

Chapter 30 - Design of Sewers

General Design Information

22 Design Capacity
Maximum hourly domestic flow _____
Maximum Industrial flow _____
Infiltration/Inflow _____

23 Design Flow GFCD _____
Design value used for ratio of peak to average daily flow _____

24 Details of Design and Construction
Minimum diameter of gravity sewers _____
Maximum diameter of gravity sewers _____
Minimum slope _____ Maximum Slope _____
Minimum depth _____ Maximum depth _____

25 Manholes
Minimum inside diameter _____ Minimum access diameter _____

26 Inverted Siphons
Location _____

27 Stream Crossings
Location _____

28 Aerial Crossing
Location _____

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|-----------------------------------|---|--------|--------------|----------------|------------|
| 21 | Approval of Sewers Design is for a separate system and has excluded 1/1? | Yes | | | --- |
| 22 | Design Capacity The following factors have been considered in sizing the sewers: | | | | --- |
| | Maximum hourly domestic sewage flow? | Yes | | | --- |
| | Maximum Industrial flow? | Yes | | | --- |
| | Infiltration/Inflow? | Yes | | | --- |
| | Topography of areas, locations of STP, sewer depth and pumping requirements? | Yes | | | --- |
| | A table is presented indicating depths and velocities at minimum, average and maximum daily flow all sizes of sewers used? | Yes | | | --- |
| 23 (40 CFR 35) 23.2 23.3 | Design Flow Design value used for average daily per capita flow (GPCD)? | --- | | | --- |
| | Design value for ratio of peak to average daily flow? | --- | | | --- |
| | Combined sewers have sufficient additional capacity to insure attainment of appropriate NYSDEC and USEPA water quality standards? | Yes | | | --- |

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| 24 | Details of Design and Construction | | | | |
| 24.1 | Minimum diameter of gravity sewers conveying raw wastewater? | 8" | | | |
| 24.1 a (TIP #24) | Minimum diameter of gravity sewers conveying partially treated or fully treated wastewater? | 4" | | | |
| 24.2 | Sewers designed deep enough to receive sewage from basements and to prevent freezing? | Yes | | | |
| 24.2 | Sewers not at a sufficient depth to prevent freezing are insulated? | Yes | | --- | |
| 24.3 | Gravity sewers conveying raw wastewater designed to give mean velocity, when flowing full, of 2.0 fps? | Yes | | | |
| 24.3 | Gravity sewers conveying raw wastewater have minimum slope as stated in the standards? | Yes | | | |
| 24.3a (TIP #24) | Small diameter gravity sewers conveying partially or fully treated wastewater designed in accordance with TIP #24? | Yes | | | |
| 24.33 | Uniform slope between manholes? | Yes | | --- | |
| 24.34 | Where velocities exceed 15 fps, special provisions made to protect against displacement by erosion and shock? | Yes | | ---- | |
| 24.35 | For slopes >20%, sewer anchored securely, with anchors spaces in accordance with Standards? | Yes | | --- | |
| 24.4 | Straight alignment between manholes for sewers <24"? | Yes | | --- | |

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| 24.6 | For pipe size changes, 0.6 depth point utilized for vertical alignment to maintain energy gradient? | Yes | | --- | |
| 24.6 | Material selected for sewers is adaptable to local conditions? | Yes | | --- | |
| 24.6 | Sewers designed to prevent damage from superimposed loads? | Yes | | --- | |
| 24.71 | Installation specifications and methods of bedding and backfilling adequate to prevent damage to pipe or impairment of flow capacity? | Yes | | --- | |
| 24.72 | Trench width adequate for proper installation? | Yes | | --- | |
| 24.72 | Pipe strength class adequate for trench width and bedding class specified? | Yes | | --- | |
| 24.72 | All rock to be removed within 4" of installed pipe? | Yes | | --- | |
| 24.73 | Bedding classes conform to the type and strength of pipe (rigid or flexible) to support the anticipated load? | Yes | | --- | |
| 24.74 | Suitable backfill material specified? | Yes | | --- | |
| 24.74 | Debris, frozen material, large clods or stones, organic matter, or other unsuitable materials eliminated from use as backfill within 2 feet of top of pipe? | Yes | | --- | |
| 24.74 | Backfill placed so as not to disturb pipe alignment? | Yes | | --- | |
| 24.75 | Deflection tests in accordance with Standards required for all flexible pipe? | Yes | | --- | |

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| 24.81 | Installation of joints and materials used included in specifications? | Yes | | --- | |
| 24.81 | Joints designed to minimize infiltration and to prevent entrance of roots? | Yes | | --- | |
| 24.82 (TIP #15) | Leakage tests specified in accordance with Standards and TIP #15 (if applicable)? | Yes | | --- | |
| 24.82 | Maximum allowable infiltration/exfiltration rate (gal/in-dia/mile/day) for water tests? | 100 | | --- | |
| 24.82 | Minimum positive head (ft) required for infiltration/exfiltration tests? | 2 | | --- | |
| 24.82 | Groundwater elevations to be determined prior to testing? | Yes | | --- | |
| 24.83 | Manholes to be inspected for watertightness prior to placing into service? | Yes | | --- | |
| 25 | Manholes | | | | |
| 25.1 | Manhole locations and spacing in conformance with Standards? | Yes | | --- | |
| 25.2 | Drop pipe provided on manholes if influent sewer 24" or greater above manhole invert? | Yes | | --- | |
| 25.2 | Manhole invert filtered to prevent solids deposition when drop is less than 24"? | Yes | | --- | |
| 25.2 | Outside drop connections encased in concrete? | Yes | | --- | |
| 25.2 | Interior drop connections adequately secured with access for cleaning provided? | Yes | | --- | |

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| 25.3 | Minimum manhole inside diameter? | 48" | | --- | |
| 25.3 | Minimum manhole access diameter? | 22" | | --- | |
| 25.4 | Flow channel through manholes conform in shape and slope to that of sewers? | Yes | | --- | |
| 25.5 | Manholes are pre-cast or poured in-place concrete, waterproofed on exterior? | Yes | | --- | |
| 25.5 | Inlet and Outlet pipe joined to manhole with a flexible watertight connection arrangement? | Yes | | --- | |
| 25.2 | Watertight or locking manhole covers used whenever necessary? | Yes | | --- | |
| 25.6 | Electrical equipment installed or used in manholes complies with NEC, Class 1, Group D, Division 1 (explosion-proof) in accordance with 32.35 of Standards? | Yes | | --- | |
| 26 | Inverted Siphons | | | | |
| | Minimum number of pipe barrels provided? | 2 | | | |
| | Minimum pipe size provided? | 6" | | | |
| | Inlet and outlet details and minimum flow velocities conform to Standards? | Yes | | --- | |

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| 27 | Sewer in Relation to Streams | | | | |
| 27.11 | Sewers entering or crossing stream have the minimum depth of cover listed in Standards | Yes | | --- | |
| 27.12 | Sewers located along streams are far enough outside stream bed? | Yes | | --- | |
| 27.13 | Sewer structures located so as not to interfere with free discharge of flood flows? | Yes | | --- | |
| 27.14 | Stream crossings minimized and, when necessary, are designed nearly perpendicular to stream flow and free from change in grade? | Yes | | --- | |
| 27.21 | Sewers entering or crossing streams constructed of cast or ductile iron pipe with mechanical joints? | Yes | | --- | |
| 27.21 | Backfill material - stone, coarse aggregate, washed gravel or other material not causing siltation? | Yes | | --- | |
| 27.22 | Construction methods specified to minimize siltation and erosion in accordance with NYSDEC stream crossing permit? | Yes | | --- | |
| 28 | Aerial Crossings | | | | |
| | Supports for pipe joints provided and designed to prevent frost heave, overturning and settlement? | Yes | | --- | |
| | Design incorporates freezing precautions, including expansion jointing? | Yes | | --- | |
| | Bottom of pipe no lower than 50 year flood elevation? | Yes | | --- | |

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| 29 | Protection of Water Supplies | | | | |
| 29.1 (TIP #14) | No physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto? | Yes | | --- | |
| 29.31 (TIP #14) | Horizontal separation - minimum (ft.) between sewer and existing or proposed water main? | 10 | | --- | |
| 29.32 (TIP #14) | Vertical separation - minimum (inches) between sewer and water main crossings? | 18 | | --- | |
| 29.32 (TIP #14) | Sewer crossing arranged so that pipe joints will be equidistant and as far as possible from the water main joints? | Yes | | --- | |
| (TIP #11) | Miscellaneous | | | | |
| | Where sewers are designed through wetlands, do specification includes requirements of TIP #11? | Yes | | --- | |
| (TIP #25) | For vacuum sewerage systems, have design criteria of TIP #25 been incorporated? | Yes | | --- | |

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| Standard Ref. | Remarks - Explanations/Justifications for Departure from Standards |
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