

Basis of Design

This section applies to underground sanitary sewer systems.

Background

- The University sanitary sewers drain to Metro sewers located on Montlake Boulevard, Pacific Street, and Pacific Place. Refer to University drawing 805RU-1 for more information.
- Refer to University drawings 875RU-1 through 875RU-17 for existing utilities. The above drawings are updated regularly, but are schematic and may not be accurate or complete.

Design Criteria

- Design and install all sanitary sewer mains, side sewers (laterals), sewer lift stations, telemetering facilities, and sewer system appurtenances in accordance with WSDOT/APWA Standard Specifications and the Washington State Department of Ecology "Criteria for Sewage Works Design."
- Provide engineering calculations used to size the main or sewer service.
- Bury mains with at least 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.
- Generally use pipe that is 8 inches or larger in diameter. Sewer pipe 6 inches in diameter may be used if approved by University staff.
- Install sewer mains below water mains at crossings to provide a vertical separation of at least 18 inches between the invert of the water pipe and the crown of the sewer pipe.
- For gravity sewers, provide a manhole every 300 feet or less, and at changes in pipe direction or diameter.
- For pressure sewers, install clean-outs every 100 feet or less, and at changes in pipe directions.
- For sewer force mains, use only piping with restrained joints.
- Use 54-inch diameter manholes unless approved by University staff.
- Refer to Utility Corridor Arrangement drawing (see Roadways section) for piping placement under roadways.
- Install clean-outs at connections to buildings and ensure that an electrical receptacle is available within 100 feet.
- Avoid the use of lift stations. Where lift stations are necessary discuss with Campus Engineering. Provide remote high level alarms, self-priming pumps, and auxiliary power with an automatic transfer switch.
- In new buildings, do not connect sanitary and acid waste piping systems to each other inside the building. Collect laboratory waste lines independently and carry separately out of the building to a sanitary sewer manhole.

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 and the following:
 - 1) Pipe sizes, routing, points of connection, trench and bedding details, connection and joint details, manhole plans and sections, clean-out details, and building penetration details.
 - 2) Plan(s) 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 that all utilities are included and that each utility is clearly distinguishable from other drawing information.
 - 3) Invert elevations at the inlet and outlet of each manhole, at building connections, where sewer main crosses water distribution main, and at changes in grade, alignment, or pipe size.
 - 4) Grate and cover elevations
 - 5) Pipe slopes
 - 6) For projects where the utility plans are an assembly of multiple sheets, provide a simplified composite utility plan showing all existing and new utilities on one sheet.

Construction Submittals

- Provide standard industry submittal requirements.

Related Sections

- Facilities Services Design Guide - Earthwork
- Facilities Services Design Guide - Roadways
- Facilities Services Design Guide - Waste & Drains

Products, Materials and Equipment

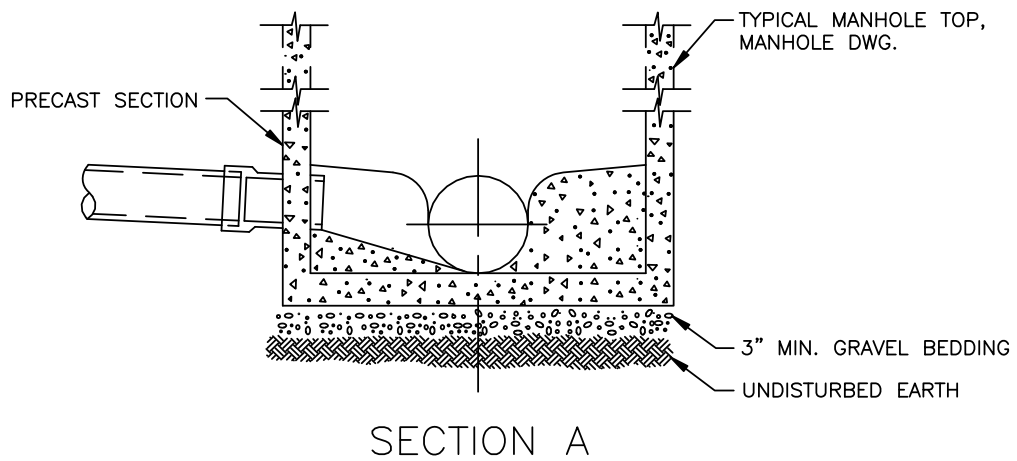
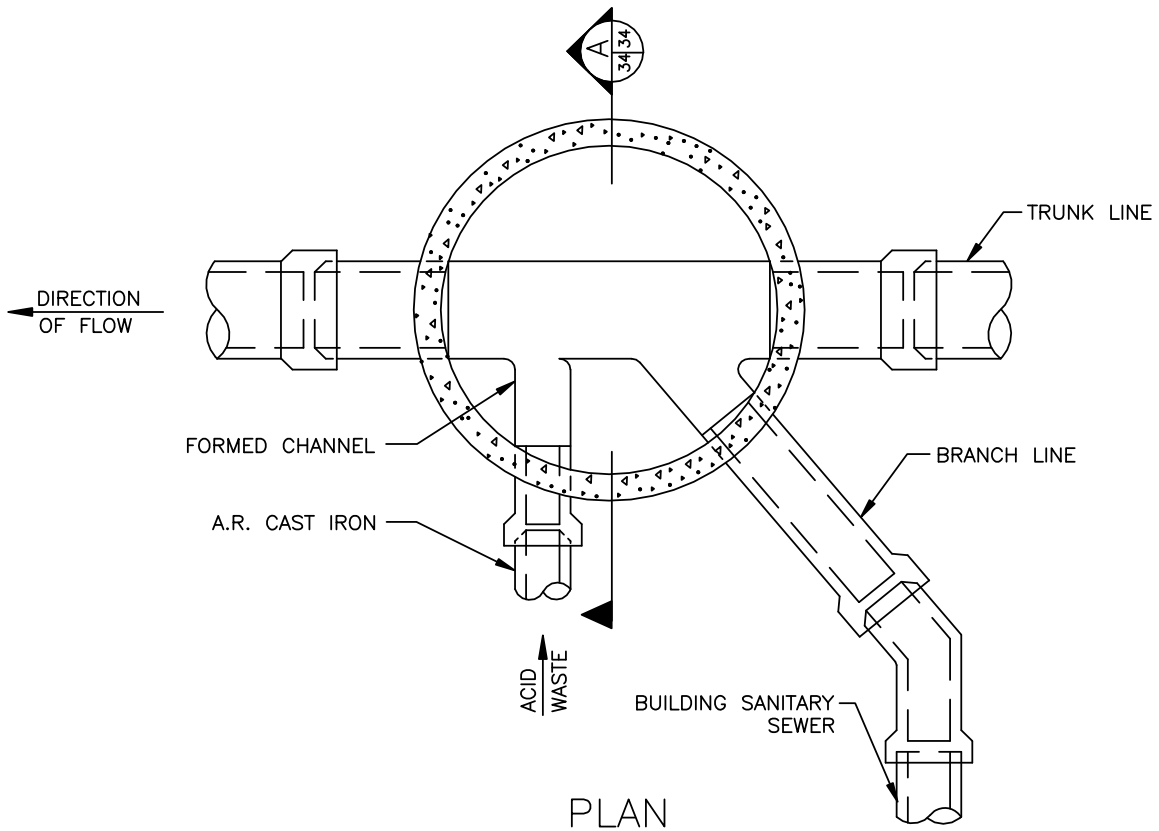
- All products, materials, and equipment shall conform to WSDOT/APWA Standards.
- Piping: SDR 35 PVC pipe per ASTM D3034 for sizes 12 inches in diameter and below, and reinforced concrete pipe per ASTM 67 for sizes above 12 inches in diameter. Exception: Use ductile iron pipe or a ductile iron sleeve where high surface loads exist, under roadways, and where minimum cover cannot be achieved.

- Pipe connections: Use fittings made of the same material as the connecting pipe. Use an appropriate adapter when changing materials (e.g. when penetrating a concrete manhole with a PVC pipe.)
- Exterior below grade pipe penetrations: Link-Seals, or approved substitution
- Manhole lids: Ductile iron, permanently marked "SEWER". Do not use locking lids.

Installation, Fabrication and Construction

- Install, clean, and test sewers in accordance with WSDOT/APWA Standard Specifications.
- The Construction Coordinator shall make test arrangements with the Contractor and shall notify University Engineering Staff as to the date and time of testing. University staff must witness and approve all testing before the sewer may be placed in service.
- Refer to the following University drawings:
 - 1) Acid Waste Manhole
 - 2) 54" or Larger Drop Manhole Interior (see Storm Drainage section)
 - 3) Site Work & Utilities Symbols (see Storm Drainage section)
 - 4) Roadway & Utility Corridor Arrangement (see Roadways section)
- Refer to the following City of Seattle (COS) Standard Plans:
 - 1) Manhole (COS 201b)
 - 2) Drop Connection (COS 233a)
 - 3) 8" Clean-out (COS 280)
 - 4) Typical Trench Section (COS 284)
 - 5) Pipe Bedding (COS 285)

END OF DESIGN GUIDE SECTION



DO NOT SCALE

SD-C-34

Acid Waste Manhole