

CE 3372 – Water Systems Design Project

Purpose

To provide practice in reading the engineering literature, abstracting the contents of that literature, and using the abstracted information to design a selected water system.

Design of Water Distribution System

A small residential subdivision is depicted in Figure 1. The drawing is adapted from the background article. The subdivision is assumed to be within the extra-territorial jurisdiction (ETJ) of the City of Houston.

The water distribution system will obtain its supply from a 24-inch water main running along Luck Webb road. The pressure in that supply line is 97 psi. The blue horizontal line on Lucy Webb road is the water supply line.

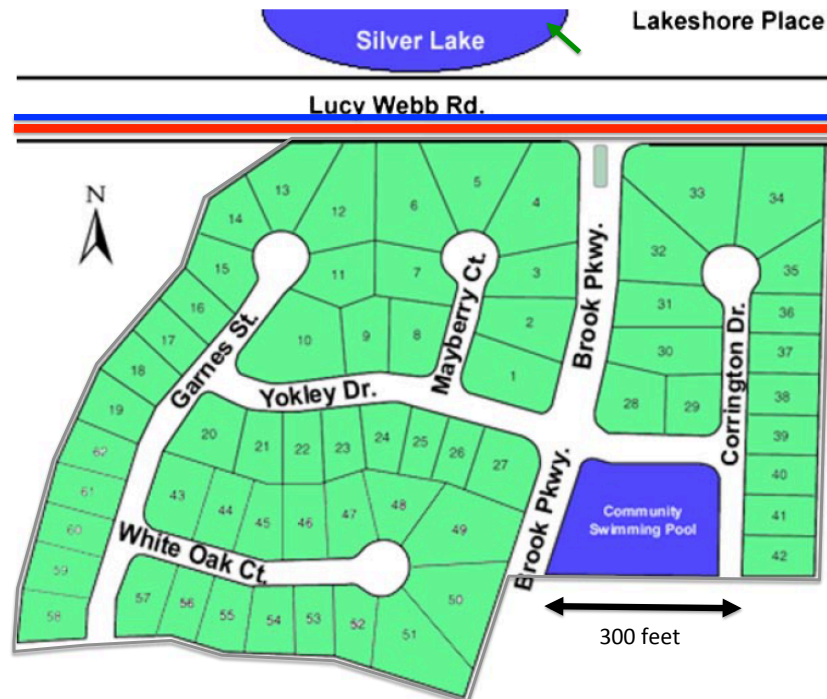


Figure 1: Subdivision layout map with existing water and sanitary sewer shown.

System Layout

Using the subdivision map as a basemap, and the elevations determined in PE-1, layout a water-distribution system for the subdivision. The system should identify the location of the tap(s) from the existing main line. Design the system up to the customer meter for each lot and the swimming pool. Be sure your layout includes fire hydrants located appropriately. Include correct citations to guidance documents for selecting fire hydrant locations appropriate for the size of the subdivision.

Estimate the population of the subdivision based on lot size and the subdivision type (single-family, executive homes). Estimate the system demand during normal use. Select an appropriate peaking factor based on the population of the subdivision. Estimate the system demand during fire flow.

Report these estimates in narrative and/or tabular format. Include the requisite calculations as exhibits to be included with the final engineering report. Also include correct citations to the guidance documents used for making the population and demand estimates (these may be to Texas Code, City of Houston IDM, or outside literature as appropriate).

Use EPA-NET to construct a hydraulic model of the system you design for the larger of normal flow with peaking factor or fire flow. Include a screen capture of the working model showing flow directions and pressures in the system. Modify the model as needed with pumps and pressure reducing valves to ensure that minimum and maximum pressures are maintained in the system. Include correct citations to guidance documents used for selecting the minimum and maximum system pressure.

Include the EPA-NET full report file (as an attachment) with the exhibit. This file should show the elevations of the junctions in the design.

Table 1 is a list of deliverables to be submitted for PE-2. The tabular items will be useful in the final report when you estimate costs.

Table 1: PE-2 Deliverable List		
Item	Type	Remarks
Demand Estimates	Narrative	Show calculations, Include citation to references used to make estimates
Hydrant locations	Narrative and on layout	Include citation to references used to locate hydrants
Pipe materials	Narrative, tabular, and on layout	Include sizes and total length each size; include required burial depth and citation to reference
Isolation Valves	Narrative, tabular, and on layout	Include sizes and locations
Pressure reducing valves	Narrative, tabular, and on layout	Sizes and location (if needed)
Pumps	Narrative, tabular, and on layout	Sizes, operation curves (if needed)
EPA-NET results	Screen capture	Include flow direction arrows and pressures on the model
EPA-NET report	Tabular	Include the full report as an appendix.