



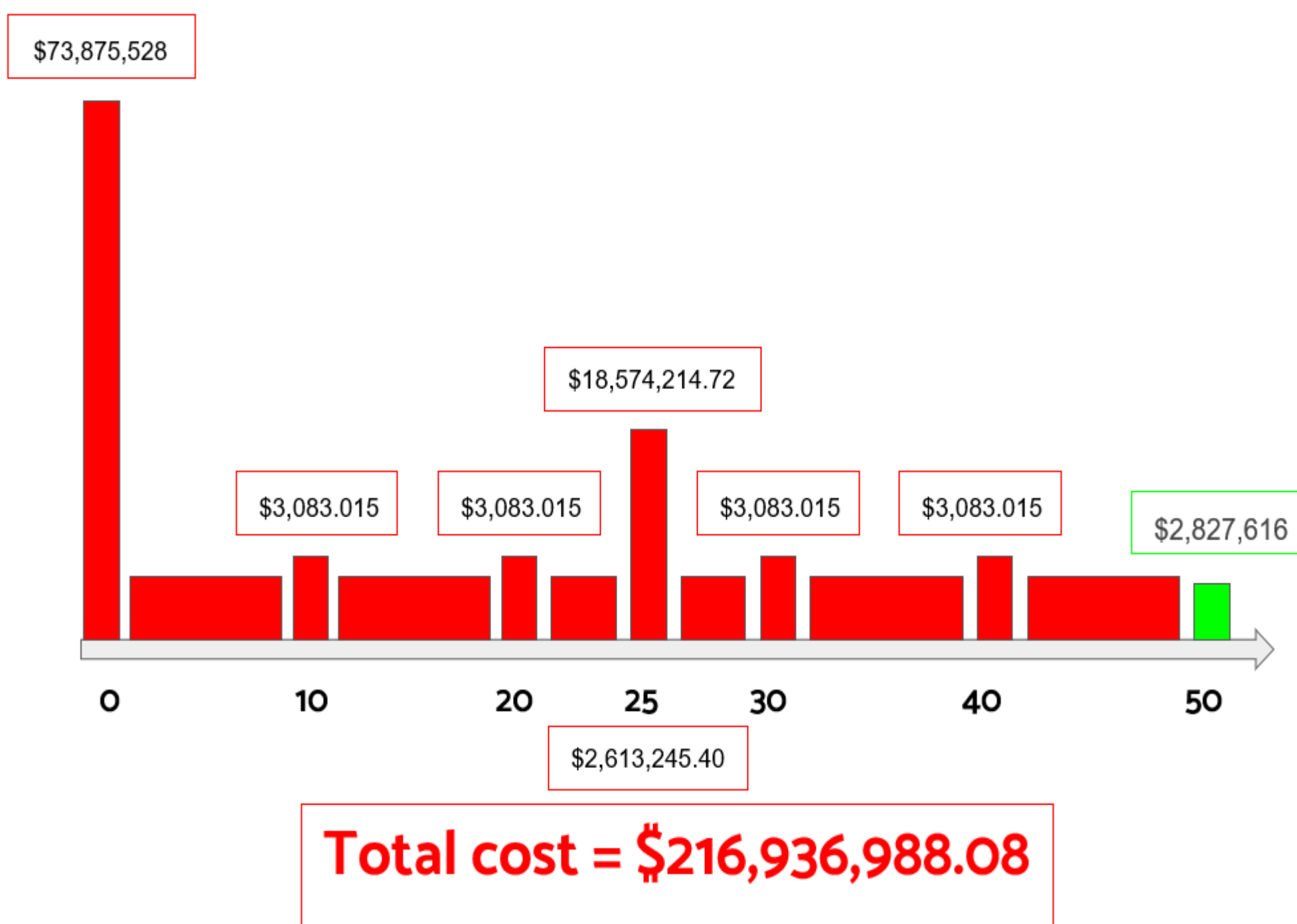
## Intro/Problem Statement

The current wastewater facility is near capacity and will experience an estimated increase in population of 10,000 individuals.

In order to prevent the facility from overloading GROW Co. was contracted to design a new state of the art facility that will off load the existing facility.

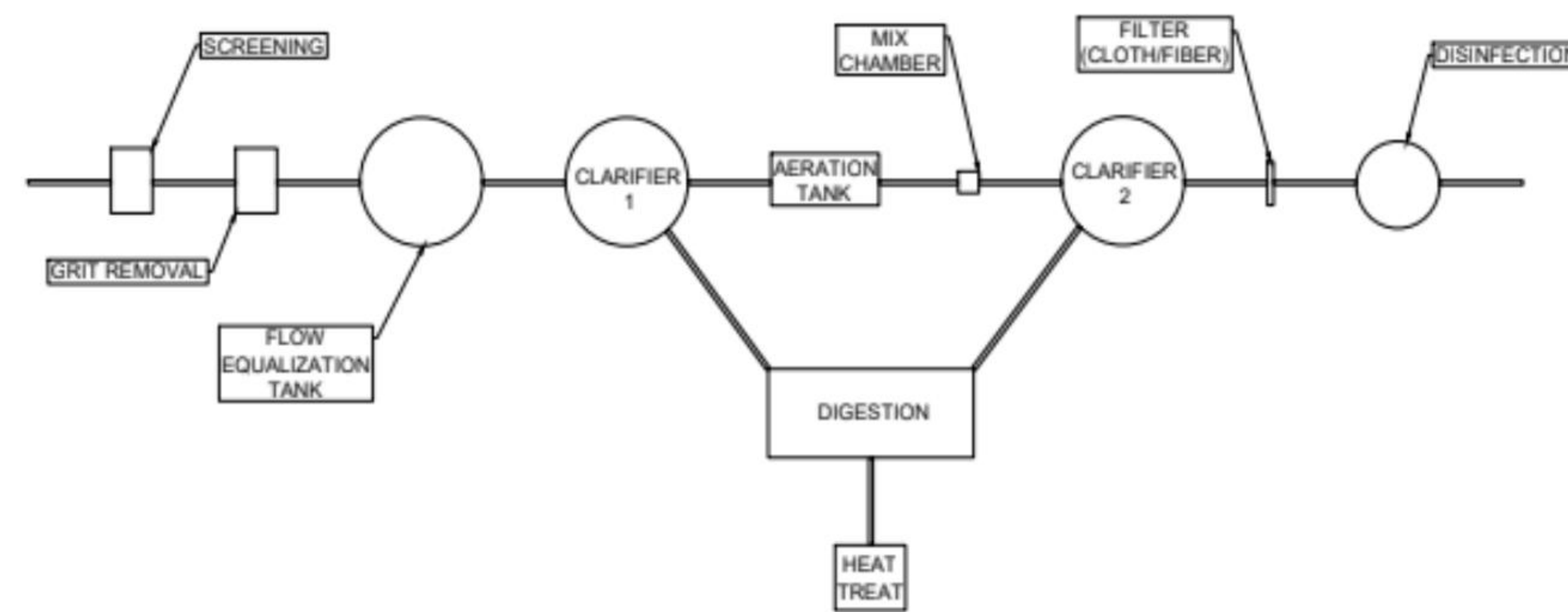
## Life Cycle Cost

- Capital cost was found using the size of each individual component.
- Volume was calculated of each tank to estimate the amount of reinforced concrete needed for each.
- Each component was also estimated to require a 5-foot foundation based on the calculations of the heaviest component.
- Maintenance and replacement cost were left the same.



## Wastewater Layout Model

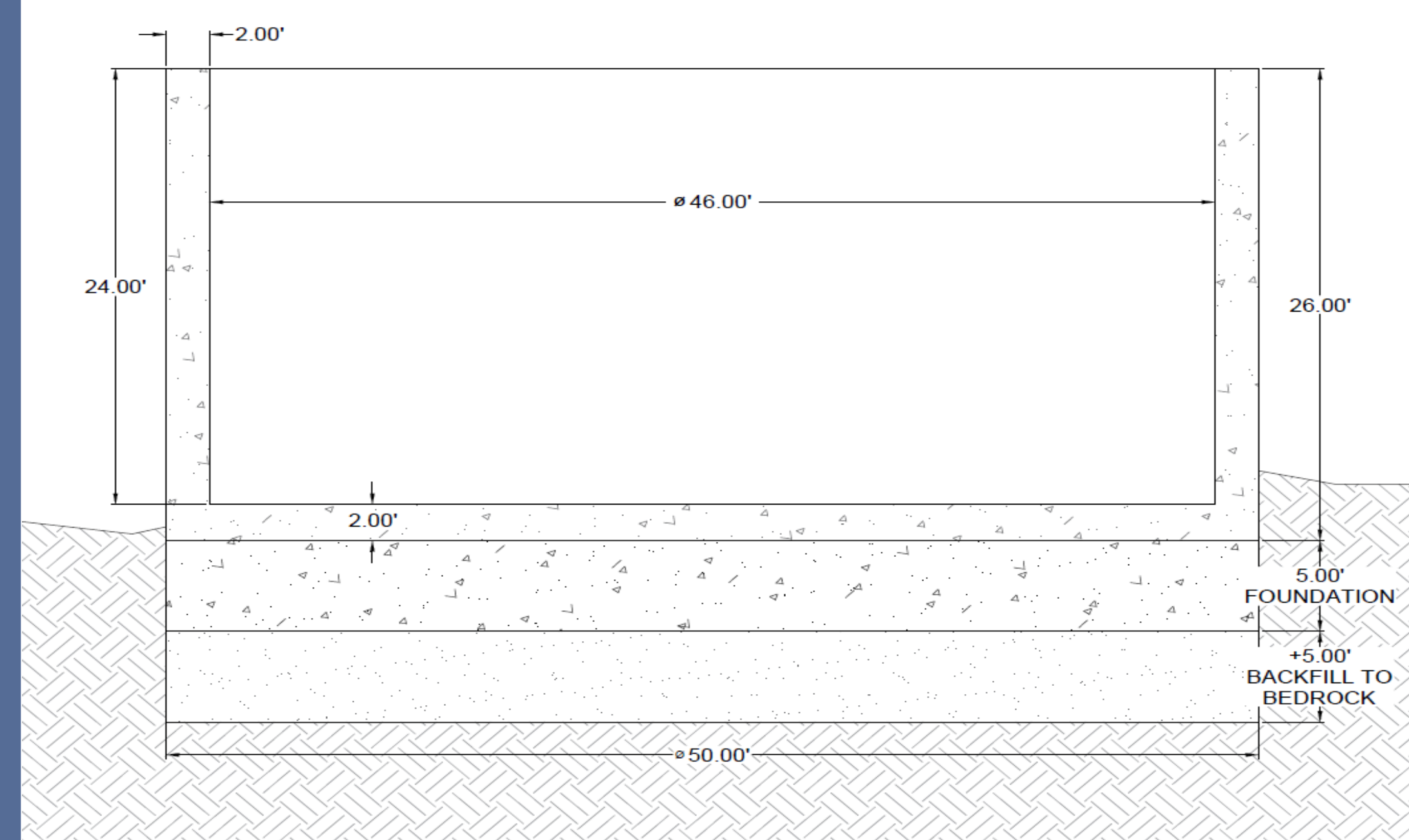
The first decision that was made was the type of plant, it will be a traditional facility that will follow the traditional systems. It will be design to be a gravity feed system that will receive assistance through pumps to overcome the topographical terrain. Illustrated below are the preliminary 2D and 3D model of the initial design.



## Component Design

### Foundational Design

- Using the nominal unit bearing capacity for circular footing equation the bearing capacity is 45,511.731 lb/ft<sup>2</sup>.
- Using the Terzaghi's Method the foundation was calculated to be 6,764,289.5642 lbs
- LRFD method was used to confirm that the soil will be able to hold the foundation.



### Hydraulic Design

- Hazen-William C=150 value used in both frictional losses for pump determination and pipe sizing.
- Pipe Sizing was determined 12" HPDE based off average site slope of 0.7% and a slope of 0.5% slope in pipes between components.
- Used Hazen-William velocity formula setting velocity at 2 ft/s, solving for Diameter.
- Total head to overcome for reclaimed water pumping was determined to be 11-ft based on Hazen-Williams frictional formula and Bernoulli's Equation overcoming elevation gain.

## Reclaimed Water Flow

- Flow needs to overcome an elevation of 10 ft.
- DSHU Submersible Pump.
- Reclaimed water is used for reasons including:
  - Irrigation for golf courses
  - Toilet flushing
  - Car washing
  - Irrigation for crops, etc.



## Preliminary Schedule

The four different section to focus on include: Base Stage, Instillation, Foundation & Building, and Finishing. The life span of the construction schedule is approximately two years, this is based off engineering estimates.

## Acknowledgment

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