grinder located at one side of the channel (see Fig. 5–9*c*). Standard sizes of this device are available for use in large channels ranging from widths of 750 to 1800 mm (30 to 72 in) and depths of 750 to 2500 mm (30 to 100 in). The headloss is lower than that of the units with counterrotating blades shown on Fig. 5–9*a*.

Grinders

High-speed grinders, typically referred to as hammermills, receive screened materials from bar screens. The materials are pulverized by a high-speed rotating assembly that cuts the materials passing through the unit. The cutting or knife blades force screenings through a stationary grid or louver that encloses the rotating assembly. Washwater is typically used to keep the unit clean and to help transport materials back to the wastewater stream. Discharge from the grinder can be located either upstream or downstream of the bar screen.

Design Considerations

Comminuting and macerating devices may be preceded by grit chambers to prolong the life of the equipment and to reduce the wear on the cutting surfaces. Comminutors should be constructed with a bypass arrangement so that a manual bar screen is used in case flowrates exceed the capacity of the comminutor or when there is a power or mechanical failure. Stop gates and provisions for dewatering the channel should also be included to facilitate maintenance. Headloss through a comminutor usually ranges from 0.1 to 0.3 m (4 to 12 in), and can approach 0.9 m (3 ft) in large units at maximum flowrates.

In cases where a comminutor or macerator precedes grit chambers, the cutting teeth are subject to high wear and require frequent sharpening or replacement. Units that use cutting mechanisms ahead of the screen grid should be provided with rock traps in the channel upstream of the comminutor to collect material that could jam the cutting blade.

Because these units are complete in themselves, no detailed design is necessary. Manufacturers' data and rating tables for these units should be consulted for recommended channel dimensions, capacity ranges, headloss, upstream and downstream submergence, and power requirements. Because manufacturers' capacity ratings are usually based on clean water, the ratings should be decreased by approximately 80 percent to account for partial clogging of the screen.

5–3 FLOW EQUALIZATION

The variations of influent wastewater flowrate and characteristics at wastewater-treatment facilities were discussed in Chap. 3. Flow equalization is a method used to overcome the operational problems caused by flowrate variations, to improve the performance of the downstream processes, and to reduce the size and cost of downstream treatment facilities.

Description/Application

Flow equalization simply is the damping of flowrate variations to achieve a constant or nearly constant flowrate and can be applied in a number of different situations, depending on the characteristics of the collection system. The principal applications are for the