Avion Water Company

Design Manual

Revision: C

Use of These Design Standards

These Design Standards provide required design constraints, methodologies, features, and practices that shall be implemented in all designs of facilities located within Avion Water Company service area. If, in practice, a designer encounters a design feature for which a Design Standard does not exist, the responsible designer shall use best professional judgment for completing the design. Avion Water Company retains the right to establish requirements for design of systems and components for which a Design Standard does not exist and the designer shall modify designs to reflect all requirements of Avion Water Company. To avoid re-work, the responsible designer should seek approval from Avion, early in the design process when it becomes apparent to the responsible designer that a project requires design of features for which a Design Standard does not exist.

Developers and designers/engineers are reminded that Avion Water Company is a privately owned, public regulated company. It is not part of any municipality or district, but is regulated by the Public Utility Commission. Consequently, there are differences in Avion's requirements as compared to other water system operators such as the City of Bend and these standards should be reviewed carefully.

The City of Bend Community Development Department and other agencies should be consulted for permits that will be required for projects. Prior to design, the designer should consider proximity to all private utilities, canals, or railways that may exist and understand their permitting and approval requirements. Their requirements are likely different than these design standards but could impact overall design and layout of public infrastructure.

These design standards are intended to complement Avion Water Company's standard construction specifications, which are based on the Oregon Standard Specifications for construction as supplemented and/or modified by appropriate special provisions.

Information Required on Plans

In addition to specific information required below, the following shall also be included on all plans:

- Identify the location of all public and private utilities, both existing and proposed
- Street names including area quadrant (i.e. N.E., N.W., S.E., or S.W.)
- Special details for items not shown on Standard Drawings
- All relevant public facility data, including size and quantity of improvements
- Fire flow requirements as per City of Bend Fire Marshal
- Show existing and proposed ROW, property lines, survey monuments and label assessor's parcel numbers
- Any existing or proposed easements

Water Plan and Profile Views

- Location of valves, fittings, fire hydrants and services
- Stationing along waterline
- A profile showing sufficient minimum cover and finished street grade and crossing locations showing potential conflicts
- All existing Avion infrastructure shall be pothole verified for location, elevation and pipe type, prior to design. Plan sets will not be signed by an Avion representative without pothole information.
- Fire flow requirements
- Utilities conflicts
- Service to each lot with station and offset at end of service line
- Pipe curvature radius and/or joint deflection angle
- Fittings specified with stations
- All fire service lines plan and profile
- Thrust block details
- Restrained joint pipe table showing restrained joint lengths for all restrained pipe
- Water and sewer information should be on the same plan sheet.
- Location of stormwater manholes, storm lines, catch basins,
- Invert elevations shown at manholes, catch basins, and inlets
- All utilities and services with conflicts indicated on profiles
- Stormwater pipe material identified

Design Guidelines

Materials and procedures for water facilities shall conform to the most current Oregon Standard Specifications for Construction as supplemented and/or modified by Avion's specific requirement; as well as Oregon Health Division Administrative Rules, and American Water Works Association (AWWA) standards.

All design elements below are minimum requirements. Any exception will require written approval from Avion Water Company Engineering Department.

Any changes to final, approved, and signed plans require written authorization of Avion Water Company and the Engineer of Record for the project.

1. Main Line

Avion's water distribution system is designed to meet peak hour demands and all fire flow requirements with minimal impacts to our customers. All new elements added to the existing system need to be designed with these requirements in mind. Where new water infrastructure is being constructed, water systems shall be looped into existing water pipes in the project vicinity. Dead ends are not permitted.

Where water mains and services within a utility easement (outside of public right of way) on private property are to be decommissioned, it is preferred to have all pipes removed, however with Avion's approval, they can be abandoned in place when the easement is extinguished and Avion releases liability of/for the abandoned pipeline to the property owner.

Avion water pipe shall be constructed in a trench with Class B compacted backfill within the pipe zone in conformance with the standard drawings. Water mains shall not be constructed on blocks.

Responsibility for engineering and any necessary Oregon Health Authority approval rests entirely with the developer, such approval being required prior to starting construction on any system not covered by an exception authorized via an approved master plan.

Minimum Size

The minimum pipeline diameter for mainlines shall be 8-inches. Mainlines shall be either 8, 10, 12, 16, 18, 20, or 24 inches in diameter, at Avion's sole discretion. In general, 8 inch will be allowed only for loops serving small numbers of services that are not part of the larger transmission network. Fire hydrant lines shall be 6-inches in diameter and have a 400-foot maximum running length. All mainline extensions and system designs shall meet required minimum fire flow for that zoning. Design flow through a development may be specified separately as appropriate on a case-by-case basis.

A developer who wishes to reduce a mainline size specified by Avion may request a reduction under the following conditions:

- Pipe systems for new developments shall be sized sufficiently that there is zero additional peak pressure drop for any existing customer upstream or downstream resulting from the added demand.
- Pipe velocity requirements specified in this document are met.

- The developer shall perform modeling with assistance from Avion Water to support their design and show that the previous conditions are satisfied. All details and assumptions made shall be stated and approved by Avion.
- Reductions will be at Avion's sole discretion.

As an unchlorinated system, Avion may request smaller distribution mainlines to address water quality concerns at its sole discretion.

Marking Tape

Marking tape and tracer wire is required on all mains. Marking tape must be minimum 2 inches wide, APWA blue. The marking tape must be installed at the top of the pipe zone material, 12 inches minimum above the main, centered on the main. Refer to Standard Details.

Materials

PVC is the preferred material for construction of waterlines for the Avion system. Ductile iron is also approved for construction of water lines and fittings, and is required in specific circumstances. Use of ductile pipe where not required by Avion requires written approval. Adequate controls and protective equipment shall be provided so that the level of pressure rise resulting from surges and other variations from normal operations shall not exceed the internal design pressure at any point in the piping system and equipment by more than ten percent. Surge analysis calculations shall be provided on request for Avion's review and shall be included with any design submittals. Minimum class requirements:

Pipe Diameter (I.D.)	Class
12-inch and smaller Ductile Iron	52
16-inch and larger Ductile Iron	50
PVC	DR-18

Location

All water lines must be located in public right-of-way or private, exclusive easement. Public easements across private property will not be allowed unless approved by Avion and shall be used sparingly. Any Avion water lines (domestic water services, fire services, or private water mains) entering into private property requires premise isolation (backflow devices) at the right of way. The location of the premise isolation shall be on private property. Backflow devices will be permitted within a building on a case-by-case basis.

Water mains shall be located 10-feet from roadway centerline. Water mains shall be offset a minimum 6-feet from the centerline where located on streets 32-feet or less in width (curb to curb). Water mains shall be constructed a minimum 3-feet from the curb.

A 10-foot minimum horizontal separation from sanitary sewer, storm and underground utilities shall be maintained. At sewer and storm crossings, the bottom of the water line shall be 1.5-feet or more above the top of the sewer line. Where 1.5-feet vertical separation cannot be obtained at the crossing or anytime the sewer line is above the waterline, the sewer/storm pipe at the crossing shall be constructed such that one full 20-foot stick of water pipe is centered at the crossing. Separation from sanitary sewer lines is established by Oregon Administrative Rule (OAR) 333-061-0050. Utility crossings are to maintain a typical 12-inches vertical separation from all water crossings, with minimum 6-inch vertical separation permitted with Avion.

All water lines shall have a minimum of 36-inches of cover measured from the top of the outside pipe to the top of the roadway surface. Maximum depth of a water main shall not exceed 6-feet unless specifically approved by Avion.

Velocities

Peak day instantaneous velocities shall not exceed 5 feet per second. Peak day instantaneous + fire flow velocity shall not exceed 8 feet per second. In no case will velocities exceed 8 feet per second. New construction shall not cause velocities to exceed 10 feet per second in any portion of the distribution system upstream of the development (peak day instantaneous + fire flow). Offsite improvements will be required for any new development that results in velocities exceeding these standards. Consideration for surges from higher velocities must be considered in the design.

Pressures and Flow Calculations

Avion Water Company has numerous pressure zones throughout its service territory, each with unique pressures. Avion strongly recommends that the designer understand the pressure zone they are in and the specific requirements associated with that zone.

The following table identifies the requirements for pressures:

Condition	Pressure (PSI)
Minimum Service Pressure Under Fire Flow	20
Minimum Service Pressure Under Normal Conditions	50
Maximum Service Pressure without PRV	80
Maximum Service Pressure with PRV	120

Avion is required to ensure required fire flows can be obtained at 20 psi. Pressures higher than 20 psi are not guaranteed, and the designer should consider how pressures may change over time as additional development is added beyond any proposed tie in or extension of the existing water distribution system.

Normal service pressures are defined as static pressures on peak day demand. Pressures below 50 psi typically generate complaints. To avoid complaints, the designer is required to design facilities to obtain this goal. If normal service pressures cannot be met, each service line will require an individual and private pressure pump located a minimum of six feet past the premise isolation and shall not be located on Public Rights Of-Way, and/or the title to the property that the service line is serving shall be modified to state:

> *"Known low water pressure area. The Avion Water Company is not responsible for inadequate service pressures associated with this property. If pressures are unsatisfactory to the property owner, the property owner at their discretion can install a pressure pump on the downstream side of the Avion Meter at the owner's expense. The pump shall be located at a minimum of six feet past the premise isolation and shall not be located on public Right-Of-Way. In no situation is Avion responsible for maintenance, service, or replacement of this pump."*

Maximum service pressures that are at, or exceed, 80 psi on Avion owned mainlines will require a pressure reducing valve and vault. The designer will need to meet with Avion to determine

exact location, orientation, size, and type to be installed. Water service lines past the Avion owned meter must meet plumbing code requirements for maximum pressure. It is strongly suggested that service lines that are within 10% of maximum pressure as determined by plumbing code install individual pressure reducing valves.

Bends and Joint Deflection

All bends shall be called out on the plan and profile by station and offsets, including size, number, and designation (90°, 45°, 22-1/2°, 11-1/4°) of each. When applicable, joint deflection shall be called out in the number of degrees per joint and radius of curvature when several joints in succession are to be deflected. Deflection shall not exceed one half the manufacturer's recommendation. In most cases, maximum allowable deflection is 0.5°. If the design engineer wishes to utilize the allowable deflection for design purposes, and the allowable deflection is 1.0° or less, the design engineer shall designate a method of inspection that is acceptable to Avion Water Company. The developer's contractor shall provide all necessary equipment to perform the designated inspection.

Thrust and Restrained Joints

Avion requires mechanical restrained joints. Any other thrust restraints require a waiver request in writing, including the specific reason mechanical restraints cannot be used and the engineering calculations behind the proposed alternative. All restrained systems shall be in conformance with AWWA guidelines and engineering best practices.

The Engineer shall provide calculated restrained lengths for all bends, tees and appurtenances requiring thrust restraint. Calculations shall be run under the following minimum requirements, as per AWWA standard: 2:1 safety factor, type 5 trench, 3-foot bury, 150 psi test pressure and soils consistent with the site geology (typically a GM – Silty gravel, or as determined by the engineer of record). All improvement plans shall have a restraint table stating the applicable restraint lengths for pipe size and fittings used, calculation inputs and installation notes.

Pressure Reducing Vaults

Pressure Reducing Vaults designs shall be coordinated with Avion on a case-by-case basis, but shall generally conform with the appropriate Avion drawing. See details under valves.

2. Service Lines

The minimum water service line size is 1-inch diameter to the meter. This line size may be reduced through the meter as required for domestic service. The water meter shall be the same size or smaller than the water service line.

No more than one dwelling is permitted for a meter. Any rentable unit such as an ADU requires a separate meter. Each unit of a duplex or tri-plex requires a separate meter. New construction homes with a built-in ADU require a separate meter for each dwelling. Any newly constructed ADU requires its own meter. Remodeling of an existing house within the existing foundation footprint to add an ADU does not require separation of the plumbing or a new meter. Remodeling of a house to add an ADU that expands the existing foundation footprint requires a separate meter. Conversion of a detached building (i.e. garage or shed) into an ADU requires a separate meter. Multi-family housing with 4 or more units per building may be master metered with one meter per building. In rare cases, large commercial or multi-family developments may be metered differently. Such allowances are to be made at the sole discretion of Avion Water Company.

Service lines shall be installed as shown on the Standard Drawings. All service runs shall be one continuous run of copper to the meter. All service lines shall have a minimum of 3 feet of cover.

Marking tape shall be installed a minimum of 12 inches above the service line at the top of the pipe zone material, centered on the service line.

Service taps at the main shall not exceed one tap every 2 feet and be a minimum 2 feet from bends, bells, tapping sleeves, and edges of fittings on the mainline. Water services are to maintain 10 feet separation from sewer and storm sewer when within the right of way or in a utility easement.

Services larger than 1 inch shall be hot tapped with a minimum 2-inch gate valve, using the appropriate tapping saddle and appurtenances as called out by the Engineer of Record. Service connections to existing pipe may utilize a saddle tap and valve. All water service lines shall be placed perpendicular to the water main.

New service connections greater than 2” shall be designed by a Professional Engineer.

Avion standard is that services are to be provided directly to property with meters and premise isolation installed within the right of way for residential application. Reference Standard Details for residential service installation. Service connections beyond the premise isolation, installed through one property to another shall be considered private and installed within an easement. This easement provision may not be used to avoid placing the service line perpendicular to the main lines. See Section 13 for line extension policy. Avion is not responsible for maintenance beyond the meter box. Reference Standard Details for commercial service installation.

Water services not being used, needing to be upsized or needing to be relocated within in a parcel are required to be removed back to the main and the pipe removed from the right of way. Avion requires that the corp stop shall be removed from the main and the main be plugged.

If the meter assembly/box or service line is damaged during construction / site improvement activities / during the warranty period or if the existing meter box or service line does not meet current Avion Standards and Specification, the developer / property owner will upgrade the components of the service out of conformance.

For all non-residential potable services a minimum of a D.C.V.A. (Double Check Valve Assembly) shall be required for Premise Isolation. The Premise Isolation Assembly shall be installed in accordance with O.A.R. (Oregon Administrative Rules) 333-061-0071, Oregon Plumbing Specialty Code Chapter 6, and Avion Standards and Specs before a meter is set. The degree of hazard of each service connection shall be identified and verified by Avion Safe Drinking Water Program. Health Hazard connections shall be required to either utilize an approved In Premise Backflow Prevention Assembly that is commensurate with the degree of hazard, (Air Gap or Reduced Pressure Principle Backflow Prevention Assembly) or install the Health Hazard Assembly as Premise Isolation. A Reduced Pressure Backflow Assembly will be required at the service connection when non-potable water services (i.e., COID irrigation, private well) and Avion services exist at the same project site, per State regulations.

Services Off of Fire Lines

Avion will not permit fire hydrant or fire sprinkler lines to be used as the domestic service line. Potable water services must be tapped from a main separate from the fire line. Fire sprinkler services shall not connect to fire hydrant lines.

Fire sprinkler lines must have a Double Check Detector Assembly (DCDA) installed with leak detection meter. Avion's ownership of the fire sprinkler lines terminate at the right of way line with the installation of a gate valve, per the Standard Details. All fire sprinkler lines and fire sprinkler vaults shall be reviewed by the Building Department when on private property to be in conformance with plumbing and fire code regulations. Fire sprinkler vaults are required at the right of way.

Fire sprinkler services that use any chemical additions shall require an approved R.P.D.A. (Reduced Pressure Principle Detector Assembly). Fire services, vaults and backflow prevention assemblies shall be installed in accordance with O.A.R. (Oregon Administrative Rules) 333-061-0071, Oregon Plumbing Specialty Code and Avion Standards and Specs.

3. Valves

The maximum distance between valves is 500 feet. Valve locations to be determined by Avion. Typically, transmission mains are defined as lines that have no other services or distribution connections to them and are typically coming from one of the sources of water. All other lines are distribution lines.

Valve Location

Valves shall be located outside the normal path of wheel travel, bike lanes, and accessible travel path. No valve shall be located within 3-feet of an existing or proposed street gutter line and shall fall minimum 12 inches beyond the gutter pan where curb and gutter exists. All valves shall have a minimum distance of 18 inches measured from the top of the valve body to the top of the road surface. Where valves fall outside paved roadways, a concrete collar shall be constructed per Avion's specification drawing.

At all tee and cross fittings, valves shall be installed on every branch of the fitting unless otherwise approved by Avion. In cases where the legs of the branches of the fitting are of different sizes, a valve shall be placed on the smaller diameter first. All valves shall be located within 5-feet of the cross or tee fitting.

All temporary dead-end lines shall be terminated using a valve and blow off per Avion's specification drawing.

Hot taps to existing watermains shall be permitted depending on the location of existing valves in the vicinity. Where valves are not adequate to the existing system, a cut in tee will be required with valves installed on all branches. Size-on-size taps will not be permitted without specific written authorization.

Valve Types

Gate valves are required on all waterlines 12 inches and smaller. Butterfly valves shall be used on all waterlines of 14-inch diameter or larger; or on smaller diameter lines where sufficient cover to the top of a gate valve body cannot be obtained. Butterfly valves shall be mounted with the stem vertical and on the "curb" side of the main.

Air-Vac/Air Release valves shall be considered during design. Typically these will be located at all elevation rises and elevation high points. Typically, a 1-inch Air-Vac valves shall be installed for 12-inch and smaller water mains and 2-inch Air-Vac/Air Release valves installed for all larger watermains, however the sizing shall be verified against manufacturer's recommendation. All Air-Vac/Air Release valves will be located outside the vehicular roadway as illustrated in the Standard Details. All Air-Vac/Air Release valves shall be designed to be insulated to protect against a

sustained temperature of -10 degrees Fahrenheit. Hydrants are not considered Air-Vac or air release.

Pressure Reducing Valves

Pressure Reducing Valve designs/layouts shall be coordinated with Avion on a case-by-case basis, but shall generally conform with the appropriate Avion drawing. All pressure reducing valves shall be CLA-VAL valves. Electrical power shall be provided to all PRV vaults. Approved flow monitoring appurtenances must be provided for all pressure reducing valves.

Blow-Offs and Dead-End Lines

Generally, dead-end lines are not permitted without specific approval from Avion Water Company. Where the system designer wishes to leave a dead-end line within their design, the drawing shall specifically note the length of the dead-end line and the proposed method of flushing. Where permitted, blow off valves shall be located on all dead-end lines. Automated flushing appurtenances are required for any dead-end line within 1000 feet of any school or youth facility property line; or if the dead end line is longer than 50 feet. New lines that are connecting to existing lines at both ends will require a temporary blow-off for chlorination purposes. Design shall address how water from blow off and flushing will be addressed to prevent any erosion or landscape damage.

4. All-Weather Access

Where water facilities requiring maintenance access outside paved right-of-way, a paved access pad or road sufficient for service equipment to operate without blocking the traveled way shall be constructed. Where water facilities (such as fire hydrants and valves) are away from paved right-of-way, a 14-foot wide 2-inch thick paved all weather access road, with a 6-inch base, or as approved by Avion, shall be installed to provide access. If the access road requires a vehicle turn around, adequate space shall be included for an all-weather access road.

Where water facilities not requiring maintenance access (such as transmission lines) lie away from paved right-of-way, an all-weather access road shall be constructed over the line. This all-weather access road shall be a minimum of 14-feet in width and shall be surfaced with a minimum of 6-inches of compacted aggregate base. The road shall be shaped to promote drainage and shall not cause the ponding of storm runoff.

5. Meters

All water service lines must have a meter box and assembly placed a minimum of 1 foot outside of hard surfaces (concrete and asphalt). Where meter boxes are unable (as determined by Avion Water Company) to be located outside hardscape, an expansion joint shall be installed 12-inches around the entire perimeter of the meter box. When meter boxes are located in/near sidewalks with tree wells, the meter box shall be located a minimum of 6 feet from the tree well. Fire lines do not require meters but are required to have double detector check assemblies (DCDA) to detect low-flow events. Any service line that is providing water from the Avion distribution system for purposes other than fire flow must have the entire amount of water used measured. Water meters shall be sized to the water service line size or one size smaller.

New meters installed at commercial and industrial properties must be one-inch minimum. Commercial water meters shall be installed on residential projects that have four dwelling units or more.

Meters that are 3 inches or larger will be Muller HbMag. All accessories need to be included to insure the meter functions properly.

For domestic water services, Avion's ownership ends at the meter. Avion's ownership for fire services ends at the right of way.

Automatic Meter Reading Systems

Avion requires the HOT ROD system on all metered services.

All meters shall include a HOT ROD meter transmission unit.

Standard Meters

All water meters 1-inch and smaller shall be installed by Avion. Meters shall be approved by Avion prior to installation.

Vaults and Meter Boxes, Including Insulation

No vaults or meter boxes can be installed more than 5 feet from the property corner without approval from Avion. Vaults and meter boxes are to be installed outside of hard surfaces.

Meter banks, multiple meters placed in close proximity to one another to provide multiple lot services, are permitted with approval from Avion. Meter boxes shall be staggered per Standard Drawings. Water taps shall be spaced a minimum of 2-feet apart at the main. Stamped or engraved stainless steel or brass address tags shall be on the meter box to identify which meter services which address. Refer to the water meter standard drawing.

Approved meter boxes are detailed in Section 9

For all meters larger than 2-inch, the designer will determine the appropriate meter box or vault. All meter boxes and vaults must be traffic rated. See Standard Details for 3-inch and larger meters.

All meter vaults and boxes must be installed to the correct finish grade. Any that do not meet this requirement, including requirements for correct depth of meter stops and service line, will not be activated and locked off with an Avion lock.

6. Fire Services, Flows and Hydrants

Avion will perform one (1) fire flow test for a new developer and the developer's request. Additional fire flow tests will be charged at Avion's tariff rate for General Field Service.

Fire Flow Requirements

Fire flow requirements are determined by the City of Bend.

Fire Service Lines

Avion requires all fire service lines be designed by a registered Professional Engineer up to the right of way/demarcation valve. The fire service backflow/premise isolation device shall be designed in accordance to all applicable building/fire/plumbing codes. Where the building is located within 20 feet of the right of way line, the developer has the option of installing the premise

isolation within the building, otherwise it shall be placed in a vault on private property near the right of way line. All fire service lines will be installed from the nearest water main with a valve located adjacent to the tap/tee. Fire Department Connections (FDCs) and Indicator Valves (PIVs or WIVs) can be located on building walls with fire and building department approval. PIV's and FDC's must be located on private property, unless otherwise approved by Avion. If approved by the Avion to be located within the right of way, the PIVs and FDCs shall be a minimum 5 feet from roadways/curb. Construction documents shall provide a plan and profile of the fire service installation up to the right of way line. The Avion standard detail for fire lines is a minimum standard only.

All fire service lines will require a DCDA around the backflow preventer.

Backflow Assembly vaults shall comply with the Uniform Plumbing Code requirement for electrical and heat for freeze protection as determined by the Building Department.

Hydrants General

Each hydrant shall be connected to the main with a 6-inch-diameter ductile iron branch with a 6-inch shutoff gate valve using a restrained MJ x MJ connection. Breakaway flange shall be no higher than 3-inches above the surrounding surface for Roadside Design compliance. See Standard Details. No valve shall be located closer than 60-inches to the hydrant. When the hydrant branch line exceeds 100 feet in length, two valves shall be required: one near the hydrant, and one at the main. Hydrants shall comply with AWWA specification C-502-64 with a dry top, left-hand opening, and have one 5 1/4-inch steamer nozzle and two 2 1/2-inch hose nozzles. The steamer nozzle should always face the street with the exception of parking lots. Hydrant extensions are not allowed on new hydrants but can be utilized only on existing hydrants at the discretion of the Avion. Extensions shall be from the manufacturer or approved equal, with a maximum of one extension per hydrant. Hydrant extensions shall not exceed 12-inches. All hydrant extensions shall be inspected during installation and approved by an Avion inspector. Hydrant drains will be surrounded by a washed gravel pocket, wrapped with filter fabric or 12 millimeter plastic, to provide drainage. No hydrant drains will be connected to either the sanitary or storm sewer system.

Hydrants are not to be used in lieu of air release or air-vac valves.

Location

Hydrants shall be located such that maintenance staff has complete access. They shall also be located to minimize the possibility of damage from vehicles or injury to pedestrians, with location preferred near intersections not directly on the corner. Hydrants located in parking areas must be protected, preferably by placing hydrants in a curbed landscape median/island. Concrete filled steel bollards are not preferred. Unless otherwise approved by Avion, hydrants placed onsite shall have a premise isolation valve installed at the right of way line. All plumbing onsite shall be privately owned and maintained by the property owner.

A hydrant shall be positioned within 100 feet of an FDC when required by the Fire Marshall.

Concrete Pad

Concrete hydrant pads shall be required around all hydrants (See Standard Details).

7. Crossings and Clearance

Water lines shall be a minimum of twelve (12) inches from any rock, power line, telephone line, fiber optic line, television cable, or any other obstruction.

Any water line crossing railroad, gas, sewer, power, telephone or TV. cable lines shall be done to the specifications of the appropriate company. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAID RAILROAD AND UTILITY CROSSINGS AND ALL REPAIRS TO THE RAILROAD OR UTILITIES.

Gas Line Crossings

Water lines shall be a minimum of twenty-four (24) inches from any natural gas line.

Sewer Crossings

Sanitary sewer line and water line crossings shall be designed per OAR 333-061 and/or AWWA standards, whichever is most stringent. Storm drain piping is treated as sanitary sewer for purposes of this specification.

When a sanitary sewer main or lateral crosses a water main or lateral, the bottom of the water line shall be 1.5 feet or more above the top of the sewer line, wherever possible. One full length of the water line shall be centered at the crossing.

Where the water line crosses over the sewer line with a clearance of less than 1.5 feet or where the water line crosses under the sewer line, the sewer line shall be constructed with AWWA C-900 PVC pressure pipe for one full length of pipe, centered at the crossing point (at a right angle with 10 feet on each side of the crossing water line) and be equipped with gasketed PVC couplings specifically designed for transition from gravity sewer pipe to PVC water pipe. In either of these cases, a written report of findings must be provided indicating the reasons of reducing the separation.

Minimum vertical pipe separation shall be 12 inches. A reduction to 6 inches vertical separation may be allowed with prior approval from Avion.

Sewer main or service crossings of less than 6” clearance shall be backfilled with cementious slurry backfill and the mainline shall be ductile iron pipe with no joints for 10 feet on either side of the crossing.

Continuous copper water service crossings of any sewer main or lateral with less than 6” of clearance shall be installed through a 10 foot sleeve of 4” C900 water pipe centered on the crossing.

8. Trench Requirements

- Rocks, trees, brush, debris, and garbage may not be used as trench backfill and shall be hauled away.
- Pipe installation shall be performed in accordance with manufacturer’s instructions, AWWA guidelines, applicable statues, and the applicable Avion Water Company drawings.
- The job site shall be returned, as close as possible, to its original condition.

- Any use of a road right-of -way or road crossing must be approved by the appropriate County, City and/or State Highway Department. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAID ROAD CROSSINGS AND ALL REPAIRS TO THE ROAD SURFACE.
- Any water line crossing a canal shall be done to the specifications of the appropriate irrigation district. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAID CANAL CROSSINGS AND ALL REPAIRS TO THE CANAL.
- All excavators hired by the customer or Avion shall provide Avion with a certificate of insurance, and follow the OSHA Safety Standards.
- Minimum width and depth requirements for trenches: NOTE: YOU WILL NEED TO ADD SIX (6) INCHES TO THE TRENCH DEPTH AND PAD THE PIPE WITH A MINIMUM OF SIX (6) INCHES OF CLEAN, COMPACTED FILL MATERIAL ON THE BOTTOM, AND TWELVE (12) INCHES ON TOP OF THE MAINLINE.

Pipe Size	Width	Depth
Less than 6”	30”	36”+OD+Bedding
6”	30”	48”
8”	32”	50”
10”	34”	52”
12”	36”	54”
16”	40”	58”
24”	48”	66”
36”	60”	78”

12” Clearance at ALL Times !!!

- All water lines will be at least ten (10) feet from any sewer line or any other potential source of contaminants.
- The proper locating tape and 14 gauge, or larger, wire shall be installed as directed. Proper wire nuts, rated for direct bury, with silicone, shall be used. (e.g. DryConn DBR/Y-600, or equivalent) Locate wires in Valve tubes shall run outside the 3034 Riser Sleeve and inside the 910 Cast Iron Valve tube.
- Provision shall be made for the installation of meters and a stub trench shall be dug five (5) feet perpendicular to the main line for the installation of a tail piece and pipe. This will be decided before the construction begins. No meter box shall be set in sidewalks, driveways, curbs, or any hard surfaces.
- Tapping Sleeves shall be wrapped in 4 mil plastic sheeting, with a concrete thrust block. The size of the thrust block will be determined by the design engineer and approved by the inspector on site.

9. Water Pipe and Fitting Material Requirements

- PIPE: Avion will determine size, type, pressure rating, or class prior to construction. All pipe used shall be C900 (DR 18) or Ductile Iron (DI, Thickness Class 52) and gasketed pipe. NO GLUE pipe will be accepted. All gasketed pipe shall be joined using an approved water soluble, vegetable based non-toxic lubricant. All pipe shall have 2 Reference Marks on the spigot end of the pipe. (1 as the Insert Mark, and the 2nd being the Inspection Mark.)

- PIPE FITTINGS: All fittings 3” and larger shall be ductile or cast iron with mechanical joints. All fittings shall be constructed to AWWA standards and be a Domestic product. All direct bury fittings shall be MJ fittings. Fittings in a vault shall be Flange, unless approved by Avion Water Co.
- THRUST/STRADDLE BLOCKS: Will ONLY be used when specifically noted by Avion Water Co., All Thrust/Straddle block specifications shall be determined by the design engineer and approved by the inspector.
- RESTRAINT JOINTS: All fittings shall be restrained with EBBA Mega, or equivalent, restraint joints. Bell joint restraints shall be installed per Avion Water specifications. Specifications on bell joint restraints will be given by the Avion Water engineering department or the inspector at the time of pre-construction or construction. If using class pipe, restraint joints with TRANSITION gaskets MUST be used. MJ gaskets must be pipe type specific gaskets. No universal gaskets will be accepted.
- VALVES: All valves shall be iron and shall be of the resilient seated type, with non-rising stems, and a 2” square operating nut. Butterfly valves shall be used in all applications 14” and larger (GV for 12” and lower) with the exception of live line taps. All valves shall be AWWA approved, and a Domestic product.
- VALVE BOXES OR TUBES: Valve tubes shall be, East Jordan 910 18” Top, Valve Tube and cast iron lid with “AVION WATER” cast into the lid. The riser pipe shall be a 6” 3034 PVC pipe. All valve boxes NOT set in asphalt shall be set in a 4” thick concrete pad, 18” width minimum. Locate wires in Valve tubes shall run outside the 3034 Riser Sleeve and inside the 910 Cast Iron Valve tube.
- METERS: All meters 1”, or smaller, shall be provided by Avion Water Co. All meters larger than 1” shall be approved by Avion Water Co. and shall read in cubic feet. All lines from the main line to the meter stop shall be no less than 1” in size. All meters to be paid for by the customer or contractor. Avion requires the HOT ROD system on all metered services. All meters shall include a HOT ROD meter transmission unit.
- FIRE HYDRANTS: All Fire Hydrants shall be RED. Fire Hydrants that are scratched or dull may need to be re-painted at contractor’s expense.

10. Additional Policies for Services in Subdivisions

- All services and Backflow Prevention Assemblies (BPA) shall be installed in a professional manner. Using the following guidelines provided by Avion Water Co. Inc. Must adhere to OAR 333-061-0070, or Illustration drawings.
- No service, meter, or backflow assembly that falls under our tariffs shall be in concrete or asphalt, unless approved by Avion Water. (Driveways, Sidewalks, or Streets)
- All service lines, 1” to 1 ½” shall have a Corporation Stop. All service lines 2” and larger shall have a gate valve, with a valve tube, at the tap.
- All 1” to 2” mainline taps shall use a Double strap Service Saddle. All corporation stops shall be either: Mueller or A.Y. McDonald
- All 1”, 1 ½” and 2” service lines will be copper, unless approved by Avion Water Co.
- All meters and BPA‘s shall be between the curb and sidewalk, or in a P.U.E., or as approved by Avion Water Co. Inc. All BPA installations must adhere to OAR 333-061-0070.
- All 1 ½” and 2”, meters and BPA’s, shall be in their own box.
- All meters, 1 ½” and larger, shall have a meter screen.
- All ¾” and 1”, meters and BPA’s, shall be in the same box.

- All boxes for ¾” and 1” meter and BPA’s shall be either:
    - For non-traffic areas: OldCastle 17”x30”x18” Straight Wall Polymer Box (#17302030) w/ 17”x30” Black/Gray Plastic Lid w/CI Flip Reader (#17304172)
    - For light traffic areas: OldCastle 17”x30”x18” Straight Wall Polymer Box (#17302030) w/ 17”x30” Polymer Concrete Lid w/CI Flip Reader
    - Any other box shall have prior written approval before installation.
- All boxes for 1½” and 2” meter and BPA’s shall be either:
    - For non-traffic areas: NDS 17”x30”x18” Flared Wall Plastic Bpx (#126BCDMCIFB) w/ 17”x30” Black Plastic Lid w/CI Flip Reader
    - For light traffic areas: Hubbell 17”x30”x18” Flared Wall Polymer Concrete Box (#PT1730BA18) w/ 17”x30” Polymer Concrete Lid w/CI Flip Reader (#PG1730WAR250)
    - Any other box shall have prior written approval before installation.
- Must adhere to OAR 333-061-0050 Construction Standards
- Material under meter boxes shall be compacted with a plate compactor or Jumping Jack, to prevent settling.
- All fittings shall be sized for 1” meters.
- All fittings shall be set at 12” below finish grade, and 14” to the top of the box.
- All brass to be rated at 150 psi, or greater, and meet the new “lead free” rules. Must adhere to OAR 333-061-0087.
- All 1” meter stops shall be full port, either: Mueller – 1” part # B24258 or A.Y. McDonald – 1” part # 74602BQ
- All Services that have been cut down after the initial pressure test, shall have the compression gaskets replaced prior to the 2nd pressure test.
- All services shall be Flow Tested, 50gpm minimum.
- All spacers shall be level and properly threaded into the meter nuts.
- All services shall be inspected by Avion Water Co. Inc. before the subdivision is accepted.

11. Chlorination and Pressure Testing

- Chlorination shall adhere to AWWA standards C651 through C654, as well as OAR 333-061-0050 (10) Disinfection Standards. Avion Water shall adopt the Hot stick method for most chlorination’s. (Physical separation between existing and new system) 3ft/sec min. Flushing Requirement.
- All Service Lines shall be chlorinated and pressure tested with the main system. The services shall be set at least 1 foot above grade, during the initial test. There will be a 2nd pressure test after the services have been cut to the required grade specifications. The meter stop compression gaskets MUST be replaced prior to the 2nd pressure test.
- Avion Water Co. reserves the right to choose the Contractor responsible for the Chlorination, Hot Tapping and Pressure testing procedures. Avion Water Co. may require a different Contractor from the Pipe and Parts Supplier, to perform the Chlorination, Hot Tapping and Pressure Testing.
- After the Hot Stick tie in has been completed, a 2nd pressure test may be required.

12. Franchise Utility

Avion is a Franchise Utility of the City of Bend. Entities developing or working within the City of Bend must conform to the following sections:

General

Utility companies that have a current franchise agreement with the City may construct facilities in City of Bend public rights-of-way or publicly controlled easements in strict conformance with the City of Bend Standards and Specifications and the requirements stipulated in the Franchise Agreement. Prior to starting any construction, franchise utility companies shall obtain a City Excavation / Right-of-Way permit in an existing roadway or easement. Utility companies and their designers and agents shall cooperate with the City of Bend to allow for City inspection of utilities and the street restoration during construction. The intent of this requirement is to protect the interests of all utilities within City of Bend rights of way.

13. Main Line Extension and Refund Policy

Avion is required by the provisions of its tariff to maintain a main line extension and refund policy:

Any person or entity (developer) requesting a new service in an area with no or undersized mainlines will be required to extend the main line from a point with sufficient capacity to adequately serve the new development or service. Extensions will be paid for by the developer, along with applicable Schedule 8 fees.

Extensions to the main will be made along only streets, county roads, highways, or satisfactory rights-of-way; provided that in these cases of extension pressure conditions permit and the Utility has sufficient water to supply additional demands without detriment to those customers already being served. The following provision governing service shall apply.

The utility may require each applicant, for new service, to provide the main line extension when required to bring service to the applicant's premise. The main line extension will continue along the applicant's property line to the point where the applicant's service line would be at a 90 degree angle to the street or main line.

Each new customer requesting a main line extension shall advance the main line to provide service to the applicant prior to receiving service.

For a period of 5 years after construction of the requested main line extension, an amount per foot equal to the new applicant's proportionate share (per lineal feet) of the main line extension cost for that portion used. No part of the distribution system installed prior to the request for a main line extension shall be used to calculate any customer advance or refund.

The Utility will then refund the share differential amount to those customers who previously shared the cost of said main line extension. Refunds shall not exceed the amount originally advanced. Refunds are based upon line length constructed, or property frontage, whichever is appropriate.

Main line extensions and refund agreements that serve tracts, subdivision, housing projects or industries may be a matter of special contract with the promoters. Special contracts are subject to review by the Public Utility Commission.

14. Construction and Contractor Standards

Avion operates within the jurisdiction of numerous cities and counties. All contractors shall comply with any rules and requirements of the entity (city or county) governing construction in their specific area. All contractors shall provide CCB number and proof of insurance. All contractors shall be approved by Avion. Those contractors on the approved ROW work list for Bend,

Redmond, Sisters, Crook County, or Deschutes County will generally be approved. Those not on one of these lists may submit proof of successful completion and references from a previous job installing public waterworks.