Journeyman International: Karambo River Master Plan

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My senior project consisted of an interdisciplinary partnership with students in the College of Architecture & Environmental Design and the non-profit, Journeyman International. My project team has been given the Karambo River Master Plan located in Rwanda, Africa. Empowering Villages, the sponsor for the project, has bought land to make way for new buildings in a fairly remote area with no existing utilities. The site, near the Mahoko village, will foster community, learning, and growing together. There will be a library, classroom, and multi-purpose building constructed for the surround villages in the area. Empowering Villages has also partnered with Afritech Energy to provide a hydropower plant that will provide power to the village and make it more sustainable. The purpose of my project is to develop, prepare, and submit a preconstruction package for Journeyman International. My main deliverables as the construction manager include a full conceptual estimate with quantity take offs and a complete project schedule. Other deliverables include research to provide a feasibility analysis, hazard and risk mitigation plan, storm water pollution prevention plan, site safety plan, and a phasing plan.

Key Words: Humanitarian Construction, Rwanda, Preconstruction, Interdisciplinary, Non Profit

How Project Came About

This project came about through Journeyman International. My interest in humanitarian construction is what brought me to Journeyman International and partnering with them to design and develop a construction project for a Rwanda village in Africa. Afritech Energy, a leading sustainable energy solution provider, expressed interest in purchasing a plot of land near the Mohoko village and Karambo River. The reason being is to built out a 1 kw hydropower plant to provide energy to the village. Afritech Energy has teamed up with Empowering Villages to build a new multi-building project in order to have a communal gathering for the village. The buildings will bring about trade and connectivity, as well as the growth. Empowering Villages then reached out to Journeyman International to help prepare a design, cost estimate, and schedule that fits their needs.

Process

After partnering with Journeyman International, I was given the option to select from a few different projects. This project spurred my interest because it does not just involve bringing electricity to a community, but the sponsor wants to genuinely help a village and develop it for use. When meeting with my project team, which consisted of an architect and two architectural engineers, we had a vision to promote growth, learning, and community. Each building serves a specific purpose while maintaining flexibility. Building A will promote trade and connectivity within the village. Building B will consist of a classroom for continual learning. Building C will provide the village with a library and an area to relax.

Deliverables

As the construction manager on the project, my duties were to provide assistance to the architect for the design of the Karambo River Master Plan project. I was in constant contact with my team in order to establish design specifications, materials needed, and pricing for construction. The deliverables for my project mirror deliverables found in a real preconstruction phase.
Estimates

A full conceptual estimate with a summary page included a scope breakdown by percentage and cost for each CSI division. Items were listed within their respective division and an estimate was done from there. For my particular project, the estimated cost of construction will be just under $37 USD per square foot and $416,000 USD for the total project.

Schedule & Phasing Plan

Excluding pre-construction, this construction project was broken up into three different phases. The first phase will include much of the site work and grading the site. Phase two will include the construction of Building A and phase three will consist of both buildings B and C. Phase two is not on the critical path but it is crucial as crews will move from one building to the next. The construction of the buildings will include a structural followed by finishes. Structural, there will be a concrete slab under the confined masonry buildings. For finishes, any reasonable interior finishes will be added and built.

Quantity Take Offs

Each building was taken off individually and has its own sheet. A summary of materials is also included. All estimates were taken off a Revit model converted from feet to meters because the country of Rwanda is on the metric system. The majority of materials on this project are brick, concrete, and steel. The project design and ensures the feasibility of the building.

Hazard & Risk Mitigation Plan

The hazard and risk mitigation plan was developed to analyze the site condition and surroundings, as well as taking a look at the major risks and regional hazards. Through research and exploration, it was found that the top three hazards at this project site are floods, landslides, and earthquakes.

Site Logistics Plan

The site logistics plan was developed through the use of Google Maps and an outline of the project’s location. The plan highlights the Karambo River and an existing road that provides access to the Mahoko Village and the project site. Access to the construction site is not a great concern, but more so grading the hillside for access to where buildings B and C are located.

Storm Water Pollution Prevention Plan

The storm water pollution prevention plan, or SWPPP, was created by analyzing the provided soil analysis and considering weather due to the high amount of rainfall the area receives each year. The soil consists of gneiss rock at the bank of the river as well as silt and sandy material. There is exposed limonite, a brown and red rock. However, with this area receiving 1200 to 1500 millimeters of rain each year, the greatest threat seems to be runoff because of the loose soil and site being on a hillside.

Utilities Analysis

The site currently possesses no electricity. At this time, it is uncertain if other utilities, such as plumbing, are available to connect to the site. At this moment, the closest known utility lines are 3.5 kilometers away in the city of Karama. Afritech Energy’s planned installment of a 1 kilowatt hydropower plant will provide power to the village and the new Master Plan project, while having a little excess for any additional use. Although the hydropower plant has not yet begun construction, two engineers from Afritech Energy have been put in charge.
Lessons Learned

The three most important aspects I took away from this project were communication, organization, and scheduling. Being on an interdisciplinary team with students who have their own deliverables and schedules, being able to coordinate meetings and ensure everybody is on the same page was necessary. Putting together a full design and preconstruction package is no easy tasks, especially for students that have little experience in their respective fields, so this was a challenging preview of what is to come in the future. Being organized as a team was also very helpful. Setting up a shared cloud with categorized folders through Google Drive proved to be beneficial. Scheduling was also important to keeping the project team on schedule with their deliverables. Being able to know each other’s schedules and know what we are working on assisted us in having efficient meetings.

Application to Construction Industry

From an industry standpoint, I have learned how to work in an integrated team with both an architect and two architectural engineering students. I have learned more about the importance of communication and to always be prepared for change and challenges. This served true when we had to make some modifications to the design due to structural feasibility. I know my interdisciplinary experience will be able to carry over once I work full-time. Being thrown the challenge to schedule, estimate, and research about a place I have never worked in really tested me about what I know and what I struggle with. This experience has enlightened me both as a person and a construction manager.
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Miscellaneous:
Journeyman International – Daniel Wiens
Empowering Villages – Predesign Questionnaire