

In areas of high groundwater, drainage facilities should be provided to prevent embankment failure. To further ensure a stable embankment, the tops of the dikes should be of adequate width. The use of an adequate dike width will facilitate the use of mechanical equipment for maintenance and will also reduce construction costs, especially where mechanical compaction equipment is used.

Mixing and Air Requirements The proper operation of both in-line and off-line equalization basins generally requires proper mixing and aeration. Mixing equipment should be sized to blend the contents of the tank and to prevent deposition of solids in the basin. To minimize mixing requirements, grit-removal facilities should precede equalization basins where possible. Mixing requirements for blending a medium-strength municipal wastewater (see Table 3-15), having a suspended solids concentration of approximately 210 mg/L, range from 0.004 to 0.008 kW/m³ (0.02 to 0.04 hp/10³ gal) of storage. Aeration is required to prevent the wastewater from becoming septic and odorous. To maintain aerobic conditions, air should be supplied at a rate of 0.01 to 0.015 m³/m³·min (1.25 to 2.0 ft³/10³ gal·min). In equalization basins that follow primary sedimentation and have short detention times (less than 2 h), aeration may not be required.

Where mechanical aerators are used, baffling may be necessary to ensure proper mixing, particularly with a circular tank configuration. To protect the aerators in the event of excessive level drawdown, low-level shutoff controls should be provided. Because it may be necessary to dewater the equalization basins periodically, the aerators should be equipped with legs or draft tubes that allow them to come to rest on the bottom of the basin without damage. Various types of diffused air systems may also be used for mixing and aeration including static tube, jet, and aspirating aerators (see Sec. 5-12).

Operational Appurtenances Among the appurtenances that should be included in the design of equalization basins are (1) facilities for flushing any solids and grease that may tend to accumulate on the basin walls; (2) a high-water takeoff for the removal of floating material and foam; (3) water sprays to prevent the accumulation of foam on the sides of the basin and to aid in scum removal; and (4) separate odor control facilities (see Chap. 15) where covered equalization basins must be used. Solids removed from equalization basins should be returned to the head of the plant for processing.

Pumps and Pump Control Because flow equalization imposes an additional head requirement within the treatment plant, pumping facilities are frequently required. Pumping may precede or follow equalization, but pumping into the basin is generally preferred for reliability of treatment operation. In some cases, pumping of both basin influent and equalized flows will be required.

An automatically controlled flow-regulating device will be required where gravity discharge from the basin is used. Where basin effluent pumps are used, instrumentation should be provided to control the preselected equalization rate. Regardless of the discharge method used, a flow-measuring device should be provided on the outlet of the basin to monitor the equalized flow.

5-4 MIXING AND FLOCCULATION

Mixing is an important unit operation in many phases of wastewater treatment including (1) mixing of one substance completely with another, (2) blending of miscible liq-