Group Members

Andrew Coleman, Claudia Zambrano, Armando J. Nunez-Fausto, Armando Ortega, Matthew Venega, Nelson Hernandez, Omar Morales, Mario Miranda Trujillo, Jose Larios, Jonathan Trujillo, Thomas Mach, Bryan Gomez, Jonathan Arellano, Xavier Melendez, Jose Rodriguez, Sylvia Sonora, Zhen Haocheng, Jonathan Arellano, Jonathan Pacheco, Manuel Ramirez, Daniel Virgen, Miriam Correa, Emmanuel Limaco, Juan Morales, Mark Cruz

The Cajalco Water Distribution System Project

Special Thanks to Cal State LA Civil Engineering Department

Project Description :

The Cajalco Water Distribution System project aims to construct a sustainable and ecofriendly water system to meet Hanson's Aggregates water demand of 1.25 cfs for 9 hours per day. The Project will take place west in the City of Corona near the 15 Fwy. This project has been designed to be constructed in five (5) separate phases within the vicinity of the mining site, Eagle Valley Quarry. The 5 phases consist of demolition, excavation, grading, the construction of the water system, and the installation of landscaping to preserve the natural habitat. The construction of the water system includes a well, pump station, tank, and pipeline that conveys water through those features. This water delivery system will convey the water for dust control.

Knowledge/Skills Gained:

Throughout the process of this project, we developed both technical and non-technical skills as stated below.

Technical:

- SAP 2000: Utilized for the design of the tank and well for the water distribution system.

- ArcGIS: Geoprocessing data to visualize location of endangered species, & topographic information.

- Google Earth: Locating and presenting the design proposal on the project site.

- Autodesk: Software including Civil 3D and AutoCAD utilized for modeling the road and pipe alignments.

Non-Technical:

- As a group, the restrictions imposed due to COVID-19 enhanced our communication skills with the aid of Zoom and Discord primarily. The ability to assign the tasks so that the overall project could come together and provide an efficient solution. The project management team developed team leadership and providing feedback to one another. The knowledge gain ed furthered the understanding of the skills required to be a well-rounded civil engineer.

Multidiscipline and/or Allied Profession Participation:

Multiple disciplines and professions across the engineering industry were involved initiating, planning, designing, and managing this project.

Disciplines & Professions:

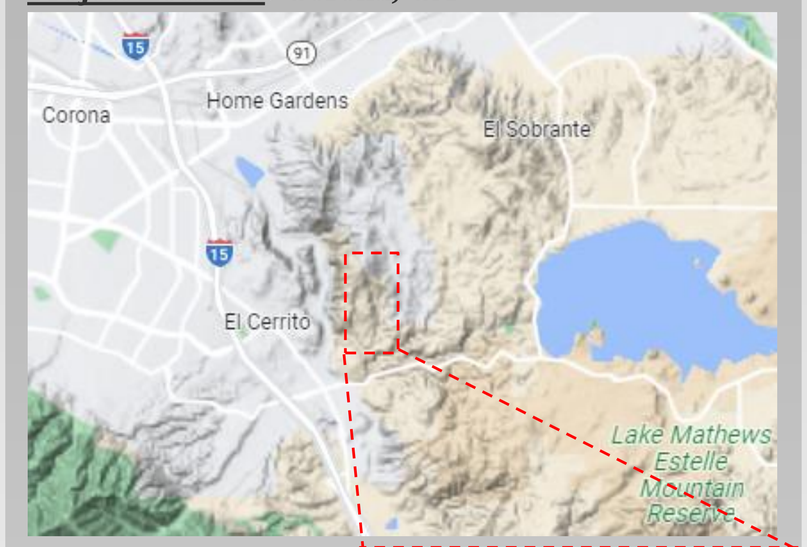
-Water Resource -Geotechnical -Environmental

-Management -Structural -Transportation

-Cost Estimation

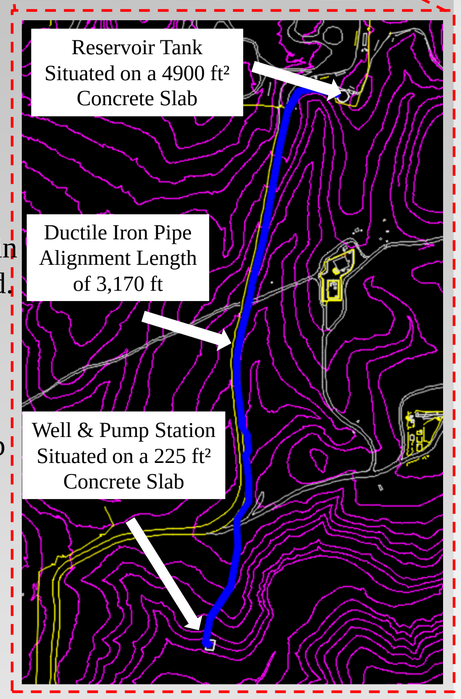
Engineering Analysis and Design:

Project Location: Corona, CA



Well:

Parameters:
-Well Length: 163 ft.
- Casing Diameter: 12 in.
- Suction Pipe Diameter: 6 in
- Construction Type: Drilled.



Pump Station:

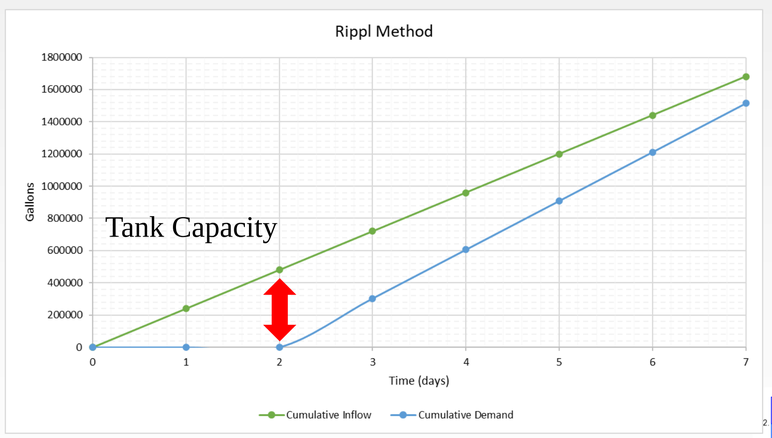
The pump that will be utilized is Centrifugal Pump

Conditions:
- WHP: 46.25 HP
- BHP: 66 HP
- MHP: 1.39 HP

Reservoir Tank:

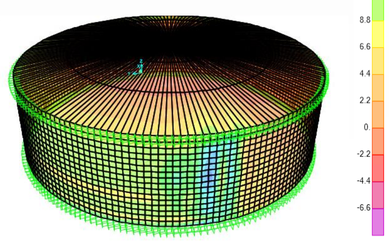
The method that was used to determine the tank capacity was the ripple method. The tank capacity was measure for a 7-day period with the permitted pumping rate of 500gpm for 8 hours per day.

Results:
- Reservoir Tank Capacity: 314,700 gallons



Tank Design:
- Modeling demonstrates stresses focused to the bottom of the tank. With minimal stresses towards the mid to upper levels as expected from hydrostatic pressure.

Parameters:
- Tank Height: 19 ft
- Tank Diameter: 60 ft



Protection of Public Health, Safety

- Following the Riverside General Plan 2025 – Policy AQ1.1: Ensure that all land use decisions, including en forcement actions, are made in an equitable fashion to protect residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status or geographic location from the health effects of air pollution.

- Policy AQ-1.2: Consider potential environmental justice issues in reviewing impacts (including cumulative impacts for each project proposed).

Environmental Preservation:

Local Habitat Preservation

- Utilization of the CEQA Checklist for Environmental Factors Potentially Affected helped lay out the design parameters that must be followed for our specific project.

- Additionally, following "Lake Matthews Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan" we were able to locate the geographic areas that are highly sensitive to the surrounding natural habitat.

Replicable

- This project would be considered replicable, granted the design team takes into consideration the everlasting effects of the construction, as well as the initial environmental impacts.

Conclusion:

Global Application

-Environmentally Friendly

-This type of project is adoptable anywhere

-Existing water source can be redirected for other use

Impact

-Permits company to have water source control

-More cost effective than current water source

-Helps improve work efficiency

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