

4.40 DEWATERING

Definition

Lowering the water table by means of pumping.

Purpose

To allow the construction of structural and stormwater improvements by removing water from excavation areas and allowing construction by conventional "dry" methods.

Planning Considerations

The major planning consideration in dewatering is disposal of removed water. Volume, quality, and topography are the factors governing the method and destination of removed water. Discharge from well-point dewatering is relatively clear except for the initial discharge after installation or inactivity. Water pumped from a sump hole is thoroughly sediment laden and must always be treated. Turbid water must either be filtered before leaving the site or must be impounded onsite and allowed to settle. In flat terrain it is sometimes more economical to impound relatively clean water rather than pipe it long distances to a receiving water body.

Specifications

The two most common methods of dewatering used in Florida are well-point systems and sump pumps. A well-point system consists of one or more rows of small 2" (5 cm) collector pipes which are jetted vertically into the ground near the proposed excavation. The small pipes are connected by a larger 6" (15 cm) manifold pipe which is connected to the pump and discharge line. The sump method is simply a hole in the ground with a pump drawing all of the water flowing into the hole. Excess water is conveyed to the sump by open ditches or perforated pipes embedded in sand or gravel.

Sumps and Ditches

The water table is lowered by ditching and conveying water to a lowered sump hole. Water pumped from a sump hole is usually heavily laden with sediments. Water flowing over disturbed and saturated ground detaches and transports all sizes of soil particles into the sump pit to be sucked up by the pump. Saturated liquid soil (mud) is also drawn into the pump. The discharged water must be treated before release into a receiving water body or stormwater system. Placing haybales around the pump intake or outlet is not sufficient filtration by itself. Turbid water must either be impounded long enough for effective settling of fines, or filtered through a temporary filter or sediment tank. Initially the water may percolate freely into the ground, however this will diminish as the fine particles settle and clog the surface layer of soil. In situations which preclude the use of filtration or settlement facilities, and turbid water is discharged directly into a water body, a suitably designed floating turbidity barrier must be used. Note that this method does not remove any sediments, it merely allows for dilution to lower the turbidity level.

Horizontal Wells

This system also consists of a series of ditches leading to a sump hole or pump. The ditches are filled with sand or gravel surrounding a perforated pipe. A geotextile may also be used to prevent excessive migration of fines into the system. The discharged water must be treated before release as described above.

Well-point Systems

The well-point system is the preferred system for dewatering and should be used whenever possible. The initial discharge yields the sediments displaced by the installation of the small collector pipes. This can be directed into the excavation, a small settling or filtration facility, or larger temporary impoundment. Thereafter the water is generally clear ground water and may be discharged into a receiving water body provided that there is suitable conveyance.

Maintenance

1. Any water impoundment must be inspected daily to prevent failure of dikes, berms, or control structures. Minor problems should be repaired at once. Major problems will require a redesign and plan modification.
2. Any filtration device must be inspected and cleaned frequently. The discharge should be monitored daily and whenever the pumps are started. Inspection and maintenance of the system are best performed when the facility is dry. The first signs of diminished performance should be an alarm that maintenance is required. If the facility will no longer drain itself, the untreated water must be pumped back to its source, rather than by-passing the facility and discharging to the water body or stormwater system.
3. Floating turbidity barriers shall be maintained as per FLOATING TURBIDITY BARRIER - Section 4.45