CE 412 A: Water Supply & Wastewater Disposal Systems

Tutorial – 2022-23 (2nd sem) ● Part II: Wastewater Management

TUTORIAL 2 ● Monday, March 13, 2023

Exercise 1: A sanitary sewer line of diameter 950 mm serving a fully developed area of 1000 hectares with population density 70 persons per hectare is laid on a slope of 0.0016 (Manning's Coefficient: 0.015). In the alignment of the sewer a flowing water body is to be crossed whose base is 10 m below the invert level of the sewer and is approximately 50 m wide. Design a device that can connect the sewer line to allow crossing of the water body without requirement of pumping and ensuring that the pipes flow with minimum velocity of 0.9 m/s for all flow conditions i.e., low, average as well as peak flows to avoid any deposition inside the connecting pipe(s). Sketch the plan, longitudinal section between inlet and outlet chambers, and an appropriate cross-section of the inlet chamber. Following information may be used for design purposes.

1	Water Supply	250 lpcd
2	Maximum Rate of infiltration	7000 lpd/hectare
3	Wastewater reaching the sewers	90 % of W/S
4	Minimum Flow	0.4*Average Flow
5	Peak Flow	3.5*Average Flow
6	Maximum length of the pipe(s) between outer wall of exit side of the inlet chamber to the outer wall of the inlet side of the exit chamber	100 m
7	Available fall from invert level of outer wall of exit side of the inlet chamber to the invert level of outer wall of the inlet side of the exit chamber	1 m
8	Available head loss at inlet	100 mm