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## UNDERWATER CONSTRUCTION

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During the construction of bridges, dams or any other structure where the foundation part of the structure is most likely to lie underwater, we have to opt for underwater construction.

Construction in water poses many difficulties especially in the places where there the depth is considerable.

As the structure is hard to build in water as concrete doesn't set in water. Many methods are being used to overcome this problem. One the methods used for this purpose are Cofferdams.

There are various types of cofferdams used for construction of structures in water.

Cofferdam can be defined as the temporary structure that is built to keep the water away from the execution site, so that the structure can be built on the dry surface.

The cofferdams should have walls that exclude water from building site. For this the walls must be water proof and the height of the wall must be more than the maximum water level. These types of cofferdams are preferred where the area of building site is large and the dry soil bed is at reasonable depth.

*Types of Cofferdams and Their Construction Details.* Cofferdams can be classified into many types depending upon the depth, soil conditions, and fluctuations in the water level and type of material used.

*Types of Cofferdams.*

Considering the material used in their construction, cofferdams may be divided into the following categories.

1. Earthen cofferdam;
2. Rockfill cofferdam;
3. Single-walled cofferdam;
4. Double-walled cofferdam;
5. Braced cofferdam;
6. Cellular cofferdam (Circular or diaphragm type);

*Earthen Cofferdam.* Earthen cofferdams are constructed at the place where the height of the water is less say 3m and the current velocity is low. These dams are built using the local available material such as clay, fine sand or even soil.

*Rockfill Cofferdam.* Rock-fill cofferdams are better than that of earthen dams. These dams are preferred when the rock is available easily at the construction site. These dams are very pervious, to prevent water from seeping an impervious membrane of soil is provided in the dam.

The height of the dam is can be up to 3m. The slope can be maintained at 1:1.5 to 1:125. The slope on the water side is pitched so as to protect dam from wave action.

*Single-Walled Cofferdam.* This type of cofferdam is preferred when the depth of the water is more than 6m and area of construction is less. Usually this is used in construction of bridges.

*Double-Walled Cofferdam.* Double-walled types of cofferdams are used when the area of construction site is large and depth of water is high. In this place use of single walled cofferdam becomes uneconomical as the supports are to be increased. So double walled cofferdam is used.

*Braced Cofferdam.* When it's difficult to drive piles inside the bed in the water, then this type of cofferdam is used. In braced cofferdam two piles are driven into the bed and they are laterally supported with the help of wooden cribs installed in alternate courses to form pockets.

*Cellular Cofferdam.* When the water layer is more than 20m, common types of cofferdams are uneconomical to use. In this situations cellular cofferdams are used. This type of dam is used in construction of dams, locks, weirs etc.

*Advantages of Cofferdams:* Allow excavation and construction of structures in an otherwise poor environment. Provide a safe environment to work. Contractors typically have design responsibility. Steel sheet piles are easily installed and removed. Materials can typically be reused for other projects.

*Disadvantages of Cofferdams:* Special equipment is required. Relatively expensive. Very time consuming and tedious process of construction. If rushed, sheets can be driven out of locks or out of plumb. When in flowing water, 'log jams' may occur creating an added stress on the structure.