

City of Logan Sanitary Sewer Design Standards

2011



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Table of Contents

PART 1. CITY OF LOGAN SANITARY SEWER SYSTEM DESIGN STANDARDS FOR GRAVITY SEWERS.....	3
1.1 GENERAL.....	3
1.2 BASIS OF DESIGN.....	3
1.3 DESIGN AND CONSTRUCTION DETAILS.....	4
1.4 CURVED SEWERS.....	6
1.5 INSTALLATION REQUIREMENTS.....	6
1.6 MANHOLES.....	6
1.7 INVERTED SIPHONS.....	7
1.8 SEWERS IN RELATION TO STREAMS.....	7
1.9 PROTECTION OF WATER SUPPLIES.....	8
PART 2. CITY OF LOGAN SEWAGE PUMPING STATION AND FORCE MAIN DESIGN STANDARDS.....	8
2.1 GENERAL.....	8

Part 1. City of Logan Sanitary Sewer System Design Standards for Gravity Sewers

1.1 GENERAL

- A. Construction of a sewer project may not begin until the applicant has submitted detailed design and construction drawings to the City Engineer, and received a copy of the approved set of drawings, that have been stamped and signed by the City Engineer .
- B. Sewer services to residential households do not constitute a sewer project, and will not generally be reviewed by the City Engineer.
- C. Storm water and ground water shall not be allowed to enter the sanitary sewer system.
- D. Each individually owned unit shall have a separate sewer line connected to the public sanitary sewer system unless otherwise approved by the City Engineer.
- E. All connections to the public sanitary sewer system shall be constructed by a licensed plumber.
- F. Sewer laterals shall be backfilled to the same standards as the sewer main line and other pipes.
- G. Wastes detrimental to the public sanitary sewer system or plant shall not be discharged into the sanitary sewer system.
- H. Property owners are responsible for maintenance of sewer laterals from the public main line, including tapping saddles or connections.
- I. Property owners are responsible for the maintenance of all pretreatment facilities including but not limited to: grease traps, sand separators, oil separators, or clarifiers connected to their facilities.
- J. All permits shall be secured and fees shall be paid before any work is commenced on a sewer connection.
- K. Warning tape and locate wire shall be installed on all sewer laterals.

1.2 BASIS OF DESIGN

- A. Planning Period
 - 1. Sewers shall be designed for the estimated ultimate tributary population. The City Engineer may approve the design for reduced capacities provided the capacity of the system can be readily increased when required. The maximum anticipated capacity required by institutions, industrial parks, etc. must be considered in the design.
- B. Sewer Capacity
 - 1. The required sewer capacity shall be determined on the basis of peak hour sewage flow.
- C. Per Capita Flow
 - 1. Residential sewer systems shall be designed on the basis of an annual average daily rate of flow of 100 gallons per capita per day unless there are data to indicate otherwise.

- D. Design Flow
 1. Residential laterals and collector sewers shall be designed with a peak hour factor of 4.0.
 2. Interceptors and outfall sewers shall be designed with a peak hour factor of 2.5
 3. Commercial and industrial capacities shall be calculated and documented by the Engineer or Architect based on fixtures and any expected process or wash down flows. Calculations shall not be considered final until approved by the City Engineer.
 4. The City Engineer will consider other rates of flow for the design if such basis is justified on the basis of supporting documentation.
- E. Design Calculations
 1. Detailed computations, such as the basis of design, average and peak flow calculations and hydraulic calculations showing depth of flow, velocity, water surface profiles, and gradients shall be submitted with the construction plans.

1.3 DESIGN AND CONSTRUCTION DETAILS

- A. Minimum Size
 1. No gravity sewer main shall be of less than eight inches in diameter.
 2. A 6-inch diameter pipe may be permitted when the sewer is serving only one connection, or if the applicant justifies the need for such diameter on the basis of supporting documentation.
- B. Depth of Bury
 1. Sewer Main lines shall be buried a minimum of seven feet deep, unless otherwise approved by the City Engineer.
- C. Slope
 1. The pipe diameter and slope shall be selected to obtain velocities to minimize settling problems.
 2. All sewers shall be designed and constructed to give mean velocities of not less than 2 feet per second.
 3. Unless otherwise approved and/or required by the City Engineer, sewer lines eight through fifteen inches in diameter shall be designed to flow no more than half full during peak flow. Sewer lines larger than fifteen inches in diameter shall be designed to flow three-fourths full.
 4. Table 1.3.D.4 shows the minimum slopes which shall be provided; however, slopes greater than these are desirable.

Table 1.3.D.4 - Minimum Slopes	
Inch	FEET/FEET
8	0.004
10	0.0028
12	0.0022
15	0.0015
18	0.0012
21	0.0010
24	0.0008

5. Sewers shall be laid with uniform slope between manholes.

D. Flatter Slopes

1. Slopes flatter than those required for the 2-feet-per-second velocity criterion, may be permitted by the City Engineer provided that:
 - a. there is no other practical alternative;
 - b. the depth of flow is not less than 30 percent of the diameter at the average design rate of flow;
 - c. the design engineer has furnished with the report the computations showing velocity and depth of flow corresponding to the minimum, average and peak rates of flow for the present and design conditions in support of the request for variance; and

E. Steep Slopes

1. Where velocities greater than 15 feet per second are attained, special provision shall be made to protect against displacement by erosion and shock.
2. Sewers on 20 percent slopes or greater shall be anchored securely against lateral and axial displacement with suitable thrust blocks, concrete anchors or other equivalent restraints, spaced as follows:
 - a. Not over 36 feet center to center on grades 20 percent and up to 35 percent;
 - b. Not over 24 feet center to center on grades 35 percent and up to 50 percent;
 - c. Not over 16 feet center to center on grades 50 percent and over.
3. Where velocities greater than 15 feet per second are attained drop manholes may be used. Drop manholes may not be used under any other circumstances unless approved by City Engineer.

F. Alignment

1. Sewers shall be located under the paved streets or roads to allow access of maintenance equipment under all weather conditions, unless otherwise approved by the City Engineer.
2. Sewers shall be laid with a straight alignment between manholes. The alignment shall be checked by either using a laser beam or lamping.

G. Changes in Pipe Size

1. When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient, and shall be documented by the design engineer in plan details and the hydraulic grade lines.

H. Materials

1. The material of pipe selected should be suitable for local conditions. The material of sewer pipe should be compatible with factors such as industrial wastewater characteristics, putrecibility, physical and chemical properties of adjacent soil, heavy external loading, etc.
2. The material of pipe must withstand superimposed loads without any damage. The design of trench widths and depths should allow for loads. Special bedding, concrete cradle or encasement, or other special construction may be used to withstand extraordinary superimposed loading.
3. Unless otherwise approved by City Engineer, all sewers shall be constructed of green SDR 35(or thicker walled) PVC pipe.

1.4 CURVED SEWERS

- A. Allowed
 - 1. Curved sewers are permitted only under circumstances where conventional sewer construction is not feasible. A conceptual approval must be obtained from City Engineer, before beginning the design.
- B. Design
 - 1. The minimum radius of curvature shall be greater than 200 feet or one-half of the maximum deflection angle for the material of pipe allowed by the manufacturer.
 - 2. The design n value for the sewer pipe shall be 0.018.
 - 3. Only one horizontal curve in the sewer alignment will be allowed between manholes. No vertical curves shall be permitted.
 - 4. Manhole spacing shall not exceed 350 feet.
 - 5. Manholes shall be provided at the beginning and the end of a curved alignment (i.e. change in radius of curvature).
 - 6. The design should consider increased erosion potential due to high velocities.
- C. Other Requirements
 - 1. Maintenance equipment shall be available at all times for inspection and cleaning.
 - 2. Horizontal and vertical alignment of the sewer after the construction must be verified and certified by a registered professional engineer.
 - a. Accurate record or as-built drawings must be prepared showing the physical location of the pipe in the ground, and submitted to the division in accordance with the requirements of R317-3-1.

1.5 INSTALLATION REQUIREMENTS

- A. Standards
 - 1. The technical specifications shall require that installation be in accordance with the requirements based on the criteria, standards and procedures established by:
 - a. Utah Administrative Code R317;
 - b. Current American Public Works Association (APWA) Standards and Specs as amended by Logan City;
 - c. Recognized industry standards and practices;
 - d. The product manufacturer's recommendations and guidance;
 - e. The Following codes, as adopted by the State of Utah: International Building Code, International Plumbing Code, International Mechanical Code and National Electrical Code;
 - f. American Society of Testing Materials (ASTM);
 - g. American National Standards Institute (ANSI); and
 - h. Occupational Safety and Health Administration (OSHA), US Department of Labor or its succeeding agencies;
 - i. American Society of Civil Engineers (ASCE);
 - j. American Water Works Association (AWWA);

1.6. MANHOLES

- A. Location, manholes shall be installed at:
 - 1. The end of each line;

2. All changes in grade, size, or alignment;
 3. All pipe intersections; and
 4. Distances not greater than 350 feet unless otherwise approved by City Engineer.
- B. Drop Type Manholes
1. A drop pipe should be provided for a sewer entering a manhole at an elevation of 24 inches (61 centimeters) or more above the manhole invert. Where the difference in elevation between the incoming sewer and manhole invert is less than 24 inches (61 centimeters), the invert should be filleted to prevent solids deposition.
- C. Diameter
1. The minimum diameter of manholes shall be 48 inches;
 2. All manholes with three or more pipes entering the base or with pipes 18 inches or larger in diameter shall be 60 inches inside diameter.
 3. All manholes shall be analyzed by a Professional Engineer to ensure structural integrity of walls is sufficient for pipe penetrations.
- D. Access
1. A minimum diameter of 25 inches shall be provided for safe access.
 2. Corrosive resistant steps beginning no more than 24 inches from the bottom surface of the manhole shall be installed.
- E. Flow Channel
1. The flow channel through manholes should be made to conform in shape and slope to that of the sewers. The depth of flow channels should be between one-half and three-quarters of the diameter of the sewer. Adjacent floor area should drain to the channel with the minimum slope of 1 inch per foot (8.3 centimeters per meter).
- F. Water tightness
1. Manholes shall be of the pre-cast concrete.
 2. Manholes shall be waterproofed on the exterior.
 3. Sanitary sewer manholes shall not be installed where ponded water is expected for any duration.
 4. Manholes shall be located to avoid street runoff and high water.
 5. Locked manhole covers may be desirable in isolated easement locations or where vandalism may be a problem as directed by the City Engineer.
- G. Electrical
1. Electrical equipment installed or used in manholes shall conform to appropriate National Electrical Code, as adopted by the State of Utah, requirements.

1.7 INVERTED SIPHONS

- A. Not allowed unless approved by City Engineer.

1.8 SEWERS IN RELATION TO STREAMS

- A. Location of Sewers on Streams
1. The top of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line from damage and freezing. In general, the following cover requirements must be met:
 - a. one foot (30 centimeters) of cover is required where the sewer is located in bedrock;
 - b. three feet (90 centimeters) of cover is required in other material;

- c. cover in excess of 5 feet may be required in streams having a high erosion potential; and
 - d. in paved stream channels, the top of the sewer must be placed 5 feet below the bottom of the channel pavement.
- B. Horizontal Location
 - 1. Sewers located along streams shall be outside of the stream bed and banks.
- C. Structures
 - 1. The sewer outfalls, headwalls, manholes, gate boxes, or other structures shall be located so they do not interfere with the free discharge of flood flows of the stream.
- D. Alignment
 - 1. Sewers crossing streams should be designed to cross the stream as nearly at right angles to the stream flow as possible, and shall be free from change in grade.
 - 2. Sewer systems shall be designed to minimize the number of stream crossings.
- E. Construction
 - 1. Materials.
 - a. Sewers entering or crossing streams shall be constructed of joint-less pipe.
 - b. Material used to backfill the trench shall be engineered to protect sewer line from scour or other damage as directed by the City Engineer.
- F. Aerial Crossings
 - 1. Not Allowed.

1.9 PROTECTION OF WATER SUPPLIES

- A. All sewer designs must comply with the requirements stated in Utah Administrative Code R309.

Part 2. City of Logan Sewage Pumping Station and Force Main Design Standards

2.1 GENERAL

- A. All Sewer Sewage Pumping Stations and Force Main Designs shall comply with Utah State Administrative Code R317-3-3.
- B. A 12 gauge copper wire, PVC jacketed for underground service, shall be placed along the crown of force mains along its entire length.
 - 1. All splices shall be with gel filled wire connectors.
 - 2. At vault locations, coil wire inside of vault, and secure in a location that is readily accessible near the entrance of the vault, to allow access to the wires without completely entering the vault.
 - 3. Provide a termination point for locate wire every 500 linear feet. Termination points not in a vault should be protected in valve box type structures.