Course on

# Wastewater Pumping Stations Design

## Lecture 4

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# Lecture 4

# Site Selection

## 4-1 Site Selection

When selecting a site for a pumping station, give careful consideration to access, not only for operating personnel but also for equipment.

Equipment can vary from a pickup truck for small stations to a big crane for large stations. Weather conditions may influence access requirements.

## 4-1 Site Selection (Cont.)

•Designers may have little choice in selecting the sites for wastewater pumping stations, which must often be located in low-lying areas characterized by poor soils and high groundwater. The deep excavations for wet wells create difficult problems requiring expertise and care.

•The designer of a water pumping station has a better choice of sites. The location of sites for raw water intake pumping stations usually depends on the requirements of the intake structure rather than the pumping station.

## 4-2 Factors to Consider for Site Selection

The following factors should be considered when selecting a site:

- Land availability and cost. Allow for construction activities, future expansion, and parking for maintenance vehicles and even mobile cranes. Except in wet, unstable soils or very deep pits, it is less expensive to excavate side slopes than to use sheet piling.

- Topography. Land should be flat enough to minimize construction problems but have enough slope for surface drainage.

- Soils. Complete the subsurface survey prior to land acquisition.

## 4-2 Factors to Consider for Site Selection (Cont.)

The following factors should be considered when selecting a site:

- Protection from flooding. Some states require designs based on the "hundred year" flood. Flood elevations may be obtained from local Authority (Egyptian Meteorological Authority E.M.A ).

- Availability of utilities.
    - ° Water and fire protection.
    - ° Power.
    - ° Find the costs of extending water and other utilities to the site.
    - ° Gas.

## 4-2 Factors to Consider for Site Selection (Cont.)

The following factors should be considered when selecting a site:

- Access. Roads adequate for required construction and future maintenance are necessary.
- Security. Consider the potential for theft and vandalism. Avoid remote sites that are visible and readily accessible from a road.
- Aesthetics. Highly visible sites or sites near other structures may require special architectural treatment and/or provisions to minimize odors and/or noise.
- Multiple use. Obtain owner input on site use and combining other facilities with the pumping station.

## 4-2 Factors to Consider for Site Selection (Cont.)

The following factors should be considered when selecting a site:

- Local land use and zoning ordinances. Are there any special restrictions imposed by planning agencies?

- Transmission pipelines. Minimize profile elevation changes and the length of pipelines. Consider the problems and costs of rights of way, eminent domain, and construction in busy neighborhoods.

## 4-3 Subsurface Investigations

It is vital that a qualified geotechnical engineer make subsurface (soil) surveys and prepare an engineering report. The geotechnical engineer must inform the structural engineer about expected soil conditions and describe their probable effect on the various options available for the structural design engineer.

It is the structural engineer's responsibility to evaluate the geotechnical engineer's report and select the most suitable option. It is often advantageous to involve the soils engineer during the construction phase to ensure that construction procedures conform to design assumptions regarding the magnitude of earth pressures and the sequence of construction. A sufficient number of borings should be made to determine the stability of the excavation.

## 4-3 Subsurface Investigations (Cont.)

The following information is required:

- The stability of slopes.
- The possibility of heave in the bottom of the excavation.
- The high and low groundwater levels .
- The best dewatering procedure:
    (1) pumping from open sumps,
    (2) well points,
    (3) deep wells, or
    (4) sheeting driven to an impervious stratum and caulked to prevent leakage .

## 4-3 Subsurface Investigations (Cont.)

The following information is required:

- The need for permanent underfloor drainage.
- The best method of excavation:
  - (1) open pit (include the allowable slope),
  - (2) sheeting (steel sheet piling or lagging beams),
  - (3) the need for bracing, or
  - (4) caissons.
- The best method for resisting uplift due to groundwater.
- The lateral earth pressure.
- Soil properties at all changes in strata

## 4-3 Subsurface Investigations (Cont.)

The following information is required:

- The probable effect of excavation, dewatering, and/ or pile driving on nearby structures.
- The possibility of unequal lateral forces and the resultant tendency for sliding if adjacent areas are excavated in the future.
- The water table: install a permanent well point in one boring to determine the static water levels because levels obtained when borings are made are unreliable.
- The foregoing information is the responsibility of the geotechnical engineer. The investigation is made with the help of preliminary design information furnished by the structural engineer.

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Inlet Screen / Grinder.

**Thank You**