PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

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CITY OF PORTLAND, OREGON 1851

May 27, 2022

Administrative Rules Adoption Memo

Portland City Code Title 21 (Water)
Administrative Rules: Portland Water Bureau Engineering & Technical Standards

Under the authority to adopt administrative rules as detailed in Portland City Code Chapter 21.24.080, I, Gabriel Solmer, Director of the Water Bureau, hereby accept and adopt the rules attached here as Attachment A. Per Title 21.24.080, the rules are effective June 1, 2022.

Gabriel Solmer 5/27/2022

Gabriel Solmer
Director, Portland Water Bureau
City of Portland

Date

Attachment A

Portland Water Bureau

Engineering & Technical Standards Admin Rule

Effective June 1st, 2022.

Portland Water Bureau
Engineering & Technical Standards Admin Rule

Section 1. Effective Date
This administrative rule is effective on June 1, 2022.

Section 2. Regulatory Authority
A. PCC 21.24.080 establishes the authority for the Administrator / Director of The Portland Water Bureau to create administrative rules related to the public water system.
B. PCC 21.04.010 establishes the authority for the Chief Engineer of the Portland Water Bureau to establish engineering and technical standards for the protection, design, construction, operations, and maintenance of the public water system.
C. PCC 21.12.130 defines limits of Portland Water Bureau assets vs private property owner assets for purposes of maintenance, repair, and replacement. This Engineering & Technical Standards Admin Rule (hereafter referred to as "Rule") applies to Portland Water Bureau assets, not private water systems.

Section 3. About these standards
Purpose of these standards:
The Portland Water Bureau is responsible for developing and maintaining engineering standards to protect, construct, operate and maintain the water system infrastructure integrity and to provide unobstructed access to the infrastructure for operations, maintenance, and repairs 24 hours a day, 7 days a week. The standards in the enclosed Appendices cover a variety of conditions and scenarios and are necessary to document existing and address new or changing conditions from current standards. This Rule provides clarity and citation ability for these standards.

The Portland Water Bureau's right to review work
To maintain water service, reduce the risk of damage or injury, and comply with applicable City, State and Federal regulations, the Portland Water Bureau can evaluate any work that might affect Portland Water Bureau water system infrastructure, as defined in PCC 21.12.130. Portland Water Bureau review may require relocation of existing utilities, installation of isolation valves, submittal of Utility Protection Plans, or other site-specific changes.

The Portland Water Bureau can require changes during construction for work around or impacting Portland Water Bureau assets to protect and maintain the integrity of the water system. Changes during construction must still follow appropriate applicable permit approvals.

Who must follow these standards:
Anyone who plans, designs, constructs, operates, changes, or maintains infrastructure that includes, or impacts, public water infrastructure must follow these standards. This can include but is not limited to:

- City staff
- Consultants
- Developers
- Contractors
- Utilities
- Public agencies

Section 4. Design Exception Process

When the Portland Water Bureau standards, code and policies in this Rule are not feasible: When the Portland Water Bureau standards, code, or policies of this Rule cannot be met, either due to permanent or temporary development or construction, the applicant may submit a Design Exception Request form to the Portland Water Bureau. Design Exception Requests are considered by the Portland Water Bureau Chief Engineer or designee(s) and will be approved, approved with mitigations, or denied. The applicant must submit the Design Exception Request form with their permit application or when they learn that their proposal cannot meet the standard or policy. A Design Exception may also be required by the Portland Water Bureau for any proposed development or construction that does not meet Portland Water Bureau standards and thus the Portland Water Bureau's ability to access, maintain, and/or protect Portland Water Bureau assets and reduce risk. Any fee imposed for review of Design Exceptions will be included in the Portland Water Bureau Fee Schedule. The Fee Schedule is revised yearly and can be found at fy-2021_2022-pwb-bes-rates.pdf (portland.gov) Portland Water Bureau Design Exceptions are not possible for premise-isolation backflow requirements, see Portland Water Bureau document "Backflow Assembly Installation Requirements". Other exceptions may be allowed as defined in Title 25.07. **https://www.portland.gov/water/backflow-prevention/backflow-assembly-installation-requirements**

On the Design Exception Request form the applicant will need to include:

- The type of conflict and Portland Water Bureau Standard, Code, Guideline or Policy that cannot be met and why
- Relevant documentation, such as site plans and cross sections
- A clear rationale for the proposed alternative design; and
- How the proposed alternative design and/or mitigations support the intent of the applicable criteria.

A copy of the Design Exception form and instructions is available on the Portland Water Bureau's website at https://www.portland.gov/water.

Section 5. Appendices

The Standards included by Appendices:

A. Submittal requirements for development and utility permit applications.
B. Submittal requirements for deep vaults
C. Compliance with current standards
D. Standard Separation Tables
E. Tap Separations for New Services
F. Water & Sewer separation policy
G. Seismic Infrastructure policy
H. Conduit/Transmission Main Protection Requirements
I. Electric Rail (light rail and streetcar) Requirements

Appendix A. Water Bureau Submittal requirements for development & utility permit review applications

Definitions:

Development permit – work driven by development permit on private property.

Utility permit – work on utility service facilities in the right of way

Submittal requirements for utility connections in the right of way, and/or work impacting or connecting to the public water system.

A. Requirements for development permits:

1) Development proposals must include right-of-way (ROW) utility plan information showing the following utilities and infrastructure:

   a) The entire street (property line to opposite curb) running along the full length of the property frontage, including right-of-way lines, curb, and easements, existing and proposed; show existing curb on the opposite side of the street.

   b) Proposed frontage improvements within that area including but not limited to:

      i) existing and proposed driveways and curb cuts
      ii) existing and proposed street trees
      iii) ADA ramps
      iv) Planting strips
      v) signage
      vi) stormwater facilities
      vii) vaults

   c) Utilities: existing and proposed, including water mains, meters, service lines, valves, hydrants, gas lines, underground and overhead power and communication cable lines, power poles, guy wires/anchors, electrical vaults and conduits, sewer mains and laterals, stormwater management infrastructure, telecommunications, and any other utilities in the right of way. Research existing utilities using the 811 One-Call Oregon Utility Notification Center locate service.

   d) Identify required premises-isolation backflow protection. Premises-isolation backflow is typically installed on private property at the property line on the centerline of the water service. See Portland Water Bureau "Backflow Assembly Installation Requirements". **https://www.portland.gov/water/backflow-prevention/backflow-assembly-installation-requirements**

2) Potholing: See Section D for when potholing is required.

3) Site plan

   a) Make sure the plan is to scale

      i) Include a scale bar. Preferred utility scales are 1”: 5‘or 1”; 10‘.

   b) Uses labels throughout

      i) Label street names and identify whether private or public for all streets,

   c) Is clearly readable

      i) Include a legend showing all symbols and line types; use different symbols and line types for existing versus proposed.

B. Water Bureau Requirements for utility/street opening permits:

Utility permits, or street opening permits are governed by City Administrative Rule TRN 10.19. In addition to the City requirements, the Water Bureau requires all utility or street opening permit applications must include right-of-way (ROW) utility plan information showing the following utilities and infrastructure using the 811 One-Call Oregon Utility Notification Center utility locate service:

1. All existing water infrastructure in all areas of the proposed work: water mains, service lines, valves, vaults, and hydrant runs and include a profile showing adequate clearances (if the proposed utility will cross a water main, service, or hydrant at any point), following the standard separation requirements in Appendix D.
2. A profile showing adequate clearances (if the proposed utility will cross a water main, service, or hydrant run at any point).
3. Potholing: See Section D for when potholing is required.

C. Requirements for submittals for deep excavations:
See Appendix B for deep vault requirements

1. Requirements for submittals for all excavations that may impact water infrastructure (excluding deep vaults as defined in Appendix B) are outlined in the City of Portland PWB Guidelines for Utility Protection requirements: https://www.portlandoregon.gov/water/article/415225

D. Potholing Requirements:

Based upon risk to the public water system, potholing for depth and or location shall be required at the applicant's expense where standard horizontal or vertical clearance cannot clearly be met under the following conditions. Survey may also be required on the main.

1. Proposed perpendicular crossings with less than 24 inches vertical separation, skin to skin, from water mains 12 inches diameter and greater.
2. Proposed utilities with less than 5 feet horizontal separation, skin to skin, from water mains 12 inches diameter and greater.
3. Potholing in the Public right of way requires a PBOT utility/street opening permit. Submit utility/street opening permits according to City Administrative Rule TRN-10.19 Utility Permits in the Right-of-Way: https://www.portlandoregon.gov/citycode/article/692262
4. Work with Portland Water Bureau to address confidentiality needs for all main 12 inches diameter and greater on publicly accessible plans.

Appendix B. Submittal requirements for deep vaults and excavations

These requirements apply to deep excavations, including for deep vaults that are:

1. Within 5 feet of the skin of the water main or water service 2 inches or greater
2. More than 8 feet deep; and
3. More than 8 feet long.

Engineered Utility Protection Plan

The Engineered Utility Protection Plan is always required for an excavation meeting the requirements above. The Engineered Utility Protection Plan must include:

1. A scaled site plan, which must show:
   - **a.** The location of the deep vault structure
   - **b.** Associated conduit bank and utilities
   - **c.** All water lines, service laterals, valves, and hydrants; and
   - **d.** Dimensions from these structures to outside skin of water infrastructure.

2. Standard drawings of the vault, showing dimensions and profile.

3. An excavation shoring plan. This must show:
   - **a.** Locations of required shoring members (both horizontal and vertical)
   - **b.** An explanation of how the project will maintain continuous positive pressure throughout the shoring process (installation through removal)
   - **c.** Stamp and seal from a Professional Engineer registered in Oregon.

4. Structural calculations that demonstrate how the shoring system will meet project needs. These calculations must be stamped and sealed by a Professional Engineer registered in Oregon.

Pre-construction meeting

The plan reviewer may require a pre-construction meeting as a part of approving the permit when not required as part of a separate process or project general conditions. The meeting is between the Portland Water Bureau Public Works Inspector and the contractor who will excavate the site.

Appendix C. Compliance with current standards

Water services and infrastructure may be required to be brought into compliance with Title 21 and Administrative Rules when the property is being developed, or when the property owner is notified by the Portland Water Bureau of a code violation. In addition, plumbing permits for changes to the private water system may require the service, meter, or backflow assembly be brought into compliance.

This includes but is not limited to, backflow assembly requirements, separate services and meters, meter sizes and locations, and basement vaults.

For Title 21.12.070.A.3 compliance, a “new” mixed use building is one that is permitted for new construction after July 1, 2021.

For Title 21.12.070.A.4 compliance, a “new” development is one that receives Land Use Approval after July 1, 2021.

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).

Appendix D. Portland Water Bureau standard separations

Proposals not maintaining Portland Water Bureau standard separations require a Design Exception from the PWB Chief Engineer. They may also require a Construction Waiver from the Oregon Health Authority as appropriate. These separation standards supersede all other conflicting or contradictory separation requirements or standards shown in preceding Portland Water Bureau policies, manuals, or standard drawings, dated, or produced prior to January 1, 2022.

1. PWB below-ground standard separations

From skin of …	To skin of water …	Minimum horizontal separation	Minimum vertical separation	Reason	Source
1. Top of parallel sanitary or combined sewer main or lateral **below** the bottom of the water main or service	A. Main, vault, or service	5 feet	None (top of sewer pipe below or even with bottom of water main)	Protects the water system from cross contamination by maintaining clearances to Zone 1 requirements of OAR 333 & 340	Oregon Administrative Rules 333-061-0050(9) and 340-052-0020 (Appendix A; Appendix F
2. Top of parallel sanitary or combined sewer main or lateral **above** the bottom of the water main or service	A. Main or service	10 feet	None		
3. Perpendicular sanitary or combined sewer main or lateral below the bottom of the water main	A. Main or service 12-inch diameter or less	N/A	1.5 feet	Protects the water system from cross contamination	Oregon Administrative Rules 333-061-0050(9) and 340-052-0020 (Appendix A ;
	B. Main or service greater than 12-inch diameter	N/A	2.0 feet		

From skin of …	To skin of water …	Minimum horizontal separation	Minimum vertical separation	Reason	Source
4.Perpendicular sanitary or combined sewer main or lateral above the top of the water main	A. Main or service	N/A	Prohibited	Protects the water system from cross contamination	Oregon Administrative Rules 333-061-0050(9) and 340-052-0020 (Appendix A; Appendix F
5. Maintenance holes, & catch basins	A. Main or service	5 feet	Prohibited	Protects the water system from cross contamination	
6. Sumps	A. Main, vault or service	5 feet	Prohibited	Protects the water system from cross contamination	
	B. Conduits	12 feet	Prohibited		
7. Other utility pipe crossing perpendicular above or perpendicular under water main (e.g., storm sewer, non-water)	A. Main or service 12-inch diameter or less	N/A	1.5 feet	Protects water mains from construction damage. Leaves space for water infrastructure, access for operations, maintenance, replacement and repairs.	
	B. Main or service greater than 12-inch diameter	N/A	2.0 feet		
8. Other utility pipe parallel to water main (e.g. storm-sewer, gas, electrical conduit, etc.)	A. Main or vault	5 feet	N/A	Protects water mains from construction damage. Leaves space for water infrastructure access for operations, maintenance, replacement, and repairs.	
	B. Service or meter 2-inch or less	3 feet	N/A		
	C. Service or meter greater than 2-inch	5 feet	N/A		

From skin of …	To skin of water …	Minimum horizontal separation	Minimum vertical separation	Reason	Source
9. Any underground structure, (such as but not limited, to vault, building, foundation, footing, poles (lights, signal, signs, utility, etc. including footings), retaining wall, utility pole, etc.)	A. Main or vault	5 feet	N/A	Protects watermains from construction damage. Leaves space for water infrastructure and the structure, access, operations, maintenance, replacement, and repairs.	
	B. Service or meter 2-inch or less	3 feet	N/A		
	C. Service or meter greater than 2-inch	5 feet	N/A		

2. PWB above-ground standard separations

From skin of …	To skin of water …	Minimum horizontal separation	Minimum vertical separation	Reason	Source
1. Utilities and structures (such as walls, fence, cabinets, vaults, poles, obstructions). Measured from closest point, including above and below ground footings.	A. Main	5 feet	N/A	Leaves space for water infrastructure integrity, access, operations, maintenance, replacement, and repairs.	
	B. Service or meter 2-inch or less	3 feet	N/A		
	C. Service or meter greater than 2-inch	5 feet	N/A		
	D. Vault	5 feet	N/A		

From skin of …	To skin of water …	Minimum horizontal separation	Minimum vertical separation	Reason	Source
2. Guy wires and anchors	A. Main	5 feet	Prohibited directly over main	Leaves space for water infrastructure integrity, access, operations, maintenance, replacement, and repairs.	PCC Title 11.60.060.D.2
	B. Service or meter 2-inch or less	5 feet from closest point of anchor to skin of service line	Prohibited directly over service or meter		
	C. Service or meter greater than 2-inch	5 feet from edge of service line or edge of vault, whichever is greater	Prohibited directly over service or meter		
	D. Vault	5 feet	Prohibited directly over service or meter		
3. Utilities and structures	A. Hydrant	6 feet from center of hydrant on both sides and 3.5 feet in back of hydrants	7 feet measured from top of hydrant	Allows for hydrant use and maintenance	Uniform Fire Code; PWB Drawing W-105
4. Electric poles, structures, and guy wires	A. Hydrant	6 feet from center of hydrant on both sides and 4.0 feet in back of hydrants	7 feet measured from top of hydrant	Allows for hydrant use and maintenance	Uniform Fire Code; PWB Drawing W-105; NESC

From skin of …	To skin of water …	Minimum horizontal separation	Minimum vertical separation	Reason	Source
5. Stormwater Facility, side curb	A. Hydrant	5 ft	N/A	Fire Bureau requirement for solid surface next to hydrant for connection.	
6. Curb (curb ramps, traffic circles)	A. Main	6 feet – measured to center of pipe	N/A	Provides space for water infrastructure integrity, access, operations, maintenance, replacement, and repairs.	PBOT P-504
7. Stormwater Facility: A. outside skin of gutter pan or B. edge of stormwater facility liner	A. Main	2 feet- no lining required	N/A	Provides WQ protection and space for water infrastructure integrity, access, operations, maintenance, replacement, and repairs.	BES Drawing P-333 with no lining required per detail
	B. Main	0 - 2 feet – lining required	N/A		BES Drawing P-333 w/appropriate lining per detail
	C. Service	N/A	2 feet		BES Drawing P-332
8. Side property line extended to its intersection with the ROW line	A. Meter	3 feet	N/A	Makes sure meter installation and maintenance do not disturb neighboring property or utility poles.	8. Side property line extended to its intersection with the ROW line

From skin of …	To skin of water …	Minimum horizontal separation	Minimum vertical separation	Reason	Source
9. Trees: from skin of trunk where it meets the ground at maturity	A. Main or service less than 24 inches in diameter and water meter box or vault.	5 feet	N/A	Separations limit risk, prevent root damage to water system, provide space for water infrastructure integrity, access, operations, maintenance, replacement, and repairs. Separations are for ≤ 12-inch Diameter Breast Height.	Portland Water Bureau Standard Drawings P-845 & 846 PCC Title 11.10.010.c PCC Title 11.50.060.c
	B. Main 24 inches or greater in diameter, conduits and transmission mains, and hydrants.	10 feet[1]	N/A		
10. Trees: from skin of trunk where it meets the ground at maturity	C. Conduit or transmission main in private PWB easements or outside City of Portland.	20 feet	N/A	Separations limit risk, prevent root damage to water system, provide space for water infrastructure integrity, access, operations, maintenance, replacement, and repairs.	Portland Water Bureau Standard Drawings

[1] Locations where proposed improvements do not meet this standard will be reviewed by the Portland Water Bureau in collaboration with Urban Forestry through the Portland Water Bureau Design Exception process to determine if different design methods or construction techniques are possible to allow an exception.

Appendix E. Connection separations for new services

Connections of new services to an existing main that are done by "tapping" the main (taps) must be at least the following distances from other taps and appurtenances, including but not limited to joints, valves, bends, blowoffs, and tees. All dimensions are from the center of the tap to the center of the tap, or from the center of the tap to the edge of the pipe joint.

	2" main	4" main	6" main	8" main	10–14" main	16" + main
One tap						
1"	N/A[1]	18"	18"	18"	18"	18"
2"	N/A[1]	18"	18"	18"	18"	18"
4"	-	3'	2'	2'	2'	2'
6"	-	-	3'	2'	2'	2'
8"	-	-	-	3'	3'	3'
10"	-	-	-	-	4'	4'
12"	-	-	-	-	4'	4'
Two taps						
4" and 4"	-	6'	4'	4'	4'	4'
4" and 6"	-	-	4'	4'	4'	4'
4" and 8"	-	-	-	4'	4'	4'
4" and 10"	-	-	-	-	5'	5'
4" and 12"	-	-	-	-	5'	5'
6" and 6"	-	-	6'	4'	4'	4'
6" and 8"	-	-	-	5'	4'	4'
6" and 10"	-	-	-	-	5'	5'
6" and 12"	-	-	-	-	5'	5'
8" and 8"	-	-	-	6'	4'	4'
8" and 10"	-	-	-	-	5'	5'
8" and 12"	-	-	-	-	5'	5'
10" and 10"	-	-	-	-	6'	6'
10" and 12"	-	-	-	-	6'	6'
12" and 12"	-	-	-	-	6'	6'

[1] The Portland Water Bureau always installs a tee on 2-inch mains.

Appendix F. Water & Sewer Separation Policy

I. APPLICABILITY:

This policy applies to all City of Portland staff, consultants, developers, contractors, utilities, and public agencies who plan, design, construct, operate, and maintain the physical infrastructure that comprises the Portland Water Bureau (PWB) system. It also applies to developer initiated and interagency projects that result in new PWB water infrastructure, modifications to existing PWB infrastructure, or sanitary sewer (including combined sewer) projects which impact water infrastructure. PCC 21.12.130 defines limits of Portland Water Bureau assets vs private property owner assets for purposes of maintenance, repair, and replacement. This Appendix and Rule apply to Portland Water Bureau public assets, not private water systems which are covered by Plumbing code.

II. BACKGROUND:

The Oregon Health Authority (OHA) OAR 333-061-0050-(9) and the complementary Department of Environmental Quality (DEQ) OAR 340-52, both specify required clearances between sanitary sewer and water assets for public health and safety. Per OAR 333-061-0060 all projects installing new water lines, or replacing existing with a larger size, must be approved by OHA (same size replacement in same location does not require OHA approval). Pursuant to section 333-061-0060(4), Portland Water Bureau (PWB) has been granted and maintains a Plan Review Exemption from OHA which authorizes PWB to review water plans (for PWB, developer, and interagency projects) for conformance with OARs as long as PWB provides annual certification and maintains the minimum requirements.

Sewer line construction is regulated by DEQ, but currently DEQ does not have a formal plan review requirement. Currently with DEQ consent, PWB reviews new sewer line projects to ensure conformance with (DEQ) OAR 340-52.

This policy will clarify requirements needed to meet public water and sewer regulations, Portland Water Bureau standards, and document the process for review and approval of plans related to meeting public water and sewer separation requirements. Please note that additional requirements for separation or mitigation measures may be required to address other applicable standards, constructability and/or maintenance needs, see Appendix D.

III. DEFINITIONS:

Line: For water, includes the public water main as well as the public water service up to the meter, and all public potable water runs, such as fire services, fire hydrant runs, drinking fountains, and water quality sampling stations. This does not apply to private water mains or services. For sewer, includes the sanitary or combination sewer main as well as the lateral to the property line and the catch basin lead pipe for combination sewer systems.

New Water or Sewer Line: A new line is either an entirely new line, a replacement line in a different zone, see Figures 1 and 2, or a replacement line that is upsized.

Types of Approvals:

- A Design Exception is processed and granted by PWB.
- A Construction Waiver is processed by PWB using the DE application but is granted by OHA.

IV. POLICY:

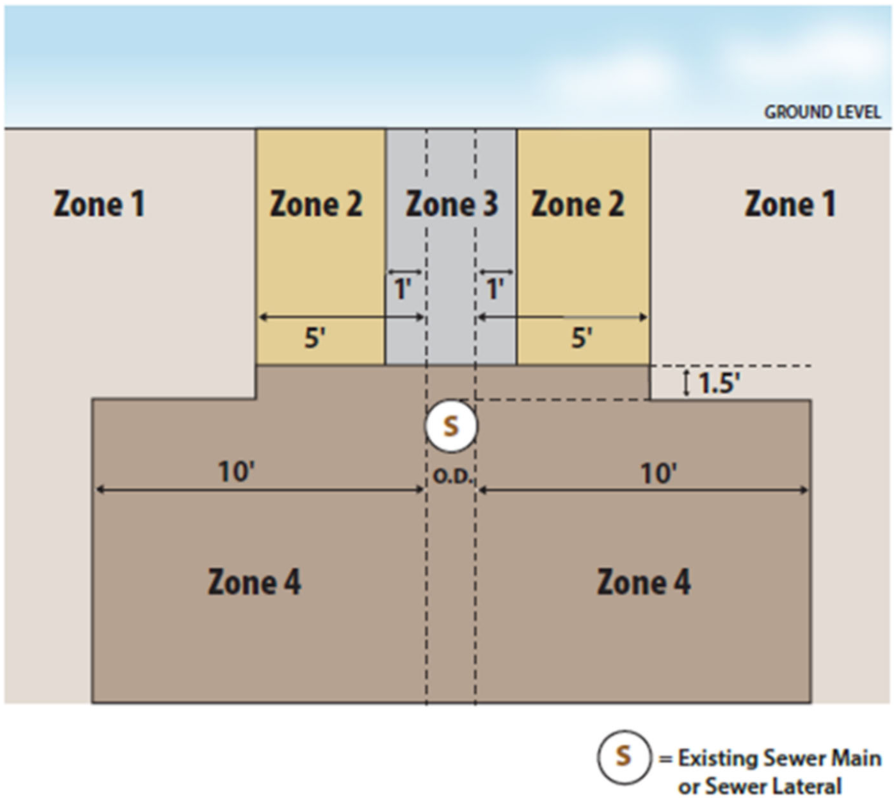
1. New Water projects

OHA has designated four Water Line Zones, identified as Zone 1, Zone 2, Zone 3, and Zone 4; see (OAR 333-061-0050(9) - Figure 1: Water Line – Sewer Line Separation) or Figure 1 below. As part of the PWB Plan Review, if the water line installation falls in Zone 1, then PWB is authorized to approve the construction under the OHA Plan Review Exemption. If the water line installation falls in Zone 3, which is a prohibited Zone, then PWB will deny the application.

For plans that indicate water line installation in Zones 2 or 4, a Construction Waiver must be obtained from OHA. Installation in Zone 4 is strongly discouraged, and Construction Waivers are unlikely. Prior to submittal to OHA for installation in Zone 4, PWB requires demonstration of extreme circumstances of why re-design to an acceptable zone not feasible and subsequent proposed substantial mitigation and protection measures is. PWB staff process and submit specific Construction Waiver requests to OHA for approval. Typically, Construction Waiver requests involve mitigation measures, see Section 4 of this appendix.

New Water Main

Parallel Placement Restrictions near Existing Sewer Lines



Water Line Zones

Zone 1: Only crossing restrictions apply.
Zone 2: Case-by-case determination.
Zone 3: Parallel water line prohibited
Zone 4: Parallel water line prohibited

Figure 1:
Water Line-Sewer Line Separation
OAR 333-061-0050(9)(b), effective 8/13/2010

Figure 1 – OHA OAR 333-061-0050(9)

2. New Sewer projects

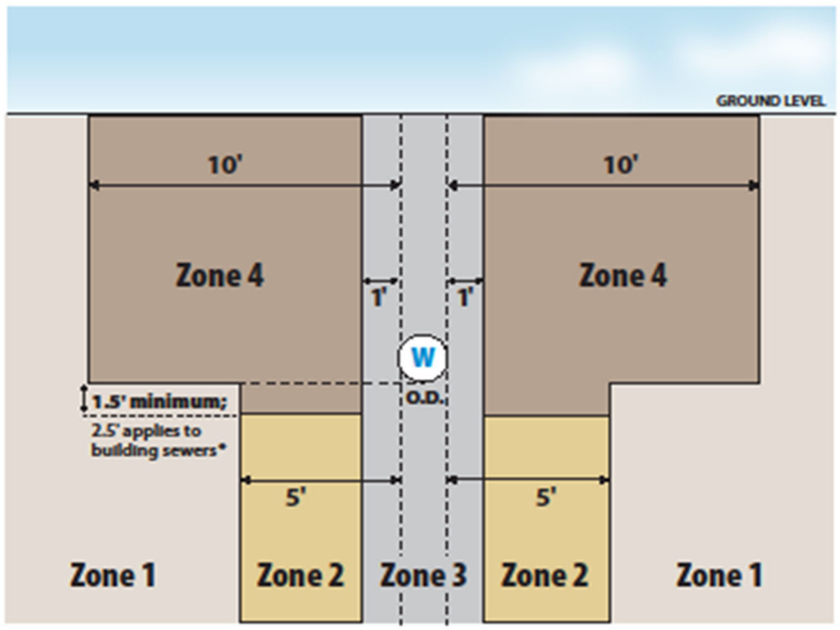
DEQ has designated four Sewer Line Zones, identified as Zone 1, Zone 2, Zone 3, and Zone 4; see (OAR 340-52 Appendix A Figure A1: Sewer Line Zones or Figure 2 below. As previously described in the background section PWB reviews new sewer line projects to ensure conformance with (DEQ) OAR 340-52.

As part of the PWB Plan Review, if the sanitary or combination sewer installation falls in Zone 1, then PWB requests no additional water system protection requirements. If the sanitary or combination sewer installation falls in Zone 3, which is a prohibited Zone, then PWB will deny the application in conformance with OAR 340-52 and as a public health risk.

For plans that indicate sanitary or combination sewer installation in Zones 2, where additional justification is required, PWB will review on a case-by-case basis and may require additional mitigation measures. For plans that indicate sanitary or combination sewer installation in Zones 4, PWB will require additional mitigation measures, see Section 4 of this appendix.

New Sewer Line

Parallel Placement Restrictions near Existing Water Mains



W = Existing Water Main or Service

Sewer Line Zones

Zone 1: Sewer line can be laid in this area with no special requirements of either construction or materials.

Zone 2: Installing a sewer line in this zone is not advisable and must be justified in each case. Water line should be located on a bench of undisturbed earth when constructed concurrently and a common trench with sewer line.

Zone 3: Installing a sewer main directly over a water main or directly under a water main in this zone is prohibited since tapping and O&M of each line would be impaired.

Zone 4: Sewer line construction in this zone would generally not be permitted. Each installation must be justified. If consruction was permitted, pressure pipe materials for this sewer line would be required.

* *Building Sewer - the pipe that carries sewage from the outside wall of the building to the public sewer.*

Figure 2 – DEQ OAR 340-52

3. Replacement of water or sanitary sewer lines with same size or smaller in same location

Replacement of existing water or sanitary sewer lines in the same location with the same size or smaller do not require approval from OHA. However, PWB in the interest of protecting public health consistent with new installation requirements, will deny replacement of water line in OAR 333 Zone 3 and will not approve sewer installation applications which indicate placement of sewer line in OAR 340 Zone 3. Replacement of water or sanitary/combination sewer lines in either OHA or DEQ Zones 2 or 4 will be required by PWB to propose and utilize appropriate mitigation measures per Section 4. These projects will document the PWB approval and approved mitigation measures through the Design Exception process. See Section 7, Figure 5 of this appendix.

4. Mitigation Measures

Potential mitigation measures which may be used include:

a. Use of pressure rated pipe (125 psi or higher) for the sanitary or combination sewer main or lateral with watertight gaskets. For perpendicular crossings, center so the sanitary sewer pipe joints are as far as possible, or at least 10 feet, from the water pipe joints. Compact material from approved material list to 95% and verify construction by use of pressure testing (15 psi hydraulic) or closed-circuit television (CCTV) inspection.
b. Controlled low strength material (CLSM) fill in the sanitary sewer or water trench. If used in the water trench, water pipe and fittings must be wrapped with minimum of 8 mils thickness polyethylene encasement before concrete placement per COP SCS 01140.44 and CLSM must be fly ash free.
c. Casing of the water pipe.
d. Relocate the water or sewer main or lateral to achieve clearance.

5. Sanitary Sewer Lining or Spot Repair Projects

Projects which propose to line existing sanitary sewer main or laterals with cured-in-place pipe (CIPP) or by slip-lining are permitted without requiring additional measures. It should be noted that open cut access pits will need to be reviewed on a case-by-case basis and may have additional requirements. In addition, spot repairs to repair a limited section of line do not require additional measures. A spot repair is considered a repair to an existing main that does not extend from one maintenance hole to another. Pipe bursting is considered a new line if it increases the size and subject to Section 2 of this appendix. Pipe bursting of equal size is the same as lining and not subject to Section 2.

6. Process

Plans will be reviewed according to the following process. “New Water/Sanitary Sewer Line” refers to both main and laterals and includes replacement in the same zone with a larger size. Replacement in same zone with same size or smaller will follow same process as a new sewer line only, see Figure 5.

a. PWB new water line projects:

Projects which are designed and approved by the PWB will be reviewed as part of the PWB Design process. New water lines identified in Zones 2 or 4 will require a Design Exception form for a Construction Waiver request to the PWB WQ designated personnel who will coordinate with OHA for approval. See Section 7, Figure 3 of this appendix. See also Section IV.1, paragraph 2 for additional criteria regarding Zone 4 requests. Approved Design Exceptions or Construction Waivers shall be identified on the construction documents for all projects going out to bid.

b. Developer new water/sanitary sewer line projects:

Developer projects are projects submitted to PWB for review through the Bureau of Development Services permit application process. Projects will include plans that include water, sanitary sewer, or combined sewer improvements. Plans are reviewed by PWB staff for conformance with OAR 333-061-0050. New water lines identified in OHA Zone 1 will be approved for conformance with the OAR’s and new water lines in Zone 3 will be denied. New water lines identified in Zones 2 or 4 will submit a Design Exception form with a Construction Waiver request. The Design Exception form and Construction Waiver process will require identification of justification and proposed mitigation measures. See also Section IV.1, paragraph 2 for additional criteria regarding Zone 4 requests. This Design Exception form and Construction Waiver will be processed by PWB staff, who will also coordinate obtaining OHA approval for the Construction Waiver.

If the proposed project includes a new sanitary sewer line, then per Section 2 of this appendix, PWB will review and may require a Design Exception form and appropriate mitigation based on the proposed Sewer Line Zone. A Construction Waiver will not be required if there is no concurrent new water line. See Section 7, Figure 4 & 5 of this appendix. Approved Design Exceptions or Construction Waivers shall be identified on the construction documents.

c. Interagency projects:

Projects which are designed and approved by other agencies or City Bureaus, such as the Bureau of Environmental Services, ODOT or Tri-Met are submitted and reviewed by PWB’s Interagency Liaison or Design PM, who reviews the plans for conformance with PWB standards and the OAR statute. Plans which identify new water lines in OHA Zone 1 will be approved for conformance with the OAR’s and new water lines in Zone 3 will be denied.

New water lines identified in Zones 2 or 4 will submit a Design Exception form with a Construction Waiver request. The Design Exception form and Construction Waiver process will require identification of justification and proposed mitigation measures. This Design Exception form and Construction Waiver will be processed by PWB staff, who will also coordinate obtaining OHA approval for the Construction Waiver.

If the proposed project includes a new sanitary sewer line, then per Section 2 of this Appendix, PWB will review and may require a Design Exception form and appropriate mitigation based on the proposed Sewer Line Zone. A Construction Waiver from OHA will not be required if there is no concurrent new water line. See Section IV.7, Figure 4 & 5 of this appendix. Approved Design Exceptions or Construction Waivers shall be identified on the construction documents.

7. Flow Charts

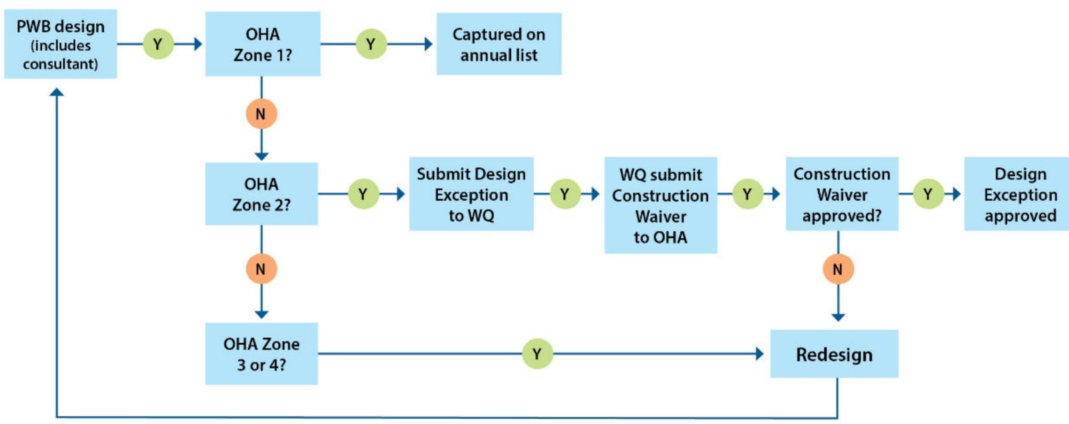
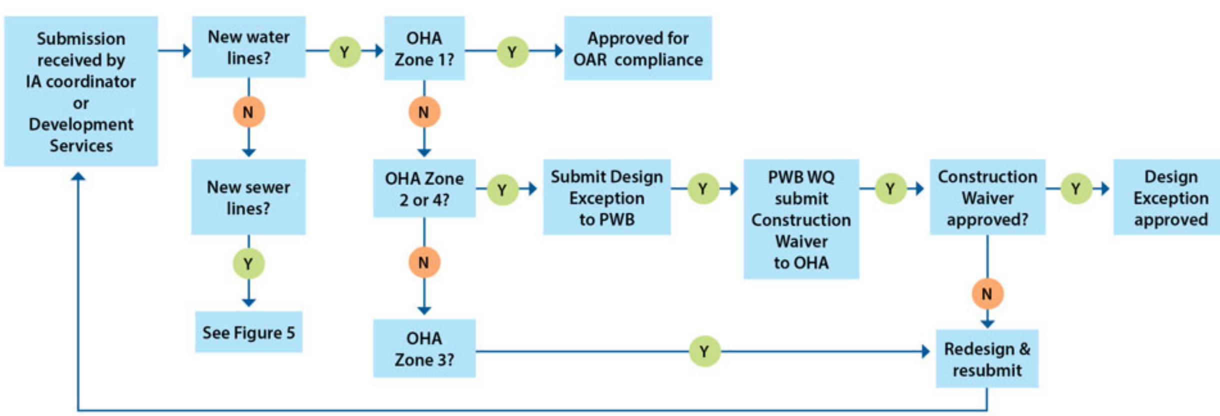


Figure 3: New Water Line – Designed by PWB internal staff



* Under extreme circumstances, a request for a Design Exception and OHA Construction Waiver for Zone 4 may be submitted. See Section IV.1, paragraph 2 for additional information.

Figure 4: New Water or Sewer Line – Designed by external agency or developer

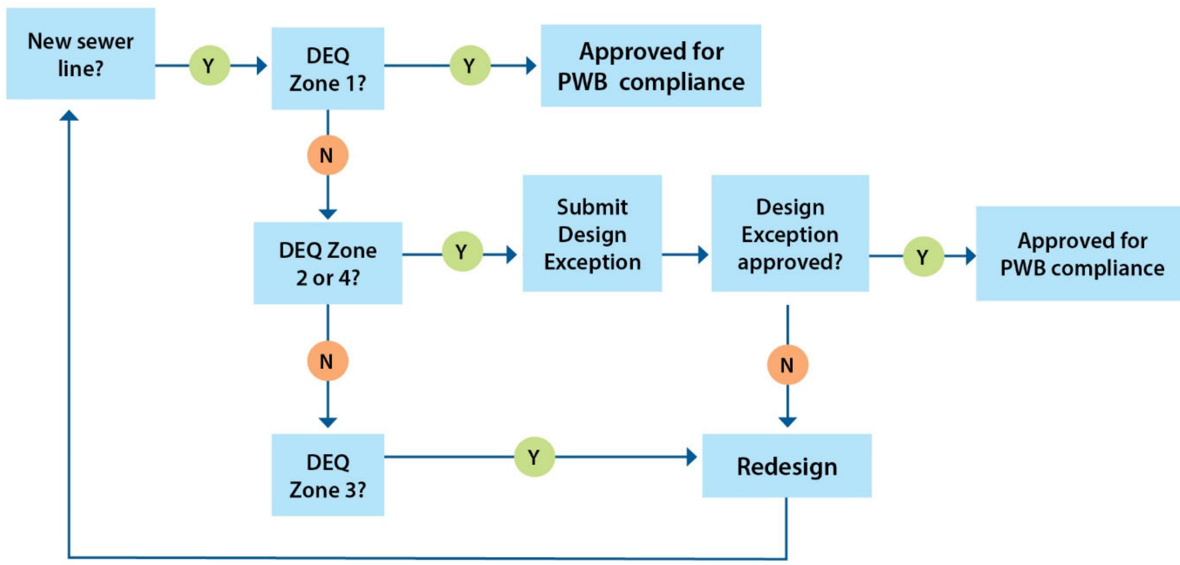


Figure 5: New Sewer Project or Replacement Sewer line (larger size in the same location or any size in new location)

Appendix G. Seismic Infrastructure Policy

I. **BACKGROUND:**

PWB intends to meet the goals and requirements for public water systems stated in the 2013 Oregon Resilience Plan, Section 2013 of America's Water Infrastructure Act of 2018, and the Oregon Health Authority, Drinking Water Services (OHA-DWS), requirements for master plans of water systems with 300 or more connections (OAR 333-061-0060 (5)). To meet these goals and requirements, it is the policy of PWB to implement the strategies in the 2017 Water System Seismic Study (WSSS), and the 2018 Seismic Implementation Plan (SIP) along with any future updates to these documents. These policies are designed to meet the Target State of Recovery (TSoR) required as part of OHA-DWS, which require the water system backbone system to be 80% to 90% operational within 24 hours following a Cascadia Subduction Zone (CSZ) earthquake and the distribution system to be 80% to 90% operational within two weeks following a CSZ earthquake.

II. **SEISMIC POLICY:**

1. All new or existing water system infrastructure assets designated by the Portland Water Bureau as critical backbone pipeline elements are required to be designed (new assets) to meet the desired performance goals (TSoR). Backbone elements include conduits, transmission mains, and key distribution mains.

2. All non-backbone pipelines, 6 inch or greater, in areas of high liquefaction hazard areas with a permanent ground deformation (PGD) greater than 6 inches, are required to be designed (new assets) to meet the desired performance goals (TSoR).

3. New pipeline assets identified in 1 and 2 above shall include earthquake forces in design of welded steel pipe, use Earthquake Resistant Ductile Iron Pipe (such as Kubota Genex), or other as approved by PWB to meet the desired performance goals.

4. All new structures and components shall be designed in accordance with best practice at the time of design, including the most current version of the Oregon Structural Specialty Code (OSSC) and the Portland Water Bureau standards.

An ARC GIS web map has been placed on the City of Portland website to determine the ground movement characteristics of all sites within the City of Portland.

These requirements will be in effect at time of recording of this Rule.

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.

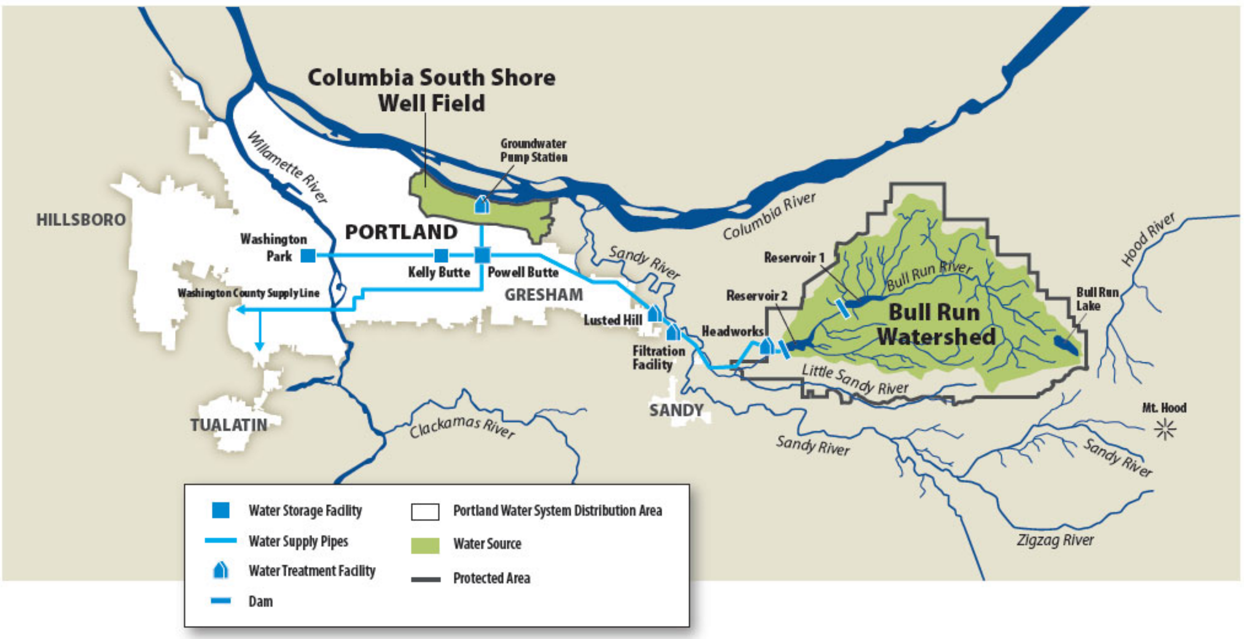


Figure H-1. The Portland water supply sources and system diagram

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.

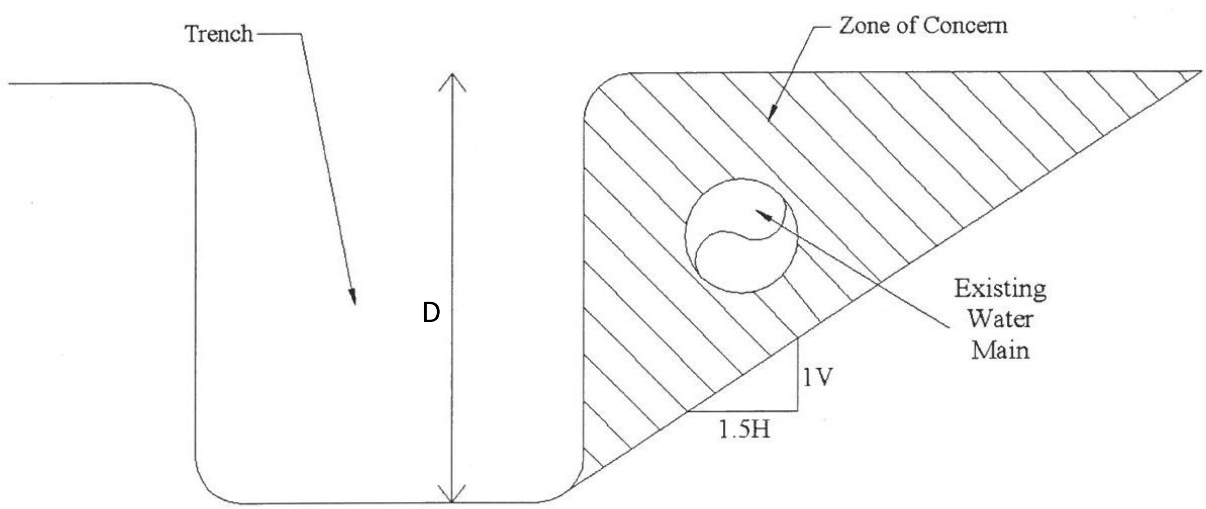
Terminal Storage includes Powell Butte, Kelly Butte, Washington Park, Mayfair, and Sam Jackson Tank sites.

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).

Appendix I. Electric Rail (light rail and streetcar) Requirements

This section is intended for the additional unique considerations required for the Water Supply Transmission & Distribution Systems when electric rail is to be located in proximity.

Electric Rail Design Guideline (Electric Rail)

A. General Criteria

1. Apply the following criteria when installing new water facilities in the vicinity of rail projects or determining mitigation needed for the existing water system to be protected from rail projects:

    (a) Ensure that the integrity of the water system is maintained to the same standards or better than that which existed prior to the rail project.

    (b) Ensure that the water system can be operated and maintained with reasonable access and without obstructions, delays, or complications.

    (c) Ensure that the water system can remain in service with no service disruptions, except for planned maintenance or emergency shutdowns.

    (d) Ensure that the rail system can remain in service with no disruption for normal water operations and maintenance, except planned maintenance or emergency water system repairs.

    (e) Ensure that safe working conditions can be maintained for PWB personnel to carry out operations and maintenance in the vicinity of the rail system.

2. The design life of the water system, which is estimated to be 200 years or more for pipelines and 100 years or more for services and other appurtenances, is expected to be maintained.

3. See Appendix 3.6 of the Portland Water Bureau Design Manual for the general application of these criteria.

B. Main Isolation Valves

1. Design for new and existing distribution mains capable of being fed from two directions to have isolation valves on both sides of rail crossings and located to minimize customer service disruptions caused by shutdowns of the water mains. Main shutdowns are needed to accommodate the rail project construction and future water system maintenance, repair, and construction. Mains fed from one direction may be isolated upstream of the rail crossing.

2. Locate isolation valves between services and rail crossings to allow the main under the rail crossing to be replaced with minimal or no service outages.

3. Restrain isolation valves on both directions to allow the main on either side of the valve to be removed without shutting down the main upstream of the valve.

4. Design for isolation valves to be appropriately spaced on distribution mains parallel to rails to facilitate rail project construction and minimize future service disruptions. Locate distribution system line valves on each side of intersections and not exceeding 500 feet between line valves.

5. Supply and transmission line valves should not exceed 500 foot spacing.

C. Clearances

1. Relocate, maintain, and protect all water facilities in conflict with other utilities. Maintain minimum clearances between water mains and appurtenances and other utilities and structures per Appendix D, except as stated below.

2. Relocate existing mains and other water facilities under or near rail alignments to ensure continued access 24 hours/day, 7 days/week for operations and maintenance. This requires that water mains and facilities have 10-foot minimum clearance between the outer skin of the water facility and the nearest rail slab or edge of ballast to be able to excavate them without disrupting rail operations.

3. Determine the allowable construction loads applied directly to subgrade over mains and other facilities that will have less than 9 feet of cover. Replace cast iron pipe and other facilities if construction traffic loads are expected to exceed allowable loads.

4. Consider replacing cast iron pipe if the existing pavement is removed.

5. Install casings under any facility that cannot be readily removed to access mains or that will adversely affect the loading on the facility. Portland Water Bureau casing pipe guidelines available from Portland Water Bureau staff upon request.

6. See the Transportation and Utility Impacts Section of Appendix 3.6 of the Portland Water Bureau Design Manual for design standards involving highway, street, and utilities construction conflicts.

D. Electric Rail Substations

1. Install or relocate all water mains and facilities to be a minimum of 200 feet from electric rail substation DC ground mats.

2. Install or replace all water mains and facilities that must be located with 200 feet from electric rail substation DC ground mats to be dielectrically isolated and have full corrosion protection systems.

E. Mains Near Rails

1. Dielectrically isolate and cathodically protect all new or relocated water mains and facilities that are within 100 feet of rail slabs or the outermost edge of rail ballasts.

2. Relocate, dielectrically isolate and cathodically protect all water mains and facilities to be a minimum of 10 feet from the nearest rail slab or outermost edge of the ballast (skin-to-skin clearance).

3. Mains may be located within 10 feet of a rail slab or edge of ballast on an exception basis, provided:

   (a) No space exists to have a 10-foot clearance.

   (b) The main is dielectrically isolated and cathodically protected from surrounding mains. Note: Cathodic protection can rarely be installed on existing mains. Existing mains must typically be replaced with new cathodically protected pipelines.

   (c) The main is not in conflict with recommended rail isolation criteria, the rail slab is encased in a dielectric membrane and there is no additional risk of failure or reduced life expectancy of the main or facility.

4. Existing water mains that are over 10 feet from the rail slab or outermost edge of the ballast may not need to be relocated, dielectrically isolated or cathodically protected provided:

   (a) There are no conflicts with the risk assessment of the water system.

   (b) There are no conflicts with the recommended rail isolation criterion.

   (c) No other physical impact exists such as unacceptable loading on the pipe; unacceptable vibrations on the pipe; conflicts or unacceptable clearance with other structures, utilities, duct banks, rail slabs, tie and ballasts, walls, catenary poles, stations, drainage, etc.

F. Mains Crossing Under Electric Rail Rails

1. Replace existing mains and construct new mains so they are in casing pipe, dielectrically isolated, and cathodically protected where crossing electric rail alignments.

2. Also dielectrically isolate and cathodically protect metallic casing pipe crossing under electric rail alignments.

3. Design for at least 1-foot vertical clearance from top or bottom of casing to duct banks and other utilities and structures. (Note: Typically, clearances are a 3-foot to 5-foot excavation envelope for the rail slab, duct banks, and catenary poles, etc., so minimum cover from ground surface to top of casing is about 4 feet to 6 feet).

4. Extend casings at least 10 feet beyond the rail slab or outermost edge of the ballast. Extend casings 5 feet beyond station platforms, but no less than 10 feet from the rail slab.

5. See the Tunneling and Casing Installation section of the Portland Water Bureau Design Manual for casing pipe design guidelines. See Appendix 3.6 of the Portland Water Bureau Design Manual for light rail crossings.

G. Services and Hydrants

1. Replace existing services and hydrant runs with new pipe in casings and any new pipe in casings that cross under electric rails.

2. Dielectrically isolate and cathodically protect metallic casing, service pipe and hydrant runs.

3. Extend casings at least 10 feet beyond the rail slab or outermost edge of the ballast. Extend casings 5 feet beyond station platforms, but no less than 10 feet from the rail slab.

4. Require watertight seals on both ends of service casing ends.

5. Provide 1-foot minimum vertical clearance from the top or bottom of casing pipe and duct banks or other utilities.

6. Require ground rods at each meter on the customer side for electrical grounding.

7. Copper Services:

    (a) Dielectrically isolate copper service runs at the main and at the backside of the meter.

    (b) Encase copper services that cross under rails with PVC from the main to the meter.

    (c) Tape-wrap the ends of copper services that are not encased.

8. DI Services and Hydrants:

    (a) Dielectrically isolate DI service runs at the backside of the meter only and protect the runs with the main's corrosion protection system.

    (b) Dielectrically isolate and cathodically protect metallic casing pipe.

H. Cathodic Protection

1. Many elements of the corrosion protection system are uniquely designed for specific applications. General measures are noted below for electric rail projects. See the corrosion protection chapter of the Portland Water Bureau Design Manual for corrosion design guidelines.

2. Mains: Bond all joints to be electrically continuous; coat or encase (wrap) all pipe with polyethylene wrap and install anodes at intervals per the corrosion design, but not exceeding 100-foot intervals. Provide isolation joints with test stations at the beginning and end of every cathodically protected main.

3. Parallel mains: Provide for isolation joints for mains parallel to the rails every 500 feet and test stations (TS) at the beginning and end of corrosion protected main sections and at each insulating joint.

4. Rail crossings: Provide insulating joints and test stations on the main as per the corrosion protection design, on each side of the rail crossing.

5. Steel Casings: Provide test stations and anodes on each end of the casing. Dielectrically isolate the casing pipe from the pressure pipe. Provide a protective coating on the casing pipe, i.e., HDPE wrap, epoxy, tape wrap, polyurethane, coal tar, etc.

6. Ductile Iron (DI) Services: Dielectrically isolate the end of services, behind the meter or property valve and install test stations at isolation joints and bond joints. Encase all service crossings under rails. Provide a coating or polyethylene wrap on all sections not cased. Provide anodes on all DI services as per the corrosion design.

7. Copper services: Dielectrically isolate each end of copper service branches. Provide insulating corporations at the main and IJs at the meter. Encase copper service crossings of rails with PVC. Tape wrap all copper service pipes not encased with PVC.

8. Acceptance Criteria: Acceptance testing is required for all joint bonding and isolation joints. Rail acceptance testing varies with the rail design.