Wilderness Resort Lodge Project

Important considerations to be distributed after the project or at specified stages during the project (edit these appropriately for your students)

Always check with your customer that you have interpreted the project correctly. The most common mistake was not understanding the site conditions (such as the distance between lake, cottage, and hilltop). In this case, I represent the customer; I did not receive nearly enough questions, and some teams did not question the conditions and constraints with me at all.

While you can approach the start of the problem in many different ways, at least determine the “big picture” items first. What is the size of the Lodge? What is the maximum number of people it will accommodate? This will help determine water needs per day. This in turn will tell you how large the water supply tank should be. Once this information is known, you have an idea what your tank filling flow rate should be based on time and size constraints. Note that you can run the pump at night to fill the tank when water use is low and electricity is cheaper (off-peak). The ability to use the nighttime hours to fill the depleted tank requires a low flow rate. A low flow rate allows for a smaller pump which is cheaper. There is also less wear on a pump that moves lower flow rates.

Next figure out the pressure needed to overcome the elevation and pipe losses from the lake to the water tank. With ΔP and Q known, you can find an appropriate pump. Use pump curves to do this, and these curves will also help with determining your specific pump’s efficiency. High efficiency equals lower operational cost.

Put a water filter or some kind of strainer before your pump inlet. Sand, mud, aquatic life, and plants can all destroy or quickly degrade your pump. They also clog or destroy pipelines over time.

Few teams included a water purifier and instead only included a crude filter. Filters will typically remove particulates but will not remove microbes, bacteria, viruses, and cysts. Lake water is full of that harmful stuff.

From the tank to the cottage/hotel, design for the hotel. You can always throttle the flow and pressure with valves. If you design to only supply the cottage, you will need to throw away all your piping and perhaps your water tank and start over in perhaps less than one year. Uncle Mortimer does not like to waste money. (Most people don’t.)

Include costs in the abstract. The main point of this report from Uncle Mortimer’s perspective is to have a working system with costs minimized (but not overly cheap either, because of higher maintenance costs).

Inside a typical house, you will find valves under sinks, under toilets, behind showers, at inlets and outlets of water heaters, and of course at the main inlet line. These are needed for maintenance or system draining. If you have one leaky faucet, it is more convenient to turn off that single faucet than the whole house.

Include a timer for the pump so it can begin filling the tank each night. Also include a “level switch” in the tank; if the water level gets too low, the pump will turn on to begin refilling, even in daytime; if the water level reaches maximum, the pump should turn off.