Hiinga Hospital Project
Uganda, Africa

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This paper outlines the role of a construction management student in the interdisciplinary development of an urgent care clinic and hospital in Kampala, Uganda. This interdisciplinary team was composed of five students all belonging to the College of Architecture and Environmental Design at California Polytechnic State University in San Luis Obispo. The team was tasked by Hiinga Inc., a capital investment company, to provide a preliminary design and construction resources to aid with development of these facilities. Two construction management students worked on this project at different stages. The first student was tasked with constructability research and a preliminary estimate and schedule for both the urgent care clinic and hospital. The second student, whose role is highlighted in this paper, was responsible for providing a detailed quantity takeoff, cost estimate, and schedule for the urgent care clinic. This paper will outline the team's development process in addition to these deliverables.

Key Words: Construction Management, Uganda, Hospital, Analysis

How the Hiinga Hospital Project Came About

The Hiinga Hospital Project is a project conceived by Andy Agaba, founder and CEO of Hiinga Inc. Hiinga is a Christ-Centered Impact Investing Fund, dedicated to investing in the East African "Missing Middle" entrepreneurs, so they can create jobs that bridge the gap between poverty and wealth. HiINGA targets three critical sectors to create the greatest impact for those who most need it, ensuring the maximization of social return on investment. These sectors include agriculture, education, and healthcare. Andy Agaba is a native of Uganda and has seen the dire need for investment in medical facilities as the country ranks 149th out of 191 countries. Hiinga put Agaba in the perfect position to make a lasting impact on the healthcare system in Uganda because of this Agaba gave himself the ambitious goal of developing a hospital and urgent care clinic from the ground up. Through networking Agaba was able to find students in the College of Architecture and Environmental Design at California Polytechnic State University in San Luis Obispo to aid with the development of these facilities. These students together were able to provide a preliminary architectural and structural design which were accompanied by a constructability analysis, quantity takeoff, estimate, and schedule.

Interdisciplinary Team

The College of Architecture and Environmental Design (CAED) at California Polytechnic State University in San Luis Obispo is one of the highest-ranked built environment colleges in the country, the
CAED offers a unique blend of eight degree programs in five closely related departments: architectural engineering, architecture, city and regional planning, construction management, and landscape architecture. The scope of the design and development of the project required the team to consist of five students, architecture student Annebel van der Meulen, architectural engineering students Lexi Buhr & Abigail Coffing, and construction management students Arley Landis & Brett Shank. Although the departments work closely together and students are required to take interdisciplinary classes, a project that requires students from each respective program to utilize their own discipline collectively is much more rare. The team completed the design process in a similar manner to that of industry professionals.

Process

The project was separated into two parts. The first part being the design and development of an urgent care clinic and the second being the design and development of a hospital. The urgent care clinic was to consist of a nursing station, consultation rooms, private and public patient rooms, as well as a recreation room and waiting area. The urgent care clinic also had to be designed to be compatible with the hospital as the two buildings would be integrated into each other when ready. The idea behind this logic was that the urgent care clinic can be completed quickly and become operational. This would hopefully increase interest in the project overall and provide the opportunity to secure the funding needed for such a large medical facility. The hospital was to consist of 150-200 beds, with both private and general wings and would stand up to three stories tall. In addition to the hospital rooms, there needed to be an attached nursing school with lecture rooms and a dormitory, a chapel area and multi-purpose meeting place or cafeteria, studio rooms for visiting doctors, and a healing center. There would also need to be a parking lot with enough space for about 200 vehicles.

With the design criteria in hand, the project was initially presented to architecture student Annebel van der Meulen who would become the project manager. Meulen was responsible for providing a preliminary design as well as recruiting other team members, and coordinating team meetings. Meulen was successful in finding two architectural engineering students, Lexi Buhr and Abigail Coffing who would be responsible for designing the structural layout of the facilities with preliminary member sizes and providing structural analysis based on soil classification and seismic requirements. Upon completion of the preliminary design, construction management student Brett Shank provided a constructability review in addition to a preliminary cost estimate and schedule.

After compiling all of these documents, the team traveled to Uganda in order to visit the site with Agaba and continue work on the design of the urgent care clinic with Ugandan design professional, Joseph Kasimbi. Kasimbi not only offered his unique design abilities but was able to provide helpful information on the differences between development and construction in Uganda compared to the United States. The team worked diligently in the studio to complete the design and create a set of construction drawings during their visit but were unsuccessful due to time constraints. The design was passed on to Kasimbi to complete and the team left Uganda with a whole new understanding of design, development, and construction. After Kasimbi was able to produce finalized construction drawings of the urgent care clinic, a detailed quantity takeoff, cost estimate and schedule could be produced.
Deliverables

*Quantity Takeoff / Estimate*

Explaining what a quantity takeoff (QTO) is in construction is relatively straightforward. Essentially, a quantity takeoff refers to estimating materials. You review the project plans and take off information about what physical materials the architect, engineer or draftsperson specifies to assemble the project. Quantity takeoffs in construction often have many other names, including:

- Estimating Takeoff
- Material Takeoff
- Material Estimate
- Quantity Survey

Due to this project being international and in a location where information is not readily available, the production of the quantity takeoff offered some unique challenges to overcome. The first challenge was understanding how the country of Uganda functions and how this function has such an immense impact on the construction process as it is known in the United States and many other countries in the west. The main difference that was seen in Uganda was their building codes and labor practices. Two aspects that have the most impact on the cost of construction. These aspects were considered throughout the development of the project.

Another irregularity was a lack of excavation, foundation, structural, mechanical, electrical and plumbing plans as well as a lack of section, detail, ceiling and perspective drawings. Because this project was so unique, none of these plan sets have been produced. This did have an impact but in order to resolve this issue and provide a QTO with as much detail as possible, historical cost data was utilized for those scopes of work. *(See Figure 1-2)*

Once the cost data was found the project management software, Bluebeam Revu was utilized. Bluebeam allowed me to find several things required to complete this estimate. *It allowed me to measure and mark up plans which is one of the most important features of Bluebeam Revu for completing a quantity takeoff of a hospital project.*

With Bluebeam Revu, you can use the measurement tools to quickly and accurately calculate the quantities of various elements such as walls, floors, ceilings, and roofs. Bluebeam Revu provides a range of measurement tools, including length, area, volume, and count, that allow you to measure and mark up digital plans with ease. You can use the measurement tools to measure distances, angles, and slopes, and apply colors and symbols to mark up the plans. This enables you to quickly identify the different types of elements that need to be included in your quantity takeoff. *(See Figure 3)*
Once quantities and costs were found I could complete an estimate of the project cost of the overall project. In order to do this I utilized the quantities found using Bluebeam and input them into Microsoft Excel with found costs. (See Figure 4)

Schedule

As historical project durations are unknown in Uganda, a schedule was produced using past experiences and data found in the United States. (See Figure 5) The durations were modified based on the clinic’s scope of work and broken down into by scope of work utilizing Microsoft Project to produce a GANTT chart:

1. General Conditions
2. Long Lead Procurement
3. Mobilize on Site
4. Site Grading & Utilities
As previously discussed, the construction practices found in Uganda are unique. This could impact the project in more ways than one. A huge concern is the construction safety practices, from what was seen it doesn’t appear that a majority of the people of Uganda take safety seriously. It is unlikely that you will see anybody on a jobsite wearing personal protective equipment (PPE) and unfortunately, Uganda does not have a Occupational Safety and Health Administration (OSHA) comparable to the United States. On the flip side, although unlikely, these lax practices could potentially expedite the process due to not being required to follow the strict processes found in the U.S.

**Lessons Learned**

The Hiinga Hospital Project was a unique and challenging undertaking that presented many opportunities for the interdisciplinary team to learn valuable lessons. One of the most significant takeaways from this project was the importance of effective communication and collaboration between team members from different disciplines. The team was composed of students from five
different departments within the College of Architecture and Environmental Design, each bringing their own unique skills and perspectives to the project. However, working together required the team to overcome communication barriers and learn how to effectively collaborate on a complex project. This experience taught the team the value of teamwork, respect for different expertise, and the need to maintain clear and consistent communication throughout the project.

Another lesson learned was the importance of understanding the cultural and environmental context in which a project is being developed. The team's visit to Uganda allowed them to gain firsthand experience and insights into the country's healthcare system, construction practices, and cultural norms. This experience provided invaluable knowledge that helped the team develop a design that would be appropriate and relevant for the local context. The team learned that understanding the local culture and working with local professionals is critical to the success of any development project, particularly in a country with unique environmental, social, and cultural considerations.

Finally, the Hiinga Hospital Project taught the team the value of flexibility and adaptability in the face of unexpected challenges. The project presented numerous obstacles and setbacks, from limited resources and tight deadlines to unforeseen construction challenges. However, the team was able to overcome these obstacles by staying flexible, adapting their plans as necessary, and maintaining a positive attitude throughout the process. This experience taught the team that flexibility and adaptability are critical skills for success in any complex project and that the ability to think creatively and pivot quickly can make all the difference in achieving project goals.
Photos

Interdisciplinary team working on preliminary design in Kampala, Uganda

Interdisciplinary team at the Victoria Nile, Purongo, Nwoya, Uganda
Radiology clinic under construction in Kampala, Uganda

Hiinga Urgent Care Clinic Rendering
References


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