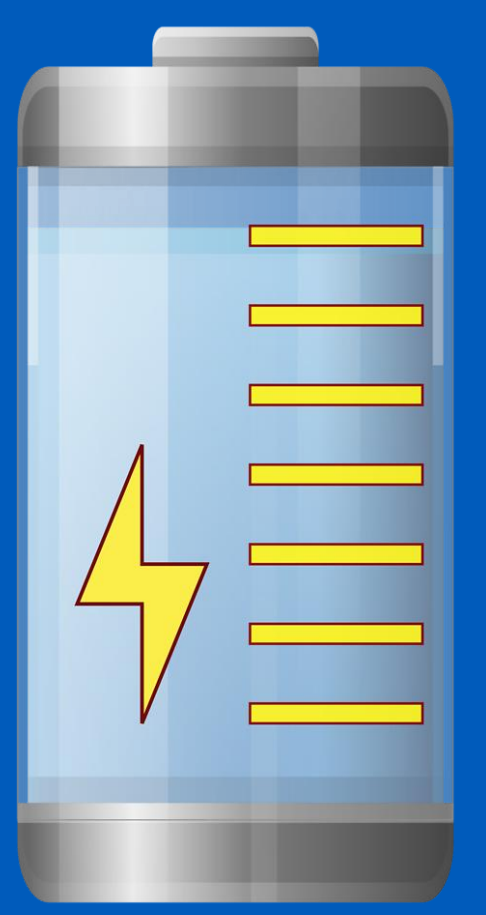




HYDRO-BATTERIES FOR STORING SOLAR ENERGY

A Feasibility Study of Using Hydro Batteries for Storing Solar Energy

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Introduction

– Problem Statement

Due to the high price and limited life of ordinary solar panel batteries, solar panels have not achieved their full potential, which is an integrated source of energy.

One proposed solution to the solar panel storage problem is a green facility that stores the extra energy generated from the solar panels in the daytime using the principle of hydropower. In the absence of sunlight, the facility will then run to generate electricity by interacting with mechanical turbines.

– Constrains:

- Design Codes and Standards
- Building Height
- Turbines Efficiency
- Wi-Fi cannot be connected with distance more than 45 m.
- Sensors with contact with water or humidity shall be water-proofed

– Specifications

- Can be implemented into a large-scale
- An efficiency of 60%
- Interface system connected to the internet.

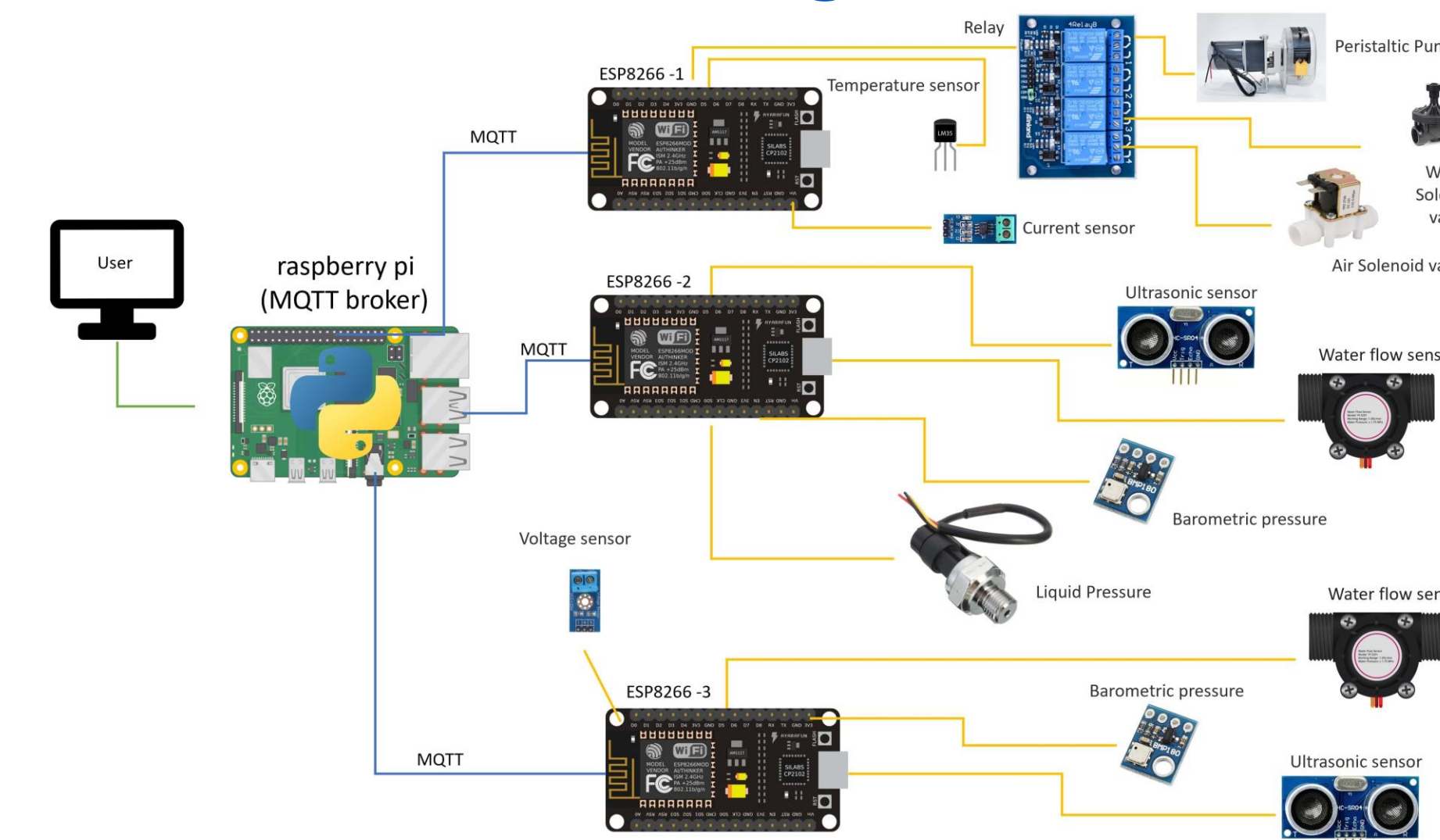
Methodology:

The facility is a combination of an underground concrete water tank and an overhead tank. In the case of sufficient sunlight, a solar panel will utilize the available energy to raise the water from the lower tank through mechanical pumps to the upper pressurized tank. Then, at night, the water will fall from the overhead tank due to gravity and run turbines, which will generate electricity to supply the road's light networks.

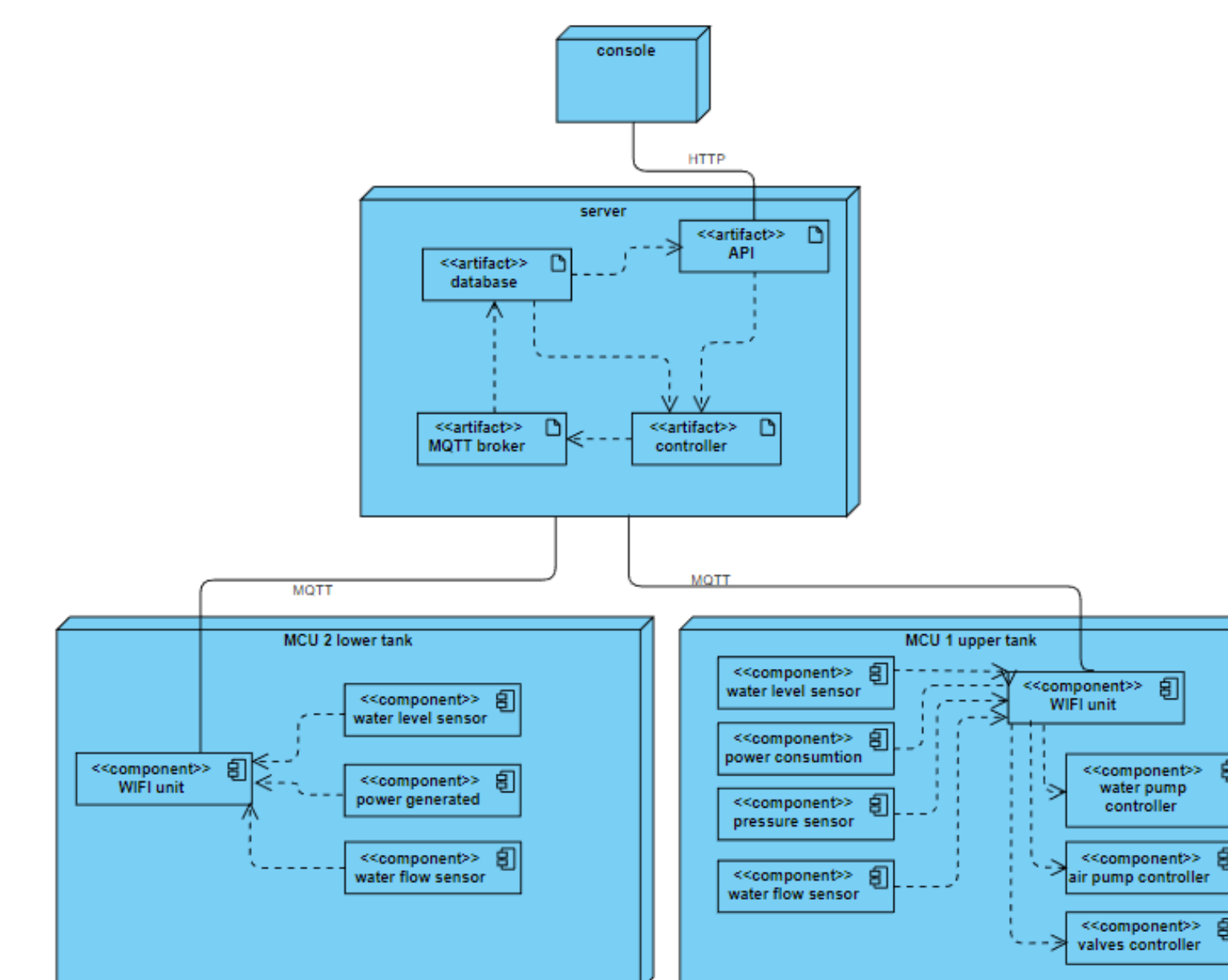
Testing and Validation:

Monitoring and Control System Design in the Prototype

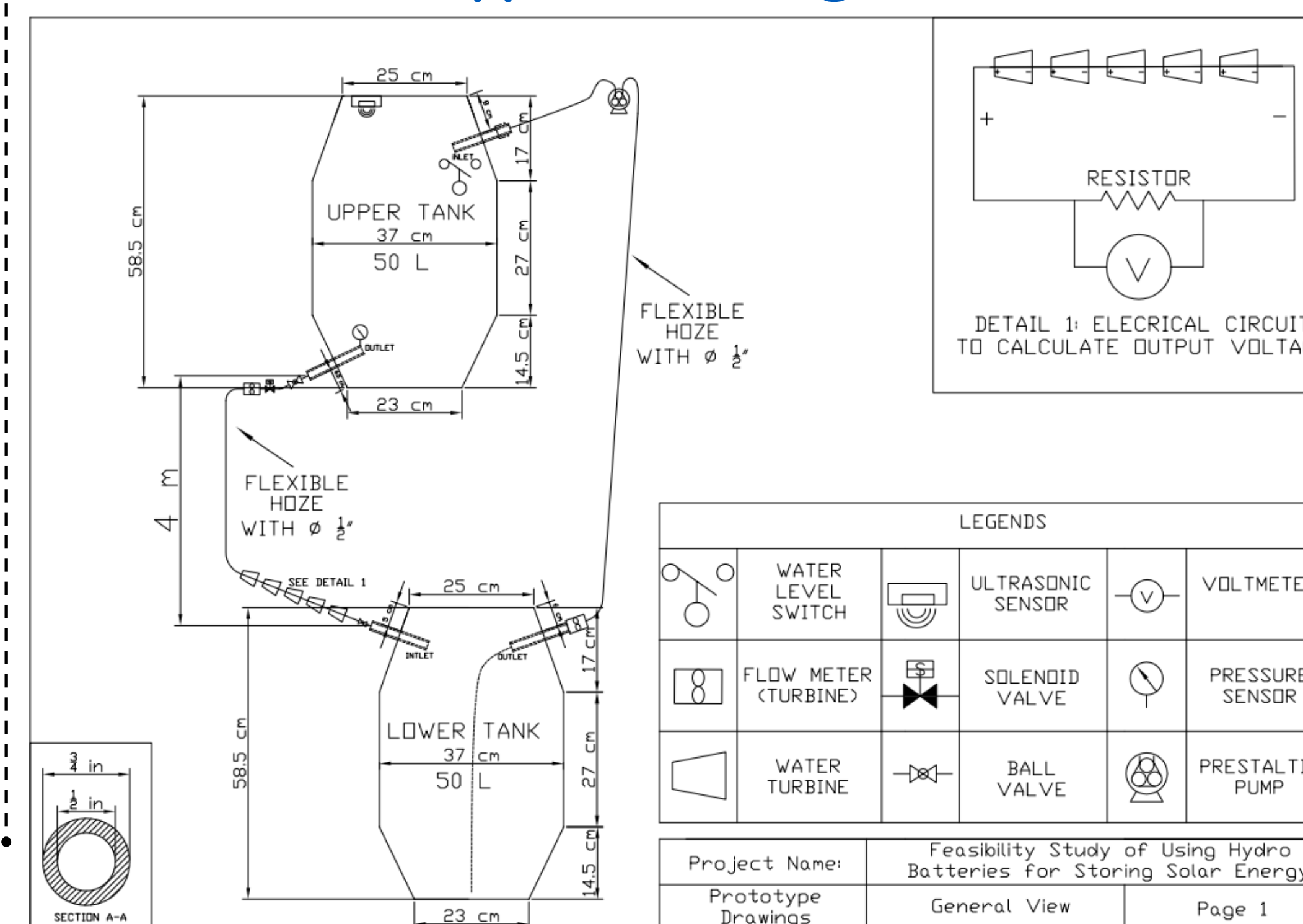
– Hardware Design



– Deployment Diagram



– Prototype Drawing



Facility Structural Design

Underground Water Tank Mix Design:

Structure	Underground Water Tank
Slump	175 ± 25 mm
Maximum Size of Aggregate	19 mm
Content	Amount
Cement Content (Type-V)	409.5 kg/m ³
Water	198 L/m ³
Fine Aggregate (Dune Sand)	709 kg/m ³
Coarse Aggregate (Crushed Limestone)	1063 kg/m ³
Supperplasticizer	3.2 L/m ³
Silica Fume	45.5 kg/m ³
Set Retarder (Sugar)	228 g/m ³

Overhead Water Tank Mix Design:

Structure	Above Ground Water Tank
Slump	175 ± 25 mm
Maximum Size of Aggregate	19 mm
Content	Amount
Cement Content (Type I)	409.5 kg/m ³
Water	198 L/m ³
Fine Aggregate (Dune Sand)	709 kg/m ³
Coarse Aggregate (Crushed Limestone)	1063 kg/m ³
Supperplasticizer	3.2 L/m ³
Silica Fume	45.5 kg/m ³
Set Retarder (Sugar)	228 g/m ³

Geotechnical Foundation Design:

D = 0.95 m	D _w = 1.6 m
B = 1 m	L = 1 m
c' = 0 kPa	φ' = 30°
γ = 17.5 kN/m ³	γ _w = 9.8 kN/m ³

Factor of Safety (F) = 2.5

- No base inclination
- No ground inclination
- No load inclination

Conclusion

NOTE: The intellectual property of the idea is owned by SARCO Group

Company Reprehensive:
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