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Selecting a Pump from a Design Point

All pumping projects consist of two basic elements: The Pump and the System. We all know what the pump is. The System consists of all the piping, fittings, and valves that the water will travel through after leaving the pump but before hitting the atmosphere. Pumps push flow into systems, and systems resist that flow with a pressure called Total Dynamic Head. Anyone working with pumps routinely should make it a goal to really understand the interaction between pumps and systems.

1. Determine a minimum Flow Rate (GPM) for the application
    a. Fixture Unit Method for Sewage
    b. Large Capacity Chart
    c. Population Method
    d. Website, etc.

2. Determine the Total Dynamic Head (feet of water)
    a. Identify **Static Head**
        i. Remember: Static Head is just elevation difference
        ii. Check for system high points: the selected pump must be able to 'crest the hill'

    b. Calculate **Friction Head**
        i. Identify length, size, and type of pipe
        ii. Count the fittings and valves and determine 'equivalent length'
        iii. Add 'actual length' of the pipe to the 'equivalent length' of fittings to get 'total length'
        iv. Consult friction loss charts to find the right friction loss factor
        v. $\frac{loss\ factor}{100} \times 'total\ length' = Friction\ Head$

    c. Consider **Operating Head** if applicable
        i. Most applications don't have operating head
        ii. Remember: 1 psi = 2.31 feet of water

    d. Static Head + Friction Head + Operating Head = Total Dynamic Head (TDH)

3. Use the Design Point (Flow and TDH) to choose an adequate pump from the pump curves