

33 30 00 SANITARY SEWERAGE UTILITIES

1. Applicability

- 1.1. The installation, construction, alteration, and repair of the sanitary sewer utility system beginning five feet from the building foundation on any and all University of Minnesota property in the state of Minnesota.

2. General Information

- 2.1. Ownership of the sanitary sewer system varies by Campus and location throughout the state of Minnesota. The UMN Civil Engineer shall be consulted regarding utility ownership during feasibility and/or pre-design.
- 2.2. Additions, extensions, and replacement of any University owned sanitary sewer infrastructure on University property shall be designed and installed in accordance with the latest revision of the Recommended Standards for Wastewater Facilities by the Great Lakes Upper Mississippi River Board of State Public Health and Environmental Managers (Ten State Standards). The local sanitary sewer purveyor's requirements shall be consulted as well. In the case of conflicting requirements, the standards in this section shall govern.

3. Permits

- 3.1. Additions, connections, and/or modifications to the sanitary sewer utility system will require a Utility Permit from the University Building Code Department.
- 3.2. Connections to sanitary sewer systems not owned by the University may require permits from the owner.
- 3.3. Refer to Division 22 and the University Building Code Department website for permits related to service/capacity availability charges or similar for new connections to the sanitary sewer.
- 3.4. Minnesota Pollution Control Agency (MPCA)
 - 3.4.A. Sanitary Sewer Extension Permit
 - 3.4.A.1. A permit from the MPCA may be required for an extension, addition, or modification of the sanitary sewer utility system, that affects any facility expansion, production increase, or process modification which result in new or increased discharges of pollutants.
 - 3.4.A.2. Extension permits may be issued through the local sanitary district.
- 3.5. Other permits may apply.

4. Combined Sewer

- 4.1. Some areas may still have discharges of stormwater to the sanitary sewer.
- 4.2. For buildings with an existing combined sewer that are being completely renovated, the sewers shall be separated as part of the project.
- 4.3. New construction/full renovation projects may not connect to a combined sewer system.
- 4.4. **PROHIBITED:** New construction of combined sanitary and storm sewer.

5. Acceptable Materials**5.1. Polyvinyl Chloride Pipe (PVC)**

- 5.1.A. Pipe and fittings shall conform to the latest requirements of ASTM D3034 and ASTM F679 for the size, standard dimension ratio (SDR), and strength requirements.
- 5.1.B. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the latest requirements of ASTM D543.
- 5.1.C. Unless specified otherwise, all pipe and fittings shall be a minimum thickness of SDR-26.
 - 5.1.C.1. Connections shall be push-on with elastomeric gasket joints bonded to the inner wall of the gasket recess of the bell socket.
 - 5.1.C.2. Joints shall conform to the latest requirements of ASTM D3212.
 - 5.1.C.3. Pipe-to-pipe Fernco connections are allowed ONLY with approval from the UMN Civil Engineer.
- 5.1.D. Diameters 10” and smaller
 - 5.1.D.1. Pipes shall be PVC Schedule 40 or greater with solvent cement joints.
 - 5.1.D.2. Pipe and fittings shall conform to the latest requirements of ASTM D1785 and ASTM D2665.

5.2. Solid Wall Polyethylene Pipe (PE)

- 5.2.A. Pipe shall have green stripe on the outside, indicating that it conveys sanitary sewer.
- 5.2.B. Pipe and fittings shall be manufactured with compounds conforming to ASTM D3350 and conform to ASTM D3035 and AWWA C901.
- 5.2.C. Diameters 4” through 65”
 - 5.2.C.1. Pipe and fittings shall conform to ASTM F714 and AWWA C906 for the size, grade, and pressure class.
 - 5.2.C.2. Dimensions and tolerances of the pipe barrel should conform to ductile iron pipe equivalent outside diameters.
- 5.2.D. Joints
 - 5.2.D.1. Shall be Thermal Butt-Fusion Method, in accordance with ASTM 3261.
 - 5.2.D.2. Interior joints shall be ground down, level to the pipe, to allow for a smooth flow path.
 - 5.2.D.3. **PROHIBITED:** Gasketed joints
- 5.2.E. Fittings
 - 5.2.E.1. The minimum “quick-burst” strength of the fittings shall be not less than that of the pipe with which the fitting is to be used.

5.3. Vitrified Clay Pipe (VCP)

- 5.3.A. Vitrified clay extra-strength pipe and fittings shall conform to the latest requirements of ASTM C700 for the size and type and class specified.
- 5.3.B. All pipe and fittings shall be bell and spigot furnished with factory fabricated compression joints conforming to the latest requirements of ASTM C425.

5.4. Ductile Iron Pipe (DIP)

- 5.4.A. Pipe shall conform to the latest requirements of AWWA C115 or C151.
- 5.4.B. Thickness design shall conform to the latest requirements of AWWA C150.

- 5.4.C. Fittings shall conform to the latest requirements of AWWA C110 or AWWA C153.
- 5.4.D. All fittings shall be furnished with cement mortar lining conforming to the latest requirements of AWWA C104 for standard thickness lining.
- 5.4.E. All exterior surfaces of the pipe and fittings shall have an asphaltic coating at least one mil thick, or approved equivalent.
- 5.4.F. Rubber gasket joints for ductile iron pressure pipe and fittings shall conform to the latest requirements of AWWA C111.

6. Sanitary Sewer Main Distribution Piping

- 6.1. Sanitary sewer pipe shall be designed with adequate slope to produce a minimum flow of 3 ft/s (self-cleaning velocity) when flowing at full pipe flow.
 - 6.1.A. Refer to the table below for the Manning's "n" values to be used to determine the minimum pipe slope for the approved pipe materials.

Pipe Material	Manning's, n
PVC	.009
PE	.009
VCP	.014
DIP	.012

- 6.2. Pipe diameter shall be (minimum) 8".
- 6.3. Sanitary sewer discharges shall be designed to not exceed the capacity of the existing downstream pipe.
- 6.4. Pipe shall be laid straight and uniform between structures.
- 6.5. Access structures shall be provided at all changes in pipe size, pipe material, vertical alignment, and/or horizontal alignment.
- 6.6. A structure shall be provided in the sanitary sewer main where it connects to a building service. No branch fittings, such as tees, wyes, etc. are allowed.
- 6.7. The maximum spacing between structures is 400 ft.
- 6.8. Sanitary located near/crossing water pipe
 - 6.8.A. See 33 10 00 section 14 - Water and Sewer Crossings for requirements.
- 6.9. Sanitary sewer shall be protected from freezing due to cold environments.
 - 6.9.A. Refer to Minnesota Administrative Rule 1303.1600.
 - 6.9.A.1. Projects in Zone I
 - 6.9.A.1.a. Sanitary pipes to be installed with a minimum cover of 6 ft.
 - 6.9.A.2. Projects in Zone II
 - 6.9.A.2.a. Sanitary pipes to be installed with a minimum cover of 5 ft.
 - 6.9.A.3. Sanitary pipes installed with less than minimum cover shall be approved during design by the UMN Civil Engineer, and shall have proper insulation installed.
 - 6.9.B. Sanitary pipes shall be protected from freezing due to proximity to storm sewer.

- 6.9.C. See 33 05 00 for insulation installation requirements.
- 6.9.D. **PROHIBITED:** Heat trace tape
- 6.10. UMTC: New connections to University owned deep sanitary sewer tunnel systems shall be avoided, this may necessitate extending a sewer main.
- 6.11. **PROHIBITED:** Deflections in horizontal or vertical pipe alignment between structures.
- 6.12. **PROHIBITED:** Blind connections to sanitary sewer system.
- 6.13. **PROHIBITED:** Reinforced concrete pipe

7. Sanitary Sewer Service Laterals

- 7.1. Sanitary sewer service laterals shall be installed from the building to the sewer main.
 - 7.1.A. Sewer service lateral is defined as the pipe between the building and the first access structure.
 - 7.1.B. Service laterals shall not exceed 100 length feet.
- 7.2. Buildings shall be served by a gravity flow system.
 - 7.2.A. Where portions of the building are below the lowest invert elevation of the sewer main, a gravity service shall be installed for all sanitary connections in the building higher than the gravity invert. Only the sanitary connections below the gravity service may be pumped.
 - 7.2.B. Refer to Division 22 for building plumbing requirements.
- 7.3. Sanitary sewer service laterals shall be a minimum of 6" diameter with a minimum slope of 2% (0.02 ft/ft).
 - 7.3.A. Pipe may be 4" diameter for a single residential equivalent service connection.
- 7.4. Pipe shall be laid straight and uniform between the building and the main, perpendicular to the building.
- 7.5. Access shall be provided at any changes in pipe material.
 - 7.5.A. Cleanouts
 - 7.5.A.1. Allowed when within 10 feet from the building.
 - 7.5.A.2. Allowed on pipes 8" and smaller.
 - 7.5.B. Access Structures
 - 7.5.B.1. Shall be installed when further than 10 feet from the building.
 - 7.5.B.2. Shall be installed on pipes 10" and greater.
- 7.6. Sanitary sewer service laterals shall not be connected to an access structure at an elevation greater than 24" above the crown of the outgoing main.
 - 7.6.A. Where the elevation difference is greater than 24", the connection shall be made by means of a drop connection.
 - 7.6.B. See UMN standard plate SAN-0002.
- 7.7. Sanitary pipes to be installed with a minimum cover of 5 ft.
 - 7.7.A. Sanitary pipes installed with less than 5 ft of cover shall be approved during design by the UMN Civil Engineer, and shall have insulation installed above the pipe.
 - 7.7.A.1. See 33 05 00 for insulation installation requirements.
- 7.8. Maximum cover on sanitary sewer service laterals shall be 15 ft without prior approval from the UMN Civil Engineer.

- 7.9. UMTC: New connections to University owned deep sanitary sewer tunnel systems shall be avoided, this may necessitate extending a sewer main.
- 7.10. **PROHIBITED:** Deflections in horizontal or vertical pipe alignment between structures.
- 7.11. **PROHIBITED:** Blind connections to sanitary sewer system.
- 7.12. **PROHIBITED:** Reinforced concrete pipe
- 7.13. **PROHIBITED:** Hub-less joints

8. Structures and Appurtenances

8.1. Access Structure

- 8.1.A. Precast concrete riser sections and appurtenant units used in the construction of structures shall conform with the requirements of the UMN standard plate SAN-0001, ASTM C-478, MnDOT 2506 and the following supplementary provisions:
 - 8.1.A.1. The precast sections and appurtenant units shall conform to all requirements as shown on the UMN standard plates.
 - 8.1.A.2. Air-entrained concrete shall be used in the production of all units. Air content shall be maintained within the range of five and seven percent (5-7%).
- 8.1.B. All structure components shall be watertight and sealed to provide a completely watertight structure.
 - 8.1.B.1. Joints of manhole riser sections shall be tongue and groove with rubber “O” ring or profile gaskets.
 - 8.1.B.2. Snap-in boot required at all sanitary sewer connections.
 - 8.1.B.3. Exterior Inflow and infiltration (I/I) barrier shall be installed around adjusting rings.
 - 8.1.B.3.a. All seals shall extend from the casting to the cone.
 - 8.1.B.3.b. Infi-Shield Uni-Band or approved equal.
- 8.1.C. Base Section
 - 8.1.C.1. Shall be an integral base with pre-formed inverts.
 - 8.1.C.2. Cast-in-place base may be allowed where integral base sections cannot be used.
 - 8.1.C.2.a. The channels shall be, minimum, half the height of the outflow pipe diameter.
- 8.1.D. Top Section
 - 8.1.D.1. Barrels shall be a minimum of 48” diameter with an access of 27” diameter.
 - 8.1.D.2. Top section may be as follows:
 - 8.1.D.2.a. MnDOT standard plate 4005 Type B for eccentric cones.
 - 1. **PROHIBITED:** MnDOT standard plate 4005 Type A for concentric cone.
 - 8.1.D.2.b. MnDOT standard plate 4020 for top slabs.
- 8.1.E. Adjusting Rings
 - 8.1.E.1. A minimum of two 2” adjusting rings shall be installed. A maximum of five 2” adjusting rings shall be installed.

- 8.1.E.2. Concrete: Adjusting rings shall be installed with a full bed of mortar between each ring.
- 8.1.E.3. HDPE: Follow manufacturer's instructions for installation.
- 8.1.E.4. Modifications to existing structures shall adhere to minimum and maximum adjusting ring requirements.
- 8.1.F. Steps
 - 8.1.F.1. Structures with a build height greater than 4 ft shall install steps spaced 16" on center over the downstream outlet.
 - 8.1.F.2. Steps shall be Neenah R-1920E or similar.
- 8.2. Drop Structures
 - 8.2.A. Required for any pipe that enters a structure 24" above the crown of the outgoing sewer pipe.
 - 8.2.B. Inside drop connections allowed.
 - 8.2.B.1. **PROHIBITED:** Exterior drop connections
 - 8.2.C. See UMN standard plate SAN-0002.
 - 8.2.D. Drop connections with pipes greater than 8" diameter to be approved by the UMN Civil Engineer.
- 8.3. Cleanouts
 - 8.3.A. Diameter shall match lateral pipe diameter, maximum diameter of 8".
 - 8.3.B. Cleanouts and inspection risers shall be PVC.
 - 8.3.C. Cleanout structure shall connect to the pipe with a wye fitting oriented in the direction of flow.
 - 8.3.D. See UMN standard plate SAN-0003.
- 8.4. Structures located in pavers, Class V, or gravel
 - 8.4.A. Install a concrete collar that extends a minimum of 12" around all sides of the casting. See UMN standard plate GEN-0002.
 - 8.4.A.1. Concrete shall be designed for traffic loading, 8" minimum thickness.
 - 8.4.A.2. When located in a paver surface, size concrete collars such that there are no pavers less than ½ of a paver wide.
 - 8.4.B. Install chimney seal around adjusting rings of structure.
- 8.5. Structures located in pedestrian areas
 - 8.5.A. To the maximum extent practicable, locate structures outside of pedestrian walkways and plazas.
- 8.6. Castings and Frames
 - 8.6.A. All castings to be flush with grade, unless specified below:
 - 8.6.A.1. Casting may be installed up to ¼" below grade in areas that have pedestrian traffic.
 - 8.6.A.2. Casting may be installed up to ½" below grade in areas that have vehicle traffic.
 - 8.6.A.3. Casting shall be installed 1" above grade in mulched areas.
 - 8.6.B. Access Structure

- 8.6.B.1. Frame: Neenah R-1733 or approved equal
- 8.6.B.2. Casting: Neenah R-1733-0804 or approved equal with a University of Minnesota block 'M' and the words "SANITARY SEWER" stamped onto the lid.
 - 8.6.B.2.a. See UMN standard plate SAN-1001.
- 8.6.B.3. UMD:
 - 8.6.B.3.a. Neenah R-1723 (Duluth) with concealed pick holes.
 - 8.6.B.3.b. See City of Duluth standard plate SAN-1.
- 8.6.C. Cleanout
 - 8.6.C.1. Frame: EJ 1574 or approved equal
 - 8.6.C.2. Casting: EJ 1574A SW VC or approved equal with the word "SEWER" stamped onto the lid.
- 8.7. Structures to be owned and operated by another governing entity (e.g., City of Minneapolis, City of Duluth) to follow the entity's standards as applicable.

9. Abandoning/Removing Sanitary Sewer

- 9.1. Removals
 - 9.1.A. Sanitary sewer structures and pipes that are taken out of service shall be removed within excavation limits or as directed by the UMN Civil Engineer.
- 9.2. Abandoning Pipe
 - 9.2.A. Any piping not removed shall be properly abandoned.
 - 9.2.A.1. Pipes 6" diameter and smaller can be left in place as-is and bulkheaded.
 - 9.2.A.2. Pipes larger than 6" diameter shall be filled and both pipe ends bulkheaded.
 - 9.2.B. Fill material may be flowable fill, sand, or other approved material.
- 9.3. Bulkheads
 - 9.3.A. Shall be watertight.
 - 9.3.B. UMD: Abandoned pipe shall be disconnected from the structure and the structure bulkheaded.
- 9.4. Abandoning Structures
 - 9.4.A. Sanitary structures may be abandoned in place in limited situations if allowed by the UMN Civil Engineer based on project excavation limits, invert elevations, and/or preservation of existing features.
 - 9.4.B. Abandoned structures shall follow UMN standard plate GEN-0001.
- 9.5. Documentation of Abandoned Features
 - 9.5.A. All abandoned pipe ends and structures shall be located and included on as-builts.
 - 9.5.A.1. UMTC: GPS locations required.
 - 9.5.A.2. Tie-ins dimensioned on as-built prints if GPS locating is not available.

10. Septic Systems

- 10.1. See Division 33 34 00 Subsurface Sewage Treatment Systems (STSS).

11. Acceptance Testing of Sanitary Utility

11.1. Testing

- 11.1.A. All sanitary sewer lines, including laterals, shall be substantially watertight and shall be tested for leakage.
- 11.1.B. Each test section of the sewer shall be subjected to exfiltration testing, either by hydrostatic or air test method.
- 11.1.C. The testing method shall be determined by the Engineer of Record and included in the project specifications.
- 11.1.D. All testing shall be performed by the Contractor, and the Contractor shall furnish all necessary equipment and materials as required.
- 11.1.E. Testing method shall follow the requirements set forth in City Engineers Association of Minnesota (CEAM) Standard Specifications section 2621.3.E Sanitary Sewer Leakage Testing.

11.2. Closed Circuit Television (CCTV)

- 11.2.A. CCTV testing is required for the following conditions:
 - 11.2.A.1. Trenchless installation of sewer pipe
 - 11.2.A.2. Lining of sewer pipe
- 11.2.B. Sewer line televising may be required by the University Building Code Official, UMN Civil Engineer, or Engineer of Record, at the cost of the Contractor, if visual inspection and/or leakage testing indicate the sewer has not been constructed in accordance with specifications.
- 11.2.C. The CCTV inspection must be conducted with a crawler propelled camera equipped with on-board lighting that is able to record digital videos of the pipe condition.
- 11.2.D. The inspection shall maintain high-quality video resolution; maintain a clean lens; maintain appropriate lighting and true color of the video image; control inspection speed; document visible damage; note condition-related factors that impact video quality; and note environmental-related factors that impact video quality.

11.3. Submittals

- 11.3.A. Submit copies of all sewer testing results to the Engineer of Record, the University Building Code Official, and the UMN Civil Engineer.

END OF SECTION