

Clause 5.2.7.1 Design Considerations

The intake structures design should provide for withdrawal of water from more than one level to cope up with seasonal variations of depth of water. Undersluices should be provided for release of less desirable water held in storage.

In the design of intake a generous factor of safety must be allowed as forces to be resisted by intakes are known only approximately. The intake in or near navigable channels should be protected by clusters of piles or other devices, against blows from moving objects.

Undermining of foundations due to water currents or overturning pressures, due to deposits of silt against one side of an intake structure, are to be avoided.

The entrance of large objects into the intake pipe is prevented by coarse screen or by obstructions offered by small openings in the crib work placed around the intake pipe. Fine screens for the exclusion of small fish and other small objects should be placed at an accessible point. The area of the openings in the intake crib should be sufficient to prevent an entrance velocity greater than about 8 meters per minute to avoid carrying settleable matter into the intake pipe. Submerged ports should be designed and controlled to prevent air from entering the suction pipe, by keeping a depth of water over the port of at least three diameters of the port opening.

The conduit for conveying water from the intake should lead to a suction well in or near the pumping station. For conduits laid under water, standard cast iron pipe may be used. Larger conduits may be of steel or concrete. A tunnel, although more expensive, makes the safest conduit.

The capacity of the conduit and the depth of the suction well should be such that the intake ports to the suction well should be such that the intake ports to the suction pipes of pumps will not draw air. A velocity of 60 to 90 cm/s in the intake conduit with a lower velocity through the ports will give satisfactory performance. The horizontal cross-sectional area of the suction well should be three to five times the vertical cross-sectional area of the intake conduit.

The intake conduit should be laid on a continuously rising or falling grade to avoid accumulation of air or gas pockets of which would otherwise restrict the capacity of the conduit.