



***DEVELOPER EXTENSION
DESIGN AND CONSTRUCTION
STANDARDS AND SPECIFICATIONS***

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EXECUTIVE SUMMARY

Highline Water District (District) is a municipal corporation serving potable water to customers within the cities of Burien, Des Moines, Federal Way, Normandy Park, Kent, SeaTac, Tukwila and portions of unincorporated King County and the Port of Seattle. The District, as water purveyor to the public, must ensure water infrastructure connected to its system meets or exceeds accepted industry standards required by their regulatory agencies.

The purpose of these Standards is to provide guidelines for design and construction professionals in the preparation and execution of developer extension projects. This document is comprised of six (6) chapters plus appendices. The Developer and their agents should familiarize themselves with all aspects of these Standards to create a comprehensive understanding of the District requirements. In cases of interpretation or conflict among the provisions or references, the Developer should seek clarification from the District Engineer.

These Standards are considered minimum requirements and applicable to all developer extension work under the District's jurisdiction. Privately constructed extensions are not permitted to connect to the District's system unless the Work is performed in accordance with these Standards.

The requirements in these Standards do not contemplate every design or construction scenario. Unique situations, like conflicts existing facilities or operational considerations may require deviations from these Standards. The District Engineer has authority to make and approve engineering deviations from these Standards, as necessary, based on the unique situation and their engineering judgment.

Compliance with these Standards does not relieve the Design Engineer of the responsibility to apply conservative and sound professional judgement in their Design. These are minimum standards and intended to assist, but not substitute, for competent work by design professionals. The District may, at its sole discretion, require more stringent requirements than required under these Standards due to special conditions and/or environmental constraints.

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CHAPTER 1

GENERAL REQUIREMENTS

CHAPTER 1 GENERAL REQUIREMENTS

1.01 PURPOSE

Highline Water District (District) is municipal corporation organized pursuant to Title 57 RCW with the responsibility to ensure water infrastructure connected to its system meets or exceeds accepted industry standards required by their regulatory agencies.

The purpose of these Standards is to provide the minimum requirements and guidelines for the design and construction of developer extension projects. No extension or modification to the District's water system shall be made without the District's approval of construction plans prepared in accordance with these Standards and the Highline Water District Code (HWDC).

All developer extension projects shall conform to these Standards, applicable American Water Works Association (AWWA) specifications, the WSDOT Standard Specifications, the DOH Water System Design Manual and the requirements of the Governing Agencies with authority over the Project. The District Engineer has authority to make decisions on behalf of the District in all matters related to design, location, construction and interpretation of these Standards.

The Developer and their Design Engineer, in the preparation of their Design, shall consider all information and guidelines in these Standards. This shall include review of all sections of these Standards, including noted references and the Standard Details to create a comprehensive and thorough design. Conflicts discovered between standards and references should be brought to the attention of the District Engineer for clarification.

These Standards do not include design of the District's general facilities such as wells, pump stations, transmission mains or storage tanks. General facility improvements require special design considerations and will be reviewed and approved by the District based on factors unique to each project.

Compliance with these Standards does not relieve the Design Engineer of the responsibility to apply conservative and sound professional judgement. These are considered minimum standards and are intended to assist, but not substitute, for competent work by design professionals. The District may, at its sole discretion, require more stringent requirements than required under these Standards due to unique situations, special conditions and/or environmental constraints.

These Standards do not contemplate every design or construction scenario. Unique situations, like conflicts with existing facilities or operational considerations may require the deviation from these Standards. The District Engineer has authority to make engineering deviations from these Standards, as necessary, based on the unique situation and their engineering judgment.

Revisions to these Standards will be made administratively from time-to-time. The users of this document shall be responsible to ensure they are using the latest edition of these Standards. When questions or conflicts arise, the Developer and their agents should seek guidance from the District Engineer.

1.02 DEFINITIONS

The following definitions are used in these Standards:

- a. **APPROVED MATERIALS LIST (AML)** – a listing of materials deemed approved or allowed for use in the District and not requiring submittal information unless the material deviates from its general use, intended application or when requested by the District Engineer.
- b. **BOARD OF COMMISSIONERS** – the governing Board of Highline Water District
- c. **CONTRACTOR** – the individual, firm, partnership, corporation, or joint venture employed by the Developer, licensed and bonded with the State of Washington for general contracting and/or utility construction, to do any part of the Work, whom shall be considered agents of the Developer, including the Contractor’s agents, employees, and subcontractors.
- d. **DEFECTIVE** - an adjective which, when modifying the word Work, refers to Work that is unsatisfactory, faulty, or deficient, or does not conform to the Plans, or does not meet the requirements of any inspection, reference standard, test, or approval, or has been damaged prior to final acceptance.
- e. **DESIGN** - the work product including Plans and other supporting information and documentation prepared by the Design Engineer illustrating the extension or modification of the District's water distribution system.
- f. **DEVELOPER** – the property owner, person or organization in charge of developing the Project, that has made, or intends to make, an application to the District for permission to construct a water system connection, extension, relocation or modification to the District’s water distribution system. The Developer may be an individual, group of individuals, partnership, corporation, association, municipal corporation, state agency or other person undertaking development and their successors and assigns.
- g. **DEVELOPMENT** – the subdivision, or short plat, or the construction or reconstruction of residential, commercial, industrial, public, or any other building, space or land.
- h. **DEVELOPER ENGINEER OR DESIGN ENGINEER** – the professional engineer or engineering firm licensed in the State of Washington as a registered Professional Engineer with experience in utility design who is retained by the Developer to prepare the Design, Plans and other construction documents and to perform other engineering services to support the developer extension project. The term shall also include its employees and subcontractors who shall all be considered agents of the Developer.
- i. **DEVELOPER EXTENSION** – a water main and/or other water facility to be connected to and extending or relocating the District’s water distribution system.
- j. **DEVELOPER EXTENSION AGREEMENT** – an executed agreement between the Developer and District describing the terms, considerations and responsibilities between the parties for the performance of the Developer Extension.
- k. **DISTRICT** – Highline Water District, a municipal corporation existing under and by virtue of the laws of the State of Washington.

- l. **DISTRICT APPROVAL** – unless otherwise specified, the term “District Approval” “Approval by the District”, “as determined by the District” or “District Acceptance” shall mean approval by the District Engineer or duly authorized designee acting in their capacity. Engineering decisions shall only be made by the District Engineer.
- m. **DISTRICT ENGINEER** – the District’s licensed professional engineer designated to act as an authorized engineering representative of the District. The District Engineer may be a District employee or a designated engineering firm retained by the Board of Commissioners to act as the District’s engineering representative during the course of construction to make appropriate inspection and computations. The term District Engineer and Engineering Manager shall be considered synonymous.
- n. **DISTRICT STANDARDS OR THESE STANDARDS** – Highline Water District Developer Extension Design and Construction Standards and Specifications, latest edition and/or direction from the District Engineer.
- o. **DISTRICT STANDARD DETAILS OR STANDARD DETAILS** – the District’s standard detail drawings.
- p. **GOVERNING AGENCY(IES) OR GOVERNING JURISDICTION(S)** – entities with legal authority (City, County, State or Federal agencies) over planning, regulations, development or right-of-way where the Project is located (e.g. City of SeaTac or WSDOT)
- q. **EQUIPMENT** – machinery, accessories, appurtenances and manufactured articles to be furnished and/or used to facilitate the Project.
- r. **HIGHLINE WATER DISTRICT CODE (HWDC)** – the adopted code of policies as approved by the Board of Commissioners.
- s. **INSPECTOR OR CONSTRUCTION OBSERVER**– a representative of the District Engineer authorized to perform construction observation governed by these Standards. The terms Inspector and Construction Observer shall be used interchangeably.
- t. **MATERIAL OR MATERIALS** – this shall include machinery, manufactured or fabricated articles and appurtenances, and natural substances to be furnished and installed in connection with the Project as part of the Work.
- u. **NON-RESIDENTIAL** – any building or development for the purpose of occupancy and use other than a single family or duplex residential use.
- v. **PLANS** – the plans, profiles, cross-sections and details prepared by the Design Engineer and approved for construction by the District Engineer, which show the design and details of the extension to the District’s water distribution system. The terms Plan, or Drawing(s), have the same meaning as the term Plans unless otherwise stated or specified.
- w. **PROJECT** – all work planned or approved for construction, reconstruction or relocation of water facilities and/or other structures proposed or under contract within a limited area.
- x. **REFERENCE STANDARDS AND SPECIFICATIONS** – the technical standards and specifications of other agencies or entities incorporated or referred to herein.

- y. **STRUCTURES** – foundations of any kind, buildings, sheds, vaults or fences over 6' in height and/or retaining walls and rockeries over 3' in height. Also includes obstructions such as poles, eaves, cornices, awnings or trellis.
- z. **SYSTEM** – the District's water transmission and distribution system including mains, wells, pump stations, storage tanks, telemetry and all other facilities.
- aa. **WATER SYSTEM PLAN** – the currently approved comprehensive water system plan (WSP) for the District, as required by state and county law, as amended.
- bb. **WORDS AND PHRASES** – whenever the words, "as directed", "as required", "as permitted", or words of like effect are used, it shall be understood that the direction, requirement or permission of the District Engineer is intended. The words, "sufficient", "necessary", "proper", and the like shall mean sufficient, necessary, or proper in the judgment of the District Engineer. The words "approved", "acceptable", "satisfactory", or similar words shall mean approved by, acceptable to, or to the satisfaction of the District Engineer.
- cc. **WORK** - all the labor, materials, construction, equipment, transportation, incidentals, supplies and other facilities necessary or convenient to produce the proposed extension or relocation of the water system as required by District and any and all obligations, duties, and responsibilities necessary for the successful completion of the proposed extension.
- dd. **WSDOT STANDARD SPECIFICATIONS** – Standard Specifications for Road, Bridge and Municipal Construction, latest edition, Washington State Department of Transportation and the American Public Works Association, including all amendments.
- ee. **AWWA STANDARDS**– standards published by the American Water Works Association.

1.03 ABBREVIATIONS

The following abbreviations shall have the meanings indicated herein:

AASHTO - AMERICAN ASSOCIATION OF STATE, HIGHWAY, AND TRANSPORTATION OFFICIALS
AC – ASBESTOS CEMENT
ANSI – AMERICAN NATIONAL STANDARDS INSTITUTE
APWA – AMERICAN PUBLIC WORKS ASSOCIATION
ASTM – AMERICAN SOCIETY OF TESTING AND MATERIALS
AWWA – AMERICAN WATER WORKS ASSOCIATION
DOE – WASHINGTON STATE DEPARTMENT OF ECOLOGY
DOH – WASHINGTON STATE DEPARTMENT OF HEALTH
ESA – ENDANGERED SPECIES ACT
OSHA – OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
NSF – NATIONAL SANITATION FOUNDATION
PSAPCA – PUGET SOUND AIR POLLUTION CONTROL AGENCY
RCW – REVISED CODE OF WASHINGTON
UPC – UNIFORM PLUMBING CODE
WAC – WASHINGTON ADMINISTRATIVE CODE
WISHA – WASHINGTON INDUSTRIAL SAFETY AND HEALTH ACT
WSDOT - WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

1.04 REFERENCE STANDARDS

The latest editions of the AWWA, APWA, ANSI and ASTM reference standards govern design and construction within the District, unless otherwise specified, and shall apply as if they were included within these Standards. The District shall not be responsible for furnishing these reference standards to the Developer, Design Engineer, or Contractor.

The latest editions of these additional references are also incorporated within these Standards:

- HWD Water System Plan (WSP) and Highline Water District Code (HWDC)
- Recommended Standards for Water Works, Great Lakes-Upper Mississippi River Board of State Public Health
- Cross Connection Control Manual, Accepted Procedure and Practice. Current Edition, PNWS-AWWA Cross Connection Control Committee
- King County Road Standards, King County Department of Public Works
- Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation with APWA Supplement
- Manual of Uniform Traffic Control Devices (MUTCD)
- NSF/ANSI Standard 61 and 372 for Drinking Water System Components
- Washington State Department of Health Water System Design Manual, latest edition
- Public Works Documents issued by Local Governing Authority over the Right-of-Way

1.05 SPECIFICATIONS INCORPORATED BY REFERENCE

Where any specifications are referenced or included by reference herein, the latest issue and/or amendment thereto published at the date of approval of the Plans by the District shall be incorporated into the Project as if set forth herein in full. Should a conflict exist between the approved Design and any specifications or details referenced herein, the District shall determine which shall prevail.

1.06 CHANGES AND UPDATES TO THESE STANDARDS AND SPECIFICATIONS

The District may revise these Standards in order to make corrections, clarify procedures, to conform to municipal practices and to address regulatory changes. Changes to these Standards may also be based on: operational needs, water quality, safety, reliability and resiliency, to implement newer technologies and/or construction methods, availability of materials or parts, outside third parties, or at the direction of the Board of Commissioners. The District Engineer, acting in their capacity, shall have the authority to interpret, add, modify, update and delete provisions in these Standards based on their engineering judgment or other considerations.

1.07 GOVERNMENTAL AGENCY REQUIREMENTS

All Work within Cities, County or State of Washington and their rights-of-way shall be performed in accordance with the applicable standards and requirements established by the Governing Agencies and in accordance with franchise agreements and/or permit requirements. The Developer shall investigate, ascertain and adhere to the requirements of each public authority and fulfill all permit conditions in all respects throughout the duration of the Project. The Developer shall coordinate construction activity with other interested parties and agencies.

The Developer shall enforce discipline and good order among its employees, contractors and agents and shall not employ any unfit person or anyone not skilled in the Work assigned. Employees or agents of the Developer who may impair the quality of the construction shall be removed by the Developer from the Work upon the written request of the District.

The public shall not be inconvenienced unnecessarily in its use of the public streets and facilities. Should the Developer's Contractor not respond in a timely manner, the District or District's contractor may perform the Work and bill the Developer for all costs and/or execute rights of the performance guarantee.

1.08 VARIANCES

The Developer or Developer Engineer may request variances to these Standards. Variance requests must be in writing and reference the applicable standard to be deviated, the reason and justification for the deviation, the proposed alternative and any supporting documentation for consideration. The District Engineer may request additional information from the Design Engineer to support the variance request. The District Engineer will review the request giving full and fair consideration. The District Engineer will evaluate the variance based on:

- The intent of the required Standard(s).
- Equal to or better than the requirements in these Standards.
- In the public interest.
- Based upon sound engineering judgment and practices.
- Requirements for safety, function, appearance, and maintainability are fully met.

Upon completion of the review, the District Engineer will provide a written response to the variance request or may note the approval during the plan review process. Approval of a variance does not constitute a precedent for future requests or set policy regarding these Standards.

Requests for variances should be submitted in writing as soon as possible during the plan review and permit process to allow time for consideration and a decision by the District Engineer. Variances require approval prior to construction. Variances to address noncompliance with District Standards after construction will not be considered.

1.09 APPEAL PROCEDURES

Appeals to decisions made by the District Engineer shall be presented in writing to the District's General Manager. At a minimum, the appeal shall state the requirement imposed by the District, the reason why the requirement should not be implemented, the proposed alternative and any other justification or support materials to be used for consideration. The General Manager will consider the request and either approve, deny or may present the appeal to the Board of Commissioners for their consideration. All decisions of the Board of Commissioners shall be final.

1.10 SAFETY

Throughout the duration of the Project, the Developer and Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during the performance of the Work, and for compliance with all federal, state and local safety laws and regulations. In cases of conflict between different safety regulations, the more stringent regulation shall apply. This requirement will apply continuously and will not be limited to normal working hours.

The Washington State Department of Labor and Industries shall be the paramount administrative agency responsible for the administration of the provisions of the Washington Industrial Safety and Health Act (WISHA).

The Developer and Contractor shall comply at all times with the Washington Industrial Safety and Health Act (RCW 49.17) and safety and health standards, such as Safety Standard for Construction Work (296-155 WAC), General Safety and Health Standard (296-24 WAC), General Occupational Health Standard (296-22 WAC) and any other appropriate safety and health codes. The Contractor is solely responsible for safety.

The right of the District to conduct construction review of the Contractor's performance or inspection of the Work shall not be considered a review or approval of the adequacy of the Contractor's safety measures in, on or near the construction site. The presence of a District representative onsite does not relieve the Developer and Contractor from their sole and absolute responsibility to provide a safe work environment.

The Contractor is required to provide a competent person(s) trained to identify existing or predictable hazards related to trench safety, soil conditions, and shoring requirements in accordance with WAC 296-155(N). Representatives of the District shall not perform the role of competent person for Developer projects.

1.11 ROYALTIES AND PATENTS

Developer and/or Contractor shall pay all royalties and license fees and defend all suits or claims for infringement of any patent rights and shall save the District harmless on account thereof, unless a particular process or the product of a particular manufacturer is specified by the District and the Contractor is unaware that the process or article is an infringement of a patent.

CHAPTER 2
PLAN REVIEW AND APPROVALS

CHAPTER 2 PLAN REVIEW AND APPROVALS

2.01 GENERAL

This section provides a general overview of the plan review and approval procedures associated with Developer Extensions up to and including construction. Following these Standards will help to ensure a timely review of the Design and keep review costs to a minimum. Plans not conforming to these Standards may take longer to review, require additional resubmittals, and potentially increase the overall costs to the Developer.

The District's decision to approve, reject or modify the Design and Plans shall be based on:

- Design Plans and Construction Documents conforming to the District's Water System Plan and the requirements of these Standards
- Meeting or exceeding applicable locally adopted codes and regulations
- Not adversely affecting the existing or future water system
- Additional considerations associated with:
 - Water Quality
 - Safety
 - Operations and/or Maintenance
 - Redundancy, Reliability and Resiliency

The Developer shall retain a Design Engineer to prepare a Design and Plans for the Project. The Plans shall include features such as water mains, hydrants, valves, meters, backflow prevention and other appurtenances within and/or to serve the proposed Project. The Plans require review and approval by the District prior to construction of any water extension.

The Design Engineer is responsible for any errors and omissions in the Plans. The District review or approval of Plans does not relieve any of the Design Engineer's responsibility or liability imposed upon it by law or contract and does not absolve the Design Engineer from performing their services in accordance with their professional standards-of-care.

The District may reject Plans at its sole discretion and without a detailed review if they are of poor quality, contain a significant errors or omissions, or are not in conformance with these Standards.

The District Engineer's plan review, plan approval, and construction inspection do not relieve the Developer of any responsibility to conform to the Highline Water District Code (HWDC) and these Standards.

Unless agreed otherwise, water system features such as booster pump stations, reservoirs, water treatment facilities, transmission mains or other water system features outside the boundaries of a proposed development will be designed by the District and constructed through award of a construction contract by the District Board of Commissioners in accordance with WAC and RCW requirements. All costs of design, contracting, construction, inspection and administration by the District shall be directly reimbursed by the Developer according to terms of a formal Developer Extension Agreement (DEA).

2.02 CERTIFICATE OF WATER AVAILABILITY

When requested by the Developer, the District will prepare a Certificate of Water Availability (CWA) for a fee. The CWA will describe the available fire flow and pressure information based on the District's hydraulic model and indicate the required improvements necessary to serve the proposed Project based on assumptions provided by the Developer. Generally, the District does not provide pressure and flow information without a CWA. A CWA is valid for one (1) year after signature of the District Engineer.

To avoid multiple iterations of the CWA, the Developer should first contact the local fire authority to determine the minimum fire flow and duration requirements specific for the proposed development prior to requesting a water availability. Otherwise, the District will model using the adopted fire flow as described in these Standards, which may be less than adequate to support the proposed development.

2.03 DEVELOPER EXTENSION FEES, COSTS AND DEPOSIT

The Developer shall pay all fees and costs charged by the District for the Project. The Board of Commissioners establishes the fees, charges and rates as identified in the HWDC. The District may update and amend fees and charges periodically and any such updated fees and charges shall apply to the Project.

The District shall charge Developer for all services performed on a time-and-materials basis which shall include, but not be limited to, the following:

- Contract Administration;
- Engineering;
- Inspections by District or Consultant Personnel;
- Revisions of the Plans and work occasioned by an act of the Developer relating thereto;
- Additional Inspections (City, County, State, District, Other);
- Re-inspection of deficient Work;
- Any permit or franchise acquired by District for the Developer Extension;
- Acts by the Developer that necessitate the District's Manager, staff or District consultants such as engineering and legal to spend time on the Developer Extension;
- Water sampling, testing and water loss;
- District materials used by the Developer;
- Miscellaneous expenses and/or costs incurred by the District for the Developer related to the Project;

The Developer shall submit a deposit to cover costs incurred by the District in administering the Developer Extension. The District will charge all costs against the deposit for services performed based on the actual time-and-expense. The District shall determine the initial deposit amount and the Developer shall provide the funds prior to the optional predesign meeting or first plan submittal. The Developer must provide additional funds when the deposit becomes exhausted throughout the Project. Failure to provide additional deposit when requested may result in suspension of the Developer Extension. The District will refund any excess deposit to the Developer at the end of the Project.

2.04 CONNECTION CHARGES AND STATEMENT OF CHARGES

All new or upgraded service connections to the District's system require payment of connection charges (General Facility Charges or GFC) in accordance to HWDC. All connection charges are set by policy and subject to change at any time by approval of the Board of Commissioners.

The District will prepare a Statement of Charges itemizing the estimated connection charges and other miscellaneous connection fees associated with the Project. The Developer and/or their Design Engineer must first evaluate and determine the number and size(s) of meters requested for the Project. Typically, the District does not size meters for Developer Extensions. The actual charges will be based on the current rate structure at the time the charges are paid.

The Developer may receive a credit toward GFC for existing active meters abandoned and removed from service. All services lines must be cut and removed by the Developer in accordance with these Standards and meters returned to the District. The amount of the credit will be based on the number and size of the meters removed and must serve the same parcel(s) under development. Credits may not be transferred to other parcels, third parties or credited for future projects or development. At no time will the credit be greater than the cost of the GFC for the new or upgraded service(s) associated with the Project.

2.05 AUTHORITY OF DISTRICT

The District shall have authority to approve, reject or require changes in the Design and Plans prepared by the Design Engineer. The District shall also have authority to:

- Require changes in the Design throughout the duration of the Project.
- Inspect the Work
- Stop Work to ensure compliance with the approved Plans and these Standards.
- Reject Work and Materials which do not conform to the Plans and these Standards
- To make decisions to questions or conflicts which may arise in the execution of the Work.

Although Construction Observers may advise the Contractor of any faulty or Defective Work, Materials or infringements of the terms of the Plans and Standards, failure of the District, District Engineer or Observers to do so shall not constitute acceptance or approval of said Work.

2.06 PRE-DESIGN MEETING

At the request of the Developer, an optional predesign meeting may be scheduled to discuss the Project and establish the requirements for the Developer Extension. The Design Engineer shall provide the project description, mapping and other supporting information along with any specific questions to the District prior to the meeting. The Developer or their representative should attend the pre-design meeting along with the Design Engineer. District staff will assist in water main layout and sizing, and provide available record drawings, mapping, and assist in the interpretation of these Standards.

2.07 PLAN FORMAT AND LAYOUT

This section describes the general Plan format and layout. At a minimum, the Plans shall include:

Separate Plan Set – Water Developer Extension Plans shall be produced separate from other utility plans. A typical Water Plan Set includes Title Sheet, Key Map/Legend/Notes, Plan & Profile, and Standard Details.

Drafting – Plans shall be prepared using the current adopted version of AutoCAD™. Hand drawn submittals (including corrections or alterations) and pasted pieces will not be accepted. All construction Plans for Developer Extensions shall be black/white on 22" × 34" standard drafting paper.

Drawing Quality — The Plans must be easy to read, with all lines and letters dark enough to provide good contrast with the paper. The base map showing existing features shall be screened to one-half tone.

Drafting Standards/Symbols – Drafting standards and symbols shall conform to Washington State APWA Chapter CAD Standards.

Title Sheet/Title Block – Title sheet shall include a project title, generally centered on the top of the sheet, which include the project name, section, township, range, the number of lots or units for a residential development, and the water system pressure zone(s). The title block shall include the name of the project as well as the names, addresses and phone numbers of the Developer and the Design Engineer and a revision block.

Vicinity Map – The vicinity map shall be shown on the title sheet and shall cover the project site and surrounding streets and property within a minimum of 600 feet of the project site. Adjacent developments, existing and proposed, are to be shown in sufficient detail to indicate effects on the water system layout. The project name, highway/streets, major public properties (such as schools, fire stations, etc.), and quarter section corners shall be shown in the map. The map shall be 8" W×6" H with a scale from 1" = 1,000' to 1" = 2,000'.

Key Map – If the plan set has more than two plan and profile sheets, a key map showing the entire project site at a smaller scale and the boundaries showing the areas covered by all plan and profile sheets shall be provided. The key map shall show all proposed and existing water mains (with sizes), valves, meters, air valves, blow-offs, and hydrants within a minimum of 600 feet of the project site. Call out details should not be shown on this map.

Street Names – Official Street/road names in the Project shall be used if known. Otherwise, name street/road by letters (such as Street A, Road B, Tract C, etc.) in construction plans and convert to official street/road names in record drawings.

Legend – The key map sheet shall include a legend of symbols for proposed and existing items for clarity. Legend must show symbols for other plan features such as utilities, structures, poles, etc., within the project area.

North Arrow – Include north arrows on all plan view drawings. Where possible, north arrow shall face up or to the left of each drawing. A north arrow and bar scale shall be shown at the upper left-hand corner of the drawing.

Datum – Horizontal datum shall be NAD-83-91 and vertical datum shall be NAVD 88 control and shall be indicated on the Plans. Plans shall not mix datum – all features shall be according to the same datum. Plans shall reference a local benchmark for control. Design shall reference WA State Plane Coordinate System, North Zone.

Bench Marks – Show locations and elevations of permanent and temporary bench marks on plan drawings

Stationing – Stationing on plan and profile should proceed from left to right in 50-foot increments or from bottom to top, where appropriate. Other more detailed increments due to larger projects with longer profiles may only be used with the District approval.

Right-of-Way, Easement, and Property Data – The drawings shall include all right-of-way lines, property lines, dimensions, lot numbers, parcel numbers or tax lot numbers, block numbers, plat names, and street names. If the street is private, it shall be identified as such. Show existing and proposed easements and rights of way.

Drawing Layout – Drawings shall be laid out in a logical order for reasonable understanding. Plans will not be approved if the layout is inconsistent with District requirements. Plan layout for a large project shall be discussed at a pre-design meeting with District staff. The plan view and profile for segments of water main should be shown on the same plan sheet with the plan view on top of the sheet. The profile shall be located and oriented directly below the plan view wherever possible. When the Plan for a short branch of water main (such as a water main in a tract) is shown on a sheet, the profile for the tract and water main shall be shown on the same sheet. Fire hydrant laterals and fire service lines will require a profile view on a separate sheet if Plan sheets do not adequately demonstrate adequate separation from other utilities.

Profiles shall be accurate in callouts for elevation to avoid need for system adjustments during construction. For larger Developer extensions, match lines shall be provided showing stations and sheet numbers at all appropriate locations. Other utilities and structures, existing and proposed, shall be shown to a level of detail to allow the District to identify potential conflicts or constructability issues during design.

Fire Hydrant Location Plan –Plans submitted to the District for review must have first received approval by the appropriate local Fire Authority showing fire hydrant locations.

Plan View Information – The plan view shall indicate and identify all existing and proposed buildings, structures, utilities (water, sewer, storm drain, power, phone, gas, fiber optics and cable TV), road/street right-of-way, easements, curbs, gutters, driveways, sidewalks, planters, streams, wetlands, mailboxes, structural features, topographic data, and other known physical features within the project area, which may affect the design and construction of the water mains. Show all existing and proposed water facilities including water mains, valves, hydrants, blow-offs, air/vacuum valves, meters, cross connection control assemblies, fire sprinkler vaults, fire department connections, and sections of mechanically restrained pipe and fittings, etc. Fitting callouts shall be shown on the plan view and not repeated on the profile view. If an existing pipe is greater than 12 inches in diameter, the pipe may be drawn in its actual width, depending on the scale. All callouts shall include the station and offset number.

Profile Information – Profiles shall accurately show existing and finished grades. All existing and proposed utilities shall be shown. Each utility crossing shall be accurately depicted, or a calculated clearance shall be shown. All physical characteristics of the utilities shall be shown true to scale. This shall include, but is not limited to, waterline deflection, fittings, valves, fire hydrants, blow-offs, air valves, pipe length/diameter/material, pipe slope, storm water catch basin inverts, sewer manhole inverts, etc. Separate profiles are required for hydrant runs and fire lines from the main to the vault or hydrant, including the finished grade elevations.

Pressure Zone – If the Project covers more than one pressure zone, Plans shall show all pressure zone boundaries, pressure reducing valves, normal flow directions, booster pumps, check valves and isolation valves.

Scale – Indicate scales in the drawing area and title block on each sheet, utilizing a consistent format. Bar scales shall be used in drawing areas for Plan reproduction integrity. The horizontal scale for plan and profile sheets shall be 1" = 10', 1" = 20', or 1"=30'. Smaller horizontal scales (1" = 40' or 1" = 50') may be used only with prior approval by the District Engineer. The vertical scale for profiles shall be 1" = 5' or 1" = 10', unless otherwise approved by the District. Architectural scaled drawings will not be accepted.

Details and General Notes – The Design Engineer shall provide all design details (and calculation where appropriate) for the District's review and approval for details not included in District Standards or altered to fit a specific project need. The Design Engineer shall include all applicable Standard Details on the Plan sheets. Include all unmodified General Notes.

2.08 CALLOUTS

Callouts shall include but are not limited to the following:

Street Names - Use official street/road names wherever possible.

Easement Callouts - Dimension and ownership of existing and proposed easements (e.g. 15' HWD WATER EASEMENT).

Existing Water Main Callouts - Size and material of all existing water mains (e.g. EX. 12" D.I.).

Proposed Water Main Callouts - Pipe length (from center-of-fitting to center-of-fitting), size, and material alongside of each pipe in both plan or profile (e.g. 150 L.F. 8" D.I.). The Plans shall include centerline stationing and offsets for all water mains and appurtenances.

Structure Callouts – All structures within 20-feet of the water main or District facility shall be identified. The Design Engineer shall demonstrate minimum clearances are met.

Tie-In Callouts – For connection to an existing water main, callouts shall include size and material of new and existing water mains, method of tie-in, and fittings, valves, adaptors, sleeves and all other items to be used. Indicate "COORDINATE W/HWD".

Fitting Callouts – Station, offset, size, type, and attachment of fittings such as tees, crosses, bends, restrained pipe lengths, and sleeves shall be shown in plain view (e.g. STA. 18+55.6, 3.5' RT, 12"×8" TEE (FL×RJ) W/CONCRETE BLOCK). If valves, reducers, adapters and sleeves are used at the fitting, all the items shall be listed.

Valve Callouts – Station, offset, number, size, type, and attachment, (e.g. STA. 18+55.6, 3.5' RT, 12" GATE VALVE (FL×RJ)). Existing valve callouts shall be described, and the location shown on Plans. If plan drawings are not able to provide the location on plan, then the direction and distance shall be depicted on plan view.

Hydrant Callouts – Sequential number and station of fire hydrant and all restrained fittings and parts for the fire hydrant assembly. Hydrants shall be shown on the Plans where the hydrant is to be located with respect to property lines and easements that will be provided.

Air/Vac and Blow-off Callouts – The sequential number of each item and refer to the sheet where the details are shown. If they are labeled as "AIR/VAC No. 1 AT HIGH POINT" or "BLOW-OFF NO. 5", the approximate stationing shall be shown.

Utilities Crossing Callouts – Where a water main crosses or potentially conflicts with other utilities, show location in the plan and the callout station, calculated pipe elevations, and demonstrate minimum wall to wall clearance requirement is met in the profile.

Other Utilities Callouts – Existing and proposed utilities shall be shown in plans and profiles if information is available. Callouts shall include stationing, offsets, sizes, material, and invert elevations where impact on water line design or installation may exist. Separation shall be based upon wall to wall clearance; measurement from centerlines is not acceptable.

Meter Callouts – Single family residential meters do not need callouts if standard sizes (3/4") are used. If 1" meters are requested, they are to be called out. However, the location, service line size, size and type of each meter (including domestic, irrigation and fire sprinkler meters) shall be shown for non-residential developments.

Individual PRV – If the area has a high static pressure (above 80 psi), the plans shall include the Statement that individual PRV is required.

Backflow Prevention/Premise Isolation – Size and apparatus for backflow prevention directly behind the meters shall be clearly identified as required by the District. Refer to appropriate Standard Details for callouts.

Landscape and Irrigation Plans – Landscaping plans and features shall be shown in sufficient detail to indicate irrigation system configuration and plumbing arrangements. Plans must show existing and proposed District water system features, including easements. Irrigation systems shall be modified where a conflict is presented between existing or proposed District facilities.

Abandoned Facilities – Plans shall clearly identify existing system components that will be abandoned and/or removed. Abandoned meters, hydrants, blow-off assemblies, air-vacs and other above ground features shall be called out.

Scope of Project Block – Insert the District's standard Scope of Project block on the cover page or first page of the water plan sheets. The Design Engineer shall fill out the applicable sections of the table.

HWD Approval Block – Provide the District's standard approval block on the upper right corner of each Plan sheet. The District's approval will expire 18 months from the date of signature by the District Engineer.

2.09 ENGINEER STAMP

Plans shall be prepared by the Design Engineer with current registration as a professional engineer in the State of Washington with competency in water utility design. All Plan sheets submitted to the District for approval shall be stamped and dated by the Design Engineer. The Design Engineer shall indicate "SUBMITTED TO HWD FOR REVIEW, NOT FOR CONSTRUCTION" clearly at the lower right corner on each preliminary Plan sheet when reviewed by the District.

The final Plan set submitted for approval shall be wet stamped, signed in ink and dated by the Design Engineer or may be electronically stamped and signed. Each Plan sheets shall contain a District signature block labeled "Approved for Construction" to accommodate signature by the District Engineer.

2.10 GENERAL NOTES

General Notes shall be incorporated on the key map sheet as provided in the Standard Details. All notes on the list may not pertain to each Project. The Design Engineer shall include all General Notes on the Plan regardless of their applicability. If additional notes are needed, they shall be added under the title of "SPECIAL NOTES" next to the General Notes.

2.11 PLAN SUBMISSIONS

The first plan submittal to the District for review shall include two (2) copies of Plans; one (1) copy of the Fire Hydrant Location Plan stamped as approved by the Fire Marshal with jurisdiction over the Project; one (1) copy of civil Plans with final grading, sewer and storm information, one (1) copy of landscaping Plans (if applicable) and any design calculations or reports. The District may accept electronic PDF versions of drawings for review with prior approval.

Subsequent submissions shall include two (2) sets of revised Plans and the original submittal comment set. The District reserves the right to require additional information and/or reports as necessary prior to final approval.

Fire Hydrant Location Plan and Fire Marshal Approval - The Design Engineer shall be responsible for obtaining approval of the hydrant locations by the local Fire Authority prior to submitting Plans to the District for the first review. The Design Engineer shall submit one (1) copy of a Fire Hydrant Location Plan stamped approved by the Fire Marshal of local jurisdiction. The District reserves the right to require additional fire protection measures or modify sizes as deemed necessary.

Easements - If any off-site easement(s) is required on a property not owned by the Developer, District or public right-of-way, the Developer must acquire the easement(s) at their expense before Plan approval by the District. All offsite easements shall be executed on the District's Standard Form in accordance with these Standards. The Developer shall provide the executed easement to the District for recording along with a title report for the property no older than thirty (30) days. All water facilities including, but not limited to, water mains, hydrants, meter boxes and backflow prevention devices require easements. Refer to other sections of these Standards for additional easement requirements.

Geotechnical Reports - The District may require a geotechnical investigation on the project site to support for trench design assumptions.

For final submission of approved Plans for District Engineer's signature, include five (5) full-sized, unstapled sets and one (1) mylar set of Plans all signed and wet-stamped (blue ink preferred) by the Design Engineer. Remove all "NOT FOR CONSTRUCTION" notes. Include a signature block for the District Engineer's approval for construction. Do not submit final plans until authorized by the District.

2.12 DEVELOPER EXTENSION AGREEMENT

Upon completion of the Plan Review process, the Developer shall execute a Developer Extension Agreement (DEA) with the District on the District's standard form. The Developer must be the same legal entity as the property owner and party desiring to develop said property. The Developer will provide to the District two original copies of the DEA wet signed by an authorized agent. The District will return one, fully executed original DEA to the Developer. The same legal entity must complete all obligations of the DEA throughout the duration of the Project.

2.13 LATECOMERS AGREEMENTS

Developers may be eligible for latecomers based on improvements constructed to serve the Project. In general, the District is a non-expanding purveyor and most growth is reconstruction or infill projects within previous development that is already served. Most projects are not eligible for latecomers. The Developer should inquire with the District whether the Project is eligible for Latecomers prior to the execution of the DEA.

2.14 PERMITTING

The District is responsible to road agencies for water work within right-of-way. The District will apply for all public right-of-way (ROW) permits for Developer Extensions. The Design Engineer shall prepare and provide a Traffic Control Plan to the District with enough plan sets for all ROW permit applications. The Developer shall apply for and obtain all other permits. The District will submit the ROW permit application after execution of the Developer Extension Agreement. All permits shall be obtained prior to scheduling the preconstruction conference.

2.15 BONDING AND INSURANCE

The Developer shall furnish to the District, prior to the preconstruction conference, a performance guarantee of a type and in a form, as determined by the District in its sole discretion, in an amount equal to one-hundred percent (100%) of the engineer's estimated extension construction cost or Five Thousand Dollars (\$5,000), whichever is greater. The Design Engineer shall prepare an estimate of Project costs for review and approval by the District Engineer or may request a standardize bond amount per linear foot of pipe from the District. If the performance guarantee is a surety performance bond, the bond shall be issued by a surety acceptable to the District. The cost of the performance guarantee shall be the responsibility of the Developer. It is recommended the Developer confirm the required bond amount with the District prior to securing the bond to prevent the need for subsequent changes after issuance.

The Developer may provide a cash performance bond in lieu of a performance bond issued by a surety. If elected, the Developer will execute the Cash Performance and Pledge of Monies Agreement on the District's standard form.

The Developer shall require their Contractor to furnish and maintain throughout the course of the Project, liability insurance as described in the Developer Extension Agreement. Insurance certificates must include all endorsements. The Contractor shall have the District specifically added as an additional named insured in all said policies, all at no cost to the District. The Contractor's insurance shall be designated primary coverage for both indemnity and defense.

2.16 PRECONSTRUCTION CONFERENCE

The District will hold a preconstruction conference prior to authorization to proceed with construction. The Developer, Contractor and other interested parties must attend as no construction will be authorized until the preconstruction conference is complete.

Prior to scheduling the preconstruction meeting, the Developer shall provide copies of the construction Plans, Certificate of Insurance with all endorsements, performance guarantee, all Material submittals (see Chapter 4), and any offsite easements documents for review and approval by the District. The District will not hold the preconstruction meeting until all documents are approved and all required permits from Governing Agencies are obtained.

The purpose of the preconstruction meeting will be:

- A.** To review and coordinate the initial progress schedule.
- B.** To establish a working understanding among the various parties associated or affected by the Work.
- C.** To establish and review procedures for notifications, inspections, approvals, submittals, shut-offs, as-builts, etc.
- D.** To establish normal working hours for the Work.

The person who will be responsible for completion of the Work shall be present during the entire preconstruction meeting. If applicable, the Developer shall bring a representative from each subcontractor that will be performing Work on the Project to the preconstruction meeting. The meeting shall be at least two (2) weeks but no more than four (4) weeks in advance of the start of the water work. If more than four (4) weeks pass before construction begins, a subsequent preconstruction meeting may be required. If the Developer changes Contractors / subcontractors after the preconstruction meeting, the District will determine if an additional preconstruction meeting is warranted.

2.17 CONSTRUCTION OBSERVATION

The District Engineer or their designee will have authority to enforce these Standards and will appoint project engineers, assistants and inspectors as necessary to inspect the Work for compliance. All Work shall be subject to inspection by the District. The District, its employees, representatives and agents shall have access to the Work at all times, and the Contractor shall provide proper facilities for such access and inspection.

The presence or absence of a District representative on any job will be at the sole discretion of the District Engineer, and neither presence nor absence of a District inspector will relieve the Developer of responsibility to obtain the construction results specified in these Standards. Any revision to the approved Plans shall be submitted to the District Engineer for approval, prior to the change.

The Contractor shall give the District timely notice that Work, or any part thereof, which has been constructed is ready for inspection. In no event shall the work, or any portion thereof, be covered up or placed into operation until the District Inspector has directed otherwise. If any Work has been covered up without prior inspection or authorization by the District Inspector, it must be dug up for inspection at the Developer's expense.

2.18 PLAN MODIFICATION APPROVALS

Any changes to the scope of the work outlined in approved Plans shall be documented and accompanied by two (2) sets of Plan change drawings which clearly identify by clouding to illustrate the proposed change. The District Engineer must review and approve all changes before commencing any revisions to the Work. Facilities not identified on approved Plans will not be accepted by the District without prior approval. During construction, changes deemed minor by the District Engineer, shall be noted, and accounted for in the record drawings.

2.19 PLAN EXPIRATION

District's approval of Plans shall be valid for a period of eighteen (18) months subsequent to date of approval shown on the Plans. If construction is not completed within that time, the District may require plan revisions depending on changes occurring since the approval date or may exercise its rights under the performance guarantee. The Developer shall pay all costs resulting from plan change requirements.

CHAPTER 3
DESIGN STANDARDS

CHAPTER 3 DESIGN STANDARDS

3.01 HYDRAULIC REQUIREMENTS

All water mains, including those not designed to provide fire protection, shall be sized based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under maximum day demand (MDD) plus fire flow conditions and 40 psi under peak hour demand (PHD). Fire flow demand will be established by the local fire authority. Piping network shall be designed not to exceed a sustained flow of 8 feet per second under peak hour demand and 10 feet per second during the maximum day demand plus fire flow, as determined by the District hydraulic model. Per the International Plumbing Code, an individual PRV is required on private service lines where the static pressure at the ground level exceeds 80 psi.

3.02 PLANNING CRITERIA

Planning criteria for developer extensions are established in the currently adopted District Water System Plan (WSP). Criteria presented in the plan include average daily usage by customer class and peaking factors. Minimum requirement for developer extensions are determined by hydraulic modeling and are made conditions of the Water Availability Certificate. Minimum fire flow requirements for buildings are established by the local fire marshal for the jurisdiction serving the Project. Necessary improvements to reliably provide fire flow are subject to District approval.

The District's minimum fire flow demand during maximum day demand is:

- 1,000 gallons per minute (gpm) for single family residential,
- 1,500 gpm for multifamily residential,
- 2,500 gpm for commercial,
- 3,500 gpm for industrial development within UGAs (Urban Growth Areas)

NOTE: The Fire Authority having jurisdiction over the Project location may require a fire flow greater than these Standards.

Existing water system infrastructure impacted by finish grade modifications shall be brought to current standards as part of project construction. Failure of the Design Engineer to identify such impacts or for District plan review to identify such impacts does not relieve the Contractor or Developer of the requirement to bring the system to current standards.

3.03 WATER MAIN LAYOUT

Water mains shall be extended to the far end of property whenever practical, as determined by the District. More than one extension may be necessary. In addition, the water mains must be installed through all internal streets; loop to all adjacent mains which will, in the District's opinion, extend past or through the property in the future; and stub to the property line where it is likely that they will be needed to connect to future mains or connect to mains to eliminate existing dead ends. Depending on the property size, shape and the Water System Plan, the District may require mains to be constructed on more than one, and up to all, full sides of the property.

Developer extensions shall be designed as a looped network to provide increased reliability of service, improved water quality and reduced pressure losses under high demand conditions, such as fire flow. Dead end mains are permitted only under limited circumstances and only by approval of the District. Dead end mains, when allowed, shall be fully mechanically restrained.

3.04 WATER MAIN LOCATION

Where practical, water mains shall be within the right-of-way of public streets and roads. Water mains should be approximately 15 feet off the property lines and approximately midway between centerline and curb or in locations as directed by the local governing agency with authority over the right-of-way. The Design Engineer shall consider a location to prevent valve boxes being placed within bike lanes or wheel paths. Water mains in the roadway or parking lots shall be a minimum 6 feet from curbs or edges of parking lanes. Exceptions to this requirement may be made in order to minimize the cutting and replacing of pavement, to avoid conflicts with other underground facilities, to permit sanitary sewers to be installed on the "low side" of streets, or for other reasons approved by the District. Mains shall be installed on a street with the distance from the property line and/or centerline varied as little as practical. Water mains shall not be designed to be located under or behind parking lanes, curbs, gutters, or sidewalks.

In an easement crossing paved areas on private property, water mains shall be installed in driving lanes (not under parking stalls). Easements shall be minimum 15 feet wide and provided on the District's standard form. It is recommended easements be shown on the recorded plat map; however, the District will record easements separately.

Water mains 12-inch diameter or less may be laid along road/street curves using pipe joint deflection. The maximum allowable deflection at each joint shall not exceed one-half the manufacturer's recommended permissible deflection. Use of short pipe segments to achieve a greater rate of deflection is prohibited. Angle fittings may be required to maintain proper water main alignment.

3.05 HORIZONTAL AND VERTICAL SEPARATION

The Design Engineer shall adhere to the Washington State Department of Health and Department of Ecology regulations and guidelines at all times for separation of water main and sanitary sewer. Variances shall be at the discretion of the District Engineer and shall not exceed formal criteria established by the Department of Ecology Manual entitled *Criteria for Sewage Works Design* and the Washington State Department of Health *Water System Design Manual*.

Water mains shall be separated at least 10 feet horizontally (outside wall to outside wall) from any existing or proposed sanitary sewer, septic tank and/or absorption field. Water service connections and side sewers shall have minimum horizontal separation of 10 feet. The distance shall be measured at the least point of separation. In cases where it is not practical to maintain a 10-foot separation, the District may allow deviation on a case-by-case basis using DOE criteria.

The horizontal separation between water mains and other utility features such as storm drains, gas, power, other water mains, telephone, utility poles, fiber optics, cable TV, and utility vaults, shall be a minimum of 5 feet when situated in public right-of-way. Separation from structures shall be 10 feet within easement areas or tracts unless a variance is approved by the District.

Water mains shall cross other utilities at right angles. If this is not possible, the crossing angle shall be maintained between 45 and 90 degrees. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outer wall of the water main and the outer wall of the sewer. Wherever practical, the water main shall be above the sewer main. Where a water main crosses over a sanitary sewer, one full length of water pipe shall be used with the pipe centered over the sewer for maximum joint separation. When the above conditions cannot be met, the District may approve a variance in accordance with DOE criteria. However, where water main crosses below a sanitary sewer, the District will require additional measures to protect the water main such as concrete encasement "blanket" or structural casing pipe. Encasements and casings shall extend 10 feet past each side of the crossing.

The vertical clearances between water mains and other utilities such as storm, gas, power, telephone, fiber optics, and cable TV shall be at least 12 inches. Contractor shall call for inspections to verify separations for utility crossings installed prior to completion of the water main.

3.06 SETBACK DISTANCE FROM BUILDINGS AND STRUCTURES

Water mains shall be located a minimum of 10 feet from covered parking, walkways or retaining walls and 15 feet minimum from buildings. Mains shall not be allowed below a 1V:1H plane from the toe or bottom of a wall, rockery or structure. A minimum 20-foot wide easement shall be provided for a water main between buildings with the main centered in the easement. All pipe between buildings shall be fully mechanically restrained. When passing under retaining walls or rockery, or when the minimum separation cannot be provided, water mains shall be placed in a steel casing in accordance with these Standards. Water main shall not be placed under buildings.

The Design Engineer shall incorporate measures to allow for future access and excavation for the water main in their design of walls, rockeries and other structures.

3.07 WATER MAIN SIZING

Water mains shall be sized to accommodate peak water demand and fire flow requirements. Mains in residential areas shall be 8-inch or larger pipe diameter. The District uses 6-inch pipe only as fire hydrant runs (not longer than 50 feet). With District approval, 4-inch pipe may be used to serve water to tracts serving 4-8 single family parcels or the end of a cul-de-sac beyond the last fire hydrant when no future extension is anticipated. The length of the 4-inch water main shall not exceed 200 feet. The District does not use 10-inch or 14-inch pipe as water distribution main.

Pipeline design for water main extensions 16-inch diameter or greater is a specialty design not fully included in these Standards. Design Engineers shall provide assumptions and calculations for specialty designs for review and approval by the District Engineer.

3.08 PIPE MATERIAL

Water mains shall be cement-mortar lined ductile iron Class 52 conforming to AWWA C-151 unless otherwise allowed by the District. Flanged DI spools shall be Class 53. Other pipe material shall be on case-by-case basis only with engineering justification and subject to approval by the District Engineer.

3.09 PIPE FITTINGS

Pipe fittings shall be furnished with flanged or mechanical joints (MJ). Megalugs or equivalent mechanical joint restraints (RJ) shall be used on all MJ fittings. The Design Engineer shall reflect this requirement on the Plans by calling out MJ as RJ. Vertical bends shall be used when vertical alignment cannot be achieved using joint deflections of maximum one-half the manufacturer's recommended permissible deflection. All reducers shall be concentric.

3.10 STEEL CASING

Ductile iron pipe shall be encased in a steel casing when crossing under a rockery, wall, or other feature where reasonable access for future maintenance of the water main is restricted without disturbing the structure. Casings shall extend a minimum of 5 feet past each edge of the structure, or a distance equal to the depth of pipe plus 5 feet, whichever is greater. Other casing materials may be approved through a variance request as described in these Standards.

Ductile iron pipe shall be restrained and encased in a steel casing when crossing under a railroad or state highway. Casings shall extend beyond the edges of the right-of-way. The casing pipe and carrier pipe shall be installed in accordance with the applicable federal, state and local regulations. In the case of railroad crossings, the casing and pipe shall also comply with requirements established by the railroad company. Active or passive cathodic protection may be required.

Minimum vertical clearance between the bottom of the wall or footing and top of the pipe or casing shall be 2 feet and the structure may require special design to accommodate future access and excavation of the casing without impact to the structure. A minimum of 30 feet shall be provided at the end of the casing to allow for future removal of the pipe. The pipe trench at the casing shall be backfilled with select trench backfill material.

The carrier pipe shall be installed with casing spacers and be fully mechanically restrained. Carrier pipe should be sized to minimize the number of joints within the casing. For all installations, casing spacers shall ensure approximate centering within the casing pipe and to prevent damage during installation. At a minimum, 1-inch clearance between the carrier pipe bell and casing pipe shall be maintained. Voids between all steel casings and native soil shall be pressure grouted through plug holes. Each end of the casing shall be sealed to prevent infiltration. See Standard Details for additional information.

3.11 DEPTH OF COVER

Cover over the top of water mains shall be a minimum of 42 inches (3.5 feet) from final grade. In no case shall main depth to the top of the pipe exceed 60 inches (5 feet) without specific approval of the District Engineer. The Design Engineer shall consider existing and proposed utilities when selecting pipe depth to minimize vertical bends. Cover for 8-inch or smaller diameter pipe may be reduced to 36 inches to avoid existing utilities, with prior approval by the District Engineer.

3.12 SLOPES

Where slopes are 20% or greater, pipe joints and fittings shall be fully mechanically restrained. Anchor blocks shall be used in conjunction with joint restraints where slopes are 20% or greater. Trench dams may be required to prevent groundwater from running along trench line. The Design Engineer shall design anchors and trench dams for the District's review.

3.13 CORROSION PROTECTION

Ductile iron pipe and fittings shall be protected from corrosion in areas of high susceptibility. Corrosion protection may include 8-mil polyethylene encasement in accordance with AWWA/ANSI C105/A21.5 or other passive/active corrosion control devices. Polyethylene encasement shall be required for fittings to protect from contact with concrete used for thrust blocking, in locations with corrosive soils or in places where soil amendments (e.g. cement modified soils) are proposed.

Active or passive corrosion protection may also be required by the District in other areas where the potential of corrosion and/or stray current exists (e.g. power lines, utility crossings or light rail applications). In these scenarios, the Design Engineer shall evaluate and design corrosion protection system as appropriate to the satisfaction of the District. The District reserves the right to retain a corrosion consultant to review the Design at the expense of the Developer.

3.14 THRUST RESTRAINT

Provide horizontal and vertical concrete blocking with locations and types of blocking shown on plan and profile. Concrete blocking is required on all fittings, including all mechanically restrained pipe and fittings unless specifically waived by the District Engineer. See Standard Details for concrete blocking.

Special designed blocking and/or restrained pipe shall be provided for conditions or locations where requested by the District Engineer. Conditions where installation is within or adjacent to fill or disturbed material, close proximity to other existing or proposed utilities or utility trenches, connections to existing mains, inside pipe casings, critical or sensitive areas, easements with limited access or dead-end conditions are typical circumstances requiring special blocking design.

The Design Engineer shall prepare a design for all restraint devices, special designed blocking, any mechanical devices and show the restraint limit on the plans and profiles. When requested, the Design Engineer shall submit supporting documentation including calculations and assumptions such as geotechnical reports and soil classification data and tabulated restrained joint documentation to the District for review. The Design Engineer shall also consider constructability in their assessment for mechanical restraint devices, including but not limited to extending the restraint system to the nearest fitting or valve.

3.15 ASBESTOS CONCRETE PIPE CROSSING

When a proposed water main or other utility crosses below existing asbestos concrete (AC) pipe, the District may require removal and replacement of the AC pipe with ductile iron pipe. The AC pipe to be removed shall be lawfully disposed in accordance with all local and state regulations. The main shall be replaced a minimum horizontal distance of the depth of the disturbed excavation plus five (5) feet each side of the trench excavation. The trench must be backfilled with crushed surfacing compacted to 95% max compaction by modified proctor or with controlled density fill (CDF) to 12 inches below the bottom of water main. Water mains shall not be embedded in CDF but shall be bedded in crushed surfacing per these Standards. Refer to Standard Details for additional requirements.

3.16 VALVES

Valves shall be provided on water mains to minimize service interruptions and sanitary hazards during repairs, construction, and maintenance. Line valves shall be located at no more than 500-foot intervals in non-residential, industrial, and multi-family areas and at no more than one block or 800-foot intervals in other areas. At water main intersections, valves shall be placed on all legs at each cross or tee (unless wet tapping an existing water main). The valves shall be spaced so that no more than two fire hydrants are removed from service with any separate main shut-down. The final determination of valve spacings and locations shall be approved by the District.

An auxiliary valve shall be installed on each hydrant run at the tee. Additional valves may be required for area isolation, uni-directional flushing and other operational considerations.

Valves on water mains shall, where practical, be located within or immediately adjacent to the edge of the street outside of sidewalks, H/C ramps, curb and gutters, wheel paths for vehicles or bicycle lanes. A valve box shall be provided for every valve, including by-pass valves.

All valves 12-inch and smaller shall be vertically installed, resilient seat gate-type valves and all valves larger than 12-inch shall be horizontally installed, resilient seat gate-type valves. Butterfly type valves may be used on 16" or larger mains upon approval by the District. If a valve is installed in gravel or unpaved area, a 2'x2'x2" asphalt pad, or 2'x2'x4" concrete pad shall be provided.

3.17 FIRE HYDRANTS

Fire hydrants shall be shown on Plans to illustrate their location with respect to property lines and where easements will be needed or provided. Building footprint or pad areas shall also be shown relative to the water system features. The number of hydrants and their locations shall be approved by the local fire authority. Bollards shall be placed only where directed by the District.

The maximum spacing of fire hydrants serving single-family or duplex dwellings on individual lots shall be 600 feet on center. The fire agency with authority over the Project may modify or increase this requirement. Hydrants should be placed at the "throat" of cul-de-sacs and not at the end. The Design Engineer shall also consider placing hydrants at low points in mains in lieu of a blowoff assembly for operations and maintenance.

Hydrants serving multi-family and non-residential lots shall be located not more than 300 feet on center. Hydrants shall not be closer than 50 feet from multi-family or non-residential buildings.

Hydrants should be located on the short side of the road or street as close to the water main as possible. Any hydrant run exceeding 50 feet in length shall be 8 inches in diameter. The joints of hydrant runs shall be fully mechanically restrained. No more than one hydrant shall be installed on any permanent dead-end 8-inch water main. No domestic, irrigation or fire sprinkler water service will be permitted on any hydrant branch. Fire hydrants shall be installed at the ends of each dead-end line more than 300 feet in length. The District and local fire authority reserve the right to require additional hydrants for operations and maintenance of the water system.

Fire hydrants shall be located near the beginning of curb return or at lot lines. No fire hydrant shall be placed within 3 feet of a driveway. A hydrant shall be installed within 50 feet of a Fire Department Connection (FDC). FDC may be placed on buildings instead of at the fire control vault, only as approved by local Fire Marshal.

Hydrants shall be designed for standard bury depths; extension kits shall not be permitted to adjust new hydrant installations to finished grade. Bends are not permitted on fire hydrant runs. Existing hydrants used to achieve fire flow or spacing requirements after development of the Project shall be upgraded to meet current Standards by the Developer.

3.18 COMBINATION AIR VACUUM VALVE ASSEMBLIES

Combination air vacuum valve assemblies (air vac) shall be installed on high points of new water mains which are 8-inch diameter or larger, where the elevation difference between the high point and the next low point exceeds one (1) pipe diameter, or as required by the District. The typical valve size shall be 2 inches. However, larger air vacs may be required based on site-specific slope and higher flow rate scenarios. When requested, the Design Engineer shall prepare supporting calculations per AWWA Manual M51 to verify proper valve sizing.

The Design Engineer shall consider the location and constructability of air vacs in their Design. The air vacs shall be located outside the traveled portion of the roadway, preferably behind the curb or sidewalk and within the public right-of-way or easement. The depth of the water main near the air vac shall be deep enough to achieve at least the minimum upslope (2%) to the release valve. Where practical, water main profile shall be adjusted to eliminate the use of air vacs. The Design Engineer shall also consider locating air vacs where their discharge will not cause property damage or must incorporate mitigation measures to allow safe conveyance.

3.19 BLOW-OFF ASSEMBLIES

Each dead-end main shall be provided with a fire hydrant or blow-off assembly for flushing purposes. Flushing devices shall be sized to provide a velocity of at least 4 feet per second in the water main being flushed. No flushing device shall be directly connected to any sewer or storm facility. Blow-off assemblies shall be located outside the traveled portion of the roadway, behind the curb or sidewalk, and within the right-of-way or water line easement. The Design Engineer shall consider locating blow offs near storm drain facilities with sufficient capacity to discharge potable water. Avoid multiple blow-offs through strategic hydrant placement.

3.20 CONNECTIONS TO EXISTING SYSTEM

Connections to existing mains shall be via a wet tap unless a cut-in is required by the District in order to install line valves at the tee or when connecting to asbestos cement pipe. The overall design shall consider the number and sequencing of connections to the existing system to minimize the number of water main shutdowns.

3.21 JOINING DISSIMILAR METALS

Connections between dissimilar metals (i.e. brass to iron) shall utilize dielectric unions or insulating gaskets to eliminate electrical connectivity between the fittings.

3.22 EASEMENTS

All water appurtenances not in public right-of-way shall have easements designated on the Plans to provide the District with permanent access to these mains and appurtenances, and future line connections. The easement for the water mains shall be 15 feet in width with the main located within the center 5 feet of the easement and a minimum of 5 feet on each side of appurtenances

(such as hydrants, meters, air/vac, blow-offs, etc). If the water main location is within 10' of the edge of a property, the easement shall extend to the property line.

Provide easement boundaries on Plans and identify their widths. If an easement is defined as a constant width on each side of the water main, then show an easement call-out and label it as typical (TYP.). An easement shall not be split to occur on two lots unless approved by the District.

The District may require a title report for any property not owned by the Developer or to validate ownership of the developed property. The easement, title report and legal descriptions with accompanying figures shall be prepared by a licensed land surveyor.

3.23 SERVICE CONNECTIONS

Service connections including saddle, service line, meter box and appurtenances shall be installed as part of the construction of all new water developer extensions. All services shall have a designated parcel and property owner. Except for single family residential properties (SFR), each building requires a separate domestic use meter.

For residential developments, meter boxes shall be located in front of the lot to be served unless otherwise approved by the District. They shall be close to the property line, within public right-of-way or water easement, and not in paved areas such as sidewalk or driveway. Meters for two neighboring lots shall be installed near the common lot line to ease meter reading. Meters located close to driveways shall use boxes with traffic rating. The distance from the water main to the meter box shall not exceed 60 feet for 1-inch or smaller meters and 40 feet for 1-1/2 and 2-inch meters. Service lines shall be perpendicular to the water main.

The standard meter size is 3/4-inch for a single-family residential properties. The minimum meter size for SFR with fire sprinklers shall be 1-inch. Non-Residential meter sizes shall be determined by the Design Engineer, with the Plans indicating the locations and sizes for each.

Minimum allowable service lines from mains to meters shall be 1-inch in diameter. Non-residential irrigation and fire sprinklers shall be served by separate services and meters unless otherwise approved by the District. A minimum pressure of 20 psi at the meter shall be maintained in the main during fire flow plus maximum day flow demand. If friction losses will cause the pressure at the building to drop below the minimum, the service line size shall be increased, or private booster pump installed.

3.24 EXISTING WATER MAIN ABANDONMENT

The Design Engineer shall show on the Plans all existing water mains removed from service as a result of the Project. All decommissioned water infrastructure shall be abandoned or removed as required by the District and/or the local Governing Authority. Many cities require the complete removal of all decommissioned infrastructure per city code. In these situations, the District will enforce city policy and will not apply for a variance on behalf of a Developer to deviate from the requirement.

Water mains to be removed shall be loaded, hauled and lawfully disposed in accordance with applicable all state and local requirements, including handling of asbestos cement pipe. The Developer shall submit to the District documentation of lawful disposal.

Water mains which are authorized to be abandoned in place shall be filled, entirely, with controlled density fill (CDF) and capped with an acceptable capping device. Care shall be used in placing the CDF or concrete to see that the opening of the pipe is filled and thoroughly plugged. All hydrants, valve boxes and marker posts shall be removed, salvaged or disposed at the direction of the District.

All existing water services not reused as part of the Project shall be cut and capped at the water main and removed from the right-of-way or easement. The Design Engineer shall callout all services to remain or to be removed as part of their Design. Existing services to be reused but not up to current District standards shall be replaced in its entirety from the water main to meter. The District will not consider allowing existing services to remain if unused to avoid abandonment or street cuts in the right-of-way.

3.25 PRESSURE REDUCING STATIONS

If a Development is in two or more pressure zones, the District may require pressure reducing stations be designed and installed by a Developer. The District will provide project specific design requirements for pressure reducing stations if they are required.

3.26 BACKFLOW PREVENTION AND CROSS CONNECTION CONTROL

Irrigation systems, fire sprinkler systems, non-residential service connections, private wells and other water uses which create a potential or will cause contamination of the District's water system by backflow or back siphon, shall be required to install approved backflow prevention assemblies, and/or otherwise meet the requirements of the WAC 246-290-490 "Cross Connection Control Regulation in Washington State", and the recommendations of the PNWS-AWWA Cross Connection Control Manual, latest edition. Premise isolation is required unless a variance is approved by the District.

The District strictly prohibits interconnection of other water supplies with the District's water system. Auxiliary water supply on or available to a consumer's premises is not acceptable to the District without full premise isolation in the form of a reduced pressure backflow assembly (RPBA) on any and all services from the District's main, even if such auxiliary water supply is not interconnected or proposed for interconnection. RPBA units require annual testing for proper operation and reporting to the District (WAC 246-290-490(2) (a)).

Fire sprinkler system connections to the District's water system shall be owned, maintained and repaired by the property owner, beginning immediately on the exterior inlet vault face, residential meter or valve where the fire sprinkler system connects to the District's water main. The backflow prevention assembly on irrigation and residential fire sprinkler system connections shall be located immediately downstream of the meter connection on the owner's property. The assembly shall be tested annually by a certified backflow assembly tester (BAT) for backflow devices. The assembly design and construction shall be approved by the Cross-Connection Control Coordinator and/or District Engineer. Prior to use of a new meter, the backflow assembly shall be tested, and results provided to the District.

Developer shall comply with all government and District rules and regulations prohibiting cross-connections. Developer shall install and maintain backflow prevention devices as required by the District to isolate the water from other systems. Assemblies shall be purchased and installed as a unit from the manufacturer; no modifications to any part of the assembly is allowed.

In addition, an inspection or test report from a State-approved inspector shall be required as a condition of receiving final acceptance of the extension improvements and utility service from the District for water systems.

For each commercial water service connection, the Developer shall install and furnish an approved Reduced Pressure Backflow Assembly (RPBA), Reduced Pressure Detector Assembly (RPDA), Double Check Valve Assembly (DCVA), or Double Detector Check Valve Assembly (DDCVA) for Mandatory Premise Isolation Requirements, as applicable.

Meters serving multiple occupancies require a Double Check Valve Assemblies (DCVA), or Reduced Pressure Backflow Assemblies (RPBA) depending upon hazard level, as determined by the Cross Connection Control Coordinator and/or District Engineer. A bypass with equal backflow prevention shall be provided to avoid loss of service during maintenance and repair. All backflow assemblies must be tested prior to project acceptance and introduction of service to the facility.

Backflow assemblies for fire systems 3 inch and larger shall be in a vault unless a feasible location for its placement cannot be accommodated due to access or other conflicts. Only under these circumstances will the assembly be allowed within a building or structure. No connections or between the meter and backflow assembly will be allowed without additional backflow considerations incorporated based on the degree of hazard.

For each metered connection for separate irrigation, the Developer shall install and furnish at minimum an approved Double Check Valve Assembly (DCVA).

RPBA shall be installed above grade and located in areas that is not subject to flooding. Considerations shall also be incorporated to prevent freezing and tampering. Provide adequate drainage to allow for water to drain away from the assembly.

Refer to the current Highline Water District Cross Connection Control Requirements for additional considerations and requirements.

3.27 TRENCH DETAIL AND RESTORATION

The Design Engineer shall include in the Plans details for the trench and any restoration associated with the water Work if a required modification is necessary from the District's Standard Detail. The trench detail shall include callout for all dimensions for trench excavation, backfill and material requirements, compaction, and surface restoration including thickness and type. Trench details shall comply with the local governing jurisdictions trenching requirements and the District's Standard Details.

Any material or restoration specifications should be called out on the Plans. Provide sufficient detail and information to aid the Contractor in construction.

CHAPTER 4
MATERIAL STANDARDS

CHAPTER 4 MATERIAL STANDARDS

4.01 GENERAL

All pipe, fittings and water materials in contact with potable water shall be manufactured in the United States of America. The same manufacturer of each item shall be used throughout the Project. All Materials specifically referenced shall comply with applicable sections of ANSI, ASTM, AWWA or the WSDOT/APWA Standard Specifications and approved by the District. The Developer should refer to the Standard Details for additional material requirements.

All water materials shall be new, undamaged and in compliance with the Safe Drinking Water Act (SDWA). Materials in contact with potable water shall be NSF/ANSI 61 and 372 certified. All products shall have a maximum weighted average lead content requirement of 0.25 percent to be consistent with state and federal laws meeting the "No Lead" requirements and the SDWA.

The District has prepared an Approved Materials List (AML) identifying approved materials for general use in the District. The Design Engineer shall ensure the listed materials in the AML meet the requirements of their design application. When specific manufacturers or models are listed in these Standards or the AML, no substitutions will be allowed without prior approval by the District Engineer. If requested by the District, the Contractor shall furnish certification from the manufacturer of the materials being supplied that all the specified tests have been made and the results thereof comply with the requirements of the reference Standards. The District Engineer shall be the sole judge if a material qualifies as "or equal".

4.02 MATERIAL SUBMITTALS

The Contractor shall provide material submittals to the District for approval after the Plans are approved and prior to the preconstruction conference. Use of materials in the AML does not require submittal of cut-sheets.; however, the Contractor shall submit a summarized bulleted list of the product description, manufacturer, model number, size, and fitting type when applicable. Organize the list in accordance with the material category designation below. Material submittals shall be submitted in electronic pdf form.

District's review of material submittals covers only general conformity to the Plans and these Standards. The Developer is responsible for quantity determination and any errors, omissions, or deviations from the approved Materials. The Developer shall also assume the risk for material or equipment, which is fabricated or delivered prior to the District's approval of material submittals. Review and approval of submittals by the District does not relieve the Developer or Contractor from their obligation to furnish required items in accordance with the Plans and these Standards. Materials delivered to the construction site shall conform to approved submittal information maintaining consistency with regard to manufacturer and model numbering. Poor quality materials shall be rejected by the inspector and removed from the site by the Contractor.

The following shows the preferred order to list the material categories:

1. Pipe, Fittings, Pipe Restraints and Casings
2. Valves (Gate Valves, Butterfly Valves, Air Vac Valve Assemblies, Blow-off Assemblies, and Valve Boxes)
3. Hydrants and Appurtenances
4. Service Fittings, Copper Pipe, Saddles, Ball Valves, Corps, Sleeves, U-Bolts, etc.)
5. Boxes for Meters, Blow-offs, and Air Valve Assemblies
6. Cross Connection Control Assemblies (DDCVA, RPBA, DCVA)
7. Bedding Material with Sieve Analysis
8. Concrete and Hot Mix Asphalt (HMA) – Refer to Governing Agency Requirements
9. Vaults, hatches, and ladders
10. Other items as required or requested.

4.03 ALTERNATIVE METHODS OR MATERIAL REQUESTS

Requests for alternate construction methods or Materials will be considered for approval by the District based on general District goals, objectives and conformance to all requirements indicated elsewhere in these Standards. Persons seeking approval of alternates shall submit a variance request in writing to the District Engineer. A non-standard system or method of construction may take longer to review resulting in increased processing costs. Persons submitting a variance request for review acknowledge these risks.

The decision by the District Engineer to grant, deny or modify alternative methods or materials will be based upon evidence that the request can meet all the following criteria:

- The change will achieve the intended result in a comparable or superior design and a better quality of the water system improvement; and
- The change will not adversely affect safety and/or operation; and
- The change will not adversely affect maintainability, resiliency or redundancy; and
- Availability of Materials, Supplies, Support and Service from manufacturers.

In addition to addressing the bulleted criteria above, the written variance request shall reference the Standard section for which a deviation is sought and engineering justification for deviating from said Standard.

4.04 DUCTILE IRON PIPE

All new water main construction in the District shall be ductile iron pipe unless alternate materials are required and approved by the District. Alternate materials may be required in special circumstances like directional boring or near high voltage powerlines.

Ductile iron pipe shall be cement-lined conforming to ANSI/AWWA C151/A21.51 standards. Ductile iron pipe shall be minimum thickness Class 52. Flanged spools shall be minimum Class 53. Standard thickness of cement-mortar lining shall be in accordance with ANSI/AWWA C104/A21.4 standards. Higher thickness or pressure class pipe may be required where exposed to high external loads, depth of bury outside of Standards or where required by the District. Special design submittal will be required in such circumstances. Gaskets shall conform to ANSI/AWWA C111/A21.11. All pipe shall be manufactured in the United States of America.

All pipe shall be sealed and fitted with temporary caps that are factory installed and shall remain in place until the pipe is installed in the trench.

4.05 HIGH DENSITY POLYETHYLENE PIPE

High density polyethylene (HDPE) pipe shall conform to AWWA C906. The pressure rating shall be determined by the District on a case-by-case basis. HDPE pipe shall be used only as approved by the District in a situation where DI pipe is not feasible or preferred.

4.06 GALVANIZED STEEL PIPE

Galvanized steel pipe less than 4 inches in diameter shall conform to ASTM A53, Schedule 40 and shall be hot dip galvanized inside and outside, including the couplings. The couplings shall be malleable iron with thread (IPT) couplings in accordance with ANSI B16.3.

4.07 POLYETHYLENE ENCASEMENT

Polyethylene encasement shall be minimum of eight-mil tube and comply with AWWA C105.

4.08 FITTINGS

All fittings shall be short-bodied, compact ductile iron with a minimum rating of 250 psi working pressure with mechanical joint conforming to ANSI/AWWA C153/A21.53 or flange fittings conforming to ANSI/AWWA C110/A21.10. Full body fittings may be used with District approval. Fittings shall have a cement-mortar lining conforming to AWWA C104. Mechanical joint fittings shall be equipped with a mechanically restrained follower gland (Megalug or approved equal) conforming to ANSI/AWWA C111/A21.11. Fittings shall utilize gaskets and hardware conforming to ANSI/AWWA C111/A21.11. All fittings shall be manufactured in the United States of America.

4.09 MECHANICAL RESTRAINT DEVICES

Mechanical restraint devices and restrained joints shall be either bolted or boltless design, flexible after assembly and manufactured in the United States of America. Any device utilizing set screws are not permitted. Restrained joint devices shall not be used on plain end fittings. Use of shackle rods on ductile iron bell-and-spigot pipe is not permitted without District approval. Thrust blocks shall be provided in addition to the joint restraint system unless otherwise waived by the District

Engineer. Restrained joint waterlines 16-inches or greater are specialty design which may require additional considerations not addressed in this specification.

Boltless designs shall utilize gripping gaskets suitable for a 350 psi working pressure with safety factor of 2:1. Gripping gaskets shall be rubber gaskets with stainless steel teeth for wedging action on bell-and-spigot DI pipe, 16-inch diameter and smaller. Gasket material and dimensions shall conform to ANSI/AWWA C111/A21.11. Gaskets shall only be used on compatible pipe as recommended by the manufacturer. The Developer or their Contractor/Supplier shall verify and ensure compatibility of gaskets for use with the selected pipe manufacturer.

In some applications, the District may allow piping equipped with mechanical restraint devices incorporated into the design of the pipe material. Restrained push-on joints for pipe and fittings shall be designed for a water working pressure of 350 psi for sizes 4" through 16"; such as TR Flex or approved equal. Use of mechanical restrained pipe shall be approved by the District Engineer.

Bolted joint restraint systems shall utilize multiple gripping wedges incorporated into a ductile iron retainer gland. The gland body and wedges shall be cast from grade 65-45-12 ductile iron in conformance with ASTM A536. Glands for mechanical joints shall be compatible with all mechanical joints conforming to ANSI/AWWA C111/A21.11. All MJ fittings or valves shall be equipped with wedge action RJ mechanical restraints (Megalug" or approved equal). Split designs are only allowed on mid-pipe installations for embedment into concrete for thrust restraint. The working pressure of the restraint system shall be a minimum of 350 psi for pipe diameters of 16-inches or less. Uniflange or similar bolt on flange fittings are not allowed.

4.10 COUPLINGS

Flexible coupling and transition coupling cast components shall be long-body style ductile iron. Bolts and nuts shall be in accordance with ASTM A536. Bolts shall be high strength, low alloy steel track head bolts with national course rolled thread and heavy hex nuts. Steel shall meet AWWA C111 composition specifications. Gaskets shall meet ANSI/AWWA C111/A21.11. Couplings shall be of domestic manufacture.

4.11 BOLTS AND NUTS

Bolts, nuts and washers used for securing fittings shall be of similar materials. Steel bolts shall meet the requirements of ANSI/AWWA C111/A21.11 and ASTM A307 for carbon steel or ASTM F593 for stainless steel. T-Bolts shall meet dimensional and material requirements of AWWA C111. Bolts and nuts for flanges shall meet requirements of AWWA C111, ASTM A307 with minimum tensile strength of 60,000 psi, Grade B and suitable for use with flanges described in AWWA C115. Nuts shall meet the requirements ASTM A563 for carbon steel or ASTM F594 for stainless steel. All bolts and nuts shall be of domestic manufacture.

4.12 GATE VALVES

Gate Valves shall conform to AWWA C515 and shall be ANSI/NSF 61 & 372 Certified and of resilient wedge type. Valve end connections may be flanged or mechanical joint, as required. Valves shall be manufactured in the United States of America.

Gate valves shall have ductile iron bodies, bonnets and stuffing boxes conforming to ASTM A536, solid wedge resilient seats, non-rising stems (NRS), and be suitable for installation with the type

and class of the pipe being installed and rated for direct bury. Valve wedge shall be fully encapsulated rubber meeting ASTM D429 and seal 100% leak tight. Seating rubber shall be EPDM elastomer. Valves shall be supplied with O-rings at all pressure retaining joints; no flat gaskets shall be allowed. All stem O-rings above thrust collar shall be fully replaceable with the valve fully opened and subjected to full pressure. Valve waterways shall be smooth, unobstructed, and free of all pockets, cavities, and depressions in the seat area. The body, bonnet, and O-ring plate shall be coated, both on the interior and the exterior, with fusion-bonded epoxy. Epoxy shall be applied in accordance with AWWA C550 and be certified NSF 61

Valves shall be rated for 250 psi minimum cold-water working pressure, AWWA service. Each valve shall be tested per the requirements of AWWA C515 and/or C509.

Unless otherwise required by connection piping, all 2-1/2 inch or larger buried, embedded, and encased valves shall have non-threaded ends; all 2-inch or smaller valves shall have threaded ends. Whether shown on the Drawings or not, a union, grooved end connection or other special connector allowing easy removal of threaded valves shall be provided within two (2) feet of threaded valves unless otherwise be easily removed as constructed.

All buried valves shall be provided with a 2-inch nut operator. Wrench nuts shall comply with AWWA C500. Valve extension shall be as shown in the Standard Details. Properly support shafts per manufacturers recommendations. Valves in vaults shall be OS&Y and equipped with hand wheels.

There shall be no moving bearing or contact surfaces of iron in contact with iron. Contact surfaces shall be machined and finished in the best workman like manner, and all wearing surfaces shall be easily renewable.

Nuts and bolts for connecting bonnet and body shall be 316 stainless steel. Bolts may be regular square or hexagonal heads confirming to ANSI B18.2.1. Metric size socket head cap screws are not allowed.

4.13 BUTTERFLY VALVES

Butterfly valves shall be of the rubber-seated type and conform to AWWA C504, Class 150B up to 150 psi working pressure. Valves under higher pressure shall be by special specification. Butterfly valve bodies and discs shall be cast iron ASTM A126 Class B with 18-8 Type 304 stainless steel body seat. The valves shall be short-body type and shall have flanged ends. Flanged ends shall be sized and drilled in accordance with ANSI B16.1 Class 125. Valves in vaults shall have a manual hand wheel operation. Butterfly valves shall be epoxy coated, certified for direct bury if applicable, and turn counterclockwise to open. Butterfly valves shall be manufactured in the United States of America.

4.14 VALVE MARKER POSTS

Valve marker posts shall be provided and placed in accordance with Approved Materials List and Standard Details.

4.15 VALVE BOXES

Domestic valve boxes shall be installed on all buried valves. Each valve box shall be adjusted to match the finish grade at the valve location. The box and lid shall be cast iron, 2-piece slip type. All castings shall be coated with asphaltic varnish. Valve boxes in high traffic areas shall be locking type as requested by the District. Valve boxes shall be extended with soil pipe only. Riser rings are not permitted. See Approved Materials List for approved valve box manufacturers.

4.16 VALVE AND METER VAULTS

Valve and meter vaults shall be dimensioned and sized for valve or meter removal and replacement. Vaults shall be furnished in pre-cast concrete sections with sufficient strength to withstand H-20 traffic loading (or higher if requested by governing jurisdictions, for an engineering consideration or in public right-of-way) together with access frames and covers. Hatches shall be minimum double leaf aluminum with stainless steel hardware, Bilco type or approved equal. A 1-7/8 inch hole shall be drilled in the vault hatch for installation of a meter radio head. Vaults shall be equipped with a sump pump or gravity drain to daylight. Drains shall not connect directly to storm or sewer. For additional pipe restraint, provide two mechanical joint restraint devices (Megalug or equal) facing each other on all DI penetrations and embed in concrete on the exterior side of vaults. See Standard Details for additional material requirements.

4.17 COMBINATION AIR VACUUM VALVE ASSEMBLIES

Combination air vacuum valve assemblies (air vac) shall be designed to operate with potable water under pressure to permit discharging a surge of air from an empty line when filling and relieve the vacuum when draining the system. The air valves shall also release an accumulation of air when the system is under pressure. This shall be accomplished in a single valve body designed to withstand a pressure of 300 psi.

Combination air valves shall conform to AWWA C512. The body and cover shall be cast iron or ductile iron. Floats shall be stainless steel conforming to ASTM A 240 and designed to 300 psi services. Seats shall be Buna N rubber. Internal parts shall be stainless steel or bronze.

4.18 BLOW-OFF ASSEMBLIES

Blow-off assemblies shall be as shown in the Standard Details. For 2-inch blowoff assemblies, all fittings from main to gate valve shall be brass.

4.19 FIRE HYDRANT ASSEMBLY

Hydrants shall conform to the latest revision of AWWA Specification C502, except as herein modified. Minimum of 5-1/4-inch main valve opening, 6-inch mechanical joint outlet, mechanically restrained glands, furnished with 6-inch auxiliary gate valve flanged to main tee and valve box; riser to suit trench depth at each installation. Furnished with breakoff flange on barrel and break off coupling for the stem. Furnished with two (2) 2-1/2-inch hose connections, one (1) larger pumper connection and 1-1/4-inch pentagonal operating nuts which turn counterclockwise to open. Nozzles shall be fitted with renewable bronze nipple locked in place. Hydrants shall be equipped with a drain kit as shown in the Standard Details

All fire hydrants shall be Mueller Super Centurion Model A-423, Clow Medallion F-2545 or East Jordan Iron Works WaterMaster 5CD250, with no substitutions permitted. All hydrants shall be equipped with an approved Storz adapter sized as required by the local fire authority. Hydrants shall have one coat of heavy duty, brush-type primer from manufacturer and be field coated with two coats of yellow enamel coating. See Standard Detail and Approved Materials List.

4.20 TAPPING SLEEVES

Tapping sleeves shall be used in lieu of cut-in tees except at the direction of the District. All tapping sleeves shall be rated by their manufacturer for a working pressure of at least 250 PSI. Tapping valves shall meet the requirements for valves, be epoxy coated, and of domestic manufacture. See Standard Details for additional requirements.

4.21 COPPER SERVICE LINES AND FITTINGS

All service lines from the water main to the meter shall be constructed of straight lengths of seamless copper tubing, unspliced, conforming to ASTM B88, Type K, annealed rated for 200 psi. Copper tubing shall be Cerro brand or approved equal. All connecting fittings shall be compression style, minimum 150 psi working pressure. The District may require higher standards in areas of higher working pressures. Pack joint and flared fittings are not allowed. Copper and service fittings shall be of domestic manufacture and clearly labeled as "No Lead." See Approved Materials List for approved service fitting manufacturers.

4.22 SADDLES, CORPORATION STOPS AND METER SETTERS

Service saddles, corps and meter setters shall be as provided in the Standard Details and Approved Materials List. Saddles shall have stainless steel double straps. For 1-inch or smaller meters, corps for use with the saddle shall be of bronze in accordance with AWWA C800 with AWWA tapered thread (CST) inlet by compression fitting for 1" copper outlet. Corporation stops shall be the ball valve type. Materials shall be of domestic manufacture and labeled as "No Lead".

4.23 BOXES FOR METERS, AIR VACUUM VALVE AND BLOW-OFF ASSEMBLIES

Boxes for meters, air valves and blow-offs shall be as identified in the Approved Materials List. Boxes placed in travel areas shall have traffic lids with corrosion resistant coating. Every effort shall be made to avoid placement in vehicle or pedestrian travel areas. All meter boxes shall have a 1-7/8 inch hole predrilled in the lid to equip the meter radio head device. Hole shall not be drilled in the inspection lid. Do not drill holes in air-vac and blow-off boxes.

4.24 CROSS CONNECTION ASSEMBLIES

All Reduced Pressure Backflow Assembly (RPBA) Double Check Valve Assembly (DCVA) or Double Detector Check Valve Assembly (DDCVA) shall be as listed on the most current copy of "Accepted Cross-Connection Control Assemblies" published by Washington State Department of Health. The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks. The RPBA shall be installed in a secured above ground enclosure located immediately back of the meter unless a feasible location for its placement cannot be accommodated due to access or other conflicts. No modifications to the device in the field shall be allowed. Meters for DDCVA shall be equipped with a 5/8-inch tattle tale meter as provided in the Approved Materials List.

4.25 CASINGS

Steel casing shall be black steel pipe conforming to ASTM A53. Minimum wall thickness shall be 0.375 inch for casings less than 24 inch. Project conditions may warrant additional thickness. Casing pipe shall be welded steel. Casing spacers shall be sized for pipe being installed. Materials are specified in the Approved Materials list. End seals shall be low strength grout plugs no greater than 1500 psi.

4.26 CONCRETE

Thrust blocking, encasement, or slope anchor concrete shall be mixed from materials acceptable to the District and shall have a 28-day compressive strength of not less than 3,000 psi. The mix shall contain five (5) sacks of cement per cubic yard and shall be of such consistency that the slump is between 1 inch and 5 inches. All concrete shall be mechanically mixed.

Concrete used for surface restoration shall be in compliance with the standards of the local Governing Agency with authority over the Project.

4.27 CONTROLLED DENSITY FILL

Controlled density fill (CDF) shall be a mixture of Portland cement, admixture (optional), Fly Ash, aggregates and water which have been batched and mixed in accordance with ASTM C94 or WSDOT Section 6-02.3. It shall be proportioned to provide a grout-like, non-segregating; free flowing, self-consolidating and "excavatable" material that will result in a non-settling fill which has measurable unconfined compressive strength. When CDF is required, material and installation shall conform to the standards of the applicable jurisdiction.

Controlled Density Fill (CDF) can be proportioned to be flowable, non-segregating, an excavatable by hand or machine. Desired flow-ability shall be achieved with a high water/cement ratio to meet the following guidelines:

Low Flow-ability	below 6-inch slump
Normal Flow-ability	6 - 8-inch slump
High Flow-ability	8-inch slump or greater

Individual material requirements for CDF include:

- Portland cement ASTM C 150 or AASHTO M 85 or WSDOT 9-01
- Fly Ash Class F or Class C
- Aggregates ASTM C 33 or WSDOT 9-03.14 or WSDOT 9-03.1
- Water WSDOT 9-25
- Admixtures WSDOT 9-23.6 or AASHTO M 194 or ASTM C 494 or ASTM C 260

Classification of Controlled Density Fill:

Class A	Free-flowing...void fills, tank fills, insulating fills, pipe and caisson fills
Class B	Free-flowing...road base, slab base, sub-footings, trench backfills and pipe bedding.

The table below provides a guideline for Controlled Density Fill mixes. The weights shown are only an estimate of the amount to be used per cubic yard of C.D.F. Actual amounts may vary from those shown as approved by the ENGINEER or approved trial mix data or field test results for proper strength, work- ability, consistency and density.

Class of C.D.F.	A	B
Maximum compressive strength, lbs per sq. in.(lbs./sq. ft.)	100 (14400)	300 (43200)
Max. gals. of mixing water per cubic yard	50	50
Lbs of cement per cubic yard, approximate	30	50
Lbs of fly ash per cubic yard, approximate	200	250
Lbs. of dry aggregate per cubic yard, approximate (assumed Sp.G. 2.67)	3200	3200

1. If air entraining or water reducing admixture is used for flowability, total water and aggregates may be adjusted for yield.
2. Coarse aggregate size of 1-1/2" minus assumed. For flowable or excavatable C.D.F., 3/8" minus or sand is recommended.

Weights may be adjusted for flow ability and pump ability.

4.28 PIPE ZONE BEDDING

Pipe zone bedding shall be Crushed Surfacing Top Course (CSTC) in accordance with WSDOT Section 9-03.9(3).

Bedding material for copper water services shall be clean, rock free sand meeting the requirements of WSDOT Section 9-03.13.

Foundation gravel shall comply with WSDOT Section 9-03.17 Class A

4.29 TRENCH BACKFILL

Trench backfill shall conform to the requirements of the Standards and the local governing jurisdiction.

Bank Run Gravel for Trench Backfill shall be in accordance with WSDOT Std. Spec Section 9-03.19.

Crushed surfacing shall meet the requirements of WSDOT Section 9-03.9(3) (either Top Course or Base Course as specified by District or local jurisdiction).

Native Materials shall meet requirements of WSDOT Section 9-03.19

No recycled materials or cement modified soils (e.g. kiln dust) shall be used for trench backfill or pipe zone bedding.

4.30 PIGGING MATERIALS

Pigs shall be foam cubes 2" larger than the inside diameter of the pipe being pigged or foam pigs sized for the diameter of the pipe. The Contractor shall provide all equipment necessary to pig the mains including but not limited to temporary blow offs, air releases, pigging crosses etc.

4.31 GENERAL FACILITIES

General system facilities, such as pressure reducing stations, pump stations and storage tanks shall be designed for the specific application. Material requirements for individual facility components will be established during design to maintain consistency within the existing water system.

CHAPTER 5

CONSTRUCTION STANDARDS

CHAPTER 5 CONSTRUCTION STANDARDS

5.01 GENERAL REQUIREMENTS

The Project shall be constructed as shown on the Plans in accordance with these Standards. Materials shall be installed in compliance with the manufacturer's instructions and specifications, except where a higher quality of workmanship is required by the Plans and these Standards. All Work shall be in accordance with any applicable regulations of the State, County and local jurisdictions. The Contractor shall arrange for such inspection by these agencies and shall submit evidence of their approval, if requested by the District. Contractors shall have a copy of the District Standards on site during construction. Copies of the District Standards may be found on the District's website: www.highlinewater.org.

Contractors shall be responsible for all compliance with all OSHA and WISHA requirements to provide a safe work area.

5.02 CONSTRUCTION SCHEDULE

The Developer/Contractor should provide the District with a written construction schedule at the preconstruction conference to arrange for inspection of materials and coordination of the project Work. Contractor shall allow permitting agency and District a minimum of three (3) workdays' notice or 72 hours to customers of construction impacts. The Contractor shall abide by the District's normal working schedule from Monday to Friday. Connections to the existing system will not be allowed on Mondays, Fridays, or the day prior or post a legal holiday. No Work within public right-of-way or within private easements shall proceed without authorization by the District and Governing Agency with jurisdiction over the Project.

5.03 STOP WORK NOTICE

The District may issue a Stop Work Notice upon observing construction which does not comply with these Standards or approved Plan documents. If any Work is covered contrary to the request of the District Inspector or Engineer, it must, be uncovered for the Inspector's observation, and replaced or resumed at Contractor's expense. If Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Plans, the District may order the Contractor to stop the Work or any portion thereof, until the cause of such order has been eliminated.

5.04 HANDLING OF PIPE AND MATERIALS

All types of pipe shall be handled in a manner that prevents damage to the pipe, lining or coatings. Pipe shall be bagged or plugged from manufacturer before unloading at the site. Pipe arriving without protective covering including plugged or bagged pipe ends shall be rejected or the Contractor shall disinfect and bag pipe immediately for storage on-site until installation.

Pipe and fittings shall be loaded and unloaded using forks or cable choker in a manner to avoid shock or damage, and under no circumstances shall they be dropped, skidded, or rolled against other pipe. Damaged materials will be rejected, and the Contractor shall immediately place all

damaged materials apart from the undamaged and remove the damaged materials from the project site within 24 hours.

Pipe shall be stacked in such a manner as to prevent damage, to prevent dirt and debris from entering the pipe, and to prevent any movement. The bottom tiers of the stack shall be kept off the ground on timbers, rails, or other similar supports. Pipe on succeeding tiers shall be alternated by bell and plain end. Timbers of 4"x 4" shall be placed between tiers and chocks shall be placed at each end to prevent movement.

Threaded pipe ends shall be protected by couplings or other means until the pipe is installed. Dirt or other foreign material shall not enter the pipe or pipe joints during handling and installation. When pipe installation is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means to ensure cleanliness inside the pipe.

Gaskets and bolt kits shall be kept in a manner to prevent exposure to environmental conditions that may deteriorate the material. Gaskets and other miscellaneous materials shall not be stored within pipes.

5.05 STAKING

Staking shall be performed by or under the direct supervision of the Developer's land surveyor licensed in the State of Washington. Provide the District with two (2) workdays' notice to observe construction staking before construction begins. All water main locations shall be within six (6) inches of subgrade prior to construction staking and pipe installation.

The Developer or their Contractor shall provide all horizontal control, including property corners and street centerline stakes, for locating and staking the lines and appurtenances and shall provide reasonable and necessary opportunities and facilities for setting points and making measurements, including any easements which require staking. The Work shall not commence until provisions to establish such points as necessary which generally consist of, but are not limited to the following:

- A.** Pipeline centerline and 10-foot offset stakes at tees and bends.
- B.** Pipeline centerline and 10-foot offset stakes at 100-foot intervals along straight runs of pipe.
- C.** Centerline and 10-foot offset stake for fire hydrant.
- D.** Final grades will be provided at 200-foot intervals and at tees, bends, hydrants, casings or where sudden changes in grades exist.

The Work shall be done in strict conformity with such points and instructions. Accuracy of such horizontal control is the sole responsibility of the Developer and Contractor, and any modification of horizontal location of any facility shall be at the Developer's risk and expense. The District reserves the right to review all construction staking to assure placement of their facilities is satisfactory and may choose to modify said placement.

The Developer or Contractor shall locate and carefully preserve benchmarks, monuments, stakes, and other reference points and, in case of destruction, shall pay for any resulting expense and errors that may be caused by their absence or disturbance. The Developer shall identify reference points or markers that are required to be moved due to construction, establish reference points and reset the point or marker using a qualified land surveyor.

5.06 DEVIATION FROM PLANS

No deviations from the approved Plans and these Standards shall be allowed without the District's approval. Minor changes may be approved through coordination with the Inspector and District Engineer. If major changes are required, including relocation of design to accommodate an existing conflict, the Design Engineer shall revise the Plans for the District's approval prior to restart of construction or construction of affected Work.

If the District is aware of any deviation from the approved Plans and determines that it is not acceptable, the District will give notice to the Developer. The Project will not be accepted unless the deviation is corrected.

5.07 INSPECTION AND TESTING

All Work shall be subject to inspection by the District. The Developer and Contractor shall keep the District's inspector informed of their schedule. The District shall have access to the Work at all times, and the Developer/Contractor shall provide proper facilities for access and inspection.

The presence or absence of a District inspector on any job will be at the sole discretion of the District, and neither presence nor absence of an Inspector will relieve the Developer of responsibility to ensure compliance with approved Plans and these Standards. Inspection does not relieve the Contractor of their obligation to furnish satisfactory material and workmanship.

To ensure the Inspector's safety and access during these inspections, the Contractor shall provide any equipment needed, such as walkways, railings, ladders, and platforms. When requested, the Contractor shall (without charge) provide material samples used or to be used in the Work.

When requested by the District, it shall be the responsibility of the Developer to provide test reports certified by a professional engineer licensed in the State of Washington to verify compliance of materials and methods used in the Project. Sampling and/or testing shall be at a frequency and magnitude determined by the District or local authority with jurisdiction over the Project. Copies of all test reports shall be furnished to the District Inspector. All costs incurred for testing or sampling, as required, shall be the responsibility of the Developer.

Whenever Work must be specially tested or inspected for compliance with public regulations, or with the Plans and these Standards, the Developer shall give the District 24-hour notice of the readiness of the Work for such test or inspection.

In no event shall the Work, or any portion thereof, be covered up or placed into operation until the District Inspector has directed otherwise. If any Work has been covered up without prior inspection or authorization by the District Inspector, it must be dug up for inspection at the Developer's expense.

Written and/or verbal notices of deficiency or Defective Work shall be given to the Contractor. The Contractor shall correct such deficiencies before final inspection by the District Inspector.

For inspections on private property due to issuance of permits by the District, the District retains the right to enter the subject property at reasonable times for purposes of inspection for compliance with permit conditions. The Contractor shall provide right of access for the District.

5.08 SURFACE WATER QUALITY

The Contractor is required to implement water pollution controls in accordance with ESA regulations as called out on the Plans or directed by Governing Agencies and maintain these until the Project is accepted by the District. The Contractor shall familiarize themselves with the requirements of the DOE, King County Roads and other regulatory agencies having jurisdiction over such matters.

Water with chlorine residual shall be disposed of through sanitary sewers with sewer agency's approval, containment and aerating or percolation into the ground. Water containing chlorine residual shall not be discharged into any waterway or leave the project site without dechlorination. Water containing chlorine shall not be disposed of into lakes, rivers, streams, creeks or other water where fish or other natural water life could be expected. Other agents for neutralization may be approved for discharge to containment areas on a case-by-case basis upon request. Water with zero chlorine residual may be achieved by applying Vitamin C or other acceptable agent approved by the District for neutralization and discharge. The disposal of chlorinated water shall be observed by the District Inspector.

Water discharged to storm or sanitary sewer system shall be released at a rate as to not cause adverse impacts to the downstream system. There shall be no disposal of waste oil or oil products on the project site. The Contractor shall provide a waste oil disposal tank if needed.

5.09 TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL

Temporary soil erosion and sedimentation control measures shall be provided in accordance with the local agency requirements. The Contractor shall provide all Work, labor, materials and equipment required to prevent sediment laden water from leaving the work site. Failure to comply with any permit conditions will result in the suspension of Work.

5.10 CONSTRUCTION ON EXISTING EASEMENTS

All Work on the District's easements shall be performed in accordance with easement provisions. Easements shall be restored equal to or better than the original conditions. The Contractor shall not work on easement areas until specifically authorized by the District. The Developer and Contractor shall coordinate all Work with the property owner(s) and restore to their satisfaction.

5.11 PROTECTION OF PROPERTY

Trees, shrubs, fences, and all other properties and surface structures shall be protected during construction, unless their removal is shown in the Plans and approved by the property owner in writing. Any disturbed property shall be restored as nearly as practical to its original or better condition. Any cutting of tree roots or branches shall be done only if approved by the District or a qualified arborist approved by the District. An approval from the local jurisdictions may also be required.

Temporary support, adequate protection, and maintenance of all underground and surface structure, drains, sewers, and other obstructions encountered in the progress of the Work shall be provided by the Contractor in accordance with these Standards or applicable regulations, or as directed by the District.

The Developer/Contractor shall exercise due care to protect property and the Work and shall supervise the project to ensure the Contractor exercise such care. The Contractor shall be solely responsible for any loss or damage to property or the Work occurring prior to the completion and acceptance of the Work by the District.

5.12 UNDERGROUND UTILITIES

The Plans show the approximate locations of various existing utilities known to the Design Engineer such as gas lines, water mains, storm drainage, power lines, telephone lines, TV cables, fiber optics, and other obstructions based on information obtained from various sources. This information is not guaranteed to be accurate, and the Contractor is responsible to verify interferences and obstructions by inquiry from the different utilities and by underground exploration before commencing excavation.

The Contractor shall request field locates and notify the owners of underground utilities about the scheduled commencement of excavation through the one-call system 811. If the utility is not included in the one-call number system service, notice shall be provided individually to those owners of underground utilities known to or suspected of having underground utilities within the area of proposed excavation.

Notice shall be made to owners of underground utilities not less than two (2) business days or more than ten (10) business days prior to scheduled date of commencement of excavation.

Test pits or potholes, for the purpose of locating underground utilities or structures in advance of the construction, shall be excavated and backfilled by the Contractor. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Governing Agency. The Contractor shall excavate around and under active utilities with special care and shall support and maintain them in service. Where it is necessary to cut, move or reconnect any service lines, arrangements shall be made with the respective utility owners.

The Contractor shall pothole all existing utilities to verify location and depth prior to water main installation. Failure to adequately pothole existing utilities resulting in conflicts, damage and subsequent delays shall be the sole responsibility of the Contractor.

The Contractor shall coordinate with utility owners, arrange for the movement or adjustment and notify the District, in advance, of any conflicts affecting the Work. The Contractor shall be responsible for any damage of utilities resulting from their operations and shall hold the District harmless from any claims resulting from disruption of or damage to same.

5.13 TRENCH EXCAVATION

Trench excavation and backfill operations shall comply with all requirements of the local Governing Agency with jurisdiction over the right-of-way and Project.

The Contractor shall comply at all times with the Washington Industrial Safety and Health Act (RCW 49.17) and safety and health standards, such as Safety Standard for Construction Work (296-155 WAC), General Safety and Health Standard (296-24 WAC), General Occupational Health Standard (296-22 WAC) and any other appropriate safety and health codes. The Contractor is solely responsible for safety.

Before commencement of trenching, provide gabions, waddles or filter fabric placed in all downhill storm drain catch basins for temporary sediment trap at curb inlets. Plastic sheeting must be available on-site. Cover and secure any stockpiled material at the time of heavy rains or flooding. Employ Best Management Practices (BMPs) for erosion control and maintain measures at all times.

Clearing and grubbing limits may be established by the Governing Agency or the District for certain areas offsite and within easements. The Contractor shall confine their operations within those limits. Debris resulting from the clearing and grubbing shall be disposed by the Contractor.

Prior to any excavation, all locations where Work is to be performed shall be within 6 inches of subgrade. The District will not allow grading operations to occur after installation of water facilities. Trenches shall be excavated to the line and grade shown in the Plans or designated by the District. Where higher strength pipe or special bedding is required because of excess trench width, it shall be furnished by the Contractor.

Unsuitable material below the depth of the bedding shall be removed to the extent of unsuitable materials and replaced with satisfactory materials. The length of trench excavation in advance of laying pipe shall be kept to a minimum and not exceed more than 300 feet without approval.

When trenching operations take place in the public right-of-way, the pavement and all other improvements shall be restored as required by the right-of-way permit and in a serviceable condition for the public. A temporary hot HMA patch shall be placed at the end of each workday.

When excavation of rock is encountered, all rock shall be removed to provide a clearance below and on each side of all pipe, valves, and fittings of at least 6 inches for pipe sizes 24 inches or smaller and 9 inches for pipe sizes 30 inches and larger. Material removed shall be replaced with appropriate backfill material, which shall be compacted to 95% by modified proctor.

5.14 TRENCH DEWATERING

The Contractor shall provide pumping equipment sufficient to keep the trench free from standing water. Surface runoff shall not flow into the trench. Trench water or other deleterious materials shall not enter the pipe. If, at any time, water is found to be entering the new water main, the Contractor shall plug the main and cease working until the trench water is completely pumped out or otherwise controlled, to the satisfaction of the Inspector. More extensive purity testing measures may be imposed where facilities have been contaminated by trench water.

Dewatering and its methods shall be the responsibility of the Contractor. Any method used must be in accordance with the specifications and requirements of the DOE and the local jurisdiction, including discharge location and quality.

5.15 LAYING WATER MAIN PIPE

Work shall be in accordance with AWWA C600 and the manufacturer's recommendations.

Depths of pipe shall conform to approved Plans. The minimum cover depth of pipe is 42 inches (3.5 feet) and the maximum is 60 inches measured from finished grade to top of pipe unless a variance is approved by the District. The District may allow shallowing mains 8-inch and smaller to 36 inches of cover at isolated conflicts with existing utilities with prior approval.

The bottom of the trench shall be finished to grade in such a manner that the pipe will have bearing along the entire length of the barrel. Bolts on pipe and fittings shall be tightened uniformly with a torque wrench to manufacturer's recommendation.

Except where RJ systems are required, mechanical or push-on joints shall be used. Follow all manufacturer's instructions for installation of pipe and mechanically restrained joint devices.

Water main pipe may be deflected as necessary; however, maximum allowable deflection at each joint shall not exceed one-half the manufacturer's recommended permissible deflection. Use of several short sections of pipe to achieve deflection is prohibited. The Contractor should install water mains to minimize the need for vertical bends.

Where field conditions require deflection or curves not anticipated on the Plans, the method of achieving deflection shall be subject to District approval for use of fittings vs. deflection. When rubber-gasketed pipe is installed on a curve, the pipe shall be jointed in a straight alignment and then deflected to the curved alignment. Trenches shall be made wider on curves for this purpose in order to maintain clearance for pipe zone bedding as prescribed by these Standards.

Whenever it becomes necessary to cut a length of pipe, the cut shall be done in conformance with all safety recommendations of the cutting equipment manufacturer. Cutting shall be done in a safe manner without creating damage to the pipe or cement-mortar lining. The cut shall be made by an abrasive pipe saw or an approved pipe cutter. All pipe bevels for insertion into DI bells shall be performed by the manufacturer. Field beveling of DI pipe is prohibited.

All parts of the pipe ends, couplings, fittings, and appurtenances shall be cleaned to remove oil, grit, or other foreign matters from the joint.

5.16 BEDDING PIPE

Bedding material shall be as specified in these Standards. Pipe zone bedding is defined as 6 inches below the pipe and around the pipe, and 12 inches above the pipe. Pipe zone bedding up to 12 inches over the top of the pipe shall be placed evenly and carefully.

Pipe zone bedding shall be compacted to 95 percent maximum dry density per ASTM D1557 by approved methods (hand-held tools), to provide firm and uniform support for the full length of the pipe, valves, and fittings. Provide foundation gravel if required to ensure a solid trench base. Native materials may not be used for pipe bedding. No recycled or cement-modified soil materials will be allowed for pipe zone bedding.

5.17 CONCRETE THRUST BLOCKING

All bends, tees, plugs, and caps shall be blocked in accordance with the Standard Details, including mains and fittings designed with mechanical restraint systems unless otherwise waived by the District Engineer. All poured in place blocking shall have a minimum measurement of twelve inches (12") between the pipe and the undisturbed soil. Concrete blocking shall have a minimum of 1/2 square foot bearing against the fitting. The Contractor shall install blocking which is adequate to withstand full test pressure as well as to continuously withstand operating pressure under all conditions of service. All concrete shall be mechanically mixed. The Contractor shall ensure enough time has elapsed between placing thrust blocks and water main pressure testing to allow for concrete curing.

Blocking, unless otherwise shown or directed, shall be formed and placed so that pipe and fittings will be accessible for repair. Eight-mil polyethylene sheets shall be installed around the fitting and all bolts, nuts, and glands for future dismantling.

In the rare circumstance and event of a shutdown where time does not permit the proper setting of the concrete blocking, and only upon approval of the District Engineer, ecology blocks may be installed with concrete poured around the connection point of the fitting and the blocks. This circumstance is only acceptable when sufficient mechanical pipe restraint for temporary blocking are unavailable for connections. Install as shown in the Plans and the Standard Details.

5.18 TRENCH BACKFILL AND COMPACTION

Trench backfill shall be the section of trench above the pipe zone bedding. Trench backfill shall be as specified in these Standards and as modified or superseded by the Governing Agency.

All Work within existing right-of-way shall be backfilled with 100% imported crushed surfacing material as described below. No recycled or cement-modified soil materials shall be used within any trench or pipe zone bedding.

Compaction of the backfill shall, at the minimum, be accomplished by mechanical tamper, by vibrating, by rolling, or by a combination of these methods, as approved by the permitting agency having jurisdiction and the District. Water settling is not permitted. The Contractor shall provide the services of a testing laboratory acceptable to the District to perform on-site testing to document that the specified compaction has been obtained.

The approval of the compaction method and the achievement of the specified density and compaction shall, in no way, relieve the Contractor of responsibility for all repairs caused by settlement of the backfill prior to acceptance and during the warranty period of the Project.

Prior to backfilling, form lumber and other debris shall be removed from the trench. Sheeting used by the Contractor shall be removed just ahead of the backfilling. Suitable native materials may be used in trench backfill onsite only, provided the native materials meet standards and compaction requirements.

Backfill shall not be deposited in the trench in any manner which will damage or disturb the pipe or pipe zone bedding. Care shall be taken to prevent any damage to the pipe or its protective coating.

Unless otherwise provided or modified, the Work shall meet the following backfill requirements:

Initial Backfill (Pipe Zone Bedding): The portion of the backfill from 6-inches below the bottom of the pipe to a point one (1) foot above the top of the pipe, shall be made with Crushed Surfacing Top Course (CSTC) per WSDOT Std. Spec. Section 9-03.9(3). The material shall be carried up evenly on both sides of the pipe simultaneously in approximately six (6) inch layers and each layer thoroughly compacted with appropriate tools in such manner as to avoid injuring or disturbing the completed pipeline. Service lines shall be bedded with 12-inches sand around all fittings and appurtenances.

Subsequent Backfill in Right-of-Way: Any open cut of existing right-of-way or paved area above the pipe zone bedding shall be backfilled entirely with Crushed Surfacing (Top Course or Base Course depending on local jurisdiction) meeting the requirements of WSDOT Std. Spec. Section 9-03.9(3). Native materials may not be used. Backfill shall be placed and compacted mechanically in one (1) foot lifts with an inspector present. The backfill shall be mechanically compacted to 95% max density by modified proctor per ASTM D-1557.

Subsequent Backfill within Project Development: Areas above the pipe zone bedding shall be backfilled with imported Bank Run Gravel for Trench Backfill per WSDOT Std. Spec. 9-03.19; Crushed Surfacing (Top Course or Base Course depending on local jurisdiction) per WSDOT Std. Spec. Section 9-03.9(3); or suitable native material meeting the requirements of WSDOT Std. Spec. Section 9-03.19. Backfill shall be placed and compacted mechanically in one (1) foot lifts with an inspector present. The backfill shall be mechanically compacted to 95% max density by modified proctor per ASTM D-1557.

The Design Engineer and their Geotechnical Consultant shall provide the District a geotechnical evaluation and recommendation of the feasibility of the use of native soils as backfill and provide sieve analysis and proctor tests prior to construction. The recommendation shall include means and methods for achieving sufficient compaction. The Contractor shall provide additional compaction testing if native material is proposed.

Subsequent Backfill within Project Development in Non-Vehicular Areas: For areas not subject to vehicle traffic, the trench backfill shall be compacted to a minimum of ninety percent (90%) max density by modified proctor per ASTM D-1557. Higher compaction in non-vehicle areas may be required due to specific project requirements or features.

Other Requirements:

Asphalt pavement restoration shall be either by a patch or overlay method as noted on the right-of-way permit in accordance with the Governing Agency requirements. When a patch method is used, the trench limits shall be saw cut prior to the final patch. All finish pavement cuts shall be made by saw cuts. The final saw cuts shall be a minimum of one foot outside the trench width or to undisturbed soil. "Zipping" is not an acceptable alternative to sawcutting.

The test results shall be given to the District for review and approval prior to paving. Two compaction tests shall be performed at maximum intervals of 200 feet along the length of the trench, or a minimum of two (2) locations daily per pipe run between valves, or as directed by the agency with authority over the right-of-way.

5.19 CORROSION PROTECTION

If called out on the Plans, installation of polyethylene encasement (PE) shall be in accordance with the latest AWWA C105. When required, all ductile iron pipe and fittings shall be wrapped in PE, except as specifically excluded in the Plans or in these Standards. The Contractor shall ensure that all PE is securely installed, and seam taped to prevent infiltration. PE shall be cut to minimize damage and resealed when installing service saddles for service connections. All damaged or torn PE shall be replaced prior to backfill.

5.20 INSTALLING GALVANIZED IRON PIPE

Galvanized pipe may be used only under special circumstances or where called out in these Standards. The galvanized iron pipe, valves and fittings shall be threaded. Joints shall be made in accordance with IBC plumbing practice. Threads shall be wrapped with Teflon tape or liquid sealant before connecting. Dielectric unions shall be provided when connecting dissimilar metals to galvanized materials. Pipe and fittings shall be coated as specified, sealing joints and covering voids in galvanized coating. Coating shall be the same as provided for fire hydrants with primer and like paint materials. Paint must be suitable to adhere to shop coat as well as painted surface. Colors are as specified in the Approved Materials list and Standard Details.

5.21 VALVE INSTALLATION

Prior to installation, valves shall be inspected by the Contractor for approved part numbers/manufacturers; cleanliness of valve ports especially seating surfaces, handling damage, and cracks. Defective valves shall be rejected.

The valve and valve box shall be set plumb and centered on the valve. Valves 12" and larger shall be supported by a concrete block or "paver" stone on a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe and fittings shall be supported in such a manner as to prevent stress on the valve.

Valves shall be installed in closed position. Where valve nut is 4 feet or greater below finished grade, install a valve stem extension conforming to the Standard Details. Valve extensions shall be a minimum of 2 feet long and extended to between 18 to 24 inches of finish grade.

A valve box or vault shall be provided for every valve. Valve box top sections shall be adjusted flush with the finished pavement, finished grade of landscaping and, in those areas to be excavated for future roadway grades, enough adjustment shall be provided in the valve box to allow the top of the box to be adjusted to the required grade. Riser rings are not allowed.

Backfill around valves shall be carefully compacted in 6-inch lifts for the full depth of the trench with the valve box in place. Provide a minimum of 2' x 2' x 2" asphalt or 2' x 2' x 4" concrete collar for valves installed in gravel or unpaved areas as indicated in Standard Details.

All valves that are or to become the property of the District and shall be opened, closed or otherwise operated ONLY by qualified and authorized District personnel. Contractors are not authorized to operate existing valves on the District's water system.

5.22 FIRE HYDRANT INSTALLATION

Fire hydrants shall be as shown in the Standard Details and in compliance with AWWA C600. The hydrant run shall be fully mechanically restrained.

All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb, subject to the Fire Marshall's discretion. The steamer port shall be pointed toward the street, or where directed, toward the paved vehicle approach area. All hydrants shall be bagged when not in service.

Hydrants shall be set to the established grade, with a clear span area a minimum of 4' around base as shown in the Standard Detail. The breakaway flange shall be installed not less than 4 inches, or more than 8 inches, above finished grade.

The Design Engineer and Contractor shall exercise care in establishing and placing hydrants at specified elevations to avoid adjustments during construction. No extension kits shall be allowed for new construction or for existing hydrants required to be brought to current standards. Hydrants not installed properly will be removed, replaced with the correct height hydrant and re-set to proper grades.

All hydrants shall be placed on a concrete hydrant block. Drainage shall be provided at the base of the hydrant by placing at least one (1) cubic yard of 1 ½" washed rock from the bottom of the trench to at least 6" above the drain-port opening and to a distance of 1 foot around the elbow. Cover washed rock with 3 mil thick plastic sheeting. Provide and install an approved drain kit as shown in the Standard Details.

The portion of the hydrants above the breaker flange shall be painted with two coats of high gloss yellow paint in accordance with these Standards and the Approved Materials list. Paint shall be applied by spray or brush to an acceptable appearance. Ensure the paint will adhere to shop coat and painted surfaces. Upon completion, the hydrant shall be stenciled in accordance with the Standard Details.

When fire hydrants are in parking lots or other industrial areas, hydrant guard posts may be required where the hydrant is not otherwise protected by a concrete curb (or extruded curb per Standard Details) on all sides where vehicles may have access. The District shall approval all locations where hydrant guard posts are used.

5.23 COMBINATION AIR AND VACUUM RELEASE VALVE (AIR VAC) INSTALLATION

Location of the air valves where shown in the Plans is approximate. The Contractor shall set the air vac at the high points of the water main. The water main profile may need adjustment so that the high point and air vac is installed in a convenient location with Inspector's approval. Consideration shall be made to ensure positive slope from the main to the valve to the vent. Provide a safe location for discharge to prevent damage to property or the right-of-way. Installation shall be as shown in the Standard Details.

5.24 BLOW-OFF ASSEMBLIES

Blow off assemblies shall be constructed in accordance with the Standard Details. Valve marker post shall be installed as directed by the District. Refer to Standard Details for additional requirements.

5.25 VALVE MARKER INSTALLATION

Vinyl markers shall be set for all valves or valve clusters as directed by the District Inspector, except auxiliary hydrant valves and air vacs. The marker shall be set on a line through the valve or valve cluster at right angles to the center line of the road. The marker shall generally be set at the property line unless the District decides another location is safer or more appropriate. All markers shall be stenciled with the footage between the valve marker and the center of the valve. Refer to Standard Details for additional requirements.

Markers damaged during construction shall be replaced with new markers. The District may also require replacement or installation of additional valve markers on a Project. All markers set or reset are to be new; unused previously.

5.26 SERVICE LINES

Generally, corporation stops are located at ten o'clock or two o'clock positions on the circumference of the pipe. Taps may be installed with saddles or direct insertion taps. When more than one tap is within proximity to one another, the taps should be separated at least 24 inches apart and bedded in 12" of sand. Taps on the opposite side of the water main from the meter location is not allowed. Service lines shall be continuous, unspliced from corporation to meter setter. Spliced services lines shall be replaced in their entirety. Service line must be physically inspected before backfill and placing in service. Corporation stops with IPT threads are not acceptable for 1-inch taps. Setters and boxes shall be as shown in the Standard Details and Approved Materials List.

Services may be installed in paved areas under sidewalks and curbs by boring and tunneling. Damages to water appurtenances shall be repaired by the Contractor within the workday that damage occurs. Surface restoration shall take place in a timely manner and not more than 48 hours after first disturbance. No street damage shall be allowed to remain without adequate warning and traffic control in place. Provide 30" minimum cover on service lines from the corporation to the meter box. Install service at 90 degrees horizontally to the main to intercept the existing meters. Blow off the service prior to connection to the meter.

Existing service connections shall not be transferred to the new main until all pipes have been successfully flushed, disinfected and tested. When transferring services from the existing main to the new main, the Contractor shall take sanitary precautions to protect the potable water supply in the existing, new mains and services. Where directed by the District, meter stops for new services shall be locked with a District-supplied locking device and the Contractor shall supply and install a spacer in meter setters where a meter has not been issued.

5.27 SCHEDULE OF TESTS

The Contractor shall notify the District Inspector at least 2 working days before a section of water main is ready for testing. The District recommends chlorination of the new main upon first fill to reduce water consumption and flushing excessive chlorinated water. The Contractor shall be present at the project site when the District Inspector observes testing and takes water samples.

The typical sequencing of testing is:

- Insertion of pigs and granular chlorine or other approved chlorination in water main during construction
- Fill main on downstream side of pigs for disinfection
- Disinfect for minimum of 24 hours
- Flush mains by pushing pig through main
- Remove pigs
- Pressure Test
- Flush and standby a minimum of 16 hours
- Take two sets of Purity Samples a minimum of 15 minutes apart

5.28 PIGGING

Mains shall be pigged to remove any solids or contaminated material that may have become lodged in the pipe prior to chlorination. If a hydrant is not installed at the end of the water main, the Contractor shall provide a tap large enough to develop a flow velocity of at least 2.5 feet/sec in the water main or adequate flushing facilities such as a blow-off described in these Standards.

The source water used for disinfection and pressure testing shall be flushed by District prior to its use to ensure that contaminants or debris are not introduced into the new pipe. Taps for temporary or permanent release of air, introduction of chlorine for flushing purposes shall be provided by the Contractor as a part of the construction of water mains. Temporary taps shall be plugged after use with threaded brass plugs.

5.29 DISINFECTION AND FLUSHING OF WATER MAINS

Disinfection of water mains shall be accomplished by the Contractor in accordance with the requirements of the Washington State Department of Health, AWWA C651 and in a manner satisfactory to the District.

Before being placed into service, new water mains and repaired portions of existing mains shall be chlorinated and thoroughly flushed followed by a minimum of two bacteriological samples at each sampling point collected consecutively after a minimum of 16 hours have passed. The District Inspector will take all water samples. Water samples will be submitted to a certified laboratory and confirmation of satisfactory results will be received on a DOH approved form utilized by the certified laboratory. Flush and sample from the downstream flow.

The section to be tested shall be chlorinated so that a free residual of no less than 25 ppm (parts per million) is measured at the end of all mains. At a minimum, flush each service line to disinfect those portions allowing the chlorinated water to remain in facilities, blow offs, hydrant spools, and service lines, etc. for a minimum of 24 hours. The initial chlorine content of the water shall not be less than 25 ppm no more than 100 ppm. The forms of chlorine that may be used in the disinfection operations are liquid chlorine injection at 12.5% or granular chlorine that is NSF approved. Use of swimming pool calcium hypochlorite is not allowed.

The main shall be filled with water at a rate to ensure that the water within the main will flow at a velocity no greater than 1ft/sec. Precautions shall be taken to ensure that air pockets are eliminated. When a chlorine concentration of not less than 25 ppm and not more than 100 ppm has been established throughout the line, the valves shall be closed, and the line left undisturbed for 24 hours. If chlorine concentration exceeds 100 ppm, the Contractor will immediately initiate a reduction in the concentration by properly flushing the main and removing chlorine at the discharge. Chlorinated mains will not be allowed to remain super-chlorinated greater than 24 hours or over weekends and holidays.

5.30 HYDROSTATIC PRESSURE TESTS

Prior to calling the Inspector for pressure test, the Contractor shall have all equipment set up for operation and shall have successfully performed a pre-test to ensure that the pipe is capable of meeting test conditions.

Water main and appurtenances shall be tested under a hydrostatic pressure of 250 psi for 15 minutes with no pressure loss. Pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished and operated by the Contractor. The Contractor shall demonstrate the gauge is working properly before the testing begins and shall drain the gauge to zero upon completion of the test. Gauges not recording zero under atmospheric conditions will require replacement and the pressure test repeated.

Sections to be tested shall be of convenient length but in no case greater than 1,500 feet.

Thrust blocking shall be in place for an adequate time for concrete to cure before testing and the pipe shall be backfilled sufficiently to prevent movement of the pipe under pressure. In no case shall pressure be applied before seven (7) days cure time of thrust blocking. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking and remove it after testing.

A clean container shall be used for holding water for pumping up pressure on the main being tested. This makeup water shall be disinfected by the addition of chlorine to achieve a concentration of 50 ppm.

There shall not be an abrupt loss in pressure during the 15-minute test period. Any visible leakage detected shall be corrected by the Contractor regardless of the allowable leakage. Should the tested section fail to meet the pressure test successfully as specified, the Contractor shall locate and repair the defects and then retest the pipeline.

Tests shall be made with the hydrant auxiliary gate valves and the hydrant valve in the open position. Once the new line is successfully tested, each valve shall be tested by closing each in turn and relieving the pressure behind it. The mains shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. This test of the valve will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Contractor shall verify that the pressure differential across the valve does not exceed the rated working pressure of the valve. There shall be no testing against existing valves or valves connected to the District's system.

Defective materials or workmanship discovered as a result of hydrostatic field test shall be replaced by the Contractor. Whenever it is necessary to replace defective material or correct the workmanship, the hydrostatic and disinfection tests shall be repeated to the satisfaction of the District.

5.31 FINAL FLUSHING AND PURITY TESTING

Chlorinated water shall be flushed from the new water main until the replacement water throughout its length shows residuals equal to background chlorine levels in the system.

After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken 15 minutes apart at least 16 hours after flushing, shall be collected from the new main. The Contractor shall schedule the sample collection with the District a minimum of three (3) workdays in advance of testing. The number of samples from the source and the number of representative sample points required will be determined by the District. Appropriate sample taps shall be furnished by the Contractor.

Before placing the lines into service, a satisfactory report shall be received by the District from the certified laboratory evidencing successful tests on samples collected from representative points in the Project. Should the initial test result in an unsatisfactory bacteriological test, chlorination and flushing shall be repeated by the Contractor until satisfactory results are obtained. No more than five (5) business days shall be allowed from passing testing results and the connection to the existing system without the need for retesting.

The Contractor shall be responsible for disposal of treated water flushed from the mains including de-chlorination as necessary to protect the environment. Chlorinated water shall not be flushed into the storm drain without local agency approval or to a natural body of water. This includes lakes, rivers, streams, storm drainage systems, and any and all other waters where fish or other natural aquatic life can be expected. Chlorinated water may be discharged to an available sanitary sewer system with the appropriate sewer agency's approval and where the rate of discharge will not overload the sanitary sewer.

5.32 CONNECTION TO EXISTING WATER MAIN

Points of connection to existing water mains shall be exposed prior to trenching of the new mains, and not less than 48 hours prior to the anticipated connection time. Unless specifically provided for elsewhere in these Standards, the Contractor is responsible for giving at least 72 hours' notice to the District of a requested shutdown. The District shall be responsible for notifying the customers and the Fire District affected by the shut-off. Water main shut-off shall not be scheduled to take place on Mondays or Fridays, or on the day before or after a legal holiday, unless otherwise approved by the District. The District reserves the right to limit or restrict the number of and timing of shutdowns to meet District operational needs and other considerations.

Efforts will be made not to interrupt service to a commercial business during business hours or for any special needs customers (e.g. kidney centers, senior or assisted living homes.) Contractors shall accommodate temporary water service to businesses should they be out of service during business hours. Temporary water service shall be provided in accordance with requirements of the International Plumbing Code for potable water supply. Customers shall not be placed out of service for any period in excess of 8 hours. Only authorized District representatives shall operate valves in the existing water system.

The Contractor shall ensure that existing fittings match the approved Plans. The Contractor shall immediately notify the District Inspector and the Design Engineer if the connection cannot be completed in accordance with the Plans so that the connection details may be revised and approved by the District.

Connection to the existing water system shall be done only after the new mains are flushed and have passed pressure and purity tests. All connections to the existing water system must be approved by the District and in the presence of the District Inspector.

Connections to the existing water system may be made under pressure with a tapping machine by determining the size and type of pipe and installing a tapping tee with a tapping gate valve for instances where valves are not being added at the tee. Tapping tees shall be installed as shown on Standard Details. Work shall not start until all materials, equipment, and labor are onsite and ready. The tapping tee and valve shall be installed in a horizontal position so that the valve stem is vertical. Tapping valves shall be water tested prior to tapping water main. Testing the tapping assembly and valve with air prior to performing tap is also acceptable.

Once the water main has been shut off, the work shall be prosecuted vigorously and shall not be halted until the water main is back in service. District inspection shall be provided throughout the connection process and the Developer shall compensate the District for any required overtime.

Where cut-ins are required to be made in existing pipes, the work shall be conducted at such a time and in such a manner as to minimize the interruption of service. Necessary pipe, fittings and gate valves shall be assembled at the site ready for installation prior to the shut-off of water in the existing main. Pipe and fittings to be treated by swabbing and spraying shall consist of less than one full stick of pipe. The remainder of the extension shall be disinfected and accepted as a whole, before the connection process.

The interiors of all pipe and fittings, particularly couplings and sleeves, to be used in final cut-in connection shall be swabbed or sprayed "hot swabbed" with a minimum 12.5% hypochlorite solution before they are installed. No more than one stick (18 feet) of pipe may be hot swabbed without prior approval of the District Engineer.

Flushing shall start as soon as repairs or connections are completed and shall be continued until discolored water and air is eliminated. Flushing shall be supervised by the District.

Valves and hydrants shall be operated only by approved District personnel, unless an emergency exists and requires immediate operation to control water loss and an inspector is not available.

5.33 ADJUSTING STRUCTURES TO GRADE

Existing vault covers affected by a pavement overlay, or adjustment in surface grade, shall be adjusted to grade within three (3) workdays after pavement overlay or temporary asphalt placement. Adjustments shall be made as frequently as necessary to keep the system fully accessible for operation. Adjustment to final grade prior to placement of asphalt overlay is acceptable to the District when adjustment meets the final grade criteria as specified below.

Contractor shall provide access to all valves as directed by the District and critical operating valves shall be identified on the Plans or in the field by the District Inspector.

Raising the existing valve box and cover for road re-surfacing shall be accomplished by adjusting the existing top section of the valve box. Paving risers shall not be used.

If the valve box base section needs to be extended, the Contractor shall install a 4" diameter cast iron soil pipe, with the bell-end of the soil pipe inserted over the top of the existing valve box base section. The spigot-end of the soil pipe shall be located a minimum of 6" and maximum of 9" below finished grade. The valve box top section shall be slipped over the soil pipe and adjusted to the final grade. The final box adjustment shall leave the top of the valve box no higher than final grade, and no lower than 0.5" below final grade (zero/-1/2").

In asphalt concrete pavement, excavation to adjust the valve box shall be accomplished by saw cutting or neat-line jack hammering the pavement a minimum of 12" around the perimeter of the valve box. The final adjustment of working valve boxes shall be made within three (3) calendar days following the final overlay or as directed by the District Engineer for critical operating valves. The final adjustment of non-active valve boxes shall be made within fourteen (14) days following the placement of asphalt at the valve. Excavation patches shall match existing asphalt thickness (4-inch min) and be sealed with asphalt sealant.

Adjustment of valve box covers located in unpaved areas shall be accomplished using the same method as paved areas. Provide a minimum of 2'x2'x2" asphalt or 2' x 2' x 4" concrete pad at the surface as indicated in the Standard Details for valve installations. Follow Standard Details for facilities situated in landscape areas, such as air vac and blow-off installations.

5.34 ABANDONING FACILITIES

Water mains no longer in service shall be removed and disposed of by the Contractor. The water main may be abandoned in-place only with the approval of the District Engineer and agency with Governing Agency. Mains abandoned in place shall be shown on record drawings.

Where authorized, the District shall require the Contractor to fill the abandoned water mains with controlled density fill to comply with local agency requirements depending on the size, material, and location of the water main. Mains abandoned in critical roadways or streams may require additional measures to abandon in place.

The Contractor shall remove all abandoned service lines and shutoff corporation stops at the main. The Contractor shall coordinate with the District Inspection to GPS locate the corporation stop or saddle being removed from service. The remainder of the service line shall be removed. Abandonment in place shall on a case-by-case basis by the District and subject to approval by the right-of-way authority.

Abandonment of structures shall be completed only after water facilities have been properly abandoned or removed. Unless specified otherwise, all structures shall be removed and lawfully disposed.

The District shall have right of first refusal for salvage of hydrants, fittings, valves, meters or other appurtenant features. Plans may specifically identify salvage items for the Contractor to deliver to the District operations yard. Contractor must contact the District before start of construction for clarification of any item Contractor proposes for salvage.

5.35 RESTORATION

Restoration of public and private improvements shall be performed by experienced contractors or by employees of the Developer who are qualified in this type of work. The Developer shall be responsible to maintain all roadway areas until the permanent repair is accomplished.

The Contractor shall limit his construction time on easements to the very minimum possible, including the time required for installation and testing. Restoration work shall follow immediately after pipe testing with due allowance for weather and season of year. To the extent possible, all unpaved surfaces shall be restored to a condition equal to that which existed prior to construction.

All trees, shrubs and any improvements shall be saved, relocated, or replaced by Developer unless specifically noted otherwise on the drawings or in easement stipulations.

In general, all surface restoration shall be promptly completed within 20 calendar days of first disturbance, except through single-family residential properties. All surface restorations, within single family residential dwellings, shall be completed within 7 days of first disturbance.

The Contractor shall comply with all the requirements of the Governing Authority's permits and

regulations. All existing improvements removed or disturbed during the work shall be restored to their original condition. For offsite easements, a signed release from the affected property owner may be required. As a minimum requirement, all restoration shall be made to the condition of the area prior to construction. All restoration shall be performed at Developer's expense.

Note that the Contractor shall be responsible for making or having made any emergency repair to any public or private improvements damaged or destroyed directly or indirectly by Contractor's activities in performing the Work. The District will attempt to contact the Contractor if the need for such repair is reported when Developer is not present. Should District be unable to contact the Contractor, or fails to restore existing improvements within 72-hours, the Developer will be contacted for remedy or the District may perform or authorize whatever emergency repairs the District may deem necessary, and all costs of such emergency repair shall become the responsibility of the Developer.

5.36 BORING UNDER ROOTS

Boring under the root systems of trees shall be accomplished by excavating a trench or pit on each side of the tree, being careful to avoid root injury, and then hand digging or pushing the pipe through the soil under the tree. The pit walls shall be outside the drip line and root ball of the tree and shall have enough depth to lay the pipe at the grade shown on the plan and profile. The Contractor shall employ the services of a qualified arborist at the direction of the District Engineer when conditions warrant extra care. Costs of an arborist's services shall be paid by the project Developer. Contractor shall not cut roots over 2-inches in diameter without an arborist's recommendation for treating the damaged roots.

5.37 WORKING WITH ASBESTOS CEMENT PIPE

When working with existing asbestos cement pipe (AC) in the ground, the Contractor is required to minimize human exposure to asbestos material below the exposure limit as prescribed in WAC 296-62-07705 State/Federal Guidelines and Certification. The Contractor shall provide laborers who are certified by the Department of Labor and Industries (L&I) in accordance with WAC 296-65-010 and in accordance with the correct class of work.

A permit from Puget Sound Clean Air Agency is required to perform the AC pipe removal. Personnel performing the removal must be certified to perform the work. The permit shall be obtained by the Contractor and provided to the District before notice to proceed is given. See Standard Details for additional requirements.

Where a new utility line crosses below an existing asbestos cement (AC) water main, the AC water main shall be replaced with DI pipe as shown on the Standard Detail. Refer to other sections of these Standards for additional requirements.

5.38 CONTROLLED DENSITY FILL

Level of flow-ability shall be "Normal" or as specified on the plans. CDF shall be placed by any reasonable means into the area to be filled. CDF patching, mixing and placing may be started if weather conditions are favorable, when the temperature is at 34 degrees F and rising. At the time of placement, CDF must have a temperature of at least 40 degrees F. Mixing and placing shall stop when temperature is 38 degrees F or less and falling. Each filling stage shall be as continuous as possible. CDF shall not be placed on frozen ground.

Local agency requirements for CDF material may supersede District and strength characteristics defined in this specification outside the pipe zone. CDF may not be used within the pipe zone.

5.39 VAULT INSTALLATION

Vaults for water facilities (pressure reducing stations, valves, water service, flow meters, backflow prevention devices, etc.) shall be installed at the locations shown in the Plan and as staked. It shall be constructed as shown in the Plans, Standard Details and as directed by the District Engineer.

The excavation shall have minimum one (1) foot clearance between the vault outer surfaces and the earth bank. The Contractor shall use foundation gravel (WSDOT 9-03.12(3)) on top of undisturbed soil to support the vault. The vault shall be level, plumb and watertight. The access cover shall be seated properly to prevent rocking and shall be adjusted to match the finished grade.

Where knockouts coincide with pipe location, the voids shall be sealed with concrete or non-shrink grout. Where knockout locations for pipe do not coincide with locations of pipe penetrations into the vault, the Contractor shall core drill openings for pipe.

The vault floor shall free drain to discharge, or to location shown on the Plans. Gravity drainpipe shall be a minimum of 3" diameter. Sump pumps shall be installed per the Standard Details. Installation of the sump and drain is required for all vaults. Vault ejector pumps powered hydraulically shall not be used. When electrical service is not available within 300 feet, the sump, pump and power cord will be installed for District use with portable generator.

Provide a predrilled hole in hatch lid for radio head meter reading device.

CHAPTER 6
PROJECT CLOSEOUT

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6.01 FINAL INSPECTION AND PUNCHLIST

Before acceptance by the District, all Materials and completed Work shall be subject to final inspection by the District Inspector, to determine whether the Work complies with the approved Plans and these Standards. A final punch-list will be created, and the Contractor will have 30 days to complete any outstanding items. Prior to final acceptance, all items as identified as needing additional work shall be completed and re-inspected to the satisfaction of the District Inspector.

6.02 RECORD DRAWINGS

After construction completion, the Design Engineer shall prepare and provide, stamped and signed record drawings (as-built plans) to the District for its permanent records.

Prior to submission of the final record drawings, the Design Engineer shall provide the District two (2) full-sized sets of the preliminary record drawings on bond paper for review. The District will review and provide comments. When all comments have been adequately addressed the District will authorize submission of the Final Record Drawings. Submission prior to authorization will be rejected. The District reserves the right to require subsequent reviews if the Design Engineer fails to adequately address prior comments.

The record drawings shall incorporate information pertaining to the water system improvement as constructed. The record drawings shall meet the following minimum requirements:

- Show official street and road names, addresses and/or lot numbers.
- Show the size, length, material and sections of mechanical restrained pipe and fittings on the as-constructed pipelines between fittings.
- A listing or table of all material manufacturers/products/part nos. used, including pipe, fittings, valves, restraint devices and hydrants.
- Show the size and joint type of each fitting and appurtenance installed.
- Indicate the actual location of the water main including depth of bury or elevation at all fittings and appurtenances.
- Show the actual constructed water main fittings and appurtenances, correcting the location data provided in the drawings, as necessary.
- Indicate the size and location of all water service connections.
- Indicate areas of non-standard cover and any other unique feature of the project.
- The easements shown in the record drawings shall match the final legal descriptions of the easements granted to the District and match the plat.
- Show vertical separations with all other utilities.

The District requires final stamped and signed record drawings by the Design Engineer to include: one (1) set of drawings on mylar, one (1) set on bond paper, and one (1) electronic copy on flash drive. The digital format shall be current release of AutoCAD™ adopted by the District ".DWG" files and in a pdf format. The AutoCAD™ files shall include all Plans, profiles, notes, and details of the Project. Drawings shall be spatially referenced and all external references (ex. ref) and base mapping included. The plot style table (pen assignments) file shall also be included so that the drawings are reproducible at the District.

The originals of all Record Drawings prepared by Design Engineer shall be delivered to the District as a condition of and prior to acceptance of the Project and shall become the property of the District. Neither Developer nor Design Engineer shall have any rights of ownership, copyright, trademark, or patent in the Plans.

6.03 RIGHT OF ENTRY

For projects including backflow devices equipped with detector checks, a Right of Entry Agreement (ROE) document must be provided by the Developer granting access by the District to the vault or structure. The District will own and maintain the "tattle tale" meter attached to the detector check. The ROE includes an Agreement on District standard form plus two exhibits (a legal description and a figure) to be prepared by a licensed surveyor. The Right of Entry Agreement shall be signed and notarized by the Developer or legal property owner.

6.04 EASEMENTS

Easements shall be provided for all water appurtenances not located in right-of-way in accordance with these Standards. All easements shall be prepared by a licensed surveyor on District form and provided to the District for review prior to recording.

Easement figures and legal description shall be included as exhibits suitable for recording with King County. Exhibits shall be 8-1/2-inch by 11-inch with 1-inch borders. The drawing should also depict easement boundaries with bearings, distances, points of beginning from the legal description, north arrow and other information required to review the easement for accuracy in relation to District facilities. Easement exhibits shall be consistent with record drawings indicating the location of District facilities to ensure proper accommodation.

Design Engineer shall provide a copy of all easements on the District's standard form with legal description and figure to the District for review. If the information is not acceptable, the District will return the documents with the required corrections noted. After the District has deemed the documentation acceptable, a final executed copy of the easement, legal description and figures, signed by a registered Professional Land Surveyor, shall be submitted along with a current title report (within 30 days) for the property reflecting all deeds of trust and encumbrances and subordinations (if requested). The easement shall be signed and notarized by the trustees shown on the title report. The District will record the easement after it is accepted, signed and notarized.

6.05 BILL OF SALE

The Bill of Sale form is used to transfer and convey the water system improvements to become the ownership of the District from the Developer. The Developer shall prepare a draft Bill of Sale for review by the District. Based on the review, the District may require additional information to support the costs determined by the Developer. The Bill of Sale shall not include privately-owned facilities like fire sprinkler systems or their appurtenances. The Developer will sign and notarize the Bill of Sale form.

6.06 BACKFLOW TESTING

All backflow devices shall be tested after installation by a licensed Backflow Assembly Tester. The District will not issue any meters or authorize service until all backflow testing is complete and results are reviewed and approved by the District.

6.07 MAINTENANCE PERIOD AND BONDING

Under the terms of the Developer Extension Agreement, the Developer is required to furnish a Maintenance Bond for 50% of the actual and total documented costs for the installation of water main and related appurtenances and faithful performance thereof for a period of two (2) years, or until the District inspects and releases the Project. The maintenance period begins upon acceptance of the Developer Extension as complete by the Board of Commissioners. The bond may be issued by a surety or be a cash bond.

6.08 CONNECTION CHARGES AND FEES

The District will not issue meters for a Project until all connection charges for said meter(s) has been paid. Connection charges are based on the size of the meter at the current rates in effect at the time the fees are paid. Rates are subject to change at any time by direction of the Board of Commissioners.

Developer must pay all fees prior to final acceptance. Miscellaneous fees may be deducted from remaining DE deposit on file provided there are sufficient funds. Additional deposit may be required to address subsequent billings by third party agencies (i.e. ROW permit billings or purity testing) after completion of the Work.

6.09 METER ISSUANCE

The District will not issue any meters until all project closeout paperwork is reviewed and approved as complete by the District. Meters may be issued prior to Final Acceptance provided all other outstanding items are complete.

6.10 FINAL ACCEPTANCE

Upon receipt and approval of all final closeout documents, the District will schedule final acceptance by the Board of Commissioners. A resolution will be presented to accept the Project as complete at a scheduled Board meeting. Upon approval by the Board, the date of final acceptance will set the maintenance period.

6.11 MAINTENANCE PERIOD INSPECTIONS

During the maintenance period, the District may make inspections of the facilities to workmanship or materials. During the maintenance period, the District will contact the Developer or Contractor for remedy to deficiencies in workmanship or materials. The Contractor shall promptly resolve issues but in no case later than 30 calendar days of notice. Emergency situations shall be resolved immediately. Failure of the Developer or Contractor to timely remedy deficiencies will cause the District to resolve at the Developers expense. The District may use maintenance funds or call on the Surety to have any issues resolved.