

PHILIPPINE URBAN SQUATTER RESETTLEMENT: Design for a Health Clinic

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May 2010

Submitted towards the fulfillment of the requirements for the Doctor of Architecture Degree.

School of Architecture
University of Hawai'i

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Philippine Urban Squatter Resettlement: Design for a Health Clinic

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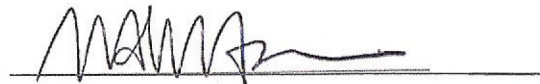
May 2010

We certify that we have read this Doctorate Project and that, in our opinion, it is satisfactory in scope and quality in fulfillment as a Doctorate Project for the degree of Doctorate of Architecture in the School of Architecture, University of Hawai'i at Manoa.

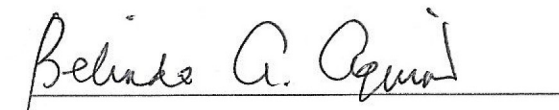
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Ella G.X.D. Garcia / University of Hawai'i at Manoa School of Architecture / May 2010

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Dedicated to my family: Mom, Dad, Dennis, Ken, and Sam...your love, support, and friendships are the foundation that I stand on. I am thankful for all of you always.

FOREWORD

I was born in Manila and lived in Cabuyao, Laguna province south of Manila, for the first four years of my life, and then emigrated to Hawaii with my family. Growing up in America, I tried my hardest to leave my Filipino heritage behind and assimilate to the American culture. It wasn't until my first year of college that I finally accepted my heritage and really wanted to learn more about my culture. During an Asia Pacific Symposium at the School of Architecture in 2002, Roberto de Ocampo, President of the Asian Institute of Management gave a lecture on urban squatters in the Philippines. Even though it's been a problem for over 50 years in Manila, it was the first time I've ever heard about this issue. It was then I decided I wanted to research the urban squatters for my Doctor of architecture project.

In doing initial research, I found out that these urban squatters from Manila were relocated to Cabuyao, my father's hometown and where I spent most of the first four years of my life. This relocation project is called the Southville Relocation Project, and was decidedly the site I really wanted to research. I was interested to see if the Cabuyao residents have accepted these people into their barangay (community), and more importantly, to research the architectural and planning solutions that the National Government provided for this relocation project.

I had not been back to the Philippines until this past summer August 2008, 21 years later, to do field research for this doctorate project. In going back, I saw the great disparity between the number of impoverished people there are in the Philippines versus in the United States. It was evident in the array of makeshift dwellings alongside canals, open fields, and even next to shopping malls. I thought to myself, how can an architect solve the poverty problem? An architect alone cannot. The economic, political, and social factors are issues that are out of our hands. However, I believe that architects can provide more affordable, innovative, sustainable, functional, and inspiring spaces to live, work, learn, and heal in. Planning and designing better health clinics in resettlement projects will help to build spaces that give them dignity and hope. This is what I set to do in this doctorate of architecture project.

ABSTRACT

This doctor of architecture project proposes an approach to locate decentralized community health clinics, and proposes a design for a prototypical clinic to replace the existing Southville health clinic. This clinic is located in the Southville Relocation Project, where the government relocated railway urban squatters from Manila to Cabuyao. Through interviews, case studies, and literature research, this health clinic proposes innovative use of local materials. This project researches the culture and healthcare needs of this low-income population to determine the spaces needed in the health clinic. It examines the problems of the physical environment and infrastructure of the relocation project, the necessity of healthcare, and analyzes the Southville area for the proper sites for the decentralized health clinics. A site is chosen within the area, and this site is further analysed for sustainable design potentials.

The health clinic addresses the residents' immediate healthcare needs by providing better facilities to diagnose, treat, and prevent health problems caused by their resettlement. Traditional medicine practices are explored and incorporated into the spaces needed for the facilities. The prevention of health problems in the community will allow the residents to focus on rebuilding their lives in Cabuyao. This health clinic will be properly located and designed according to the site and the needs of the people. It is expected to be a better facility than the current health clinic located in the Southville Relocation Project.

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I.

INTRODUCTION

INTRODUCTION

Project Goals

The goal of this project is to design a prototypical health facility that is sustainable, functional, culturally responsive, and affordable, which could replace the current Southville health clinic. The project will address the relocated, low-income populations' need for an adequate healthcare facility in Cabuyao, Philippines to design a decentralized community health clinic specifically for them. The project seeks to find innovative uses of local materials and construction methods, seeks to find climate specific sustainable design strategies, and looks at culture to inform the spaces needed in the clinic.

Some questions that this research design hopes to answer are: Who are the relocated urban squatters of the Southville project? What can healthcare do for their situation? Is decentralized healthcare more effective for preventative services? How is this clinic more effective than the existing health clinic in Southville? What types of spaces are needed for this health clinic that are specifically for the Southville residents? How large should this clinic be? Where can this clinic be built? What sustainable design solutions can be used for this project? What types of local materials and local construction methods are available? How can this building/facility be something that fits into the character/vernacular of the site?

Methodology

Background information is researched regarding healthcare architecture, humanitarian architecture, decentralized health clinics, and designing sustainable clinics. Literature research provides information on who the relocated urban squatters are, how the urban development of Manila has resulted in these communities, why they were relocated to Cabuyao, and the Southville relocation project in Cabuyao. Then, field research and interviews give an understanding of the problem. The interviews were conducted with the Mayor of Cabuyao, the National Housing Authority, the Southville residents, and employees of the Cabuyao Hospital. These interviews determine the culture and demographics of the relocated people, and also influence the design by determining what types of spaces are needed for the clinic. Case studies inform innovative uses of local materials and construction.

Correlational interviews and literature research provide for the conclusions that inform the design of the health clinic. Some of these conclusions are the programmatic spaces needed to accommodate for basic healthcare needs incorporating culture and traditional medicine practices; affordability and innovation of the local materials and construction methods; and quasi-experimental research is used to find ways to foster community interaction and pride.

Humanitarian Architecture

Humanitarian architecture is a recent phenomenon that has boomed in the last decade with the response of architects to shelter and housing needs of displaced people due to natural and man-made disasters. With the formation of organizations like Architecture for Humanity, Open Architecture Network, Common Ground Community, Shelter Centre, and World Shelters, humanitarian architecture is making a mark on the design of housing, service buildings, and infrastructure for people in need. The Indian Ocean disaster in 2004, Hurricane Katrina in 2005, and refugee camps in Darfur, are all disasters that architects have responded to.

According to Noble, architects actively involved in humanitarian architecture movement are looking to design housing that is inexpensive, long-lasting, dry, and sanitary, designed to be built quickly, buildable in many diverse locations, designed, to use building materials indigenous to the region, and designed to take advantage of non-traditional building materials like shipping containers, prefabrication, recycled and earthen materials. These criteria are a broad basis through which designers can use for emergency and transitional shelter.¹ These criteria can also be used to design service building, health clinics, recreation and community centers, and market places that are built for a permanent low-income community. This is because these concepts help to create a more feasible solution in the design of different types of facilities that can involve the local people to build it themselves.

Architecture for Humanity is an organization that has been placed in the spotlight with the publication of their book *Design Like*

¹ Noble, Robert L. "Humanitarian Architecture in the Aftermath of Disaster." *Archi Tech Magazine* (2005). <http://www.architechmag.com/articles/detail.aspx?contentID=2372> (accessed October 19, 2008), 1.

You Give A Damn, a compilation of various types of architectural solutions to humanitarian crises in areas of the world suffering from poverty, earthquakes, and war. The different responses to housing, community shelters, water, energy and sanitation, and planning shows the architectural community's innovation in construction and use of materials, while taking into consideration a specific group of people and region in the design of culturally sensitive spaces and aesthetics and use of local construction and materials. Cameron Sinclair, cofounder of *Architecture for Humanity* states, when a billion people live in poverty worldwide today, four billion live in a fragile but growing economy, more than three billion people do not have access to clean water or adequate sanitation, and one in seven live in a slum, and by 2030 it will be one in three,² architects can provide sustainable, effective, and innovative solutions to these problems.

According to Sinclair, this is the crunch time for humanitarian design. It's not just about redesigning ineffectual tents, or 'hot boxes' as those in the disaster relief trade call the two-room shelters without ventilation that number-crunching NGOs rely on. Now is a critical time to get designers to think differently. "Ninety percent of what an architect does is not drawing, it is problem solving."³ Humanitarian architecture and the designs that architects are producing are informing new approaches to not only emergency disaster relief and transitional shelter, but also low-income housing, health clinics, and low-income community planning.

Healthcare Architecture

Healthcare architecture has undergone a radical transformation from the 1960s until now, and has had six waves of health architecture that capture key developments.⁴ These trends and theories should be taken into account because there are many concepts and ideas that can work towards the design of the health clinic for low-income people. From aesthetics, to programmatic spaces, to overall layouts, the history of healthcare architecture will inform the approach in the clinic's location, its functions, and its cultural implications.

² Boniface, Russell. "Humanitarian Architect Believes Sustainability a Necessity." American Institute of Architects Spotlight (2006). http://www.aia.org/aiarchitect/thisweek06/1006/1006n_damn.cfm (accessed October 19, 2008), 1.

³ Siegle, Lucy. "Give me a shelter." Guardian News and Media Limited (2008). <http://www.guardian.co.uk/artanddesign/2006/may/14/architecture.ethicalliving/> (accessed October 19, 2008), 3.

⁴ Verderber, Stephen; Fine, David J. Healthcare Architecture In an Era of Radical Transformation. New Haven and London: Yale University Press, 2000, 3.

Trends and Theories

Verderber and Fine have identified six waves of health architecture in history, five historical waves and an emerging sixth wave, which anticipates a period of rapid transformation in the new millennium. These waves address the history of why hospitals are designed the way they are today, and because a clinic is a satellite form of the hospital, understanding these waves is necessary. These waves are the Ancient, the Medieval, the Renaissance, the Nightingale, the Minimalist Megahospital, and the Virtual Healthscape.⁵ The first five waves will be summarized identifying the key points of each, and the emerging Virtual Healthscape wave will be looked into as the identifying theory that will be used for the design of the Southville community health clinic.

Verderber and Fine describe the Ancient wave as the first wave expressed in the healing practices of the ancient Egyptians, the Greeks, and Middle Eastern and Eastern cultures. “Wellness care was developed by the Greeks between 1,000 B.C. and A.D. 100, where the rich were treated to higher standards than were the lower economic classes. The private room first appeared nearly three thousand years ago in the Greek Asclepion.”⁶

The second wave, the Medieval, occurred during the Middle Ages where the Catholic Church was the primary and most powerful provider of hospital care. Large monastic hospitals were built on the edges of villages and cities throughout the fifth through thirteenth centuries, which began the modern medical center. The origins of hospital expansionism, where towns would grow around the hospital, began at this time as well.

The third wave, the Renaissance, created stately palace hospitals of Europe that were designed with neoclassical architecture, dominated by symmetrical, axial configurations, and regimented facades, lasted from the 1650s to the late nineteenth century.

The fourth wave, the Nightingale, “is the neoclassicism of the mid-nineteenth century coinciding with the rise of first truly mod-

⁵ Verderber and Fine, 2000, 10.

⁶ Ibid.

ernist hospital-planning principles, through the work of Florence Nightingale. Her principles, actually guidelines, for hospital reform, concerned such aspects as the maximum allowable width and length of a ward, the size of windows and their placement in relation to the bed, the overall ambiance, the ventilation and heating systems, and the use of specific materials and colors.”⁷ Her principles supported her ideal to have natural daylight interior spaces, but the invention of the elevator and the light bulb compromised these principles.

The fifth wave, the Minimalist Megahospital, arose in post-World War II era. It was of International Style in the age of high-tech medicine. The hospital began to form more departments with the growth of specialized treatments, which led to the growth of the hospital’s size and spatial complexity. These megahospitals, like the 1,050-bed Veterans Administration Medical Center in Houston and Los Angeles, eventually symbolized everything wrong with the healthcare system. This was because the healthcare system was restructured to be refocused on community-based manage care.

The Virtual Healthscape began to emerge in the 1990s, in a move toward residentialist imagery and design principles for hospitals. “If the machine hospital, in its enormity, functioned as a magnet, drawing to it all feasible services and subspecialties in the name of efficiency from the viewpoint of a provider-focused system, the postmodern hospital of the 1980s and 1990s has become a centrifuge, spinning off parts from its core to reinsert them in the surrounding community in an age of patient-centered care. At the same time, the information age is profoundly influencing how we define health and how we care for ourselves. The virtual hospital and the virtual clinic are but two of the virtual health-related environments available in cyberspace.”⁸

Decentralized and Satellite Clinics

The theory of this emerging Virtual Healthscape encourages the decentralization of hospitals and design of satellite clinics embedded within communities. The general argument for decentralizing health care is the potential for improved service quality and coverage.⁹ The decentralized and satellite clinics are the best option for a low-income community without vehicular means

7 Verderber and Fine, 2000, 11-13.

8 Verderber and Fine, 2000, 14-15.

9 Decentralized Thematic Team. “What is Decentralization.” The Online Sourcebook on Decentralization and Local Development (2008). http://www.ciesin.columbia.edu/decentralization/English/General/Different_forms.html (accessed 20 October, 2008), 1.

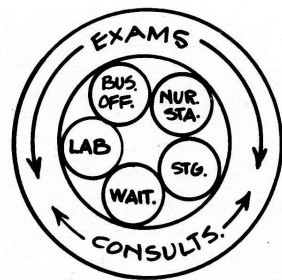
of transportation. Most low-income people cannot afford to pay for health insurance or health expenses, and when they are ill tend to hold off going to the hospital to avoid paying for health care. They wait until they get better or worse, until they are very ill. Placing the health clinic within the community will aid to family planning and the prevention of common colds, diseases, and well being of the people with ease.

According to the Decentralization Thematic Team, the term 'decentralization' is used to describe a wide variety of power transfer arrangements and accountability systems. "Policies range from the transfer of limited powers to lower management levels within current health management structures and financing mechanisms to extensive sectoral reform efforts which reconfigure the provision of even the most basic services. In general, careful attention must be given to health service needs and priorities in deciding which functions and programs to transfer and which to retain under central control. If a function is critical to the attainment of central-level goals and its sustainability at the local level cannot be guaranteed, it should not be decentralized."¹⁰

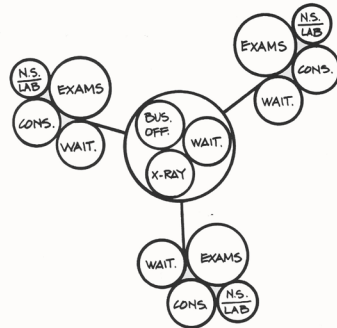
Figure 1 shows the three types of healthcare facility plans: Centralized, Decentralized, and Satellite. The ideas of these plans can be translated into the geographical planning of a decentralized healthcare system. The Centralized plan shows a Megahospital type where all services are provided in one large facility. This idea can be used in that more major medical services such as surgery, x-ray, and laboratory work is provided at this level of the system. The Decentralized Plan shows a hospital broken up into specialty groups in different wings. This idea can be used on the intermediate level of healthcare, and geographically, this would be a semi-major hospital providing more specialized services more dispersed than the Megahospital. From these decentralized semi-major hospitals, the idea of the Satellite plan can be used. This is a branch off of the semi-major hospitals, and the creation of minor clinics within the community.

Most health facilities in the Philippines are concentrated in the urban areas, and the Department of Health had made efforts to provide every barangay (or community) with at least minimum health care, but doing so was both difficult and expensive, and

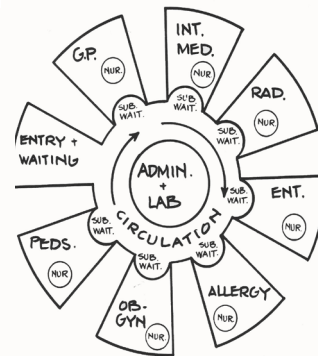
10 Decentralization Thematic Team, 2008, 2.



**CENTRALIZED PLAN
SINGLE SPECIALTY GROUP**



**DECENTRALIZED PLAN
SINGLE SPECIALTY GROUP**



**SATELLITE PLAN
MULTI-SPECIALTY GROUP**

Figure 1 – Schematic diagram of a centralized plan (Left), Schematic diagram of a decentralized plan (Middle), Schematic diagram of a satellite plan (Right); Source: Malkin, 1982, Pages 170-175.

the more remote areas inevitably received less attention.¹¹ This is a step in the direction of decentralizing the healthcare system. For the decentralized healthcare system to be efficient, a major hospital in the area must be identified, then semi-major specialized facilities, and then clinics within the communities. According to Weiss, in the United States, the most commonly identified benefit of belonging to a state or regional free clinic association is the opportunity to network with other clinics. This shows the idea of decentralization and networking within the different tiers of healthcare.

The promise of decentralization has become appealing to many because of its several theoretical advantages that include potential for ¹²:

- A more rational and unified health service that caters to local preferences
- Improved implementation
- Decrease in duplication of services as the target population are more specifically defined
- Reduction of inequalities between rural and urban areas
- Cost containment from moving to streamlined targeted programs
- Greater community financing and involvement of local communities
- Greater integration of activities of different public and private agencies
- Improved intersectoral coordination particularly in local government and rural development activities.

According to Sekher, “decentralized governance and local level participation can contribute to improving the health care facilities through better monitoring and supervision of the functioning of the health system at the local level. There are varying experiences reported from different countries on whether decentralization results in improving the provisioning of health services. Kolehmainen-Aitken (1999) underlies the pre-requisites for decentralization of health services such as active involvement of health managers in the decentralized design, clear national resources allocation standards and health services norms, and regu-

¹¹ Country Studies, 2008, 1.

¹² Decentralization Thematic Team, 2008, 1-2.

Table 1: Outcomes of Decentralization in Some Developing Countries

Figure 2 – Outcomes of Decentralization in Some Developing Countries. Source: Sekher, 2003, Page 6.

Case	Outcomes	
	Participation by/ Responsiveness to the poor	Impact on social and economic poverty
West Bengal, India	Good: improved participation and representation, improved responsiveness	Good: positive on growth, equity, HD, evidence lacking on spatial equity
Karnataka, India	Fairly good: improved representation, participation of poor less effective and responsiveness low	Neutral: did little to directly help pro-poor growth, or equity, HD and spatial equity indirectly benefited from funding allocations and development programmes
Colombia	Fairly good: participation/representation ambiguous, responsiveness improved	Fairly good: little evidence on growth or equity, but good results on HD, spatial equity
Brazil	Little evidence, but thought to be poor as spoils/patronage system run by powerful Mayors and Governors still dominant	Good on equity, HD in exceptional areas where state or federal programmes combined with decentralization, poor generally on spatial equity
Bangladesh	Poor: participation and representation low, responsiveness very low	Very poor on all criteria, undermined by corruption and political patronage
Ghana	Fairly poor: participation by poor and community groups improves, limited improvement in representation, but responsiveness low	Limited evidence shows that the resources involved are too insignificant to have made much impact, spatial equity may have improved through government allocations
Kenya	Very poor: politically run deconcentration scheme	Some impact on spatial equity through politically motivated redistribution
Nigeria	Very poor: low participation and representation, very bad record of responsiveness and lack of accountability	Poor: very bad record on equity, HD, spatial equity subject to political manipulation and urban bias

Note: HD – Human Development including public health services

Source: Crook and Sverrisson 1999

lar system for monitoring. Many country-study evidences confirm that poorly designed and hastily implemented decentralization has serious consequences for health service delivery.”¹³

Case Studies done by Crook and Sverrisson in 1999 (Figure 2) from various developing countries show that decentralized schemes provide mixed results. Sekher sates, “community-based public health services inherently require involvement of community members, decision-makers, researchers and other specialists, apart from the stakeholders.”¹⁴

Designing Sustainable Healthcare Facilities

There is no doubt that designing sustainable healthcare facilities is an ongoing trend that increases a clean and safe healing environment. It is important to define ‘sustainable’ because it can have a variety of meanings and is used interchangeably with the term ‘green’. For this research, we use the definition from “the Office of the Federal Environmental Executive, which defines green building as ‘the practice of 1) increasing the efficiency with which buildings and their sites use energy, water, and materials, and 2) reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal — the complete building life cycle.’”¹⁵ A sustainable healthcare facility is increasingly important in areas where resources are scarce to begin with. It is important for economic (long-term benefits and savings) and educational (teaching of sustainability through design) reasons.

Identifying key steps and elements of a sustainable healthcare facility is important in the process of designing one. In a report by Phil Nedin, there are “five key drivers (figure 3) that should be considered as essential when developing a design philosophy and brief that will create a sustainable healthcare facility.”¹⁶ These drivers (whole life costing, future needs, low carbon, innovative, therapeutic environment) oppose the non-sustainable approach (clinical efficiency, prescriptive, high carbon, current needs, and first costs) to develop a healthcare facility.

13 Sekher, T.V. “Healthcare for the Rural Poor: Decentralization of Health Services in Karnataka, India.” Institute for Social & Economic Change (2003): 4-5.

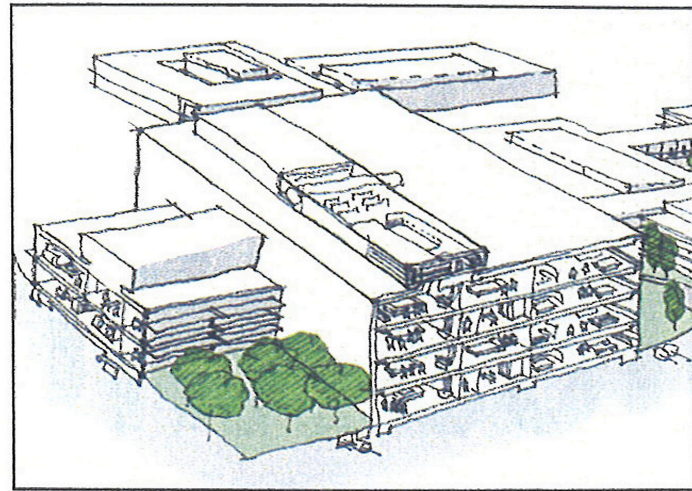
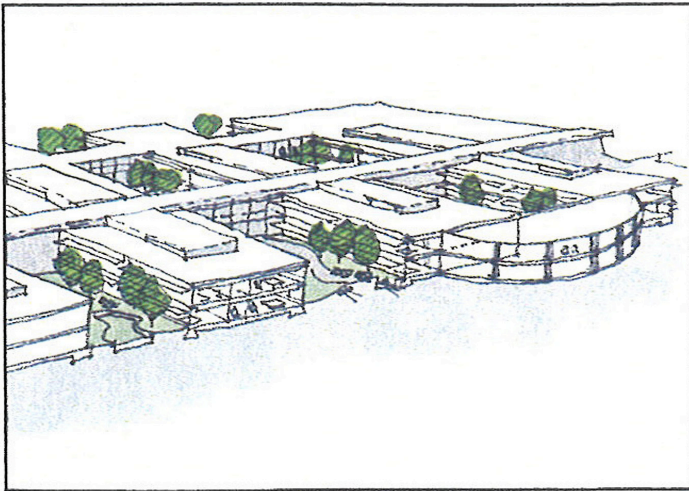
14 Sekher, 2003, 6.

15 Building Design and Construction Staff. “White Paper on Sustainability.” Building Design and Construction Magazine Website. <http://www.usgbc.org/Docs/Resources/BDCWhitePaperR2.pdf>, 2003, 4.

16 Nedin, Phil. “Designing sustainable healthcare facilities.” Health Estate Journal (2007): 23.

Figure 3 (Right)– Five key drivers to consider when developing a sustainable healthcare facility. Source: Nedin, Phil. Health Estate Journal, September 2007, 23.

Figure 4 (Below) – Sustainable planning – narrow plan vs deep plan. Source: Nedin, Phil. Health Estate Journal, September 2007, 24.



It is emphasized that the design of any new facility should be “flexible to accommodate the many changes of clinical models likely to occur over its 60 year life.”¹⁷ This flexibility should be expressed through its structural frame, should accommodate both an increase and decrease in the number of beds, and design towards a narrower plan (figure 4).

Nedin goes on to describe that a therapeutic environment are design solutions that are human in scale, naturally lit and the user has environmental control (acoustic, temperature, and ventilation), and use of art and color, while offering privacy.¹⁸ An example of a design solution promotes this type of environment is a single patient bedroom (figure 6). A therapeutic environment is conducive to speeding up the recovery process and increases the wellbeing of the patient and staff.

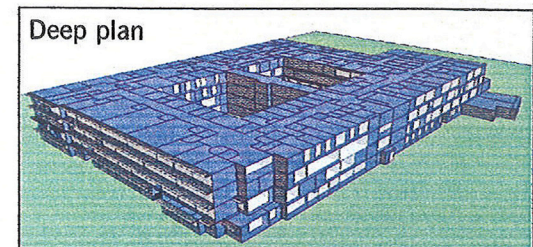
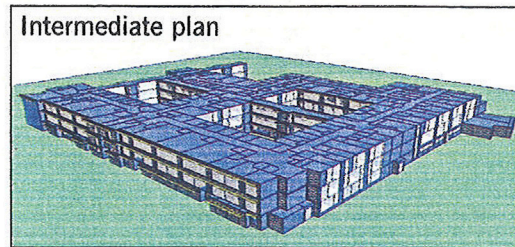
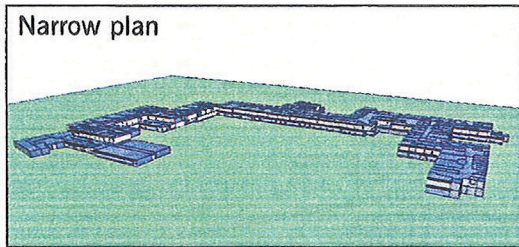
It is key to look at whole life costing (figure 5), which means comparing initial costs to long-term maintenance costs. The building geometry plays a major role in the initial costs of a facility. In the comparison between a narrow, intermediate, and deep plan, the initial costs increase the more narrow and sprawled the facility is. However, the deeper the plan, the less opportunities for natural ventilation, and the predominantly air-conditioned building increases in energy demand and maintenance costs.

Designing towards a carbon neutral building (figure 7) is an important direction for the architectural industry. Since buildings consume approximately 40% of all energy costs, designing a building that demands less energy is key to sustainable design. The criteria to achieve carbon neutral building begin from the more passive solutions and material selection to additional systems like photovoltaic panels and wind turbines. The more we fuse our building design to take advantage of renewable resources, the more we can preserve resources for future generations.

Natural Ventilation in Healthcare Facilities

A typical hospital is normally mechanically ventilated, and without the option to open any windows. With the push for healthier and sustainable healthcare facilities, designers are asking if natural ventilation is a low-cost alternative to healthcare design. A

17 Ibid.
18 Ibid.



	Narrow plan	Intermediate plan	Deep plan
Total floor area	14,795m ²	14,775m ²	13,956m ²
Number of floors	2	3	4
Façade length	1886m	2051m	1840m
% façade	34.41%	37.48%	35.60%
External length of foundation	1008m	681m	482m
Area of foundation	8127m ²	5210m ²	3680m ²
% glazing	60.20%	56.27%	35.42%
Ventilation strategy	Predominantly natural ventilation	Mixed mode	Predominantly air-conditioned

Figure 5 – Hospital Geometry and whole life costing. Source: Nedin, Phil. Health Estate Journal, September 2007, 25.

study in Lima, Peru compared the risk of airborne contagions in both naturally and mechanically ventilated spaces (published in 2007). Head of the research, Doctor Adrin R. Escombe, concluded, "maximizing natural ventilation lowers the risk of airborne contagions compared to mechanically ventilated systems. Infections transmitted by the airborne route are leading causes of morbidity and mortality worldwide, with tuberculosis (TB) alone causing 1.8 million deaths each year. Outbreaks in health care facilities may pose the greatest risk from airborne contagion by congregating infectious and susceptible individuals, resulting in frequent airborne transmission."¹⁹

The studies done in Lima Peru compared 8 hospitals (five built pre-1950 and three built between 1970-1990), looking at 70 naturally ventilated clinical rooms (respiratory isolation rooms, TB wards, respiratory wards, general medical wards, outpatient consulting rooms, waiting rooms, and emergency departments) where infectious patients would be encountered.²⁰ The experiment measured air changes/hour (ACH) in the rooms with the Wells-Riley model of airborne infection to estimate infection risk. The result was that "the infection rate was 33% in the modern and 11% in pre-1950 naturally ventilated facilities with windows and doors opened."²¹ This research was later put into practice with the implementation of natural ventilation in Peruvian hospitals (figures 8-11). Modifications to the hospitals included additional windows for cross-ventilation, sealed-skylight raised to permit air entry, and re-building of the waiting room in the open air.²²

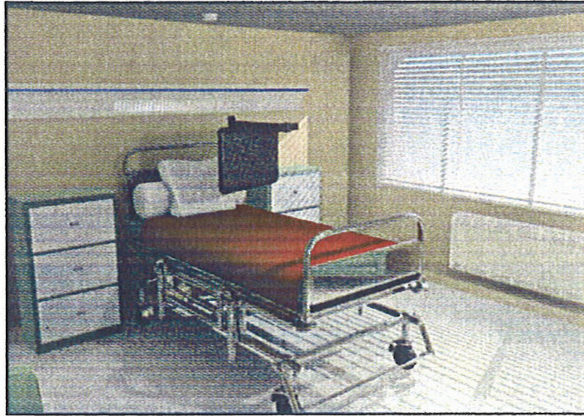
Although uncommon in more developed countries, the studies done in Peru promote natural ventilation in healthcare facilities. It proves that it supports the reduction of the spread of airborne infection. The research ultimately show that naturally ventilated clinical rooms have better ACH (air change per hour) rate than those rooms that are mechanically ventilated. Natural ventilation can reduce the energy demands for the facility and give the patients and staff more control of the indoor environment.

19 Escombe, A. Roderick. "Natural Ventilation for the Prevention of Airborne Contagion." Medscape website (2007). <http://www.medscape.com/viewarticle/5556146> (accessed April 01, 2009), 1.

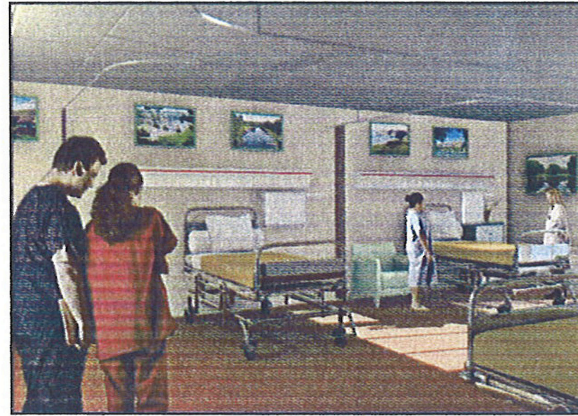
20 Escombe, A. Roderick. "Natural Ventilation for the Prevention of Airborne Contagion." Medscape website (2007). <http://www.medscape.com/viewarticle/5556146> (accessed April 01, 2009), 1.

21 Ibid

22 Escombe, A. Roderick. "Dr. Rod Escombe, Research Overview." Imperial College Website (2007). <http://www1.imperial.ac.uk/medicine/people/rod.escombe/> (accessed April 01, 2009).



- Effective isolation
- Specific cleaning regime
- Privacy and dignity
- Improved patient environment
- Reduced patient travel
- Individual room stores/supplies

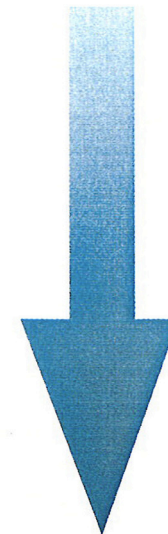


- Patient interaction
- Capital cost
- Staffing cost

Figure 6 (Top Left and Right) – Single room vs multi-bed. Source: Nedin, Phil. Health Estate Journal, September 2007, 24. 24.

Figure 7 (Bottom Right) – Design audit to achieve a low carbon building. Source: Nedin, Phil. Health Estate Journal, September 2007, 25.

- Building form and orientation
- Passive ventilation strategy
- Lighting controls
- Reduced air leakage
- Exposed mass
- Glazing spec
- Increased shading
- Increased insulation
- Biomass boilers
- Solar hot water generators
- CHP
- Ground source heat pump
- Wind turbines
- Small scale hydro
- PV
- Fuel cells



Carbon neutral building



Figure 8 – Renovated Peruvian Hospital Waiting Room Source: Nedin, Phil. Health Estate Journal, September 2007, 26.



Figure 9 – New Open Air Waiting Room. Source: Nedin, Phil. Health Estate Journal, September 2007, 26.

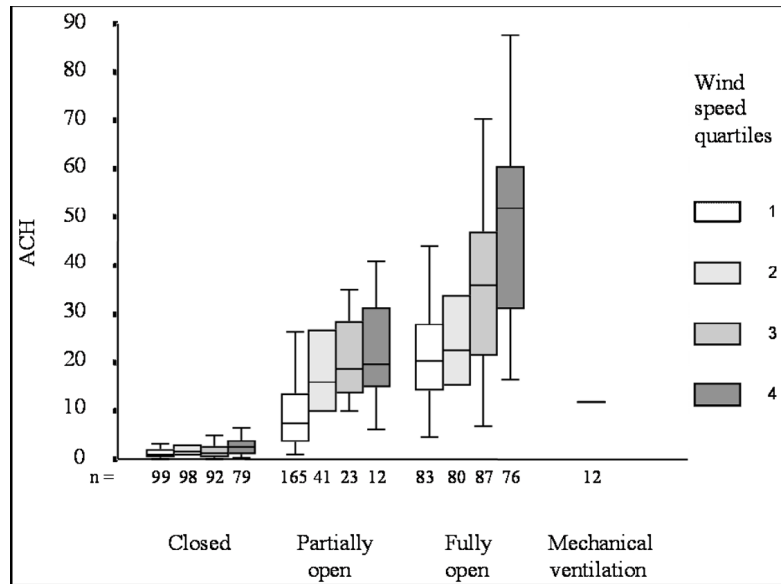
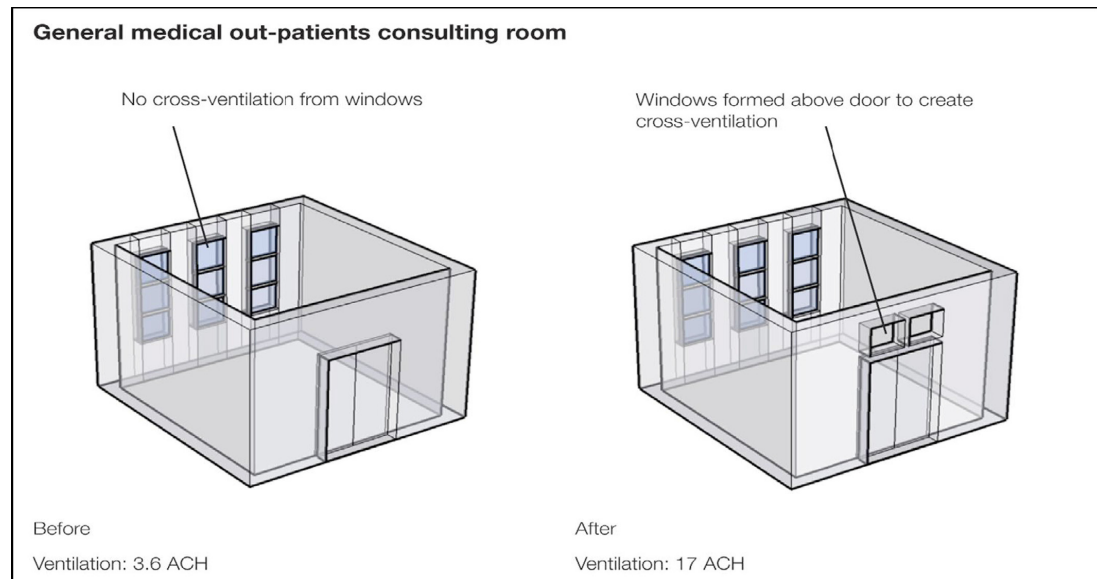


Figure 10 – Air Change Per Hour Rates between Mechanically and Naturally Ventilated Rooms. Source: Nedin, Phil. Health Estate Journal, September 2007, 26.

Figure 11 – ACH increase after introducing a second window for cross ventilation. Source: Nedin, Phil. Health Estate Journal, September 2007, 26.



II.

BACKGROUND

BACKGROUND

The background of this research focuses on poverty and the urban poor in the Philippines, the Philippine urban squatters, the city of Cabuyao, the Southville Relocation Project, humanitarian architecture, and healthcare architecture. This background helps to build upon the approach that is used for the design of the health clinic, and then compares it to the approach used by the Philippine National Government to design the current health clinic. An understanding of the history of the urban squatters and their way of life is the focus of this background, and for the purposes of this project, national policies are not discussed in this research. The spaces needed in the health clinic are determined by the needs of the low-income people. The impact on the City of Cabuyao that the Southville Relocation Project has had will be discussed and show the local residents' reactions to the new people. Humanitarian and healthcare architecture provides the theoretical framework for the design of the health clinic explaining the trends and innovations currently being used. Current literature research, definitions and theories are used as the backbone for this project.

Poverty and the Urban Poor in the Philippines

Policies and efforts of the national government in the Philippines have not been enough to alleviate the growing poverty problem. For this research, we use the definition of poverty used by the Social Reform Agenda (SRA) that President Fidel Ramos launched in 1994. The SRA considers a Minimum Basic Needs (MBN), and "are the closest indicators ever established to capture poverty beyond income and expenditure. The MBN defines poverty in terms of a three-tier needs hierarchy: survival (food/nutrition, health, water/sanitation, and clothing); security (shelter, peace, income, and employment); and enabling (basic education/literacy, people's participation, family care, and psycho-social indicators)."²³

Similar to many Southeast Asian developing countries, the Philippines has seen a rapid population growth in cities due to rural to urban migration. However, there is doubt whether rapid population growth in developing countries is really urbanization.

²³ Ragragio, Junio M. "The Case of Metro Manila, Philippines." University College London (2003). http://www.ucl.ac.uk/dpu-projects/Global_Report/pdfs/Manila.pdf (accessed August 31, 2008), 8.

Laquian states, "it is a process of *pseudourbanization*. His arguments center around the fact that the cities of the Third World are growing at a rapid rate, but that this growth is not accompanied by economic, political, and psycho-social changes that are the characteristics of true urbanization. People are being pushed away from farms, not because agricultural efficiency has achieved high production making it possible for a smaller share of the labor force to be devoted to agriculture, but because of the harshness of life in the rural areas. These rural-urban migrants account for about 93% of squatters and slum-dwellers are migrants from the rural areas. Since they move to the city with few or no skills, possessing low education and meager income, they have to stay in slums or squat on somebody else's property to be able to survive. These rural-urban migrants, therefore, are the real transitionals."²⁴

Based on analysis of the 1990 national census, nearly half of Manila households do not own the lot they are occupying.²⁵ There is a difference between slum-dwelling and squatting. According to Ragragio (2003), slum-dwelling is more of a socio-economic concept, living in homes that are so dilapidated and congested that the conditions pose a health, fire, vice and crime hazards, while squatting is primarily a legal concept and involves the occupancy of a piece of land or building without the permission of the owner, usually living in a physically disorganized collection of shelters made of light and often visually unappealing materials where poor people reside.

Typically, the urban poor build their own homes out of affordable materials they find or purchase on land they do not own. The most visible and well-known squatter community in Manila are the railway squatters. Most of these homes are poorly constructed wooden shacks with corrugated tin roofs. Unclean community water pumps create a hygiene and sanitation a problem. However, this community is not even the largest or the worst off.

There are gross underestimations in the statistics of poverty level and number of squatters in Metro Manila. Choguill states that

24 Laquian, Aprodicio A. *Slums are for People*. Honolulu: East-West Center Press, 1969, 6.

25 Ramos, Norman R. "Land Development Aspects and the Fiscal Dimension of Philippine Urban Development, Input Studies On: Urban Land Demand/Supply, Urban Finance." National Economic and Development Authority (funded by UNDP) Manila (1995), 2.

as much as 47 percent of the Metro Manila population lives below the poverty line.²⁶ With such extreme levels of urban poverty, it is apparent that solutions to the housing shortage might be important. The first of these is for the government to provide housing, while the second is self-help, which has been the primary means that the poor have used to get housing.²⁷ The shortage in housing reduces the effectiveness of education and health care, further exacerbating the poverty problem.²⁸

In 1968, President Ferdinand E. Marcos announced that housing and urban development would be one of the most important fields his administration would emphasize, he created a committee to study the housing and urban development problem called the National Housing Corporation to provide low cost housing.²⁹ Although Marcos previously stated the importance of providing low cost housing, he enacted the Presidential Decree 722 in 1975, branding squatters as criminals and effectively condemning an estimated 10 million urban poor Filipinos. In 1997, PD 772 was repealed under the administration of then President Fidel V. Ramos.³⁰ Ramos' repeal has made squatting questionable, it is neither a crime nor a right that the people have.

Railway Urban Squatters

An urban squatter is often referred to as a person who settles on land or occupies property without title, right, or payment of rent usually, against the regulations of the state.³¹ In Metro Manila, people have been living along the stretch of the Philippine National Railway (PNR) property from Tutuban Central railroad station in the north down to Carmona (Cavite) in the south.³² The history of the rail people, "based on key informants,"³³ dates back to 1927 where there were only three to four families living around the rail tracks. In 1948, these dwellings on Algeciras Street were demolished, and during that same year a few squatters slowly crept into the PNR property. These people were coming from nearby districts within Manila, most of them born there. "Then in more recent years, relatives of squatters from provinces of Luzon and the Visayas have continued to come and

26 Choguill, Charles L. "Manila: City of Hope or a Planner's Nightmare?" *Built Environment* (2001): 85-95, 89.

27 *Ibid*, 90.

28 *Ibid*, 94.

29 Laquian, 1969, 12.

30 Ragragio, 2003, 7.

31 Alojegan, Marc A. *Manila Force Fields: The State Apparatus vs. The Urban Squatter*. Honolulu: University of Hawaii School of Architecture, 2007, 7.

32 Adem, Elisea S. *Urban Poverty: The Case of the Railway Squatters*. Manila, Philippines: UST Press, 1992, 41.

33 *Ibid*, 45.

squeeze into whatever little space is available. The rail communities have had two demolitions so far, squatting has sustained over the years because people have no land and more importantly because the location is a strategic point for educational, medical, religious, and occupational reasons.”³⁴

An important aspect to remember, as stated by one railway dweller, is that “our problems in the riles (railway) are not an isolated set of problems; rather, they reflect the situation of the country and of the world at large.”³⁵ As in the past, the government’s solution to the squatter problem has been through relocation and low cost housing.³⁶ The Northrail-Southrail Linkage project has resulted in the relocation of people living along the railway.

These people along the railway were relocated to eleven sites outside of Manila (including Cabuyao). The government under President Gloria Macapagal Arroyo issued Memorandum Order No. 46 on December 10, 2001, directing the Housing and Urban Development Coordinating Council (HUDCC) to relocate and provide housing sites for informal dwellers that would be affected by the PNR rehabilitation and modernization program. She later appointed the National Housing Authority to oversee the resettlement process. It has turned out to be an insufficient relief strategy for the urban poor in the Philippines because their relocation sites are not better conditions than living along the rail. Like refugee camps and transitional housing sites for people displaced by natural disasters, these relocated people put additional stress on the city’s infrastructure, healthcare, and economy.

34 Ibid, 46.
35 Ibid, 25.
36 Laquian, 1969, 13.



Figure 12 – Railway dwellings in Manila (Top and Bottom). Source: Grundstrom.



Figure 13 – Relocation Sites in relation to Manila, Cabuyao is located south of Manila next to Laguna de Bay. Source: National Housing Authority Website.



Figure 14 and 15 – Poorly built drainage system (Top), Southville Flooding in 2006 (Bottom) . Source: Urban Poor Associates.

According to Grundstrom, “past relocation efforts of the government had been undermined by the relocatees’ abandonment of their awarded home lots or sale of their rights to speculators. Several factors can be attributed to this problem: (1) unsatisfactory conditions in the resettlement sites, such as inadequate spatial provisions in lot or unit sizes, road widths; (2) lack of livelihood or employment and commercial opportunities; (3) lack or absence of community facilities such as schools, hospitals or clinics; (4) distant, inaccessible sites which made the relocation traumatic and economically dislocated household heads from their sources of income; and (5) substandard quality of housing components and land development, owing to the haste in project implementation or unscrupulous practices by developers.”³⁷

The reasons why relocated squatters abandon their awarded homes, previously stated by Grundstrom, is reinforced by Laquian. According to Laquian, “there is a need to take a hard second look at the government’s program of relocating squatters and slum-dwellers to provinces outside of Manila. More than 55 percent of the people relocated to these provinces have moved out of the area. Those who remain work in Metropolitan Manila during the week and go home only during the weekends. A relocation program is not a simple operation that involves bodily transferring people from the slums to the relocation area. If it is to succeed, the following must be assured first: (a) A means of livelihood in the relocation area which is just as good as the one originally enjoyed by the squatter or slum-dweller;

(b) If there is no immediate means of livelihood, a cheap and convenient transpor-
³⁷ Grundstrom, Karen and Jere, Annette Wong. “Shelter for the Urban Poor: Proposals for Improvements Inspired by World Urban Forum III.” Lund University Housing Development and Management (2007): 158.

tation system between a person's job and his new home; (c) Adequate facilities such as roads, water, medical services, waste disposal and others; and (d) Provisions for new housing. The failure of past relocation schemes may be traced to a lack of some, if not all, of the above."³⁸ The failures of the relocation sites are addressed in the recommendations that Laquian gives.

Southville Relocation Project

In 2001, President Gloria Magcapagal Arroyo ordered demolition of the railway squatter homes for the Northrail-Southrail Linkage project. This project is responsible for the forced eviction of approximately 80,000 families (400,000 people). Four relocation sites were offered: Cabuyao, Cauayan and San Pedro in Laguna, and San Jose del Monte City in Bulacan.³⁹ Ultimately 11 relocation sites (See Figure 13) were built determined by which municipalities would accept the addition of these people. By 2004, people living along the railway in Manila, Makati, and Cabuyao were relocated to Southville I Relocation Project (Cabuyao, Philippines).

Approximately 8,173 families (multiplied by average of 4 people per family = 32,692 people) were relocated to a 52-hectare site next to a landfill from the cities of Manila, Makati, and Cabuyao. This is called the Southville relocation project. Cabuyao is a municipality in Laguna located near Laguna Bay (approximately 43 kilometres 27 miles from Manila), where approximately 205, 376 people⁴⁰ live in the 18 barangays (towns).

Due to the lack of job opportunity in the region, families were no longer able to earn 2 incomes by both parents, which is something they could do when they were in Metro Manila. According to the residents, their income can hardly cover the necessary expenses. They earn about PhP350 per month, while they need to pay the government loan for the land and housing, which costs PhP750 each month. Potable water has to be purchased which adds further financial burden to the families. Many shared that they only take 1 or 2 meals a day as a result.⁴¹

38 Laquian, 1969, 228.

39 Urban Poor Associates, 56.

40 2007 Census.

41 ACPP Report, 2007, 4.

The lack of basic amenities, health hazards due to unsanitary conditions, economic hardship living farther away from their employment in Metro Manila, and lack of health and education services add up to a very poorly planned resettlement project. COHRE (Center on Housing Rights and Evictions) visited the Southville relocation site in Cabuyao, which is situated adjacent to a six-hectare garbage dumpsite. The garbage dump was still in operation at the time of COHRE's visit (in 2006) but has been closed since. However, the dump continues to pose a severe health risk to residents of the Southville relocation site as it contains highly toxic materials and contaminants. During heavy rains in August this year, floodwaters contaminated by run off from the dumpsite flooded all the houses at the relocation site and took up to six hours to subside (figure 14-15). According to the residents, floodwaters could reach four feet high and act as a breeding ground for mosquitoes.⁴² According to Ecological Waste Coalition, residents of the Southville relocation site are exposed to 'high levels of contaminants that are released through dump fires, landfill gas migration and surface and underground leachate migration.' Six infants from the Southville relocation site have died this year of pneumonia, sepsis and diarrhea. Due to the serious health hazards posed by the dumpsite, and lack of safe drinking water and poor drainage facilities and sanitation, six children also died from a dengue outbreak at the site in November 2006, with 18 more being infected with the virus.⁴³ The health facilities are inadequate, with only one health center at the site, residents need to travel far to a hospital where medical services are unaffordable, outside of Cabuyao since the local public hospital does not accept Southville residents. These unsanitary conditions and flooding coupled with inadequate health facilities, shows that the government needs to re-evaluate the planning of their relocation projects.

According to *Manila Times*, in August 24 2006, Manila Archbishop Gaudencio Rosales asked Vice President Noli de Castro, in charge of the relocation projects, to look into the condition of the families relocated at the Southville Housing Project in Cabuyao, Laguna. The poor living conditions of the 'relocatees' prompted the Archbishop to state that the relocation program "fails to take into consideration the health and environmental hazards that living next to a mixed waste dump might cause to the relocates."⁴⁴ The poorly planned location of the relocation project has caused health risks to the displaced population. Had the Cabuyao Hospital accepted the Southville residents or better yet, if they had an adequate health clinic on site, the harm caused by un-

42 ACPP Report, 2007, 4-5.

43 Plessis, 2006, 1.

44 Manila Times, 2006, 1.

sanitary conditions could have been minimized. The National Housing Authority, which is the local organization in charge of the Southville relocation project, considers the complaints of the people, but have not made any changes to make things better in the four years these people have lived in Cabuyao.

This relocation project has proven to be a disaster stemming from its initial planning. Compared to the poor conditions these people lived in along the railway, the only guarantee now is that they would no longer be evicted or have their homes demolished, but their living conditions have not improved.

Philippine Health System

The Philippines has a dual health system that consists of a public, financed through taxes, and private sector, financed through user fees.⁴⁵ The poor get their health services from government operated health facilities such as the Cabuayo Hospital. There was a devolution of health services under the Local Government Code of 1991, where health services provided by the public sector became shared by the Department of Health (DOH) and the Local Government Units (LGUs).

There was a movement in the early 1990s towards recognizing the importance of traditional medicine in the Philippine health and economy. In 1992, the Department of Health first came out with the Traditional Medicine Program to promote and advocate traditional medicine nationwide.⁴⁶ Then in 1997, President Fidel V. Ramos, appreciating the potential of traditional medicine in the health and economy, approved the Republic Act 8423 (R.A. 8423) otherwise known as the Traditional and Alternative Act (TAMA).⁴⁷ "This gave rise to the creation of the Philippine Institute of Traditional and Alternative Health Care (PITAH), a government owned and controlled corporation (GOCC) attached to the DOH."⁴⁸ This movement towards the promotion of traditional medicine is a more affordable solution for health delivery to reach more Filipinos. Western pharmaceuticals that are readily available in stores are expensive, which the poor cannot afford.

45 Republic of Philippines Department of Health, 1.

46 Philippine Institute of Traditional and Alternative Health Care, 1.

47 Ibid, 1.

48 Ibid, 1.

Culture and Health

The design of health clinics needs to consider the culture of the specific population that the facility is being designed for. According to Malkin, if the medical clinic serves an ethnic population it is important to research how that group uses space. For example, Mexican families tend to bring many relatives when one family member has to visit the doctor, similar to Filipino families.

Sinclair states in an interview, it is important for architects to take community-involvement approach to reconstruction by learning as much as they can about the local culture, especially in a foreign land. "Architects should design with the community and not for it,"⁴⁹ adding that involving an entire foreign village in the design and building process is paramount to community ownership and the local economy. "We must help arm communities with expertise, technology, and social capital."⁵⁰

It is important to consider the local customs and culture not to undermine them, but to include them in the design and construction process of their community. Sinclair was inspired by Fred Cuny, a renegade engineer working in Chechnya working in disaster relief, and states that he talked about how in these situations, much of the response is more harmful than the disaster itself. He saw that a lot of organizations coming in with very Western solutions, and undercutting local history and the economy with their Band Aid approach, which actually destroy the development that's been happening.⁵¹

Main Health Problems

According to the Philippine Department of Health, non-communicable diseases were responsible for majority of deaths in the country, while communicable diseases make up majority of the leading causes of morbidity. Figures 16 and 17 show the leading causes of mortality and morbidity rates in the Philippines in 2004, and figure 8 shows the leading immunizable diseases that have caused death in the country in the year 2000. According to Hardon, urban communities are known to suffer relatively high respiratory morbidity because of the crowded living conditions.⁵² "People suffer from both communicable diseases associated

49 Boniface, 2006, 1.
50 Boniface, 2006, 2.
51 Siegle, 2006, 3.
52 Hardon, 78.

with poverty and cardiovascular disorders associated with industrialization.”⁵³ There are limitations on this data because they are based on cases reported by government health facilities, and does not include the private sector. The mortality table reveals that majority of people are dying from heart diseases and vascular system diseases, which are both non-communicable diseases. The majority of the causes leading to ill health are preventable diseases that can be deterred if immunization is provided.

Urban Poor Context and Health

The urban poor in the Philippines lack the finances to attain proper health care. Their living conditions affect their perceptions of health, illness and treatment, and their health care practices.⁵⁴ Studies in healthcare and the urban poor context in Metro Manila reported in *Confronting Ill Health: Medicines, Self-Care and the Poor in Manila* (Anita P. Hardon) reveal some observations on the perceptions of health or the urban poor, “although not a comprehensive description of the situation of the country’s urban poor in general.”⁵⁵

There are some conclusions that were made between Bonanza and Balubud (in Marikina municipality outside of Metro Manila) that can be used to inform the design of the Southville Health Clinic. Similar to the Southville residents, Bonanza and Balubud people originated from different parts of the Philippines. “This results in a “large number of ‘mixed’ (province of origin) marriages that leads to less of a shared ‘traditional’ health belief system. As a result, culture-specific health ideas and practices appear to diminish, but ‘common denominators’ are reinforced. For example, a few types of herbal remedies that people in the slum reportedly use are found to predominate: among them *oregano*, *kalamansi* and *bayabas*.”⁵⁶ However, because of the polluted environment and drinking water, the urban poor are not able to grow and use herbal medicines.

The perceptions of health and treatment of Bonanza and Balubud people show that their economic situation results in a self-care approach to the treatment of illnesses within their families. This means that instead of spending money to go see a doctor to as-

53 Hardon, 96.

54 Hardon, 62.

55 Ibid, 61.

56 Ibid, 77.

MORTALITY: TEN LEADING CAUSES BY SEX
Number, Rate/100,000 Population and Percent Distribution
Philippines, 2004

Cause	Male	Female	Both Sexes		
			Number	Rate	Percent*
1. Heart Diseases	40,361	30,500	70,861	84.8	17.6
2. Vascular System Diseases	28,930	22,750	51,680	61.8	12.8
3. Malignant Neoplasm	21,395	19,129	40,524	48.5	10.1
4. Accidents**	28,041	6,442	34,483	41.3	8.6
5. Pneumonia	15,822	16,276	32,098	38.4	8.0
6. Tuberculosis, all forms	17,841	8,029	25,870	31.0	6.4
7. Ill-defined and unknown causes of mortality	10,916	10,362	21,278	25.5	5.3
8. Chronic lower respiratory diseases	13,084	5,891	18,975	22.7	4.7
9. Diabetes Mellitus	7,970	8,582	16,552	19.8	4.1
10. Certain conditions originating in the perinatal period	7,809	5,371	13,180	15.8	3.6

Source: The 2004 Philippine Health Statistics
 * percent share from total deaths, all causes, Philippines
 ** External Causes of Mortality
 Last Update: February 11, 2008

MORBIDITY: TEN LEADING CAUSES BY SEX
No. & Rate/100,000 Population
PHILIPPINES, 2004

CAUSE	MALE	FEMALE	BOTH SEXES	
	Rate**	Rate**	Number	Rate*
1. Acute Lower RTI and Pneumonia	888.8	868.0	776,562	929.4
2. Bronchitis/ Bronchiolitis	651.8	817.1	719,982	861.6
3. Acute Watery Diarrhea	668.5	651.5	577,118	690.7
4. Influenza	400.7	444.6	379,910	454.7
5. Hypertension	338.2	442.1	342,284	409.6
6. TB Respiratory	137.7	93.9	103,214	123.5
7. Chickenpox	51.5	56.2	46,779	56.0
8. Diseases of the Heart	38.5	45.1	37,092	44.4
9. Malaria	24.0	20.0	19,894	23.8
10. Dengue Fever	17.8	17.1	15,838	19.0

Source: 2004 Philippine Health Statistics
 ** rate/100,000 of sex-specific population
 Last Update: February 11, 2008

Figure 16 (Top) – Top Ten Mortality Rates in Philippines in 2004. (Top) Source: Department of Health Website <http://doh.gov.ph/kp/statistics/mortality>.

Figure 17 (Bottom)– Top Ten Morbidity Causes in the Philippines in 2004. (Bottom) Source: Department of Health Website <http://www.doh.gov.ph/kp/statistics/morbidity>.

Mortality Among Immunizable Diseases
(Under 1; 1-4, 5-9; 10-14 Years)
Number & Rate/100,000 Population
Philippines, 2000

Cause	Under 1		1-4 Years		5-9 Years		10-14 Years	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1. Measles (B05)	412	20.9	877	11.5	104	1.1	34	0.4
2. Tetanus (A35)	146	7.4	11	0.1	47	0.5	51	0.6
3. Tuberculosis of Meninges (A17)	24	1.2	117	1.5	78	0.8	63	0.7
4. Diphtheria (A36)	5	0.3	12	0.2	7	0.1	0	0.0
5. Other Tuberculosis (A14-A18;B90)	36	1.8	67	0.9	67	0.7	111	1.3
6. Acute Poliomyelitis, including late effects (A80)	0	0.0	2	0.0	6	0.1	3	0.0

Figure 18 – Mortality among immunizable diseases in the Philippines in 2000. Source: Department of Health Website <http://www.doh.gov/kp/statistics/immunizable>.

sess the symptoms, they themselves determine what the illness is and what they should take for relief (as shown in Figure 19). In 1,411 cases in the two areas, 41% of people did not get treatment and 37% of people picked up western pharmaceuticals to treat their illnesses. Self-care is the most popular method of health care among urban poor because their economic situation limits their spending on health care.

There are alternatives to taking western drugs that the Philippine government is advocating such as the use of traditional medicines. Community-based health programs (CBHP), that are run by community health workers (CHW), “enhance self-reliance through the promotion of traditional mostly herbal-remedies. Wester pharmaceuticals are regarded as products of foreign profit-oriented industry, which exploits the poor health conditions of the Filipino people.”⁵⁷ Studies presented by *Hardon* show that drug expenditures account of nearly half of the country’s total health expenditures.⁵⁸

Self-Care and Traditional Medicine Practices

The Philippines has practiced the use of traditional medicine to alleviate sickness for generations. They use herbal and natural remedies for sicknesses like non-severe diarrhea or non-severe coughs and the common cold. CBHP has recommendations for which herbal medicines work best as seen in figure 20. In figure 21, Bonanza and Balubad herbal and home remedies are shown, similar to the CBHP treatment recommendations. These remedies consist of natural ingredients that can easily be grown like oregano, avocado, and banana.

These traditional medicine practices are widely accepted by Filipinos, and are supported as an alternative to pharmaceuticals by the national government. This treatment would be inexpensive, natural, and sustainable. “There are ten medicinal plants that the Philippine Department of Health through its ‘Traditional Health Program’ have endorsed, and all ten herbs have been thoroughly tested and have been clinically proven to have medicinal value in the relief and treatment of various ailments”⁵⁹ (figure 22).

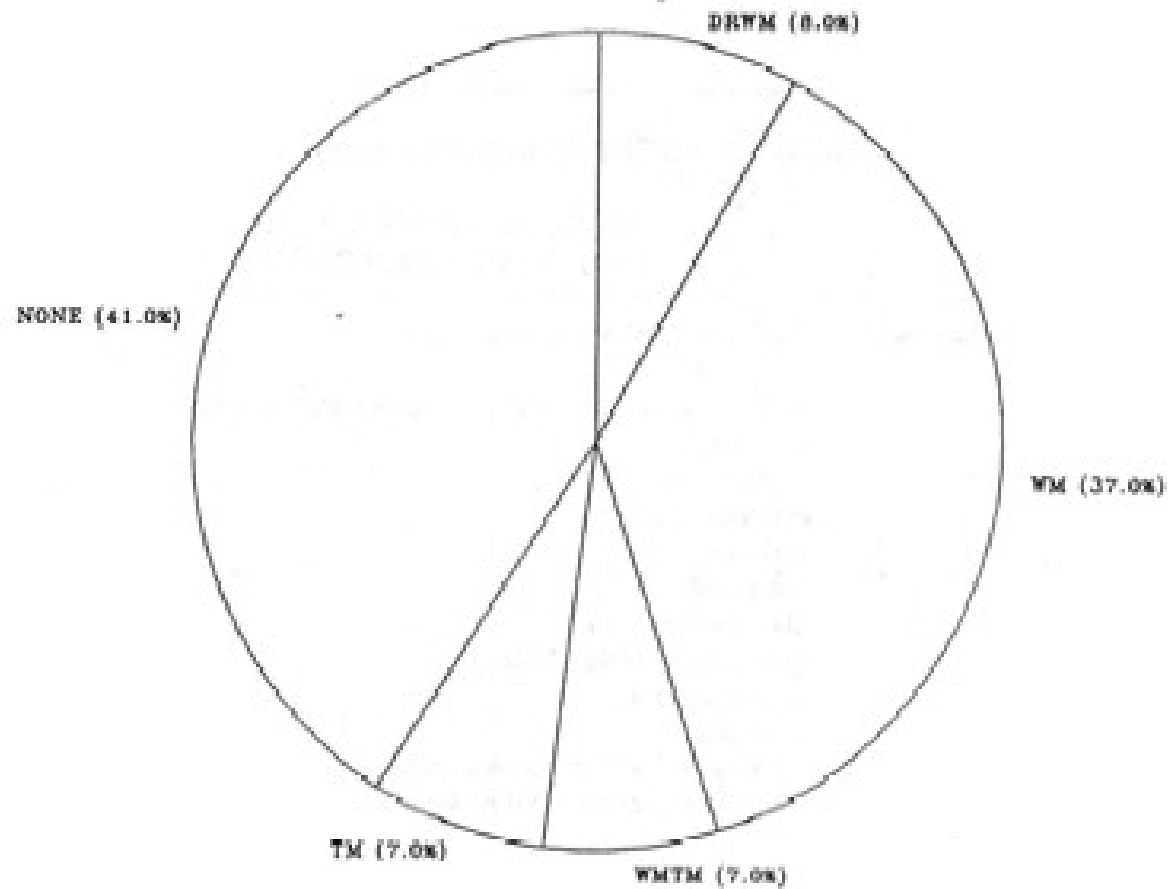
57 Ibid, 43.

58 Ibid, 43.

59 Philippine Herbal Medicine, 1.

THERAPY CHOICE IN BOTH AREAS

In 1411 illness episodes.



DRWM
WM
WMTM
TM
NONE

- doctors' prescriptions and western medicines
- western medicines only
- a combination of western and traditional medicines
- traditional medicines only
- no treatment

Figure 19 – Health Care Therapy Choices in Bonanza and Balubud Studies. Source: Hardc Page 142.

. Types of herbal and home remedies used in the treatment of non-severe diarrhea and cough, slight fever and colds in Bonanza and Balubad

DISORDER	TREATMENT	
	BONANZA	BALUBAD
Non-severe diarrhea	<i>bayabas</i> * <i>kaimito</i> * water * <i>hilot</i>	<i>bayabas</i> * <i>abokado</i> *
Non-severe cough	<i>oregano</i> * <i>kalamansi</i> * <i>salabat</i> * <i>asin-gas</i> hot-compress	<i>oregano</i> * <i>kalamansi</i> * <i>salabat</i> * <i>asin-gas</i>
Slight fever	sponge bath *	no home treatment used
Colds	<i>kalamansi</i> * <i>hilot</i>	<i>kalamansi</i> * <i>oregano</i>

Figure 20 – Bonanza and Balubud Herbal and Home Remedies. Source: Hardon Page 160.

CBHP treatment norms	
DISORDER	SUGGESTED TREATMENT BY CHW AND CBHP DOCTORS
Non-severe diarrhea	Oral rehydration therapy (ORT); avoid fat <i>ABK</i> syrup (a concoction of <i>abokado</i> , <i>bayabas</i> and <i>kaimito</i>); banana; <i>lugaw</i> (rice soup); <i>am</i> (rice water); <i>kaimito</i> feed well
Non-severe cough	steam inhalation; give a lot of water to drink give <i>oregano</i> ; <i>mayana</i> ; <i>SLK</i> syrup (a mixture of <i>sampalok</i> , <i>luya</i> and <i>kalamansi</i>); don't let the chest cool down
Slight fever	sponge bath; give a lot of water or juice; <i>oregano</i> ; keep out of the draft; give good food
Cold	no treatment is necessary; give a lot of water; give <i>kalamansi</i>

Figure 21 – Community-based Health Program Suggested Traditional Remedies. Source: Hardon Page 141.

TEN HERBAL MEDICINES APPROVED BY THE DEPARTMENT OF HEALTH

MEDICINAL PLANT	ILLNESS
BAYABAS-BAYABASAN (RINGWORM BUSH)	Treats ringworms and skin fungal infections
AMAPALAYA (BITTER MELON)	Diabetes, for the non-insulin dependent patients
BAWANG (GARLIC)	Mainly reduces cholesterol in the blood, and hence helps control blood pressure
BAYABAS (GUAVA)	Antiseptic, to disinfect wounds. Also can be used as mouthwash to treat tooth decay and gum infection.
LAGUNDI (5-LEAVED CHASTE TREE)	Relieves coughs and asthma
NIYOG-NIYOGAN (CHINESE HONEY SUCKLE)	Elimination of intestinal worms
SAMBONG (BLUMEA CAMPHORA)	A diurectic that helps in the excretion of urinary stones. It can also be used as an edema
TSAANG GUBAT	Treats intestinal motility and also used as a mouth wash since the leaves of this shrub have a high fluoride content
ULASIMANG BATO	Fights arthritis and gout
YERBA BUENA (PEPPERMINT)	Relieves body aches and pain.

Figure 22 – Ten herbal medicines approved by the Department of Health.
 Source: Philippine Herbal Medicine Website http://www.philippineherbalmedicine.org/doh_herbs.htm.

Literature Review

The sources have been primarily about the economic, political, and social aspects of the urban squatters. There are books specifically talking and interviewing the squatters, which helps understand the culture and people for the design of the health clinic. More current studies of resettlement areas should be done. There are only a limited amount of interviews documented, and those interviews only show a glimpse of the lifestyle and health of the urban poor. The documentaries depict the lives of the urban squatters very well. The diversity in case studies, types of health clinics and construction methods and materials used in humanitarian architecture, are overall the most useful to consider.

The theories in humanitarian architecture and healthcare architecture have been key to understanding the trends that are used to design for these two types of architecture. An architect can't completely solve the urban squatter and poverty problem in the Philippines, but architects are problem solvers, and we can provide a solution that fits the location and scenario. Understanding culture, local materials, and the vernacular of Cabuyao, Philippines will be very important as well. A site analysis of the Southville relocation project, demographics, culture, skills, and aspirations of the Southville residents is key to the approach used to design the health clinic.

III.

PROJECT STATEMENT

PROJECT STATEMENT

Urban squatters in Manila have been an increasing problem. In hopes of beautifying Manila and for the Railway Linkage Project, the National Philippine Government has relocated the urban squatters living along side railroad tracks. Urban squatters from the cities of Manila, Makati, and Cabuyao have been moved to Southville in Cabuyao, Philippines. This is the Southville Relocation Project, and after about 4 years, there are 32,000 people living in the 52-hectare site (128 acre site). As stated by Laquian, one of the four requirements for a relocation project to work is “adequate facilities such as roads, water, medical services, waste disposal and others.”⁶⁰ The relocation site has proven to be a disaster stemming from its initial planning, with its location next to the Laguna dumpsite, it has created health hazards and unsanitary conditions. The poorly designed drainage system has resulted in flooding of the area, adding to the unsanitary and unliveable conditions of the Southville Relocation Project.

Initial research for my Doctor of Architecture project was to support the design of service buildings (community center, schools, health clinics, and electricity and water) for the relocated squatters. In August 2008, I went to the Philippines to do field research for my project. I visited the Southville Relocation Project and learned that there were already facilities such as elementary and high schools, and infrastructure set up for electricity and water. However, the facilities are inadequate and electricity and water are only available for a few hours in the morning and afternoon. After interviewing the residents of Southville and the Mayor of Cabuyao, they expressed the need for a hospital expansion. In response to the unsanitary conditions and health hazards caused by the planning and design of the Southville Project, the city needs to provide adequate healthcare to accommodate the relocated people in Southville (Cabuyao), Philippines. This research focuses on providing an affordable, sustainable, cultural, and functional design to replace the existing health clinic in the Southville community. Using the idea of decentralization, community health clinics are located within the area, and a specific site is chosen for the design.

According to a study done on the urban squatters, “the main reasons for dropping out of school are economic and health-related; the latter brought about by malnutrition due to poverty.”⁶¹ There is one health clinic on block 42 already built (there

⁶⁰ Laquian, 1969, 228.

⁶¹ Adem, 1992, 35.

are three health clinics planned within the Southville Relocation Site, but are not currently in use; not available for emergency services, and are only there during a limited period during the day). Cabuyao hospital (the local public hospital) does not currently serve the Southville people.

“Providing medical service is one of the most effective ways of generating cooperation in the community, especially true in the Philippines, where people are generally careful about their health. The physician in white is one of the most enduring symbols of goodness in the Philippines.”⁶² These people need a place to go to for preventative services as well as treatment for illnesses. The decentralized healthcare facility that is embedded within the community means that people can get the preventative health-care they need. This design of the health clinic needs to be sustainable and function to serve the low-income community.

The Doctor of Architecture project researches the types of spaces that these urban squatters need in a health clinic; to determine the size of the facilities needed; to locate the proper site for the facility or facilities; to research current materials and construction methods used by the National Housing Authority; and to determine which methods will be most appropriate to design a sustainable health clinic for one of the located sites. The project looks at the needs of low-income populations, specifically the Southville residents to design the health clinic to address their needs; looks at a series of case studies of architectural projects focused on health clinics for low-income people in developing countries, and to choose one of the sites to design a health clinic to serve the Southville community.

This project takes a more humanistic approach to architecture and design, using an interdisciplinary approach that includes humanitarian architecture, urban design, healthcare, and Philippine cultural studies.

62 Laquian, 1969, 164.

IV.

**FIELD RESEARCH -
LESSONS LEARNED**

FIELD RESEARCH – LESSONS LEARNED

In August 2008, I conducted interviews with the Mayor of Cabuyao, Southville residents, and the Cabuyao Hospital employees. These interviews depict a first-hand perspective of the Southville relocation project from the city official, the displaced people, and the insufficient healthcare facilities in the city. Lessons learned from these interviews are summarized, and reveal the need for basic healthcare, additional classrooms, and livelihood.

Interview with Mayor of Cabuyao

The Mayor of Cabuyao, Isidro B. Hemedez, has only been in office for one year, but has considered the current state and potential improvements of the four-year-old Southville relocation project located in his city. Hemedez begins with the background of the project. The South and North Railway projects in Manila required the railway squatter community to be relocated, and Cabuyao was chosen as a potential location. The city of Cabuyao agreed to take the squatters in and cleared 53 hectares (approximately 131 acres) of farmland. The first residents transferred were from Metro Manila, then Makati, then Cabuyao. The plan of the Southville was to segregate the residents from where they came from.

Two basic services, healthcare and education need funding to accommodate for the addition of these relocated people. There is only one health center, and the Southville area needs additional clinics. The satellite hospital located within the community is run between 6pm-6am by 2 doctors and a few nurses. Education costs the city more than 1,000 Philippine Pesos per household. In municipality, local government pays for education, meaning it's free for the people of Cabuyao. The addition of these relocated squatters to Cabuyao will cost the city approximately 20 million Philippine Pesos per year, which includes basic services, garbage, property, livelihood, and peace and order.

The Southville residents live in low-cost housing with no realty tax. They were loaned 50,000 Philippine Pesos (in two instalments) by the National Government to build their own homes on a 40 square meter lot (approximately 431 square feet). They pay back the government monthly for the loan, electricity, and water. There is an average of five people per household.

Interview with National Housing Authority

The National Housing Authority (NHA) is the sole national agency mandated to engage in housing production for low-income families, and also provide resettlement assistance.⁶³ The National Housing Authority has offices in the Southville site. They primarily take care of any concerns and complaints the residents have, and are also in charge of the development and building subdivision. The documents below are reports created by the National Housing Authority to describe the state of the Southville Project.

The number of people living in Southville, according to Figure 2, is 8,173 people. There are approximately 64% of those people that have power connection, while the rest of the people don't have house wiring, private poles, side wires, meter base, Meralco application (electric company), or the homes are abandoned, or the electricity has been cancelled. Since the people have to pay for their own electricity, many of them are two months behind, and at three months, their electricity gets cancelled. This reveals the livelihood issues of the relocated people. They were relocated far from where their jobs were, approximately a 45-minute drive from Manila, and don't have any means to support their families since their relocation.

⁶³ National Housing Authority Website: These provisions include (1) Article VII, Section 28: Undertake adequate relocation, whether temporary or permanent, provided, however, that in case of eviction or demolition pursuant to a court order involving underprivileged families, relocation shall be undertaken in coordination with the concerned LGUs (Local Government Units) and other government agencies within 45 days from service of notice of final judgment by the court; (2) Article VII, Section 29: Implement the relocation and resettlement of persons living in danger and other public areas within two years from effectivity of this Act, in coordination with concerned LGUs; (3) Article V, Sections 21 & 22: Provide basic services and facilities and access to livelihood opportunities sufficient to meet the basic needs of the affected families in socialized housing or resettlement areas in cooperation with private developers and concerned agencies.

D. STATUS OF RELOCATIONS
As of Jan. 21, 2008

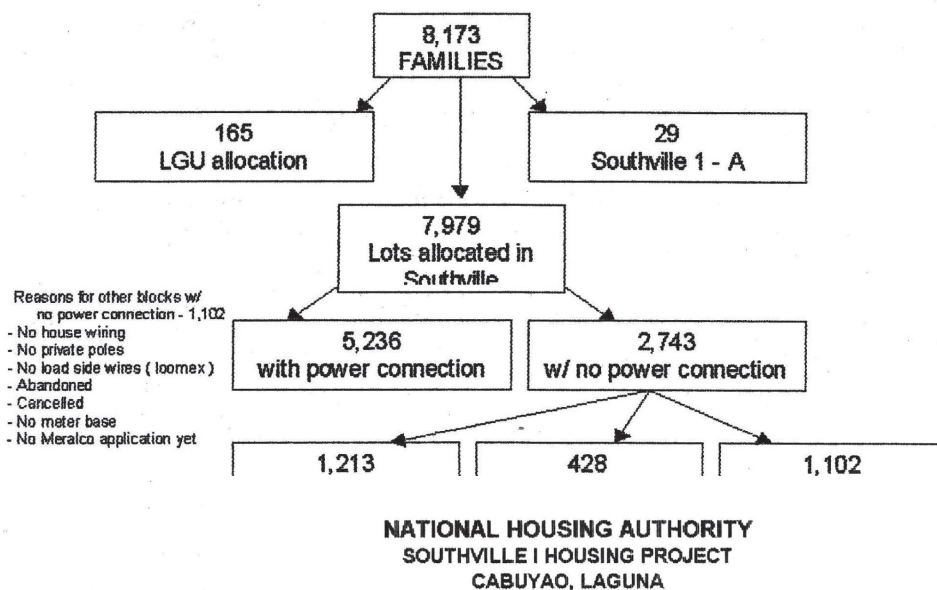


Figure 23 – Status of Relocations describes number of families and electricity connection (Left); Source: Philippine National Housing Authority, Cabuyao, 2008.

UPDATE ON POWER AND WATER CONNECTION AS OF MARCH 6, 2008

MAKATI, MANILA AND CABUYAO RELOCATEES

SOUTHVILLE I	NO. OF POWER CONNECTION			NO. OF CEI			WATER CONNECTION	
	CABUYAO	MAKATI	MANILA	CABUYAO	MAKATI	MANILA	w/H ₂ O METER	WELLS
	2,571	2,098	781	2,311	2,801	821	5,022 UNITS	172 UNITS
	TOTAL= 5,456 UNITS			TOTAL= 5,933 UNITS				

* INCLUDING 3 SCHOOL SITES AND 3 ELEVATED WATER TANKS

CABUYAO AND MANILA RELOCATEES

SOUTHVILLE I-A DEPANTE AND BASCO (BLOCK 66, 67, & 68)	NO. OF POWER CONNECTION			NO. OF CEI			WATER CONNECTION	
	CABUYAO	MANILA	TOTAL	CABUYAO	MANILA	TOTAL	W/H ₂ O METER	WELLS
			0			0		32 UNITS

MANILA RELOCATEES

SOUTHVILLE I-B LAKESIDE NEST	NO. OF POWER CONNECTION		NO. OF CEI		WATER CONNECTION	
					W/H ₂ O METER	WELLS
	224		381			462

Figure 24 – March 2008 Update on Power and Water Connection (Left); Source: Philippine National Housing Authority, Cabuyao (2008).

**10 LEADING CAUSES OF MORTALITY
2007**

1. SENELITY	6
2. DM TYPE II	6
3. CVA	5
4. PNEUMONIA	5
5. AGE AND SEVERE DEHYDRATION	4
6. PTB	3
7. MULTIPLE SHARP FORCE INJURIES: HEAD,TRANK AND EXTREMITIES	3
8. HCVD	2
9. TRAUMATIC HEAD INJURY	2
10. HPN	2
-IJFD	2
-RENAL FAILURE	2
-MULTIPLE TRAUMATIC INJURIES: HEAD,TRANK AND EXTREMITIES	2
Estimated Total Population as of 2007	5,998 (Household)
Total Number of Deaths 2007	- 65
<i>Male</i>	- 37
<i>Female</i>	- 28
<i>Neonatal Death</i>	- 3
<i>Infant Mortality</i>	- 4
<i>Maternal Mortality</i>	- 2

Figure 25 – 2007 Southville Mortality Causes (Right), 2007; Source: Philippine National Housing Authority, Cabuyao (2008).

**TOP 10 LEADING CAUSES OF MORBIDITY
2007**

- 1. URTI**
- 2. AGE**
- 3. INFECTED WOUND**
- 4. T/C DENGUE FEVER**
- 5. BRONCHIAL ASTHMA**
- 6. ATP**
- 7. HPN**
- 8. SKIN INFECTION**
- 9. INTESTINAL PARASITISM**
- 10. UTI**

Figure 26 – 2007 Southville Morbidity Causes (Top); Source: Philippine National Housing Authority, Cabuyao (2008).

The 10 leading causes of mortality in Southville in 2007 are listed in Figure 35, and the 10 leading causes of morbidity are listed in Figure 26. Most of these deaths can be prevented through general practice services, and most of the illnesses can be cured if a health clinic was more accessible. The polluted area and unsanitary conditions are some of the reasons of the top 10 causes of morbidity.

The ratio of teacher to student is on average 1:60. There are typically 2 sessions of classes for students, 8am-12pm, then 12pm-4pm because of the shortage of teachers and classrooms. Figure 27 shows that the school needs are 25 teachers needed, but 75 more classrooms needed for the projected enrollment in 2008-2009.

Current Enrolment ELEMENTARY		Ideal Class Size	Ideal Number of Classes	Available number of Teachers	Number of Teachers NEEDED	Number of Classrooms		Number of Classrooms Needed (Ideal 1:1)	Classrooms Discrepancies/ NEEDED
						Existing	Borrowed		
I	819	1:45	18	14	4	5	3	18	13
II	664	1:45	15	9	6	tent	2	15	15
III	596	1:45	14	9	5	laboratory	3	14	14
IV	564	1:50	11	10	1	4	0	11	7
V	554	1:50	11	8	3	4	1 lab	11	7
VI	452	1:50	9	9	-	4	0	9	5
TOTAL	3 649		78	59	19	17		78	61

PROJECTED ENROLMENT : SY – 2008-2009

Current Enrolment		Number of Teacher	Number of Teachers NEEDED	Classrooms NEEDED	Note: Proposed utilization of Laboratory rooms:
KINDER	400				
I	990	55	23	55	1 for Library 1 for science laboratory 1 for computer laboratory 1 conference area 1 H.E room 1 for reading center 1 Learning Resource Center (LRC) 2 will be converted into instructional classrooms
II	795				
III	715				
Sub-total	2,500 / 45				
IV	650	37	2 plus 1 full time guidance counselor	37	
V	650				
VI	550				
Sub-total	1850 / 50			92 less 17	
TOTAL	4750	92	25	75 more	

Submitted by:

ELVIRA B. CATANGAY
Principal

Figure 27 – 2007-2008 Actual Elementary School Enrollment (Top), 2008-2009 Elementary School Projected Enrollment (Bottom); Source: Philippine National Housing Authority, Cabuyao (2008).

Interview with Southville Residents

The family of four that was interviewed lived in the Makati area of Southville. They listed their number one problem to be livelihood. The mother is grateful that they now have a place to live and don't have to worry about being evicted, but now have to worry about where they're going to get money to support their family. She said the city plans to build a warehouse to create jobs for the Southville people, but she said because of her age, she wouldn't be able to get any of those jobs.



Figure 28 - Southville Family;
Source: Photo taken by Ella Garcia,
2008.



Figure 29 - Cabuyao Hospital Exterior (Left); Source: Photos taken by Ella Garcia 2008.

Interview with Cabuyao Hospital Personnel

The hospital dietician conducted the tour through Cabuyao Hospital. Photos were taken and floor plans were given for reference, and potential sites for addition were suggested. Cabuyao Hospital is the only public hospital that services the city of Cabuyao. This means that all medical services provided are free to the residents of Cabuyao. It was commissioned by the National Government built in 1994. After its construction, there was no additional money for its maintenance.

It is a 2-story, 50-bed hospital that has OB/GYN, Pediatrics, Surgery, a Chapel, Physical Therapy, Occupational Therapy, Emergency Room, X-ray Rooms, Operating Rooms, Laboratory Room, a Dietitian, and a Pharmacy. It is approximately 2,592 sq. meters. (8,504 sq. ft.) total, and 1,962 sq. meters (4,252 sq. ft.) per floor. Retail and residential buildings surround the hospital. Right now, there is construction happening for the addition of 25 additional beds, which will primarily be OB/GYN rooms. The problem with this hospital right now is that it doesn't accept any Southville residents into the hospital.

One of the interesting elements of the Cabuyao Hospital is the natural ventilation in all patient rooms. The photos below show that the patient rooms are naturally ventilated from the outside and bring the inside air in. The hospital is located along busy roads where cars, motor tricycles and jeepneys run by emitting carbon monoxide right outside of the patient windows. This is dangerous for recovering patients, and different from many hospitals since good indoor air quality and sanitation are important in healthcare design.

The layout of the hospital is split into two wings with the lobby space on the first floor dividing the two. The hospital chapel, located in the center of the second floor, divides the two patient room wings.

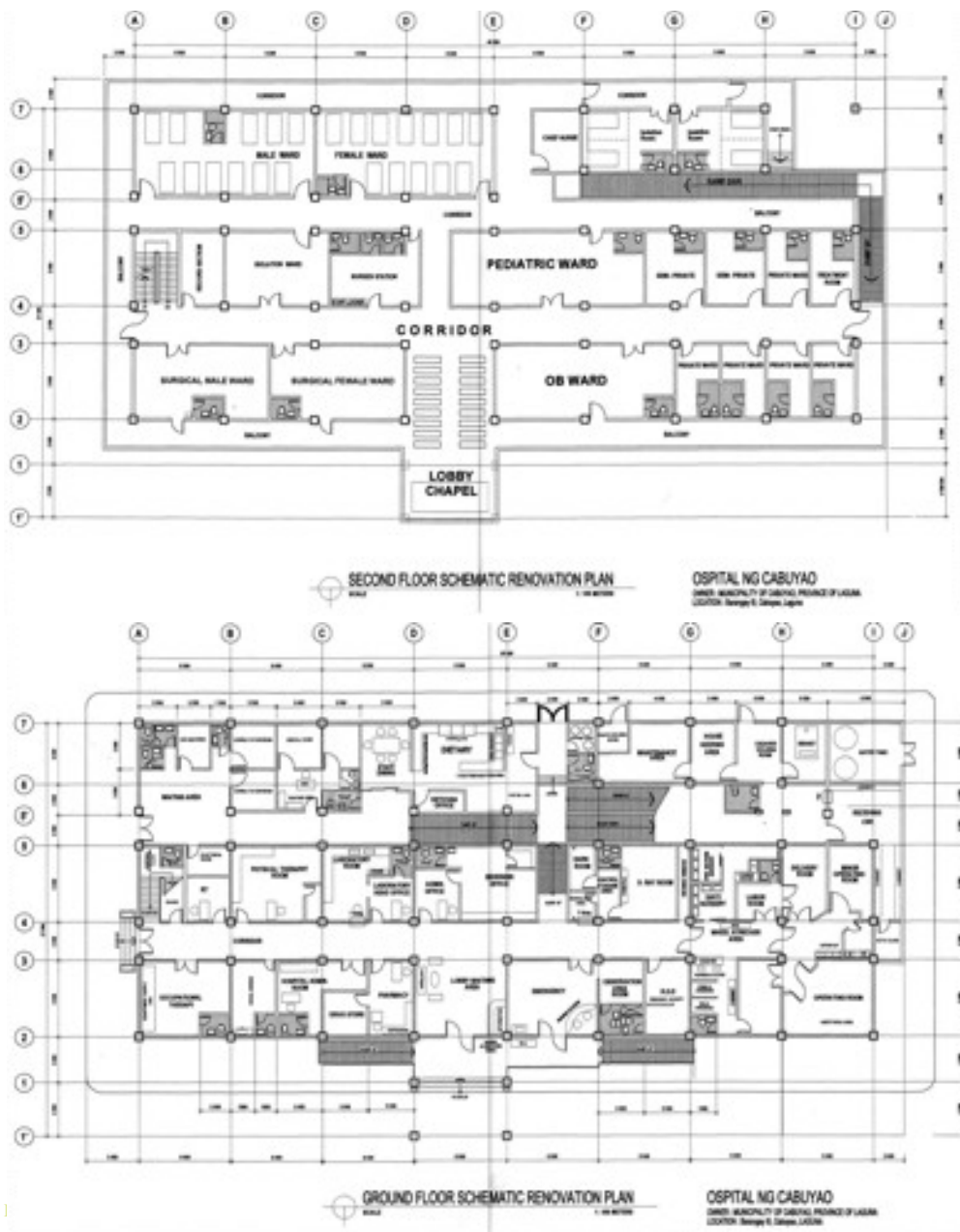


Figure 30 - Cabuyao Hospital Ground Floor (top left), Cabuyao Hospital Second Floor (bottom left); Source: Cabuyao Hospital (2008).



Figure 31- Cabuyao Hospital Departments (Top Right); Source: Photos taken by Ella Garcia

Figure 32 and 33 - Waiting Room (Top), Cabuyao Hospital Chapel (Right); Source: Photos Taken by Ella Garcia



Figure 34 and 35 - Cabuyao Hospital Corridor (Left), Operable Interior Windows (Right); Source: Photos taken by Ella Garcia



Summary

The additional costs of the Southville residents, as stated by Mayor Hemedez, means that any additional facilities built should be affordable. The segregation between the Makati, Manila, and Cabuyao areas has created a disconnect and even conflict within the Southville community. Building a market place would help to create a sense of pride and connection between the residents. The interview with the displaced family has shown that livelihood is their number one concern since they're far from where their jobs were. Without livelihood, the residents have no idea where to get their monthly amortization. In the event that they are unable to pay for 3 consecutive months, the houses will automatically be confiscated from them.

The information provided by the National Housing Authority on mortality and morbidity rates informs the necessary services needed for the health clinic. The Cabuyao Hospital does not accept people from Southville, even during emergencies. The Southville community needs their own health clinic to serve the people. The facilities that are lacking are a functioning health clinic, additional elementary classrooms, and places to work.

V.

**HEALTH CLINICS FOR
LOW-INCOME FAMILIES**

HEALTH CLINICS FOR LOW-INCOME FAMILIES

For the design of a health clinic, it is important to understand the healthcare situation in the Philippines for low-income families. It is also important to research how low-income and free health clinics have been designed in the United States. From this information, we can gather conclusions for to inform the approach to the design of a health clinic for the Southville residents.

Free Health Clinics for low-income families in the United States

America's free health clinics emerged in the 1960s as "a result of tremendous need for medical care that was not being met by establishment medicine. These community health care clinics, or "free clinics" as they are called, were not created as novel community experiments, demonstration projects, or even as pilot programs, nor were they the result of social dilettantism by social reformers. They were also not part of what Selznick has called 'a broad, conscious, social vision,' but were established, ad hoc, to cope with an epidemic of youthful drug abuse and the health problems that accompany it. After a few years, there were three types of free clinics that emerged: hippie drug clinics (also called street clinics, neighborhood (minority) clinics, and youth clinics."⁶⁴

America's free clinics went through three transformations, and as a result have a determined future path. The first transformation of the free clinics was an increased focus on the uninsured and working poor. The second transformation was a shift to the medical mainstream (evolution from an 'alternative identity to becoming a part of the community's mainstream medical care). The third transformation was a shift toward a network and collective organization and the rise of the National Free Clinic Council. "The future path of free health clinics will be shaped by four factors that will play a role in the stability and possible expansion of free health clinics. These factors are (1) healthcare access policy decisions made at the federal and state levels, (2) demographic changes within the United States population, (3) the maintenance and possible expansion of corporate, foundation, and public financials support for free clinics, and (4) the level of development of free clinic associations and supporting organizations."⁶⁵

⁶⁴ Weiss, 2006, 24.

⁶⁵ Weiss, 2006, 171.

These transformations of America's free clinics can be seen as a grassroots effort that have achieved success through the support of the local communities, volunteers, and other organizations funding these free clinics. The creation of these clinics from the ground up has affected national and federal policies in America. This grassroots medicine concept can be used in other developing countries with foreign funding. Starting with a few free health clinics in the Philippines can one day have the support it needs to be able to provide low-income families with the healthcare they need. One of the many lessons that can be taken from the transformations of America's free health clinics is the idea of a collective association and networking. "The most commonly identified benefit of belonging to a state or regional free clinic association is the opportunity to network with other clinics. Clinic staff and volunteers speak glowingly of the interaction with others who understand free clinics from the inside; the resources that are freely shared; the change to question, vent, and commiserate; and the feelings of belonging to a group with a common focus."⁶⁶ This idea can be translated into the decentralization of the health clinics all connected and networked to one another with the goal of providing healthcare to low-income families in the Philippines. There are many organizations in the United States such as Doctors Without Borders and Aloha Medical Mission who go into places like the Philippines and provide medical services. These people are necessary in being able to start up a grassroots effort of providing free health clinics in the Philippines.

Healthcare for Low-Income Families in the Philippines

Health and sanitation are a few of the main problems in the slum and urban poor areas because of "overcrowding, the run-down conditions of the housing, and lack of basic facilities like water, and the low income that usually results in malnutrition. When the lack of medical, dental, and nursing services is added to all these factors, the problem becomes serious, indeed."⁶⁷ Most of the low-income families do not have enough money to pay for medical coverage or hospital costs. The consequences of not having health insurance or money to pay for medical costs have a profound effect on health of individuals and families. "Studies have shown that people without health insurance are less likely to seek preventative medical care such as medical checkups and immunization. They are more likely to try to get through illnesses on their own without seeking a medical provider. If they do

⁶⁶ Weiss, 2006, 11.

⁶⁷ Laquian, 1969, 164.

see a medical provider, they often have waited until they have become very sick, their health is more threatened, and in some cases such as patients with cancer or diabetes, the benefits of early detection are lost. They are less likely to be admitted to a hospital but are sicker when they are admitted. Not surprisingly, people without health insurance end up in poorer health and with earlier deaths than those with insurance.”⁶⁸

The Southville residents only have access to one health clinic on site. This clinic does not provide adequate healthcare because it lacks in equipment and staff.⁶⁹ This is the only health facility that the Southville community can go to because the only other public hospital, Cabuyao Hospital (which caters to all residents of Cabuyao for minimal costs), does not serve the Southville residents, even though they have been living in Cabuyao for 4 years. Decentralized free health clinics need to be built to alleviate the inadequate facilities and health services for the Southville residents.

68 Weiss, 2006, 67.

69 NHA Interviews and Documents, 2008.

Health Clinic Size

According to Marty Waldron of Anshen+Allen Architects, the satellite clinic size is determined by a collection of rules of thumb based on many variables. He continues, if you consider the total number of patients using a clinic on any given day, you can calculate the total capacity and the area required given in the following example:

1) Total number of patients a clinic sees in a day – 4 to 6 per exam room x number of exam rooms + total number of staff = Total capacity of a clinic

2) This is scalable. Example: A 24-exam room clinic will have a capacity of 96-144 patients per day. The total providers and staff needed for a 24-exam room clinic is about 0.9 per exam room (primary care clinic) = 18

3) Total population of the clinic = 114-162 persons (not all there at the same time though). At any one time, 1.5 patients per exam room are in the clinic (36) plus all of the staff (18).

4) A 24-exam clinic building requires about 10,000 net SF. When you gross this up to the overall building area, it is 10,000 SF x 1.25 x 1.35, or 16,875 BGSF.

5) So the total area per person (capacity, not occupants!!) is $16,875 / 144 = 177$ SF/person, roughly. If you calculate the occupancy at any one time, it is $16,875 / (18+36) = 312$ SF/person.

Below shows the total number of the healthcare facilities needed in Cabuyao by using the previous formulas given by Waldron, we can see that a 24-exam clinic building at 16,875 BGSF will serve about 96-144 patients per day. This means that this clinic building will serve approximately 25,056-37,584 people per year, only open 5 days a week. Knowing that there are 8,173 families (or 32,692 people, 4 people average per family), and the 25-bed existing Cabuyao Hospital (8,504 SF) has two consultations rooms adjacent to the waiting room doesn't serve any of the Southville residents, we can see that a 16,875 BGSF exam clinic building will suffice for the amount of people in Southville.

However, this 24-exam clinic building needs to be broken up to be more accessible to the community and because there isn't a lot large enough to accommodate this size building. We can break up the building into six 4-exam clinic buildings at 2,812 BGSF each. These clinics will be located at the local community level, and a proposal of an additional 25 beds to the Cabuyao Hospital.

Recommendations for a Health Clinic for Southville Residents

The health clinic for the Southville Residents needs to be located within the community. Since the low-income population does not have insurance and typically pay out of pocket for healthcare, these health clinics need to be free. There needs to be several of these free health clinics to effectively distribute health care to the residents. The health clinic can begin with a grassroots effort, and with organizations like Doctors Without Borders to be providing the services, and private foreign organizations investing the money to provide equipment, medicine, and facilities.

The recommended 24-exam clinic building at 16,875 BGSF will be broken up into six 4-exam clinic buildings at 2,812 BGSF each. These clinics will be located at the local community level, and a proposal of an additional 25 beds to the Cabuyao Hospital. The locations of these health clinics and hospital addition will be determined by interviews and decentralization theories. It should be within the Southville community, and at a location that is accessible to everyone in the community.

VI.

MATERIALS & CONSTRUCTION

MATERIALS & CONSTRUCTION

The design of a low-income and free health clinic requires the project to be affordable. Affordability can come from the use of local materials and typical construction methods. The Southville residents, who have experience in construction through building their homes, can help build the health clinic if familiar materials and construction methods are utilized. Prefabricated construction can also be an affordable option that would provide a high level of quality and quick construction time. “During the Marcos administration, the most ambitious effort to meet the housing problem was the creation of the National Housing Corporation. It negotiated with a German firm in the 1960s for a low-cost housing factory, planned to manufacture pre-fabricated homes costing P6,000 or less each and to sell these at long-term installments. It had hoped to cut down costs by mass production.”⁷⁰ There are prefabricated technology that the National Housing Authority uses for their low-cost housing projects, and these technologies will be looked at to determine the materials and construction that should be used for sustainability and low maintenance.

Materials and Construction used by the National Housing Authority

Established during the Marcos regime, the National Housing Authority, or NHA, provides resettlement assistance to the National Government. One of the main provisions of resettlement assistance states that NHA will provide basic services and facilities and access to livelihood opportunities sufficient to meet the basic

70 Laquian, 1969, 14.



Figure 36 and 37– NHA relocation projects (Top) and (Bottom); Source: National Housing Authority

needs of the affected families in socialized housing or resettlement areas in cooperation with private developers and concerned agencies.⁷¹ Figure 41 shows the contracts that NHA has with different manufacturers of building materials and technology. AITECH (Accreditation of Indigenous Technologies for Housing) is a committee under NHA that evaluates and accredits various innovative technologies/systems for housing (items listed in Figure 41). NHA uses these companies for their low-income housing projects, including the relocation projects (Figure 36-37). These systems can be looked at as potential materials for the design of the health clinic.

The technologies that NHA uses that look to be most useful for the design of the health clinic are mostly wall and roof framing and panel systems. There are a few 'apartment boxes' and complete housing units that are prefabricated. A lot of these systems are modular or prefabricated wall systems that either pour in place on site or are already assembled. The waffle-crete wall system (Figure 38-39) is a system that has prefabricated components brought on site, then the concrete is poured into the components and formed onsite, and are also two of the more sustainable products. One interesting material used by NHA is concrete interlocking blocks (Figure 40), which are used by Bicol Habitat for Humanity Philippines. A lot of the roofing is made of galvanized steel sheets. NHA does not use any finishes or veneers on the wall systems, and if anything at all, paints the walls. The technology used by NHA is a good indicator of what innovative and indigenous technologies are available in the Philippines at an affordable cost. The question is the sustainability and maintenance costs of these materials.

Prefabricated Construction

Prefabrication is not a widely used technology in the Philippines. It is primarily used to manufacture steel, precast concrete, fastwall or pre-fabricated wall panels made of light concrete/cement and styrofoam resins, and styrofoam w/metal mesh. In researching this construction method specifically in the Philippines, it does not seem to be a viable design solution. This is because the costs of prefabrication would increase the total cost of the project since it is not a commonly used technology. Since concrete is a readily available material, it is not imported, and costs less to build with. Concrete is typically poured in place or off site like the Waffle-Crete technology. Concrete is going to be the material of choice for its local availability, ease of construction, affordability, its structural strength for typhoons and earthquakes, and ease of maintenance.

71 [National Housing Authority Website.](#)



Figure 38 and 39 – Pouring waffle-crete forms (Left), Erecting the Wall Panel (Right). Source: Waffle-Crete International Inc.



Figure 40 – Concrete Interlocking Blocks (Left) Source: Verot Oaks Building Blocks Inc. Website.

Figure 41 – Housing Technology used and approved by the National Housing Authority. Source: National Housing Authority Website: <http://www.nha.gov/ph/pages/housing-technology/list-of-accredited-technology.php>.

	PROPONENT/CONTACT NO.	ADDRESS	TECHNOLOGY	USAGE OF TECHNOLOGY	BRIEF DESCRIPTION OF TECHNOLOGY	VALIDITY DATE
1	ALSONS LAND CORPORATIONALSONS STEEL FORMING Contact Person: Ruel B. de Jesus Contact No.: 6700-5185-87	3F Solid House Bldg. 2285 Pasong Tamo Extension Makati City	Alsons Steel Loc Framing System	Roofing and Wall Framing	The Alsons Steel LOC Framing System housing model is a complete unit with interior partition and ceiling & utilizes Australia standard light gauge steel sections both for roofing & wall framing.	5/12/2007
2	AFEA LAND & PROPERTY MGT. CORP. Contact Person: Jojo Esquivel IV Telefax: (023) 820-11-10	205 A Chico Street BF Homes Subdivision Paranaque City	AFEA Building System	Wall Framing	The wall panel system is an integrated permanent form work system of constructing monolithic, poured-in-place, solid concrete walls.	7/2/2007
3	AVIDA LAND CORPORATION Contact Person: Marvin Moyon Contact No.: 02-814-7487 Fax: 818-2267; 812-8130	4th Floor, Makati Exchange Ayala Avenue City of Makati	Tex Building System Phoenix Bldg. System	Wall Panel System	The Tex Building System is composed of four (4) elements, namely; foundation system, structural framing, perimeter walls and floor framing system.	5/16/2008
4	BICOL HABITAT FOR HUMANITY PHIL. FOUNDATION Contact Person: Sharon Magat Contact No.: (632) 897-3069	Unit 12 F- Pet Plans Tower, EDSA, Makati City	Concrete Interlocking Block	Wall Framing	The Concrete Interlocking Block (CIB) can be compared to "Lego" plastic toy. It can be manufactured on site using molder, drying boards & make shift shed.	9/2/09
5	CESAR V. CANCHELA & ASSOCIATES	70-11TH Ave. Bgy. Socorro, Cubao, Q.C.	Canchela Shelter Components	Apartment Boxes	Apartment boxes are erected by crane using a stacking process that creates free spaces between boxes when joined together at their corners. In effect, 55 apt. boxes can produce 100 apt. units in 30 days.	3/8/06
6	CHOI TRADING VENTURES Contact Person: Woong Jo Contact No: 631-4815; 746-9566 Fax: 632-0355	25-B San Rafael St. corner Phil Am Road, Pasig City	Durable Housing System	Steel Panels for Walls and roofing	The Durable Panels are made of galvanized steel sheets with polyester & silicon sandwiching the high density styrofoam inside	9/17/2008

7	COLORSTEEL SYSTEMS CORP. Contact Person : Engr. Remo Sobrevega Contact No: 726-8303	Del Rosario, San Fernando, Pampanga	Steel Truss Framing System	Roof Framing	The steel truss framing system uses hat type purlins & S frame & web section for truss members. It is structurally sound & it maximized the structural stability of light gauge steel.	12/5/2006
8	DIAMOND HEAD GLOBAL PHIL. Contact Person: Darrel Sabihon	Legaspi Towers 200 Suite 1 & 2 Penthouse Paseo de Roxas, Makati	Diamond Head Homes Steel Frame	Roof and wall framing	The system utilizes light gauge steel sections for its roof framing and steel framing for its wall studs.	12/22/09
9	D.M. WENCESLAO & ASSO. INC.	306 Rodriguez Sr. Blvd. Quezon City	Eco Panel Bldg. System	Wall Panel System	A hollow core fiber cement panel using indigenous materials. This panel can be used for load bearing exterior and interior wall partition for 2-storey and up.	9/15/2010
10	EHPI DEVELOPMENT CORP. Contact Person: Noel Gonzales Contact No.: 809-5861/63 Telefax: 809-5863	Suit 5 C Unipil Center Commercial Ave. Alabang Muntinlupa	Wafflecrete	Wall Panels	Waffle-Crete is a modular concrete panel building system using 6" or 8" thick structural panel section that uses 3 to 3 1/2 of Concrete (Solid Slab equivalent Volume)	11/14/06
11	FAST WALL SYSTEM PHILS. Contact Person: Felix Cadayona Contact No: (02) 687-3582 Fax No: 687-3519	Suite 3306 Antel Global Corp Center, Ortigas Center	Fastem Extended Lighweight Composite Panel	Wall Panel System	Utilized the same construction concept of the accredited Dong Shin Panel Light Gauge Sandwich Panel (Cert. No. 96-006) where both systems utilize light gauge steel as structural frames and pre-fabricated panels as wall component.	7/21/2010
12	H.N. ABBATUAN BUILDERS Contact Person: Hilario N. Abbatuan Contact No.: 842-1522	No. 148 Purok 4, Alabang, Munitinlupa City	H.N. Abbatuan Building System	Cast-in-Place Wall System	The Abbatuan System is the design of a complete house form that allows a simultaneous concrete pouring of walls, partitions, beams & columns thereby allowing a uniform distribution of strength for the whole house.	7/10/10

Local Materials Used in Southville Housing

The local materials that were commonly used to build the homes in the Southville project were concrete masonry units walls finished with unpainted concrete, wood constructed roof frames, metal framed jalousie windows, and metal corrugated roofs. Figure 42-46 shows one house built by the residents and materials provided by NHA. Their designs and materials are limited to what NHA states they can use.

The common use of concrete masonry units in the Southville community means that it is a feasible solution that the residents know how to use and build structures with. The walls do not have dry walling or waterproofing. There is not enough money to finish the inside or outside of the house, or even enough money to provide an adequate bathroom.



Figure 42 - A home in Southville and Photos exterior of the house they built for P50,000 (Approx. \$1,000) Source: Photos taken by Ella Garcia



Figures 43-46 - Photos of the interior of the house; Source: Photos taken by Ella Garcia



VII.

DESIGN MODELS

DESIGN MODELS

Architectural responses documented by Architecture for Humanity are design models that show lessons of elegant, affordable, cultural, and sustainable designs. These responses to the needs of the specific communities and ingenuity in material uses are true responses that give pride back to these communities. The three architectural responses that will be analyzed are a Mobile Health Clinic in Botswana, a Medwed Clinic in Israel, and innovative and elegant uses of concrete blocks in Sistema Arde in Mexico. These design models exemplify lessons that can be used for the design of the Southville Community Health Clinic.

Mobile Health Clinic (Botswana, South Africa, 2002-05)

The Mobile Health Clinic, designed by atelier, was designed in response to the AIDS population in sub-Saharan Africa. This clinic is constructed with two permanent earthen buildings to support the temporary clinic, which creates flexible spaces that triple up for other functions. During the day, the permanent clinic doubles up as a marketplace, where local artisans set up stalls to sell their wares while people wait to see doctors. Then at night, the facility becomes a travelling community center for events, including film screenings. It costs \$16,500 for each clinic. It is not seen as a AIDS clinic but as a travelling community center.

The permanent clinic building consists of two waiting spaces, segregated by gender, an education room for each, two consultation rooms for each, a three bed-bedroom for each, staff storage, and a pharmacy/local contact. Each space makes up the 12 modular units of the building. The veil placed on top the structure is a cultural response as it uses local African textiles, while giving it protection from the sun. The modular design, cultural response, and multi-functional spaces of this mobile health clinic in Botswana, South Africa are some of the ideas that can be used to design the Southville health clinic.

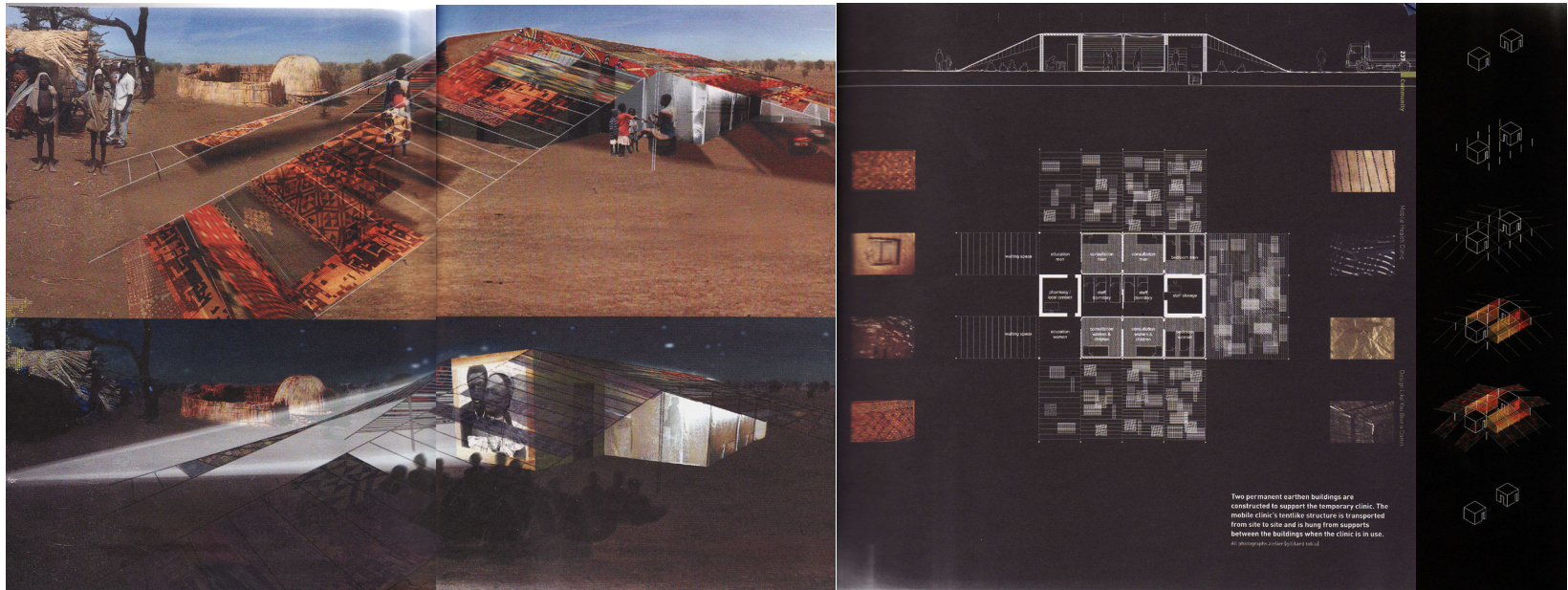


Figure 47 – Images of Mobile Health Clinic showing multiple uses. Source: Architecture for Humanity, 2006, 234-235.

Medwed Clinic (Wadi-Naam, Israel, 2003)

Built by several hundred volunteers and funded by private donations from the United States, this \$25,000 Medwed Clinic has resulted in a “self-sustaining shaded structure that finds dignity in simplicity. This clinic is not just about medical rights for the citizens of Wadi-Naam, it is about health security for all the Bedouin citizens.”⁷² It is designed with a semi-translucent façade made from two layers of polycarbonate sheeting filled with twigs allows light into the interior while maintaining a sense of privacy.

The clinic is equipped with many sustainable design solutions that result in a self-sustaining structure. The clinic has a butterfly roof that is reminiscent of the traditional Bedouin tent, and three of its exterior walls are made from mud-covered straw bales. The fourth wall is made from two layers of polycarbonate sheeting with vegetation grown in between. The clinic has a solar-powered refrigerator that holds medical supplies. It is sited so that it takes advantage of wind patterns to allow for natural ventilation. The clinic also has a shaded garden and enclosed by a fence made from adobe-covered tires. The butterfly roof helps to collect rainwater.

72 Architecture for Humanity, 2006, 247.



Figure 48-50 (Next Page) – Medwed Clinic showing semi-translucent façade allows light in (Bottom Left). A rainwater collection system irrigates the fruit trees around the area (Top). Volunteers and residents built the clinic in six days (Bottom Right). Source: Architecture for Humanity, 2006, 244-247.

Innovative Uses of Masonry (Sistema Arde Mexico, 1996-98)

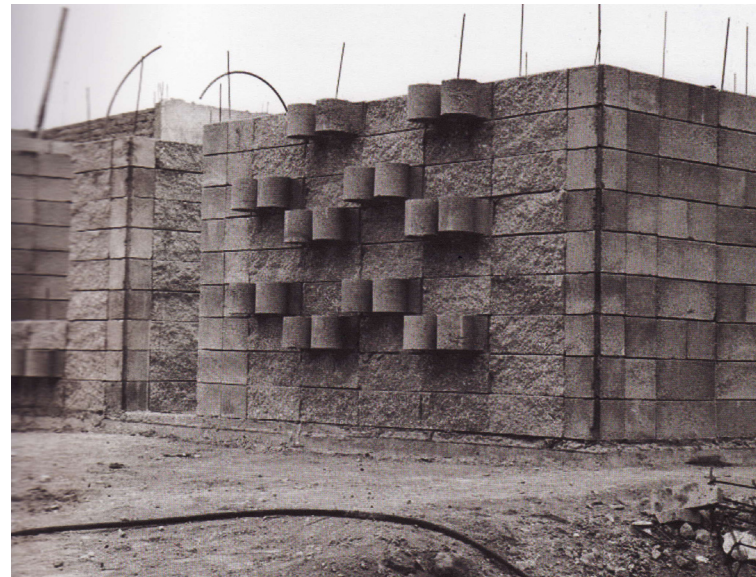
The innovative and elegant use of masonry has created exciting possibilities for Sistema Arde (a patented building system that combines the ease of building with a cement-block with the warmth and variety of traditional construction)⁷³. Concrete masonry unit (CMU) block is cheap and widely available in Mexico, Alejandro Villarreal developed these elements to design the housing.

The components of the low-income houses are divided into three basic types (Figure 53). These three types are: “basic technology (inner wall blocks and other structural elements); finishing blocks for facades; and structural accessories (for stairs, details for planters, or to form chase walls for plumbing).”⁷⁴ The structural accessories such as planters and stairs humanize the façade and interiors. This innovative use of a simple and traditional building component has resulted in a very elegant architectural solution and an unlimited amount of possibilities.

⁷³ Architecture for Humanity, 2006, 170.

⁷⁴ Architecture for Humanity, 2006, 172.

Figure 51 and 52- A group of single family, low income houses, textured façade is created by using a variety of blocks (Left), Inner courtyard of houses, flower-vase block creates planters (Right). Source: Architecture for Humanity, 2006, 170-171.



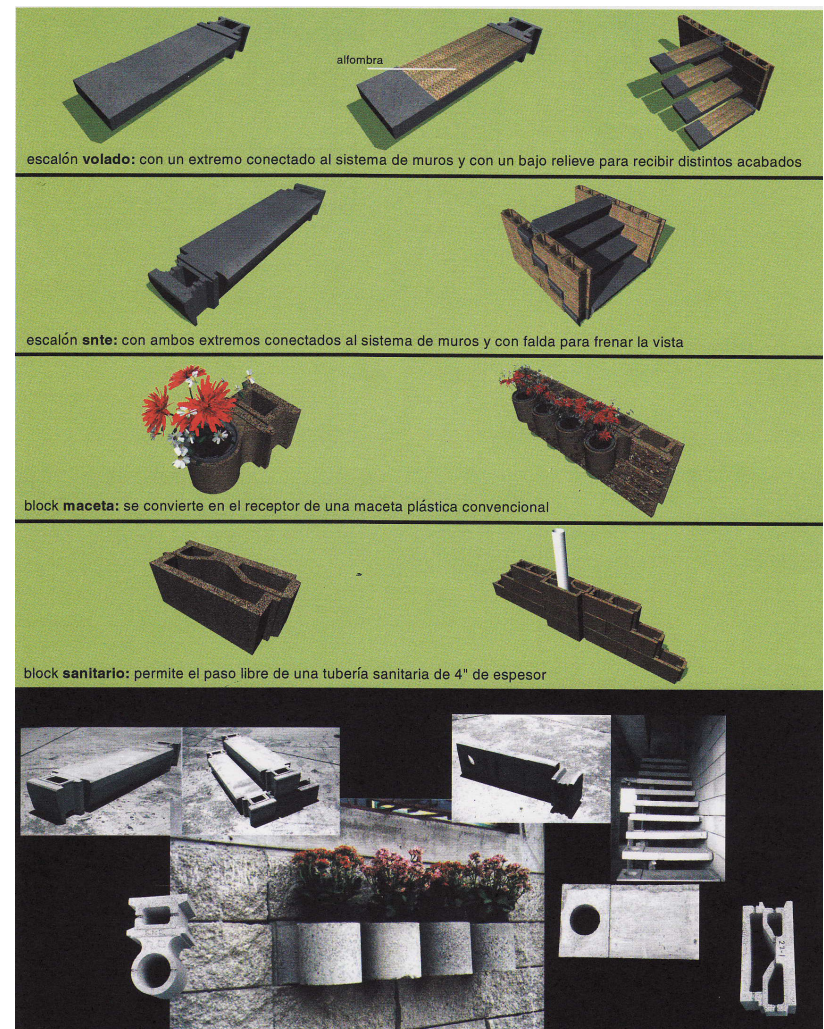


Figure 53 and 54- Components of the block systems used in the housing.
Source: Architecture for Humanity, 2006, 170-171.

Conclusion

The three case studies each have different ideas that can be used for the Southville Community Health Clinic. The flexibility of spaces and modularity in the Mobile Health Clinic in Botswana will help to create more efficient spaces. The self-sustaining design solutions of the Medwed Clinic in Israel are ideas that need to be used in the design of the Southville Clinic. Although costs are much higher up front, its payback will be quick, and its maintenance costs will be reduced enormously. The ingenious invention of Sistema Arde show that even a simple and traditional material can be transformed into elegant pieces to form interesting architectural solutions.

VIII.

SITE ANALYSIS

SITE ANALYSIS

Municipality of Cabuyao, Central Laguna Province

The health clinics that will serve the Southville residents is going to be located in Cabuyao, Laguna province, Philippines. Cabuyao is located South of Manila next to Laguna De Bay. According to the 2007 census, Cabuyao has a population of 205,376 people. The city is one that was settled during the 1500s by the Spaniards. Spanish cultural influence is still prominent in the city with the original church built in the late 1500s, the town square, courtyards, and narrow streets. The buildings are typically constructed with concrete because of frequent typhoons. The region is also prone to earthquakes and flooding.

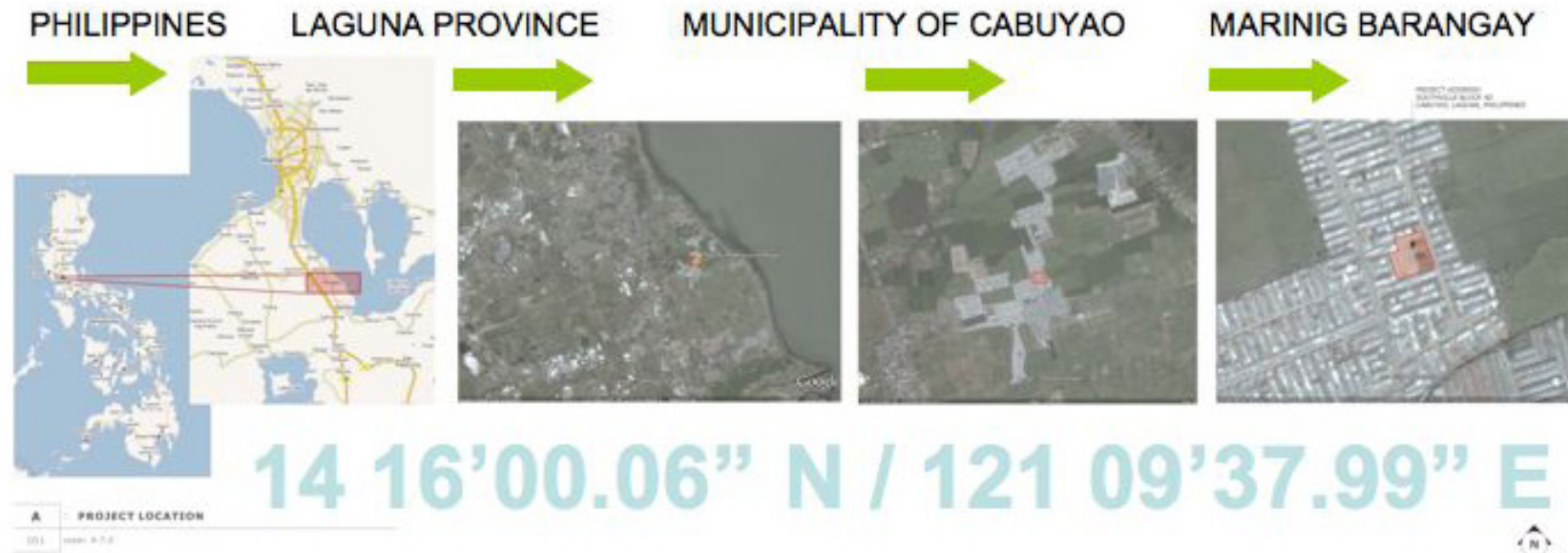


Figure 55 - Philippines and Location of Cabuyao; Source: Google Maps

SOUTHVILLE RELOCATION PROJECT

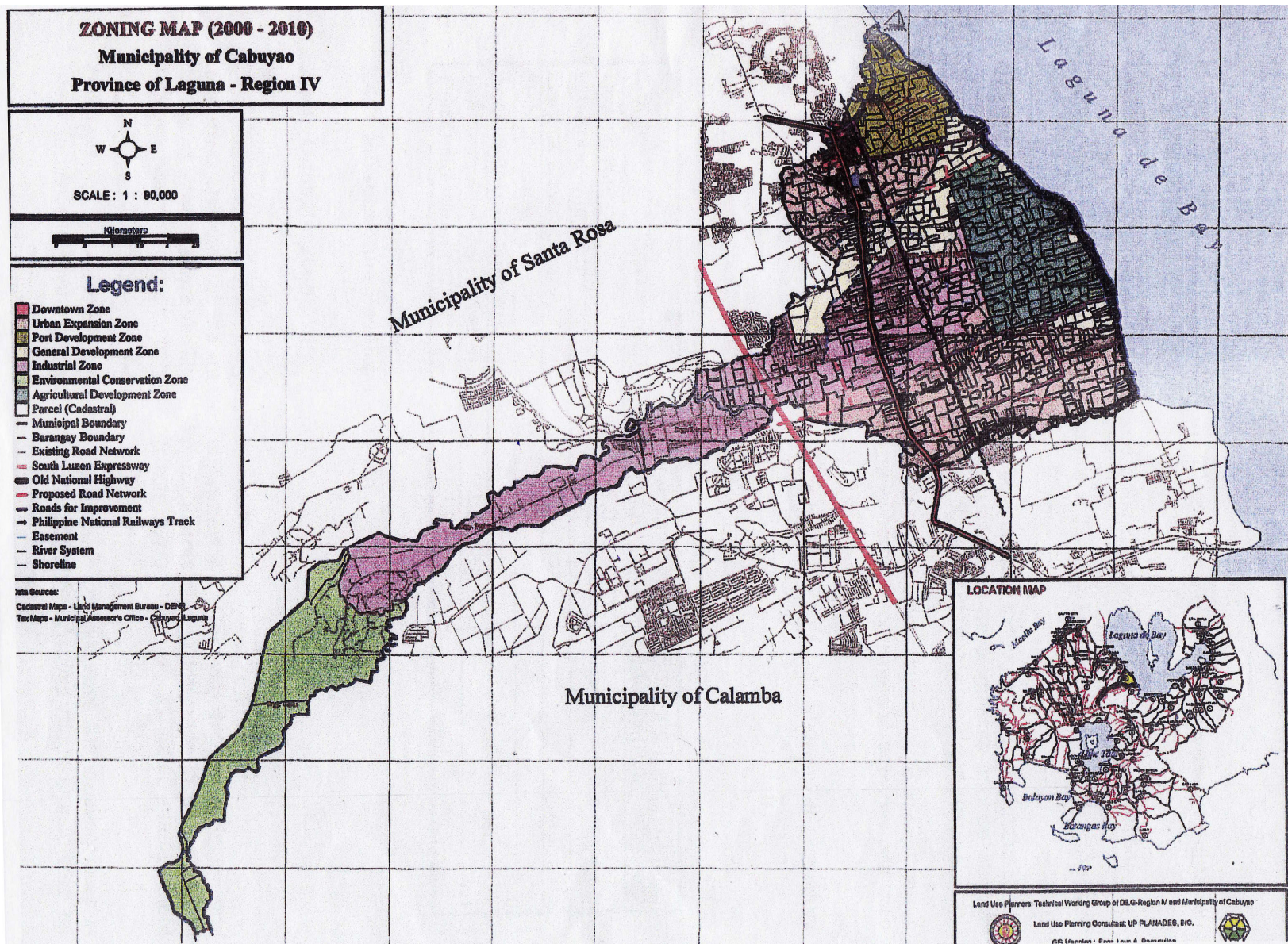


Figure 56 - Zoning of Cabuyao; Source: City of Cabuyao

Climate

Although the Philippines is generally in a tropical climate, it is an island nation, and has various microclimates. There are low-lying valley areas, areas located near the ocean, lakes, lush and cooler mountain areas, and urban city centers. Cabuyao, Philippines is located 14 16'00.06" N and 121 09'37.99" E. Figure 41 shows the sun path for the area. Temperatures vary between 24 to 27 degrees Celsius, or 75 to 81 degrees Fahrenheit throughout the year. Wind speeds are typically less during the rainy seasons (May to November), but increase during typhoon season (August to November). Since there is a rainy season, Cabuyao gets an average of 19-20 days of rain during the months of July and August, where precipitation reaches an average of 13.8 inches of rainfall.

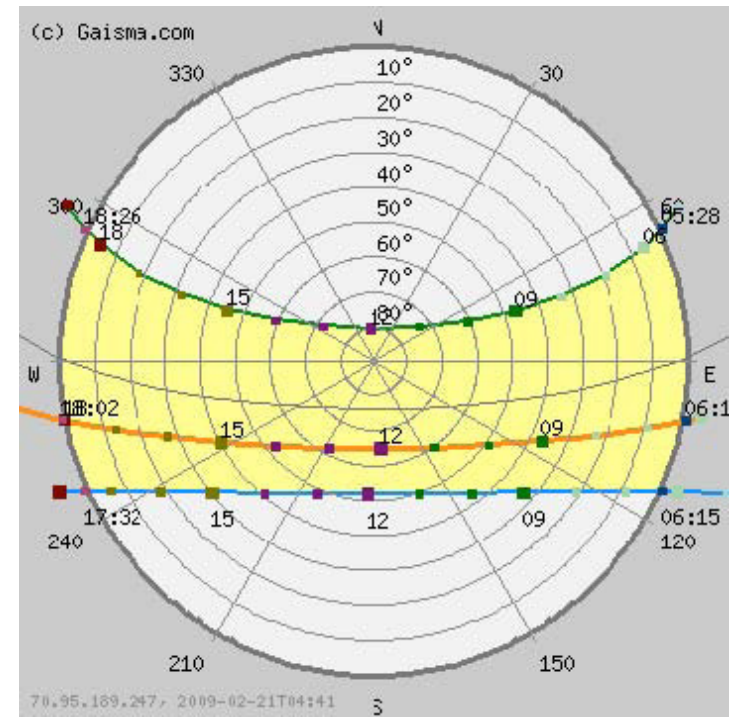


Figure 57 - Sun Path Diagram for Central Laguna Area; Source: GAISMA website.

Variable	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Insolation, kWh/m²/day	3.86	4.53	5.32	5.86	5.47	4.92	4.55	4.24	4.32	3.96	3.68	3.45
Clearness, 0 - 1	0.47	0.50	0.53	0.56	0.52	0.47	0.43	0.40	0.43	0.42	0.43	0.43
Temperature, °C	24.29	24.80	26.13	27.14	27.19	26.47	26.06	26.09	25.98	25.79	25.37	24.62
Wind speed, m/s	6.61	5.66	5.19	4.15	3.40	4.44	4.21	5.39	4.20	4.83	6.40	7.25
Precipitation, mm	41	15	26	40	144	272	332	351	308	274	210	116
Wet days, d	6.7	3.9	4.1	4.5	10.4	16.5	19.0	19.4	18.5	17.4	13.8	10.1

Figure 58 - Climate Data for Central Laguna; Source: GAISMA website.

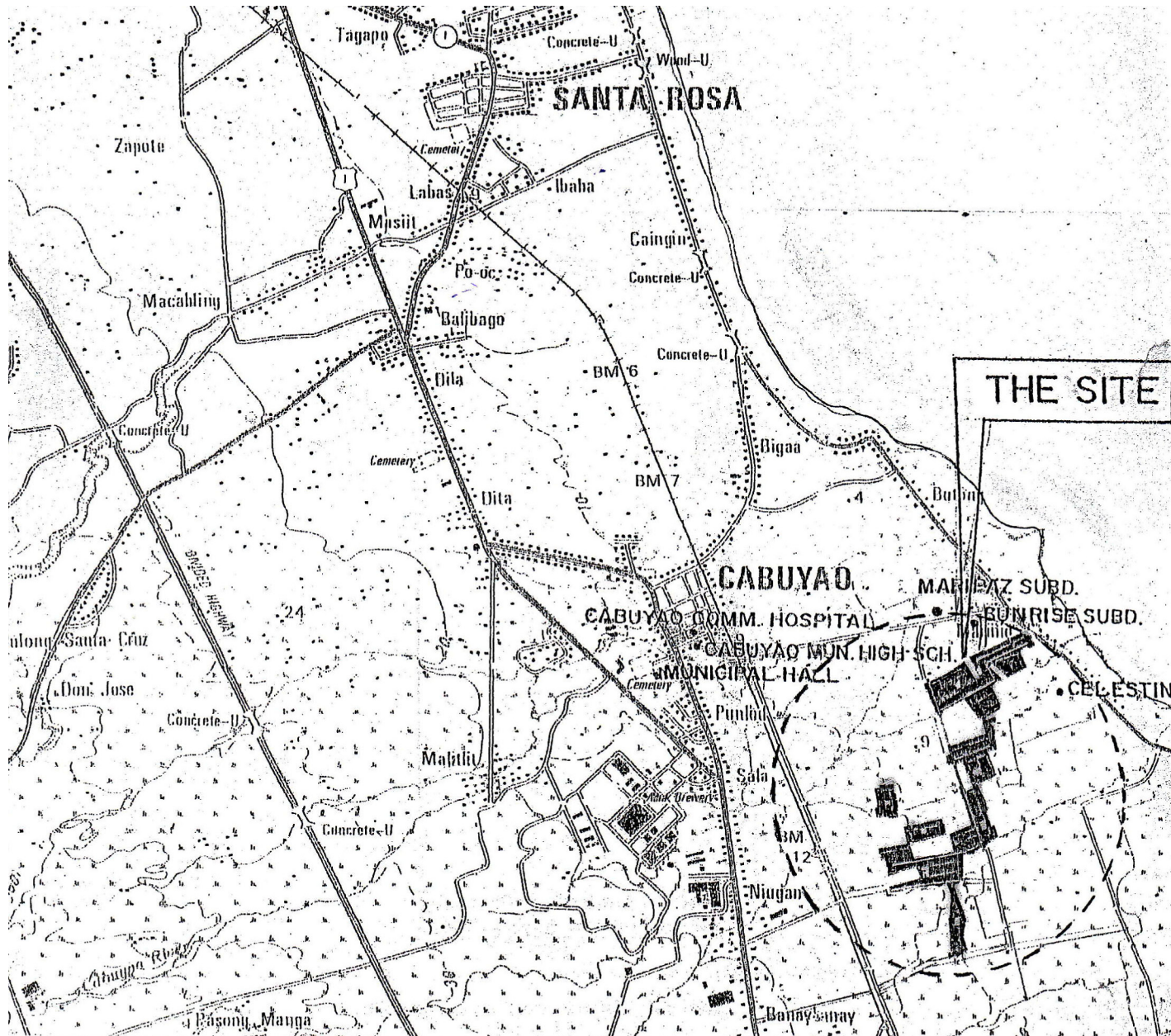


Figure 59 - Southville Project Site, Cabuyao, Philippines; Source: City of Cabuyao

Southville Relocation Project Site

The Southville Relocation Project is located east of the Cabuyao main town center (See Figure 59), in an area zoned for agricultural development. There are 15 phases for the Southville project. The site is divided into 65 blocks (Figure 60) and a block manager is assigned to oversee any problems that the residents have. These blocks are further divided by where the people originally came from. There is a Makati area, a Manila area, and a Cabuyao area. This further segregates the people, which cause tension between the three groups. Each block manager oversees approximately 20-30 families (one family per lot). A 40 square meter (431 square feet) lot is given to each family to build their house upon. These lots are located adjacent to one another with narrow roads as a buffer between them. Each block has a water pump that is the main source of water for the residents.

The spatial design of the site is very spread apart segregating the different areas. The blocks end up being designed as a lot of row houses with a very narrow road in between the rows (see Figure 67). This creates danger for pedestrians since there are no sidewalks, especially students walking from school to their home. This spatial design of the site also creates heat islanding since there are hardly any open green spaces in the Southville Project. Building only a one story home on a 40 square meter lot, each lot is very cramped for an average family of four to five persons. There is a lack of culture and heritage, which is a reason why people end up leaving. There is no community identity and pride of their place. There are a few basketball courts provided within the site, which provides for a good recreational space for the children, but there should be more varied types of recreational spaces in the community.

There needs to be more open green spaces, more recreational spaces, and community spaces for cultural activities. Providing open green spaces for recreational and agricultural purposes can help people earn money raising pigs and chickens and growing rice. This can also help alleviate heat-islanding helping to decrease the temperature of the surrounding area.

Water and electricity are only available to half of the residents, and only at restricted times during the day. The National Housing

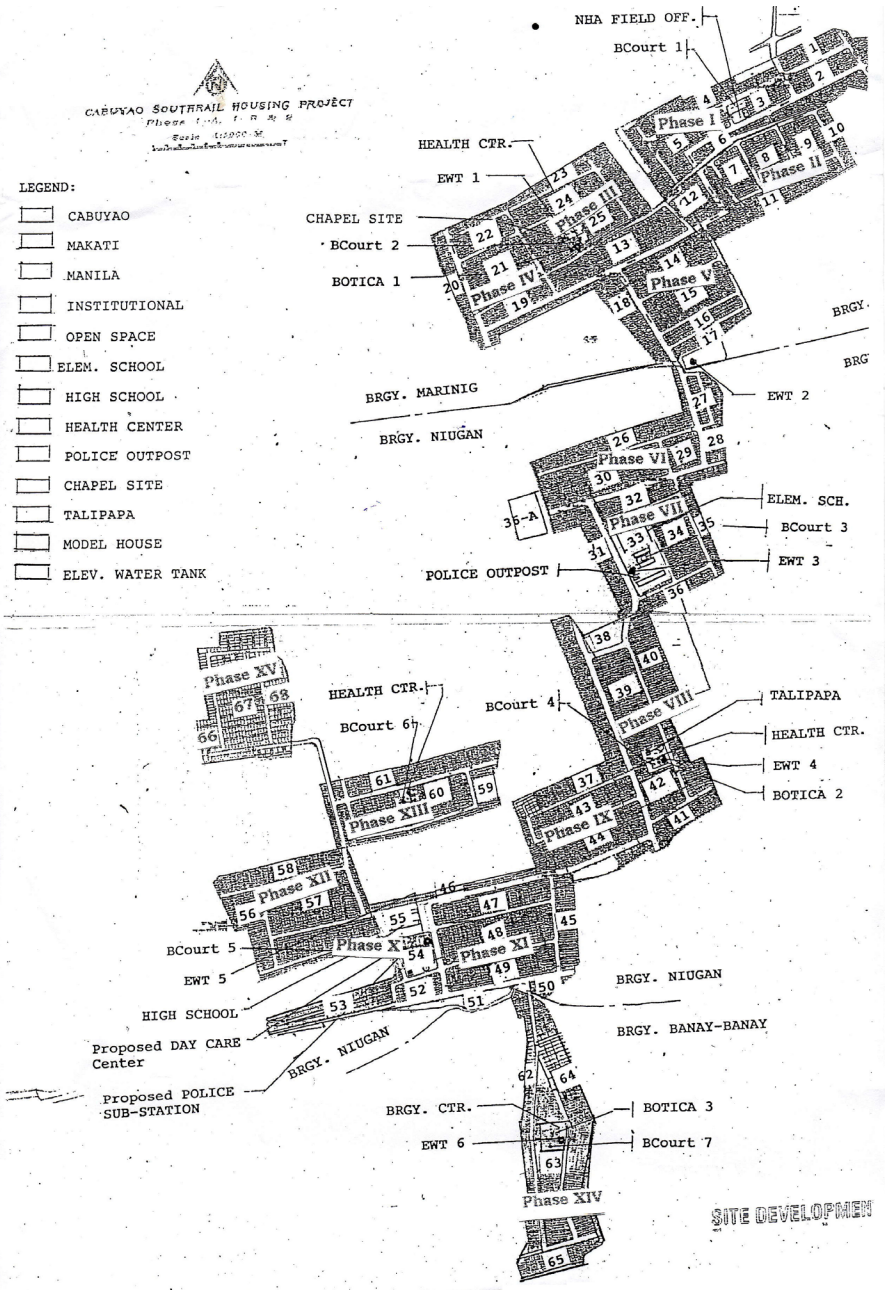


Figure 60 - Site Development Plan;
Source: City of Cabuyao



Figure 61-63 - Southville Elementary School (Left and Middle), High School (Right); Source: Photos taken by Ella Garcia



Figure 64-66 - Non-Working Community Water Storage Tank (Bottom Left), Water Pumps (Bottom Middle), Typical 'Sari-Sari' Store (Bottom Right); Source: Photos taken by Ella Garcia



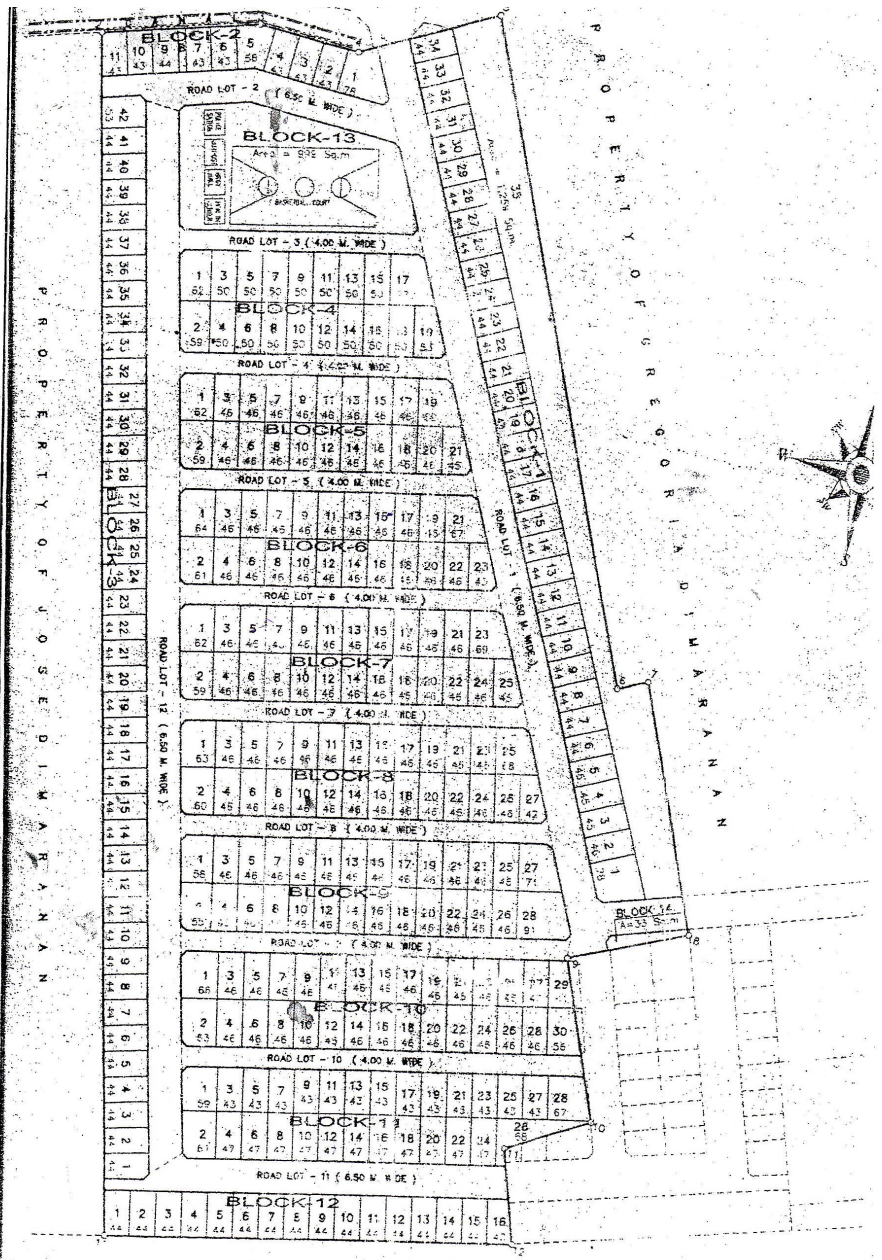


Figure 67 -
Phase 1, Block
Layout; Source:
City of Cabuyao

Authority, or NHA, oversees the entire project and has an office located within the site. The facilities that have been constructed in Southville are basketball courts, an elementary and high school, and various markets and shops run by the residents.

The Southville health center is located on block 42. NHA states that the medicines are lacking, and there are no equipment, no doctors, only a mid-wife, nurse, and 9 other personnel. They are open Mondays-Fridays all day, and Saturdays half the day. It is the only health clinic servicing the 8,173 families in the area. It is too far for some to walk to it since it is located on one end of the site. It is a dreary building with bars as its windows, and open to the elements. It is a one-story building built flat on the ground, which means it is prone to flooding that occurs during the rainy season. It has no signs that it is a health clinic, and being adjacent to a basketball court looks like it could be a community center for reserve. It even looks like a house that a resident may have built there. The other facilities have a painted exterior, while the health clinic does not., making it unidentifiable as a facility provided by NHA. It is unwelcoming with no shelter for people waiting outside since there isn't enough room for people to wait inside.



Figure 68-69 – Health Clinic in Southville (Left), Adjacent Basketball Courts (Right); Source: Photos taken by Ella Garcia



- CABUYAO COMM HOSPITAL
- CABUYAO HOSP ADDITION
- COMMUNITY HEALTH CLINICS

Figure 70 – Locations of the Cabuyao Hospital Addition (semi-major hospital) and the Six Community Health Clinics (local free health clinics), Decentralized healthcare delivery network

Southville Healthcare Network

The Southville Healthcare Network needs to rely on being able to utilize the Cabuyao Hospital as a semi-major hospital source. The major hospital will be one of the main hospitals located in Manila to provide for more specialized and more difficult cases. The community health clinics are broken up into six health clinic buildings at 2,812 BGSF each. These clinics will be located at the local community level, and a proposal of an additional 25 beds to the Cabuyao Hospital to expand the semi-major hospital. Figure 34 shows the location of the Cabuyao Hospital addition and the six community health clinics within the Southville Relocation site.

This base level of health care delivery would be at the local level of the decentralized health system, provided at the community clinics. The specialists would be at the centralized level, provided at the main hospitals. The primary care physician would be located at the community clinics providing for a total health care over a period of years.

Location and Analysis of Prototypical Health Clinic

The location of the health clinic that will be designed for this project is on block 42, where the existing health clinic is located. It is central to the other proposed clinics on the project site. Since the surrounding houses and basketball court already define the site, there are restrictions on the buildable area on the site. The current health clinic is approximately 60 square meters (646 square feet) with space behind and on one side of it to build on. This means that the 2,182 BGSF facility will need to be two stories high and extend beyond the footprint of the existing clinic.

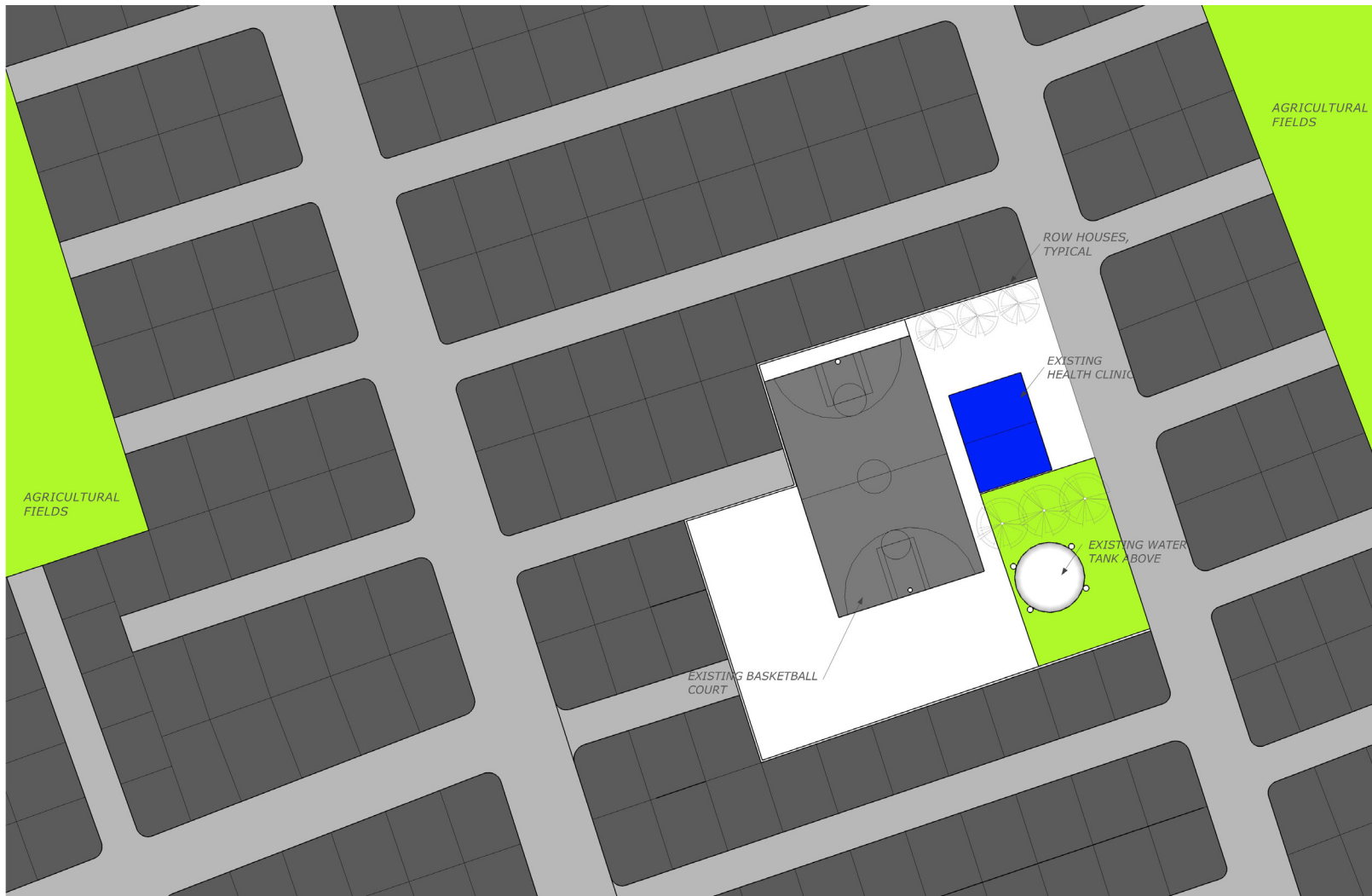


Figure 71 – Existing Site Plan and Location of Health Clinic, Scale: NTS.

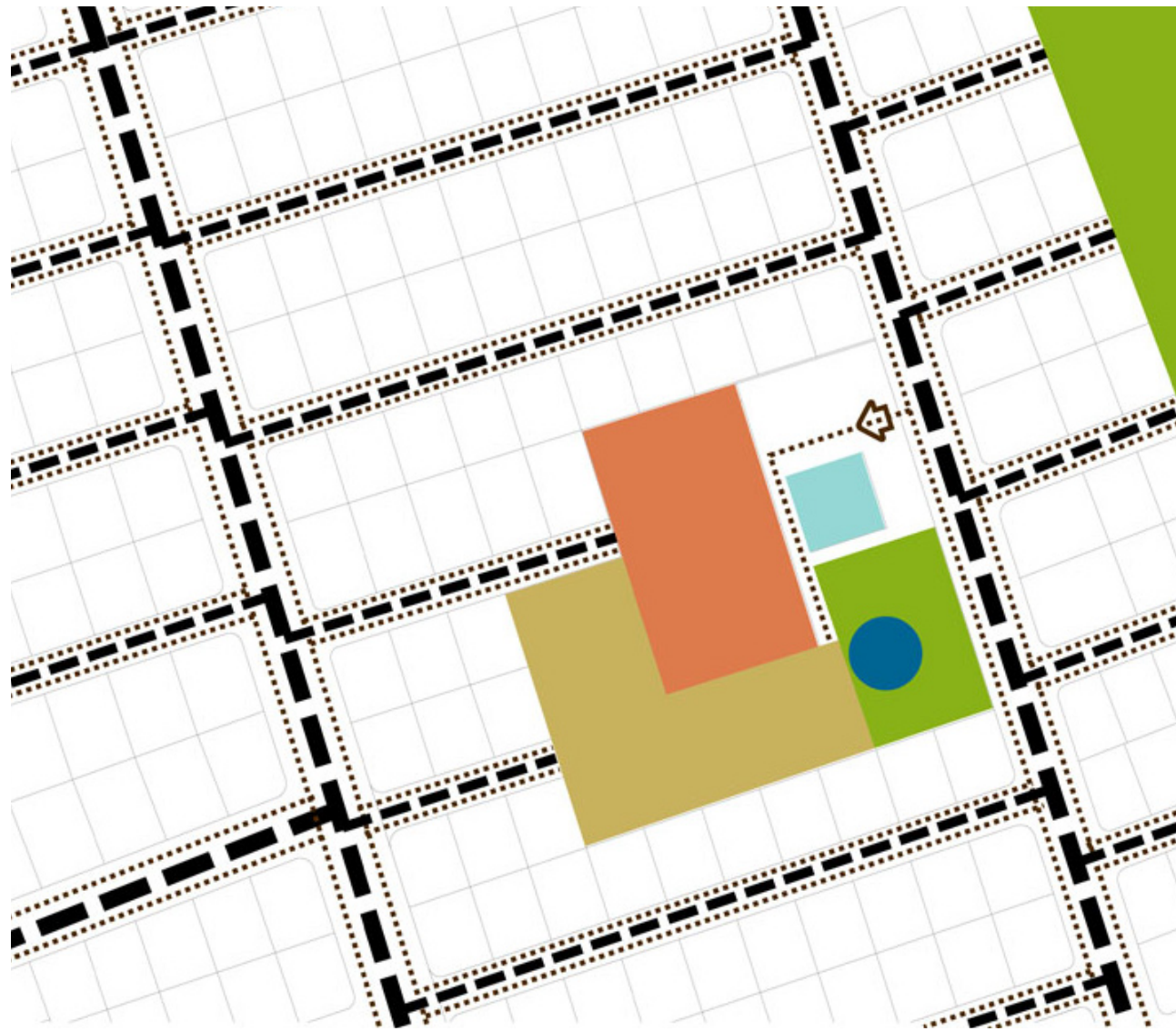


Figure 72 – Traffic Pattern Diagram, Scale: 1/32" = 1'0"

- EXISTING CLINIC
- PROJECT SITE
- RECREATION
- GREEN SPACE
- WATER TANK
- VEHICULAR TRAFFIC
- PEDESTRIAN TRAFFIC

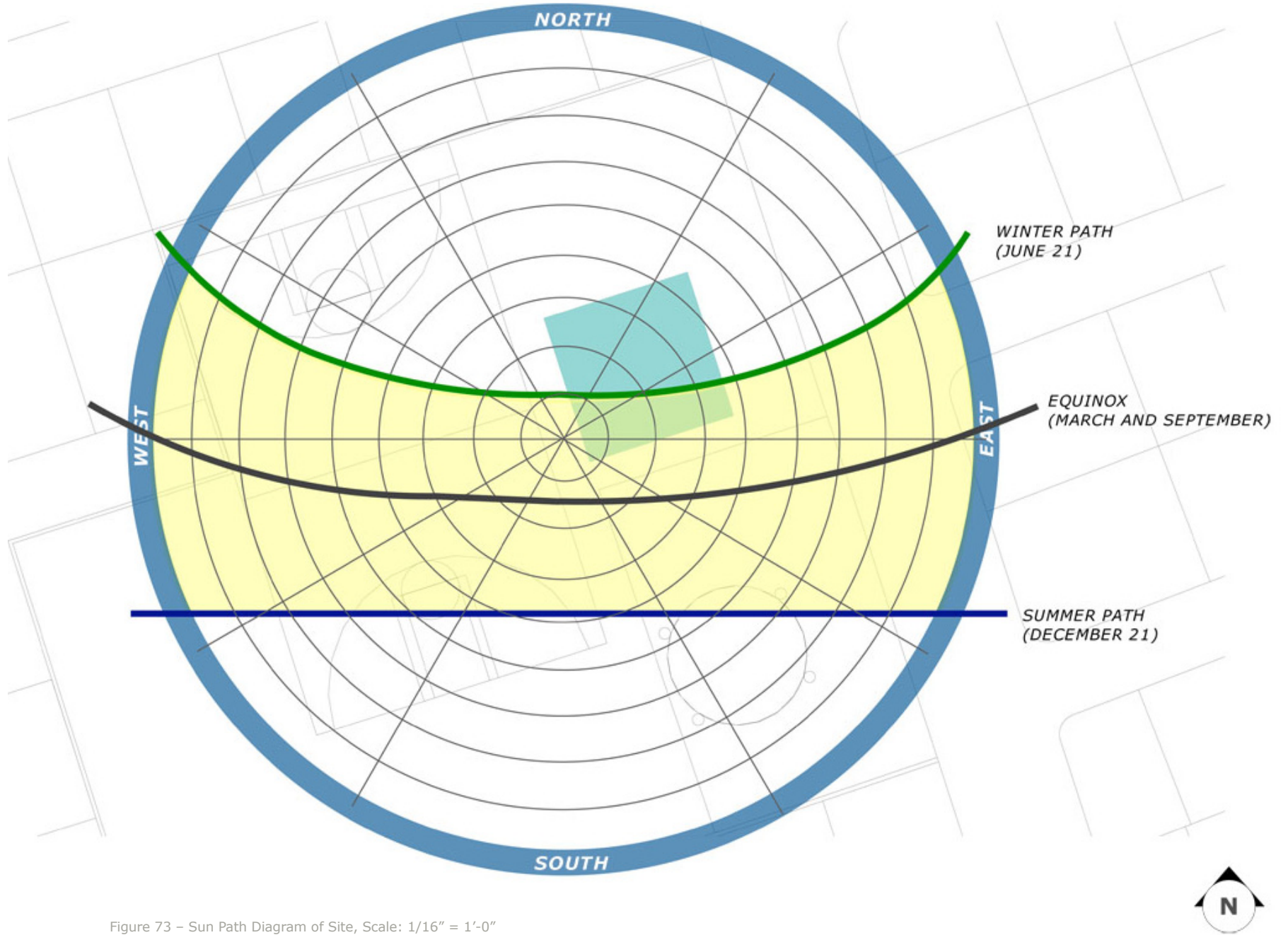


Figure 73 – Sun Path Diagram of Site, Scale: 1/16" = 1'-0"

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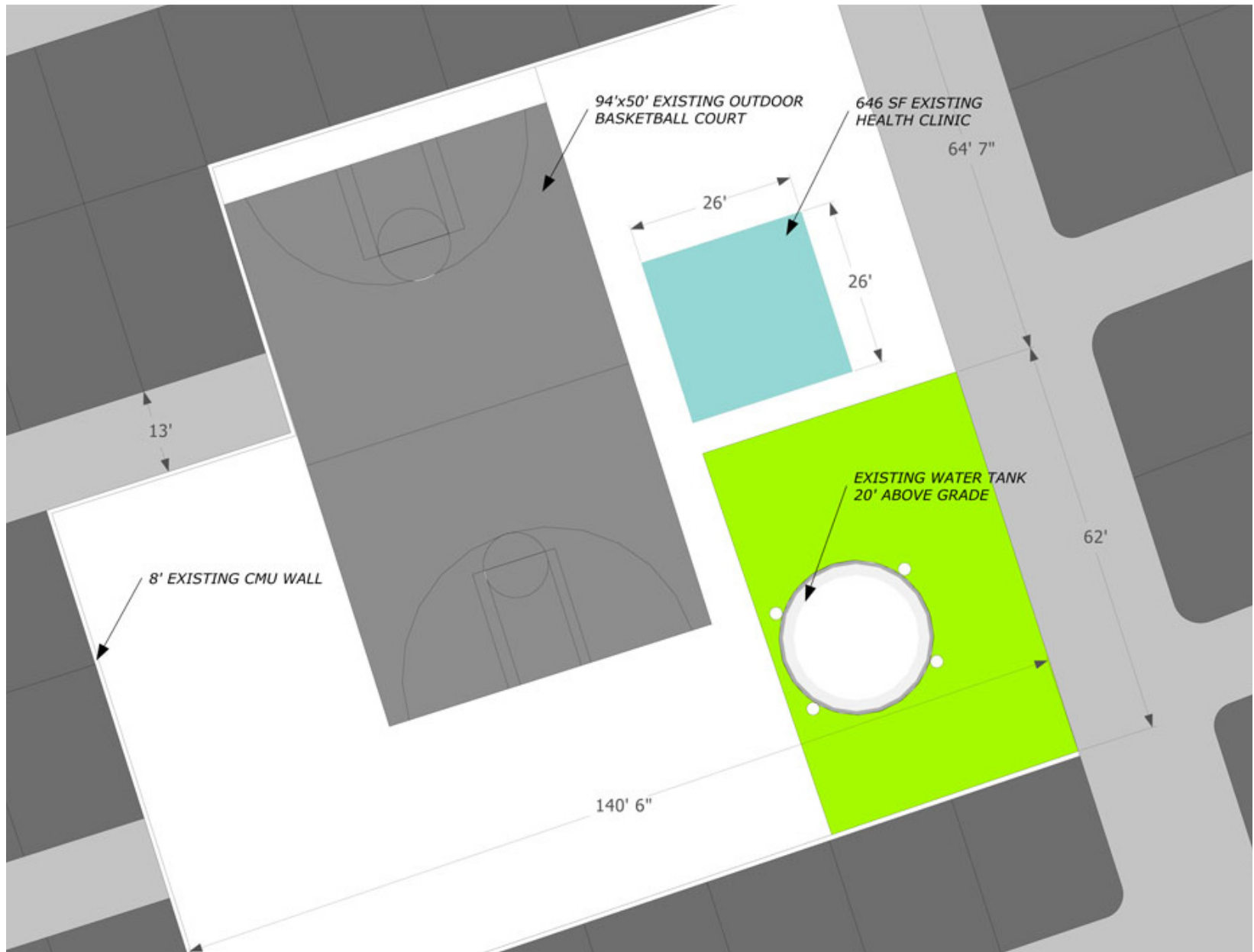


Figure 74 - Enlarged Existing Site Plan, Scale: 1/16" = 1'-0"

The area of the entire site is approximately 16,343 square feet. There are two roads that are adjacent to the site. These roads do not connect to the site because there is a perimeter wall on all sides except for one adjacent to the main street. This means access to the site is only on one side, and seems to lack community connectivity. There is a main street adjacent to the site, which means there is increased vehicular and pedestrian traffic going to the site (Figure 45). There are three different functions going on in the site, a health clinic, a water tank, and a basketball court. These functions do not have any relation to one another, and should be addressed in the new design of the clinic. The rest of the area is an empty dirt lot.

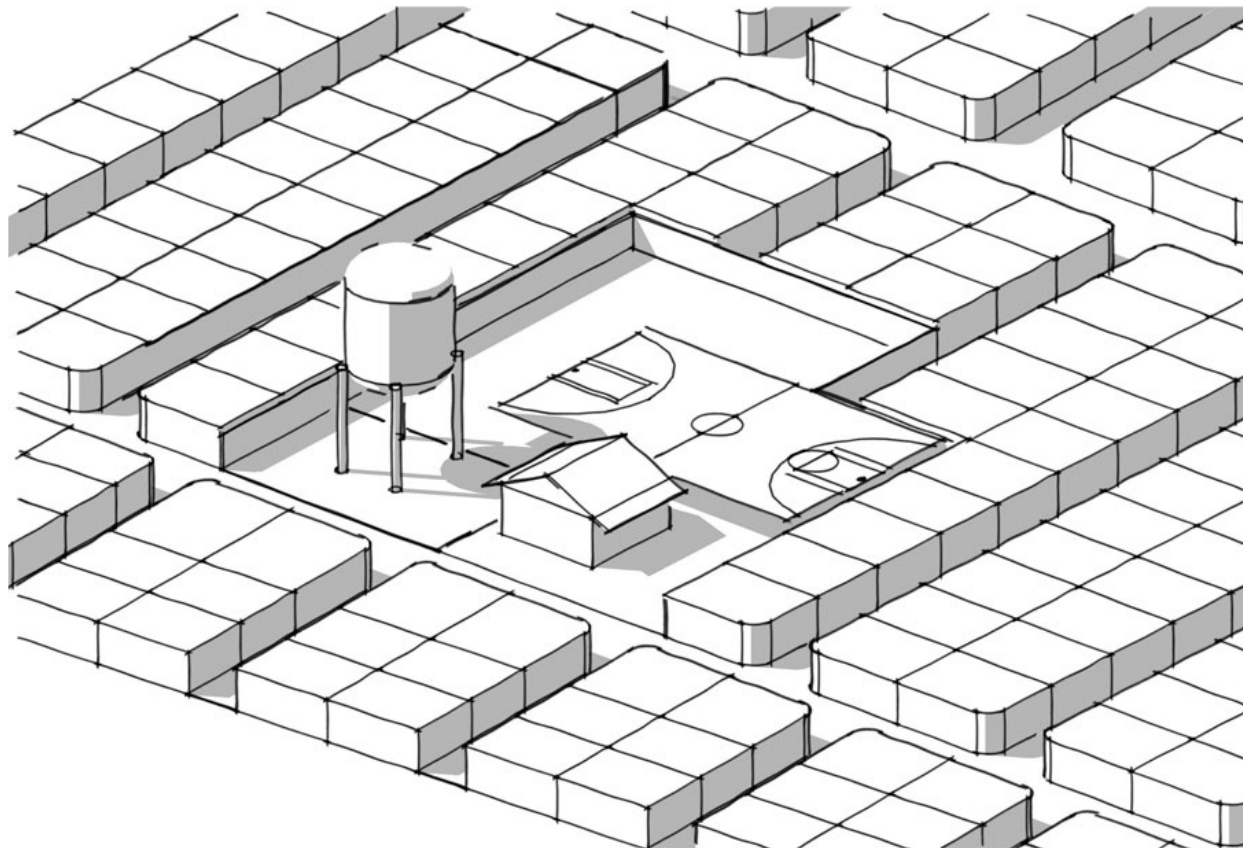


Figure 75-78– Axonometric Massing of Block 42 and Existing Clinic Location

IX.
PROGRAM

PROGRAM

According to Malkin, “at the base level of the health care delivery system we begin with the ‘primary’ fields of medicine: General Practice, Pediatrics, Family Practice, and Internal Medicine. Physicians in these areas are responsible for the total health care needs of their patients. They are termed ‘primary’ medical specialties because they are normally the entry-level physician one would consult about a medical problem. If the problem requires a specialist, the general practitioner or internist will then refer the patient to a specialist.”⁷⁵ This base level of health care delivery would be at the local level of the decentralized health system, provided at the community clinics.

According to Whole Building Design Guide, “the clinic/health unit space types are facilities where outpatient ambulatory health services are provided. Sub-space types, such as office spaces, private toilet, and filing and storage areas are included. This space type does not include provisions for invasive surgery, in-patient services, medical diagnostic categories I, II, and III equipment (including exam lights and medical gas systems), radiological diagnostic services, darkroom revolving door systems, or medical laboratory spaces. Clinics where general anaesthesia, invasive procedures, or overnight care are provided require Institutional Occupancy construction types and are not included.”⁷⁶ These spaces should be accessible, functional, efficient, flexible, private, and secure and safe. The rooms needed for each service provided are based on WBDG example program and Malkin’s Analysis of a General Practice Program (figure 79), and are designed specifically for the size and capacity of the health clinic.

The program of the health clinic will include general practice for preventative services. Family practice will be the service provided in the community health clinics. “Family practice is a specialty where the doctors in this field have had at least three years’ training and service in all major areas of medicine such as surgery, obstetrics and gynecology, pediatrics, internal medi-

75 Malkin, 1982, 17.

76 http://www.wbdg.org/design/clinic_health.php, WBDG Staff, 2007, 1.

Description	Qty.	SF Each	Space Req'd.	Sum Actual SF	Tenant Usable Factor	Tenant USF
Tenant Occupiable Areas						
Entry Lobby				240		
Waiting	1	120	120			
Reception/Registration	1	60	60			
Payee Window	1	60	60			
General Patient Care				684		
Physician Office/Consult	1	120	120			
Exam Room	3	108	324			
Nurse Work Area	1	40	40			
Patient Toilets	1	60	60			
Clean/Supply Room	1	60	60			
Medications Storage	1	20	20			
Soiled Utility Room	1	60	60			
Medical Records				60		
Medical Records Files	1	60	60			
Staff Support Spaces				216		
Staff Toilet (Male)	1	60	60			
Staff Toilet (Female)	1	60	60			
Staff Break Room	1	60	60			
Housekeeping	1	36	36			
Tenant Suite			1,200	1,200	1.53	1,840
Tenant Usable Areas						1,840

Figure 79 – Whole Building Design Guide Example Program of Health Unit, Source: WBDG Staff, 2007, 2.

cine, and psychiatry.”⁷⁷ Family practice services that will be provided in this health clinic focus on general practice, pediatrics, and obstetrics and gynecology. There is also going to be a telemedicine/educational service to respond to people’s initiative for self-care. Also included is a medicine garden and pharmacy that promote the use of herbal and traditional medicine practices. These services were determined based on the information provided by the city of Cabuyao regarding Southville residents’ health issues, and health services needed by low-income people.

77 Malkin, 1982, 17.

No. of Physicians:	1	2	3
Consultation	12 × 12 = 144	2 @ 12 × 12 = 288	3 @ 12 × 12 = 432
Exam Rooms	3 @ 8 × 12 = 288	6 @ 8 × 12 = 576	9 @ 8 × 12 = 864
Waiting Room	12 × 14 = 168	14 × 18 = 252	20 × 24 = 480
Business Office	12 × 14 = 168	14 × 16 = 224	18 × 30 = 540 ^a
Nurse Station	8 × 10 = 80	10 × 12 = 120	12 × 12 = 144
Toilets	2 @ 5 × 6 = 60	2 @ 5 × 6 = 60	3 @ 5 × 6 = 90
Storage	4 × 6 = 24	6 × 8 = 48	8 × 10 = 80
Cast Room	Use Minor Surgery	Use Minor Surgery	12 × 12 = 144
EKG	Use Minor Surgery	Use Minor Surgery	8 × 12 = 96
Staff Lounge	—	8 × 12 = 96	10 × 12 = 120
Minor Surgery	12 × 12 = 144	12 × 12 = 144	12 × 12 = 144
X-ray Area ^b	—	12 × 20 = 240	12 × 20 = 240
Laboratory	—	8 × 10 = 80	16 × 16 = 256 ^c
	Subtotal	1076 ft ²	2128 ft ²
	15% Circulation	161	319
	Total	1237 ft ²	2447 ft ²

^a Includes insurance clerk, bookkeeper, and office manager.

^b Includes darkroom, control, film filing, and dressing area.

^c Includes lab, waiting, and blood draw.

Figure 80 – General Practice Program, 1, 2, and 3 Physicians, Source: Malkin, 1982, 47.

There are going to be three exam rooms in each of the services provided, totalling 6 in all. In the telemedicine/education component, there will be 3 individual offices provided with computers for patients to access healthcare information online. The pharmacy will primarily be attached to general practice adjacent to the medicine garden.

Size and Capacity of the Clinic

Based on the programming formulas given by Anshen+Allen's Marty Waldron, we can see that a 24-exam clinic building at 16,875 BGSF will serve about 96-144 patients per day. This means that this clinic building will serve approximately 25,056-37,584 people per year, only open 5 days a week. Knowing that there are 8,173 families (or 32,692 people, 4 people average per family), and the 25-bed existing Cabuyao Hospital (8,504 SF) has two consultations rooms adjacent to the waiting room doesn't serve any of the Southville residents, we can see that a 16,875 BGSF exam clinic building will suffice for the amount of people in Southville.

However, this 24-exam clinic building needs to be broken up to be more accessible to the community and because there isn't a lot large enough to accommodate this size building. We can break up the building into six 4-exam clinic buildings at 2,812 BGSF each. These clinics will be located at the local community level, and a proposal of an additional 25 beds to the Cabuyao Hospital. Each clinic will serve 16-24 patients per day at 2-3 patients per hour in a typical 8-hour day.

Figure 81 – South-ville Health Clinic Block 42 Program.

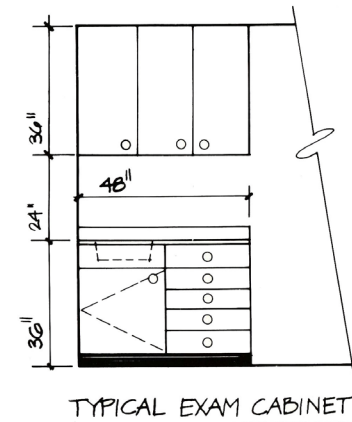
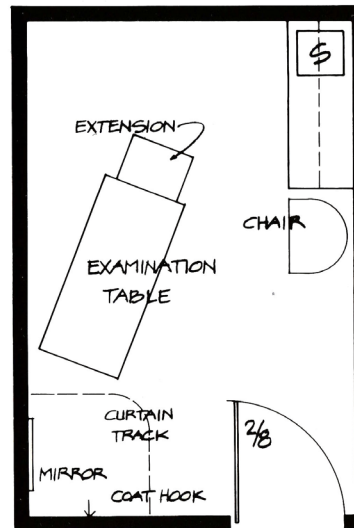
SOUTHVILLE HEALTH CLINIC PROGRAM					
Service	Description	Qty.	SF Each	Space Req'd.	Actual SF Sum
GENERAL PRACTICE/ OBSTETRICS AND GYNECOLOGY	Entry Lobby	1	300	300	2178
2-4 patients/ Hour	Outdoor Waiting	1	524	524	
	Reception/Physician Office	1	200	200	
	General Pt. Care				
	Exam Room	3	114	342	
	Nurse Area	1	80	80	
	Patient Toilets	1	39	39	
	Storage/Soiled Utility Rm	1	104	104	
	Medical Records	1	80	80	
	Staff Support Spaces				
	Toilet (Unisex)	1	39	39	
	Outdoor Break Room	1	470	470	
TELEMEDICINE/ EDUCATION	General Pt. Care				476
	Exam Room	1	124	372	
	Storage/Soiled Utility Rm	1	104	104	
PHARMACY	Reception	1	72	72	530
	Storage	1	120	120	
	Office	1	120	120	
	Laboratory	1	144	144	
	Toilet	1	74	74	
TOTAL					3184

Services Provided in the Health Clinic

General Practice includes everything needed for a one-physician family practice. Figure 83 shows a zoning diagram of a typical general practice layout. It also shows a 1,380 SF plan of a general practice suite. Since one of the four 6-exam clinic buildings will be 2,812 BGSF, we have to include additional programs within the space to accommodate for psychiatry and additional family practice oriented rooms.

An ideal size for a typical exam room is 8'x12', which gives a clear dimension of 7 feet 6 inches x 11 feet 6 inches inside the room. According to Malkin, this size allows for a full-size exam table, a built-in sink cabinet with storage above, a dressing area, a small writing desk, a stool on casters for the doctor, a guest chair for the patient, a treatment stand, and perhaps a small piece of portable medical equipment. (See Figure 82).

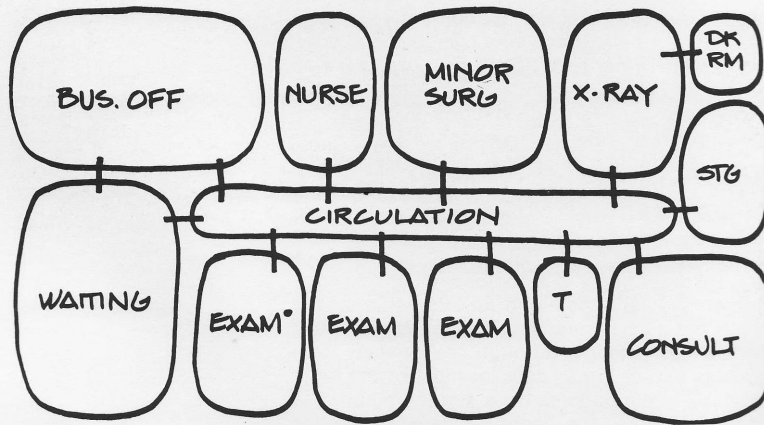
The program includes pediatrics and OB/GYN areas because family planning is important for the Southville residents. These additional areas will add approximately 1,800 SF to the 1,380 SF of the general practice suite. This will be enough to fit into the 2,182 BGSF needed for each of the health clinics. There will probably be more than 4 exam rooms located within the facility since the diagrams provided by Malkin show that these three suites could fit into 2,182 BGSF.



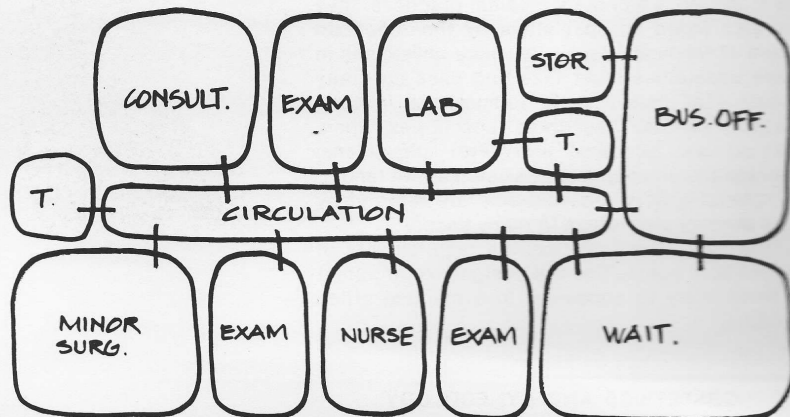
TYPICAL EXAM ROOM

Figure 82 - Equipment and Layout of a Typical Exam Room (Left), Typical Exam Cabinet and Heights (Right); Source: Malkin, 1982, Page 35.

GENERAL PRACTICE



OB/GYN



PEDIATRICS

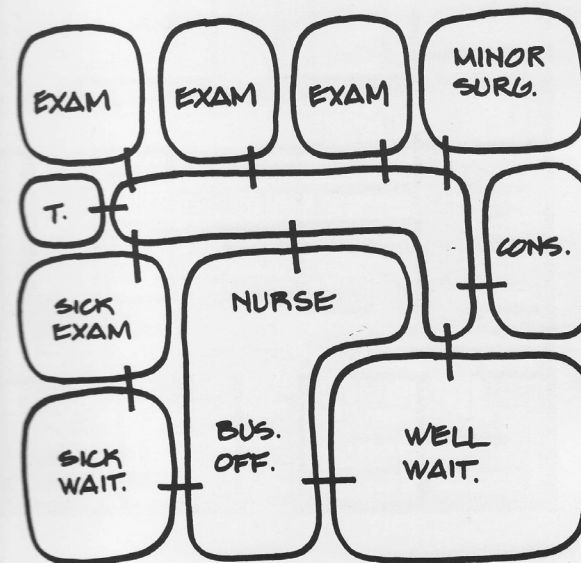


Figure 83 - Schematic Diagram of a general practice suite (Left), Suite plan for general practice, 1380 SF (Right); Source: Malkin, 1982, Pages 18, 27.

X.

DESIGN CONCEPTS

DESIGN CONCEPTS

The formal concepts are determined by the case studies and the conclusions found in the research. One specific health clinic location will be chosen for the design of a prototypical community health clinic. Then, a zoning diagram of the health clinic is presented based on the findings of the program. Sustainable design solutions will be implemented into the design, and appropriate solutions are discussed. The proposed Southville Community Health Clinic will innovatively use local materials and technology; address the healthcare needs of the residents, and will be a self-sustaining facility decreasing maintenance costs.

Zoning Diagram of Health Clinic

The zoning of the health clinic is based on the program previously researched. Figure 84 shows how the three main areas will function with one another. The facility will be a two-story design elevated four feet above the ground. The areas that are more private are located on the second level, while the areas that are most used and most public are on the first level. This zoning diagram will determine floor plans for the design of the health clinic.

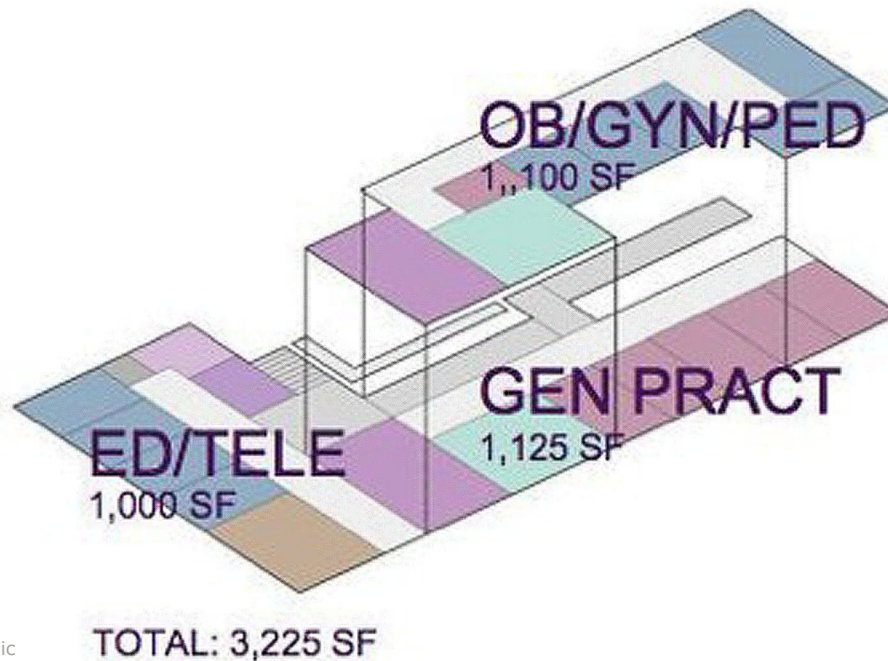
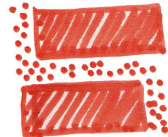


Figure 84 – Zoning Diagram of the Community Health Clinic

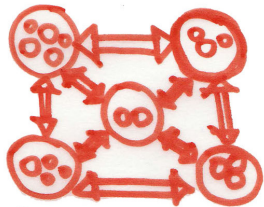
CULTURAL CONCEPTS



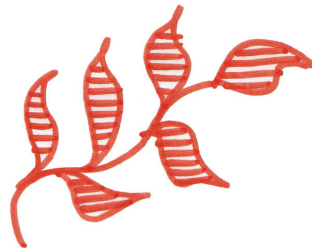
FAMILY ORIENTED
(nucleus)



OUTSIDE SOCIALIZING

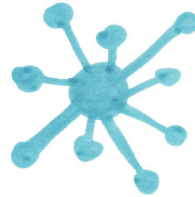


SUPPORT OF NEIGHBORS

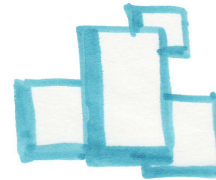


RESOURCEFUL/RESILIENT

FUNCTIONAL CONCEPTS



CONNECTIVITY



CENTRALIZED,
CLUSTERED

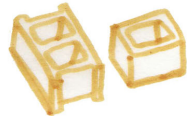


BROKEN UP



ICONIC

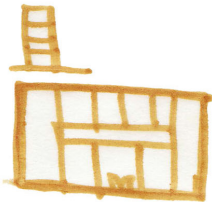
AFFORDABILITY CONCEPTS



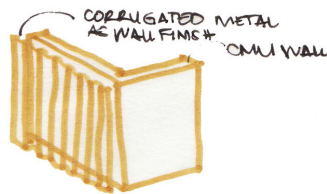
COMMON/STANDARDIZED
MATERIALS &
CONSTRUCTION



RECTILINEAR, NOT
~~NECESSARILY~~ HARD TO CONSTRUCT
FORMS



SMALLER FOOTPRINT



INNOVATIVE USE OF MATERIALS



RAINWATER
CATCHMENT



PHOTOVOLTAICS



LOCAL
MATERIALS



MEDICINAL GARDEN

SUSTAINABILITY CONCEPTS

NATURAL LIGHTING

NATURAL VENTILATION

Figure 85- Conceptual Diagrams

Sustainable Design Solutions

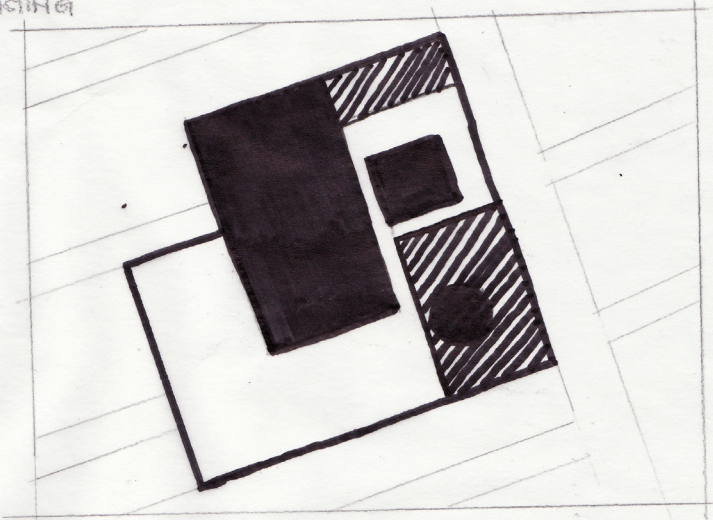
Incorporating sustainable design solutions is key to keeping long term and maintenance costs down. This will help to design an affordable health clinic that can be maintained by volunteers and non-profit organizations. This will also help to reduce the demand on the local government for funding, and will help to keep running these clinics without interruption.

Using local materials and traditional construction methods in innovative ways will allow for affordability and ease of maintenance. Also, not having to ship new materials from other places reduces the carbon footprint of the project. The area is abundant in resources and wood and cement are cheap and readily available. These two materials will be used for the design of the structure of the health clinic.

Based on the region and specific site, solar and rainwater are two renewable energies that should be used. With flooding as an issue for the site, the entire clinic will be raised up four feet. This will also help natural ventilation scooping cool air from below into the facility and releasing hot air out of the roof. Cabuyao is a relatively sunny area, photovoltaic powered appliances are proposed. Since there is a lack of green space within the community, a garden around the perimeter of the clinic is proposed. This garden can grow herbs and medicinal plants. A green roof and rainwater collection system is proposed to alleviate heat islanding around the area and to irrigate the proposed garden.

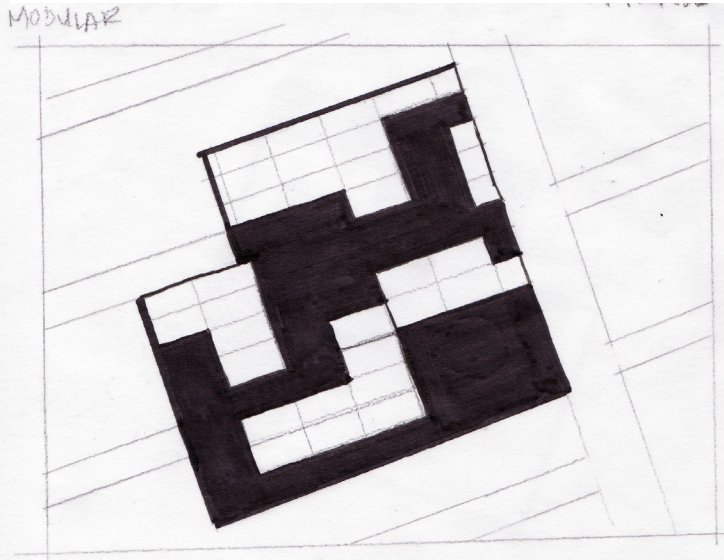
FIGURE GROUND CONCEPT STUDIES

EXISTING

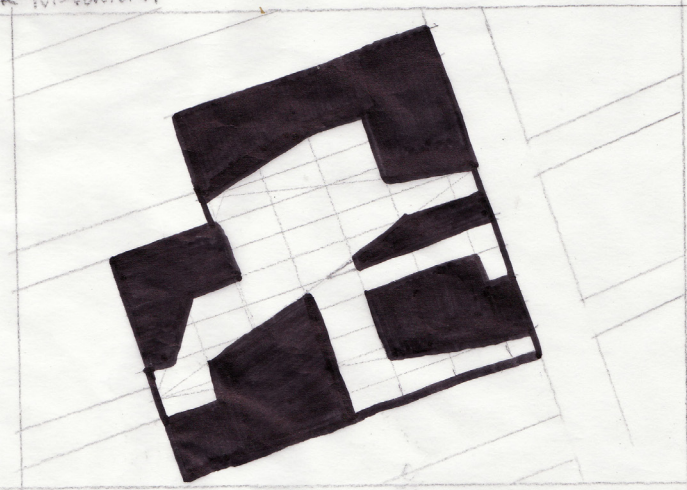


2

MODULAR



MODULAR-MOVEMENT



MOVEMENT II

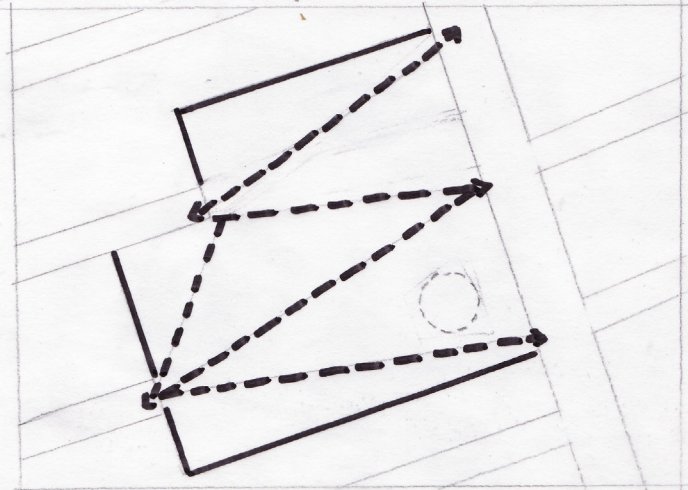
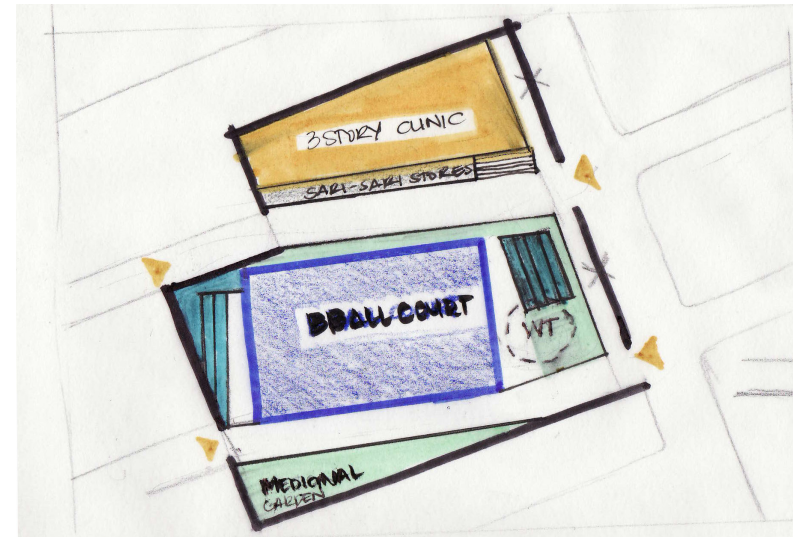


Figure 86 - Figure Diagrams Studies

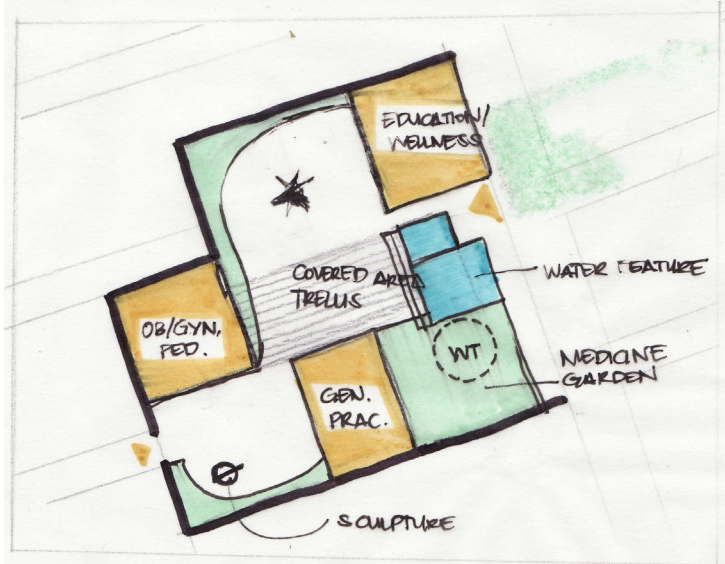


● MARKET/CLINIC CENTER



● COMMUNITY CONNECTIVITY

- PREDOMINANT PATHS TO CONNECT
- CREATE PLACES OF INTEREST, PLACES TO LINGER
- BREAKING UP OF SITE



● CLINIC PARK

Figure 87-89 - Conceptual Plans Studies

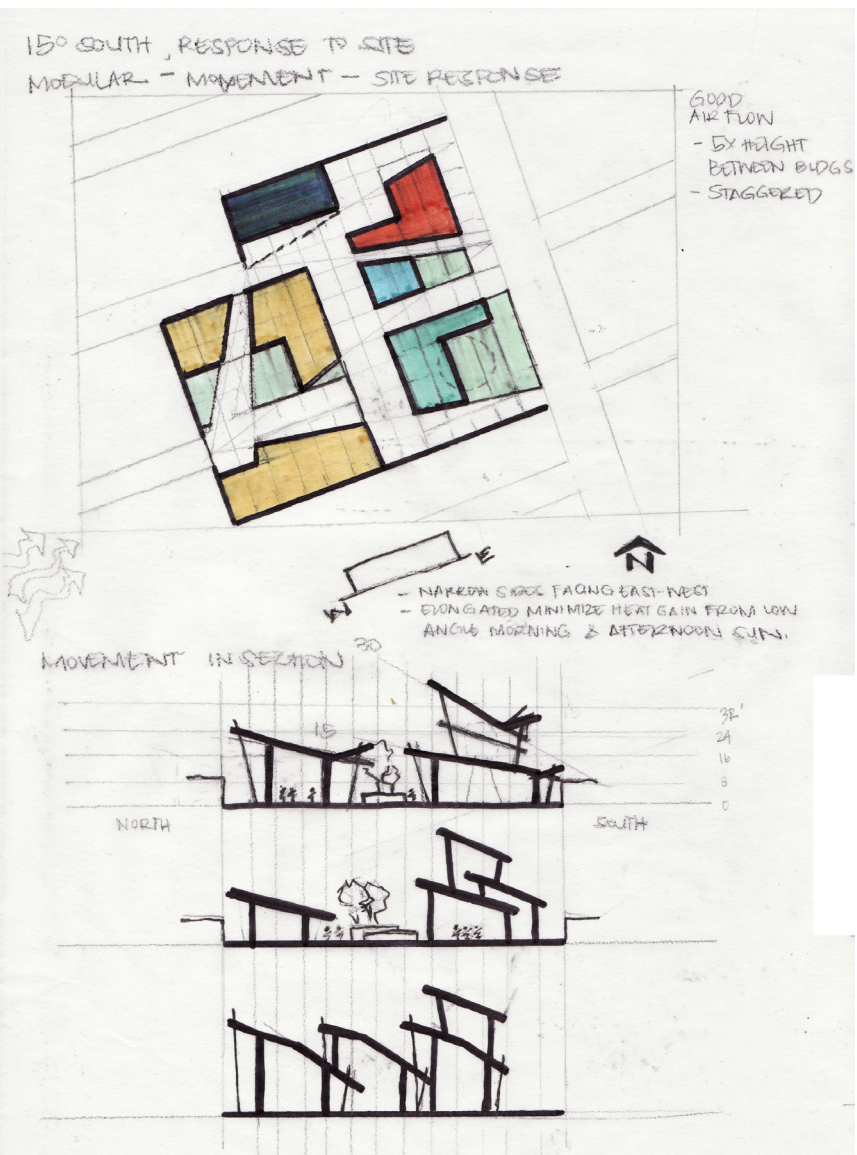
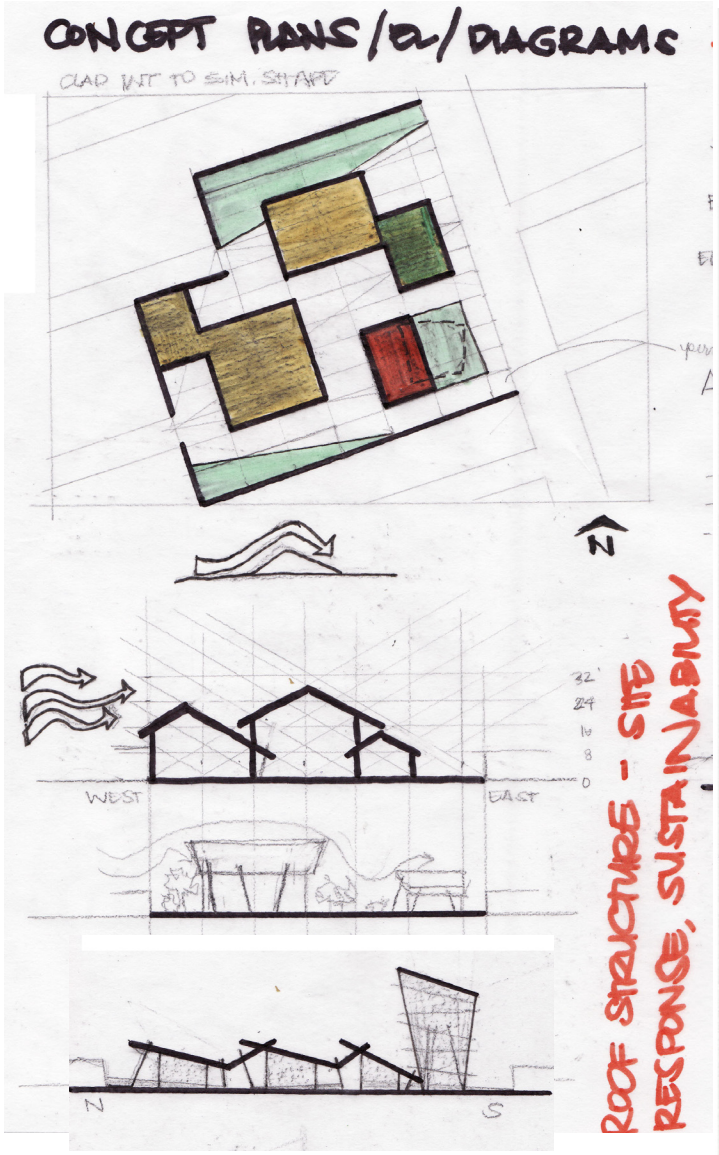


Figure 88-91 - Concept Plans and Elevations Studies

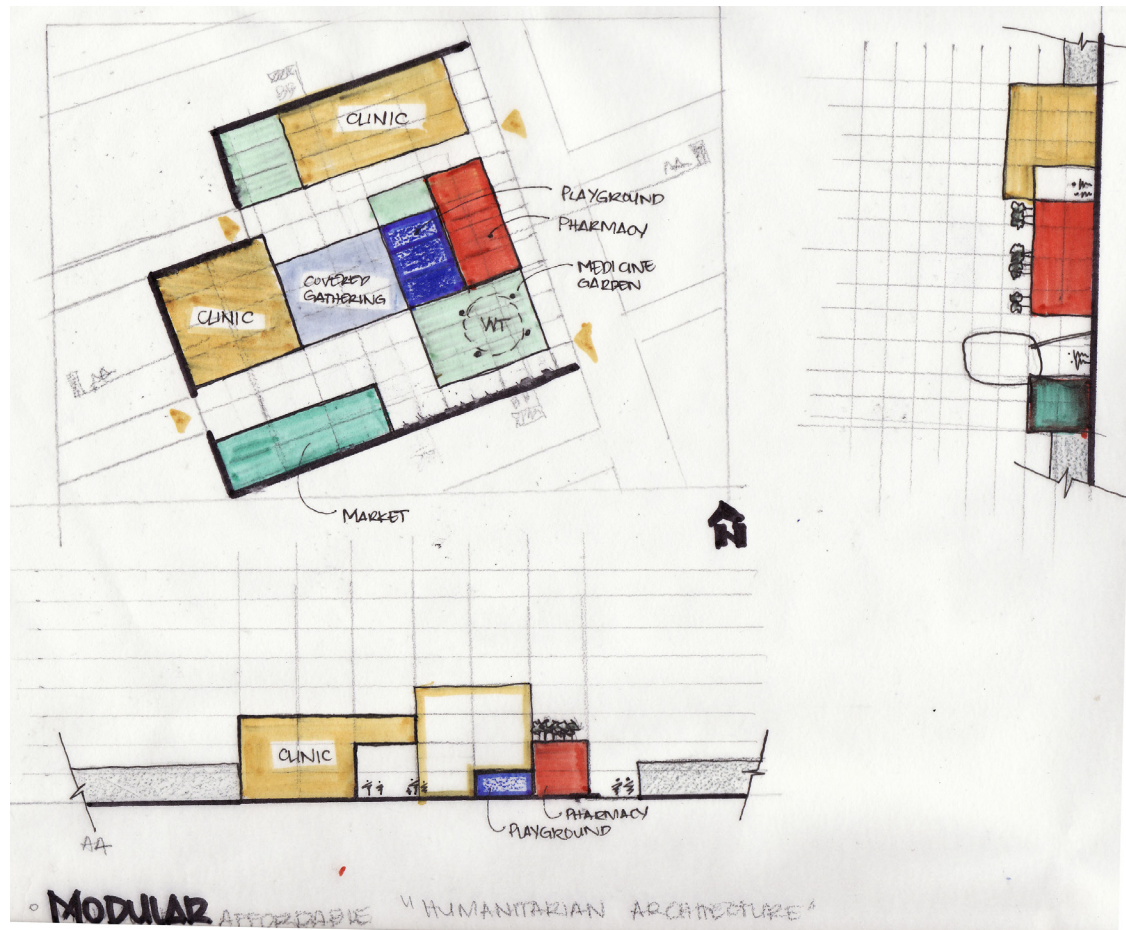
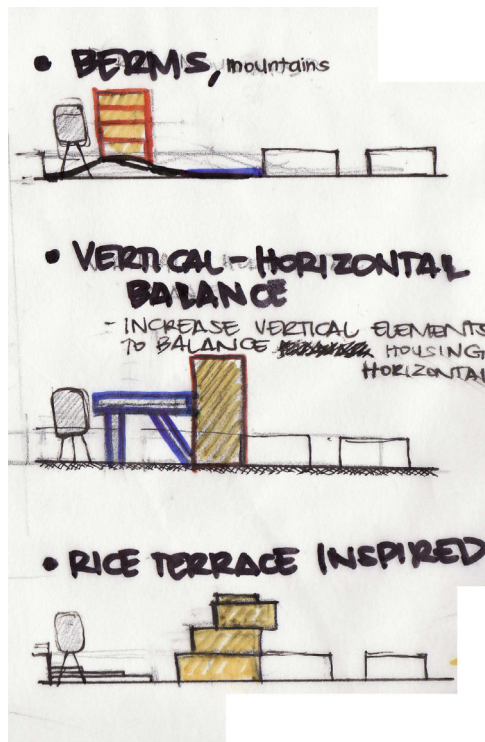


Figure 92-93 - Concept Plans and Elevations Studies

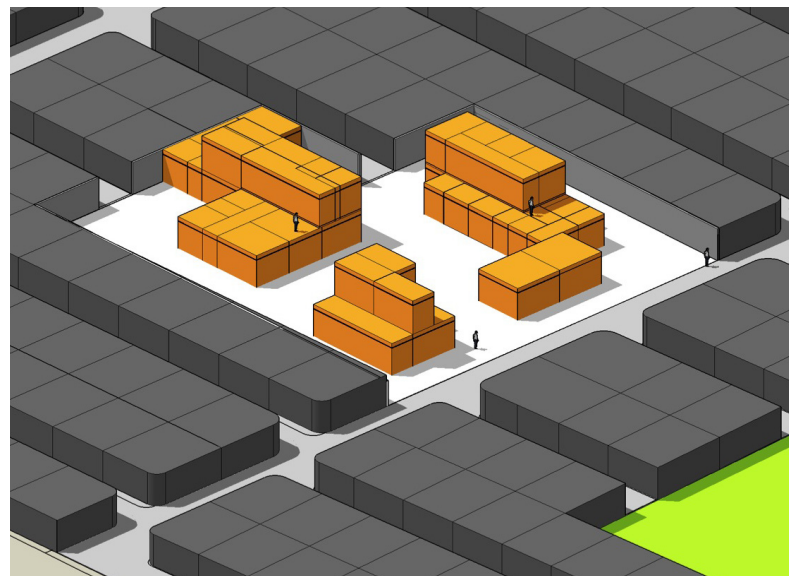
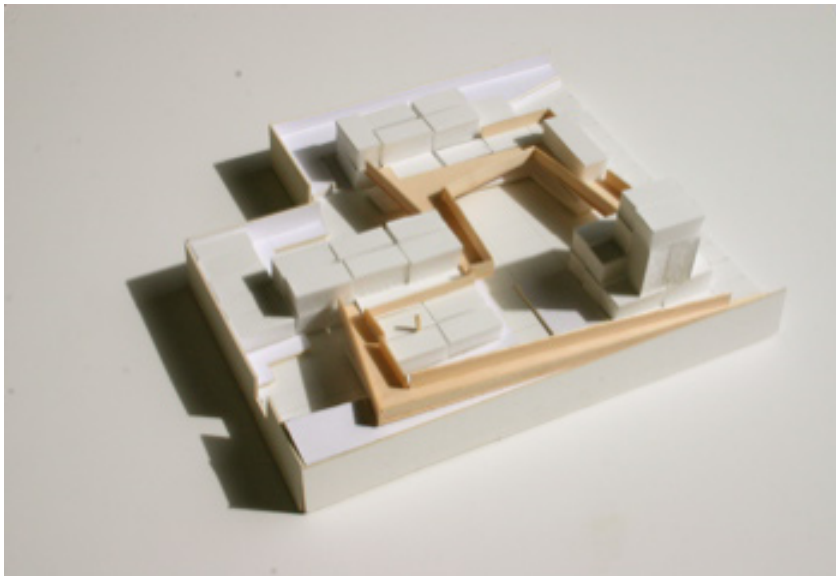
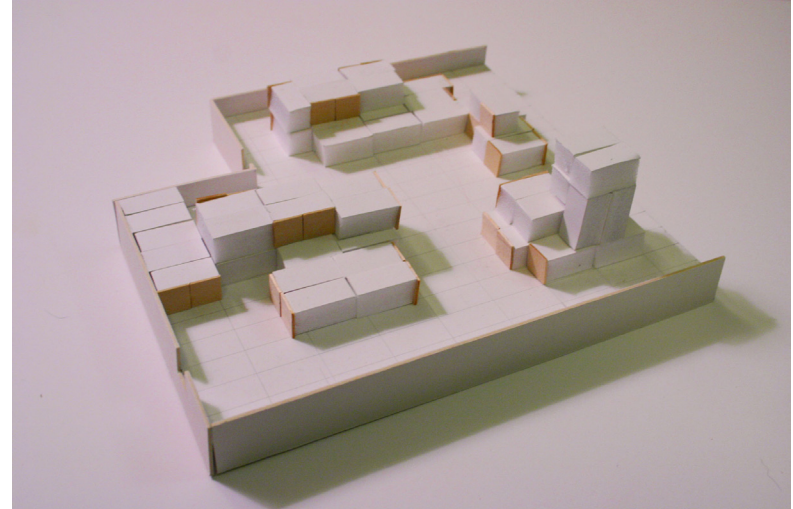
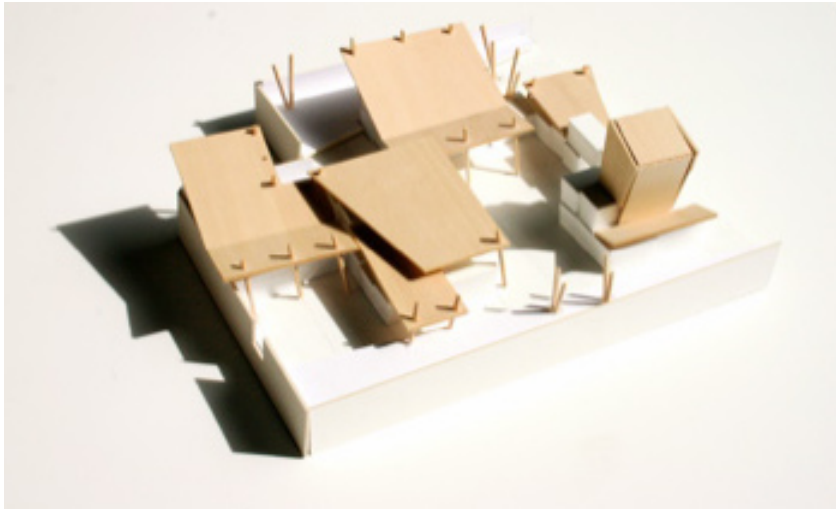


Figure 94-97 - Conceptual Models - Roof Lines (Top Left), Angular Paths (Bottom Left), Modular Push/Pull (Top Right), Module Massing (Bottom Right).

PHILIPPINE URBAN SQUATTER RESETTLEMENT: Design for a Health Clinic

Planning Module

A planning module⁷⁸ is necessary to create an efficient, flexible, and expandable health clinic. For small suites (1,000 to 2,500 square feet) in a medical office building, the ideal by depth is 33 feet (an exam room 12 feet deep, a corridor of 5 feet and larger rooms, such as reception and business offices at 16 feet deep). "A planning module width of 2 feet is ideal. This allows for perimeter rooms of 8, 10, and 12 feet width. Alternatively, a 4-foot planning module is acceptable, but is less flexible. Window mullions or solid walls must occur at the planning module centers so that interior wall may terminate into something solid for sound attenuation."⁷⁹ For the design of this health clinic, this module will be used as a minimum requirement and recommendation.

Southville Community Health Clinic

The inadequate existing health facility and a public hospital that does not accept low-income people used to be what the Southville residents knew as healthcare. The proposed Southville Community Health Clinic will be a better solution than the existing clinic. It will respond to the people's needs, will be sustainable and affordable, and will give people dignity and hope.

Weaving of Movement Through Site

The concept of weaving was inspired by the elements found to be moving concurrently through the site. These elements are of the natural (rain, wind, and sun), the social (people moving through and around the site), and the imposed (the grid imposed by the Southville community). These elements are interpreted through the design of the plan, section, and elevations of the site.

78 Based on CSI Executive Specifications August 2004.

79 CSI Executive Specifications August 2004.

XI.

HEALTH CLINIC DESIGN

HEALTH CLINIC DESIGN

Introduction

The design of this health clinic is based on attaining three main goals: be culturally responsive, be affordable, and sustainable. The concept of weaving of movement through the site is applied to the architectural expression of the buildings. This prototypical health clinic responds to the needs of the urban poor with its services and program, responds to affordability with its choice in materials and construction and looks at whole-life costs, and responds to sustainability by taking advantage of the renewable resources available for the climate.

Existing Context

The Southville relocation project was an efficiently, but poorly planned resettlement for the displaced urban squatters. Although there are amenities provided for the Southville residents, the facilities are overcrowded or ineffective. There is only one health clinic that serves the 8,173 families living in the 52-hectare site (129 acres). The existing health clinic is only open a few days a week and does not have enough medicine or equipment to serve the entire community.

According to Laquin, to make a successful relocation program, the following must be assured: a means of livelihood or cheap and convenient transportation between new home and job, adequate facilities (roads, water, medical services, waste disposal), and provisions for new housing. Healthcare is one of the basic needs for the urban poor, and is not provided for the Southville community. The only health clinic in the area has limited service, the nearest local hospital is Cabuyao hospital, and does not service Southville residents. These are the reasons behind the design of a decentralized, community health clinic.

For the design, there were six community health clinics that were located according to the proximity to various parts of the Southville project. One site was chosen for the design of a prototypical health clinic. This will replace the existing clinic, and find an approach to the design that will be able to guide future clinic designs.

The 16,343 square feet of area chosen as the site for the prototypical health clinic is revitalized and utilized entirely. There is the existing health clinic (approximately 646 square feet), an outdoor basketball court (4,700 square feet), and a non-working water tower that sits 25 feet above the ground, all encompassed by dirt, gravel, and a few trees adjacent to the health clinic. For the design of the site, only the water tower remains. This water tower helps to generate energy and be utilized to store and serve water to the surrounding residents.

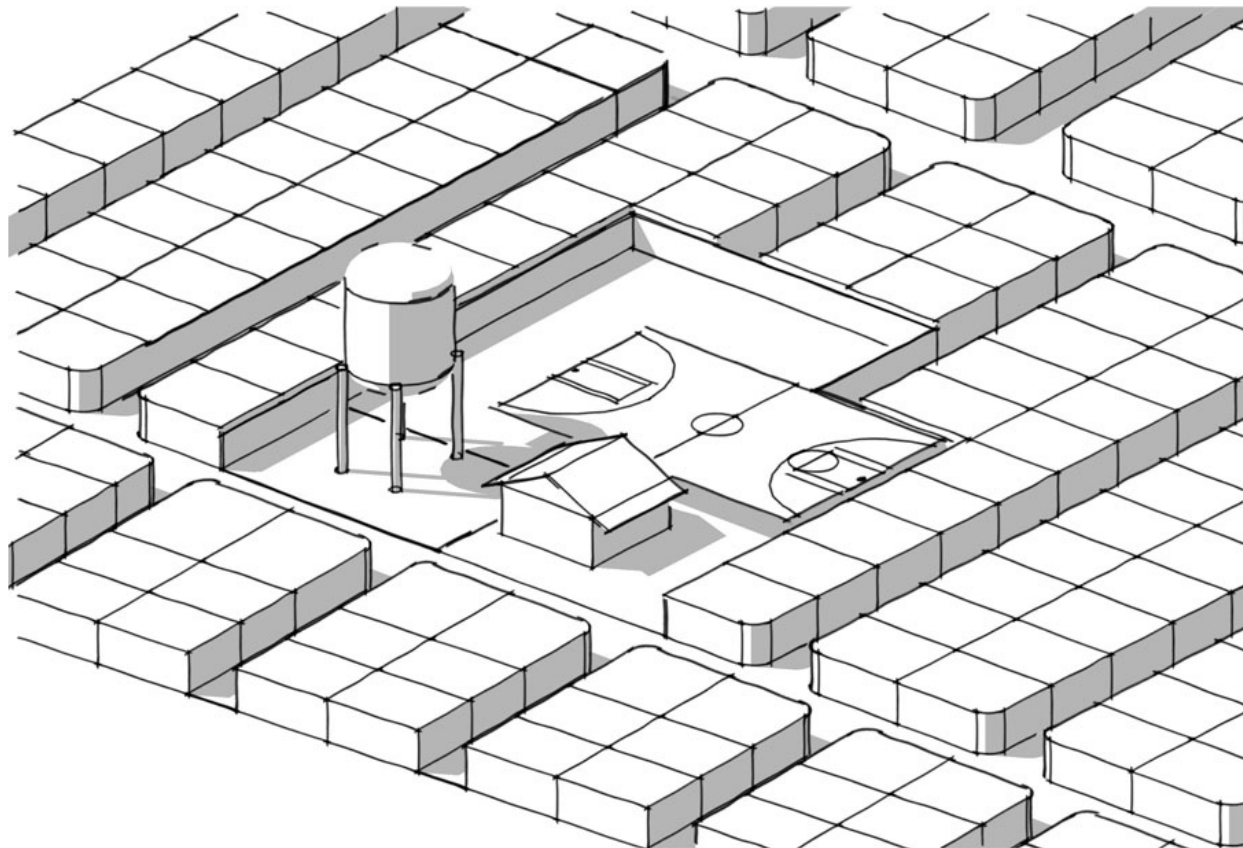
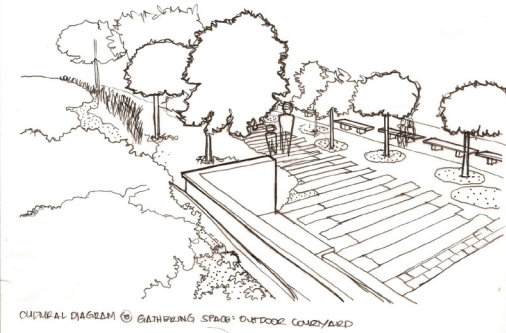
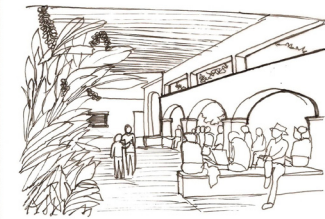
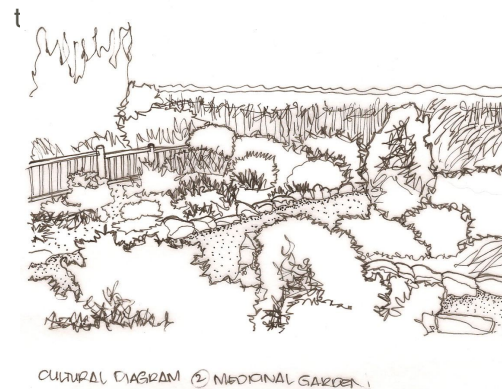


Figure 98-101 – Axonometric Massing of Block 42 and Existing Clinic Location

Cultural Response

The services provided are based upon Philippine national mortality and morbidity statistics, Southville mortality and morbidity statistics, and studies done in Balubud and Bonanza of the urban poor's response to healthcare. The services provided are an education/telemedicine component, general practice, and obstetrics/gynecology/pediatrics. There is also a pharmacy adjacent to the medicine garden, which helps to promote traditional medicine and herbal medicine use. A retail component is also included within this site as a response to bringing livelihood to the community.

Inspired by the pockets of green within the site, the landscape plan shows the location of the medicine garden. The medicine garden consists of the 'ten herbal medicines approved by the department of health' (figure 22). These herbal medicines are then sold to the community at a cheaper cost than western pharmaceuticals. The pharmacy serves as a lab to garden, gather, and create the traditional medicines, and sells it to the people coming to the clinic.



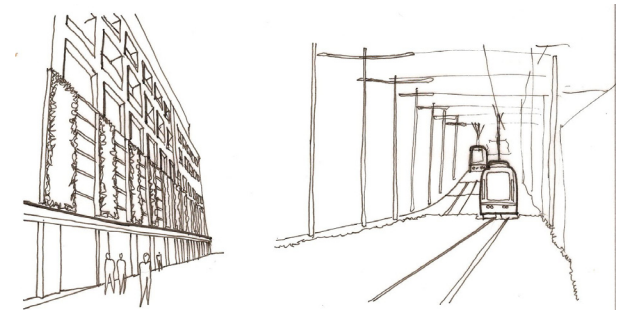
responses in the clinic design. There is a large open waiting room with an adjacent courtyard for overflow. There is a private courtyard designed specifically for the clinic's patients and staff. There is a more private component in the design of the clinic to balance out the more public components like the pedestrian streets and retail elements. These civic spaces help to tie the clinic into the community.

Sustainable Design Elements

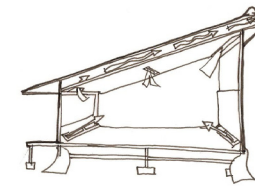
The buildings respond to the climate and to the site. There are sustainable design elements that help to promote a reduction of energy use. The design of the clinic, pharmacy, and retail buildings respond to maximize the use of the natural elements on the site. There is passive cooling used in all of the buildings. The roofs that are oriented south are at optimal angle for photovoltaic panels. This gives the option for the addition of PV panels post-construction to further create a carbon neutral design. These panels could help serve the surrounding homes providing free electricity to the community. The butterfly roof and shed roof designs also allow for rainwater collection for irrigation of the private courtyard and the medicine garden.

The cool aluminum roof and vertical and horizontal green spaces reduce heat island effect throughout the site. The wind pattern through the site also helps to cool down in an around the buildings.

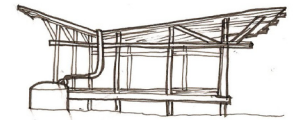
All of the materials used in the building are local, which decreases the carbon footprint of the building. CMU blocks, metal roofing, wooden roof trusses, and concrete are all manufactured and common materials in the Philippines. All of the foliage and



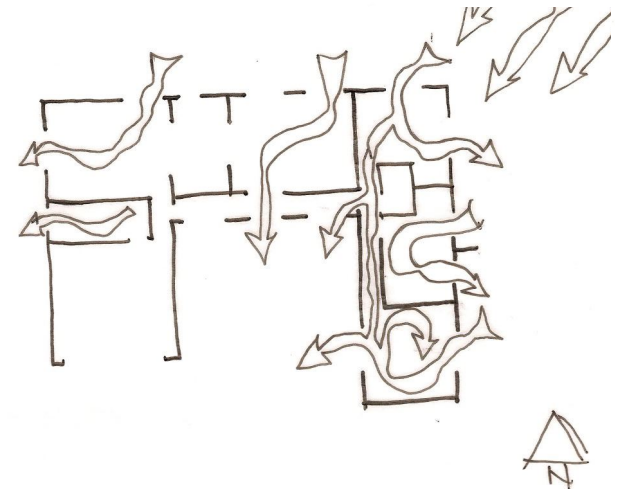
SUSTAINABLE DIAGRAMS ② REDUCTION OF HEAT ISLANDING



SUSTAINABLE DIAGRAM ①



SUSTAINABLE DIAGRAMS ②



SUST. DIAGRAMS ① NATURAL VENT.

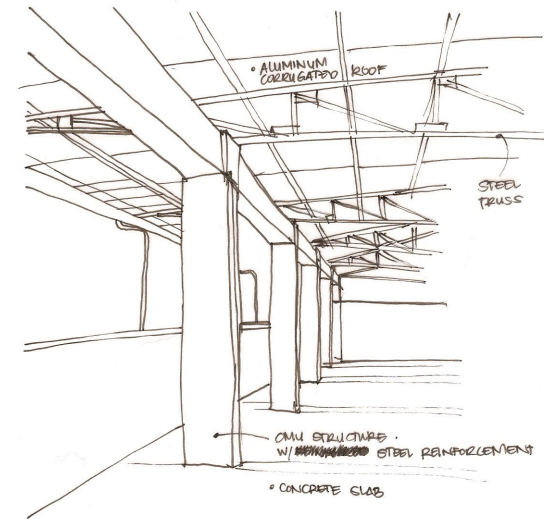
vegetation are local plants acclimated to the climate, which helps to reduce irrigation for the plants.

Breaking up the buildings coincides with the idea of decentralization, as well as promotes good airflow through the site. Instead of designing on large mass on the site, three main buildings are created: health clinic, shops, and pharmacy. Being a naturally ventilated building will allow for a faster Air Changer Per Hour rate, reduce energy consumption, and create an indoor-outdoor feeling within the buildings. Passive cooling is an ideal climate response for tropical areas.

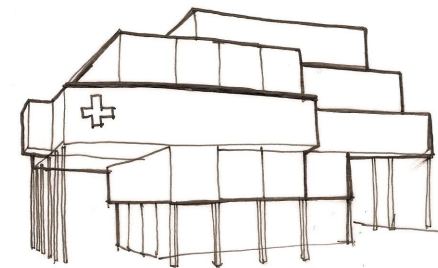
Long-term maintenance costs are reduced through the use of passive cooling, rain-water collection, use of local materials, and use of local plants. There is also potential for photovoltaic panels to provide electricity for the community.

Affordable Materials and Construction

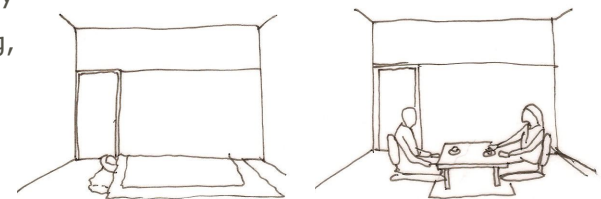
The buildings are designed with concrete masonry unit blocks, which are affordable and local to the Philippines. Constructing with this material does not require skilled labor, and further reduces construction costs. The small footprints of the buildings create fewer complications during construction. The plumbing is stacked vertically in the health clinic building, and the plumbing wall runs only one side of the building, which reduces the costs of complex plumbing throughout the building.



AFFORDABILITY ① LOCAL MATERIALS



AFFORDABILITY ② MODULAR



AFFORDABILITY ③ FLEXIBLE SPACES

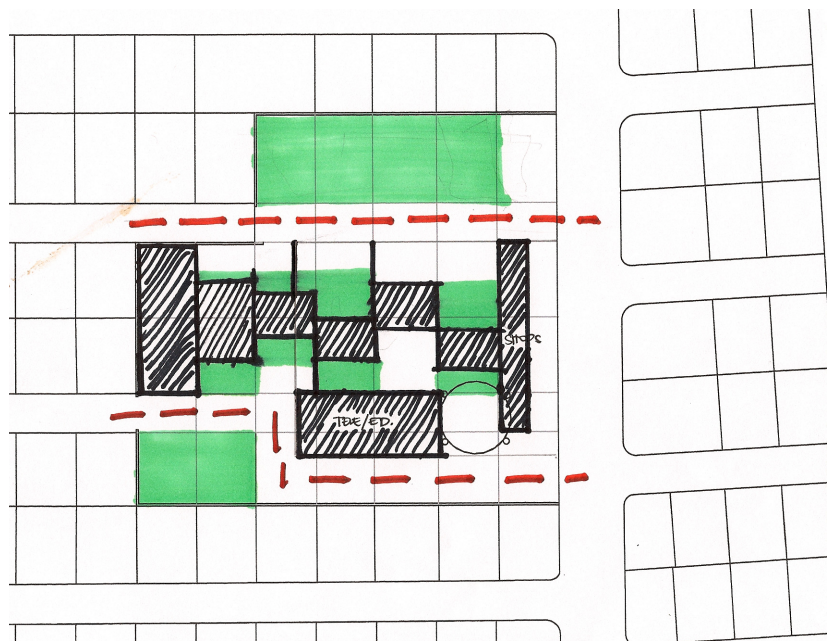
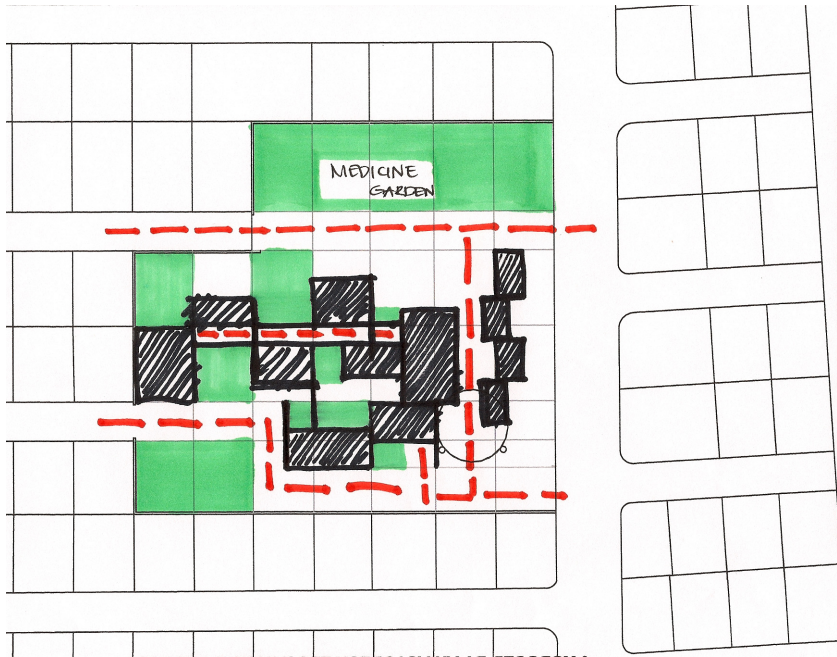


Figure 102 - 104 - Conceptual Site Plans



The modular design of the clinic creates the potential for expansion and phasing. The flexible spaces create dual-purpose rooms that decrease the square footage of the buildings. The modularity of the windows and masonry blocks help to create affordable buildings.

Health Clinic Design

From the existing context, which has a basketball court, a 600 sf health clinic, perimeter wall, and a water tower, only the wall and water tower remains. The perimeter wall is opened up on the west side of site to create a connection through the site, and creates two more points of entry. The weaving of the various site elements has created an indoor-outdoor site responsive design. The design begins with the imposed community grid using the residential grid as a module for the buildings, then uses a planning module of 2'x20' for the rooms, then breaks up the functions into different buildings, and creates public and private components. The more public spaces (pharmacy and retail) are located adjacent to the main road. The clinic is located towards the more private part of the site. The exam rooms are located on both the first and second floors, and staff support is located on the second floor. The water tower serves as a landmark for the Southville health clinic, and a source of rainwater collection. In response to the flooding in the area, the paths ramp up to the building that sits 24 inches above the ground, 6 inches above the average maximum rainfall. In addition to this, the paths are made of pervious surfaces that help to absorb the rainwater and prevent stormwater runoff.

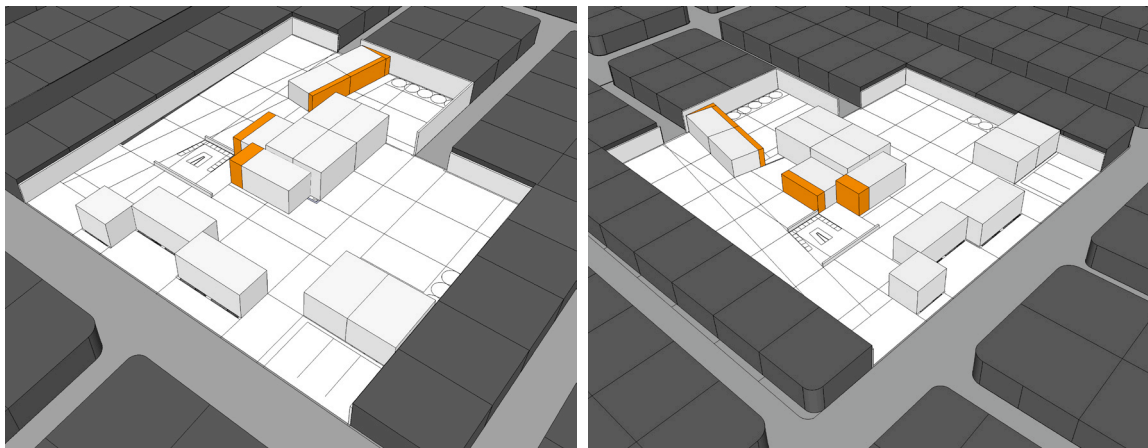


Figure 105-106 Axonometric Massing



Figure 107 - Site Plan
Scale: 1/32" = 1'-0"

TOTAL AREAS (SQUARE FEET)

Bldg Footprint Total: 4,227 SF
 Private Courtyard: 1265 SF
 Pharmacy: 538 SF
 Medicine Garden: 1420 SF
 Shops: 760 SF

Outdoor Break Area: 470 SF
 General Practice: 1,465 SF
 Education/Pediatrics: 560 SF
 Open Waiting Area: 524 SF

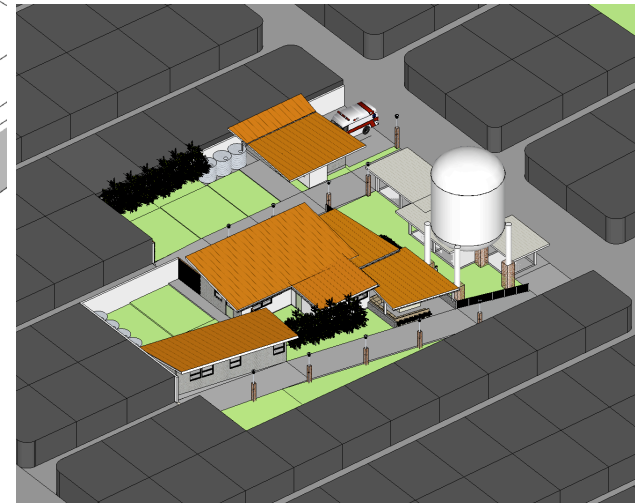
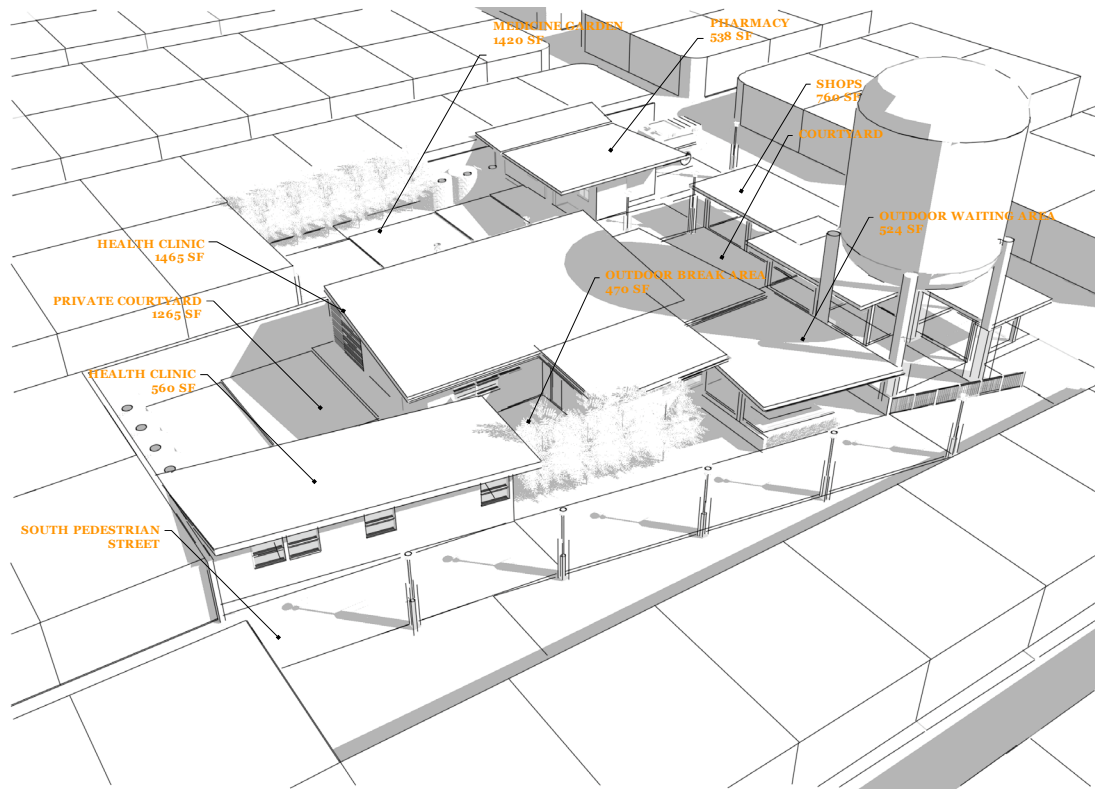


Figure 108 - (Top) Programming Diagram

Figure 109 - (Top Right) Axonometric 3D Model

Figure 110 - (Bottom Right) Axonometric 3D Model

Figure 111 -
 Floor Plans
 Scale : 1/16" = 1'-0"

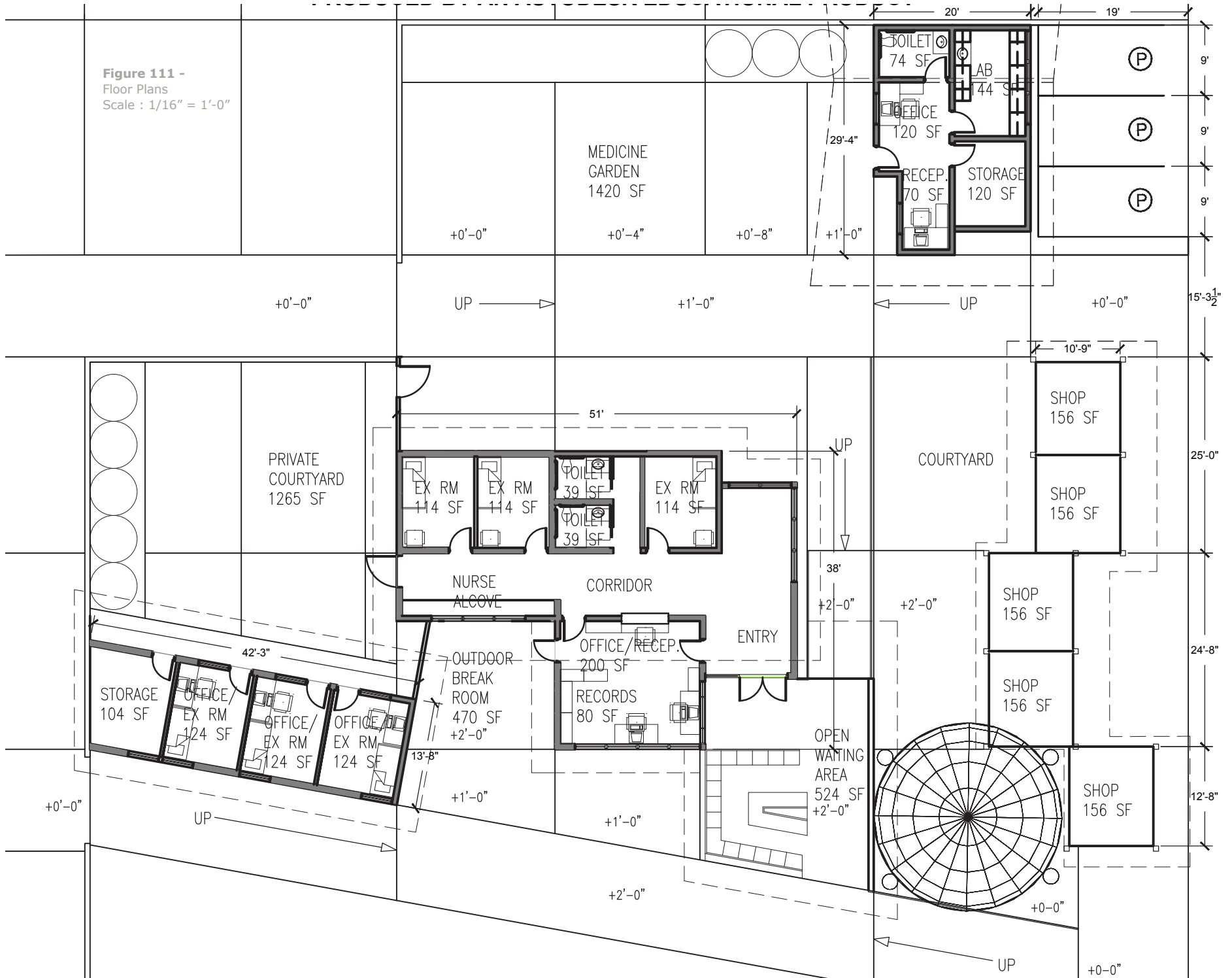
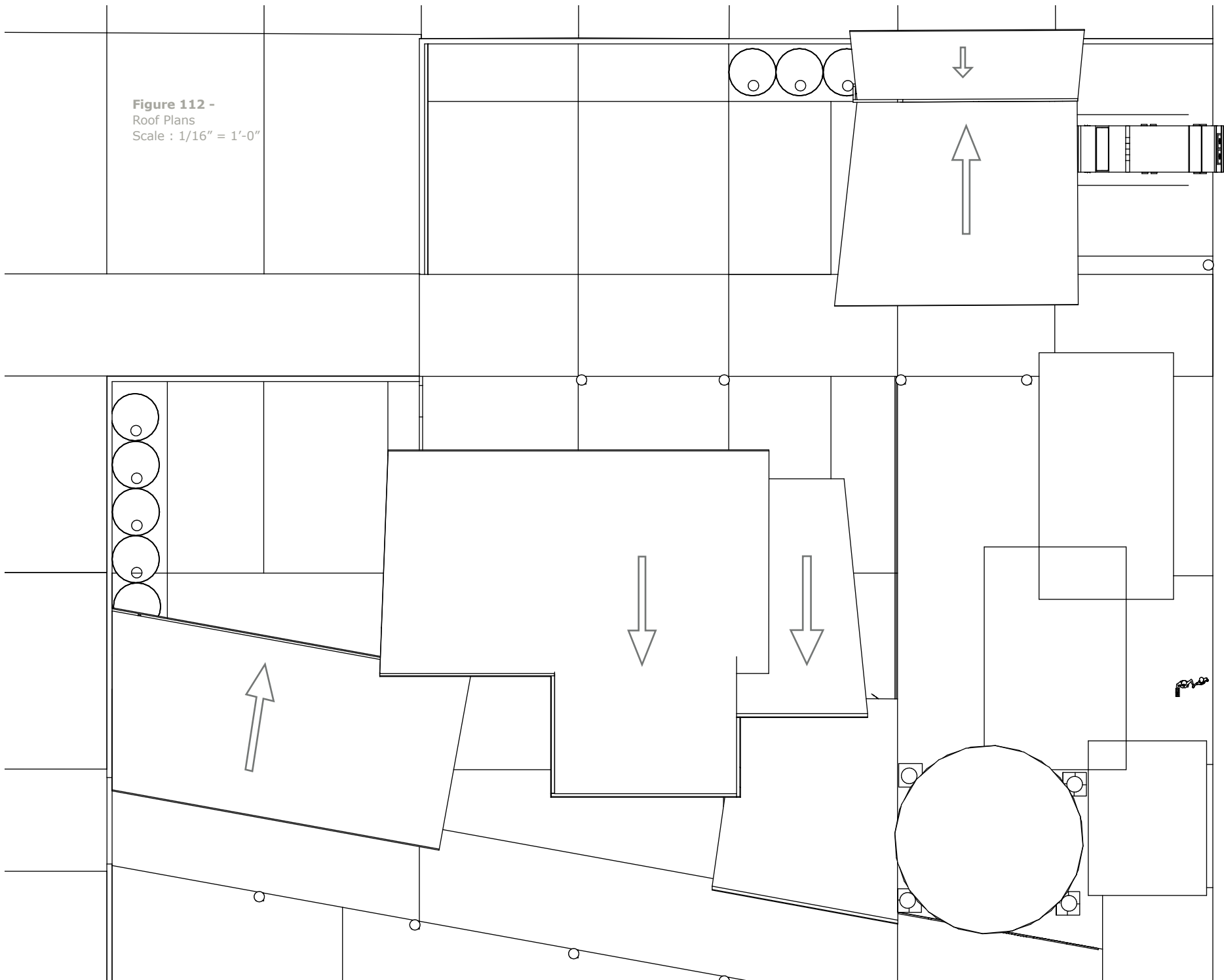


Figure 112 -
Roof Plans
Scale : 1/16" = 1'-0"





Figures 113- (Top Left) Axonometric Plan, **Figure 114** - (Top Right) Health Clinic Perspective
Figure 115 - (Middle Right) North Pedestrian Street Perspective, **Figure 116** - (Bottom Right) South Pedestrian Street Perspective, **Figure 117** - (Bottom Middle) Pharmacy Perspective, **Figure 118** - (Bottom Left) Pharmacy Perspective from Street

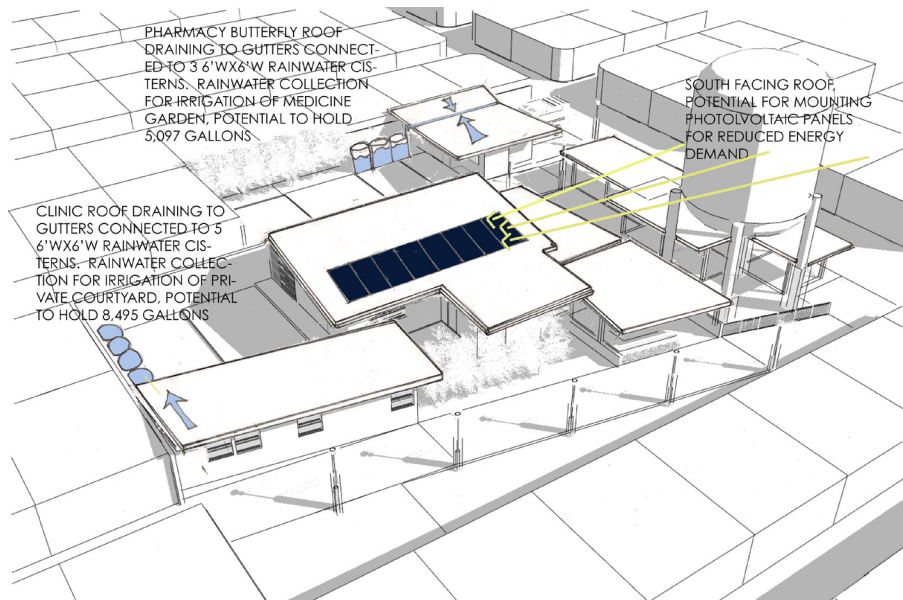
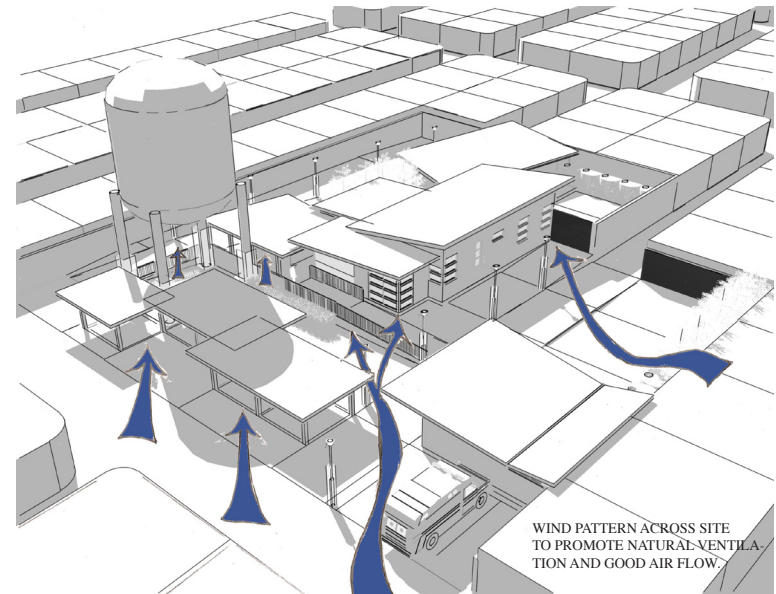
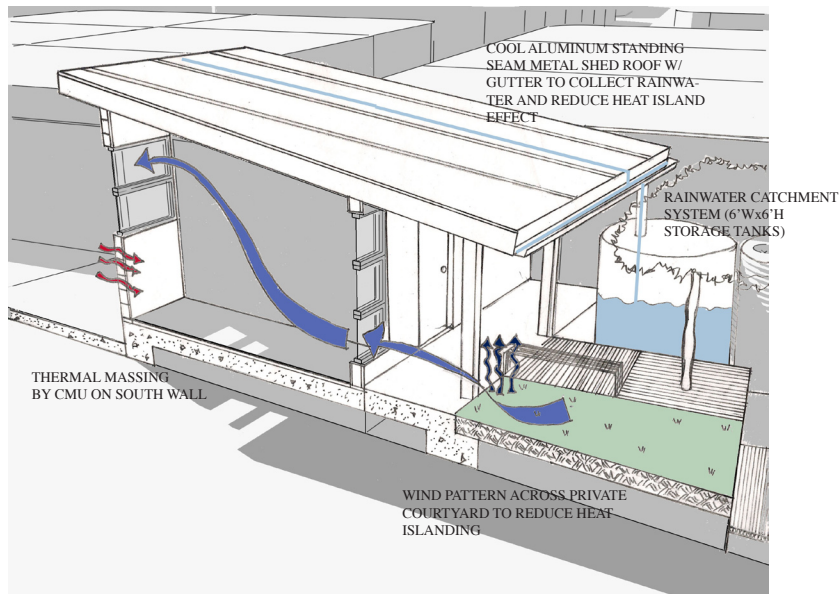


Figure 119 - (Top Left) Diagram showing sustainable building elements, Figure 120 - (Top Right) Wind Pattern through site, Figure 121 - (Bottom Left) Rainwater Collection and Photovoltaic Potential

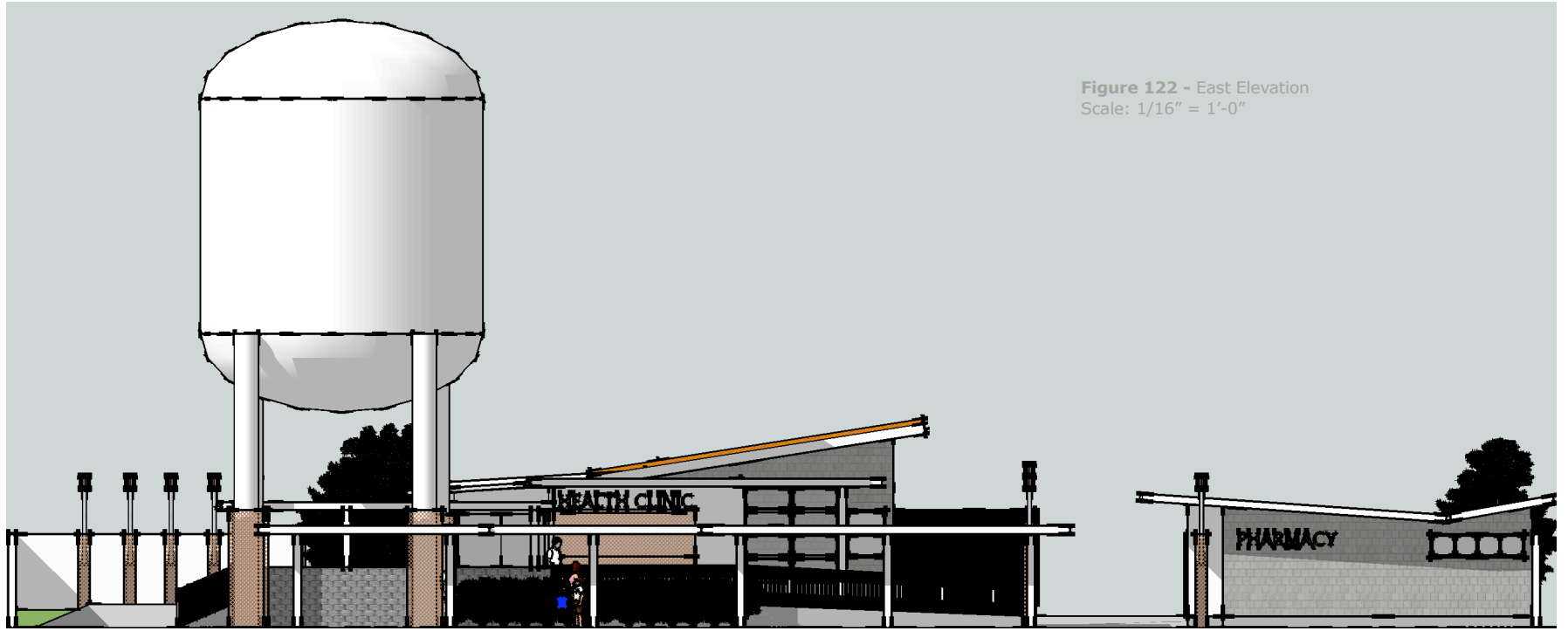


Figure 122 - East Elevation
Scale: 1/16" = 1'-0"

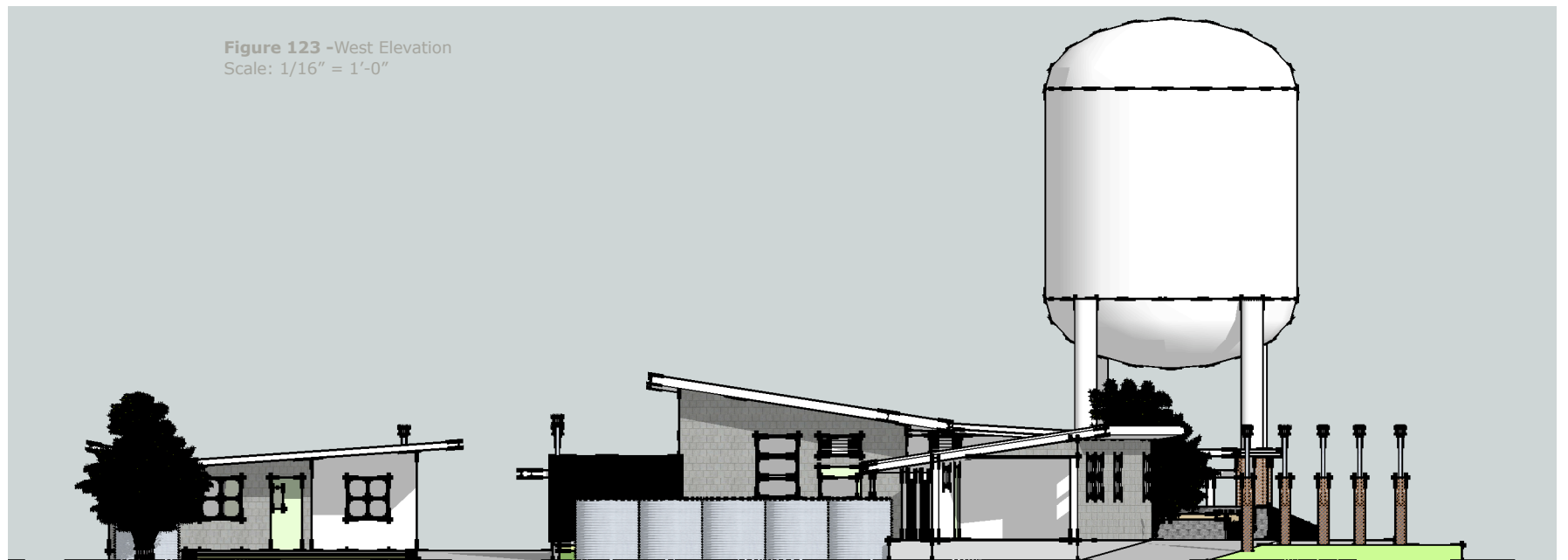


Figure 123 - West Elevation
Scale: 1/16" = 1'-0"

Figure 124 -North Elevation
Scale: 1/16" = 1'-0"

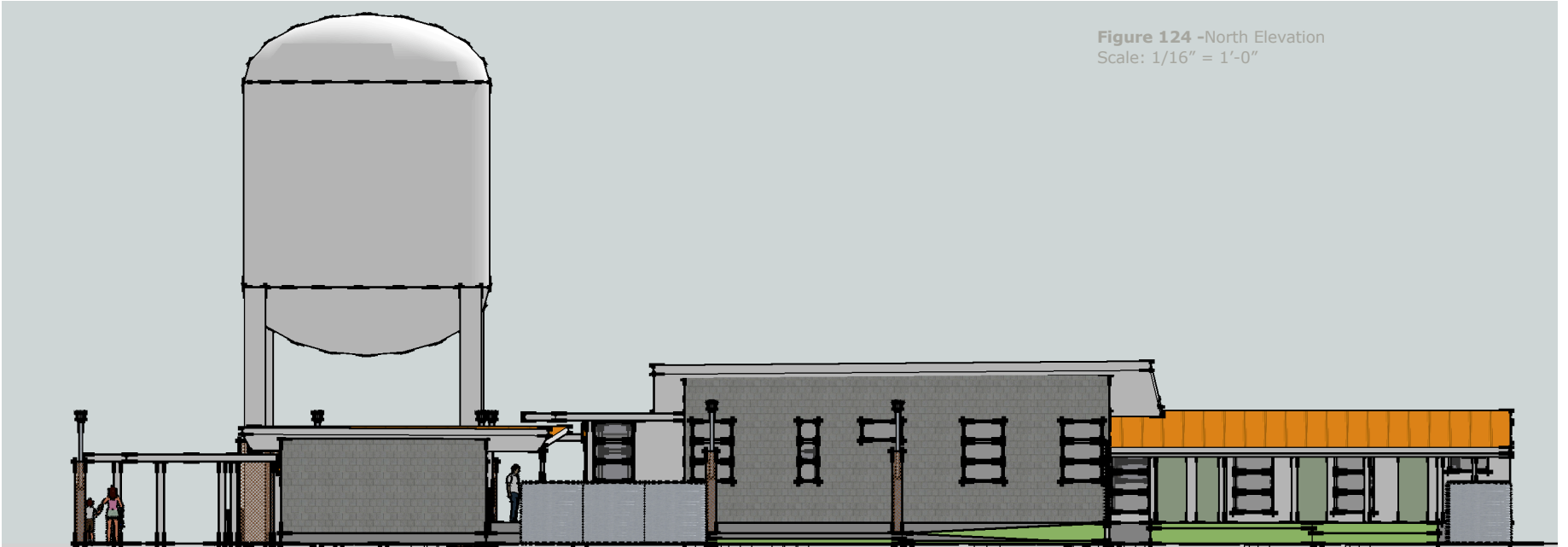
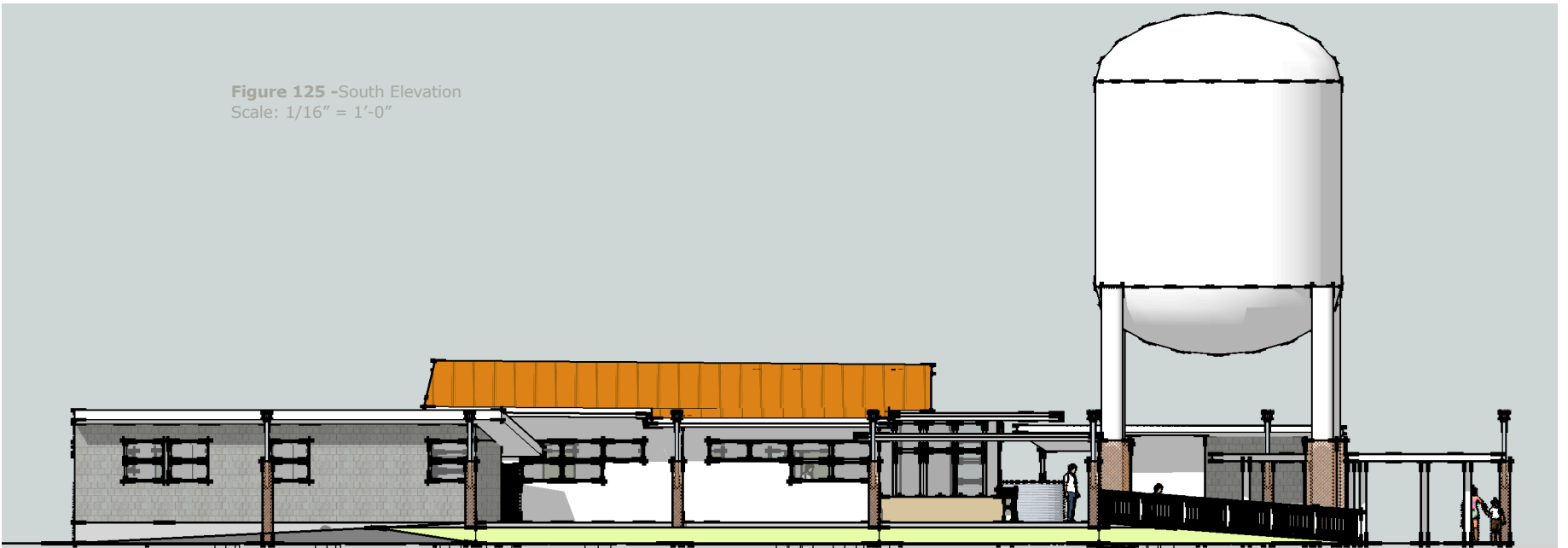


Figure 125 -South Elevation
Scale: 1/16" = 1'-0"



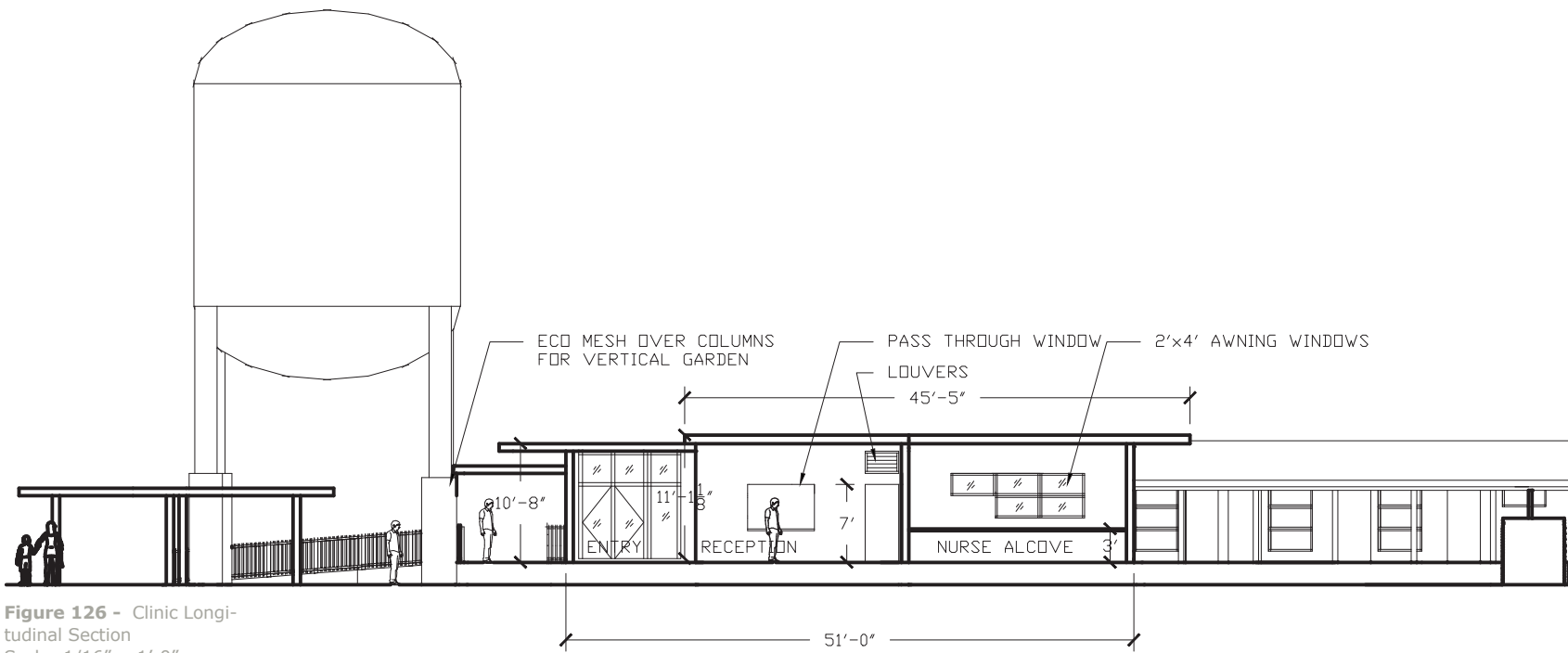


Figure 126 - Clinic Longitudinal Section
Scale: 1/16" = 1'-0".

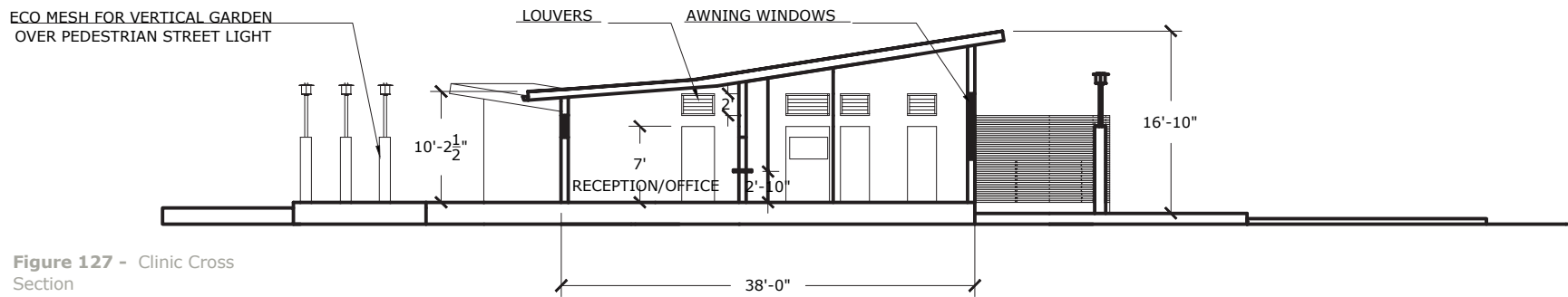


Figure 127 - Clinic Cross Section
Scale: 1/16" = 1'-0".

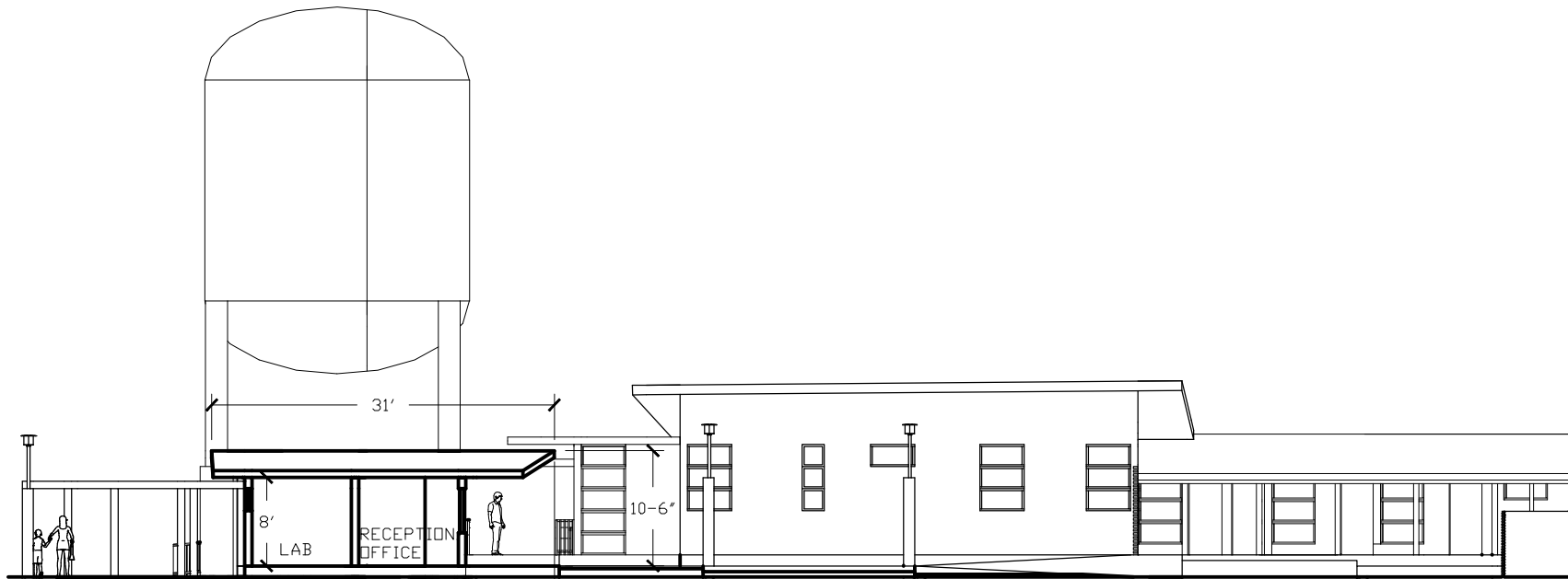


Figure 128 - Pharmacy
 Cross Section
 Scale: 1/16" = 1'-0".

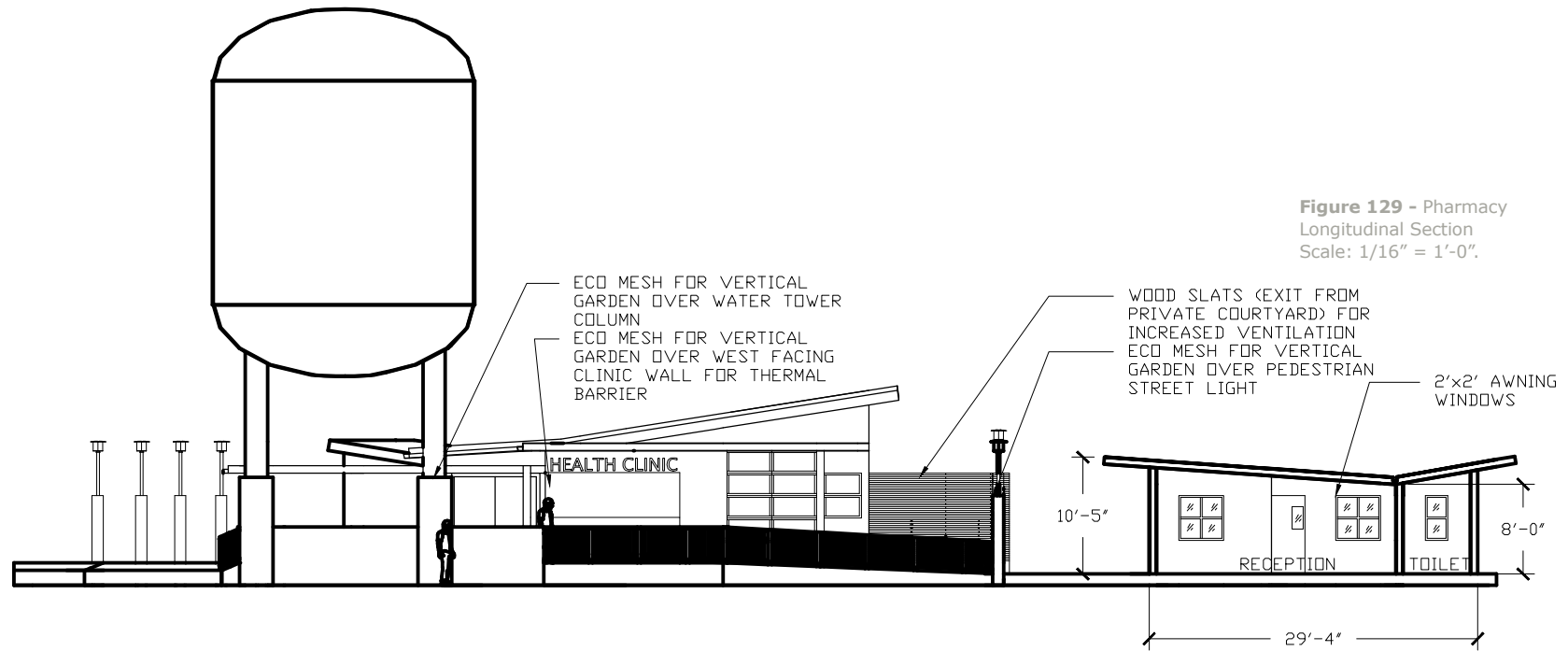
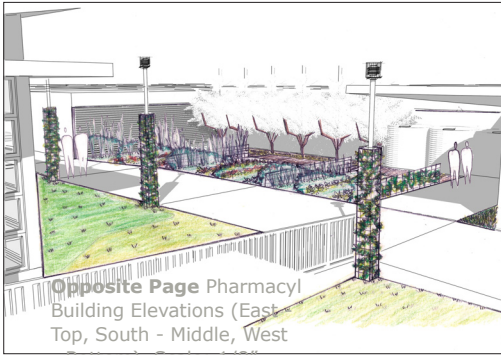


Figure 129 - Pharmacy
 Longitudinal Section
 Scale: 1/16" = 1'-0".

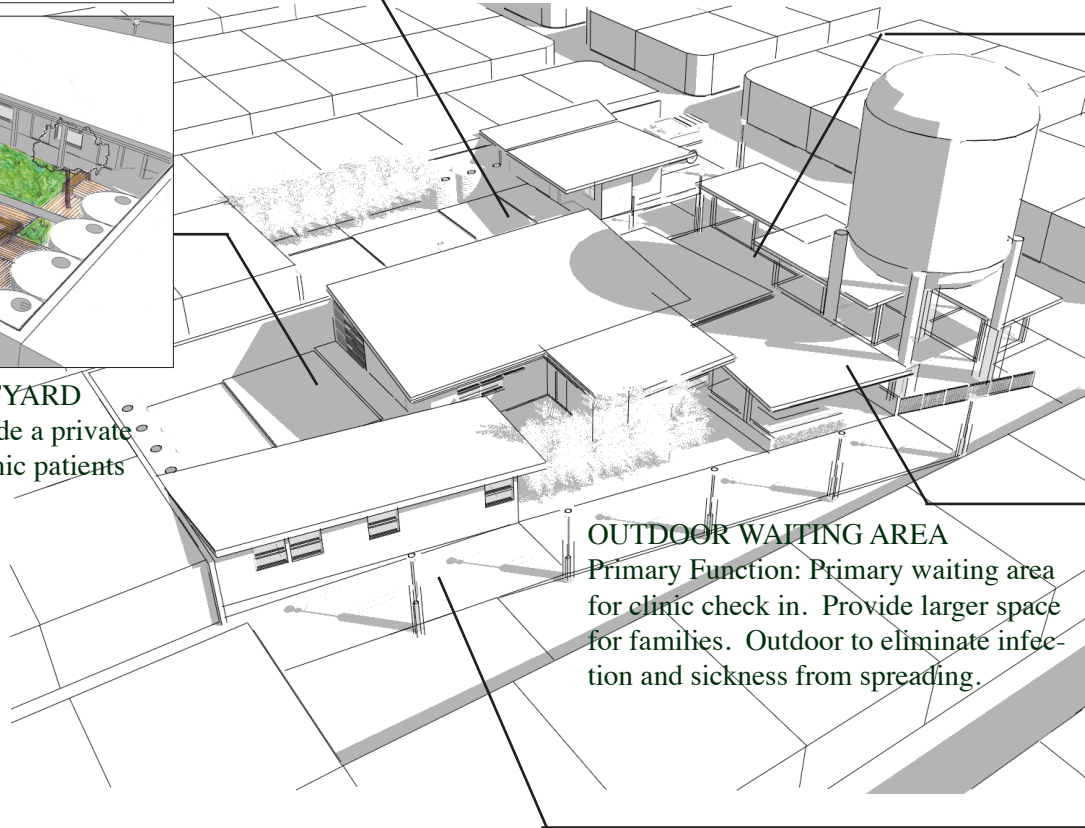


MEDICINE GARDEN
 Primary Function: To grow medicinal plants to be sold at the pharmacy promoting use of alternative medicines.

Opposite Page Pharmacy Building Elevations (East - Top, South - Middle, West - Bottom), Scale: 1/8" = 1'-0".



CLINIC PRIVATE COURTYARD
 Primary Function: To provide a private outdoor seating area for clinic patients and staff.



SHOPS AND PUBLIC COURTYARD
 Primary Function: To provide an overflow area for clinic, and to provide sitting areas for shops and community.



OUTDOOR WAITING AREA
 Primary Function: Primary waiting area for clinic check in. Provide larger space for families. Outdoor to eliminate infection and sickness from spreading.



SOUTH PEDESTRIAN WALK
 Primary Function: To provide a connection and pass through for the community.



Figure 130 - Cultural Connectivity and Outdoor Civic Spaces

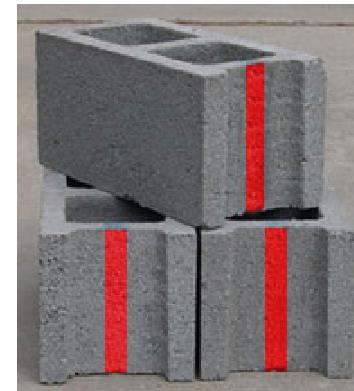
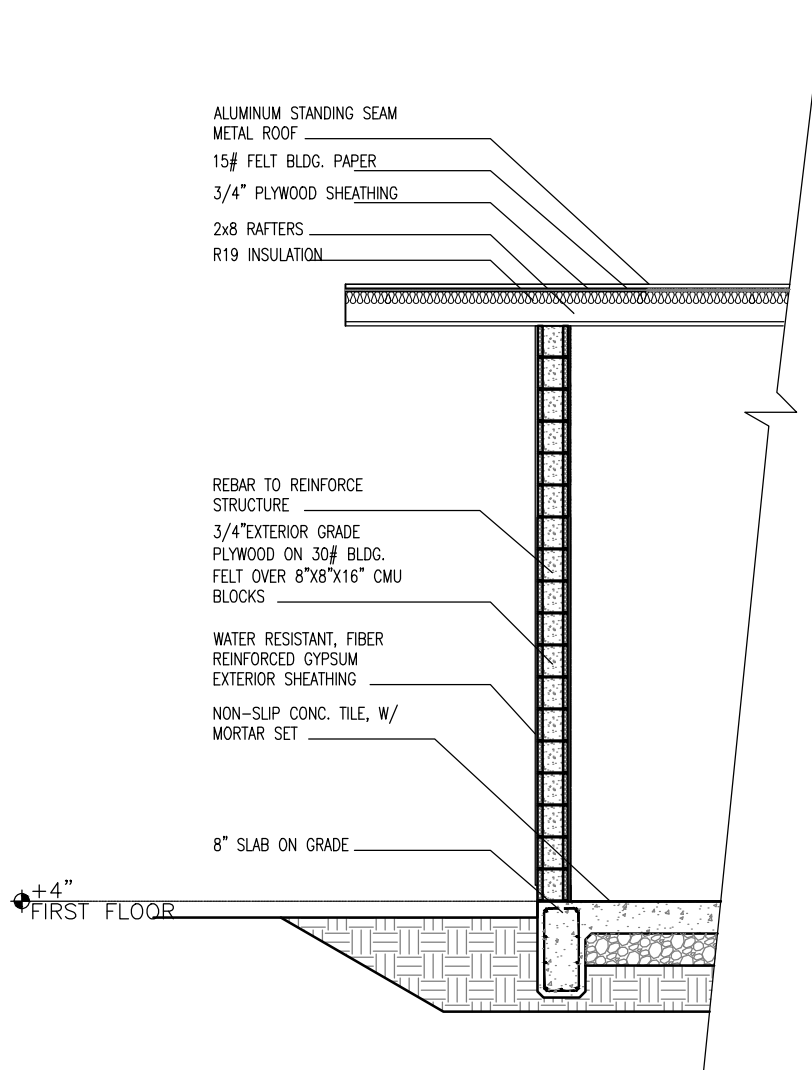


Figure 131 - (Left) Typical Wall Section of Buildings
Scale: 1/2" = 1'-0"

Figure 132 - (Top Right) Aluminum Standing Seam Roof
Figure 133 - (Bottom Right) CMU blocks

Conclusion

The buildings' designs respond culturally to the Southville residents, takes advantage of renewable resources on site and responds to the climate, and is affordable with its material and construction choices reducing long-term maintenance costs. Through its weaving of design elements, it allows for an indoor-outdoor feel, providing pedestrian streets to provide connectivity for the area, and its colors liven up the site in contrast to the residential area. It is not just a health clinic, but also a response to the site to connect the community, create a place for healing, and helps to promote tradition and culture.

Objectives and Goals

The goals of this project are to design a prototypical health clinic that is affordable, cultural, and sustainable. Through the study of trends and theories of healthcare architecture, humanitarian architecture, decentralized healthcare, and design models, an approach was determined. This approach is prototypical and specific to the site location and resident culture. However, the study of multi-disciplinary fields is necessary to providing a program that works with the people, and a design that enhances the area.

Process

The process first began with field research and an initial inquiry about the Philippine Urban Squatters. This field research was conducted in August 2008, two weeks spent in the Philippines, with a prior semester spent in researching the background of the Urban Squatters. The project initially began as a research for a housing design for the Urban Squatters in Manila. During the visit to Manila and various locations where the Squatters dwelled, it was evident that these people were self-sufficient, resourceful, and have knowledge on how to build their own homes. These homes were not architecturally inspiring, but stripped down to the basic shelter needs of these people. This idea was recognized by the Government, and during the relocation process to Southville, Cabuyao, these relocated squatters were given the land to build their houses upon.

The Southville Relocation Project was very interesting to me, and upon further site visits and research about the project, I saw

that there it was a poorly planned resettlement for the displaced urban squatters. Although there are amenities provided for the Southville residents, the facilities are overcrowded or ineffective. In doing research for the definition of basic needs, medical services and healthcare are one of the main necessities. There is only one health clinic that serves the 8,173 families living in the 52-hectare site (129 acres). This led me to focusing on creating a prototypical health clinic for the site, selecting one of six proposed health clinic locations in Southville. This began my research on healthcare and humanitarian architecture, decentralized healthcare, and how to create an affordable, culturally responsive, functional, and sustainable clinic.

Healthcare Architecture

The six waves of healthcare architecture are trends and theories were taken into account because there are many concepts and ideas that can work towards the design of the health clinic for low-income people. From aesthetics, to programmatic spaces, to overall layouts, the history of healthcare architecture will inform the approach in the clinic's location, its functions, and its cultural implications.

These waves address the history of why hospitals are designed the way they are today, and because a clinic is a satellite form of the hospital, understanding these waves is necessary. These waves are the Ancient, the Medieval, the Renaissance, the Nightingale, the Minimalist Megahospital, and the Virtual Healthscape.⁸⁰ The emerging Virtual Healthscape wave is the identifying theory that is used for the design of the Southville community health clinic.

Decentralized Healthcare

The theory of the emerging Virtual Healthscape encourages the decentralization of hospitals and design of satellite clinics embedded within communities. The decentralized and satellite clinics are the best option for a low-income community without vehicular means of transportation. Most low-income people cannot afford to pay for health insurance or health expenses, and when they are ill tend to hold off going to the hospital to avoid paying for health care. They wait until they get better or worse,

80 Verderber and Fine, 2000, 10.

until they are very ill. Placing the health clinic within the community will aid to family planning and the prevention of common colds, diseases, and well being of the people with ease. For the decentralized healthcare system to be efficient, a major hospital in the area must be identified, then semi-major specialized facilities, and then clinics within the communities.

Humanitarian Architecture

Humanitarian architecture is a recent phenomenon that has boomed in the last decade with the response of architects to shelter and housing needs of displaced people due to natural and man-made disasters. According to Noble, architects actively involved in humanitarian architecture movement are looking to design housing that is inexpensive, long-lasting, dry, and sanitary, designed to be built quickly, buildable in many diverse locations, designed, to use building materials indigenous to the region, and designed to take advantage of non-traditional building materials like shipping containers, prefabrication, recycled and earthen materials. These criteria are a broad basis through which designers can use for emergency and transitional shelter.⁸¹ These criteria can also be used to design service building, health clinics, recreation and community centers, and market places that are built for a permanent low-income community. This is because these concepts help to create a more feasible solution in the design of different types of facilities that can involve the local people to build it themselves. Humanitarian architecture and the designs that architects are producing are informing new approaches to not only emergency disaster relief and transitional shelter, but also low-income housing, health clinics, and low-income community planning.

Affordability

The materials chosen for the buildings and site were based on what was available locally and the FEMA August 2008 flood damage-resistant materials requirements. The buildings are constructed of 8x8x16 CMU blocks on top of concrete slab on grade, connected to the aluminum standing seam roof by 2x8 wood rafters. This type of construction is typical in the area, and one that is familiar to the Southville residents. They also have used this type of construction to build their own homes. Using local materials and construction methods in addition to FEMA flood-appropriate materials help to reduce costs of transporting materials, eliminates the need for skilled labor, and increases the longevity of the buildings.

⁸¹ Noble, Robert L. "Humanitarian Architecture in the Aftermath of Disaster." *Archi Tech Magazine* (2005). <http://www.architechmag.com/articles/detail.aspx?contentID=2372> (accessed October 19, 2008), 1.

The spaces in the clinic building where there are exam/office rooms help to create flexibility in the program and day to day use of the health clinic. This helps to reduce the square footage of the buildings reducing total costs of materials. The modular design helps with the standardization of construction and reduction of hard to construct buildings.

The potential of phasing for this project will help to also reduce the demand of construction costs for the local government. This will ensure the construction of the entire project over the course of a few years, instead of a reduction of the entire site and program.

Culture

The program of the health clinic, pharmacy, shops, and outdoor spaces were all a result of research on the culture of the Southville residents. It was important to research their history, where they came from, who they are, and what their aspirations are to be able to determine their needs for this health clinic design. The Southville residents are self-sufficient people who can benefit from the use of traditional medicine. This necessitated a medicinal garden and a pharmacy to sell the herbal medicine. This practice is supported by the Philippine Department of health has an agency dedicated to the support of this practice.

In looking at the family structures of the Southville residents, there are at least two generations living in the homes, some with three generations. This information led to the determination of the program needs in the clinic. The clinic needs to have an educational/telemedicine area, pediatrics/obstetrics/gynecology, and general practice in addition to the primary functional elements of a health clinic (reception area, nurse alcove, storage, soiled utility, offices, and toilets).

Gathering spaces and shops are planned to encourage the community to walk through site. The shops also generate additional livelihood within community. The pedestrian streets are designed to connect the community through the site and to the gathering spaces, and bring a civic function to the health clinic project. The public courtyard serves as an overflow for the outdoor waiting area, and as a rest area for the shoppers. The structures where the shops are can also be turned into a functional space

where community gatherings can be held. A sense of connectivity and community are an important design aspect to the health clinic because it is empathetic to the needs of the Southville residents.

Sustainability

A sustainable healthcare facility is increasingly important in areas where resources are scarce to begin with. It is important for economic (long-term benefits and savings) and educational (teaching of sustainability through design) reasons. Identifying key steps and elements of a sustainable healthcare facility is important in the process of designing one.

The health clinic is designed to be flexible to accommodate any changes in the program over the course of its life. This flexibility should be expressed through its structural frame, should accommodate both an increase and decrease in the number of beds, and design towards a narrower plan. The building geometry plays a major role in the initial costs of a facility. In the comparison between a narrow, intermediate, and deep plan, the initial costs increase the more narrow and sprawled the facility is. However, the deeper the plan, the less opportunities for natural ventilation, and the predominantly air-conditioned building increases in energy demand and maintenance costs.

Designing towards a carbon neutral building is an important direction for the architectural industry. Since buildings consume approximately 40% of all energy costs, designing a building that demands less energy is key to sustainable design. The design of the health clinic utilized passive cooling strategies, natural ventilation, rainwater collection, reduction of heat islanding through material choice and vertical and horizontal green spaces, responds to the climate (flooding and typhoons), orients the roof south for the potential to use Photovoltaics for the clinic, and reduces its carbon footprint by using local materials and construction as well as having a small building footprint.

All of the sustainable design strategies respond to the site's climate. It is prone to flooding because of the typhoon and rainy season, humid with temperatures between 73-76 degrees year round. The reduction of heat islanding is accomplished through

the use of CMU blocks creating a thermal mass for all of the buildings. The specification of cool aluminum standing seam roof and adding green spaces adjacent to all the buildings reduces heat island effect. The buildings are designed to enhance the wind pattern through the site and allow air flow through to all the gathering spaces.

A typical hospital is normally mechanically ventilated, and without the option to open any windows. With the push for healthier and sustainable healthcare facilities, designers are asking if natural ventilation is a low-cost alternative to healthcare design. Although uncommon in more developed countries, the studies done in Peru promote natural ventilation in healthcare facilities. It proves that it supports the reduction of the spread of airborne infection. The research ultimately show that naturally ventilated clinical rooms have better ACH (air change per hour) rate than those rooms that are mechanically ventilated. Natural ventilation can reduce the energy demands for the facility and give the patients and staff more control of the indoor environment. The buildings' narrow geometry also help increase natural ventilation through the spaces.

Lessons Learned and Future Research

The goal of this project is to design a prototypical health facility that is sustainable, functional, culturally responsive, and affordable, which could replace the current Southville health clinic. The project will address the relocated, low-income populations' need for an adequate healthcare facility in Cabuyao, Philippines to design a decentralized community health clinic specifically for them. The project seeks to find innovative uses of local materials and construction methods, seeks to find climate specific sustainable design strategies, and looks at culture to inform the spaces needed in and around the clinic.

The questions that this research design has answered are: Who are the relocated urban squatters of the Southville project? What can healthcare do for their situation? Is decentralized healthcare more effective for preventative services? How is this clinic more effective than the existing health clinic in Southville? What types of spaces are needed for this health clinic that are specifically for the Southville residents? How large should this clinic be? Where can this clinic be built? What sustainable design solutions can be used for this project? What types of local materials and local construction methods are available? How can this

building/facility be something that fits into the character/vernacular of the site?

Background information was researched regarding healthcare architecture, humanitarian architecture, decentralized health clinics, and designing sustainable clinics. Literature research provides information on who the relocated urban squatters are, how the urban development of Manila has resulted in these communities, why they were relocated to Cabuyao, and the Southville relocation project in Cabuyao. Then, field research and interviews give an understanding of the problem. The interviews were conducted with the Mayor of Cabuyao, the National Housing Authority, the Southville residents, and employees of the Cabuyao Hospital. These interviews determine the culture and demographics of the relocated people, and also influence the design by determining what types of spaces are needed for the clinic. Case studies inform innovative uses of local materials and construction.

Correlational interviews and literature research provide for the conclusions that inform the design of the health clinic. Some of these conclusions are the programmatic spaces needed to accommodate for basic healthcare needs incorporating culture and traditional medicine practices; affordability and innovation of the local materials and construction methods; and quasi-experimental research is used to find ways to foster community interaction and pride.

The questions of this project were answered to the extent of a year long project, but there is more information out there and more field research that needs to be done to determine the best solution for the provision of healthcare to the urban poor. I believe that it is necessary to meet with the Southville residents and the National Housing Authority for recommendations to the design of the health clinic.

Additional research topics that could be explored are: an extensive research into local materials and construction, how to measure the sustainability of the project, how do we measure the people's response to the project, how the buildings will actually respond to the climate, and will the government fund this type of project and with what type of budget?

Since this is an international project, there are issues that should have been initially addressed. These issues include: site research should have been done extensively during field visit, some design work should have been done before field visit to assure all questions are answered and to be able to anticipate questions to be answered, and when questions arise, establishing a point of contact would have been helpful.

The lessons learned from this research design are: that the involvement and understanding of the residents/clients very important when designing a health clinic; understanding realistic parameters of project is key to providing a viable solution; that each community has its own culture; Urban Squatters are a type of homeless people; and to be able to respond properly to needs, interviews must be conducted in addition to primary source research . Sustainable design is key to keeping costs down and helping to create a more human environment, addressing all objects and goals of this project (cultural, affordable, and sustainable). There are an infinite number of solutions and modules that could have been designed for the health clinic. The use of mobile healthcare could have been used, more innovative and modular materials such as containers could have been used in the design, and perhaps a focus on the expansion of the local hospital could have been explored.

Health Clinic Design for Resettled Squatters

The theories of healthcare and humanitarian architecture were utilized in the design of the site, incorporating healing environments and views through the green spaces. The prototypical design for the Southville Health Clinic is affordable, cultural, and sustainable. Its affordability is seen through the use of local materials, response to climate, smaller building footprints, and modularity and flexibility. The cultural response is seen through the green spaces and pedestrian streets that create civic purpose for the design outside of the clinic. The promotion of the use of traditional medicine practices is another culturally designed element. The sustainability of the project contains aspects of affordability and culture. The sustainable design elements reduce the energy demands of the buildings with the incorporation of passive cooling, natural ventilation, and reduction of heat islanding. It also captures rainwater to use to irrigate the green spaces. The additional design of the south facing roof on the health clinic is designed for the potential of photovoltaic panels. The weaving of all these concepts have created a civic, connected, and empathetic design for the Southville residents.

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ABBREVIATIONS

ACH	Air changes per hour
AITECH	Accreditation of Indigenous Technologies for Housing
ATP	Metabolic syndrome
CBHP	Community-based health program
CHW	Community Health Workers
CMU	Concrete masonry unit
CVA	Stroke
DM TYPE II	Diabetes Mellitus
DOH	Department of Health
GOCC	Government owned and controlled corporation
HCVD	Hypertensive Cardiovascular Disease
HPN	Hypertension
HUDCC	Housing and Urban Development Coordinating Council
ICFS	Insulating Concrete Form
IUFD	Intrauterine Fetal Demise
LGUs	Local Government Units
MBN	Minimum Basic Needs
NGO	Non-Governmental Organization
NHA	National Housing Authority
OB/GYN	Obstetrics and Gynaecology
PITAH	The Philippine Institute of Traditional and Alternative Health Care
PNR	Philippine National Railway
PTB	Pulmonary Tuberculosis

R.A. 8423	Republic Act 8423
RTI	Respiratory Tract Infection
SRA	Social Reform Agenda
TAMA	The Traditional and Alternative Act
TB	Tuberculosis
T/C Dengue Fever	Thrombocytopenia in dengue fever
URTI	Upper Respiratory Tract Infection
USGBC	United States Green Building Council
UTI	Urinary Tract Infection
WBDG	Whole Building Design Guide

DEFINITIONS

ABUKADO

Tagalog term for avocado

AKAPULKO

Tagalog term for Acapulco shrub found in the Philippines

AM

Tagalog term for rice water

AMPLALAYA

Tagalog term for bitter melon

ASIN

Tagalog term for salt

BARANGAY

Otherwise known as barrio, it is a Tagalog term for village, district, or ward. It is the smallest administrative division the Philippines. Municipalities and cities are composed of barangays.

BAWANG

Tagalog term for garlic

BAYABAS-BAYABASAN

Tagalog term for Ringworm bush

CABUYAO

Municipality in central Laguna province. Location of Marinig barangay, where the Southville Relocation Project is.

COMMUNICABLE DISEASES

Infectious diseases

DECENTRALIZATION

According to the Decentralization Thematic Team, the term 'decentralization' is used to describe a wide variety of power transfer arrangements and accountability systems

DECENTRALIZED HEALTHCARE

A healthcare system where there is a main central hospital, a local city hospital, and several community health clinics.

DEPARTMENT OF HEALTH (DOH)

Each becomes more specialized the larger the hospital gets. The Philippines administrative sector that is in charge of health-related decisions.

FAMILY PRACTICE

A specialty where the doctors in this field have had at least three years' training and service in all major areas of medicine such as surgery, obstetrics and gynaecology, pediatrics, internal medicine, and psychiatry.

HEALTHCARE ARCHITECTURE

Healthcare architecture includes the design of buildings that function to serve healthcare to people, including the planning, programming, interior design, planning of medical equipment, and engineering of the building. Healthcare architecture has undergone a radical transformation from the 1960s until now, and has had six waves of health architecture that captures key developments.

HILOT

Tagalog term for massage

HUMANITARIAN ARCHITECTURE

A recent phenomenon that has boomed in the last decade with the response of architects to shelter and housing needs of displaced people due to natural and man-made disasters. The formation of organizations like Architecture for Humanity, Open Architecture Network, Common Ground Community, Shelter Centre, and World Shelters, humanitarian architecture is making a mark on the design of housing, service buildings, and infrastructure for people in need.

INVASIVE SURGERY

A medical procedure that penetrates or breaks the skin or a body cavity

KAIMITO

Star apple

KALAMANSI

Tagalog term for lime

LAGUNA	A province in the Philippines, located in central Luzon, southeast of Metro Manila. Laguna almost completely surrounds Laguna de Bay, the largest lake in the country.
LAGUNDI	Tagalog term for 5-leaved chaste tree
LUGAW	Tagalog term for rice soup
LUYA	Tagalog term for garlic
MAYANA	Plant that heals cough, leaves are commonly used in herbal remedies
MUNICIPALITY	(bayan) is a town with a popularly elected administration including a mayor, and is part of a province (lalawigan) — except for the independent municipality of Pateros, Metro Manila in the National Capital Region — and is composed of barangays.
NATIONAL HOUSING AUTHORITY (NHA)	The National Housing Authority (NHA) is the sole national agency mandated to engage in housing production for low income families. It traces its roots to the People’s Homesite Corporation (PHC), the first government housing agency established on 14 October 1938 and to the National Housing Commission (NHC) which was created seven years later, on 17 September 1945. These two Agencies, the PHC and the NHC, were eventually merged on 4 October 1947 into the People’s Homesite and Housing Corporation (PHHC).
NIYOG-NIYOGAN	Tagalog term for Chinese Honey Suckle
NON-COMMUNICABLE DISEASES	Diseases, which are not infectious; diseases that may result from genetic or lifestyle factors.

NORTHRAIL-SOUTHRAIL LINKAGE PROJECT

According to the Philippine National Railway, the Northrail-Southern Linkage Project is a joint undertaking of the Philippines and Korea that aims to develop a modern railway system towards the south of Manila. It also seeks to link the north of Manila from Caloocan, to the south as far as Calamba, Laguna. The project is expected to provide an alternative means of mass transport service that is fast, reliable and affordable.

OUTPATIENT AMBULATORY HEALTH SERVICES

Includes the provision of professional diagnostic and therapeutic services rendered by a physician, physician's assistant, clinical nurse specialist, or nurse practitioner in an outpatient setting. Settings include clinics, medical offices, and mobile vans where clients generally do not stay overnight. Emergency room services are not outpatient settings. Services includes diagnostic testing, early intervention and risk assessment, preventive care and screening, practitioner examination, medical history taking, diagnosis and treatment of common physical and mental conditions, prescribing and managing medication therapy, education and counseling on health issues, well-baby care, continuing care and management of chronic conditions, and referral to and provision of specialty care (includes all medical subspecialties).

PEDIATRICS

Branch of medicine concerned with the treatment of infants and children

POVERTY

For this research, we use the definition of poverty used by the

PROVINCE

Social Reform Agenda (SRA) that President Fidel Ramos launched in 1994. The SRA considers a Minimum Basic Needs (MBN), and "are the closest indicators ever established to capture poverty beyond income and expenditure. The MBN defines poverty in terms of a three-tier needs hierarchy: survival (food/nutrition, health, water/sanitation, and clothing); security (shelter, peace, income, and employment); and enabling (basic education/literacy, people's participation, family care, and psycho-social indicators)."

A subdivision of government, usually one step below the national level.

PSUEDOURBANIZATION

A process that Laquian states around "the fact that the cities of the Third World are growing at a rapid rate, but that this growth is not accompanied by economic, political, and psycho-social changes that are the characteristics of true urbanization. People are being pushed away from farms, not because agricultural efficiency has achieved high production making it possible for a smaller share of the labor force to be devoted to agriculture, but because of the harshness of life in the rural areas. These rural-urban migrants account for about 93% of squatters and slum-dwellers are migrants from the rural areas. Since they move to the city with few or no skills, possessing low education and meager income, they have to stay in slums or squat on somebody else's property

RAILWAY URBAN SQUATTERS	to be able to survive. These rural-urban migrants, therefore, are the real transitionals.” Squatters that live alongside the stretch of the Philippine National Railway property from Tutuban Central railrod station in the north down to Carmona (Cavite) in the South.
RILES	Local term for railways or railroad
SALABAT	Tagalog term for ginger ale
SAMBONG	Blumea camphora plant
SAMPALOK	Tagalog term for tamarind fruit
SLUM-DWELLING	According to Ragragio, slum-dwelling is more of a socio-economic concept, living in homes that are so dilapidated and congested that the conditions pose health, fire, vice and crime hazards.
SOUTHVILLE RELOCATION PROJECT	As a result of the demolition of the railway squatter homes to make way for the Northrail-Southrail Linkage project, this relocation project is one of four sites that were offered for the displaced people. Approximately 8,173 families (32,692 people) were relocated to a 52-hectare (128 acres) site in Cabuyao.
SQUATTING	Primarily a legal concept and involves the occupancy of a piece of land or building without the permission of the owner, usually living in a physically disorganized collection of shelters made of light and often visually unappealing materials where poor people reside.

SUSTAINABLE

Interchangeable with the term 'green,' we use the definition from "the Office of the Federal Environmental Executive, which defines green building as the 'practice of 1) increasing the efficiency with which buildings and their sites use energy, water, and materials, and 2) reducing building impacts on human health and the environment, through better siting, design, construction, operation.

TELEMEDICINE

Delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interest of advancing the health of individuals and their communities

TSAANG GUBAT

Tagalog term for forest tea

URBAN POOR

Impoverished people living in the city, typically in a slum dwelling or living as a squatter.

URBAN SQUATTERS

Often referred to as a person who settles on land or occupies property without title, right, or payment of rent usually, against the regulations of the state.

ULASIMANG BATO

Tagalog term for Peperomia pellucida

YERBA BUENA

Peppermint plant

