Hospital: A Creature of Duality

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A CREATURE OF DUALITY

SEEKING BALANCE BETWEEN

NATURE AND TECHNOLOGY

IN HEALTH ARCHITECTURE

GORDON MCCORMICK
1. CONSTRUCTION TYPE: Type 3A
2. USE: Group I-3
3. OCCUPANCY: 240 max. capacity of building
4. HEIGHT LIMITATION: 1 Story
5. OCCUPANCY LOAD: 240 SF/person
6. MEANS OF EGRESS:
   a. NUMBER OF RAMPS: 2
   b. NUMBER OF STAIRS: 2
   c. NUMBER OF EXIT SIGNS: 4 per floor
7. ACCESSIBILITY: 100% accessibility in all dwelling and sleeping areas
8. STRUCTURAL FIRE RATING: 1 Hour
9. FIRE SUPPRESSION SYSTEM: Quick Response and Resident Sprinklers
10. MECHANICAL FIRE RATING: 1 Hour
11. MEANS OF EGRESS:
   a. AREA LIMITATION: 11,000 SF
   b. OCCUPANCY: 290 max. capacity of building
   c. OCCUPANCY LOAD: 240 SF/person

Access: 100% accessibility in all dwelling and sleeping areas

ELEVATORS
STAIRS (EGRESS)
RAMPS (EGRESS)
EXIT SIGNS

Construction Drawings courtesy of Freeman Solt LLC

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ELEVATORS
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RAMPS (EGRESS)
EXIT SIGNS

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. That 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.

At some point, a villager decided to make preparations in anticipation of future raids. He took his boat out into the lagoon and built a dock far off from the coastline. There, his family could wait out the raids, stocked with supplies and protected from the elements. The other villagers followed suit, and soon, the entire town was located on the water.

That town is known today as Venice, Italy.

Without hardship, good design cannot flourish.
THESIS STATEMENT

A hospital as a complex creature. Treating both a medical issue and the emotional issues of diseases creates the need for a healing environment that supports the rapidity of scientific advancement, and is easier than the many complex computer programs.

DUALITIES

A house for life’s most joyful moments, but also its most tragic. Provide total privacy while being completely transparent. Constant communication, as well as reflection. An apex of evolution that continues to adapt. Harbor the sick, but attract the healthy. A place that has all of the answers, but is always asking new questions. A place of happiness that is never content. A relaxing environment in a frenzy of activity. A refuge for desperation that sustains hope.

THESS ABSTRACT

History now has developed that the concept of health care is no longer bid for the individual's use. Rather, it is a larger community or organization that is benefiting from the shift. With the ever-changing needs of science, the medical field has become more complex than ever before. The medical field is now a community that is more than just the medical gadgets that allow us to heal; it is the tender care of the nursing staff, the collaboration of doctors, the organization of the non-profits, and—the most importantly—the support of hospital administrators, the fund-raising efforts of the hospital’s staff, the strategic planning that helps to keep the hospital alive.

PROJECT GOALS

1. Develop a design solution that can adapt to the evolving health care climate, without the need for invasive medical procedures or prescription. Can a balance be struck between nature and technology to achieve a space that promotes natural healing, relying on the body itself to achieve a better quality of life? Despite this revelation, there is no doubt that the idea of the hospital as a medical machine is well past its time.

2. Change the role of the hospital from an institution that treats the body to a place where the community must come together to help sustain life—much like in the way a multitude of cells work together to keep the body alive.

3. Change the perception of health care as cost, drudgery, and unaffordable environments to places that are more hospitable, healing, and enjoyable.

4. Incorporate design elements that will challenge health care administrators to explore an encompassing new frontier of treatment.

5. Explore opportunities to develop a unique architectural language.

6. Incorporate design elements that will challenge health care administrators to explore and embrace uncomfortable environments to places that are more warm, hospitable, and soothing.

7. Change the perception of hospitals as cold, sterile, and uncomfortable environments to places that are more evolving health care climates, without the need for invasive medical procedures or prescription.

PHD ABSTRACT

We begin then by defining these dualities with one simple question: What is a hospital? A product of technology, whose greatest ally is nature. A temple of science that requires help from both disciplines, and while scientific advancement and run deeper than the manipulation of nature's own innovations in technology, that demands change—a challenge of the status quo. The health care delivery system--as a physical organism, industry, or ideology that's ever existed, of them marketplace they serve. Like every other system, the health care delivery system--as a physical organism, industry, or ideology that's ever existed, must be re-evaluated from top to bottom in order to meet the ever-changing needs of the population. The only way to do this is through an artificial evolutionary track, which has culminated at the turn of the 21st century. Today marks a critical point in the history of health care, where the concept of the hospital as a medical machine is well past its time.
The building was originally the Robert E. Lee Elementary School and was designed and built by local Richmond architect Charles Robinson in 1914. In 2003, the building was renovated into an apartment building, though great care was taken to maintain the historic integrity of the building.

The building has a strong architectural personality, exhibiting balance, symmetry, and classical ideals such as Palladian windows, a colonnade, a frieze, domes, and expressive stone work.

Construction Drawings courtesy of Freeman Solt LLC.
The way that the tower loft space opens up to the copper dome is such a great feature. The loft space is currently an apartment, with a spiral staircase leading up to an unfinished area in the space directly beneath the dome. It would be interesting to see the relationship between the interior space and the overall architecture emphasized.

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.

Construction Drawings courtesy of Freeman Solt LLC.
The construction of the building took between 2-3 years, and according to Robinson, its completion was achieved despite a great degree of difficulty. Robinson was very demanding of his design, and his ambition helped create a building that was far ahead of 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. It was Robinson's strong beliefs that compelled him to design such a unique design. The first of which 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--which is the most prominent architectural feature of the building--highlights how strongly he felt about the matter.

Included in Robinson's design was an 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 clearly evolution stage, or has there been more of a conversation 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 whether 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 Asklepieion (Healing Temple)
- Pergamon, Greece
- 450 BC

Roman Hospital
- Vindonissa--Roman Legion Camp
- Windish, Switzerland
- 15 AD

Bimaristan
- Early Persian Hospital
- Junde-Shapur, Iran
- 800 AD

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

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

Xenodochieon
- Early Iberian Hospital
- Porto, Portugal
- 400 AD

Cross Ward (Greek Cross)
- Opesdale Maggiore
- Florence, Italy
- 1456

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

Palace-Style Hospital
- France
- 17th Century

Pavillion-Style Hospital
- Herbert Hospital
- England
- 19th Century

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

Estate Hospital
- Europe
- 18th Century

Pavilion-Style Hospital
- England
- 19th Century

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—is closely related to the baths and health. The Asklepios temples were the original healthcare facilities of the western world. Though Greek medicine was quite advanced for its time—sleep-induced surgeries and prescription medicine—the priests that administered care favored natural remedies over radical intervention. These remedies included diet, exercise, exposure to sunlight and nature, as well as rest and relaxation in the baths after bathing in warm water. This day, a similar therapy, called a sauna, is also practiced in modern times.

**DERIVED LESSON**

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

**THE VALETUDINARIUM OF VINDONISSA**

The Valentinian was the hospital of ancient Rome. Based on many of the ideas developed by the Greeks, Asklepios, the Romans removed the spiritual elements in favor of functional efficiency. The reason for this was that these facilities were primarily used by the military for soldiers. Therefore efficient performance was the driving factor in the design decisions.

The most interesting of these design decisions was that of the vestibule. In modern facilities, vestibules serve as a buffer in front of the patient rooms, to keep out dust and noise. In ancient facilities, vestibules were used to house supplies and clean linens.

**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.
Christian monks maintained cloister gardens, where they grew vegetables for food and herbs for medicine. When monasteries became the de jure 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.

The Hospitaliers were one of many fighting forces that travelled east during the Crusades. Their culture was very similar to monks, in that they took sacred vows to dedicate their lives to God. If the monks are thought of as the healing hands of God, then the knights were his fist.

Like the monks, the knights seemed to have an affinity for outdoor spaces, as depicted when they 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 fort and the lush beauty of a garden landscape.
The project was designed in 2009 by NXT, who partnered with Clemson University’s Healthcare & Architecture Graduate Program. The concept is based on the question, “What would a patient room look like if the architecture, products, technology, and medical processes were all designed in unison?”

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

Though the project was designed in 2009, it still feels as if it were designed in the future. Despite the streamline design and sleek aesthetic, the space feels cold and uncomfortable. The architects are focused on creating environments that are non-porous and easy to clean.

The modular design of the space allows for instruments, tools, and storage containers to be easily switched out, 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.

This project was designed to be a concept for future patient rooms. The design is centered around the patient’s needs and focuses on creating an environment that is comfortable and inviting.

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Though the project is as impressive as it is ambitious, I find the feel of the space to be too sterile. Despite the streamline design and sleek aesthetic, the space feels cold and uncomfortable—like a high-tech science lab. I would find it hard as a patient to relax in such a space.
MCKENZIE TEACHING HOSPITAL
EDMONTON, ALBERTA (1986)
EBERHARD ZEIDLER

LATERAL SECTION SHOWING INTERSTITIAL SPACE
LONGITUDINAL SECTION SHOWING INTERSTITIAL SPACE
INTERSTITIAL SPACE DIAGRAM BY EBERHARD ZEIDLER

PATIENT ROOM
CIRCULATION
NURSE AREA
COMMUNAL SPACE
GUEST ROOM

DOES THIS AREA FUNCTION APPROPRIATELY, CARE & POST?

LARGE MEETING
SMALL MEETING

ENLARGED 3RD FLOOR PLAN--TYPICAL SOUTH PLAN
(Miller/Swanson 36)
(James 39)
(James 43)
(James 41)
(SWAM/SBO) 3RD FLOOR PLAN--TYPICAL SOUTH PLAN

CENTRAL NURSING STATION

FAMILY ROOM
ICU/STEP CARE
COMMUNAL SPACE
GUEST ROOM

36
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**DERIVED 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.
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 health network, which focuses on generating profit for its shareholders. An IPA is different from a large corporate healthcare network, which focuses on generating profit for their shareholders, an IPA is an organization of independently owned and operated medical practices.

Unlike the large corporate healthcare network, IPA practices do not necessarily hold a centralized authority over their practices, and they are there for the benefit of the organization’s members. The IPA is a group of practices that has been organized to benefit their members, and it is a way to connect the organization’s members.

The purpose of an IPA is to organize a group of medical professionals that specialize in a variety of medicine. Patients can be referred to other doctors within the organization, and they are ensured that the patient will not be lost to the large corporate network. The hospital in this project will be one of these small hospitals that will house diagnostic equipment and 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 refer their patients, all the while confident that they will not lose the patient’s business in the process.

Dr. Graham predicts that, in the near future, IPA’s will begin to open small hospitals that will house diagnostic equipment and 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 refer their patients, all the while confident that they will not lose the patient’s business in the process.

The proposed hospital in this project will be one of these small hospitals. Not only does the 80,000 SF space represent the typical size of a small hospital, but it also represents the 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 functions in another way.
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
  - 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
- supervisor’s 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
  - teaching art or horticulture
  - counseling
  - mentoring by doctor or nurse
- Therapy
  - physical activity
  - walking paths
  - exercise/yoga classes
  - thermal bathing
  - mental
  - reflection space
  - horticulture
  - group therapy
  - counseling
- Socialize
  - group gathering space
  - staff, patients, or visitors
  - small group meeting
  - one-on-one meeting
  - dining space

INDEPENDENT
- Reading
- Walking
- Reflecting
- Art
- Bathing

INTERPERSONAL
- Mentoring
- Counseling
- Conference/Discussion
- Dining
- Bathing

GROUP
- Seminar
- Exercise/Yoga Class
- Group Therapy
- Group Visits
- Patient Gatherings
- Dining
- Bathing

PROGRAMMING THE SPACE
PROGRAMMING THE COMMUNAL SPACE

INDEPENDENT
- Reading
- Walking
- Reflecting
- Art
- Bathing

INTERPERSONAL
- Mentoring
- Counseling
- Conference/Discussion
- Dining
- Bathing

GROUP
- Seminar
- Exercise/Yoga Class
- Group Therapy
- Group Visits
- Patient Gatherings
- Dining
- Bathing
SPACE ANALYSIS

3rd FLOOR PLAN

4th FLOOR PLAN

OUTSIDE OF SLOPE

OPEN TO BELOW

SPACE ANALYSIS—AXONS
PRELIMINARY SPACE PLAN
INTRODUCING THE CONCEPT

THE FOUR CRITICAL ELEMENTS OF HEALING

STRENGTH
REJUVENATION
REFLECTION
OPTIMISM

OVERALL PARTI DIAGRAM

HEALING GARDEN PARTI

HEALING GARDEN PART I

STATEGIES 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.
CONCEPT MANIFESTATION

A SEATING CONDITION FOR EACH HEALING ELEMENT

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

A JOURNEY OF RECOVERY—A PATH OF ENLIGHTENMENT—A STUDY OF MATERIALITY
CONCEPT MANIFESTATION

A SEATING CONDITION FOR EACH HEALING ELEMENT

A MOMENT OF THOUGHT -- A MOMENT OF INSPIRATION -- A STUDY OF EXPERIENTIAL CONDITIONS

CIRCULAR DESIGN PROMOTES INTRUSION -- NO EYE CONTACT

MULTIPLE VIEWPOINTS
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

EXISTING STRUCTURE

EXISTING STRUCTURE

NEW STRUCTURE

EXTERIOR WALL

AND INTERIOR AUDITORIUM WALL

ADDITIONS THAT FOLLOW EXISTING STRUCTURAL GRID
Can a balance be struck between the duality of nature and technology to achieve a healing space that demands less of terms of medical intervention?

Strong enough to protect, gentle enough to nurture. Provide total privacy while being completely transparent. Harbor the sick, but attract the healthy. A place that has all of the answers, but is always asking new questions. A place of happiness that is never content. A refuge for desperation that sustains hope. Conventional wisdom with progressive ideas.

THESIS AND THE LEE SCHOOL LOFTS

These spaces were also utilized to house supplies and clean linens. 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)

Recreational elements in favor of functional efficiency. The reason for this was that these facilities were primarily used by the military for soldiers. Therefore, efficient performance was the driving factor in the design decisions. These facilities were the architectural manifestation of these ideals, while an expansive exterior garden and, in this case, a hospital. A 2-story central atrium and rooftop garden made of stone through physical force. They established a strong connection to nature, perhaps due to the Crusades.

The Hospitaliers--were one of the many fighting forces that travelled east during the Crusades. The Hospitaliers were akin to monks, having taken sacred vows to uphold their religion. The Hospitaliers--were one of the many fighting forces that travelled east during the Crusades. The Knights of St. John--also known as the Hospitaliers--were one of the many fighting forces that travelled east during the Crusades. The Hospitaliers were akin to monks, having taken sacred vows to uphold their religion. The Hospitaliers--were one of the many fighting forces that travelled east during the Crusades. The Knights of St. John--also known as the Hospitaliers--were one of the many fighting forces that travelled east during the Crusades. The Hospitaliers were akin to monks, having taken sacred vows to uphold their religion.

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. Considerable space and engineering were dedicated to the construction and design of recreation--as it is viewed in the United States. Sites. To this day, thermal bathing is viewed more as a medicinal treatment rather than radical intervention. These remedies included a strict diet, exercise, exposure to sunlight and nature, as well as rest and relaxation in the thermal baths often found at these sites. To this day, thermal bathing is viewed more as a medicinal treatment rather than radical intervention. These remedies included a strict diet, exercise, exposure to sunlight and nature, as well as rest and relaxation in the thermal baths often found at these sites.


Roman Valetundinaria


Greek Asklepeion


Xenodochieon


Cluny Abbey


Opesdale Maggiore


Johns Hopkins Hospital


Pergamum Plan


Vindonissa Plan


Hospital of St. Barbara English of Broadstairs Plan


Robert Raimo 2006 Conceptual Images


Intermodal Hospital Imagery


Intermodal Jason Emery

Woolworth Building Hospital Imagery


Intermodal Jason Emery

Ford Foundation Perspective

<www.krdja.com/Sites/FordPhotos1.html>

Ford Foundation Plan

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