High Rate Effluent Filtration (Sand Filters) Design Considerations

These design considerations are for high rate sand filters used as tertiary treatment. The use of these filters will not normally be considered for secondary treatment.

Filters

1. Filters may be gravity or pressure.
2. Each unit should be designed and installed so that it is readily accessible for inspection and maintenance without taking other units out of service. All filter media must be readily accessible for inspection and cleaning.
3. Allowable rates shall not exceed 3 gpm/square foot based on the design maximum hydraulic flow rate.
4. Total filter area shall be provided in two or more units and the filtration rate shall be calculated on the total available filter area with one unit out of service.
5. Media sizing and selection shall be as specified in the NYSDEC Standards.
6. Filters shall be equipped with washwater troughs, surface wash or air scouring equipment, means of measurement and positive control of the backwash rate, equipment for measuring filter head loss, positive means of shutting off flow to the filter being backwashed and filter influent and effluent sampling points.
7. Manual overrides must be provided for all automatic control systems.
8. The underdrain system shall be designed for uniform distribution of backwash water (or air) without danger of clogging from solids in the backwash.
9. Separate blowers should be provided for those filters utilizing air as backwash.
10. Provision shall be made for periodic chlorination of the filter influent or backwash to control slime growth.
11. Filter units and controls shall be housed in a building constructed of corrosion resistant materials. The building must be provided with adequate light and heat and ventilation equipment to minimize humidity problems.

Backwash

1. Backwash rate shall be sufficient to fluidize and expand each layer a minimum of 20% based upon the media selected.
2. Minimum backwash period of 10 minutes must be provided.
3. Pumps shall be sized and interconnected to provide the required backwash rate to any filter with the largest pump out of service.
4. Filtered water shall be used for backwash. Waste filter backwash must be adequately treated.
5. Backwash shall be returned to the head of the plant at a rate not to exceed 15 percent of the design average daily flow. Backwash quality should be considered in the overall plant design.
6. Surge tanks shall have a capacity of two backwash volumes. An effluent clearwell shall be provided with a capacity greater than or equal to two complete backwash cycles.