

basin. The basin must be designed to drain back into the wet well or collection system as the influent flow recedes;

B. A portable pump capable of being connected to the pumping station or a portable generator; or

C. Storage of excess flow in trunk line sewers provided sufficient capacity for twenty-four (24)-hour storage of peak flows is available and flooding of basements will not occur; and

10. Alarm systems. Alarm systems shall be provided for all pumping stations. The alarm shall be activated in cases of power failure, pump failure or any cause of high water in the wet well. If possible, the alarm should be telemetered to a location that is manned twenty-four (24) hours per day. Audio-visual alarms with self-contained power supply shall be provided as a minimum. A sign shall be posted at each pump station in a clearly visible location, listing a telephone number to be called if the alarm is seen or heard; and

11. Instructions and equipment. Sewage pumping stations and their operators should be supplied with a complete set of operational instructions including emergency procedures, maintenance schedules, tools and spare parts as may be necessary.

(C) Force Mains. Design considerations for force mains are as follows:

1. Velocity. At design average flow, a cleansing velocity of at least two feet (2') per second shall be maintained;

2. Size. In general, three-inch (3") diameter pipe shall be the smallest used for raw sewage force mains. However, use of grinder pumps or similar equipment may allow use of smaller pipe. These instances will be reviewed on an individual basis. Piping materials may be pressure pipe normally used for conveying potable water, however the effects of surges and pressures within the system should be considered in the selection of the piping material. As a minimum SDR 21 PVC pressure pipe or its equivalent should be used. The force main and fittings including reaction blocking shall be designed to withstand normal pressure and pressure surges (water hammer);

3. Air relief valves. An automatic air relief valve shall be placed at high points in the force main to prevent air locking. However, consideration will be given to alternate proposals with proper substantiation;

4. Termination. Force mains should enter the gravity sewer system at a point no more than two feet (2') above the flow line of the receiving manhole; and

5. Water line and sewage force main separation. There shall be at least a ten-foot

(10') horizontal separation between water lines and sewage force mains. There shall be an eighteen-inch (18") vertical separation at crossings as required in paragraph (9)(A)4. of this rule. Only in extenuating circumstances will deviations be allowed to these minimum separation distances.

(11) Small Wastewater Treatment Works. Treatment the extent of which will depend on 10 CSR 20-7.015 Effluent Regulations and 10 CSR 20-7.031 Water Quality Standards shall be provided in connection with all installations. Secondary treatment shall be the minimum acceptable degree of treatment. Wastewater treatment plants should be designed to provide for the estimated population and flows to be fifteen (15) or twenty (20) years hence. The following items shall be taken into consideration in planning sewage treatment works:

(A) Plant Location. In general to avoid local objections, the wastewater treatment facilities should be located as far as is practical from any present built-up area or any area which will develop within a reasonable future period. No sewage treatment facility shall be located closer than fifty feet (50') to any dwelling or establishment.

1. The treatment facility shall be located above the twenty-five (25)-year flood level.

2. An all-weather access road shall be provided from a public right-of-way to every treatment facility. Sufficient room shall be provided at the site to permit turning vehicles around. In determining the type of roadway and method of construction, consideration shall be given to the types of vehicles and equipment necessary to maintain and operate the facility. If access is required for heavy sludge trucks, the road must be of more substantial construction than one (1) used only for access of mowing equipment or other light vehicles. Gravel roads to be used by heavy vehicles shall have a minimum depth of six inches (6") of crushed rock material with a bottom layer of four inches (4") of two to three inch (2-3") size material and a top layer two inches (2") thick of three-fourths inch (3/4") size material. In general, the grade of the access road shall not exceed twelve percent (12%).

3. Wastewater treatment facilities shall not be located within one hundred feet (100'), and preferably three hundred feet (300') of any well or water supply structure;

(B) Design.

1. Type of treatment. Careful consideration should be given to the type of treatment before making a final decision. A few of the important factors to consider are the location and topography of the plant site; character and quantity of the wastes to be treated; operating costs and the probable type of supervi-

sion and maintenance the plant will receive. Particular care must be used in choosing methods of treatment for seasonal use developments, such as parks and campgrounds, and for developments which produce waste loads which fluctuate between wide extremes from day-to-day. The use of activated sludge type plants is generally not recommended for these developments because a high degree of operating efficiency for these plants is dependent in part upon a relatively stable loading condition. Where all use of the development is confined to a specific season, consideration should be given to designing lagoon systems on the draw-and-fill concept, retaining all wastewaters generated during the season of use and discharging them after an appropriate period during the off season or utilizing the stored water for irrigation.

2. New processes, methods and equipment. The policy of the department is to encourage rather than obstruct the development of new methods and equipment for the treatment of sewage wastes. The lack of inclusion in these standards of some types of wastewater treatment processes or equipment should not be construed as precluding their use. The department may approve other types of wastewater treatment processes or equipment under the following conditions:

A. The operational reliability and effectiveness of the process or device shall have been demonstrated with a suitably sized prototype unit operating at its design load conditions to the extent required by the department; and

B. The department may require test results and engineering evaluations demonstrating the efficiency of the processes or equipment. The department may also require that appropriate testing be conducted and evaluations, other than those employed by the manufacturer or developer, be made under the supervision of a competent process engineer.

3. Sewage flow and strength. Minimum design loadings for all treatment processes shall be calculated using the following table unless the engineer can document the validity of lower per capita figures based on actual waste strength and/or flow data from the development to be served or from similar developments.

Table I

Type of Establishment	Pounds BOD per person (unless otherwise noted)	Gallons per day per person*
Employee Sanitary Waste	.05	15