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2014

Hospital: A Creature of Duality

Gordon McCormick
Virginia Commonwealth University

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A CREATURE OF DUALITY

SEEKING BALANCE BETWEEN

NATURE AND TECHNOLOGY

IN HEALTH ARCHITECTURE

GORDON MCCORMICK
<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODE OVERLAY</td>
<td>2</td>
</tr>
<tr>
<td>MANIFESTO</td>
<td>3</td>
</tr>
<tr>
<td>INTRODUCTION TO PROJECT</td>
<td>4</td>
</tr>
<tr>
<td>INTRODUCTION TO SITE</td>
<td>8</td>
</tr>
<tr>
<td>SITE ANALYSIS</td>
<td>10</td>
</tr>
<tr>
<td>CASE STUDIES</td>
<td>20</td>
</tr>
<tr>
<td>PROGRAM</td>
<td>36</td>
</tr>
<tr>
<td>SPACE PLANNING</td>
<td>42</td>
</tr>
<tr>
<td>CONCEPT</td>
<td>48</td>
</tr>
<tr>
<td>DESIGN SOLUTION</td>
<td>64</td>
</tr>
<tr>
<td>THESIS BOARDS</td>
<td>68</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>70</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<td>Group I-3</td>
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<td>3. OCCUPANCY:</td>
<td>290 max. capacity of building</td>
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<td>4. OCCUPANCY LOAD:</td>
<td>240 SF/person</td>
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<td>30 max. capacity of project site</td>
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<td>6. HEIGHT LIMITATION:</td>
<td>1 Story</td>
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<td>7. AREA LIMITATION:</td>
<td>11,000 SF</td>
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<tr>
<td>8. FIRE SUPPRESSION SYSTEM:</td>
<td>Quick Response and Resident Sprinklers</td>
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<td>9. STRUCTURAL FIRE RATING:</td>
<td>1 Hour</td>
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<td>10. MEANS OF EGRESS:</td>
<td></td>
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<td>11. NUMBER OF RAMPS:</td>
<td>2</td>
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<td>12. NUMBER OF STAIRS:</td>
<td>4</td>
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<td>13. NUMBER OF EXIT SIGNS:</td>
<td>4 per floor</td>
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<tr>
<td>14. ACCESSIBILITY:</td>
<td>100% accessibility in all dwelling and sleeping areas</td>
</tr>
<tr>
<td>15. NUMBER OF BATHROOMS:</td>
<td>8 full private bathrooms</td>
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<tr>
<td>16. NUMBER OF ELEVATORS:</td>
<td>1</td>
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<td>17. NUMBER OF RAMPS:</td>
<td>2</td>
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Construction Drawings courtesy of Freeman Solt LLC
There was once a small fishing village situated in a lagoon on the edge of the sea. One day at low tide, some of the fishermen noticed rocks along the shore glistening in the sun. A white, powdery residue had been left by the evaporated sea water. It was salt. Unbeknown to the fishermen, the concentration of sea water the shallow lagoon had generated a high salinity content. This, coupled with the sunshine from the warm climate of the region, created the perfect conditions for harvesting the mineral.

Salt had been around for centuries, used for everything from cleaning wounds to purifying water. However, it was expensive, imported from the East on the Silk Road—until now.

The newly discovered sea salt was also of a much higher quality than its eastern cousin, which was mined from the bowels of mountains. The purity of the sea salt made it even more valuable, and the fishing village soon became a prosperous and wealthy trade center. The salt trade attracted merchants from civilizations throughout the known world.

The fortunes of the village attracted more than just the attention of the civilized world. However, this was in the wake of the collapse of the Great Empire, which had once spanned across three continents and protected its borders from the uncivilized savages that roamed beyond them. With the Empire gone, there was no army to protect the village from the nomadic raiders.

So the raiders came often, looting and laying waste to the coastal inhabitants. These chaotic episodes would sometimes last days at a time. The villagers only hope of escape was the sea, boarding their merchant ships and old fishing vessels with whatever supplies they could carry. There they would face starvation, exposure, and the wrath of storm surges.

At some point, a villager decided to make preparations in anticipation of future raids. He took his local ship into the lagoon and built a dock far off the mainland. From there he dug a channel to the sheltered lagoon, the original design was simple enough, nothing more than an interior harbor. The entire town was located on the water.

That town is known today as Venice, Italy.

Without hardship, good design cannot flourish.
INTRODUCTION TO PROJECT

PROJECT STATEMENT

The site of 169 Kensington Avenue, the site’s location at the center of the city and the fact that it is a public building and a space in which people are gathered together for healing purposes. This is a place where healing begins and ends. The site has the potential to be transformed into an environment that is conducive to healing. The site has the potential to be transformed into an environment that is conducive to healing. The site has the potential to be transformed into an environment that is conducive to healing.

PROJECT GOALS

1. Design a healing environment that is adaptable to the evolving health care needs of a changing society.
2. Change the role of the health care provider from a passive observer to an active participant in the healing process.
3. Change the role of the patient from a passive recipient to an active participant in their own treatment.
4. Change the role of the community from a passive observer to an active participant in the healing process.
5. Explore opportunities to develop a unique architectural language.

PROJECT SUMMARY

A hospital is a complex concept. It is a place that is designed to heal and to provide care. It is a place that is designed to heal and to provide care. It is a place that is designed to heal and to provide care.

THESIS STATEMENT

THESIS ABSTRACT

DUALITIES

THESIS SUMMARY

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INTRODUCTION TO SITE

The building was originally the Robert E. Lee Elementary School, designed and built by local Richmond architect Charles Robinson in 1914. In 2003, the building was renovated into an apartment building. Great care was taken to maintain the historical integrity of the building.

EXTERIOR BUILDING ANALYSIS

The building has a strong architectural personality, expressing balance, symmetry, and classical ideals, such as Palladian windows, a colonnade, a frieze, domes, and expressive stone work.
The way that the tower loft space opens up to the copper dome is such a great feature. The spiral staircase leading up to an unfinished area in the space directly beneath the dome offers visual and physical linkage to the overall architecture.

The character of the specific spaces of the existing building suggest a particular layout. The 2-story auditorium would be ideal for an open space from the program. The existing corridor will likely remain, and the alignment of the existing classroom space (currently apartments) would be a good fit for the hospital patient rooms.
The construction of the building took between 2-3 years, and according to Robinson, it was completed despite a great degree of difficulty. Robinson was very demanding of his design, and his ambition helped create a building that was well before its time. The three key features that made the building so unique were the wheelchair ramps, central-air conditioning, and the structure concerning the windows.

If it was Robinson's strong beliefs that compelled him to design such a unique building, then it was his belief in equal access to education. Decades before any form of ADA standards would exist, Robinson placed long and winding wheelchair ramps in the building. The fact that they are located in the two towers of the facade--the most prominent architectural feature of the building--emphasizes how strongly he felt about the matter.

Included in Robinson's design was a central-air conditioning system. What was remarkable about the inclusion of this feature was that air-conditioning had been invented only 10 years before, and was mostly used in industrial refrigeration. Robinson believed that comfort was essential to the learning process, so he therefore took it upon himself to engineer the air-conditioning unit so that the school would be comfortable in the hot and humid months.
Despite its conventional style, the building reflects a forward-thinking mindset, utilizing large concrete lintels to serve as sills for a row of windows. Though the structure was designed and built well before the Modernist Movement, these large, engineered windows foreshadow the curtain-glass windows that would come to characterize architecture of the 20th century.
How has hospital design developed around the world and throughout history? What factors have influenced this development? Did the development follow a steady evolutionary track, or was there a period of competing ideas? Have any of these ideas transcended time, still being used today?

In order to move forward, we must understand where we have been and whether there are any lessons to be learned from those moments. The rise and fall of competing cultures have undoubtedly introduced different ideas concerning architecture, but this applies to hospital design needs to be assessed. It could be that great ideas have been lost to the pages of history.
EVOLUTION OF THE HOSPITAL

Greek Asklepieon (Healing Temple)
Asklepieon of Pergamon
Pergamon, Greece
450 BC

Cluny Abbey (Monastery)
Infirmary Expansion
Cluny, France
1043 AD

Bimaristan
Early Persian Hospital (Persian Empire)
Junde-Shapur, Iran
800 AD

Roman Valetundinaria (Military Hospital)
Vindonissa--Roman Legion Camp
Windish, Switzerland
15 AD

Xenodochieon
Early Iberian Hospital
Porto, Portugal
400 AD

Hospitaliers (Knights of St. John)
Medieval Christian Crusade Hospital
Rhodes, Greece
1444-1483 AD

Cross Ward (Iberian Cross)
Opesdale Maggiore
Florence, Italy
1456

Palace-Style Hospital
France
17th Century

Estate Hospital
Europe
18th Century

Pavillion-Style Hospital
England
19th Century

(Thompson 5)
(Thompson 18)
(Thompson 30)
quadralectics.wordpress.com/3-contemplation/3-5-hospitals/
Considerable space and engineering were dedicated to the construction and design of the bathing facilities. Water had to be transported via aqueducts from local hot springs. If no hot spring were nearby, then other considerations had to be made in order to heat the water. Part of the bathing ritual was the long trek through a dark hallway, which ended at the baths. The path found at Pergamon is marked on the plan above.

**HISTORICAL CASE STUDIES**

**THE TEMPLE OF ASKLEPIOS AT PERGAMON**

The rod of Asklepios—recognized today as an international medical symbol—derives from these healthcare facilities. These temples were the original healthcare facilities of the western world. Though Greek medicine was quite advanced for its time—including sleep-induced surgeries and prescription medicine—the priests that administered care favored natural remedies over radical intervention. These remedies included a strict diet, exercise, exposure to sunlight and nature, as well as rest and relaxation. The path to the baths often involved a long walk through a dark hallway, which ended at the baths. The path found at Pergamon is marked on the plan above.

**DERIVED LESSON**

Activities such as dieting, exercise, bathing, and exposure to nature are remedies that can decrease the dependency on invasive medical treatments.

**THE VALETUDINARIUM OF VINDONISSA**

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**DERIVED LESSON**

An additional space between patient room and public space can not only serve as a buffer, but can also serve functional needs of the program.

**PLAN**

**ENLARGED PLAN OF PATIENT ROOM VESTIBULE**

**quadralectic.wordpress.com/3-contemplation/3-contemplation/3-5-hospitals**

(Thompson 5)

**drblayney.com/Asclepius.html**

(Thompson 5)
HOSPITAL OF THE SECOND KNIGHTS OF RHODES

Rhodes, Greece (1481)

Built in the 15th century by the Knights of St. John, this facility provides a glimpse of what may have become a standard in hospital design had it not been sacked by the Turks some 30 years after its completion. The Knights of St. John, also known as the Hospitaliers, were one of many fighting forces that travelled east during the Crusades.

The Hospitaliers were akin to monks, having taken sacred vows to dedicate their lives to God. Like the monks, they seemed to have an affinity for outdoor spaces, and opportunities to connect directly with nature. However, instead of small herb gardens, the Hospitaliers constructed large, exotic strolling gardens. These gardens were not only present in their hospital designs, but throughout their entire fortresses. This design principle created an interesting duality between the violent solidarity of a fortress and the lush beauty of a garden landscape.

Christian monks maintained cloister gardens, where they grew vegetables for food and herbs for medicine. When monasteries became de facto health care facilities of the Middle Ages, these gardens also served as sitting areas, and were sometimes supplemented with walking paths. These areas became opportunities for patients to get outside and establish a physical connection with nature.

DERIVED LESSON

While architectural design can help establish a connection to nature, there is no substitute for the real thing.
The project was designed in 2009 by NXT, who partnered with Clemson University’s Healthcare & Architecture Graduate Program. The concept is focused on the patient and the idea is to “encourage the delivery of care through patient-centered care and deliver the medical experience in the 21st Century.”

Though the project is an innovation in its creation and design, the idea was to “streamline the delivery of care through patient-centered care and deliver the medical experience in the 21st Century.”

Though the project was designed with the idea of a future patient room, the modular design allows for instruments, tools, and storage containers to be switched out with ease, so that a single room could be outfitted to meet the needs of a specific program. This idea of universal design is extended into the bathroom area, where the partition can slide to accommodate any patient, regardless of the amount of assistance needed.

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INTERSTITIAL SPACE DIAGRAM BY EBERHARD ZEIDLER

LONGITUDINAL SECTION SHOWING INTERSTITIAL SPACE

LATERAL SECTION SHOWING INTERSTITIAL SPACE

MCKENZIE TEACHING HOSPITAL
EDMONTON, ALBERTA (1986)

EBERHARD ZEIDLER

ENLARGED 3RD FLOOR PLAN--TYPICAL SOUTH PLAN

PATIENT ROOM

CIRCULATION

NURSE AREA

COMMUNAL SPACE

GUEST ROOM

29
This project was designed in 2009 by NXT, a firm based in Chattanooga, Tennessee. The firm partnered with Clemson University’s Healthcare & Architecture Graduate Program. The concept is based on the idea that the architecture, products, technology, and medical processes should all be designed in unison.

The idea was to “streamline the delivery of care, improve patient outcomes, and redefine the medical experience in the 21st Century.”

**Deriving Lesson**

Though a high-tech aesthetic can convey competence and a sense of security, too much of it can make a space feel cold and unwelcoming.

*James 160*

*James 161*
Though a high-tech aesthetic can convey competence and a sense of security, too much of it can make a space feel cold and uninviting.
The facility will serve as a neurological oncology facility. It will offer diagnostic, surgical, and radiology services. The facility will contain 80 beds for inpatient care, but will also emphasize outpatient care to the community.
The hospital in this project will be part of an Independent Physicians Association (IPA), a large corporate healthcare network, which focuses on generating profit for shareholders, not on the health of their patients. In contrast, an IPA is an organization of independently owned and operated medical practices.

According to Dr. Richard Graham, a local urological surgeon in Richmond, VA, and one of the most revered surgeons in the state, IPA's possess a unique opportunity moving forward into the future. As mentioned before, when a doctor refers a patient to a corporate healthcare provider for something like an MRI or CAT diagnostic scan, it is common for the provider to "capture" the patient's business, so the doctor would lose the patient's business. (Patients referred to large networks are typically retained by those networks for all their medical needs, so the referring doctor may or may not see the patient again.)

IPA's can also serve as a political activist, lobbying to local government on behalf of its members. The collective voice of the IPA has more political influence than a chorus of individual practices. Though IPA's were initially thought of as a method of creating leverage against insurance companies to receive better reimbursement rates, this is actually illegal and a misconception. What the IPA does do is consolidate numerous practices in a given region into a single voice, empowering the doctors to exert political influence via grassroots movements.

Dr. Graham predicts that, in the near future, IPA's will begin opening their own small hospitals that will house diagnostic equipment and the facilities needed for major surgery. Not only will this allow the doctors to purchase expensive equipment, splitting the costs among themselves, but they will also have a trusted facility to where they can refer their patients, all the while confident that they will not lose the patient's business in the process.

The proposed hospital for this thesis project will be one of these small IPA facilities. Not only does the 80,000 SF space represent the typical size of a small hospital or an IPA facility, but it also represents a progressive mentality of this project. The fact of the matter is that the megablock hospital is cumbersome and inefficient, and as communication technology improves the need for spatial adjacencies between hospital departments diminishes. Regardless of whether this IPA model for small hospitals catches on, corporate providers will look to break up their megalithic facilities in favor of smaller, more efficient delivery models that separate one another.
PATIENT ROOM (PRIVATE)

- Min. 200 SF
- patient bed
- headboard
- overbed table
- bedside storage for patient
- bedside storage for nurse
- natural light/views
- cleanliness
- shower/bath
- toilet/bedpan
- sink/mirror
- isolation, when required
- company, when appropriate
- seating area
- sleeping area
- easy access to nurse call, phone, lighting, bed, and TV controls
- Entertainment/distraction
- TV
- interaction with nurses
- interaction with patients
- interaction with visitors
- computer with internet

NURSING UNIT

- Min. 150 SF for nursing station
- 1 station per 8 patient rooms
- easy access to patients
- ability to see patients
- minimized walking distances
- control desk—call systems
- charting desk
- medication alcove
- lockers/toilets
- supervisors office
- storage closet
- supplies and equipment
- treatment room
- utility room—for clean/soiled operations
- staff collaboration space
- serving kitchen
- ability to move beds, equipment, supplies, laundry in and out of rooms
- minimum 6 ft width for corridors

COMMUNAL SPACE

- Education
  - reading
  - access to archived sources
  - seminars
  - scheduled for patients/families
- Therapy
  - physical activity
  - walking paths
  - exercise/yoga classes
- Mental
  - reflection space
  - art
- Group
  - seminar
  - conference/discussion
  - dining

INDEPENDENT

- Reading
- Walking
- Reflecting
- Art
- Bathing

INTERPERSONAL

- Mentoring
- Counseling
- Conference/Discussion
- Dining

GROUP

- Seminar
- Exercise/Yoga Class
- Group Therapy
- Group Visits
- Patient Gatherings
- Dining
- Bathing
PRELIMINARY SPACE PLAN
BUBBLE DIAGRAMMING

AXON SHOWING SPATIAL ANALYSIS

OPEN

4TH FLOOR PLAN
INTRODUCING THE CONCEPT

THE FOUR CRITICAL ELEMENTS OF HEALING

STRENGTH
REJUVENATION
REFLECTION
OPTIMISM

OVERALL PARTI DIAGRAM

HEALING GARDEN PARTI

STRATEGIES FOR INTERACTION BETWEEN ELEMENTS
CONCEPT DEVELOPMENT

ONE BOLD GESTURE

SUBSEQUENT GESTURES IN RESPONSE
CONCEPT MODEL #3
TWO TOWERS FLANKING
FOUR RIBS
ASSIGNING THE ELEMENTS

Each of the four healing elements correlates directly with an element of nature:

- **Rejuvenation**
  - Optimism
  - Grounded
  - Confidence
  - Brightness
  - Happiness
  - Joy

- **Reflection**
  - Reflection
  - Determinative
  - Reality
  - Physical
  - Emotional
  - Intellectual
  - Social
  - Communication
  - Conservation

- **Inspirative**
  - Inpiration
  - Wonder
  - Inspiration
  - Personal
  - Individual
  - Social
  - Cultural

- **Strength**
  - Strength
  - Power
  - Dynamic
  - Physical
  - Intellectual
  - Emotional
  - Social
  - Communication
  - Conservation
CONCEPT MANIFESTATION

A SEATING CONDITION FOR EACH HEALING ELEMENT

A ROCK SOLID FOUNDATION--A CRADLE OF SUPPORT--A STUDY OF ERGONOMICS

STRENGTH

A JOURNEY OF RECOVERY--A PATH OF ENLIGHTENMENT--A STUDY OF MATERIALITY

REJUVENATION
CREATING THE SPACE

PROJECT SCOPE

EXISTING BUILDING

NORTH FACADE

EXISTING ROOF
REMOVE EXISTING ROOF
REPLACE WITH GLASS ROOF

EXISTING STRUCTURE

OUTSIDE OF SCOPE

EXISTING STRUCTURE

DEMOLITION PLAN

NEW STRUCTURE

EXISTING BUILDING

SOUTH FACADE

ADD TWO 12’ X 12’ MEZANINE DECKS TO FOURTH FLOOR
OVERLOOKING AUDITORIUM

DEMOLISH REAR FACADE
AND INTERIOR AUDITORIUM WALL

ADD NEW FACADE THAT FOLLOWS EXISTING STRUCTURAL GRID

PREEXISTING SCOPE

OUTSIDE OF SCOPE

EXISTING STRUCTURE

NEW STRUCTURE
PATIENT ROOM/ NURSE STATION

[Diagrams and drawings of patient room and nurse station layouts, including diagrams of sliding shelf units and interstitial spaces.]
Can a balance be struck between the duality of nature and technology to achieve a healing space that demands less in terms of medical intervention?

Constant communication, as well as reflection.

A place of happiness that is never content.

A relaxing environment in a frenzy of activity.

A refuge for desperation that sustains hope.

A temple of science that requires leaps of faith.

A hospital must be a marvel of technology whose greatest ally is nature.

A hospital is inherently a creature of duality. It must be many things simultaneously; many of which are contrasting characteristics.

THESIS AND THE LEE SCHOOL LOFTS
RICHMOND, VA 23220

SECTION SHOWING CENTRAL SPACE
3RD FLOOR PLAN
4TH FLOOR PLAN

THE VALETUDINARIUM OF VINDONISSA
HOSPITAL OF THE SECOND KNIGHTS OF RHODES

PRECEDENT STUDIES CONCEPT DEVELOPMENT

BRIGHTNESS, HAPPINESS
CONFIDENCE
INVITATION TO PRESS ON

UPLIGHTING
INCUBATION--DARKNESS TO LIGHT
MEDITATION
PATH TO RECOVER

vestibules were included to act as a buffer between the patient rooms and corridors. Interior doors were not used in Roman design, so in order to keep out dust and noise, the most interesting of these design decisions was that of the vestibule. (marked in red) were primarily used by the military for soldiers. Therefore, efficient performance was the elements in favor of functional efficiency. The reason for this was that these facilities the ideas developed by the Greeks Asklepeions, the Romans removed the spiritual The Valetudinarium was the hospital of ancient Roman society. Based on many of provided walking paths in a more naturalistic setting. to their spiritual beliefs, and so incorporated landscape design in their forts, palaces, through physical force. They established a strong connection to nature, perhaps due The Hospitaliers were akin to monks, having taken sacred vows to uphold their religion Crusades. Built in the 15th century by the Knights of St. John, this facility provides a glimpse of what may have become a standard in hospital design—had it not been sacked by Considerable space and engineering were dedicated to the construction and design of recreation—as it is viewed in the United States. and nature, as well as rest and relaxation in the thermal baths often found at these These temples were the original healthcare facilities of the western world. Though The rod of Asklepios—recognized today as an international medical symbol ended at the baths. The path found at Pergamon is marked on the plan above. Water had to be transported via aqueducts from local hot springs. Considerable space and engineering were dedicated to the construction and design of radical intervention. These remedies included a strict diet, exercise, exposure to sunlight prescription medicine—the priests that administered care favored natural remedies over These temples were the original healthcare facilities of the western world. Though Activities such as dieting, exercise, bathing, and exposure to...


Roman Valetundinaria


Greek Asklepeion


Xenodochieon


Cluny Abbey


Opesdale Maggiore


Johns Hopkins Hospital


Pergamena Plan


Vindonissa Plan


Hospital of the Second Knights of Rhodes Plan


Robert A.M. Stern - 2002 Conceptual Images


London Bridge Hospital Images


Ford Foundation Plan


Ford Foundation Plan


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To my friends, family, and professors who supported me through this rigorous process.