CE 412 A: Water Supply & Wastewater Disposal Systems

Tutorial – 2022-23 II ● Part II: Wastewater Management

TUTORIAL 3 ● Tuesday, March 21, 2023

Exercise 1: Design a bar rack and screen chamber for a locality with following information.

Water Supply	=	250 lpcd
Population density	=	350 person per hectare
Area served	=	690 hectares
Wastewater reaching sewers	=	80% of W/S
Peak Factor	=	3.0
Infiltration Rate	=	7391 l per day per hectare
Specifications of incoming trunk sewer		
Diameter	=	1.40 m
Depth of flow	=	1.05 m
Velocity at peak design flow	=	1.16 m/s
Drop of screen chamber floor to invert	=	0.08 m
Specifications for bars		
Width of rectangular bars	=	10 mm
Clear spacing between bars	=	25 mm

Sketch hydraulic profile through bar rack under clean conditions as well as for 50 percent clogged conditions.

Exercise 2: Design grit chamber for the area with information in Exercise 1 above to remove grit particles up to a size of 0.15 mm and of specific gravity of 2.65. The minimum temperature is 15ºC. The grit chamber is equipped with proportional flow weir as control device.

Exercise 3: Design an equalization tank for the area with information given in Exercise 1 above with diurnal variation in flow given in following table.

Time of Day	Flow Variations	Time of Day	Flow Variations
0 - 1	0.6*Q	12 - 13	0.7*Q
1 - 2	0.6*Q	13 - 14	0.7*Q
2 - 3	0.6*Q	14 - 15	0.7*Q
3 - 4	0.6*Q	15 - 16	0.7*Q
4 - 5	0.7*Q	16 - 17	0.8*Q
5 - 6	0.8*Q	17 - 18	0.9*Q
6 - 7	1.4*Q	18 - 19	1*Q
7 - 8	2.0*Q	19 - 20	2.0*Q
8 - 9	2.1*Q	20 - 21	1.2*Q
9 - 10	1.9*Q	21 - 22	0.8*Q
10 - 11	1.2*Q	22 - 23	0.6*Q
11 - 12	0.8*Q	23 - 24	0.6*Q