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Chapter 20 - Design of SewersGeneral 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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Standard Ref.	Item Under Review	Stand.	This Project	Fac. Plan Ref.	P & S Ref.
21	<b>Approval of Sewers</b> Design is for a separate system and has excluded 1/1?	Yes			---
22	<b>Design Capacity</b> 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)	<b>Design Flow</b> Design value used for average daily per capita flow (GPCD)?	---			---
23.2	Design value for ratio of peak to average daily flow?	---			---
23.3	Combined sewers have sufficient additional capacity to insure attainment of appropriate NYSDEC and USEPA water quality standards?	Yes			---

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24	<b>Details of Design and Construction</b>				
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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Standard Ref.	Item Under Review	Stand.	This Project	Fac. Plan Ref.	P & S Ref.
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	<b>Manholes</b>				
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	<b>Inverted Siphons</b>				
	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	<b>Sewer in Relation to Streams</b>				
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	<b>Aerial Crossings</b>				
	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	<b>Protection of Water Supplies</b>				
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)	<b>Miscellaneous</b>				
(TIP #11)	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