Basis of Design

This section applies to the underground sanitary sewer conveyance 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 a map detailing the campus distribution system.
- Coordinate with Engineering Services all new connection points to the University system.
- The areas east of Montlake Blvd. and south of NE Pacific Street are served by lift stations.
- Refer to University drawings 875RU-1 through 875RU-17 for all existing utilities. The above drawings are updated regularly, but are schematic and may not be accurate or complete for some areas of campus.
- Avoid the use of back water valves on side sewers. The Civil designer is to coordinate with the Mechanical designer early in the design process for situations requiring a back water valve. A cost/benefit analysis must be done to compare the feasibility of such devices.

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.”
- For side sewers, provide a cleanout approximately five feet from buildings. Minimum side sewer slope is 2.00%.
- 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.
- Shallow manholes (4-feet deep) are discouraged. If needed locate these manholes out of traffic areas and away from student gathering spots.
- Generally use pipe that is 8 inches or larger in diameter. Sewer pipe 6 inches in diameter may be specified if approved by Engineering Services.
- For gravity sewers, provide a manhole every 300 feet or less, and at changes in pipe direction or diameter.
- 8-inch side sewers generally require a manhole at connection points with the main. Coordinate this with Engineering Services.
- Cleanouts are to be installed at changes in pipe direction and at least every 100 feet of side sewer.
- Use 54-inch diameter manholes (minimum) unless approved by Engineering Services.
- Refer to Utility Corridor Arrangement drawing (see Roadways section) for preferred piping placement under roadways.
- Avoid the use of lift stations. Where lift stations are necessary discuss with Engineering Services. Provide remote high level alarms, self-priming pumps, and auxiliary power with an automatic transfer switch.
- Connect laboratory acid resistant waste lines and sanitary sewer pipe outside the building in an acid waste resistant / sanitary waste manhole as shown in detail SD-C-34.
Design Evaluation

The following information is required to evaluate the design:

- **Programming Phase**: Statement of design intent.
- **Schematic Phase**: Drawings showing existing utilities, expected connection points, estimated finished floor elevations and a narrative of material and systems proposed. Provide minimum finished floor elevations to confirm building service.
- **Design Development Phase**: Demolition plans, utility plans showing new and existing utilities, utility details, and an outline specification. Provide rough profiles (exercise caution when using record drawings for sewer connection inverts because of historical differences in University datums). Provide manhole numbers.
- **Construction Document Phase**: Complete plans, profiles and specifications and the following (along with the information from the DD phase):
  1) Pipe sizes, slopes, lengths, points of connection, trench and bedding details, connection and joint details, manhole sizes, and clean-out details. Show horizontal separation between sewer and water. Show crossing utilities on profile.
  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) Rim elevations. For manholes on hillsides or landscape areas set rim elevations 6-inches above the adjacent uphill elevation. Avoid setting manholes in grass areas. If unavoidable set rims low to avoid lawn mower damage.
  5) 18-inches is the maximum step down in manholes without a drop. When drops are needed the University prefers inside drops.
  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.

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”.

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 Resistant Waste / Sanitary 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
Acid Resistant Waste / Sanitary Waste Manhole

© University of Washington – Engineering Services 2017