Sustainable Redevelopment Strategies for Structures in Informal Settlements

An Interactive Qualifying Project proposal submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science

Executive Summary

Submitted by:

Daniel Garcia
Timothy Kunyz
Stephanie Schultz
Laura Tracy

Submitted to:

Advisors:
Prof. Scott Jiusto
Prof. Bob Hersh

Project Liaison:
Mike Tremeer, Ecobeam Technologies

December 18th, 2008

Abstract

Thousands of people live in insufficient housing throughout the informal settlements of Cape Town, South Africa. The growth of these areas has outpaced attempts to address the housing problem. The focus of our project was to propose a new redevelopment strategy for the in-situ upgrading of buildings in these settlements. With the help of community members, field experts, our sponsor Ecobeam, and through our own research, a sustainable and eco-friendly redevelopment plan was designed to present alternatives to the current building methods.

Executive Summary

South Africa is home to a large number of informal settlements, including many located within Cape Town. Much of the population of these settlements is comprised of people who have moved from the rural areas in the Eastern Cape. The subsequent population boom in the metro area has caused a significant issue in providing sufficient housing. Informal settlements present a means for a significant quantity of people to have a place to live while seeking employment within the Cape Town area. Unfortunately the job market in Cape Town has not grown to keep up with its population. As a result, the unemployment rate in some informal settlements is in excess of fifty percent. These living conditions, coupled with the overpopulation of the settlements, present risks to the health and wellbeing of the residents.

Monwabisi Park is a large informal settlement within Khayelitsha, a suburb of Cape Town. Over twenty-five thousand people make up this community. As with other communities borne of informal settling, such a large group of people makes it difficult for proper housing to emerge. These communities expanded quickly and little more than survival was taken into consideration when planning shelter for those in need of it. The structures within Monwabisi Park and other informal settlements are considered shacks. These buildings are typically comprised of corrugated iron and other inexpensive or readily available materials. These types of structures are prevalent in any type of informal settlement because they are quick and easy to construct, requiring only human power and hand tools for the building process. The shacks offer a high degree of versatility and are flexible enough to cater to unique demands. However, these houses have disadvantages as well. They do not provide much insulation and are often very warm in the summer and cold in the winter. They typically leak and are flooded easily. The shacks are a quick fix to the housing problem, but residents report they are not suitable to live in for any length of time.

Community redevelopment in informal settlements has presented a formidable and multifaceted challenge. The current method by which progress is made focuses almost solely on providing better housing, and does not sufficiently address the societal aspects of the community or their economic development. The rate at which this takes place is also inadequate: the Cape Town RDP (Residential Development Program) is capable of building 10,000 houses per year, while the backlog for this housing is between an estimated 250,000 and 400,000 units - a number which is still increasing. It is clear that, although municipal efforts are being made towards improvements, the current practices are not the best solution.

An alternative approach is needed for community redevelopment in South Africa. This approach must not only address the improvement of houses, but living conditions as a whole. By

working directly with the community, we were able to conduct detailed research on the current housing conditions in Monwabisi Park. Our efforts involved partners from the Shaster Foundation, Ecobeam, and community members in the settlement. Di Womersley, our associate from the Shaster Foundation, was able to give us background on the African culture and how the upgrading process had been evolving within the community. Through her, we were able to begin understanding how to design buildings in a way that would be accepted in Monwabisi Park, and why current redevelopment efforts through the government were flawed. Through research with our sponsor, Ecobeam, we learned how the building process was organized, and how the community members would be involved. A group of residents in Monwabisi Park, whom we came to call our co-researchers, helped a tremendous amount in our understanding of the current housing situation. Because of them, we were able to visit different shacks while our questions were translated for the home owners, and similarly, their answers for us. The people of Monwabisi Park themselves proved to be a great asset, and were able to give us the final word on what they wanted in a home and what would be appropriate to build within their community. They were very willing to share their ideas and have discussions with us about the future of their homes and their society.

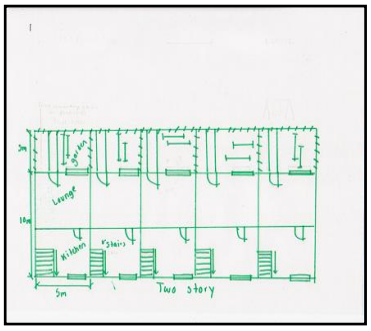
Each home within the park is unique with no set size to any of the structures, but we found they range from 3m x 3m to 5m x 8m. By visiting various shacks over the course of several weeks we were able to get a sense of how the residents built their homes, what materials and methods were used, and what amenities they accounted for in the building process. The homes we were able to study ranged from a two member family to a five member family. One of the most concerning structural problems of a shack is the roof. At first glance the tin roofing looks to be protective from the outside elements, but upon closer inspection, we noticed that the roofs have holes in them that leak during rainstorms, most of which cannot be repaired. Rain is a compounded concern among the residents of Monwabisi Park, as flooding is also a problem within the settlement. The winter rains over saturate the ground, and water can rise high enough to enter buildings through the front door.

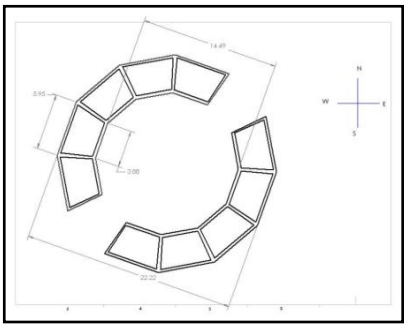
Ecobeam boasts a cost-effective and eco-friendly building method as a solution to the many housing problems within Monwabisi Park. A few Ecobeam structures have been constructed in the park already, including a guest house and a backpacker's lodge. Ecobeam structures consist of two major components: beams and sandbags. The beams are made up of

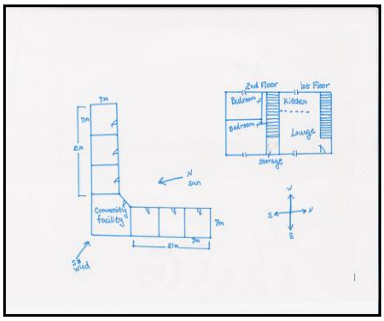
two timbers straddling a steel lattice. This construction makes the beams extremely sturdy by converting shear force into compression, where wood has remarkable strength. One element not necessary in an Ecobeam building is a foundation, which significantly lowers the cost of the entire structure. Once the beams have been constructed and put into place, sandbags can then be filled and packed into the walls. The sandbags serve as insulation from the elements, protection from fires and floods, and a source of stability for the entire structure. They are easy to build and anyone can participate - even children can help with the bag filling process.

Through our experience with Ecobeam, Shaster, and the people of Monwabisi Park we had accumulated enough information to start sharing design ideas with the community. In order to do this, we organized a charrette, which is an intensive process used to generate quick results with input from people with different backgrounds of knowledge. For this meeting we invited the community, project sponsors, and all of the IQP groups to participate. Everyone in attendance was split into small groups and asked to discuss and design either a cluster housing complex or a single housing unit. The resulting ideas were then brought to the community leaders for refinement and critique. From this charrette we were able to learn what was socially acceptable within the community and how to design our buildings accordingly.

After the charrette process had concluded, we used the results to expand upon the information we already gathered about housing design to develop three cluster housing options. Each design accommodates the community's suggestions, and can house multiple families in a fashion that will give them more space than they originally had. This, in turn, promotes densification so that more land can be used for other activities such as agriculture or recreation.







The first design depicts a row housing scheme that embodies all the elements from the design charrette. It consists of five homes, each with a lounge in the front, a kitchen in the back, and two bedrooms on the second floor. The circular house design consists of ten homes of forty square meters each, split between two stories. The center of the structure is open space that can be used for communal space or a communal water facility. The final design is very similar to the

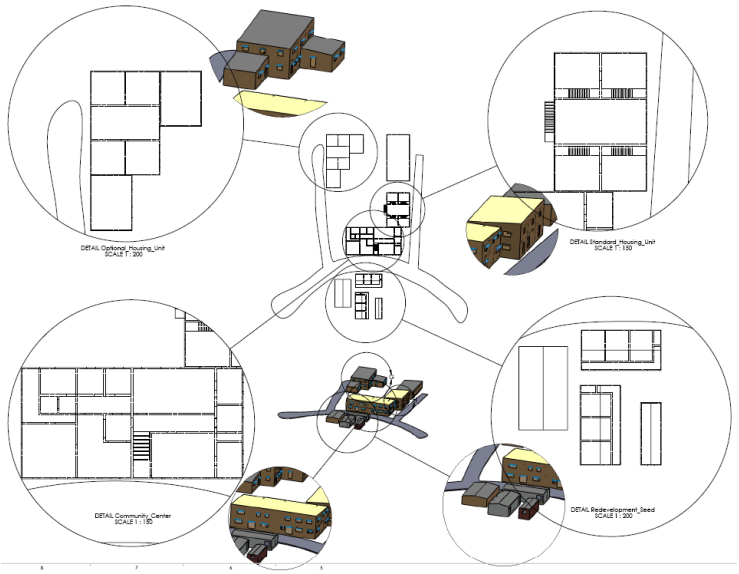
first, except that it is in an L-shaped design and has a separate communal water facility. Further details on these designs can be seen in our capstone document, "Envisioning Endlovini; Option for Redevelopment in Monwabisi Park."

During the time we were finalizing these designs, a massive fire broke out in Monwabisi Park. It destroyed the Indlovu Center and many of the homes around it. This situation forced us to quickly switch gears and begin to develop new designs for the Indlovu Center and surrounding buildings. In order to understand what was needed for the new center, we contacted Di Womersley. After discussing possible options with Di, we began using what we had learned to design new buildings for the community. Our final design consisted of an improved community center building as well as the other buildings that had already been donated. The new community center will include a clinic, community hall, soup kitchen, work shop, youth center, and a learning center. Specific details of these areas can be found in the capstone document.

Through our research, we have developed a plan for strategic and sustainable upgrade of Monwabisi Park. The redevelopment strategy must provide for jobs, community programs, health, education, safety - all the elements of a productive society. The scope of these elements is embraced by the concept of an ecovillage, which promotes a self-reliant and sustainable community. Social institutions provide impetus for the evolution of a strong ecovillage, and it is in this manner that jobs and resources are created and utilized within the community. Three main goals for this plan have emerged from the analysis of the information we have gathered:

- Provide options for upgrading the current housing conditions to provide a higher quality of life.
- Determine how to increase the density of buildings to create more usable land space.
- Ensure that the entire redevelopment process will be reinforced at the ground level by first increasing the overall public wellbeing and bolstering community involvement.

The visual outline of our plan has been detailed at right. Through the use of sturdier materials, the current housing problems will be addressed in future structures. Our strategy of upgrading addresses the need to increase the density of housing. This can be accomplished through the use of clustered housing schemes. In doing so, land area can be reallocated towards gardens and other community activities. Through this upgrading plan, it is important to first develop the community center, which will allow the



people of Monwabisi Park to become involved in the overall redevelopment process. One of the community center's most important functions is that it calls for areas where the community can take part in the fabrication of Ecobeam products, and will be the driving force behind the building effort. This, in turn, will generate public morale from the community center, and meetings regarding the redevelopment of the community will also take place there. By first constructing public facilities, the upgrading plan will occur as a fair process and with community input. With the people as the central part of the redevelopment project, Monwabisi Park will in turn become a well rounded ecovillage.

Our time in Monwabisi Park was a great experience for us as well as the participating community members. We have fostered great connections and developed friendships that will always be treasured. By working with Mike Tremeer from Ecobeam, and Di Womersley from the Shaster foundation, we were able to develop a new housing design that will solve the current housing problems. With the help of the community, the recommendations we have provided can be put into action and move Monwabisi Park closer to that of an ecovillage. Beginning with the Indlovu community center, the project will spark a sense of community participation and move forward into the development stage. Our designs will be a great asset for Monwabisi Park as they look to the future possibilities of their community.

These core issues have been explored as part of an integrated research and planning project conducted in Cape Town in 2008 and detailed in a report entitled, *Envisioning Endlovini: Options for Redevelopment in Monwabisi Park*. The document is authored by twenty-two Worcester Polytechnic Institute students and reports on efforts to plan and implement an ecovillage in Monwabisi Park to address problems of informal settlements. The overall effort is a collaboration among community residents and leaders, the WPI Cape Town Project Centre, the Shaster Foundation, the City of Cape Town, the Violence Protection through Urban Upgrading program, Ecobeam Technologies and others. Six WPI study teams investigated several aspects of ecovillage redevelopment including: buildings, water and sanitation, communications, energy, economics, and urban spatial planning. All research data and proposed options for re-development are included in the full report. This team's work is especially detailed in Chapter * and Chapter 1, the integrated redevelopment plan. The full report can be accessed at www.wpi.edu/Academics/Depts/IGSD/People/jiusto.html.