TRENCH REQUIREMENTS

1. Separation Requirements – *for details on Non-Potable Water (sanitary sewer, storm, irrigation, grey) see #2 and #3.*
   - Water lines shall be a minimum of twelve (12) inches from any rock or any other obstructions.
   - Communication - parallel mainlines have a minimum of twenty-four (24) inches of separation.
   - Gas and Power - parallel mainlines shall be a minimum of 5ft from Avion mains and services.
   - Gas and Power - parallel services shall be a minimum of 3ft from Avion mains and services.
   - All perpendicular Crossings have a minimum vertical separation of twelve (12) inches from any utility. *Potential reductions in vertical crossing separations may be allowed with prior approval from Avion Water and appropriate mitigation measures***.**
   - **Catch basins and curb inlets shall have at least 3' of horizontal separation from the closest point of any Avion facility.**
   - **Non-franchised utility (private) crossings of Avion facilities are prohibited.**
2. Avion Water considers non-potable irrigation and storm water sources sanitary sewer crossings as referred to in OAR 33-061-0050 (9). Non-potable water requirements must be adhered to within any Right of way (ROW) or on private property.
   - Non-potable water - horizontal pipelines a minimum separation of 10ft.
   - Non-potable water - vertical crossings a minimum separation of 18 inches.
   - When a non-potable water line is located above or less than 18 inches below a waterline the sewer line shall be constructed of pipe conforming to water pipe standards (AWWA C900). A 20ft stick of C900 pipe is the minimum length of strengthened sewer lines and shall be used and be centered over the water line and connect to the City of Bend sewer with approved couplings and adhere to OAR 333-061-0050 (9).
3. Avion Water considers grey water systems to be functionally equivalent to septic systems. **No grey water** facilities or leech fields are allowed within Avion Water easements.
4. No rock, trees, brush, or garbage shall be used as backfill. Haul away rocks and any/all vegetation and debris and return the job site as close as possible to its original condition.
5. Any use of a ROW or road crossing must be approved and installed to meet the specifications of the appropriate governmental agency. **Contractors are responsible for road crossings and any/all repairs to the road surface.**
6. Any water line crossing a canal shall be approved and installed to meet the specifications of the appropriate irrigation district. **Contractors are responsible for canal crossings and any and all repairs to ditches/canals.**
7. Any water line crossing a railroad, gas, sewer, power, or communication lines shall be approved by the appropriate company. **Contractors shall be responsible for any and all repairs deemed necessary.**
8. **14 gauge** or larger wire and proper locating tape shall be installed as directed. The 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.
9. The service line trench shall be dug perpendicular to the main line for the installation of a tail piece and pipe. The trench needs to extend to the property line or the back of a PUE. Avion does not allow for meter boxes to be set in hard services (sidewalks, driveways, curbs, etc.)
10. On Hot taps 4" and larger, wrap tapping sleeves in 4 mil plastic sheeting and install a concrete support block. An Avion inspector will decide the size of the support block required. (see Support Block detail)
11. Excavators hired by customers should provide Avion with a certificate of insurance and follow the OSHA Safety Standards.

TRENCH REQUIREMENTS

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”

A mandatory clearance of 12” is required at ALL Times

Bury Pipe at a Minimum Depth of 36”

12. Width and depth requirements for trenches - Add a minimum of six (6) inches to the trench depth. Pad below the pipe with a minimum of six (6) inches, and the top with a minimum of twelve (12) of clean and compacted backfill material.
13. Compaction Requirements- All trenches backfilled within a ROW shall meet all corresponding backfill, compaction and testing requirements. (corresponding City or County)
    - Bedding and sides of waterline, to be compacted in 6” lifts with a Jumping Jack.
    - From Spring line to Top of Pipe zone, 12in minimum above top of pipe, to be compacted in 6” lifts with a Jumping Jack. 1ft lifts are acceptable with a Hoe Pack Compactor.
14. Compaction testing shall be performed at the top of the pipe zone a minimum of 12” above the waterline. Every 100ft must be tested and compaction testing shall meet 92% min. Submit compaction test results to the Avion Inspector within 24hrs upon receiving results.
15. **All pipe installations require a minimum 3ft cover prior to chlorination and pressure testing.**
16. Any deviation from the above requirements shall have prior approval from Avion Water Company, Inc.
17. Avion Water requires notification a minimum of 24hrs anytime **blasting** will be within 50ft from any Avion Water mainlines or facilities (live or abandoned).
    - Blasting is not allowed within 10ft of any Avion Water mainlines or facilities.
    - Avion Water will not provide additional blasting requirements including blasting distance, charges, and/or vibration levels. The blasting contractor bears the sole responsibility not limited to the above-mentioned requirements.
    - The blasting contractor bears the sole responsibility for any damage to any Avion Water mainlines or facilities. In addition, the blasting contractor will remain the responsible party for a duration of 1 year following the completion

WATER AND PIPE FITTINGS

1. Pipe- Size, type, pressure rating, or class will be determined by Avion prior to construction.
    - The minimum bury depth minimum requirement 36”
    - All pipes used shall be **C900 (DR 18)** or Ductile Iron (DI, Thickness **Class 52**) and gasketed pipe.
    - **Glued** pipes will **not be accepted** within Avion Water’s system.
    - Gasketed pipes shall be joined using an approved water soluble, vegetable based non-toxic lubricant.
    - Pipe length shall meet required minimums: **Bell to Spigot, bell, or fitting – 5 feet. Fitting to Fitting- 2 feet**
    - Mainline installed under a concrete panel round-about must be ductile iron and entire length fully restrained.
    - Mainline installed at 6ft or deeper be ductile iron and be fully restrained through entire length of mainline.
    - Mainline installed utilizing **pipe deflection** cannot exceed one-half of the pipe manufacturers’ recommendations *(ex. C900 - manufacturer recommendation is 1 degree of deflection per bell. Avions requirement would be .5 degree per bell.)* A **.5-degree deflection is equivalent to a 2” offset per 20ft length** of pipe. The contractor shall provide methods to measure and confirm the amount of deflection used. Avion Water inspectors will verify.
    - **Pipes shall have 2 reference marks on the spigot end, one the insert mark and one being the inspection mark.**
2. Pipe Fittings- must be AWWA approved and a domestic product
    - Fittings 3” or larger shall be Ductile Iron and mechanical joints.
    - **Direct bury fittings must be MJ fittings. Vault fittings must be flange** (unless approved by an Avion inspector).
3. Thrust/Straddle Blocks--
    - Used only when specifically noted/approved by Avion. Specifications to be determined by the design engineer.
4. Restraint Joints-
    - All fittings will be restrained with EBBA Mega, or equivalent restraint joints.
    - Bell joint restraints shall be installed per manufacturer’s installation specifications.
    - If using class pipe, transition gaskets must be used with restraint joints.
    - MJ gaskets must be pipe type specific gaskets. Universal gaskets will **not** be accepted.
    - **A 25ft minimum restraint length is required on all sides of tees and crosses except for hydrant lateral tees without an in-line mainline valve.**
5. Valves- must be AWWA approved and a domestic product
    - Shall be resilient seated iron 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**) except for live line taps.
6. Valve Boxes Or Tubes-
    - Valve tube shall be East Jordan 910 18” top, valve tube, and cast-iron lid with AVION WATER cast into the lid.
    - Riser pipe shall be a 6” 3034 PVC pipe.
    - Valve boxes not set in asphalt shall be set in a 4” thick concrete pad with a minimum width of 18”.
    - **Valve tube locate wires shall run outside the 3034-riser sleeve and inside the 910-cast iron valve tube.**
7. Meters -
    - Compatible with **Mueller’s Mi.Net M AMR** system and include a **Mi.Node-M Transmitter Unit, Nicor connectors, external battery and read in cubic feet.**
    - Customer or contractor is responsible for payment of any meter. Avion only supplies meters 1” or smaller.
    - Lines from the main line to the meter stop shall be no less than 1” in size. Avion recommends all service lines to be sized to meet 50gpm at end of the service line: A service line longer than 60ft be a minimum of 1 ¼”, if longer than 200ft be a minimum of 1 ½”, and if longer than 400ft to be a minimum of 2” min.
    - Multi-Family Dwellings – Duplexes, triplexes, or ADU is required to have its own meter. A Fourplex is the smallest multi-family dwelling that can be master metered. (Serving multiple units with one meter.)
      Avion Water Engineering Department shall make the final decision to determine whether a Multi-Family Dwelling will receive a master meter or individual meters, on a case-by-case basis.
8. Fire Hydrants - must be painted fire hydrant or solar red. Re-painting may be required to issue a final inspection letter.
   (See Fire Hydrant Detail sheet for additional specifications)

POLICY FOR WATER SERVICE

1. All services and Backflow Prevention Assemblies (BPA) shall be installed in a professional manner. Following Avion guidelines and adhere to OAR 333-061-0070.
2. No service, meter, or BPA shall be in concrete or asphalt driveways, sidewalks, or streets unless approved by Avion.
3. All service lines 1" to 1 ½" shall have a Mueller or A.Y. McDonald corporation stop, 2" and larger shall have a gate valve with a valve tube at the tap.
4. All 1" to 2" mainline taps shall use a double strap service saddle. Use of **Nylon or Fusion Bonded Epoxy coating is required**. Parts will be refused if apparent damage to the coating as determined by Avion Inspector. (A standard corrosion resistant shop coat primer fitting is not acceptable) **Full Brass cast tapping saddles for Class pipe is acceptable.**
5. Inspection by Avion Water is required before a subdivision is accepted and the following are required - unless approved by Avion Water
    - 1" Service lines shall be copper. 1 ½" and 2" Service lines shall be copper when under 20ft in length. **Any service line over 20ft in length shall be Municipex, unless approved by Avion Water.**
    - Meters and BPAs shall be between the curb and sidewalk, or in a P.U.E.
    - 1 ½" and 2", meters and shall be served by a 2" service line, 2" Gate Valve (GV), and be in their own box.
    - Meters 1 ½" and larger shall have a meter screen.
    - ¾" and 1" meters and BPAs shall be in the same box.
        - Non-traffic areas: Old Castle 17"x30"x18" Straight Wall Polymer Box (#17302030) w/ a 17"x30" Black/Gray Plastic Lid w/CI Flip Reader (#17304172).
        - For light traffic areas: Old Castle 17"x30"x18" Straight Wall Polymer Box (#17302030) w/ 17"x30" Polymer Concrete Lid w/CI Flip Reader.
    - 1 ½" and 2" meters and BPAs shall be in their own boxes.
        - Non-traffic areas: NDS 17"x30"x18" Flared Wall Plastic Box (#126BCDMCIFB w/ 17"x30" Black Plastic Lid w/CI Flip Reader. F
        - Light traffic areas: Hubbell 17"x30"x18" Flared Wall Polymer Concrete Box (#PT1730BA18) w/ 17"x30" Polymer Concrete Lid w/CI Flip Reader (#PG1730WAR250)
    - Material under meter boxes is to be compacted with a plate compactor or Jumping Jack (settling prevention).
    - Fittings be sized for 1" meters, set at 12" below finish grade, and 14" to the top of the box.
    - Brass is to be rated at 150psi or greater and adhere to OAR 333-061-0087.
    - 1" meter stops shall be full port either: Mueller - 1" (# B24258) or A.Y. McDonald - 1" (74602BQ).
    - Services that have been cut down after the initial pressure test shall have the compression gaskets replaced before the 2nd pressure test.
    - Flow tested at a minimum of 50gpm. (See Water and Pipe Fittings #7 for service line length requirements.)
    - Spacers shall be level and properly threaded into the meter nuts.
    - **Ornamental vegetation must be planted at least 5 feet away from any meter or BPA box. Trees expected to have a dripline radius greater than 5 feet at maturity must be positioned so that, when fully grown, their driplines do not extend over the meter or BPA box.**
    - **For all banks of water meters, in groups of 3 or more:**
        - **Prior to acceptance contractor shall attach an anodized aluminum label engraved or stamped with the address and lot number of the corresponding service line to the meter and to the meter box lid.**
        - **Contractor to submit label cut sheets for Avion approval prior to ordering.**

Approval of this drawing set including any prior suggestions, comments, and/or feedback by Avion Water representative(s) does not relieve the developer, engineer, or contractor from responsibility. Design and construction of the water system is required to be completed to the standards of AWWA in accordance with engineering and construction practices, Avion specifications, and all applicable laws. Field changes must have written approval from Avion Water and the engineer of record. The engineer of record is exclusively responsible for errors and/or omissions. The developer is exclusively financially responsible for all changes required regardless of reason.

CHLORINATION, PRESSURE TESTING AND FLUSHING

1. Chlorination shall adhere to AWWA standards C651, as well as OAR 333-061-0050 (10). Avion Water shall adopt the hot stick method for most chlorination's. (Physical separation between existing and new system) Flushing has a minimum requirement of 3ft/sec. **Pipe installations require a minimum 3ft cover prior to chlorination and pressure testing.**
2. Avion reserves the right to select a Contractor responsible for chlorination, hot tapping, and pressure testing procedures. That may differ from the contractor who completed any construction or part installation.
3. After the pipe is disinfected, flushed to **No Chlorine Present**, and filled with Avion source water, bacteriological samples must be collected to determine the procedures' effectiveness. At least **two cycles of samples** must be collected from the new pipe. The first cycle of samples shall be collected at least 16 hours after flush (**16hrs to 24hrs**), and the second cycle of samples shall be collected **48hrs** after the **result** of the first bacteriological samples.
4. At 1st chlorination service lines shall be chlorinated, and pressure tested with the main system. When services are set 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.**
5. After the Hot Stick tie in has been completed, a **2nd pressure test** may be required.
6. If any **sample fails after 1st chlorination** heavy flushing exceeding 3ft/sec is required, then repeat the sampling procedure.
7. If a **repeat sample fails complete a 2nd round of chlorination** at 70ppm. Additional heavy flushing exceeding 3ft/sec is required. Repeat sampling procedure with **3 mandatory rounds** completed 72hrs after the results of round 2.
8. If a repeat **sample fails after 2nd chlorination and** there is **E-Coli present**; the line shall be pigged with **new** scrubbing and pusher pigs. Once completed the chlorination process begins again at Round 2 Chlorination.
9. If a repeat **sample fails after 2nd chlorination** and if **total coliform is present**, complete a 3rd round of chlorination at 70 to 100ppm with 4 rounds of samples mandatory samples to be a full 7 days after the results of round 3.
10. If a repeat **sample fails after a 3rd chlorination** the line shall be pigged with **new** scrubbing and pusher pigs. Begin the chlorination process again at Round 3 Chlorination. *Ex: 4 rounds of samples. 1st samples at 16-24hrs after flushing, 2nd samples at 48hrs after 1st result, 3rd samples at 72hrs after 2nd round results, and 4th samples at full 7 days after 3rd round results. That is a month of sampling after a 3rd round of chlorination.*
11. If a repeat sample fails after pigging and 3 rounds of chlorination. It is mandatory that the entire water line is removed and the water line installation will be started over with all new parts and materials.
12. After the new mainline passes all pressure and bacteriological tests, then the new system can be tied into the existing water system.

All **tie in parts, valves, and fittings**, shall sit in a chlorine bath with a **50 mg/l min.** chlorine solution for a **minimum of 6hrs**. Any large diameter fittings or pre-built assemblies, that do not get a chlorine bath, shall be filled with a **50 mg/l min.** chlorine solution for a **minimum of 6hrs**. This process must ensure the least amount of air pockets as possible. All pipes shall be **swabbed** with a **200 mg/l min.** chlorine solution. Any pipe not being installed immediately shall have the ends covered (bagged) with plastic sheeting. Any **spray** solution shall be a minimum of **200 mg/l min**. Sprayed and swabbed chlorine solution needs to sit for a **minimum of 30 minutes**. OAR 333-061-0050 (10)(e)