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Engineers without Borders

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Engineers Without Borders



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Introduction

Engineers Without Borders (EWB) chapter at Rowan University is a multidisciplinary team of students and faculty that work towards providing sustainable solutions to real world problems. During the academic year of 2018-2019, the team has worked on one international project located in India and three different local projects located in New Jersey. The projects for the academic year of 2018-2019 were:

- Ranshet Ashram School, Maharashtra, India
- Resilient Roots Garden, Camden NJ
- Ronald McDonald House, Camden, NJ
- Cedar Run Wildlife Refuge, Medford, NJ



Figure 1: Image of the team, Fall 2018

Camden Community Garden

Partnered with VietLead to help with the development of Resilient Roots, a community garden in Camden, NJ

Produced a land survey of the garden to obtain measurements of garden bed dimensions and overall lot size



Figure 2: Rain catchment system, Fall 2018

- Installed a rain catchment system with a 200 gallon water tank
- Collects and stores rainwater for use throughout the garden
- Provides additional water resource for volunteers to utilize

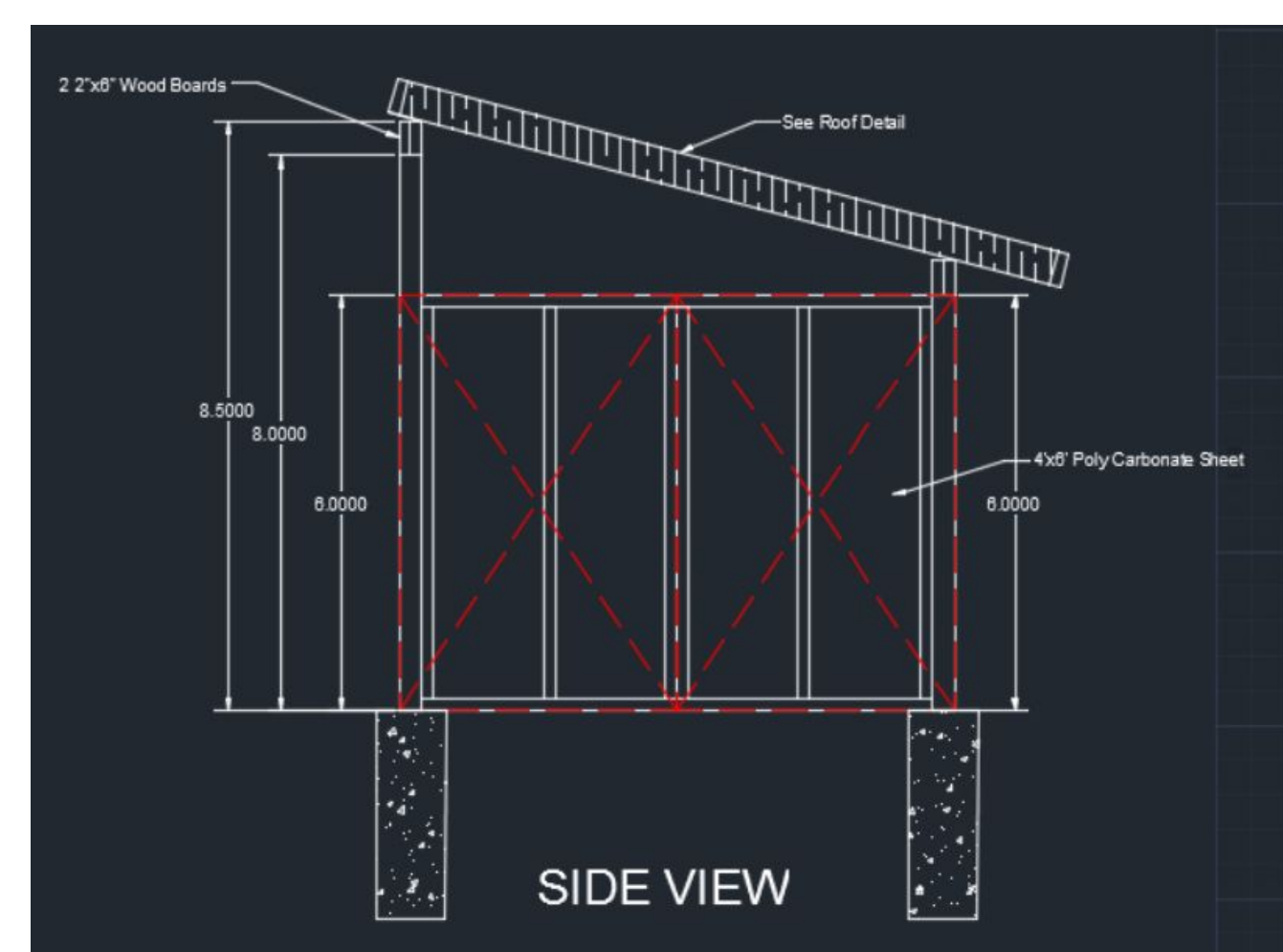


Figure 3: Side view of greenhouse

- Modifying the previously built rain catchment system into a greenhouse
- Adding polycarbonate sheeting and storm door to rain catchment structure to trap heat more efficiently



Figure 4: Bicycle powered water pump

- Designed and constructed a bicycle-powered water-pump
- Back bicycle tire utilizes friction to drive the rotor shaft of a compact water pump
- Uses water from the rain catchment and pumps it throughout the garden beds
- Collapsibility of the bike trainer allows mobility through garden

Woodford Cedar Run Wildlife Refuge

- Preserves wildlife and habitats through education, conservation and rehabilitation
- Used SolidWorks to model the enclosure
- Constructed a 6' by 12' enclosure to house birds of prey being rehabilitated



Figure 5: Door frame for enclosure

Ranshet Ashram School, India

A school community located in Ranshet, Maharashtra, India experiences frequent blackouts which causes water access issues. The chapter has conducted an assessment trip in Spring 2018 to gather preliminary data. In Fall 2018, a cost-benefit analysis was performed to assess the impact of various alternatives in the Alternatives Analysis report. This report was approved in January 2019

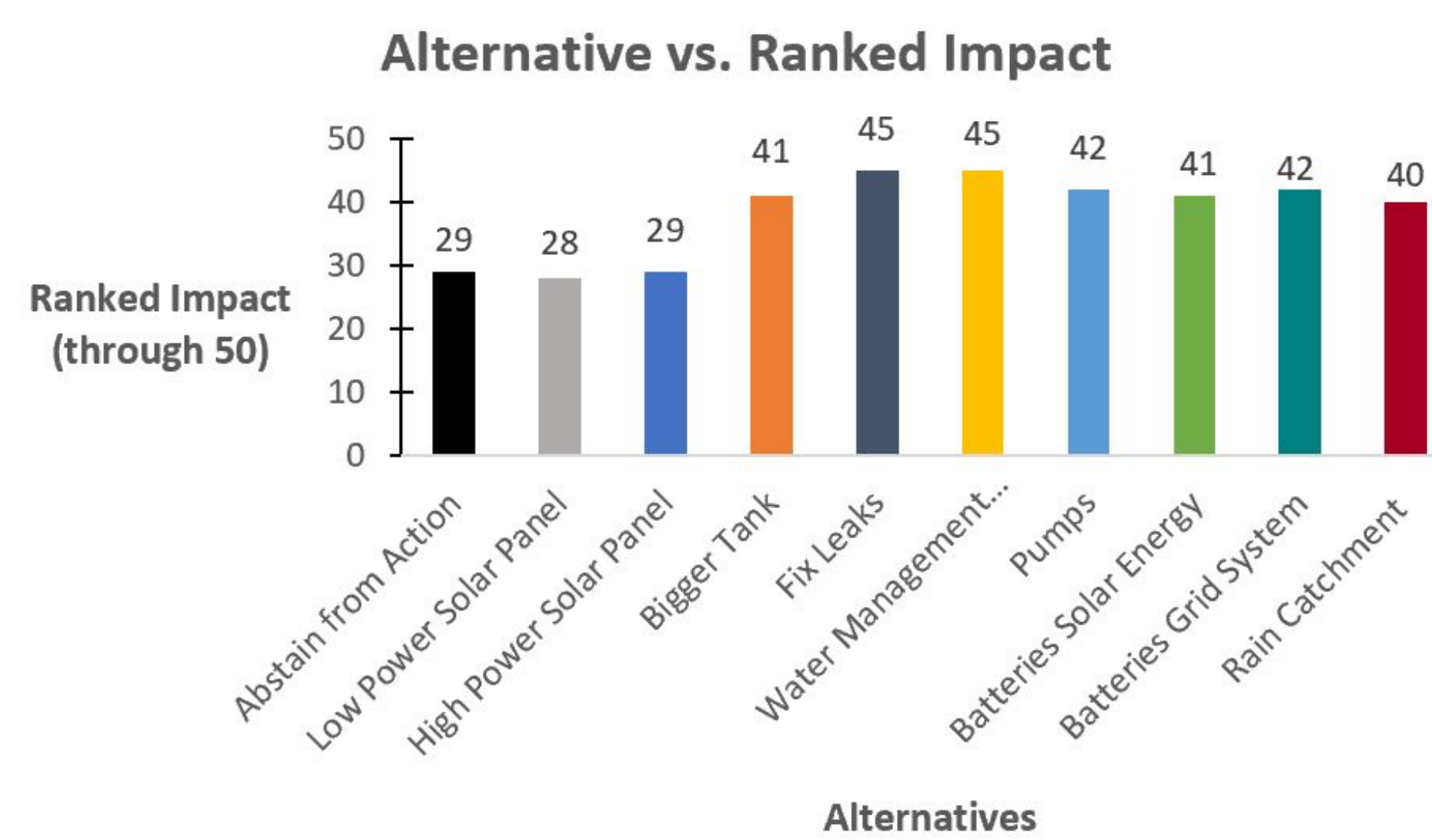


Figure 6: Alternatives I-X ranked based on the team's capability to install the project, possible community input, amount of community impacted, maintenance cost, regional experience with technology, material availability, expandability and scalability, and EWB cost

Implementation Report of final chosen package detailing construction plan, travel schedule, and plans for monitoring and data collection for Phase II was developed during Fall 2018-Spring 2019. This includes:

- Education plan developed to teach water management to students through gamification, ownership, and reward systems
- Installation of triple sink will assist with water conservation and reduce the amount of water wasted during dishwashing
- Recover 5000L per day of water through updating and optimizing the current water distribution system with PVC
- Establish assessment variables to monitor the change in behavior as well as access to water
- Evaluate school and utilities layout for optimal location of sink
- Preparation of data collection for the implementation of next phase.

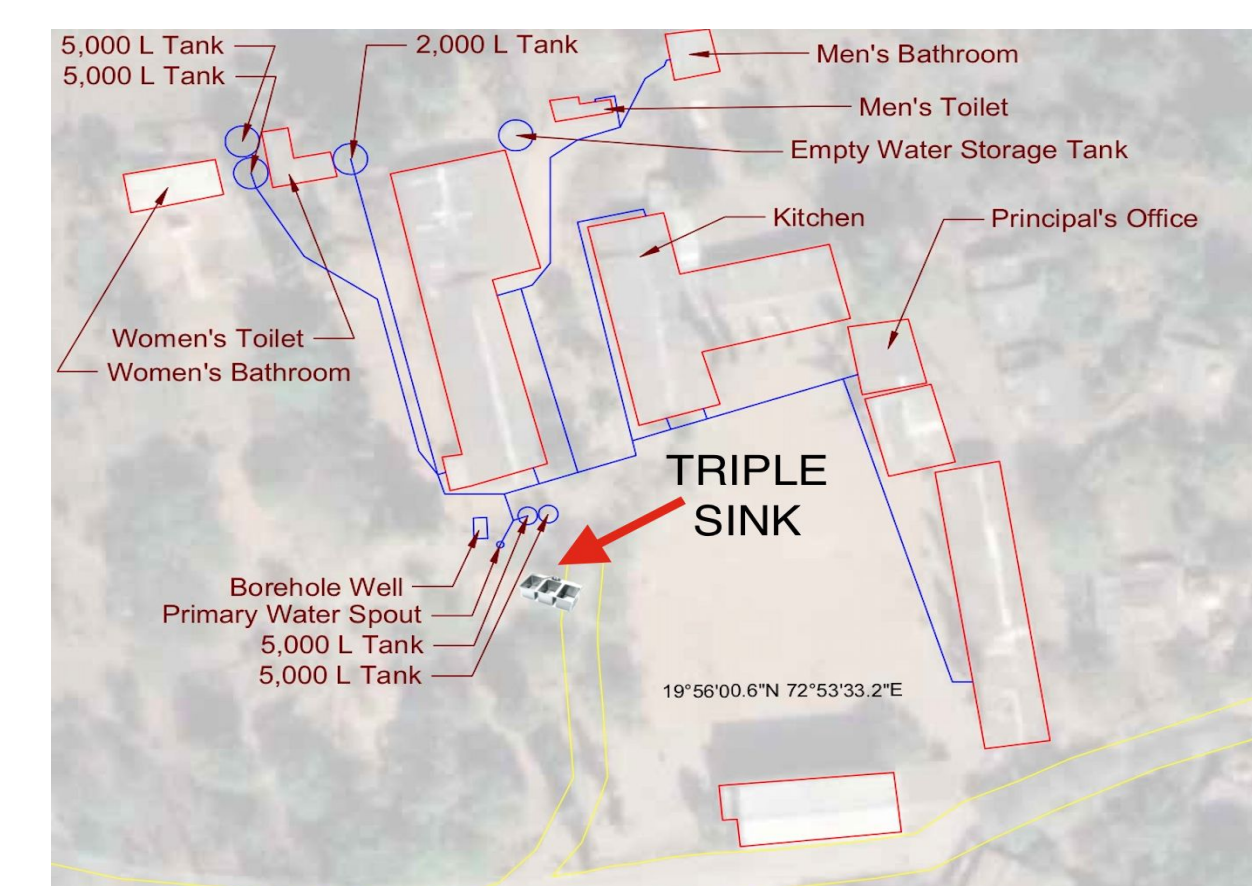


Figure 7: Map overlaying aerial view of school

Ronald McDonald House Charities

- Design and implement a Hospitality Cart to serve families of the Pediatric Unit of Cooper Medical Hospital in Camden, NJ
- 5' by 2.5' push cart to house and transport magazines, snacks, art supplies, coffee, and more!

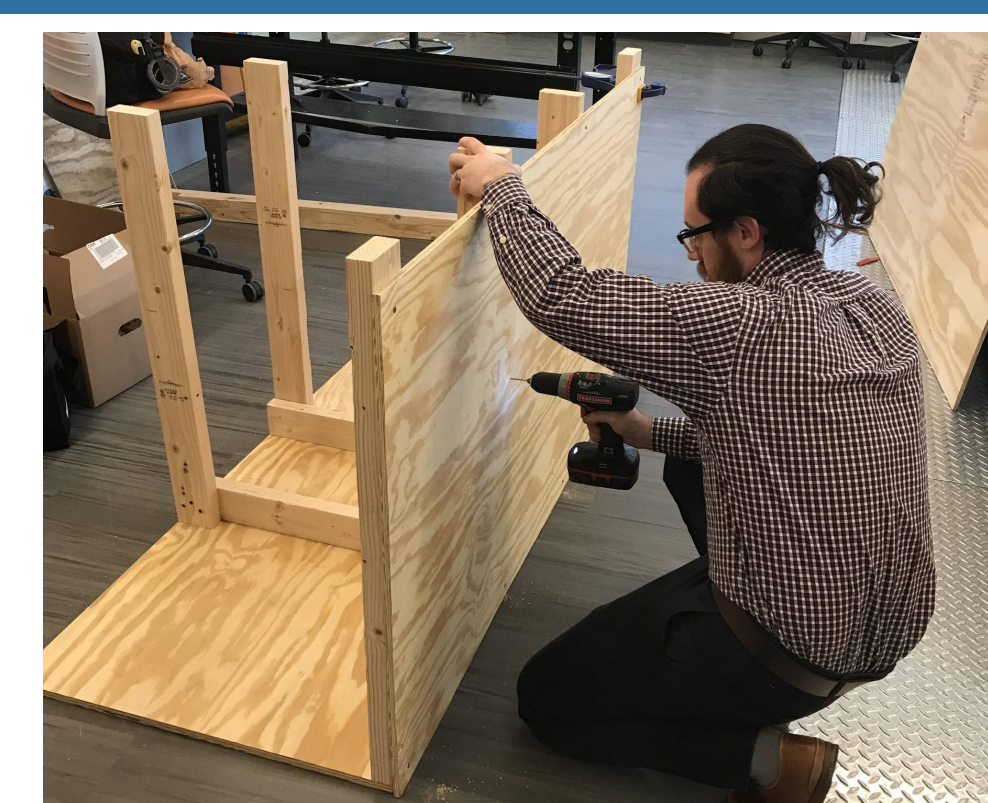


Figure 8: Construction of the cart

Conclusions

- Phase I implementation trip to India July 2019 to repair leaks, install triple sink, and educate the community on water management
- Plans to travel back to India during winter break 2019-2020 to implement the second phase of our project based on community feedback
- Designing 5-Year Master Plan to continue local garden development
- Broaden the scope of our chapter to collaborate with local communities on new projects

Acknowledgments

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