

Construction Dewatering Modelling



Dewatering means “the separation of water from the soil,” or perhaps “taking the water out of the particular construction problem completely.”



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Purpose of Dewatering

- ❖ During Construction stage
- ❖ Post Construction stage



Purpose of Dewatering

During Construction Stage Post Construction Stage

- Provide a dry excavation and permit construction to proceed efficiently
 - Reduce lateral loads on sheeting and bracing in excavations
 - Stabilize “quick” bottom conditions and prevent heaving and piping
 - Improve supporting characteristics of foundation materials
 - Increase stability of excavation slopes and side-hill fills
 - Cut off capillary rise and prevent piping and frost heaving in Pavements
- Reduce or eliminate uplift pressures on bottom slabs and permit from the reduction of slab thicknesses of basements, buried structures, canal linings, spillways, dry docks, etc.,
 - Provide for dry basements
 - Reduce lateral pressures on retaining structures
 - Control embankment seepage in all dams
 - Control seepage and pore pressures beneath pavements, side-hill fills, and cut slopes.



Methods

- ❖ Exclusion Techniques
- ❖ Dewatering Techniques



Method

Exclusion Techniques

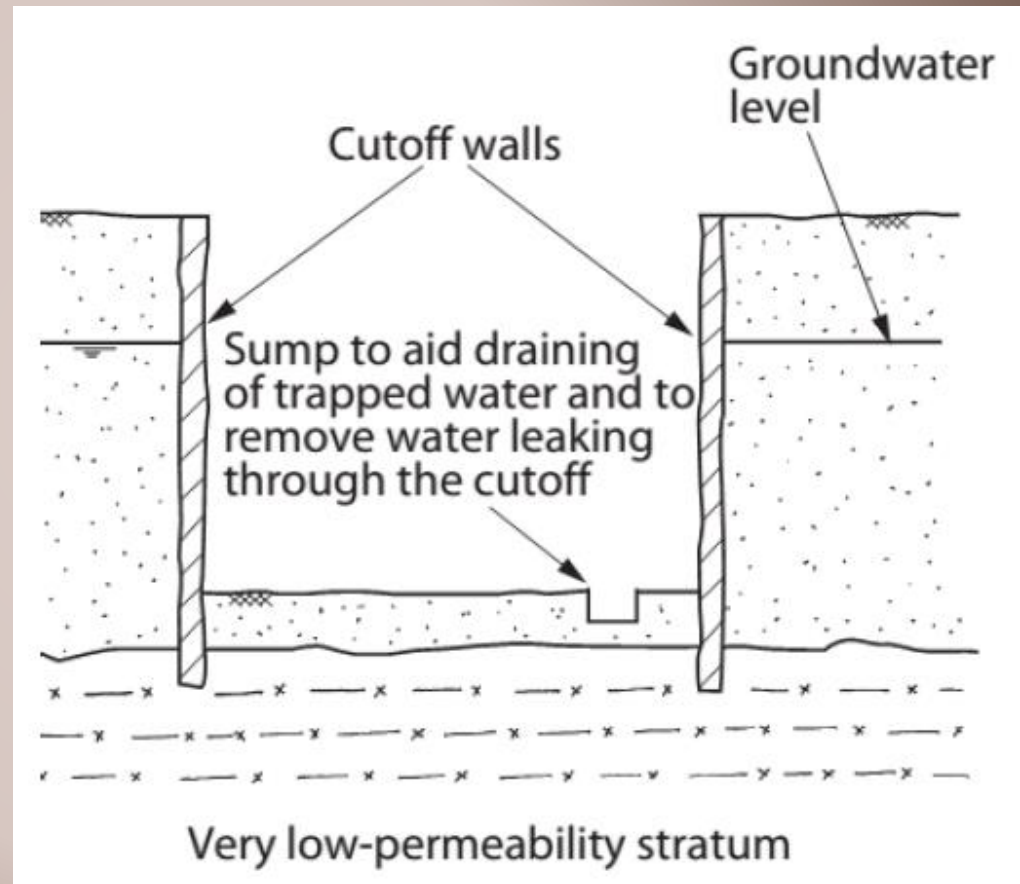


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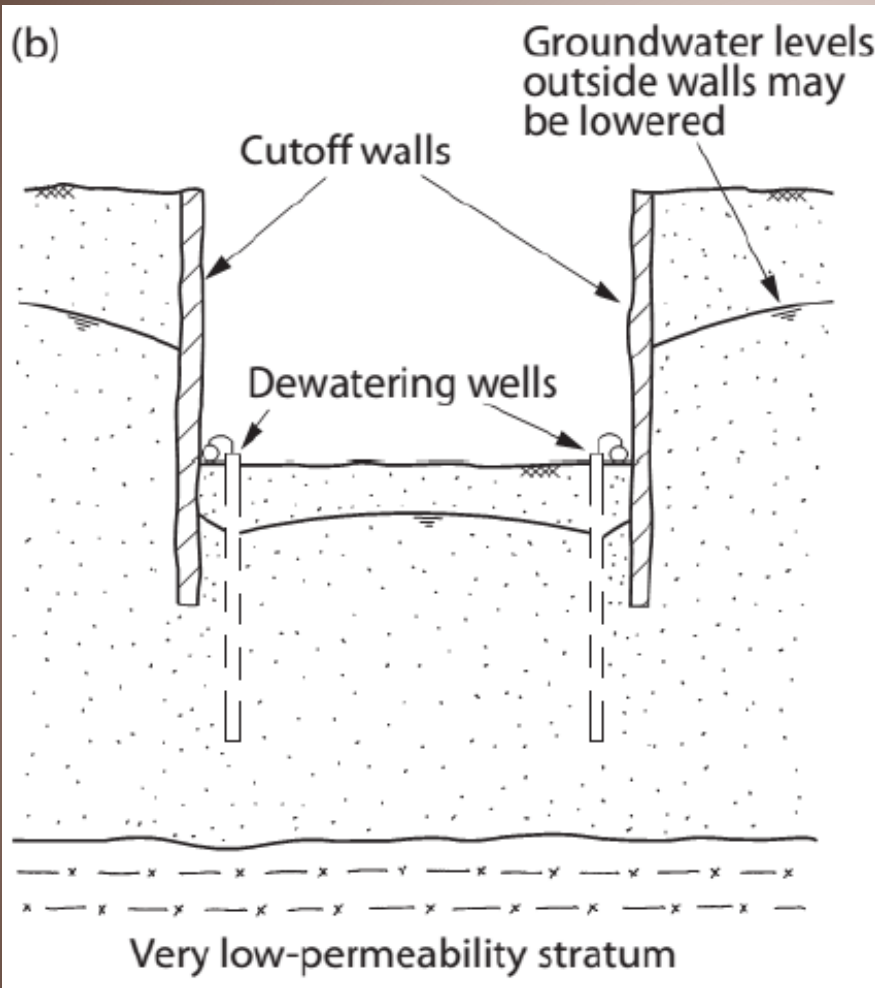
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Exclusion Techniques

Cutoff walls penetrate into a very low-permeability stratum



Exclusion Techniques

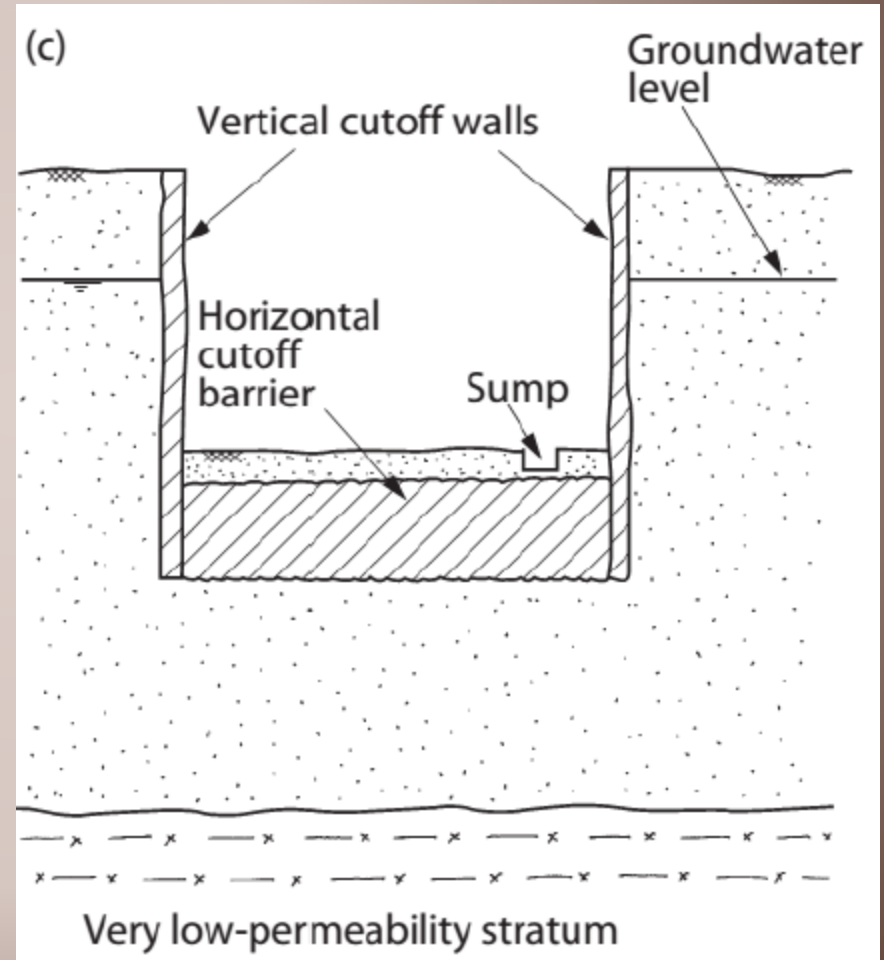


Cutoff walls used in combination with dewatering methods



Exclusion Techniques

Cutoff walls used with a horizontal barrier to seal the base



Method

Dewatering Techniques



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Dewatering Techniques

There are several methods commonly used to drain or dewater a construction site:

- ***Gravity flow***
- ***Pumping and Vacuum***
- ***Electro-Osmosis***

Here we discuss Pumping and Vacuum method with Numerical Analysis



Pumping and Vacuum Method

- **This method is more expensive than gravity, but is faster in results.**
- **It requires pumps that suck the water out of the soil and remove it to a distant place or river or lake.**



Pumping and Vacuum Method

Importance of Geotechnical Investigation

- **Before planning for Dewatering, it is very important to conduct Geotechnical Investigation, to know the ground water levels, permeability of the site, rate of infiltration etc.**
- **Need for a suitable arrangement for dewatering when water table is present within the depth of placing foundation**



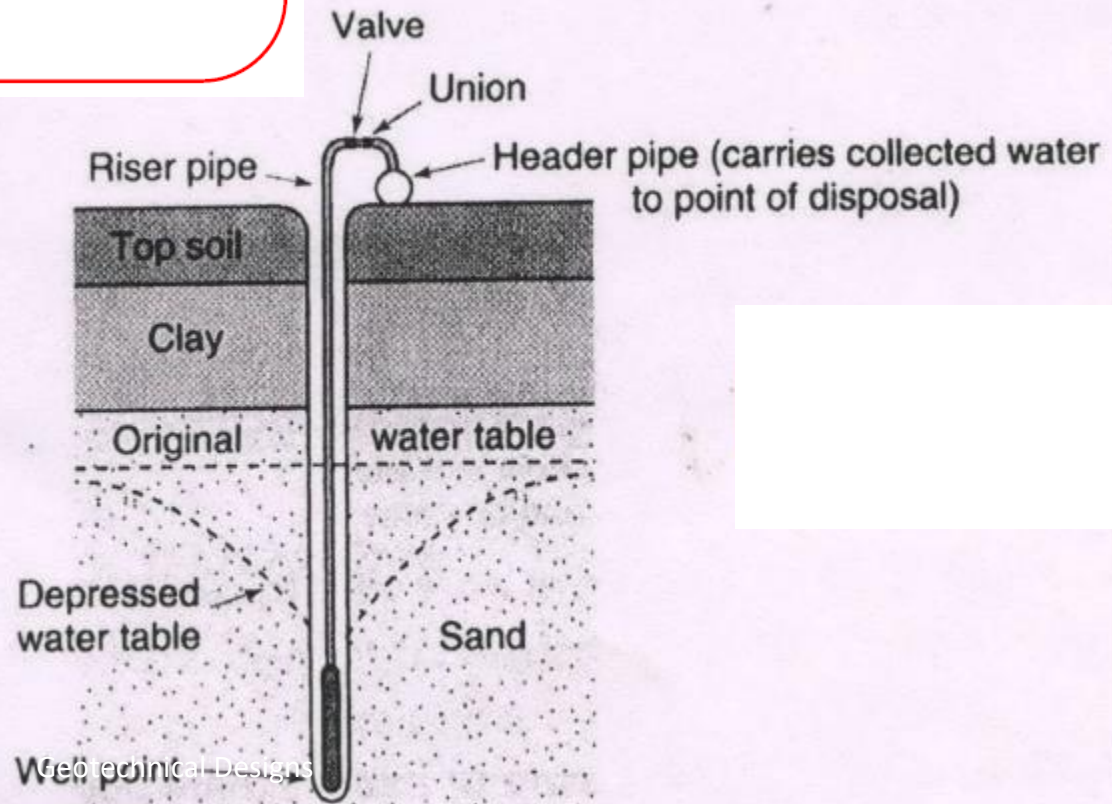
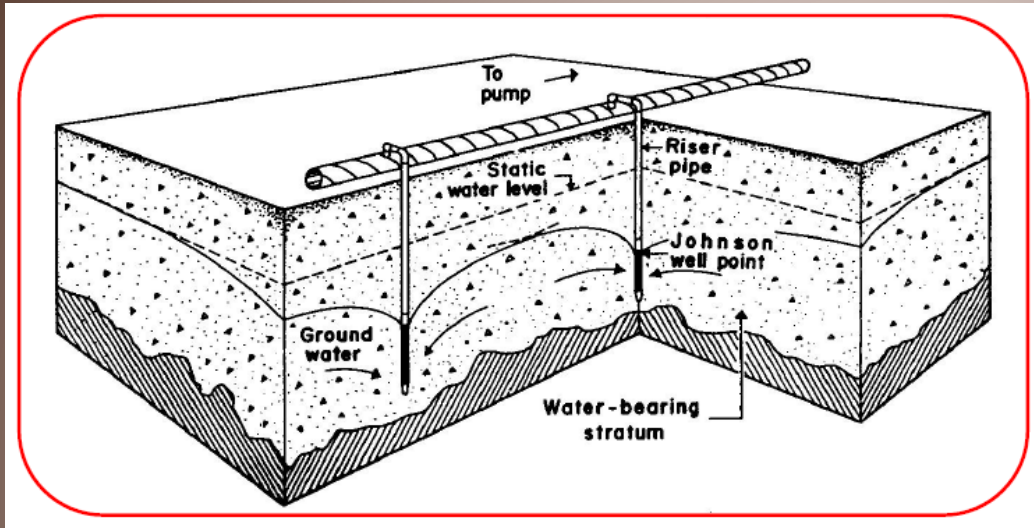
Dewatering Techniques

The most widely used techniques are :

1. Well Points
2. Deep – Well Dewatering



Well Points



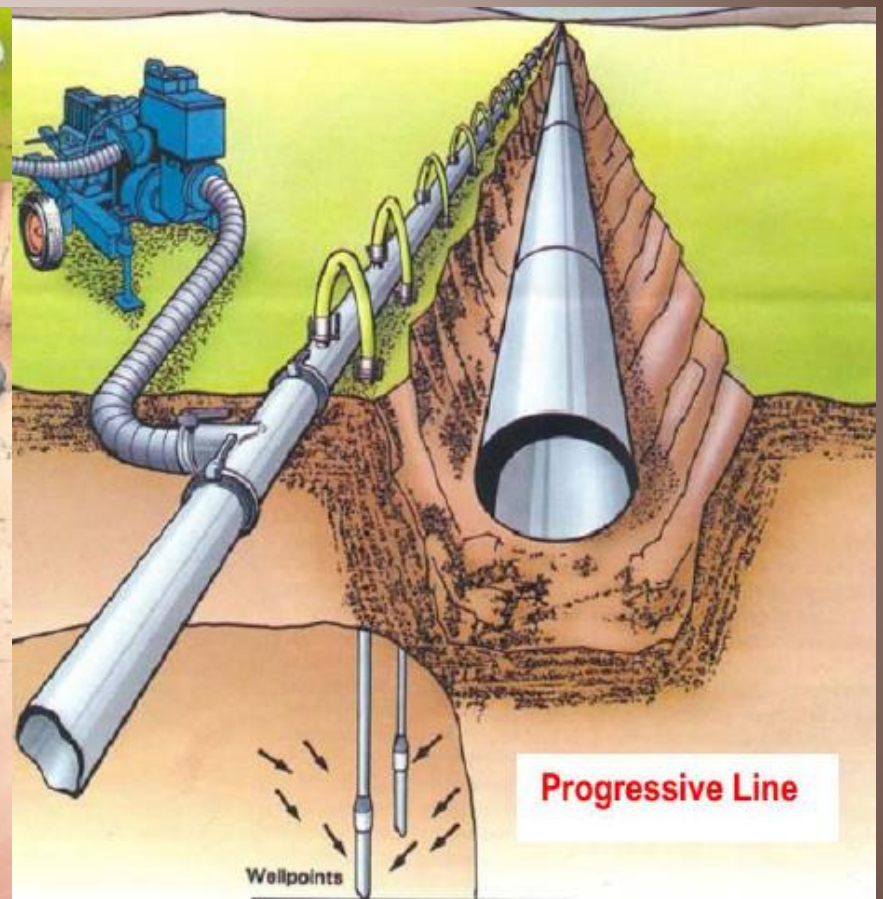
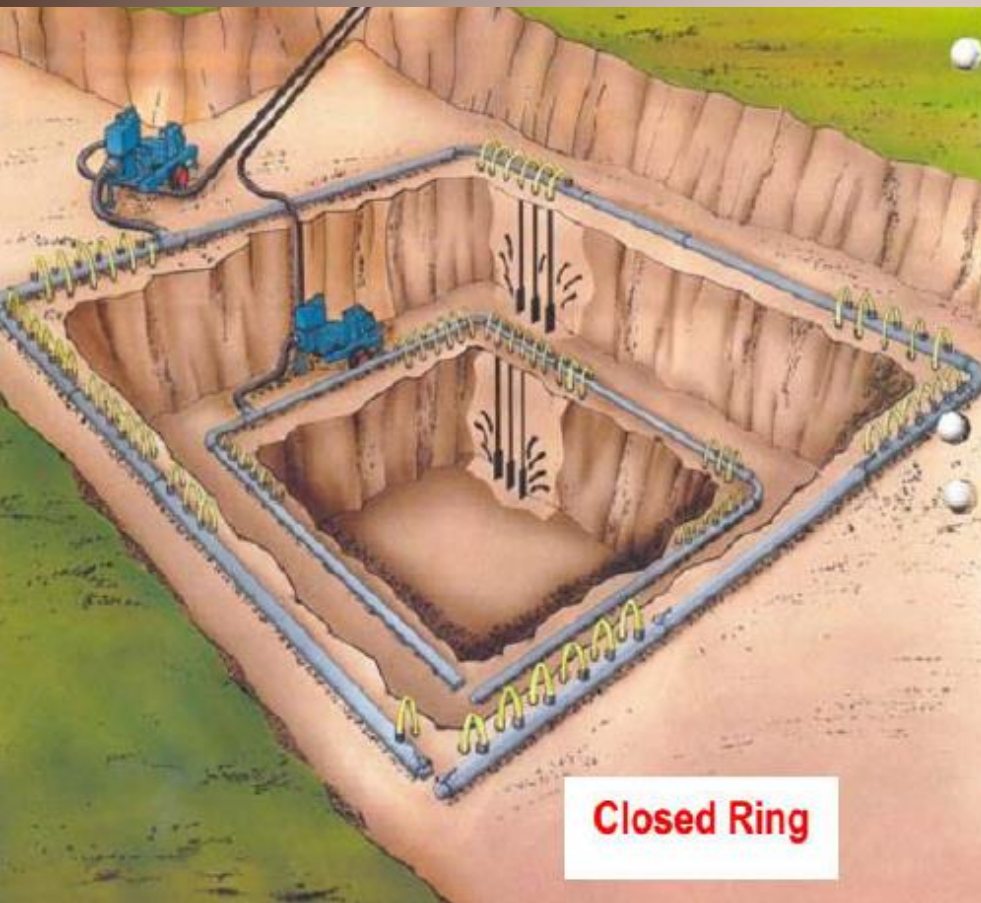
Well Points Dewatering System

A well point system consists of number of well points spaced along a trench or around an excavation site.

These well points in turn are all connected to a common header that are attached to one or more wellpoints pumps



Well point Dewatering System



Well Point Dewatering

Well point systems are frequently the most logical and economical choice for dewatering construction sites where the required lowering of ground water level is approximately 6 m (20 feet) or less. However, greater lifts are possible by lowering the water in two or more stages.



Deep Well Dewatering

Deep well systems consist of one or more individual wells, each of which has its own submersible pump at the bottom of the well shaft. Such systems are particularly suitable where large volumes of water in highly permeable sand and gravel areas permitting rapid recharging of ground water from surrounding areas exist.



Design Considerations of Deep well-Point System

- The soil investigation report
- The grain size analysis and permeability tests
- The hydrology of the area
- The topography
- The space limitations of the site and surrounding structure.
- The projected method of excavation and shoring if any
- The construction schedule



Thank you



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