Basis of Design
This section applies to the design and installation of underground water distribution systems, fire hydrants and services.

Background
- Refer to drawing 804-RU-02 for the layout of the water distribution system.
- Refer to University drawings 875RU-1 through 875RU-16 for all utilities. The above drawings are updated regularly, but are schematic and may not be totally accurate, complete, or up to date for all areas of the campus.
- 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) and the City of Seattle 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.
- Coordinate with Campus Engineering the need for water meters. Water meters are used as part of the campus energy system.
- 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.
- Bury mains with 36 inches of cover from finish grade to top of pipe. Refer to the section on earthwork for backfill requirements.
- Coordinate Fire Hydrant locations with Campus Engineering and EH and S.
- 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.
- The preferred location of vaults is away from areas of pedestrian traffic.
- Refer to Utility Corridor Arrangement drawing (see Roadways section) for piping placement under roadways.
- Provide building isolation valve.
- Additional valves may be required by Campus Engineering to minimize the disruption of water shutdowns during construction.

Design Evaluation
The following information is required to evaluate the design:
- Programming Phase: Statement of design intent.
- **Schematic Phase**: Drawings showing existing utilities, proposed connection points, proposed valve locations, and a narrative describing the proposed material and system.
- **Design Development Phase**: Demolition plans, utility plans showing new and existing utilities, rough utility details, preliminary profiles and an outline specification.
- **Construction Document Phase**: Complete plans, profiles, details, 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) Provide crossing utilities on profiles.
  3) Show a typical or minimum dimension for separation from sanitary sewer. Indicate vertical separation at all crossings with other utilities.
  4) Complete Specifications.

**Construction Submittals**

- Provide standard industry submittal requirements.

**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: (In order of preference) Waterous Pacer, Kennedy K81A or Mueller Super Centurion 250. 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 City of Seattle specifications. 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. Typically the Seattle Fire Department will inspect joints and witness flushes tests. SFD will also typically want to see all bends during 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