

Appendix H. Conduit & Transmission Main Protection Requirements

This section is intended for the additional unique considerations required for critical large diameter Conduits and Transmission Mains, shown in a symbolized format as water supply pipes in the diagram below.

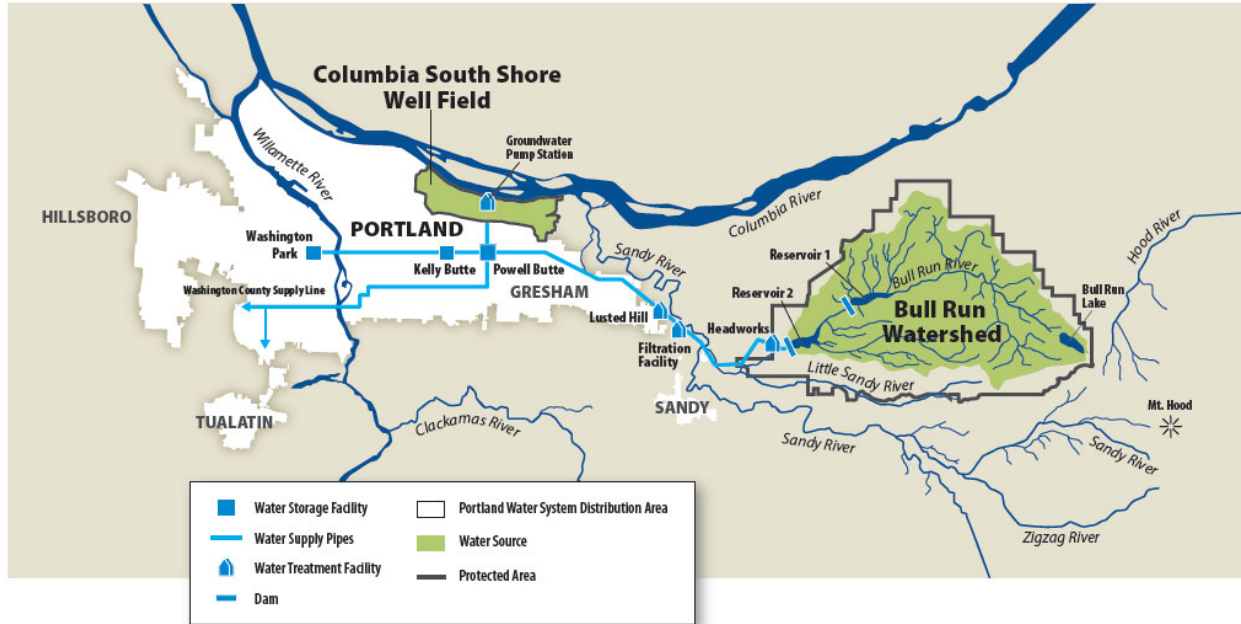


Figure H-1. The Portland water supply sources and system diagram

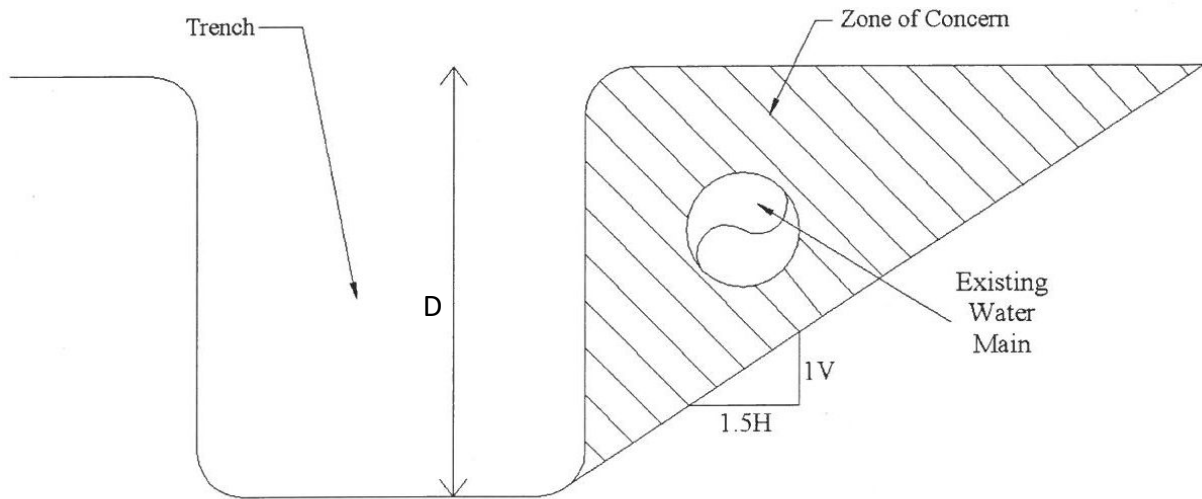
Generally speaking, Conduits 2, 3, and 4 carry the water supply from the Bull Run Watershed to Powell Butte Terminal Storage in SE Portland. Transmission Mains are pipes that carry water from the Columbia South Shore Groundwater Pump Station to Powell Butte, intercepting conduit flows along the way, and from Powell Butte to all the Terminal Storage reservoirs in the City, and to large wholesale customers west of Portland.

Terminal Storage includes Powell Butte, Kelly Butte, Washington Park, Mayfair, and Sam Jackson Tank sites.

1. Determine the depth of cover for the conduit/transmission main to be crossed.
 - a. Request depth of cover information from the 811 One-Call Utility Notification Center service.
 - b. The conduit/transmission main will be potholed to confirm depth. Notify Portland Water Bureau five (5) City of Portland working days in advance of potholing, by contacting Sandy River Station at (503) 663-4030 for work east of 162nd Ave, or Construction Inspection at (503) 823-4518 for work west of 162nd Ave to obtain PWB Inspection Assistance.

2. Maintain 5' skin-to-skin horizontal clearance between the outside diameter of the conduit pipe and the outside edge of excavation for all construction activities.
3. A site specific, Oregon registration Engineer stamped/sealed utility protection plan (EUPP) for supporting and maintaining the conduit in service will be required for excavations that:
 - 1) Cross underneath the conduit; or
 - 2) That will be parallel to the conduit and will place any part of the conduit pipe within the zone of concern (1.5H: 1V slope from the bottom of the construction excavation, see Figure H-) of the required excavation adjacent to the conduit.Submit a scaled drawing showing the conduit pipe and the limits of the excavation along with the EUPP to PWB for review. PWB acceptance of the EUPP through acknowledgement of “No Exception” is required prior to starting excavation.

Fig H-2. Zone of Concern for Conduit/Transmission Mains Parallel to the Trench



For excavations parallel to the conduit/transmission main, supported sections of trench shall have positive shoring. Positive shoring shall support the trench wall such that no lateral movement is possible. Positive shoring can be achieved with hydraulic jacks or by having zero clearance between shoring and trench wall. Plans should minimize the length of open trench at any one time, regardless of the shoring system used.

For excavations perpendicular to the conduit/transmission main, include the location of proposed supports on the submitted scaled drawing, and any blocking, length of beam on each side of trench and columns shall also be shown. In addition: 1) The support beam shall have a steel plate foundation support; 2) Pipe supports shall be adjustable, tensioned and rated to the calculated loads; 3) Provide calculations of maximum anticipated deflection and resulting stress in pipe, maximum anticipated deflection and resulting stress in support beam, and assumed soil bearing pressure; and 4) Provide the methods and means of

excavation, backfill and compaction. If required by PWB, survey and monitor conduit elevations prior to and during excavation.

4. For all tunneling or pipe jacking projects that will cross under and/or occur within the zone of influence (as defined in the paragraph # 3 above) of the conduit: 1) Provide plans showing proposed equipment, equipment guidance system, type and kind of cutter head, anticipated soil conditions, jacking pit and pipe clearances, tolerances and clearances; 2) Provide calculated pipe deflections and stresses under estimated settlements; and 3) Show proposed grout plan around jacked pipe/casing. Vacuum excavation to install settlement monitoring station(s) directly over the pipe crossing may be required, as well as providing before and after elevation measurements of the conduit pipe.

All bored utilities which parallel the conduit/transmission/supply main pipe shall be installed with a minimum 6 feet clearance from the outside diameter of the conduit/transmission/supply main pipe. The installer will continuously monitor the location of the drill tip to ensure the minimum 6 feet distance from the conduit/transmission/supply main pipe is maintained throughout the boring operation. The outside excavation of the bore pit will maintain 5 feet clearance from the outside diameter of the conduit/transmission/supply main pipe. Where the depth of an adjacent bore pit exceeds 5-feet and shoring is required, no hydraulic shoring will be allowed.”

5. Provide Portland Water Bureau two working days advance notice to the Sandy River Station prior to starting any work crossing over or under a Conduit pipe east of 162nd Ave, by calling 503-663-4030. For work west of 162nd Ave call Construction Inspection at (503) 823 4518.
6. If operating construction equipment over top of the conduit/transmission main, maintain 3 feet of cover at all times. If there is < 3 feet of cover over top of the conduit, this may be approved on a case-by-case basis with an approved plan. Any approved plan will include at a minimum, installing traffic plates (10' or wider) centered overtop of the conduit/transmission main level with bearing support beyond the outside skin of the pipe
7. The outside edge of any new Underground Injection Control (UIC) or stormwater planter/swale installation requires 12 feet separation between the outside edge of the UIC or stormwater planter/swale and the outside diameter of either side of the conduit. In addition, any stormwater facility or UIC < 12 feet from the outside edge of the conduit or transmission main shall be completely lined to ensure water does not infiltrate into the conduit pipe trench to reduce impact to the groundwater level around the conduit, in particular for areas where there is a trench drain beneath sections of Conduit 2 and 3.
8. Ensure 2.0 feet clearance for any pipe installed over top of, or underneath the conduit, to allow for future maintenance. If the conduit will be crossed underneath with < 2.0 feet of clearance, a compaction plan for the material to be placed between the bottom of the

conduit and the top of the other utility must be submitted to PWB for review and a PWB Design Exception will be required.

Additionally, sanitary sewer lines are required by OAR 333/340 to cross under potable water lines with ≥ 1.5 feet of clearance. If the sewer line will be above the water line or clearance underneath will be < 1.5 feet, a PWB Design Exception must be obtained.

9. Use of vibratory compaction equipment is allowed where there is > 3 feet of cover over top of the conduit/transmission main pipe, or > 3 feet of undisturbed soil horizontally from the outside diameter of the conduit/transmission main pipe. Where there is ≤ 3 feet of horizontal or vertical clearance, non-vibratory compaction methods must be used that will not impact the conduit, such as using a sheep-foot roller or use of a CLSM material from the approve materials list.
10. Request locates for, field locate and identify on the plans the cathodic protection system for the conduit, including the location of the rectifier, anode bed and test stations, and the wiring connection between all three and the conduit. If a section of the cathodic protection system is damaged, the Engineer of Record for the construction project must submit plans and procedures to re-establish the conduit protection system. It is the Excavator's responsibility to ensure any damaged sections of the cathodic protection system are repaired and inspected prior to backfilling that area of the trench.
11. Any new trees proposed to be planted in the Public Right-of-Way shall be planted a minimum of 10 feet from the outside diameter of the adjacent Conduit to the edge of the future mature tree at diameter breast height (dbh). If in Portland City limits, follow Appendix D for separation requirements. On PWB property and on easements, new trees shall be planted a minimum of 20 feet from the outside diameter of the adjacent Conduit to the edge of the future mature tree at diameter breast height (dbh).
12. For conduits and transmission mains within easements granted to the City for these facilities, certain activities and encroachments within these easements may be restricted or prohibited. These may include, but are not limited to, public or private utilities, buildings, sheds, garages, barns, decks, walls, garbage enclosures, mailbox structures, swimming pools, hot tubs, septic systems, stormwater infiltration basins, sumps, large vehicle storage, material storage, parking, tree planting, or grade changes in excess of one (1) foot of elevation. The applicant shall contact PWB to confirm specific easement terms, conditions, and restrictions when proposing development within easements. Development that proposes restricted activities or encroachments within easements shall require the applicant to submit a PWB Design Exception Request for consideration by the Chief Engineer or designee(s).