

**L-9**

# **Sewage Pumping**

**Environmental Engineering-II**



WET  
WELL



Modular  
pump  
well





# RISING MAIN

# The need for *sewer pumping stations* arises when

- The existing topography and required minimum *sewer* grades create deep *sewers* that have high construction costs. The *sewage* is raised and then conveyed by gravity.
- Basements are too low to discharge *sewage* to the main *sewer*.
- *Sewage* must be conveyed over a ridge.

- The *sewage* must be raised to get head for gravity flow through a treatment plant.
- Discharge outlets are below the level of the receiving body of water.

# Problems is sewage pumping

1. Sewage has foul characteristics
2. Sewage has lot of suspended solids and floating matter. Which may make running of pumps difficult and may cause frequent clogging of pumps.
3. Sewage may contain organic and inorganic waste, which may cause corrosion and errosion of parts of the pumps and reduce life of pumps.

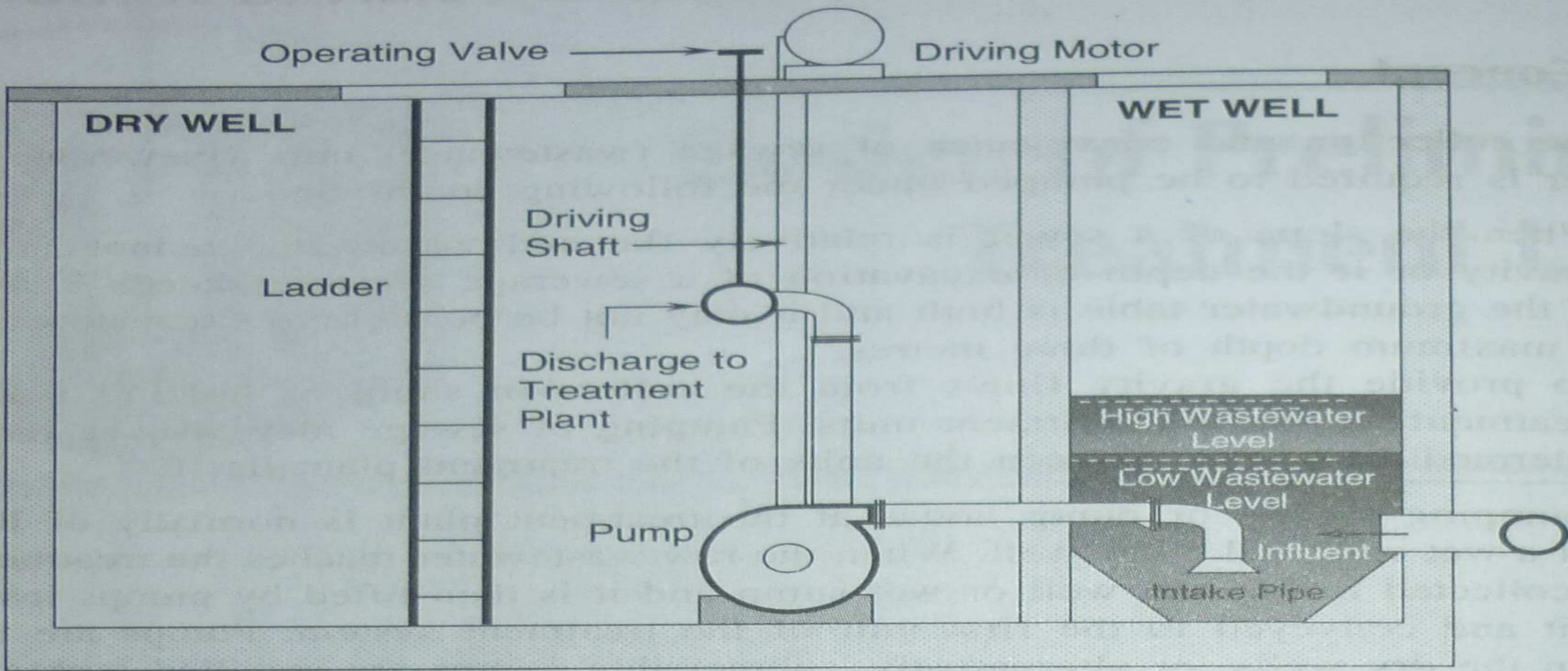
4. Sewage contains pathogens which may cause health problems to working persons at sewage pumping station.

5. The rate sewage flow varies hourly hence rate of pumping has to be adjusted accordingly

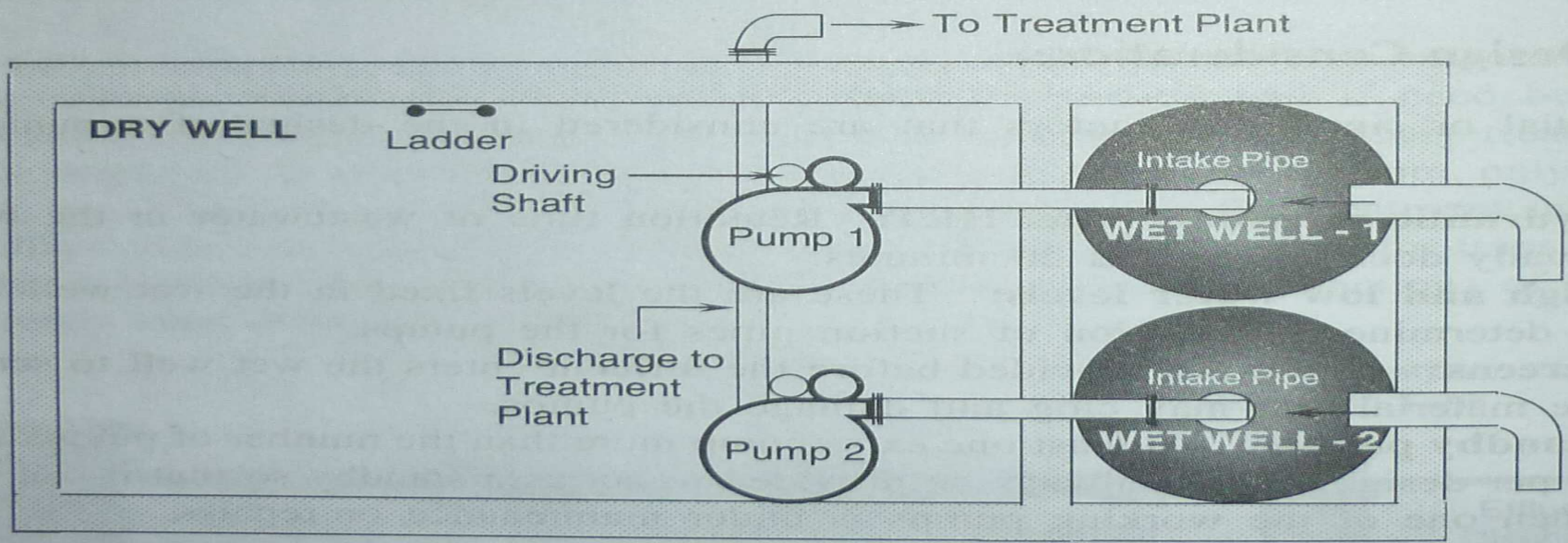
6. Size of sump is limited since large size of sump results in settlement of solids and organic matter at its bottom.

7. Pumps should be of high order reliability since failure of pumps will lead to flooding of adjoining areas.





**SECTIONAL ELEVATION**



**PLAN**

# Pumping station

- Dry well :- For housing the pumps
- Wet well: - For incoming sewage.
- Rising main:- To led the pumped sewage to high leveled gravity sewer.
- Pumps used:- Centrifugal, Reciprocating, Propeller of axial flow, Air pressure pumps or ejectors

# Design criteria

1. Hydraulic retention time HRT:- retention time of wet well usually does not exceed 20 min.
2. High and low water levels:- These are fixed in the wet well in order to determine position of suction pipes for the pumps.
3. Screens :- these are required to remove floating matter that may clog and damage the pump

4. Standby pumps :- At least one extra pump more than the pumps required per design, should always be provided to act as standby so that it can be used when one of the working pumps under maintenance or repair
5. Additional Space :- Provision for extra space for dry wells in the design of the pump house to install additional pumps in future should be kept at initial planning stage itself

## Formulae used

1. For finding frictional losses in pipe

$$h_f = (fLv^2/2gd)$$

v= velocity of flow in rising main

d= dia of rising main

L= length of pipe

## 2. Power of pump

$$P = \frac{w \cdot Q_p \cdot H}{75 \eta_p \eta_m}$$

$w$  = density of water in  $\text{kg/m}^3$

$Q_p$  = Flow to be lifted by pump

$H$  = total head

$\eta_p \eta_m$  = Efficiency of pump and driving motor resp.

# Objective Questions

1. \_\_\_\_\_ matter may clog the pump.
2. \_\_\_\_\_ and \_\_\_\_\_ wells are provided in pumping stations.
3. Dry well is required for \_\_\_\_\_.
4. Wet well is required for \_\_\_\_\_.

# Theory questions

Q1. Write short note on

1. Sewage pumping
2. Difficulties in sewage pumping
3. Design of sewage pumping station