

CE 326 Principles of Environmental Engineering
Rapid Sand Filter Design
due April 2, 2003

A new water treatment plant is planned for a community of 155,000 people along the Des Moines River. The new plant will consist of rapid mix for coagulation, flocculation, and sedimentation basins, followed by rapid sand filters. The water quality for the plant will be similar to the water sample tested in the jar test lab during the past two weeks. Use the following as a basis of design for the sand filters:

design population	155,000
average demand	120 gallons per capita per day
maximum day demand	2.5 times average
cold water temperature	10/C
sand	
specific gravity	2.65
effective size, mm	0.50
uniformity coefficient	1.34
sphericity	0.82
bed porosity	0.45

Prepare a design for the rapid sand filters and include a sketch of plan and section views. In your layout provide space for expanding the facility for twice the capacity at some future time. Prepare a report providing a summary of the basis of design, any assumptions that were made (filtration rate, depth of sand, backwash rate, etc.), and design calculations. Use the example attached as a guide for sizing the washwater troughs. Example problems 3-25 through 3-28 in the text provide examples of the hydraulic calculations.