

Chapter 5

Water

City of Kelso
Engineering Design Manual
June 2008
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CHAPTER 5 - WATER

5.00 Utility Easements and Tracts

All public utilities (storm, water, and sewer) shall be in public right-of-way, utility easements or tracts. Easement and tract width shall be a minimum twenty (20) feet. No obstructions including but not limited to fences or retaining walls are to be located within the easement or tract.

5.01 General Design Considerations

- A. In all developments water main extensions and looping are required to assure orderly development of the water utility system. Where applicable, water main extensions shall conform to the requirements of the City's latest approved Water System Plan. Where the proposed extension is not addressed in the Water System Plan, the Applicant shall pay the cost for any Water System Plan amendments required by the Washington State Department of Health, or City Engineer. All proposed water main extensions must comply with the City's requirements for development, water quality and pressure zones, and fire protection requirements of the City. The proposed main extension shall be designed by a licensed engineer and be approved by the city engineer and appropriate governmental authorities. The design shall be in conformance with the city standards and shall be designed by the use of a hydraulic analysis considering pipe size, restrictions, peak demand, length of run, elevation differences, the availability of water in the existing mains, reservoir capacity, pressures in the area, other local conditions and other factors as may be pertinent. If the extension is considered feasible, then the pipe diameter and other conditions shall be determined by the analysis. A meeting with the City Engineer shall be required prior to acceptance of the hydraulic analysis to help determine minimum requirements for the hydraulic analysis report.
- B. Design and construction of water mains, including but not limited to, mainlines, valving, fire hydrants, fire sprinkler connections with backflow devices, domestic and irrigation services, pump stations, pressure reducing stations, telemetry and other appurtenances shall be in compliance with the City ordinances, special requirements of the City, these Standards, and the Standard Details.
- C. All service laterals, 2" and smaller, shall be copper type K. All water mains and service laterals larger than 2" shall be Ductile Iron.,
- D. The applicant is responsible for designing the proposed water system(s). The system(s) must be designed by a licensed engineer and approved by the City.
- E. Water mains shall be extended through and to the extremes of the property being developed for gridding or future development, as determined by the City.
- F. The City discourages dead end water main extensions. Unless specifically approved by

the City Engineer, all water main extensions shall be looped to other water mains within the pressure zone of that water main extension. Generally, looping of water main extensions is required for all extensions serving twenty (20) or more equivalent residential units.

- G. The City discourages water main extensions for service to pressure zones different from the pressure zone from which the extension is made. Unless specifically approved by the City Engineer, booster pump stations or pressure reducing valve stations shall not be permitted.
- H. Water mains parallel to a sewer shall be above and separated by a distance of ten feet horizontally.

Under unusual circumstances, the horizontal spacing may be adjusted subject to the approval of the director of public works. Water mains crossing sewers should not be less than three feet above the sewer. Where it is necessary for a sewer to cross within eighteen (18) inches or over the water main, the sewer shall be constructed of ductile iron for a distance of ten feet on either side of the water main as approved by the director of public works. At no time shall the water main design not be in accordance with the DOE Orange Book.

- I. Rights-of-way or easements shall be provided to the City for access and maintenance of all conveyance systems, or other facilities as deemed appropriate by the City Engineer, within the development site, which are to be maintained by the City. The minimum widths of rights-of-way or easements shall be as follows, although the City Engineer may require increased widths when necessary to insure adequate area for equipment access and maintenance:
 - 1. Pipes with an inside diameter less than or equal to thirty-six (36) inches: twenty (20) feet;
 - 2. Pipes with an inside diameter greater than thirty-six (36) inches: twenty (20) feet or larger as required by the City;
 - 3. Pipes shall be centered within the right-of-way or easement;
 - 4. Pipes with more than a seven (7) foot depth to the invert shall require wider easements. A slope of one (1) horizontal to one (1) vertical from the storm drain invert to the ground surface shall be used in determining easement width.

No buildings or other structures that prevent access are permitted within rights-of-way or easements. Fences crossing rights-of-way shall provide gates of sufficient width to provide access by maintenance vehicles.

When possible, easements for apartment complexes or commercial/industrial developments shall be in parking lots, private drives, or similar areas that allow unobstructed vehicle access for maintenance.

5.02 Sizing and Pressure Requirements

- A. In areas where gridding or fire flow is a requirement, 8-inch diameter pipe will normally be required. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to meet fire protection requirements or for future service. The Applicant shall be required to pay the cost of all oversizing. Reimbursement for oversizing will be in accordance with the KMC.
- B. An adequate grid for eight (8) inch pipe shall measure no more than six hundred feet on one side and the sum of two sides shall not exceed nine hundred feet. Necessary fire flow, as recommended by the fire department, shall be considered and pipes shall be sized to meet these requirements. Where a grid is not established, pipe size shall be of a diameter suitable to carry the peak daily demand plus the required fire flow.
- C. Dead end mains normally shall not be allowed. When they are permitted, a blow off assembly will be required. In the event that the "dead end" finishes where there is risk of a vacuum being created due to water shut down, then a Combination Air and Vacuum Release Valve shall be installed in accordance with the Standard Drawings.
- D. All water system installation shall be designed to provide a pressure range at the residence of thirty (30) psi to ninety (90) psi at all times, including during peak demand, unless specifically approved.
- E. An approved screen shall be located in the pressure reducing valve vault at a location upstream of the pressure-reducing valve. Pressure reducing valves may be required at the discretion of the City on individual services. Such valves will be installed after the meter and will be the responsibility of the homeowner to install and maintain.
- F. Water service size shall be evaluated by the applicant's engineer. The requirements of this section shall be met and shall be no smaller than 1-inch. Booster pumps shall not be allowed on meter service lines in order to meet this requirement, unless specifically approved by the City Engineer.
- G. Where requested by the City Engineer, the applicant's engineer shall provide a "pressure available" chart on the water system plan sheet of the construction plans. This sheet shall indicate the calculated pressures theoretically available to each lot during static and peak demand periods. In such cases it shall be the Applicant's engineer's responsibility to determine pressures based upon an analysis of the system. All work associated with the analysis shall be paid for by the Applicant.

5.03 Shut-off Valves

- A. Valves shall be located, whenever possible, at intersections (one (1) valve per each line radiating from the intersection). In general, sufficient valves should be provided to permit shutting down any section of the line, not exceeding five-hundred (500) feet, with valve operations in not more than three (3) locations.
- B. Valves shall be installed in clusters at pipeline intersections.
- C. Valves 8-inches and smaller shall be resilient seat gate valves.
- D. Valves 10-inches and greater shall be butterfly valves.

5.04 Air-release Valves

At high points in the water system, combination air and vacuum release valves (CARV) shall be installed as required by the City Engineer. All Air-Vac, Air Evacuation, and Vacuum Prevention Valves of sizes two (2) inches and larger shall vent to the outside of the vault. If construction of the valve does not permit the venting of leakage to the outside of the vault, a screened drain to daylight of at least the supply line size must be provided at a level that will prevent cross connection and/or backflow problems. This decision will be made by the City Engineer prior to the plan approval.

5.05 Hydrants

- A. The number and locations of fire hydrants, fire flow requirements, and fire sprinkler components will be recommended by the Cowlitz Fire Department District #2. Following are general requirements for fire hydrant locations:
 - 1. **Commercial Buildings:** Fire hydrants shall be located so that no part of a commercial building is more than two-hundred and fifty (250) feet from a fire hydrant measured along a route accessible to fire department vehicles. When a fire department connection (FDC) is installed in conjunction with an automatic sprinkler system, it is required to have a fire hydrant located within seventy (70) feet of the FDC.
 - 2. **Non-Commercial Buildings:** Fire hydrants shall be placed at a minimum at each street intersection. The Fire Marshall may request additional hydrants per Fire Code requirements.
 - 3. Intermediate hydrants are required when the distances to any part of non-commercial buildings exceeds five-hundred (500) feet measured along a route accessible to fire department vehicles.
- B. Fire hydrants shall not be connected to mains less than 8-inches, or 6-inches in diameter where the length of 6-inch main is less than two-hundred (200) feet. As per

the IFC, fire hydrants shall be located to allow a 5-foot clear space surrounding the hydrant. For example, street lights, sign posts, protective posts, or retaining walls shall be no closer than five (5) feet from the nearest portion of a hydrant. There shall also be no obstructions directly in line with any of the ports of the hydrant.

- C. Fire hydrants shall have Storz fittings (or approved equal).
- D. Fire hydrants subject to possible vehicular damage shall be adequately protected with guard posts in accordance with Uniform Fire Code Section 8001.11.3. For marking, see Section 901.4.3. For obstruction, see Section 1001.7.

5.06 Water Meters

- A. Water meters sized $\frac{3}{4}$ -inch and 1-inch shall be furnished and set by the City. The owner is required to make application and pay meter fees prior to the installation. The City will install meters and lock off meter setters and turn on as requested by the owner after acceptance by the City.
- B. Meters 1 $\frac{1}{2}$ -inch and larger will be installed by the owner as part of the construction project and provided to the City Operations for testing and approval prior to installation. After testing and approval the applicant's contractor shall install.
- C. Water meters will be set only after curb stop and box are at proper finished grade, an approved sanitary sewer or septic has been installed and accepted, a water use questionnaire has been approved, and all fees have been paid. All meters shall remain the property of the city.
- D. Meters shall be located outside of the sidewalk and/or drivepath at the edge of public right-of-way, in the landscape strip or as otherwise approved by the City Engineer. Meters and services shall be relocated if a driveway or crossing is to be constructed over the existing service.
- E. Meters located within county right-of-way shall be within the county right-of-way and within two (2) feet of the property line nearest the customer's premises.
- F. In situations in which the above meter locations do not apply, or if locating the meter according to the above standards pose a risk to public safety or creates an undue hardship, the location of the meter(s) shall be approved by the City Engineer
- G. All irrigation systems require the installation of state certified backflow devices.

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

- H. Adjustments, repairs, or replacement of the service line, meter box, or setter shall be the responsibility of the property owner.
- I. Water services are to be single runs from the main line to each meter. Manifolds with multiple meters shall be allowed in multi-family units with a single property owner or on commercial/industrial sites with a single owner as approved by the City Engineer. The location of all water services crossing curbs shall be indicated by a “W” stamped into the concrete curb.

5.07 Fees and Charges

All fees and charges related to development shall be in accordance with the latest requirements of the KMC.

5.08 Cross Connection Control

- A. All water system connections to serve buildings or properties with domestic water, fire sprinkler systems, or irrigation systems shall comply with the minimum backflow requirements as established by the Department of Health (DOH), WAC 246-290-490, and the City.
- B. Backflow devices shall be installed in accordance with the requirements of the "Accepted Procedure and Practice in Cross Connection Control" manual, the Uniform Plumbing Code, Chapter 6 Washington State Amendments 603.0.

5.09 Contract for Reimbursement (Latecomer Agreements)

Should the Applicant deem that the utility extension is an undue hardship and will significantly benefit other property owners, the Applicant may request a latecomer agreement, in accordance with the KMC.

5.10 Water Quality

The quality, taste, and odor of water drawn from new construction water mains shall be the same as the water in the existing facility classed as acceptable for use by the City. Should the water not be acceptable for use because of taste, required steps as approved by the City shall be accomplished to attain water quality acceptable for use. Sampling for such water quality testing shall be performed by the use of a Kupferle (model #88 Eclipse) sampling station installed permanently and specifically for such testing. A sampling station shall be required for every fifty (50) EDU's or as determined by the City Engineer. The location for said sampling stations will be determined by the City Engineer.

5.11 Plans and Specifications

All extensions to the water system shall conform to the most recent edition of the Standard Specifications for Road, Bridge, and Municipal Construction. The system shall be capable of future

expansion and be constructed of permanent materials.

The installation of water extensions shall be in accordance with construction plans and specifications prepared by the Applicant's engineer and reviewed and approved by the City. Where conflicts exist the more stringent specification shall apply as approved by the City.

5.12 Connections to Existing Pipelines

- A. Connections shall only be allowed to existing mains. Connections to existing mains will only be allowed after receiving approval from the City Engineer. Upon the presentation to the City Engineer of the treasurer's receipt for service charges and the execution of the agreement, the City Engineer shall cause the premises described in the application to be connected to the City's water main.
- B. Connections may be made to existing pipes under pressure with a tapping machine by determining the size and type of pipe and installing tapping sleeve to fit complete with tapping valve. Where cut-ins are permitted 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. Cut-in time must be approved by the City. Necessary pipe, fittings, and gate valves shall be swabbed with chlorine and assembled at the site ready for installation prior to the shutting-off of water in the existing main. Once the water has been shut off, the work shall be performed vigorously, to minimize the interruption, and shall not be halted until the line is restored to service. Operation of all water main line valves shall be by the City. The City shall witness all wet taps and cut-in connections and requires forty-eight (48) hours notice and approval by the City.
- C. The Contractor shall have the responsibility of giving written notice to the City at least four (4) days and to affected customers at least 48-hours prior to disruption of service. Written notice to affected customers shall consist of, at a minimum, door hangers, as well as signs posted at the entrance to the customers streets of the impacted area.
- D. Pipes to be abandoned shall be removed or capped with mechanical couplings, as determined by the City Engineer.
- E. Service connections shall extend at right angles from the main to the property line. The city connection which shall include a ball corp stop, a ball valve, and an angle ball valve shall be placed within the curblineline and the meter set assembly in conformance with these Standards and the Standard Details.

5.13 Roadway and Railway Crossing

The owner shall use the method, which has been designed on the plans and is acceptable to the City and the government or private agency having control of the road. Permits are required and a copy shall be provided to the City.

5.14 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way and as permitted by the property owner and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the Applicant.
- B. Trenching for water mains shall be completed in accordance with the Standard Specifications.
- C. Trenching and shoring operations shall not proceed more than one-hundred (100) feet in advance of pipe laying without written approval of the City.
- D. Where a utility crosses under an existing asbestos cement water main or where a trench alters the bedding of an existing asbestos cement water main, the existing A.C. pipe shall be cut three (3) feet minimum from each side of the trench wall and replaced with a corresponding size ductile iron pipe Class 52. The ductile iron pipe shall be connected to A.C. pipe with transition couplings.
- E. Contractor shall furnish a watertight plug of the appropriate size which shall be installed in the end of water main when work is delayed or stopped at the end of the work shift.

5.15 Pipe in Filled Areas

Where pipe is to be installed in filled areas, special treatment may be required at the discretion of the City. This treatment may consist of compacting the backfill in 6-inch layers, careful choice of backfill materials, use of Mechanical Joint Ductile Iron Pipe in short lengths, or such other reasonable method or combinations as may be necessary or as required by the City.

5.16 Pipe Installation for Water Mains

The work necessary to excavate, bed, and backfill water pipelines shall conform to the requirements of the Standard Specifications and the Standard Drawings.

A. Pipe and Fittings

Use only Class 52 ductile iron pipe and fittings in accordance with the Standard Specifications.

B. Permissible Deflection of Joints

Wherever it is necessary to deflect pipe from a straight line either in a vertical or horizontal plane, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed the values in the following Table 1 Section 5.18B:

**Table 5.1
 Maximum Deflection Permitted*
 18-Foot Length Pipe**

Dia. In.	Mechanical Joint** Maximum Deflection		Push-on Joint Maximum Deflection	
	Angle Degrees & Minutes	Deflection Inches	Angle Degrees	Deflection Inches
4	8-18	31	5	18
6	7-07	27	5	18
8	5-21	20	5	18
10	5-21	20	5	18
12	5-21	20	5	18

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

** Safe deflection for one hundred and fifty pounds (150 lbs.) pressure. For higher pressure, reduce tabulated deflection proportionally ten percent (10%) for each one hundred and fifty pounds (150 lbs.) added pressure.

5.17 Bedding and Backfill

Use imported bedding for all water main pipe installed under pavement, curbs, sidewalks, or usable shoulder. Bed and backfill pipe and appurtenances in accordance with the Standard Specifications.

5.18 Hydrostatic Tests

The Contractor shall make pressure and leakage tests on all newly laid pipe. Test to be made at two hundred and fifty (250) psi for 2-hour with acceptable loss in accordance with WSDOT standard specifications. Test at higher pressures may be required depending upon installation. Furnish all necessary equipment and material, make all taps in the pipe as required, and conduct the tests. The City shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness the test shall be at the owner's expense.

A. Correction of Excessive Leakage

Should any test of pipe laid disclose leakage greater than that allowed, locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance. The leakage allowed during a test shall be in accordance with the Standard Specifications.

B. Isolation of Existing Systems Prior to Testing

Existing water pipelines shall be protected from contamination during the testing process for new construction. The newly installed water line shall only be connected after it has passed pressure and dechlorination tests. Use of special "blind flanges" will be necessary if the line being tested cannot be adequately separated from existing systems. The Applicant's engineer shall submit shop drawings and proposed procedures to the City prior to installing any special testing device.

5.19 Sterilization and Flushing of Water Mains

Pipeline intended to carry potable water shall be sterilized before placing in service. Sterilizing procedures shall conform to the standard specifications as hereinafter modified or expanded.

A. Disposal of Sterilizing Water

Dispose of sterilizing water in an approved manner. Do not allow sterilizing water to flow into a waterway without adequate dilution or other satisfactory method of reducing chlorine to a safe level. Dechlorination procedures are to be submitted in writing and approved by the City Engineer prior to flushing system.

5.20 Cross Connection Control and Backflow Assemblies

An approved backflow prevention assembly, as listed in "Backflow Prevention Assemblies for Installation in Washington State" (DOH PUB 331-137), is required on all fireline systems, domestic water service larger than 2-inches, and/or building in excess of thirty (30) feet above the water main.

The assembly shall be installed at the location normally established for water meters, usually at the property line. A water service shall not be turned on until all required backflow prevention assemblies are installed, inspected, tested, approved, and registered with the City of Kelso. Costs of all installations, including all costs of inspection and testing fees, shall be the responsibility of the customer. The backflow prevention assembly will remain the property of the customer. The customer will be responsible for all maintenance and testing of the assembly and vault for the life of the assembly.

When required, backflow prevention assemblies for protection of the public water system shall meet the requirements set forth in the current Washington State Department of Health regulations, Uniform Plumbing Code, and City ordinances. All installation shall meet AWWA Cross Connection Control Manual, May 1990, requirement.

The type of backflow prevention assembly required is determined by the aforementioned rules and codes, based on the type of premises to which water service is being provided. The approved types of assemblies are listed below with some of the types of premises that must be protected by each type of assembly. However, these lists are not complete, they are only intended to provide some basic guidelines.

A. Reduced Pressure Backflow Assembly

An approved Reduced Pressure Backflow Assembly shall be installed on the service connection above ground to the following:

1. Any parcel or building that has an auxiliary water supply on or available to it. This will include any above or below ground water source. (The most commonly encountered type of auxiliary water supply is a private well);
2. Buildings which are located within an industrial zone;
3. Hospitals, medical centers, and clinics;
4. Mortuaries and nursing homes;
5. Gas stations;
6. Car washes;
7. Sewage pump and lift stations;
8. Dry cleaners and commercial laundries;
9. Any water system which has a pump to supplement pressure; and
10. Irrigation systems, which are designed to use chemical injection.

B. Double Check Assembly or Double Check Detector Assembly

An approved double check assembly or an approved double check detector assembly shall be required (provided that all internal plumbing is installed and maintained in accordance with the Uniform Plumbing Code), on the service connection to premises where there is:

1. Any fire system or water line to a private fire hydrant;
2. Multi-story buildings which are in excess of thirty (30) feet above the water main at the service connection;
3. Shopping centers or large retail stores; and
4. Restaurants or fast food establishments.

C. Installation and Testing

Backflow prevention assemblies shall be installed at the water service connection on the customer side of the meter. Backflow prevention assemblies 1-inch and smaller shall be installed in a heated and/or insulated enclosure capable of providing year-round freeze protection, sized to meet the clearance requirements as shown in the Kelso/Longview Standard Plans and Specifications.

After installation, all backflow prevention assemblies that are installed must be tested upon installation by a State of Washington certified tester. The results of the testing shall be received by the City prior to issuance of "final occupancy."

Backflow prevention device assembly vaults shall be constructed in accordance with the standard drawings and requirements of this section. Backflow vaults shall be on private property and located outside of public easements.

5.21 Requirements for Water System Vault Installations

To ensure proper operation and accessibility of all assemblies, the following requirements shall apply to installation of these assemblies, unless otherwise approved by the City. Vaults shall be constructed per the Standard Details.

- A. The vault shall be sealed with an asphalt base foundation coating on the outside of the vault. Vault penetrations shall be sealed with non-shrink grout from the outside. Apply waterproof coating over grout. Backfill around vault per the manufacturer's specifications.
- B. Access shall be through an H-20 rated hydraulic assist locking hatch of minimum size 36" x 60" locking open at 90°. Hatch is to be leak proof, gasketed, double raise and made of aluminum.
- C. Provide approved ladder if the vault or chamber depth is 5'0" or greater and entry is through the vault or chamber roof. Ladders shall include a Model 1 Bilco LadderUP safety post or approved equal.
- D. Adequate drainage for the vault or chamber shall be provided. (Drainage to piped storm systems allowed with check valve).
- E. Vault must be equipped with a moisture proof light fixture if adequate lighting is not available.
- F. Vault is to have no other use, except for use described by these Standards.
- G. Vault shall be installed on undisturbed base or compacted 3/4"-0" gravel base.

- H. No piping shall be installed in excess of three (3) feet above the vault floor.
- I. Assembly is to be adequately supported from the floor, and suitably restrained from movement. Supports shall consist of steel supports or approved equal; no wood supports shall be used.
- J. All electrical wiring shall be inspected by the Washington State Electrical Inspector (Permit is required).
- K. The assembly shall be readily accessible with adequate room for maintenance.
- L. All new services are to be pressure tested and disinfected by the contractor and proven to be bacteriologically safe from the existing main to the vault.

5.22 Fire Services and Domestic Services

- A. No part of the backflow prevention assembly shall be submerged in water or installed in a location subject to flooding. In a vault or chamber, adequate drainage shall be provided; and test cocks shall be plugged. The plugs shall not be of dissimilar metals.
- B. The backflow assembly shall be protected from freezing and other severe weather conditions.
- C. All backflow assemblies shall have a minimum twelve (12) inch clearance on the backside, Twenty-four (24) inch clearance on the test-cock side and twelve (12) inches below the assembly.

Adequate clearance of at least six (6) inches must be maintained above gate-valve stem at full extension. Headroom of six (6) feet is required in vaults without a full opening top. Access to the device and to any vault or chamber shall remain clear at all times.

- D. No more than one (1) premises shall be served by any one (1) fire service.
- E. Fire services shall be metered at the expense of the owner. Detector check meters shall be installed on automatic fire sprinkler services which may include hose racks inside the building; size and type shall be approved by the City. Double Check Detector Assemblies shall be installed on all fire services where hydrants are installed.

5.23 Special for Fire Service Only

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

- B. Only approved resilient seat indicating valves are allowed on fireline assemblies.
- C. Only approved Double Check Detector Valve Assemblies are to be used for system containment on fire line services in the City. The meter on the bypass detector shall read in cubic feet.
- D. Fire Line Flow and Tamper Switches installed, as required by UBC sec. 3803, must be connected to a monitored Fire Detection System approved by the Fire Marshal. The tamper switches are required on the rising stem gate valves in the vault, as well as any other indicating control valves on the fire protection system. Electrical inspection and permit is required.
- E. The remote reader (if allowed) shall be rigidly mounted on an exterior building wall (near the domestic meter), enclosed in a metal box with a slot opening which allows reading the remote without opening the box, and at an elevation of five (5) feet above the ground level.

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

5.24 Water Meter Vaults

The vault is to be provided and installed by the Contractor, per Standard Drawings.

5.25 Pressure Reducing Valve Vaults

PRV vaults are unique to each situation. The engineer shall detail the vault on the plans and submit for review. The City will review the vault for size and compliance with the general requirements listed under this section.

5.26 Appurtenances

- A. Air and Vacuum Release Valves
 1. Air and vacuum release valves shall be APCO - Valve and Primer Corporation, "Heavy-Duty," combination air release valve, or equal.
 2. Installation shall be as shown on the Standard Details.
 3. Piping and fittings shall be copper or brass. Location of the air release valves as shown on the plans is approximate. The installation shall be set at the high point of the line. Water line must be constructed so the air release valve may be installed in a convenient location.