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Chapter 17 WATER SERVICE CONNECTIONS

This chapter of the Design Standards and Guidelines (DSG) describes standards and guidelines for designing Seattle Public Utilities (SPU) water service connections. SPU uses both permanent and temporary water service connections to its water system.

Standards appear as underlined text.

The primary audience for this chapter is SPU engineering staff.

17.1 KEY TERMS

The abbreviations and definitions given here follow either common American usage, regulatory guidance or SPU usage.

17.1.1 Abbreviations

Abbreviation	Term
AVB	atmospheric vacuum breaker
AREMA	American Railway Engineering and Maintenance-of-way Association
AWWA	American Water Works Association
DC	Detector Check
DR	Director's Rule
DCVA	double check valve assembly
DCDA	double check detector assembly
DSG	Design Standards and Guidelines
DSO	Development Services Office
GPM	gallons per minute
psi	pressure per square inch
PVBA	pressure vacuum breaker assembly
RPBA	reduced pressure backflow assembly
SDCI	Seattle Department of Construction and Inspections
SDOT	Seattle Department of Transportation
SMC	Seattle Municipal Code
SPU	Seattle Public Utilities
WAC	Water Availability Certificate
WAC	Washington (State) Administrative Code
WOSM	Water Operations System Maintenance

17.1.2 Definitions

Term	Definition
Combination Service	These services supply water with one service for both fire flow and potable water flows. Combination services typically use a low and high flow meter to allow large variations in water consumption to be correctly metered.
customers	Property owners, developers or their agents
Detector Check Fire Service	These services supply only fire flow. They have a single detector check meter (DC) to show if any water was used in the meter during the recording period.
Design Engineer	Engineer who works on production of design drawings, technical specifications, calculations and technical memoranda for any design discipline or specialty. Mainly SPU staff but may include consultants for large or specialty projects.
domestic service	These services supply only portable or drinking water for domestic uses (i.e. not for fire flow)
guidelines	Advice for preparing an engineering design. They document suggested minimum requirements and analysis of design elements in order to produce a coordinated set of design drawings, specifications, or life-cycle cost estimates. Design guidelines answer what, why, when and how to apply design standards and the level of quality assurance required.
large service	Any water service larger than 2 inches
Small service	Any water service 2 inches or smaller
Standards	Drawings, technical or material specifications, and minimum requirements needed to design a particular improvement. A design standard is adopted by the department and generally meets the functional and operational requirements at the lowest life-cycle cost. It serves as a reference for evaluating proposals from developers and contractors: For a standard: the word must refers to a mandatory requirement. The word should is used to denote a flexible requirement that is mandatory only under certain conditions.
Water Availability Certificate (WAC)	The Water Availability Certificate is SPU's formal response to requests for information certifying whether or not SPU can provide adequate water flow, demand and pressure to the new or existing properties. The WAC may impose restrictions, requirements, or special conditions for providing service. Not all projects require a WAC (e.g. no change in use or demand).
WAC Administrator	SPU staff person who administers the process, reviews, and responds to customer water service requests. See Water Availability Certificate (WAC)
Water Service Plan	SPU plan that includes meter size, type, location, parts list, tap information, etc. in plan view and profile.

17.2 GENERAL INFORMATION

SPU is the City of Seattle department responsible for providing both temporary and permanent water services to new and redevelopment projects.

The City ensures that a level of service is met as established in SPU's 2013 Water System Plan:

- [Plan Summary](#)
- [2013 Water System Plan – Volume I](#)

The Washington State Department of Health requires the plan to be updated every 6 years.

17.2.1 SPU Policy

The Washington Administrative Code establishes the following minimum standards in pounds per square inch (psi) for SPU water service pressure:

- 20 psi for the existing distribution system during normal operations
- 30 psi for new distribution system construction.

There are 6 policies that direct water services as follows:

1. Customer Connections to the Water System policy applies to water service connections.
2. Water Service within the Direct Service Area ([SPU-CS-102](#)). Effective Oct 17, 2003.
3. CS-102 Connection Charge ([SPU-DR-02-03](#)). Effective May 20, 2004.
4. Changes to the Water Distribution System by a Property Owner ([SPU-CS-100](#)). Effective Oct 17, 2003.
5. Water Availability Certificates (WACs) ([SPU-CS-101](#)). Effective May 9, 2011.
6. Standard, Connection and Administrative Charges (SPU DR-01-10). [FIN-210.2](#). Effective January 1, 2013.

For SPU policies on water supply, including water main see *DSG Chapter 5, Water Infrastructure*.

17.2.2 Types of Water Service

SPU maintains approximately 190,000 water service connections. The following types of water service are available from SPU:

- Small Domestic Services, such as single-family residences and small irrigation systems.
- Detector Check (DC) Fire Services (fire protection systems).
- Multiple Meter Services (Manifold), such as for townhomes.
- Large Domestic Services, such as industrial, commercial, and apartment or condo buildings.
- Combination Meter Services for both domestic and fire, typically for large buildings.

17.2.2.1 Small Domestic, DC Fire Service, and Irrigation (Single 2-Inch or Smaller)

Most SPU-maintained service connections (>92%) are small domestic and Detector Check (DC) fire services (Table 17-1 and **Error! Reference source not found.**). These services use single 2-inch or smaller connections and have the lowest water consumption of all service types. Small domestic and DC fire service connections **may** require review by SPU Plan Review staff if in the Central Business District or in an arterial.

Small domestic, DC fire and irrigation water service connections meter boxes use a small footprint and rarely encounter conflicts. If an area in a planter strip or behind the sidewalk is available in the ROW, small domestic, DC fire, and irrigation water services must be located in those areas.

Table 17-1
Small Domestic, DC Fire Service, and Irrigation Water Service
(Single 2-inch or Smaller Meters)

	Service Size	Standard Water Service Plan	Manufacturer/ Meter Type	Max gpm	Head Loss (psi) @ gpm	Vault Type/Meter Box Min. Footprint ¹
DOMESTIC	¾"	DSG Drawing 17-1	Master Meter Multi Jet Impeller	30	9 @ 30	Olympic Foundry SM29 2'-6" x 3'-0" (Meter Box #2)
	1"			50	7.3 @ 50	
	1 ½"	DSG Drawing 17-2		100	14 @ 100	Olympic Foundry SM30 2'-6" x 3'-6" (Meter Box #3)
	2"			160	14 @ 160	
FIRE	2"	DSG Drawing 17-3	Master Meter Detector Check Multi Jet impeller	160	14 @ 160	Olympic Foundry SM29 2'-6" x 3'-0"

¹ Allow 6-inch clearance between vaults (e. 17" x 22" box = 2'-6" x 3'-0" rounded up)

Table 17-2
Multiple Meter Water Service
Multiple 1-inch or Smaller Meters)

Service Size ¹	Standard Water Service Plan	Max gpm	Head Loss (psi) @ gpm	Vault Type/ Minimum Footprint ²
¾" (3 or 4 meters)	DSG Drawing 17-4	30	9 @ 30	Use 1 Olympic Foundry SM30 2'-6"x 3'-6" Use 1 Olympic Foundry SM29 2'-6"x 3'-0"
¾" (5 or 6 meters)	DSG Drawing 17-5			Use two Olympic Foundry SM30
¾" (7, 8 or 9 meters)	DSG Drawing 17-6	30	9@30	Utility Vault #264-T 8'-8" x 5'-2"
1" (3 meters)	DSG Drawing 17-8	50	7.3 @ 50	Utility Vault 23R-12 4'-8" x 3'-8"

1" (4 or 5 meters)	DSG Drawing 17-9			Utility Vault 25R-12 4'-6" x 7'-6"
1" (6 or 7 meters)	DSG Drawing 17-10			Utility Vault 265-T 8'-8" x 7'-2"
1" (8 meters)	DSG Drawing 17-7	50	7.3 @ 50	Utility Vault #64R-12 5'-9" x 7'-9"

¹ All SPU multiple meters are potable water type, manufactured by Master Meter and are Multi Jet impellers.

² Allow 6-inch clearance (i.e. 17" x 22" x 11" box = 2'-6" x 3'-0" x 1'-6" rounded up

17.2.2.2 All Other Water Services (Larger than 2 Inch)

All SPU water services other than the small services shown in Table 17-1 and **Error! Reference s** **ource not found.** must have plan review by SPU Development Services Office (DSO) and by Operations staff. These other services include multiple meters, large domestic and large DC fire services, and combination meters. DSG Standard Plans apply under most circumstances for these water services.

The vaults for these other water services are large and should be located with the access hatch either in the sidewalk or the planting strip portion of the right-of-way (ROW). The design engineer may be required to redesign the connection if the standard water services plans cannot be applied.

Table 17-2
Large Domestic, DC Fire, and Irrigation Water Service¹
(Larger than 2-inches)

	Meter Size	Standard Water Service Plan	Max gpm	Head Loss (psi) @ gpm	Vault Type/ Minimum Footprint ²	Bypass Size
DOMESTIC	3" Discontinued	DSG Drawing 17-11				
	4" – Octave		500 750	7.25 @ 260 7.25 @ 440	Utility Vault 575 5' x 7'	2" Soft Pipe
	6" – Octave	DSG Drawing 17-12	750 2000	7.25 @ 440 6.1 @ 1600	Utility Vault 4484 4'-4" x 8'-4"	4"
	8" – Octave	TBD	2800	10.0 @ 2800	Utility Vault 5106 5'-6" x 10'-6"	4"
COMBINATION	4" - Octave	TBD		8.75 @ 440	Utility Vault 575 5' x 7'	2"
	6" – Octave	TBD	2000 2800	6.11 @ 1600 10.0 @ 2800	Utility Vault 4484 4'-4" x 8'-4"	4"
	8" – Octave				Utility Vault 5106 5'-6" x 10'-6"	4"
FIRE	4" to 8"	DSG Drawing 17-13	500 to 1600	7.25 @ 750 to 10.0 @ 2800	Utility Vault #4441.A 4'-0" x 4'-0"	N/A

¹ Before January 2010, SPU large domestic, DC fire and irrigation water services used compound turbine meters manufactured by Sensus SRH. New meters are Enduro meters manufactured by Metron Farnier.

² Assumed clearance between vaults is 1'-0". See Figure 17-1.

17.2.3 DSG Design Resources

SPU standard water and fire services plans and details must be followed unless an alternative is approved by SPU Engineering. These standard plans and details are available only from the DSG. They are not part of the City of Seattle Standards Plans and Specifications:

- DSG standard drawings for water service connections
- Water service in or near a natural drainage system
- Water service connection plan and profiles examples

17.3 GENERAL REQUIREMENTS

Water service connections to SPU water facilities must meet City of Seattle, King County, Washington State, and federal standards. This section highlights **only** requirements for water service connections. For similar industry standards for other water system features, *see DSG Chapter 5, Water Infrastructure.*

Water and fire service design must follow American Water Works Association (AWWA) design manuals (Table 17-3). The following is a list of relevant AWWA design manuals for water service.

Table 17-3
AWWA Design Manuals for Water Services

Designation	Title	Edition
M1	Principles of Water Rates, Fees and Charges	Fifth
M6	Water Meters: Selection, Installation, Testing, and Maintenance	Fifth
M14	Recommended Practice for Backflow Prevention and Cross-Connection Control	Third
M22	Sizing Water Service Lines and Meters	Second
M28	Rehabilitation of Water Mains	Second
M31	Distribution System Requirements for Fire Protection	Third
M41	Ductile-Iron Pipe Fittings	Second
M44	Distribution Valves: Selection, Installation, Field Testing, and Maintenance	Second

17.3.1 Regulations

This section describes **only** fire service requirements and backflow prevention specific to water service connections. See *DSG Chapter 5, Water Infrastructure*, for all City of Seattle, Washington state, and federal regulations for other water service requirements.

17.3.1.1 Fire Service Requirements

The City of Seattle Fire Department (SFD) requires a fire service for certain types of structures. These fire service requirements are based on the Seattle Fire Code. The Fire Code establishes requirements for when fire protection systems are required, where the services may be located, and provides minimum criteria for size of service and fire flow demands. Large commercial and industrial buildings and some smaller buildings (e.g. townhomes) require fire service. It is the customer's responsibility to review the Fire Code and contact the Fire Department to obtain

those requirements. Customers do this as part of their application to SPU DSO for a new water service.

Note: *If the project is located outside the City of Seattle, please contact the Fire Department or District where the project is located for requirements.*

Information for determining fire requirements and sizing fire services can be found in the [Seattle Fire Code](#) and AWWA M22 Design Manual (SMT 45th Floor Library). Chapter 9 of the Fire Code identifies which types of structures require a particular type of fire protection system (e.g. sprinkler, fire alarm, chemical). Note that structures with sprinkler systems will have large water service demand.

Tip: *While the design engineer should be familiar with Fire Code requirements, do not attempt to respond to customer queries on fire service. Instead, direct the applicant to either the Fire Marshall's Office within SFD or SPU DSO.*

17.3.1.2 Backflow Prevention (Cross Connection Control)

A *cross connection* is any actual or potential physical connection between a public water system and the consumer's water system/customer plumbing and any source of non-potable liquid, solid, or gas that could contaminate the potable water supply by backflow. Backflow devices can be required based on the *type of facility* that has the water service (e.g. hospital, laboratory or sewage pump station) or by the *specific water use* (fire service, irrigation, soda machine).

A. Requirements

Under state law, (WAC 246-290-490) and Seattle Municipal Code (SMC 21-04.070), SPU is responsible for protection of the public water system from cross connections and may require backflow protection on the customer's service line or within the customer's plumbing system. Under the plumbing code, Public Health Seattle-King County, a public health department jointly managed by the City of Seattle and King County, has authority for building plumbing and cross-connection control within that plumbing. SPU and Public Health Seattle-King County have a memorandum of understanding for coordination for preventing and controlling cross connections.

B. Roles and Responsibilities

The following is the general process for backflow prevention:

1. SPU Water Quality Inspectors in the Customer Service Branch set the requirements for backflow prevention using state law, City policy, and industry standards.
2. Utility service inspectors review building design and inspect buildings under construction to ensure these requirements are met and then communicate any deficiencies to the contractor.
3. Water Service customers purchase, install, own and test backflow devices. SPU inspects backflow device installations and tracks testing of assemblies on private projects.

Where water is provided to an SPU facility, an inspector is responsible for setting the backflow prevention requirements and SPU is responsible for installing, operating, and maintaining the backflow device.

C. Types of Devices

The type and location of the backflow prevention devices depends on the degree of hazard of the cross connection. SPU determines the type during plan review or in the field if changes occur in design.

The following are backflow prevention devices (also referred to as backflow assemblies):

- Air gaps (AG)
- Reduced pressure backflow assembly (RPBA)
- Double check valve assembly (DCVA)
- Pressure vacuum breaker assembly
- Atmospheric vacuum breaker (AVB)
- Pressure vacuum breaker assembly (PVBA)

For more information on backflow prevention reference the resources in DSG section 17.6.

17.4 PLAN REVIEW AND DESIGN

17.4.1 Water Service Connection

This section briefly summarizes the current process for getting a water service connection from SPU. For specific information, refer to *DSG Chapter 18, Development Services*.

17.4.1.1 Roles

The following are the key departmental roles for setting up accounts and installing water services:

- **SPU DSO Plan Review Staff** is the lead for the following:
 - [Water Availability Certificate \(WAC\) application process](#).
 - Plan review of [water services](#).
 - Location of services on water main extensions. Refer to [Standard Specs and Plans](#).
- **SPU [Development Services](#) Staff** is the lead for all new service connections and account setup.
- **SPU Operations and Maintenance Staff (Operations)** is the lead for installing the new water service to the property line (edge of ROW). **SPU DSO Plan Review Staff** acts in an advisory role if there are conflicts found in the field with the standard water service plans.
- **Seattle Department of Construction and Inspections (SDCI)** is the lead for all development that occurs on private property. **SPU Plan Review Staff, SPU DSO and**

Customer Service Staff review and inspect installation of the water service from the ROW to the building.

- **Seattle Department of Transportation (SDOT) Staff** is the lead for all development that occurs in City of Seattle ROW. All work conducted by Operations to install water service must be coordinated with SDOT.
- **SPU Operations Staff** is the lead for applying and obtaining a Street Use Permit from SDOT, if required.

17.4.1.2 Application Process

The following is the procedure for setting up an account and installing water service:

1. [Water Availability Certificate](#) issued by the Water Availability Certificate Administrator WAC requests are routed to the WAC Administrator by SDCI as part of the review process for building and land use permits. If no SDCI permit is required, the applicant may submit a completed [WAC Request Form](#) directly to the WAC Administrator.
2. Customer applies for a [Water Service Application](#) to set up a water service account through SPU DSO.
3. SPU DSO will give a list of available services with appropriate flow information. The DSO Project Lead obtains Site Specific Cost from Operations for installation of the service, and collects fees for service. Water Operations and Service Maintenance Division obtains a Street Use Permit 51 J from SDOT for the installation.
4. SPU DSO Project Lead coordinates with SPU Plan Review Section and Operations to conduct plan review and resolve conflicts.
5. SPU may consult with SFD to review fire service requirements. SPU may direct the customer to SFD, if the customer has not coordinated with SFD staff.
6. When the plan is approved and fees paid, the DSO Project Lead coordinates with the Water Operations System Maintenance (WOSM) Division to install the meter and service from the water main to the edge of the ROW, leaving a pipe union at the end for connection.
7. Customer connects to the union and takes the service into the building in accordance with City plans and specifications and building code requirements administered by SDCI.

Note: Plan review is not required to replace a same size meter or meters smaller than 2 inches.

17.4.2 Water Availability Certificate

An approved WAC is required to set up any new water service account through SPU DSO, who evaluates the following to determine if water is available:

- Size, location and material of existing water service and/or existing water mains, if any.
- Static pressure and distance to the nearest hydrant.

Generally, if limited or no water is available, SPU policy requires installation or upgrade of a water main. The WAC Administrator may consult with the Water LOB lead, WOSM Division, and/or DSO engineering staff to determine the exact location and extent of the system improvements required by SPU water availability policy.

The WAC also includes a rough estimate of fire flow, if data is available. SFD makes the final determination of whether the existing water distribution system can provide adequate fire protection. The Fire Department may require additional improvements that are not included on the WAC.

17.4.3 Plan Review of Water Service Connections

This section describes critical items that SPU Plan Review staff need to look for when reviewing a new water service connection plan. The section also includes useful information for designing a special connection when the DSG Standard Water Service Plans cannot be applied.

17.4.3.1 Water Service Plan Review Submittal

DSO creates, updates and modifies water service accounts. A DSO Project Lead will discuss the requirements for Water Service Plan Submittal and coordinate with the customer on the type and size of Service needed. DSO then supplies the customer with the appropriate DSG Standard Water Service Plan. The customer submits a service installation plan and profile to DSO, who circulates the submittal to SPU Plan Review and Operations for review. The SPU Plan Reviewer then consolidates comments, and DSO transmits them to the customer.

17.4.3.2 Reviewing Water Service Plans

Engineering plan review for water services is a five-step task:

1. Review Water Availability Certificate requirements and service type.
2. Review plan submittal.
3. Check that a DSG Standard Water Service Plan can be applied.
4. Check for conflicts.
5. If needed, modify the Standard Water Service Plan and re-design with customer.

A. Review the WAC Requirements and Service Type

The design engineer should be familiar with the requirements imposed as a condition of the WAC. The WAC will indicate to which main a connection can be made.

If a water main extension, upgrade, or other improvement is required, that requirement must be identified in the WAC.

New services connected to a water main improvement will be reviewed and installed under the Water Main Extension.

B. Review the Plan

The SPU Plan Reviewer should check that all the requirements for the water service plan have been included and shown on the drawings. Generally, the customer is responsible for researching utility locations (e.g. water mains, gas, cable) and showing them on the plan. The design engineer must research GIS or the location of other utilities not shown in GIS (e.g. gas and cable).

The following are additional checks for water service plan submittals:

1). Water Main

Mains should be larger than or equal to the size of the service.

If allowed, service size on equal size mains must be a tee cut in and the main isolated or shutdown to do so. This is not a typical tap.

If service size is the same size as the main, the SPU Plan Reviewer should consult the WAC for adequate pressure and flow. Services larger than 8 inch diameter are non-standard. DSO will request site specific cost from the Water LOB lead, Distribution Section for installation of these larger services.

2). Connection and Vault Location

Generally, a water service must be placed within the ROW and connect to the main that fronts the lot. The WAC administrator and DSO, in consultation with the Water LOB lead, will decide where the tap will be located.

Service must be perpendicular to the main on which it is installed.

Meter vault must be in the ROW or easement procured through legislation by Real Property Services.

3). Other Design Considerations

Soil conditions supporting the vault structure.

Critical areas, such as steep slopes.

Hazardous materials issues, such as gases in vaults or contaminated soils.

Vault flooding or water following service piping trenches, and how to avoid damaging customer property (i.e. water from the vault following along the service line and seeping into the building).

Bridges and fire service:

- SPU will install a fire service for a bridge structure at or below the bridge grade up to the bridge structure.
- SPU will **not** install any piping on a bridge structure. The owner of the structure must do this.

Owners must install their own building plumbing starting at the union point.

Non-SPU fire hydrants must be painted red.

Shutdown impacts: If there could be problems with shutting down the main to perform a tap, contact Customer Service. They will check the area and identify any customers that require continuous service, such as hospitals, schools, nursing homes, fire departments, zoos, industrial businesses, and restaurants. Tapping may need to be scheduled around customer work hours. Or temporary services may need to be provided if the main cannot be shut down. See DSG section 17.5 for sizing temporary water services.

In the ROW, existing or planned natural drainage systems swales or green storm water infrastructure facilities (GSI) must be evaluated for water meter impacts. Water meters

may not be located in an existing or proposed swale. Acceptable locations for water services in natural drainage systems are listed here in order of preference:

- Location A: locate the new or existing water meter in the planter strip away from the swale.
- Location B: locate the new or existing water meter behind the sidewalk, away from the swale.
- Location C: locate the new or existing water meter in the edge of sidewalk closest to the roadway.
- Location D: locate the new or existing water meter, running the service line in casing under the swale, behind the sidewalk. The service line must provide 2-to 6-inch clearance between the top of pipe casing and bottom of the swale.
- Location E: locate the new or existing water meter, running the service line in casing under the swale, in the edge of sidewalk closest to the roadway. The service line must provide 2.5 ft clearance between the top of pipe casing and bottom of the swale.

C. Standard Meter Plan

Generally, SPU allows only one domestic service per legal parcel or a combination of domestic and fire services to large buildings. More than one fire service is allowed in some cases.

Review the Standard Water Service Plans and compare with the plan submitted by the customer. The design engineer should do the following:

- Check that the size of footprint for the vault matches the DSG Standard Water Services Plan and required valves are shown.
- Check that an isolation valve is located between any two fire services that serve one building if they are on the same main line.
- Water service crossings under railroads (e.g. light rail) are required to be in pipe casings. For more detailed information, see [AREMA requirements](#).

D. Utility Conflicts

When location and special considerations have been evaluated with the DSG Standard Water Services Plan, the design engineer should check for utility conflicts, access conflicts, and minimum clearance requirements. Try to either move or rotate the vault to avoid conflicts. If that will not work, modify the Standard Water Service Plan.

Table 17-4
Standard Clearance Requirements

Standard Clearance Requirements	
Utility clearances	Standard Plans 286A, 286B, and Standard Specifications 1-07.17 and 7-11
Meter Vault	<ul style="list-style-type: none"> • Located where it will not block traffic, parked cars, etc • Large (4 inch & larger) services in vaults <p>Minimum of 2 feet of clearance between the top of the vault and the bottom of the sidewalk or pavement. Allows conduits to pass over vault</p>
Standard Clearances	Standard Plan 030:

Standard Clearance Requirements

	<ul style="list-style-type: none"> • Trees 5 feet • Traffic, Light, and Power Poles (Regular Style) 6 feet • Traffic, Light, and Power Poles (Chief of Seattle Base Style) 6.5 feet
Railroad	Minimum depth 5 feet 6 inches from the top of the railroad rail to the top of the pipe casing

E. Modification to Standard Water or Fire Service Plan

Deviations or modifications of the DSG Standard Water Service Plans should be a last resort. During plan review or construction of the service connection, an unusual circumstance or conflict may arise that prevents strict adherence to the DSG Standard Water Service Plan. The following is a general procedure for modifying a connection:

1. If a combination meter will not fit in the locations available, the Plan Reviewer may require splitting the service into a separate fire service and a separate domestic service. Coordinate directly with DSO and the customer.
2. SPU has authority to place a water service in a location different than the standard location to avoid a hazard or to meet railroad requirements (i.e. in a street, on private property with an easement, in corner of a lot).
3. SPU can make a short connection run and union and require the customer to install a longer connection to their building that may extend out into the ROW.
4. Redesigning the water meter vault should be a last resort. If there are no apparent solutions, evaluate the following in the order shown:
 - a. Consider moving the bypass outside the vault (leave valves in vault) and burying.
 - b. Eliminate the valve upstream of the meter if there's a valve in the road:
 - i. Remove bypass if more than one water service to the building.
 - ii. Consider moving valves or dismantling joint outside of vault and direct burying. Requires a dig-up if there are any future problems.
 - iii. Consider making the vault larger if access is the problem.

17.5 SIZING TEMPORARY WATER SERVICE FOR CONSTRUCTION

Temporary water service may be required during construction. Consult the Fire Code requirements to determine whether the temporary main must provide sufficient water for fire flow. Check the water use records for the last 2 to 5 years (available on GIS) and trends. Once this has been checked, follow the design guidelines for sizing water service lines in AWWA M22 Design Manual (SMT 45th Floor Library). It includes instructions on how to size the service to meet fire flow requirements.

Because the construction period tends to be short, and the risks relatively low if there are water outages, the design engineer should investigate the need to provide fire flow capacity as a temporary service. The design engineer should consult with SFD, who may choose to institute a fire watch (i.e. stand watch to ensure no fire occurs during the water outage) as an alternate.

17.6 RESOURCES

Documents

1. [AREMA](#) Railway Crossing Requirements
2. AWWA Design Manual M22 Meter Sizing (Available from SMT 45th Floor Library)
3. [Washington Administrative Code \(WAC\) 246-290-490](#)
4. Recommended Practice for Backflow Prevention and Cross-connection Control (M14) American Water Works Association
5. Cross-connection Control Manual, AWWA Pacific Northwest Section
6. Manual of Cross-Connection Control, Foundation for Cross-connection and Hydraulic Research, University of Southern California.

Websites

Washington State Department of Health [cross-connection information](#).

Contacts

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