A Home for the Heart:
Rehabilitation Therapy for Cardiac Treatment and Healing

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April 7, 2003
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Acknowledgements

My Parents: Who have always been there for me with full support and love.

Rebecca: Who kept me going through the entire semester and for putting up with me.

My advisors: Martha Hunt and Rob Benson for taking the time to answer all my questions and have guided me with their incredible knowledge.

My professors: Ronald Spangler and Darren Reno for all the help and encouragement they have given me.

The Indiana Heart Hospital therapy staff: For all there time and information.

My friends: Who have helped me with my project and offered advice throughout the semester. I'll never forget our time here.

My guitar: My six string friend that let me take out my frustrations and help keep me sane.
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Abstract

Heart disease is the number one cause of death in the US. "More than 1.5 million Americans will have a heart attack this year." (Sangiorgio, 59) With growing concern for the population of people with heart problems, health care facilities, specifically hospitals, are starting to specialize in heart and cardiac care. Most of the facilities that specialize in heart and cardiac care lack in outdoor environments for their patients. The outdoor environment has been used for healing as far back as the Middle Ages. Reinventing these areas and improving them to accommodate those with heart problems could be one of the best ways to improve the health of a patient. The outside environment can help the healing process and this study will help prove how it can be useful.

Designing for therapeutic outdoor spaces is a fairly new field in Landscape Architecture. Before more spaces and facilities are built, there is a need to educate health care providers, insurance providers, care takers and patients about the benefits of outdoor healing gardens. Every day there are new improvements and articles educating about the benefits of this kind of treatment. In this project, the author set up guidelines and applied the newest information to a specific site.

In today's society when a hospital is built, great care is taken to make sure the building has the most technologically advanced equipment as possible. While specific attention is devoted to the technological equipment inside a hospital, not much care is taken in the design of the landscape around the building. As with this project, many therapeutic garden designs today are placed in existing hospitals.

This project is a design of a cardiac/heart recovery and recreation garden at the new heart center in Castleton Indiana. The project incorporated finding the best location for the garden and how to incorporate cardiac therapy on that location. The project is a detailed plan for a therapeutic roof garden.
Introduction

Heart problems affect millions of people and are the leading cause of death in many countries (www.webmd.com). This disease continues to grow in number every year. As the elderly live longer, the effects of heart disease keep rising. Treatment options for heart problems are often expensive and can take a long time to recover from. Because of this, there is an important need for facilities that offer newer and better treatments for heart operations and conditions.

This project entails how therapeutic gardens can play a major role in healing within a hospital setting. Therapeutic gardens in hospitals help the patient relax, heal and recover faster than staying in a room and not experiencing the outdoor environment.

Often times, no outdoor area is provided for patients to use that have or are recovering from a heart operation or therapy. One reason that therapeutic gardens are not involved in many hospitals is due to health care providers not understanding the benefits of therapeutic gardens. Due to the lack of facilities that have outdoor areas for recovery and healing, the need for these facilities is great. Studies like this one can help raise the interest of therapeutic gardens and their important role in hospitals.
History of gardens

During the Middle Ages restorative gardens were first brought to light in Europe. During this time, hospitals and monasteries helped the sick and the insane with incorporated courtyards where residents could soak up the sun and shade at a human scale. Goals of gardens during (1090-1153) are outlined by St. Bernard at his hospice in Clairvaux, France:

"Within this enclosure many and various trees... make a veritable grove.... The sick man sits upon the green lawn... he is secure, hidden, shaded from the heat of the day...; for the comfort of his pain, all kinds of grass are fragrant in his nostrils. The lovely green of herb and tree nourishes his eyes.... The choir of painted birds caresses his ears... the earth breathes with fruitfulness, and the invalid himself with eyes, ears, and nostrils, drinks in the delights of colors, songs, and perfumes (Cooper Marcus, Barnes 1995)."

During the 14th and 15th century the trends changed. Crops failed, periodic plagues hit and with the migration into the burgeoning cities, they became ran down. These trends lead to the decline of meditative/restorative gardens. Some courtyards did continue the tradition such as the Les Invalides in Paris (1671). They had rows of trees planted within their courts.

In the 17th and 18th centuries, medicine helped bring back the usable outdoor spaces for hospitals. Hospitals were now concerned with how infections were spread so they used trends like hygiene, fresh air and cross-ventilation to help control the infections. Colonnades like the end of a fork linked the two to three story buildings. This trend adopted the name pavilion hospitals. They incorporated outdoor spaces in-between the buildings.

This continued into the 19th century and by the 20th century the trend was to wheel hospital beds out onto sun porches and roofs. Original plans show beds on the trellised roof gardens. By the 1800's all that was left were flower boxes and a place for people to take a break and smoke.

The 20th century mainly brought the most rapid social change period to date in history. With two world wars and new germ theory, more medical science and advances in high-rise construction, high-rise hospitals replaced low-rise hospitals (Cooper Marcus, Barnes 1999).

"In acute care hospitals, the design emphasis shifted towards saving steps for physicians and nurses, away from attention to the environments the patients experienced. Gardens disappeared, balconies and roofs and solaria were abandoned, and landscaping turned into entrance beautifications, tennis courts for the staff, and parking lots for employees and visitors. These trends which so captured the twentieth century American acute care hospitals spread, after World War II, by the processes of fashion to long-term and chronic care facilities, to the hospitals of the Veterans Administration, to big city teaching hospitals with their gardenless patient environmental set the styles for all the others (Cooper Marcus, Barnes 1999)."
Not all garden focus was lost in hospitals and health care facilities. Using gardens to help with occupational and physica therapy were established early in the 20th century. After World War I, garden work entered in rehabilitation hospitals; following World War II, horticulture therapy entered the gardens and special-purpose gardens began to be provided for veterans, the elderly and the mentally ill. Hospice facilities became more popular due to a rising morality rate from AIDS and cancer. On a sad note, hospice facilities are the only facility/garden that made it through history (Cooper Marcus, Barnes 1999).
Location of site

The location of this site is an important factor in this project. The site is located in Indianapolis, Indiana and allows for frequent site visits, interviews with professionals and possibly faster access to information key to this project.

The Indiana Heart Hospital is located off of I-69 and 82nd street in Indianapolis, Indiana.
Context of the site

This site has a variety of different surrounding context from commercial to residential. In more detail, to the north is an Omni Hotel and 82nd street. To the South of the site are commercial businesses and some apartments. To the East of the site sits Community North Hospital and more apartments. To the West is interstate 465 and Castleton Shopping Center which attracts heavy vehicular traffic throughout the day.

Site Opportunities

This site offers opportunities that other sites would not offer. Due to this hospital being completely focused on heart surgeries and procedures, the design will be able to focus on a more specific user group. The site also offers interesting roof areas for the location of the garden. The site is located along a major highway and will gain exposure to attention from those that drive by the hospital everyday.

Site Constraints

The hospital only has three available roof areas to choose from for the location of the garden. The site is bound by other buildings around it and will have a hard time expanding and gaining further land for future development.
Site Description

First floor

The first floor of the Indiana Heart Hospital has research areas, the check in desk, imaging areas, recovery rooms, surgery rooms, and an attached public office building where therapy for the patients is currently done. The two areas indicated by red circles locate where the elevators and therapy room are located.
Second Floor

The second floor of the Indiana Heart Hospital has patient rooms, a central nurses station, three rooftop areas, access to the public office building, an elevator area and the main hallway.
Site requirements

Due to the location of the garden being on a rooftop, special consideration was taken to make sure that the site would function and work. The elements that were needed to select the site are listed below.

- Protection from natural elements
- Load bearing capacity of at least 250 to 300 pounds per square foot minimum
- 42” minimum safety railing
- Location and understanding of structural beams and water drainage systems
- Careful and thorough inventory and analysis of the roof
- Location of a safe access point to the roof

This plan shows the location of the structural beams in the hospital
Patient requirements

When designing a garden, specific information about the user is needed to tailor the design to their needs. Cardiac patients require a specific set of needs that consist of the following.

- Shade from direct sunlight
- Places to sit and rest
- A smooth walking surface
- A sense of privacy
- Security and safety

The patients also require specific elements to be included for their stay and use of the garden. In order for the garden to be used for rehabilitation and relaxation, information is needed on how the patient does rehabilitation.

The goal of rehabilitation is to get the patient back to the same or better physical shape than they had currently be in. In order to do this, rehabilitation is done in three phases. The first stage starts one to two days after the patient has a procedure or operation. The patients goal is to walk 500 feet, 3 to 4 times a day. Once this goal is reached, phase two can be started.

The goal of Phase two is to have the patient do thirty minutes of consistent exercise. The exercise done consists of walking, cycling, walking up and down steps, rowing, hand cycle and the shoulder rotation. These exercises work to strengthen and build the endurance level of the patient.

Phase three is the same as phase two with one difference. Phase three is done without the assistance of a therapist. Phase three is done on your own and should be done on a regular basis to keep the patient in shape and keep them healthy.
Site Selection

In order to select the right placement for the garden, three roof areas were studied for important factors for rooftop design.

<table>
<thead>
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<th></th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
</tr>
</thead>
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<tr>
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<td>Neutral</td>
<td>Bad</td>
</tr>
<tr>
<td>Wind</td>
<td>Good</td>
<td>Neutral</td>
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<tr>
<td>Privacy</td>
<td>Good</td>
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<td>Neutral</td>
</tr>
<tr>
<td>Public view</td>
<td>Good</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

From the matrix above, looking at noise, wind, views, access, privacy and public view were all taken into consideration when selecting the site. Each element is important when analysing the area.

Noise - The amount of noise existing in the area can cause a problem with creating areas for a garden. Finding a site with minimal noise is the ideal condition desired for the location of the garden.

Wind - Outdoor elements like wind are a must to consider. A site with too much wind will cause problems with plants and the users of the area. Wind can be damaging but also a pleasant feeling depending on the force of the gust of wind. The ideal condition would be little wind with a majority of the site shielded from the wind.

Views - Views in and out of a rooftop area are important to the comfort level of the user of the site and the person on the other side of the view inside. Patients generally do not like having the feeling of others watching them. The ideal condition for views is to make the user of the area and the person inside both feel protected and safe from someone else's eyes.

Access - Access to the garden must be smooth and easy for all users. The location and type of access must be met to make the garden a success. The ideal condition for access would be a double door that has a smooth transition to the rooftop surface material. No steps, only inclines if absolutely needed.

Privacy - Privacy coincides with views. The user of the area wants to have a sense of privacy. This helps the user feel safe and will reduce the amount of stress felt by the user. The ideal condition is to have the placement of the garden so that the public cannot see the area.

Public view - Public view also coincides with privacy and views. The ideal condition for the area is to place the area away from public view.
The Site

Area 1 is the site that best fits the criteria for an outdoor roof garden for patients. The site is located on the second floor on the northern roof. This area measures 1,602 square feet in size and can support a rooftop garden. This site is quiet and can provide privacy for the user. Access to this roof is done by walking down a hallway and walking out of a set of double doors just inside the electrical room.
Photo Tour

Arial perspective from the fourth floor

View of the entry onto the garden

View of the rooftop area

View from the south wall

View along the roofs edge
Goals:

- Design a therapeutic outdoor roof garden for male and female patients aging from 30 to 85 years of age
- Create an inviting space for patients to relax
- Provide areas to sit and walk
- Design the garden to support phase 1 and phase 2 therapeutic activities
- Incorporate a walking path that offers relaxing elements and destination points
- Incorporate Horticultural therapy exercises into the activities in the garden and the patients therapy
- Provide desirable places to enjoy and be involved in
- Create areas that are at a comfortable scale
- Create a feeling of privacy in the garden
- Use plants to soften the look of the look of the elements around the garden
- Provide a safe environment for the patients
- Locate the garden in a place that protects the patient from outdoor elements
- Provide areas that are private
- Minimize the amount of visibility to the garden from the public and others in the hospital
Assumptions

1. Funding for design and construction of the gardens will be found
2. Maintenance for the gardens will be provided by the hospital and patients
3. Support from doctors and staff will make the gardens a helpful and great experience for the patients.
4. That outdoor therapeutic gardens can benefit in the treatment of heart disease.
5. Nature is restorative.

Delimitations

1. This project will not continue to the next step which would be construction documents.
2. The roof structure for the garden will not support this design. Implementation of this design would cause the roof to give way and collapse.

The design process

The process for designing a therapeutic garden is outlined in a book by Martha Tyson called Healing Gardens. This process shows the steps that a professional office would take to complete this project. Within this project, two of the five processes will be addressed.

1. The first stage of this study will be the investigation phase. This stage looks at gathering information from surveys, interviews and observations in order to create design guidelines and goals for the client, in the study, and the users of the garden.
2. The second stage of this study will be completing the design phase in the design process. This part of the design process applies the design guidelines and the goals to the site. Designs will be developed and presented to advisors for critiques. The final outcome for this stage is a drawing set that explains and outlines the entire project and the vision of the design. The drawing
Site Inventory

Glass window on the east side of the roof

Vents for the electrical room

Roof drain

Double doors for the rooftop

4 foot by 4 foot roof air vent

2 foot by 2 foot roof air vent
Shadow Study

9:00 shade

12:00 shade

3:00 shade

6:00 shade

This shadow study determines the extent of shade on the rooftop during the day. Most patients will visit the site from 9:00 am till 6:00 pm. Heart patients need shade because any new skin needs to be protected from the sun at all time. Shade is a very important element to the patient and to the garden. Any sun exposure to new skin can cause the skin to become irritated or burned, resulting in pain and discomfort.
Analysis

Analysis of a rooftop is very important to the design and layout of the space. Every rooftop needs a careful inventory and analysis to find the best location for elements in the garden. The analysis for this garden consists of studying the entry to the site, air vents, structural beams, roof drains, views in and out and patients views, wind and shade. Each of these elements helped shape and arrange the garden along with the specific needs of the patient and their rehabilitation needs.

The entry to the site presents a problem. To access the roof, the user must go into a hallway which leads into an electrical room. Once inside the electrical room, there is a door that has a 15 to 18 inch step up to the door frame. This does not allow the patient easy access to the garden.

The three air vents on the rooftop move air from the floors below. They do not blow much air and are not very noisy. The problem with the air vents are not estetically pleasing. The air vents stand four feet tall and are four feet wide and deep. There is one smaller vent that stands three feet tall and is two feet wide by two feet deep. The three air vents need to be designed around so that they still perform there job but become more pleasing to the eye.

Within the rooftop space are 5 main structural beams. These beams show where large or heavy objects will be placed. The beams could help hold items such as a post for a trellis, large vegetation like a tree (no larger than 15 foot), retaining walls, water features and large amounts of soil. This element will be crucial in the design of the rooftop garden.

The roof drain is located in the center of the rooftop. From this location, the rooftop can be designed to allow the runoff water to move under the walkway of the garden and drain into the existing rooftop drain system.

Windows and views in and out of the garden will be a major element in the garden design. The view inside and out of the patient room window is a very important view. The patient needs to have a sense of privacy and protection from being looked at by someone out in the garden. This also works when the roles are reversed. The patients outside need to feel comfortable that they are not being watched by patinets sitting in there rooms. The other views are out of the garden to the North, East and West. These views (shown on page *) look over a parking lot out to I-69 to the West, to the Omni Hotel to the North, and to a gas meter and Community North Hospital to the East. The views out to the North, East and West could be filtered so that the patient sees only the garden space and to help the patient feel safer with a protective screen by the side of the roof.
Program

Trellis

- Use a combination of metal and wood to construct the trellis so that cantilevering can be achieved
- Trellis will be designed with overhead planting beds for vine plants and to provide an activity for the users to do for therapy and stretching and strengthening.
- Provide areas of the trellis that will allow light to come through without being restricted for areas with planting beds below

Walking path

- Use inlaid position markers to give the patients and therapist an easy to see indication of how far the patient has walked
- Make the path smooth and provide places to sit along the side of the paths.
- Apply a coating to allow the surface to come less conductive to slipping and falling
- Paths are 5 to 6 feet in width for accessibility of patients and so two people can walk comfortably next to each other

Stair area

- Provide an overlook area with 4 steps to give a needed exercise for patients in phase 2
- Incorporate a water feature into the overlook to enhance the overlook and give an attraction to achieve reaching the destination point.
- Provide railings that will protect and secure the patients safety at all times.
- Provide areas to sit while on the overlook area

Raised Planting beds

- Beds will be at a height so that they can be worked on easily and provide a place to sit and rest
- Planting beds will contain perennials, annuals, and containerized shrubs to control their growth.
- Beds will contain soil mixture of 30% soil and 70% Styrofoam shavings to lighten the weight of the beds

Private area

- Private area will allow 4 to 5 people to sit down and rest at a time.
- This area will be screened using plants, trellis and lattice work.

Destination points

- Will provide seating and shade for the patient
- Will have an element that will attract the user to want to sit down and also encourage them to want to come back
- Destination points help mark and monitor the progress of the patient as they are able to walk further
Concept 1

This concept has shade made by natural vegetation. Along with the natural vegetation is a small trellis to provide additional shade. There are raised beds along the windows so that a planting screen can be installed for the patients privacy inside the garden and inside the room. The private area is by itself in the north east corner. Accessing the private area is done by walking on the walking path. The path covers almost half of the site (800 sq. ft.) and is placed away from the patient windows to give the patients waking a heightened sense of privacy.

The good parts of this concept are the raised planting bed along the patient windows and the walkway being very private. This concept is not as good because the private area can only be accessed by one route. The walking path is small and would be hard to walk on. There are no destination points or points of interest for the patients to visit or enjoy. The views out of the garden are unfiltered allowing the patient to see views that are not as desirable. There are no designated areas for patients involved with phase two to exercise.
Concept 2

This concept has shade made by a larger trellis and one tree. The garden is enclosed with vegetation to give the garden a more enclosed and protected feel. The raised beds have been moved to the center of the garden and the walking area surrounds the raised beds. The walking area used the entire rooftop area (1602 sq. ft.) with a private area in the center.

The good parts of this concept that the private area has more than one entrance and exit point. The walkway uses the entire rooftop area and there is more shade with the larger trellis. There are two areas designated for phase two exercise and they are out of site from the view from the patients inside the hospital. The not so good parts are that the raised beds are in the center and not screening the view in and out of the garden. There are no destination points and there are not enough areas for phase two patients to walk. The walkway runs against the patient window giving no privacy to the user or the patient in the room.
Final Concept

The final concept uses parts from the previous concepts and adds a few new additions. The trellis is larger and includes one tree for natural vegetation. There are two additional trellises along the North edge and at the North-west edge. The garden is enclosed with vegetation to give the garden a more enclosed and protected feel on the North and East end with the circular trellis on the North-west side. Raised beds are located by the patient window while the privat area sits in the center of the space. The private area can be entered or exited from two locations and is surrounded by vegetation. The walking route incorporates the entire rooftop while also delivering the patient to three destination points and 5 areas for phase two therapy. The walkway comes close to the patient window, but the view is filtered by the raised beds. The plant and there position allow for the walkway to come along the window. One new addition to the garden is the introduction of a terraced area.
Master Plan

This is the Master Plan for the rooftop garden. Here is a brief walkthrough of the garden.

The red circles indicate a destination point

The blue circles indicate an activity area

This sketch shows the first destination point. At this destination point, there are places to sit underneath the circular trellis. In this area there is a fountain that has a sheet of water that falls from the top so that patients can interact with and play with the fountain.
This sketch shows the first activity area for phase two therapy. Here, the patients work on stretching and upper body strength. The exercise for stretching is done by moving a lever back and forth. When the lever is moved, the slats on the trellis above move allowing the patient to interact with the garden. Next is the upper body exercise with simulates a rowing exercise.

This sketch shows the stair terrace activity. This area serves as a destination point and an activity area. The elevation of the terrace gives the patient a nice view of the garden. The stairs serve as an activity for the patients in phase two of therapy. There are two sets of stairs and each set of stairs has four steps. Each set of steps also has a hand rail for safety.

This sketch shows the third destination point. In this area, the patient can sit along the water pool and feel the water and interact with the pool. This area is also an activity area. In this area, the patient pedals an extendable bicycle that comes out from the wall. When the patient pedals the bike, it moves the water in the pool creating a soothing water sound that will fill the garden. This feature helps the patient interact with the garden.
This sketch shows what the walkway looks like. The walkway is a smooth surface that has a non-slip surface applied to it. Along the walkway are raised beds that allow the patient a place to sit and allow the plants to be elevated to a height that is easier for older patients to enjoy.

One key feature for this garden to become therapeutic and help the patients recover faster is to have the patients interact with the space they are in. The activity areas and destination points are how this garden design creates the interaction with the patient.

*View from patient room*

Above are two pictures out of a patient window. The pictures show the perspective of a patient laying down on a bed in there room. The picture on the left is the view that currently exists at the hospital today. The picture on the right is the proposed view for the patient.
Plants Plan

Plant Index

**Deciduous Trees**

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Symbol</th>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Size</th>
<th>Conditions</th>
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<tr>
<td>1</td>
<td>PM</td>
<td>AGER GRiseum</td>
<td>PAPERBARK MAPLE</td>
<td>12'</td>
<td></td>
</tr>
</tbody>
</table>

**Deciduous Shrubs**

| 5        | A      | RHODODENDRON 'EVERMAYO' | AZALEA | 3'H  | 3' GD      |
| 3        | B      | MYRTICA PENNY VANCA   | RASPBERRY | 4'H  | 3' GD      |
| 6        | BB     | EUONYXUS FORTUNIS 'COMPACTUS' | BURNING BUSH | 4'H  | 3' GD      |
| 13       | JA     | PRUNUS JAPONICA    | JAPANESE AMUR CRAB | 5'H  | 3' GD      |
| 24       | KSV    | NICHOLIUM CARLEII    | KOREAN SPICE VIBURNUM | 5'H  | 3' GD      |
| 16       | LM     | ALCHEMILLA MOLLIS   | LADIES MANTLE | 3'H  | 3' GD      |
| 6        | OH     | HYDRANGEA QUERCIFOLIA | GLEAF HYDRANGEA | 3'H  | 3' GD      |
| 14       | RC     | CORNUS SERICEA    | REDOSIER DOGWOOD | 5'H  | 3' GD      |
| 3        | SS     | SPIREA JAPONICA 'RED HEART' | ROSE OF SHILOTH | 4'H  | 3' GD      |
| 24       | S      | SPIREA JAPONICA 'ANTHONY WATERER' | SPIREA | 5'H  | 3' GD      |
| 4        | YG     | CORNUS T Arenaria | YELLOWSTEM DOGWOOD | 3'H  | 3' GD      |

**Evergreen Shrubs**

| 2         | R      | RHODODENDRON 'BLUEBIRD' | RHODODENDRON | 3'H  | 3' GD      |
| 2         | CI     | ILEX GLabra COMPACTA | COMPACT INKBERRY | 3'L  | 3' GD      |

**Ornamental Grasses**

| 17        | Y      | MISCHANOTHIS 'YUKI JIMA' | YUKI JIMA JAPANESE SILVER GRASS | 2'H  | 3' GD      |
| 16        | ZG     | MISCHANOTHIS 'ZEBRA' | ZEBRA GRASS | 2'H  | 3' GD      |

**Perennials**

| 72        | AS     | ASTILBE ARENDSEI | ASTILBE | 18'H | 12'O.C.C |
| 36        | AV     | FESTUCA GLACIA | ARVINA | 12'H | 12'O.C.C |
| 29        | PH     | HOSTA PATRIOT | PATRIOT HOSTA | 12'H | 24'O.C.C |
| 8         | PP     | ATRIUM NIPONICUM TACUM | JAPANESE PAINTED FERN | 18'H | 24'O.C.C |
| 23        | RBB    | PEROVSKIA ATROPLUCIFOLIA | RUSSIAN BAKER BLUE SPIRE | 30'H | 24'O.C.C |
Conclusion

The need for better ways to heal, recover and undergo therapy are in need of a new identity. The spaces where healing and therapy are currently being performed are very dull and sterile. The need is apparent to reach out and start looking at new ideas for these spaces.

Within this comprehensive project, the author had the chance to show how this can be done. The theories and concepts discussed in this project apply to a number of different kinds of healing and therapy practices. There is always a place for improvement, and if we can ask our bodys to change, then the environment around needs to change as well.

This project fulfilled the authors desires to create a roof garden for the Indiana Heart Hospital. This facility cut the budget for two garden areas. I hope that this study along with future studies like this one will further support the need for therapeutic gardens and outdoor healing spaces in hospitals and health facilities.
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