

Basis of Design

This section applies to the design and installation of underground water distribution systems.

Background

- Most of the campus is served by a City of Seattle low-pressure system from a reservoir at an elevation of 316 feet. A small area at the far north end of the campus is served by a City of Seattle intermediate pressure system from a reservoir at an elevation of 420 feet. See drawing 804-RU-02 for the boundary between the two pressure zones.
- Refer to University drawings 875RU-1 through 875RU-16 for utilities. The above drawings are updated regularly, but are schematic and may not be accurate or complete.
- Obtain water supply information for the Seattle campus from the University's Fire Protection Engineer.

Design Criteria

- Design and install water distribution piping in accordance with American Water Works Association (AWWA) standards.
- Design with bell and spigot and thrust blocks. On unstable ground (East Campus) consider using FM approved restrained mechanical joints. Discuss with Campus Engineering.
- Locate backflow preventers in basement mechanical rooms. Do not locate in vaults or pits without discussing with Campus Engineering.
- Provide separate fire and domestic services. Provide a post indicator valve on the fire service, preferably 40 feet away from the building, or on or near blank wall.
- Do not install water piping below slabs on grade, except for trap priming lines.
- Provide engineering calculations used to size water services.
- Bury mains with 36 inches of cover from finish grade to top of pipe. Use Seattle aggregate No. 9 for pipe bedding. Refer to the section on earthwork for backfill requirements.
- Do not locate hydrants closer than 40 feet to building walls with unprotected openings.
- Do not use restrained mechanical joints on existing mains without verifying existing pipe material.
- Do not install vaults in traffic areas unless the lids are rated for AASHTO H-20 loading.
- Refer to Utility Corridor Arrangement drawing (see Roadways section) for piping placement under roadways.
- Provide building isolation valve.

Design Evaluation

The following information is required to evaluate the design:

- Programming Phase: Statement of design intent.
- Schematic Phase: Drawings showing existing utilities and a narrative material and system description.

- Design Development Phase: Demolition plans, utility plans showing new and existing utilities, utility details, and an outline specification.
- Construction Document Phase: Complete plans and specifications.
 - 1) Include pipe sizes, points of connection, valve details, thrust blocks (including area), thrust rods (including diameter), supports, trench and bedding details, hydrant details, connection and joint details, vault plans and sections, building penetration details, and invert elevations at building connections and at sanitary sewer crossings.
 - 2) Include a plan showing all existing underground tunnels and utilities (power, communications, gas, water, storm drain, sanitary sewer, and street lighting). A survey drawing may be adequate for this purpose, providing it has been reviewed to ensure all utilities are included and that each utility is clearly distinguishable from other drawing information.

Construction Submittals

- Provide standard industry submittal requirements.

Related Section

- Facilities Services Design Guide - Earthwork
- Facilities Services Design Guide - Roadways
- Environmental Health & Safety Design Guide - Sprinkler Protection and Standpipes

Products, Materials and Equipment

- All products, materials, and equipment shall conform to AWWA and NFPA 24 standards.
- Main pipe and fittings: Ductile iron with cement lining
- Main line valves: Resilient seated gate valves per AWWA C509
- Fire hydrants: Kennedy Model K81A, or Mueller Super Centurion 250, or M & H Style 929 Reliant
- Wet-taps: 300 series corrosion resistant steel sleeves, shells, lugs, bolts, washers, and nuts
- Exterior below grade pipe penetrations: Link-Seals, or approved substitution

Installation, Fabrication and Construction

- Install, flush, field pressure test, disinfect, and test for bacteria per AWWA standards.
- Contractor shall deliver written test results to the University. University staff must witness all testing. The Construction Coordinator shall make test arrangements with the Contractor and shall notify University engineering staff, Environmental Health and Safety, and the Seattle Fire Department as to the date and time of flushing, pressure testing, and bacteriological testing.
- Refer to the following University drawings:
 - 1) Roadway & Utility Corridor Arrangement (see Roadways section)

- 2) Site Work & Utilities Symbols (see Storm Drainage section)
- 3) Environmental Health & Safety Design Guide – Sprinkler Protection and Standpipes
- The following City of Seattle (COS) Standard Plans are approved for use where applicable:
 - 1) Connections to Existing Watermains (COS 300a)
 - 2) Connections to Existing Watermains (COS 300b)
 - 3) Hydrant Setting Detail (COS 310a). Exception: Paint with one coat of red oxide primer and one coat of University of Washington Green Sash Enamel.
 - 4) Cast Iron Valve Box & Operating Nut Extensions (COS 315a)
 - 5) Watermain Thrust Blocking Vertical Fittings (COS 330a)
 - 6) Watermain Thrust Blocking Vertical Fittings (COS 330b)
 - 7) Watermain Thrust Blocking Horizontal Fittings (COS 331a and 331b)
 - 8) Sewer and Water Spacing & Clearances (COS 286a and 286b)
 - 9) Typical Trench Section (COS 284)
 - 10) Pipe Bedding (COS 285)

END OF DESIGN GUIDE SECTION