

HUMANITY + HEALTHCARE



Christopher Zahaluk
Master of Architecture Thesis

University of Detroit Mercy
School of Architecture
Professor: Wladek Fuchs
April 2014



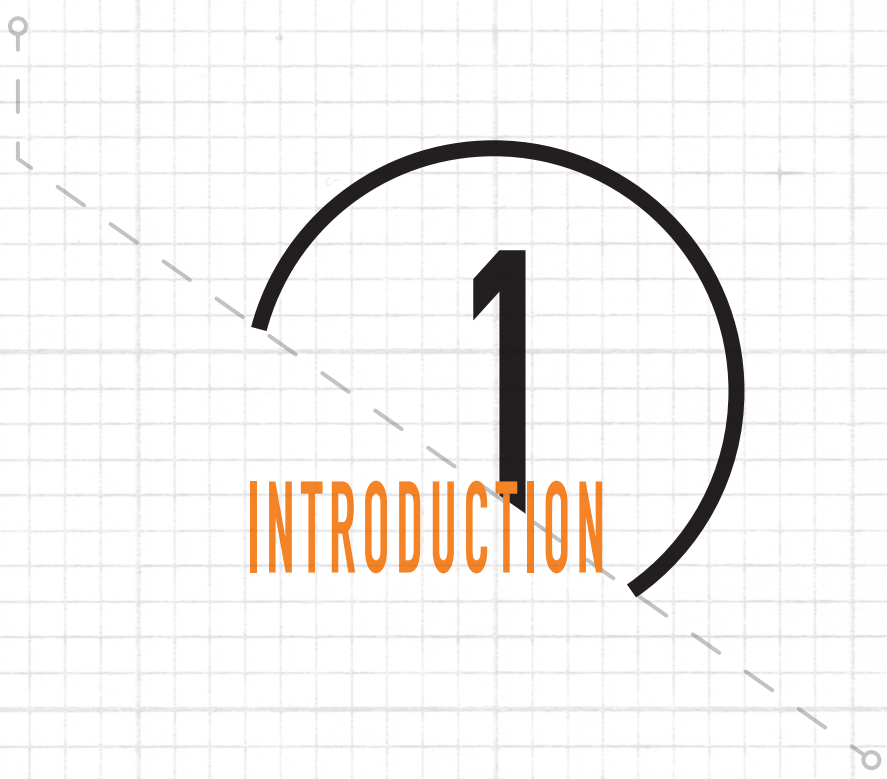
*“...BUILT CATASTROPHES, ANONYMOUS INSTITUTIONAL
COMPLEXES RUN BY VAST BUREAUCRACIES AND
TOTALLY UNFIT FOR THE PURPOSE THEY HAVE BEEN
DESIGNED FOR...THEY ARE HARDLY EVER FUNCTIONAL,
AND INSTEAD OF MAKING PATIENTS FEEL AT HOME,
THEY PRODUCE STRESS AND ANXIETY...”*

-COR WAGENAAR



Contents

<i>Introduction</i>	02
<i>Abstract</i>	06
<i>Methodology</i>	08
<i>Investigation</i>	28
<i>Early analysis</i>	44
<i>Precedent</i>	54
<i>Site Selection</i>	64
<i>Design</i>	74
<i>Conclusion</i>	96
<i>Sources</i>	100



1

INTRODUCTION

The Problem: With technology and advancements in seemingly every area, evolving at an ever increasing pace, the constant battle between form and function has never been more pressing. Adding to this tense battle is ever tightening budgets, lofty energy efficiency goals, the daily use of occupants and increasing expectations of living. Just as innovation shows no sign of slowing down, the debate that follows form and function is just as lively. As such, this thesis aims at exploring an area in which we have failed to question this relationship until the most recent of times. Beginning as a mere observance from various perspectives; that of the worker, visitor and later patient, the glaring issues which surround healthcare became very clear as this process progressed.

Personal experience working within the healthcare field has lead me to the realization that we as a society have failed many in the time of their greatest need. It is appalling to move through these facilities and to accept the idea that a patient facing a stark barren wall is an acceptable solution. As if being confined to a bed by the practices of modern medicine is not torture enough, one is forced to face a wall. In the best of situations an obstructed view of the outside through

a small window if fortunate enough to be given the bed closest to the exterior. Before appearing cynical and negative, it is important to note that it is done with the intention of addressing missed opportunities within the medical system rather than to complain for merely that sake. By addressing the areas in which we can have an impact allows for the opening of dialogue, the first step to inspiring change. This open conversation about health care brings up a very important aspect, are current healthcare models really a humane solution for family, friends, workers and most importantly patients? Secondly, is this really the most appropriate solution or course of action, or rather is it merely the most convenient?


It is the goal of this thesis to propose ideas which begin to challenge the conceptual framework within which healthcare currently is deemed to occupy. Ideas that could lead to discussion, discussion that ultimately leads to change. No longer is it acceptable for any healthcare environment to merely house patients, but to play an active role in the healing process for patients, visitors and staff alike. Design should act as a catalyst for change, it should be at the forefront of occupying a spot in the healing process just as a hospital or medicine does.

Mind, Body, Spirit and Environment

Healthcare environments are efficient and maximize the treatment and individual receives, however, is this enough? By delving into the development of the sanatorium and how it introduced a new type of healing environment into healthcare we begin to see connections. Further the biophilia hypothesis and the relationship to the work of Roger Ulrich begin to uncover a close link to the environmental side of healthcare. These factors share a close link on the personal side of the interaction touching on the mind, body and spirit, all crucial elements of the healing process. As a counter to the sanatorium is the modern day medicinal approach to healing and the now traditional side to healthcare as we know it...

The proposal: The development of a new healthcare environment that begins from the onset of arrival as one travels inwards. The goal is to constantly challenge the preconceived notion of what is healthcare and how it exists. A project which takes the optimistic view and exploits it to show the power of an idealistic situation. This thesis is intended to create a dialogue of new and exciting innovations to make healthcare as humane as possible for everyone involved





3

METHODOLOGY

Based on a lack of change it is my impression that we have become comfortable with the streamlined nature of the systems we have created. It is all too easy to fall into the "if it's not broken don't fix it" mentality. However, at this time, dare I say it, it is broken, so what a perfect opportunity to fix it! The system has failed to provide in many of the areas that play a role in the healing process. Alvar Aalto describes the condition of the patient as, **"a horizontal human being who lies on a bed most of his/her time in the weakest possible condition. Everything should be considered carefully, even in terms of color, lighting, heating, noise, etc."**[1] Aalto's description, although written some time ago, still holds true today. The very fact that we have failed to address this most basic realization is cause for concern. Given at the time of Aalto writing this, the means for treatment were the environmental conditions rather than scientific medicine which may have had an impact on why he was so easily able to deduct this. Our push towards medicine as a sole treatment option may also go on to suggest why these conditions have still to be addressed.

What makes Aalto's approach unique, is his consideration for the minor details as shown in Piamio Sanatorium. These details which are often absent

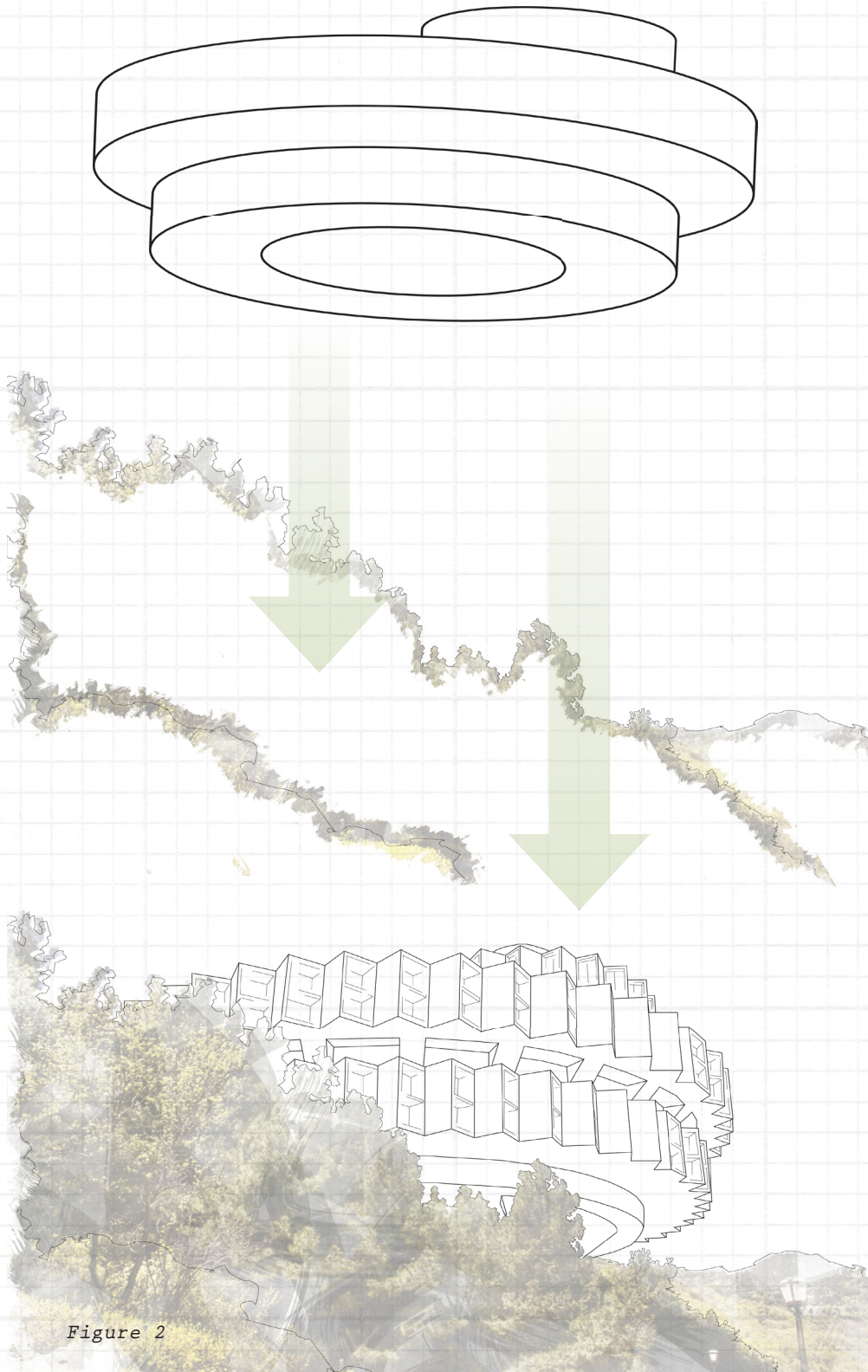


Figure 2

from modern day healthcare facilities are the most thoughtful aspects of his designs, they begin to speak volumes for his consideration for the patient rather than focusing only on efficiency. He takes note of the factors which influence “wellness” or as described in **Figure 1** as the relationships between environmental factors. In Aalto’s writing he describes in meticulous detail various aspects such as “the ceiling should be darker, with an especially selected color suitable to be the only

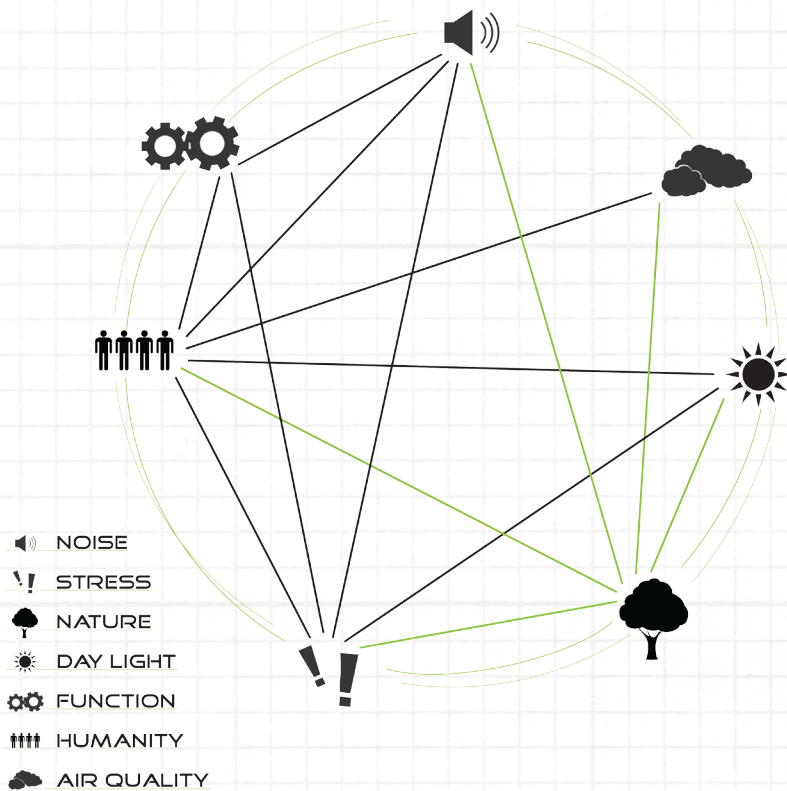
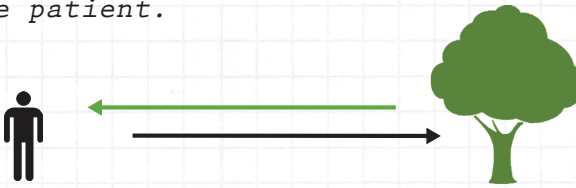


Figure 1

view of the reclining patient for weeks and weeks. The artificial light cannot come an ordinary ceiling fixture, but the principal centre of light should be beyond the angle of vision of the patient. For the heating system in the experimental room, ceiling radiators were used but in a way which threw the heat mainly at the foot of the bed so that the head of the patient was outside the direct rays. The location of the windows and doors likewise took into account the patient's position. To avoid noise, one wall in the room was sound absorbing, and wash basin (each patient in the two-patient rooms has his own) were especially designed so that the flow of water from the faucet hit the porcelain basin always at a very small angle and worked noiselessly.”[2]

These considerations begin to show the separation between the detail Aalto focuses on and the generic “solutions” of today. From basic fluorescent lighting fixtures that are used in place of more visually appealing alternates, to the general room use placement trumping that of the patients (who ends up using the room for a much larger portion of the time). Aalto also seems to be aware of the aspects of the design that would be secondary such as patient to doorway relationship which to this day is still an issue despite ADA and accessible programming guides. This ultimately

represents our attitude, in Aalto's case, he designs for the patients needs first. In the past it seems we have gravitated to the needs of spending and efficiency, where patients needs are accommodated rather than designed for. In a review conducted by Hyon-Sob Kim, he makes note to suggest that **"while rationalists would consider this detailed plan for one single room to be excessive, it was crucial to Aalto, who wanted to think truly reasonably. He ensured that the technical strategies would sensitively serve the patients' emotional requirements."**[3] This mind set should be adopted by all present day designers, as the relationship created between the space and the patient who will ultimately be using it, is the very core and essence of the design. This logic should also be carried forward to the families of the patients and workers as well in the same manner as the patient.



The healing process will be examined from three separate viewpoints, all which work together at various points but not always purely in a linear fashion, they are; environment, person (mind, body and spirit) and healthcare. With Aalto's Piamio sanatorium as a

basis for investigation, the sanatorium sets a standard for early treatment prior to the advent of medicine. In the nineteenth century, tuberculosis was a disease effecting many people with very little chance of a cure. That being said the sanatorium provided a chance to examine the effects of regulated diet, frequent rest and relationship to nature in a variety of forms. This early connection to nature as a means to seek the cure, was a direct response to the current urban living conditions. The filthy, increasingly industrialized cities which many inhabited were believed to be making people sick, so the natural instinct was to remove oneself from this environment seeking out places such as

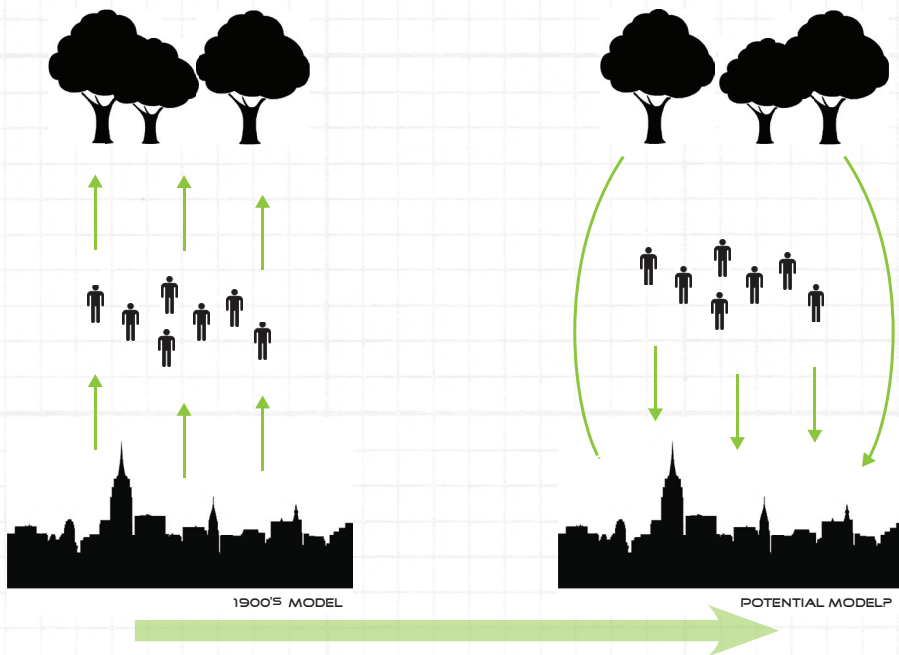
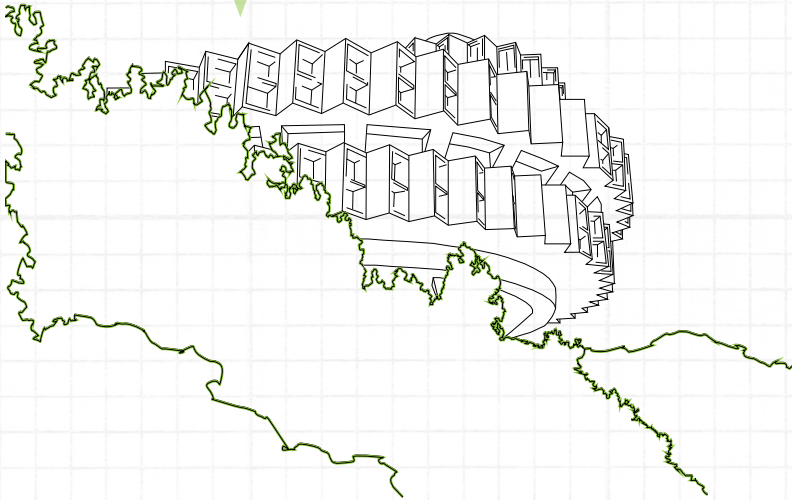
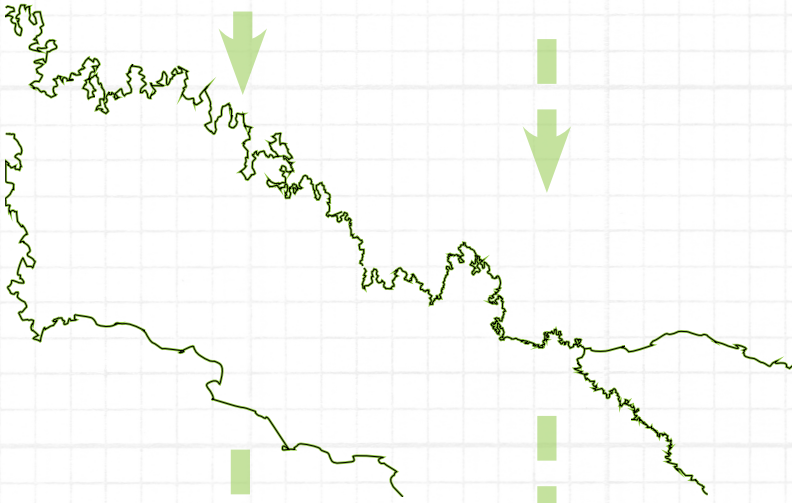
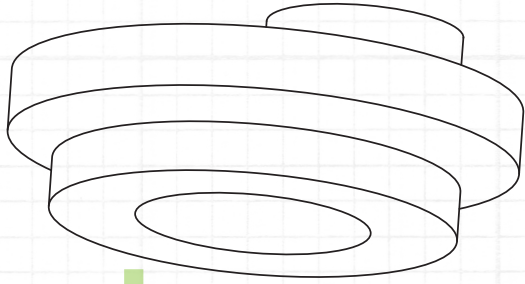


Figure 3

a sanatorium.[4] This remained the best treatment at the time until the wide use of antibiotics. While there is no absolute data collected from scientific studies at the time, "Physicians of long and intimate experience of the disease are unanimous in the opinion that the introduction of sanatorium methods has materially improved the outlook for the average consumptive, and that residence in a sanatorium represents the best treatment available at the present time." [5] Further, these facilities speak to another aspect of 'healing', mortality is an ever present occurrence within both past and present healthcare environments. The sanatorium took effort to provide a calming, tranquil environment that patients (who were fighting an illness they rarely survived) could reside in. This is a stark contrast to current conditions which seem to hurry people through the system, again asking are current care facilities really humane?

15 Aalto's design's largely, from "his reliance on 'instinct' and 'intuition'. These terms might be associated with 'whimsicality', 'randomness', or 'irrational', descriptions which "the first historians" of modern architecture generally disregarded." [6] These same ideas are evident in the initial efforts to escape tuberculosis where the effected individual would travel

to sanatorium or as rural an area as they could afford. **Figure 3** "Two of the most significant prescriptions, giving a patient direct engagement with the landscape, were fresh air and exercise. Fresh air was thought to clear the lungs of harmful pollutants and provide a great percentage of oxygen with each breath. "It is well enough to protect ourselves against cold, but in shunning fresh air too much we are apt to run the risk of lowering our resistance against disease. No air is so healthful as outdoor air, and we need a quantity of it every day in order to keep well." [7] While this was common practice at the time, this is no longer a truly valid solution within our society. With more and more people living within urban areas, urban landscapes being developed and privatized and the sheer convenience of close location make an urban centre a necessity. To treat patients in an off site location far from cities is rarely a practical solution. As such, the second diagram represents the change of thought. Bringing people and nature together back into an urban environment to engage in the healing process.



Druzhba Sanatorium

Igor Vasilievsky
Yalta, Ukraine

Constructed in 1981, this represents the most recent example of a sanatorium studied for this thesis. The form is reminiscent of a large mechanized machine emerging from the mountain side. It capitalizes on the view over the surrounding area as well as taking advantage of optimum sun angles to provide the appropriate exposure for each patients room. This scheme relies on elevating itself and be completely open to nature both from the interior central core to the surroundings. Druzhba is an appropriate starting place to examine how the man made and natural interact to provide patients with a direct connection to nature.

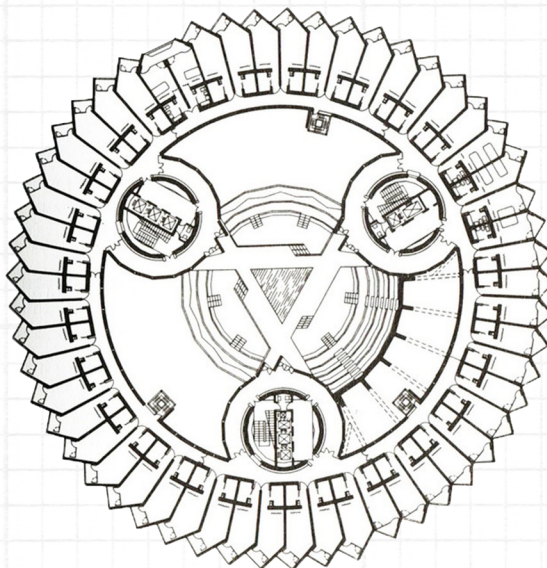
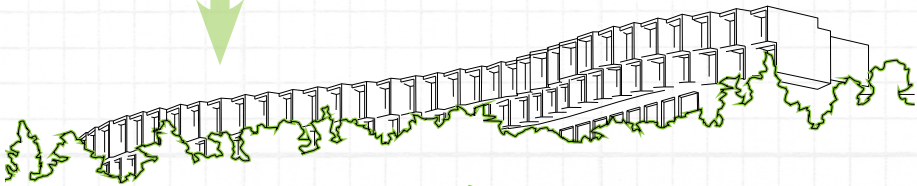
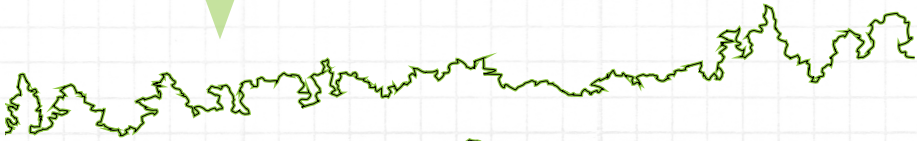
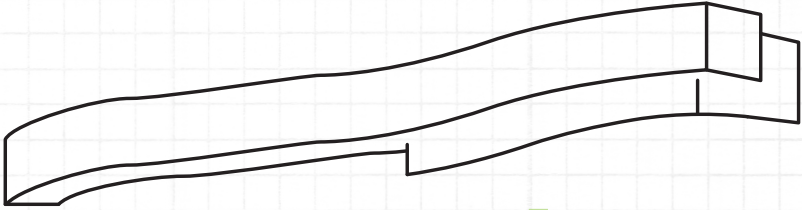


Figure 4



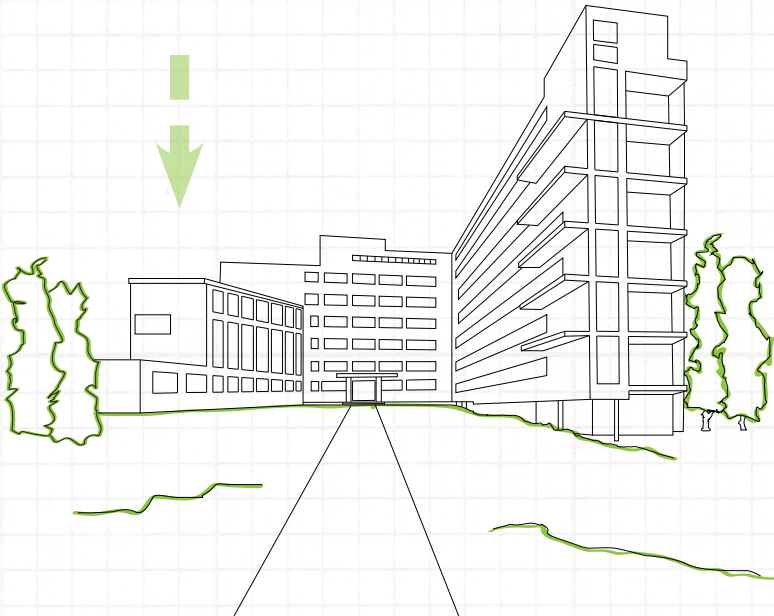
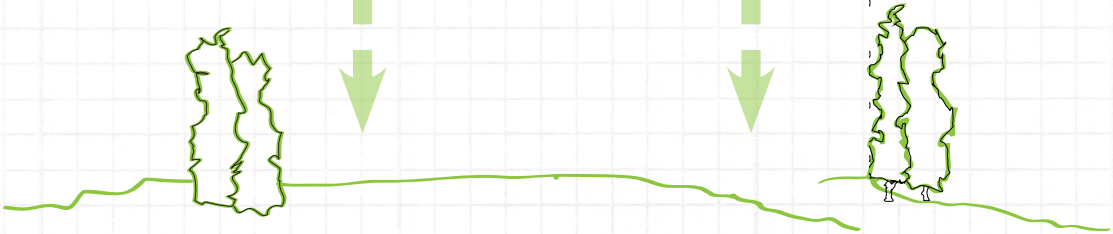
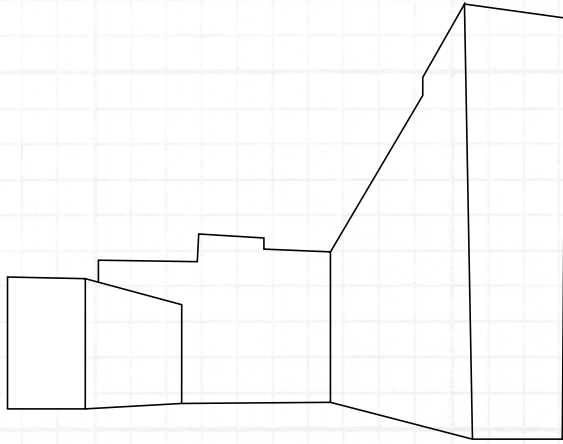
Mivtachim Sanatorium

Jacob Rechter
Zichron Ya'akov, Israel

Constructed in 1968, Mivtachim is set on the top of a hillside. The form seems to follow the natural form of the hill and serves as the top amongst dense foliage. The structure also brutalist as Druzhba appears floating upon closer view, which was described as connecting the earth and sky. Again the integration with nature is immediately apparent and it is clear why the site was chosen. The form integrates identical modularized patient rooms that create the natural curve of the building itself.



Figure 5



21

Paimio Sanatorium

Alvar Aalto
Paimio, Finland

Constructed in 1932, Aalto focused on the needs of the patient and the relationship they shared with their living space. He employed many different elements to contribute to space dedicated to relaxing and healing. The building itself is immersed within a large section of forest and allows for a push-pull relationship between nature and the building form where they seem to react off each other. The sanatorium features many different spaces to cater to the wide range of patients that would spend time here.

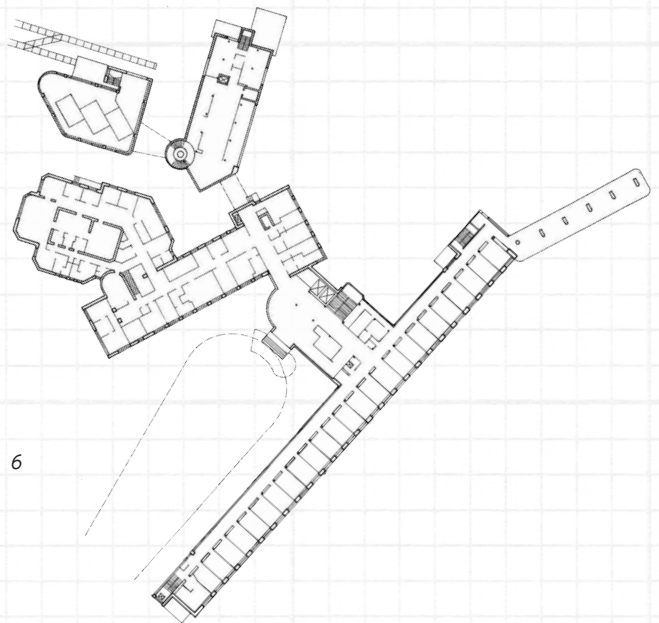
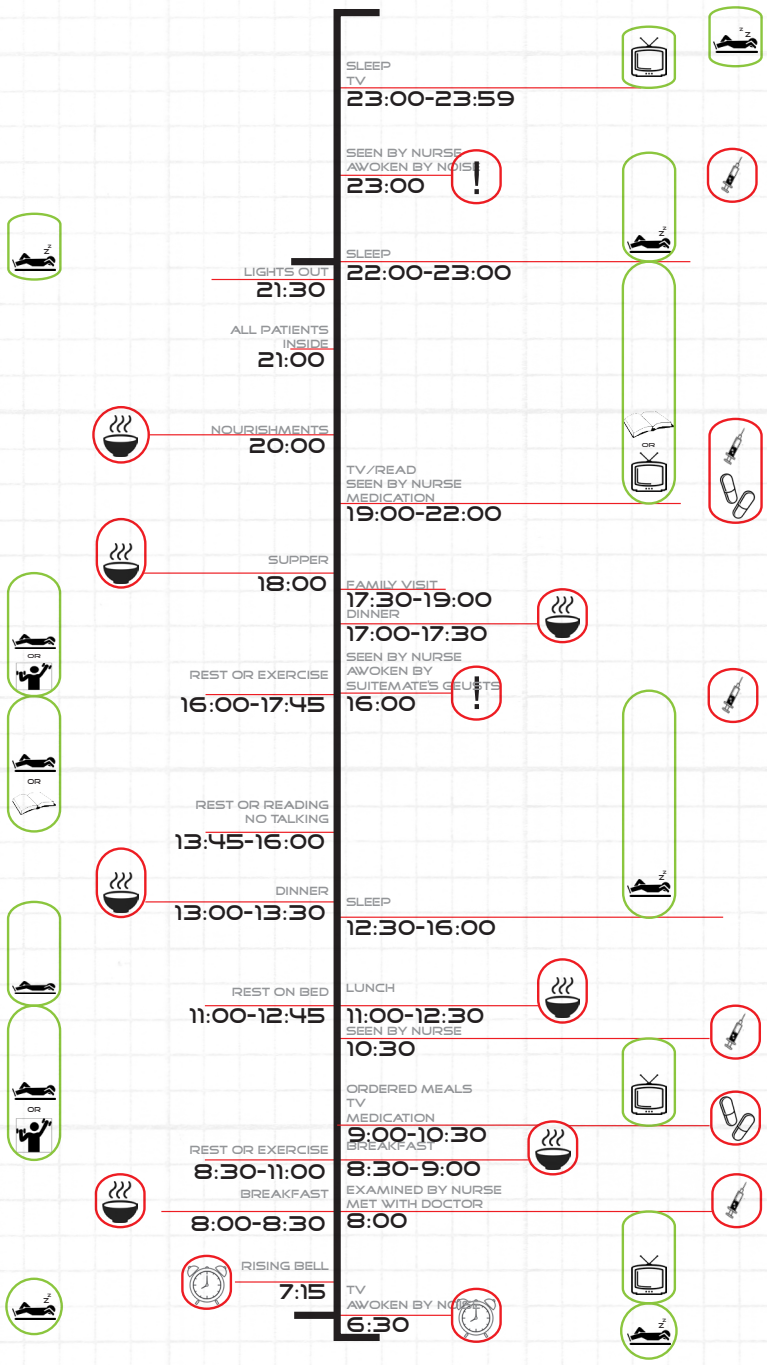


Figure 6



SLEEP
TV
23:00-23:59

SEEN BY NURSE
AWOKEN BY NOISE
23:00

SLEEP
LIGHTS OUT
21:30
22:00-23:00

ALL PATIENTS
INSIDE
21:00

NOURISHMENTS
20:00

TV/READ
SEEN BY NURSE
MEDICATION
19:00-22:00

SUPPER
18:00

FAMILY VISIT
17:30-19:00

DINNER
17:00-17:30

REST OR EXERCISE
16:00-17:45

SEEN BY NURSE
AWOKEN BY
SUITEMATES' GUESTS
16:00

REST OR READING
NO TALKING
13:45-16:00

DINNER
13:00-13:30

SLEEP
12:30-16:00

REST ON BED
11:00-12:45

LUNCH
11:00-12:30
SEEN BY NURSE
10:30

REST OR EXERCISE
8:30-11:00

ORDERED MEALS
TV
MEDICATION
9:00-10:30
BREAKFAST

BREAKFAST
8:30-8:30

EXAMINED BY NURSE
MET WITH DOCTOR
8:00

7:15
7:15

TV
AWOKEN BY NURSE
6:30

Beginning to focus on the present day healthcare system, it is important to first look at a connection that is most crucial; the patient. While it is almost impossible to directly compare the patient of today to one of the past (medical advancements alone have grown exponentially) the one constant is a patients daily routine. In order to compare the two, both days were plotted out to represent the typical day of a patient in a sanatorium and then juxtaposed to a sample of a current day patient.

Following the collection of data there is a very strong similarity, the abundance of rest in various forms along with meals in both cases. However upon closer inspection it is striking at exactly what the rest consists of. Modern day patient spends time watching TV or sleeping confined to their hospital bed, while the patient at the sanatorium spends time outdoors, moderately exercising or sleeping. The progression of technology can easily be seen as the reason for such a trend however it is overlooked at how present it really is in our society. A very stark difference that exists between the two sides is the number of interruptions or negative alerts they are exposed to. It seems that when rest is so important and vitally important to healing, that a greater emphasis should be placed on limiting these distractions which did not exist before.

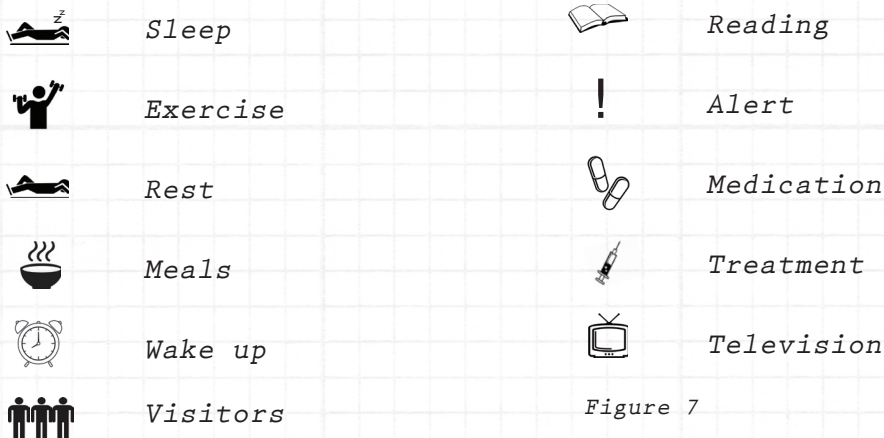


Figure 7

“A holistic treatment of mind and body, modern medicine can again look to nature for processes of healing, renewal and acceptance of dying. For this reason, tuberculosis sanatoria hold important precedence, as an example of physical and visual engagement between patient and nature.”[8] To discuss the connection of humans to nature it seems almost essential to begin by defining biophilia or the innate tendency for humans to seek connections with nature and other forms of life. To what extent this concept applies I for one am not sure, I believe as time progresses it is unfortunately becoming less true. The cultural interpretation of nature is ever changing and continues to do so as we become further removed. However, just as there are plenty of examples to support this we can easily argue against as there is an ever increasing push for parks within our cities, the planting of trees in our communities, the backyard gardens of people , etc. One of the best arguments in favour of biophilia is one’s purchase of a cottage to escape the urban life. The desire to associate with nature and connect back as a means to relax and rejuvenate is the basis for what is biophilia and for that matter a direct revisit to the sanatorium. This provides a great opportunity to begin to address the mental and spiritual health of an individual.

Table 1 Environmental variables in the seven high-priority topic areas

	HAI's	Medical errors	Patient falls	Patient satisfaction	Patient waiting	Staff efficiency	Staff satisfaction
Acoustic ceiling tile				X			
Acuity-adaptable room		X		X			X
Air pressure difference between adjacent spaces	X						
Alcohol-based hand rub	X						
Amenities					X	X	
Antimicrobial-finished textile product	X				X	X	
Attractiveness, physical environment							
Bar-code-assisted dispensing system		X					
Bed alarms, medical vigilance system				X			
Bedrail and other physical restraints				X			
Bedside assortment picking (BAP) trolley			X				
Computerized physician order entry (CPOE)			X				
Computerized (automatic) reminder of hand hygiene	X						
Copper-silver ionization system	X						
Daylight		X					
Distraction		X					
Emergency department layout							
Falls, multifaceted environmental intervention				X			
Hand hygiene devices, number of		X					
Head-mounted display							
High-efficiency particulate air (HEPA) filter	X						



Figure 8

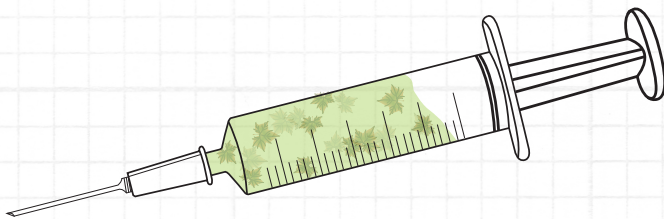
If the biophilia process proves to be true, it very closely reinforces the work of Roger Ulrich. In a 1993 study, Ulrich commented that “results suggested that patients who viewed the trees/water scene were significantly less anxious during the postoperative period than patients assigned to the other pictures and control conditions. Moreover, patients exposed to the trees/water view suffered less severe pain, as evidenced by the fact they shifted faster than other groups from strong narcotic pain drugs to moderate strength analgesics.”[9] A similar study in 1984, was conducted using a window vs. a wall for a view. Surprisingly the same results were found in respect to patients needing more encouragement, staying in hospital longer and requiring more pain medications.[10] Whether this study is valid or large enough to obtain a credible sample size, it seems too coincidental to see such a strong correlation develop.



4

INVESTIGATION

Beginning to address the personal attributes associated with healthcare brings the attention to mind, body, and spirit. All three factors play an important role in the healing process. The mind, or the mental state is a fragile one while recovering within a healthcare setting. Dealing with stress, pain, decisions, trauma etc all take a toll which contribute negatively on a persons overall health. Factors such as being with family or loved ones helps to raise ones mental state, which is why it is crucial that design also pay attention to the needs of this ground as well. By reinforcing a positive themed environment and reducing the amount of negative stressor one has the opportunity to encounter, thus the healing process can have the greatest impact. Just as it is important to create a positive spiritual environment, it is important to create a physically comforting and comfortable space as well. These factors all share a commonality; they focus on lowering the stress levels



for all parties involved. By making an effort to have the environment consciously work to lower stress, the body is in a more relaxed and healing state. By studying the way patients move through the Emergency Department for example, we begin to understand where the shortcomings exist. These can be in



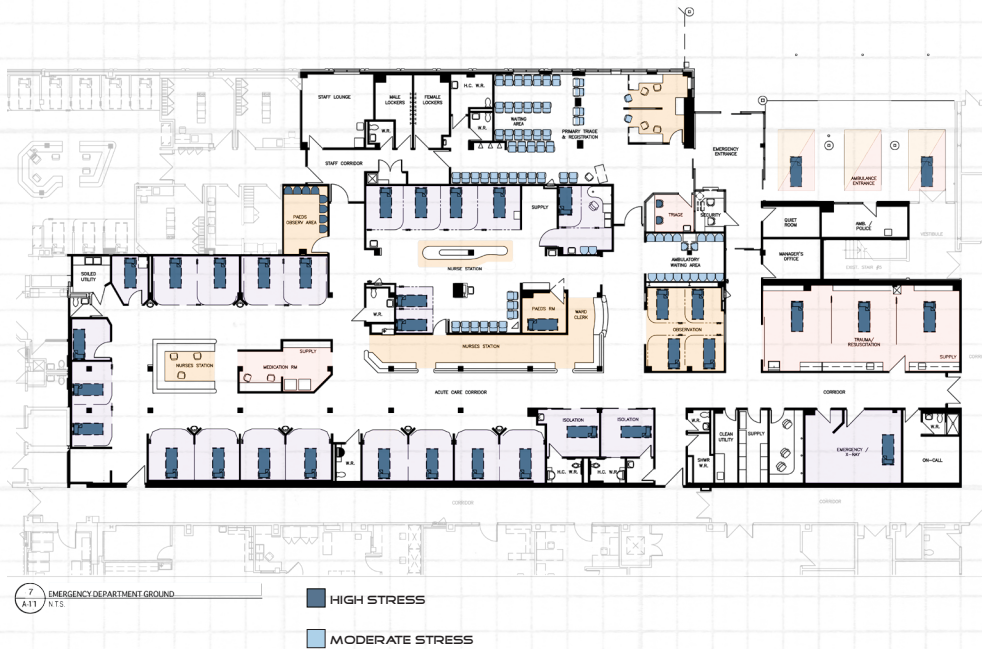


Figure 9: Zones of perceived levels of noise. Intensity and point origin sources for where noise would originate.
 Figure 10: Patient stress. Overlaid with staff stress levels.

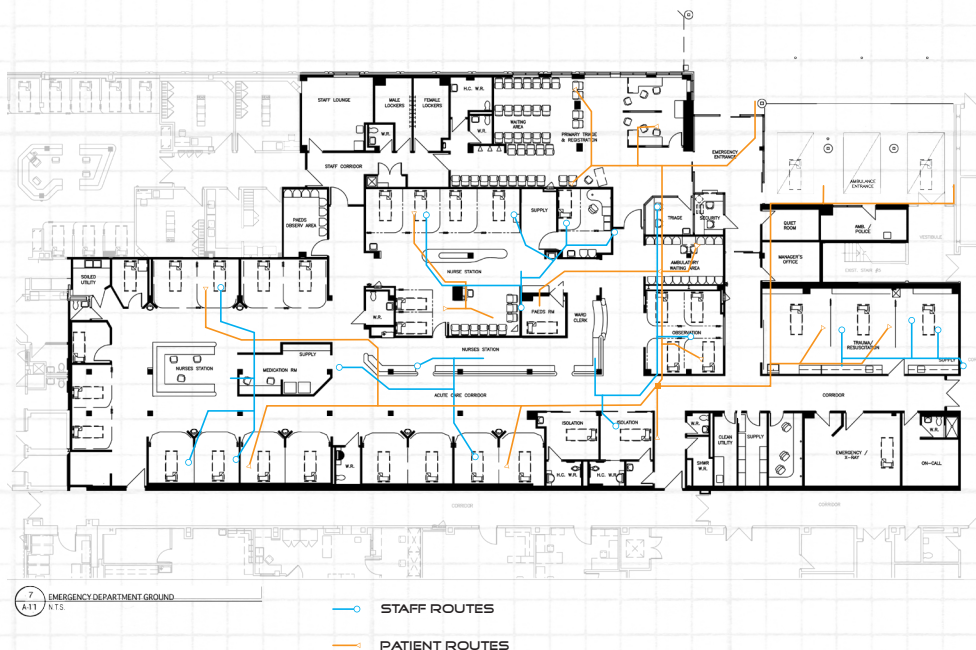
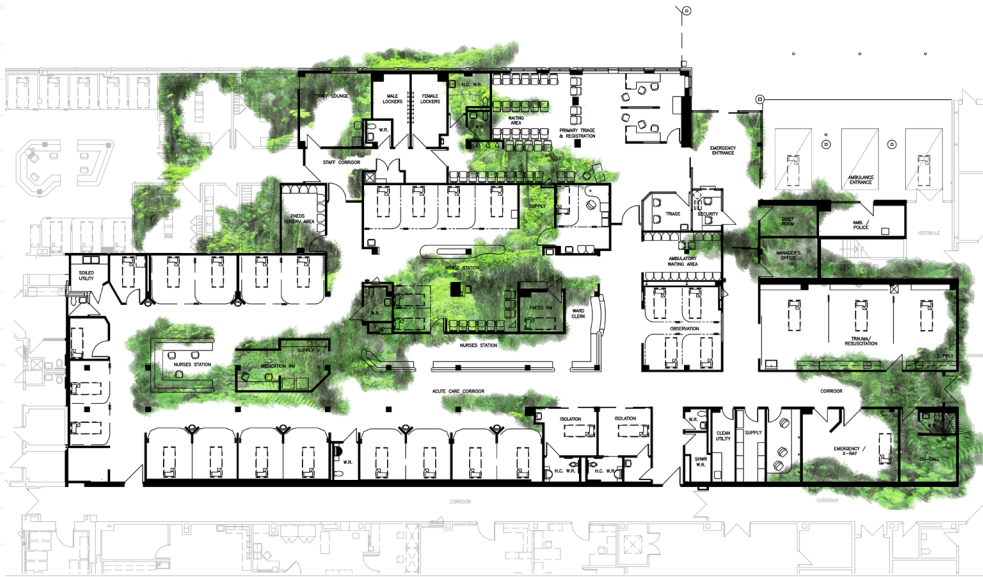


Figure 11; Staff stress levels on average based on number of patients, level of care for patient, urgency and type of illness.
 Figure 12: Movement paths through E.D. for both staff and patients

After examining the series of diagrams which aimed to discover areas of opportunities, areas of problems and general trends **figure 15** was produced. Within the Existing floor plan of WRH Metropolitan campus the combination of: Patient Stress, Noise Origins, Layout and Vegetation. Studies were infused to create a potential map for where vegetation could be introduced at the greatest benefit. Consideration was taken to still maximize functionality however at this point the emphasis is on the gesture rather than the maximization of efficiency and feasibility.

Figure 13: One of a series of initial studies dealing with how to insert vegetation into the E.D. General placement was quickly sketched in without observing the immediate clashes with what exists.

Figure 14: A counter to the previous series of studies this diagram represents the 'realistic' reality of placing vegetation within the E.D. More care was taken when placing vegetation in order to not interfere with the various activities that occur.



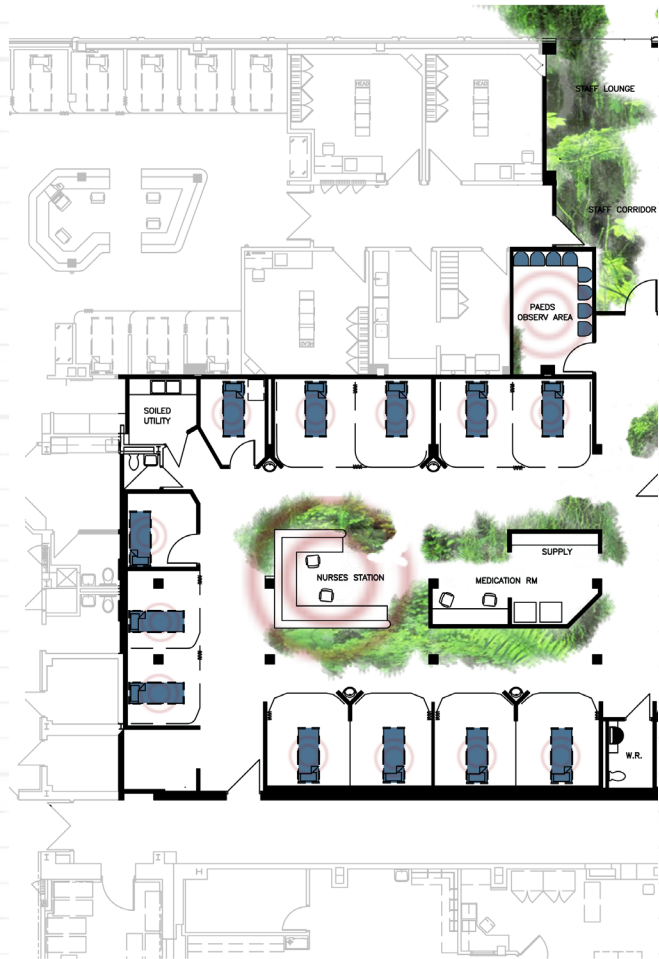
7 EMERGENCY DEPARTMENT GROUND
A-11 N.T.S.



7 EMERGENCY DEPARTMENT GROUND
A-11 N.T.S.

Met Emergency Department Integrated Diagram

This arrangement is based around key areas being formed by high noise/stress areas. Vegetation is placed in a way to buffer the low from the high. The mid stress/ noise section is situated between the two extremes as seemed an appropriate transition space as well as made the most functional sense. These interventions occur more concentrated in areas of lower stress as to not impact the high risk area which relies very closely with maximizing efficiency for patient safety. This however does not mean that these areas fail to benefit, but rather that they occur off to the side but still within view, primarily for the patients.



7 EMERGENCY DEPARTMENT GROUND
A-11 N.T.S.

Figure 15



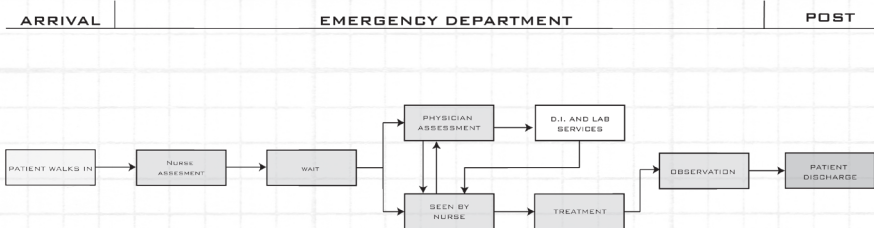
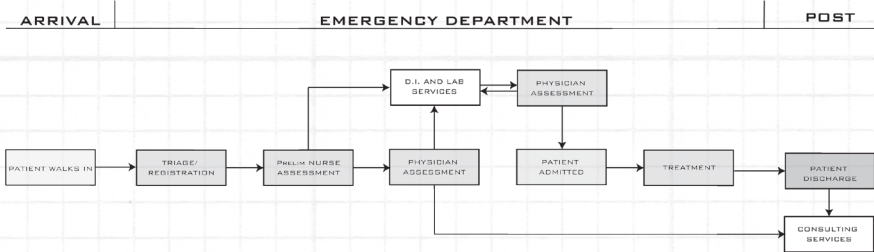
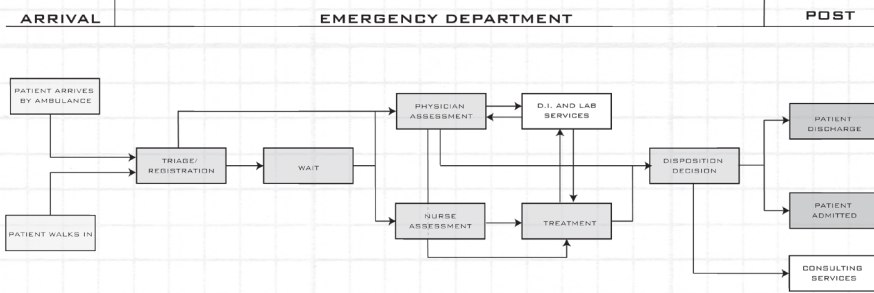
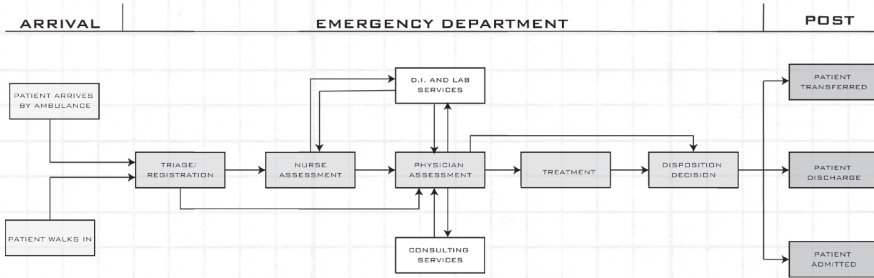
ORIGIN OF NOISE

■ HIGH STRESS

■ MODERATE STRESS

places like the waiting rooms, inadequate family space, unsafe environments for staff, overcrowding experienced during peak times. All these factors contribute to a less than satisfactory environment that establishes the basis for healing.

Just as important but often forgotten, is the mental, physical and spiritual impact on the staff members in a healthcare facility. Due to high stress conditions, there is a large amount of absenteeism in the workplace, according to Ulrich "laboratory and clinical investigations have found that viewing nature settings can produce significant restoration within less than five minutes as indicated by positive changes, for instance, in blood pressure, heart activity, muscle tension, and brain electrical activity"[11] Such a small change can have such a measurable impact. However these changes do not only extend to staff becoming ill but rather it extends to extend burnout in the workplace, depression, stress and anxiety and most importantly a better environment for patients which again contributes to the overall healing environment that is created.



Green Wall Systems

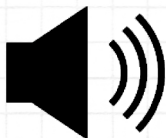
Beginning to look inside the hospital, the idea of a green wall was the first idea that arose. What does it mean? What can it offer? What needs to be considered.

After considering these questions it was important not to get too attached to this idea as it is standardized but there could be some applications. The first step was to determine the benefits (diagrams to the right) and assess how they can be applied to provide maximum benefit to the healthcare application. Generally green walls are placed in lobby spaces or high traffic areas, however, if the biophilia hypothesis is correct it would be more appropriate to incorporate these features into more intimate spaces such as staff work areas or patient rooms. Somewhere that the massive scale does not compete with humans but rather co-inhabits.

Second, why do sterile spaces have to conform to what western culture considers them. In the *Praise of Shadows*, the author discusses the relationship between healthcare facilities, sterile environments and also how it is not always the case in other parts of the world. Challenging this preconceived notion is crucial moving forward.



Figure 16

NOISE

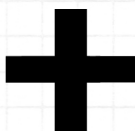
Reduce Noise: Green Walls provide a noise buffer which significantly reduces outside noise and vibration (up to 40dB). Green Walls also significantly reduce sound reflection in a building.

AIR QUALITY

Filtering systems: Natural sponges for dust and toxins in our air. They increase Energy-Rich Oxygen & Reduce CO2 through photosynthesis. Certain plant species in green walls remove trace amounts of Nitrous Oxide and Sulfur Dioxide adding to the overall air quality.

AESTHETICS

Natural Beauty: Green Walls provide buildings with a sense of harmony with nature, similar to street trees, easing integration into the environment.

HEALTH + WELLNESS

Healing Effect: Studies have shown that patients who have been in rooms with a clear sight of fully-blooming greenery have required less pain relief drugs and recovered more quickly than patients who were in direct sight of concrete walls.
Stress Reduction & Relaxation: Ease physiological and psychological pressures by providing a spiritual and physical connection to nature.

*benefits courtesy of gsky green wall systems
<http://gsky.com/green-walls/benefits/beautification/>*

Figure 17

41

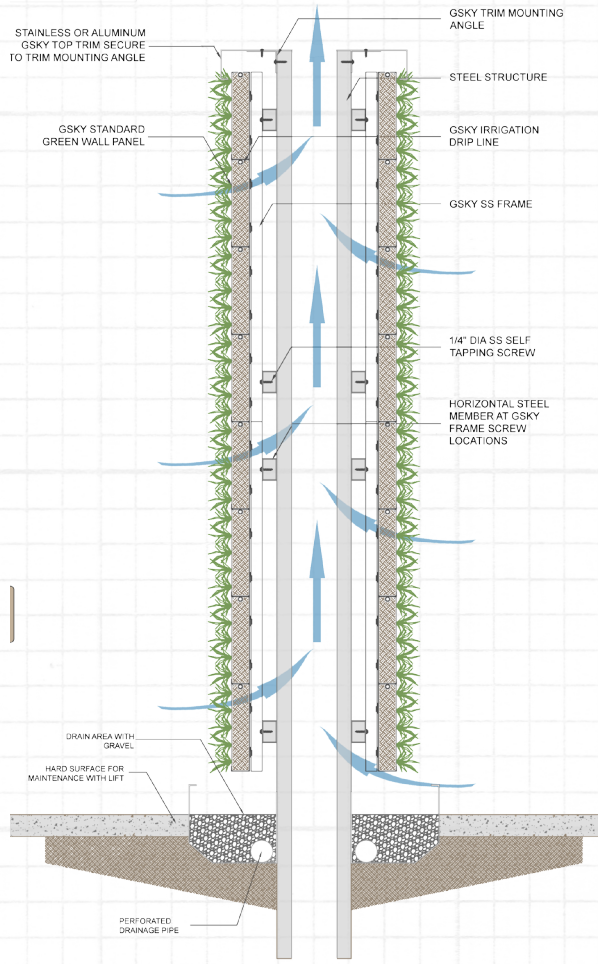


Figure 18

Green Wall Filtering System?

On the basis of providing a patient area be it a waiting room, observation room or general treatment room, a green wall that has hypo allergenic plants, and a negative air draw could have potential. Not only does the wall act as a direct connection to nature for a patient inside, but also it acts as a primary filter in which air is drawn through.



5

EARLY ANALYSIS

Programming Requirements

Projected department needs, amount of rooms and square footage required

Reception - Waiting - Triage				
Space Description	Number of Rooms	Square Footage	Total	Notes
Administration - Reception	2	100	200	
Security	1	100	100	
Washroom	2	48	96	
Waiting Area	2	400	800	**20 seats in each - size is estimate
Triage Suite	2	200	400	
Cafe	1	500	500	** Cafe + Food Services shared prep area
Food Services	1	500	500	
Washroom	2	48	96	
Internal Wait Area	1	800	800	
			3492	

Ambulatory Care + Fast Track Services				
Space Description	Number of Rooms	Square Footage	Total	Notes
Internal Waiting Area	1	400	400	**20 seats in each - size is estimate
Washroom	2	48	96	
Treatment Room	2	250	500	
Treatment Chair	4	150	600	
Paediatric Room	1	225	225	
Staff Work Station	1	250	250	**Including Med Prep
Plaster Room	1	200	200	
Clean Utility	1	250	250	
Dirty Utility	1	150	150	
Equipment Room	1	500	500	**shared
			3171	

Resuscitation Area				
Space Description	Number of Rooms	Square Footage	Total	Notes
Treatment Suite	2	400	800	
Paediatric Treatment Suite	1	400	400	
Staff Work Station	1	100	100	
Clean Utility	1	150	150	**separated but open incept to care suite
Dirty Utility	1	100	100	**separated but open incept to care suite
Isolation Room	3	0	0	**each treatment suite is to be isolation ready so no further sq ft
Respiratory Room	1	150	150	** office plus special equip
			1700	

Administration + Office Area				
Space Description	Number of Rooms	Square Footage	Total	Notes
Office	6	80	480	
Conference Space	2	150	300	
Medical Records Room	1	200	200	
Washroom	2	48	96	
			1076	

45

Acute Care					
Space Description	Number of Rooms	Square Footage	Total	Notes	
Patient Suite	14	125	1750		
Paediatric Suite	2	225	450		
Washroom	7	48	336	**2+1 washrooms accounted for in isolation rooms + Paediatric	
Staff Work Station	1	350	350	**Including Med Prep	
Equipment Room	1	0	0	**shared with fast track	
Clean Utility	1	250	250		
Dirty Utility	1	150	150		
Isolation Room	2	0	0	*** separate washrooms for each isolation room (48sq ft)	
Observation Area	1	400	400	**Direct view to nurse's station - 3 bed	
Procedure Room	2	225	450		
Mental Health Room	1	80	80		
Distressed Family Room	2	80	160		
EMS + Police Services	1	250	250		
			4626		

Staff					
Space Description	Number of Rooms	Square Footage	Total	Notes	
Lounge	1	300	300		
Change Rooms	2	150	300		
Washroom	2	100	200	** 2 stalls for each gender	
Kitchen Suite	1	50	50		
On Call Room	2	80	160		
			1010		

Short Stay Unit					
Space Description	Number of Rooms	Square Footage	Total	Notes	
Patient Rooms	48	130	6240		
Patient Washroom	48	48	2304		
Staff Work Station	4	350	1400	**Including Med Prep	
Clean Utility	2	150	300		
Dirty Utility	2	100	200		
Equipment Room	2	150	300		
Distressed Family Room	2	80	160		
			10904		

Support Services					
Space Description	Number of Rooms	Square Footage	Total	Notes	
Mechanical	1	2400	2400		
Server Room	1	200	200		
Electrical Room	1	400	400		
Specialized Mechanical	1	1000	1000		
Backup Generator Room	1	800	800		
Storage	1	200	200		
Elevator Mechanical	2	100	200		
Morgue	1	400	400		
Housekeeping	1	250	250		
Clean Utility Central	1	500	500		
Dirty Utility Central	1	300	300		
Facilities/ Biomed	1	450	450		
Receiving Area	1	400	400		
			7500		

Through the calculation of required space and programming for a modest emergency department to function as a stand-alone centre alongside a major trauma hospital the previous tables represent the accumulated data. The calculation and distribution is calculated based off the guidelines for an Ontario Emergency Department and contrasted with the equivalent Australian guidelines. The square footage was calculated based on existing conditions along with the guidelines set forth by the Victoria, Health Project International.

Based upon the previous investigation into how a patient interacts with the Emergency Department, this data can begin to show a trend into a potential intervention.

Data Sources For Programming Figure 19

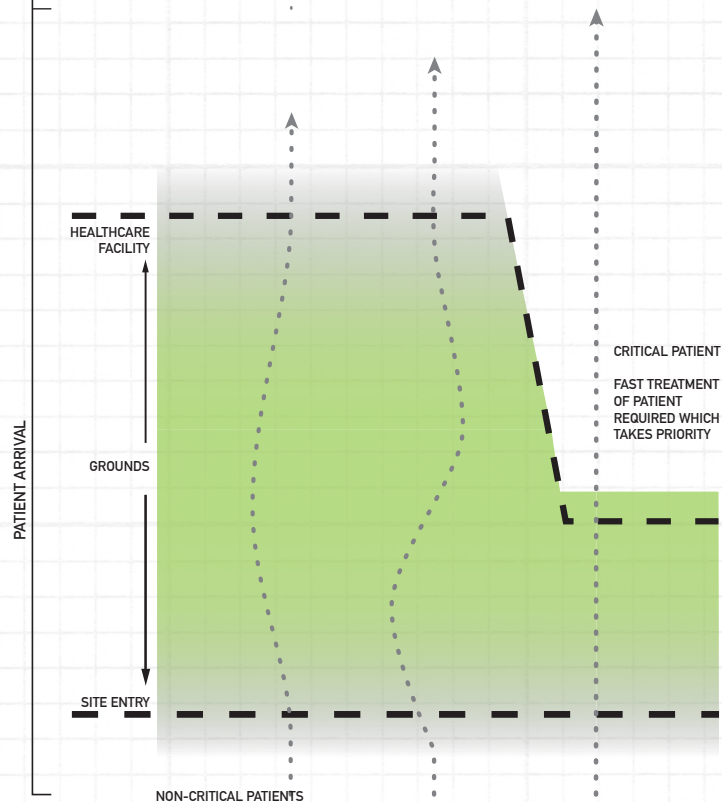
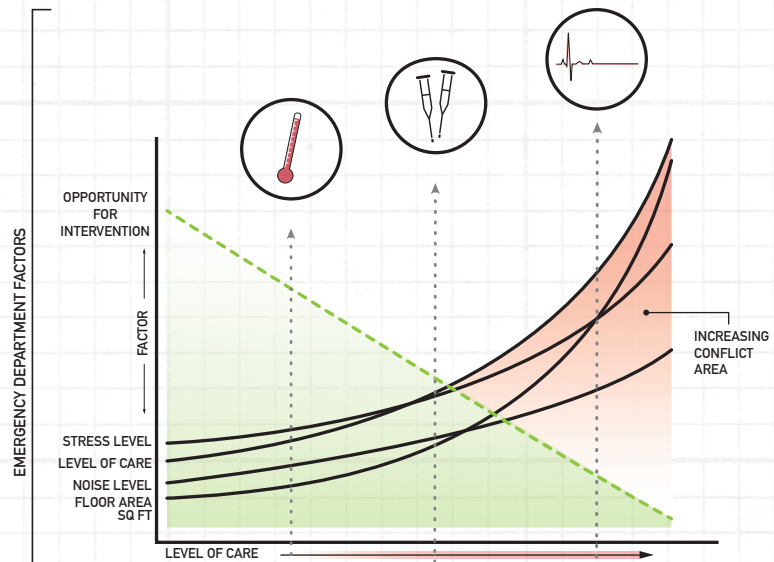
"GUIDELINES ON EMERGENCY DEPARTMENT DESIGN."
Australian College for Emergency Medicine

"Models for Improving Patient Throughput and
Waiting at Hospital Emergency Departments."
The Journal Of Emergency Medicine

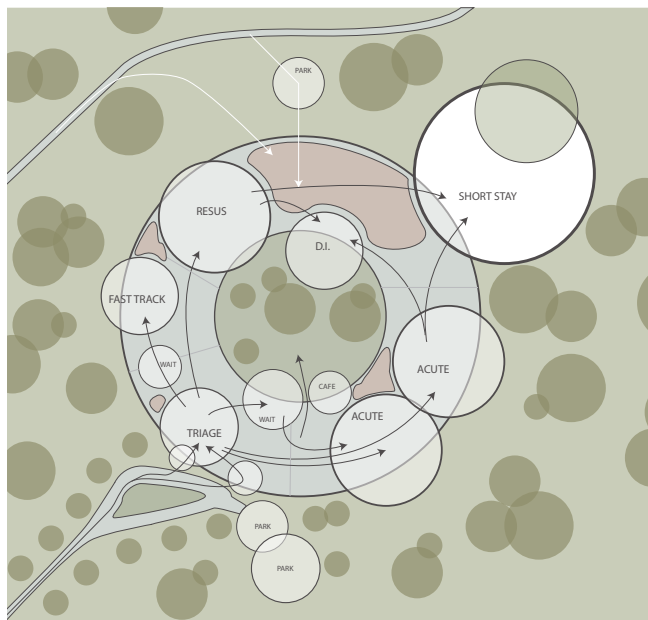
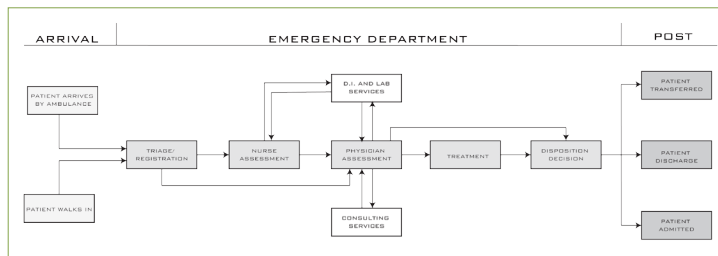
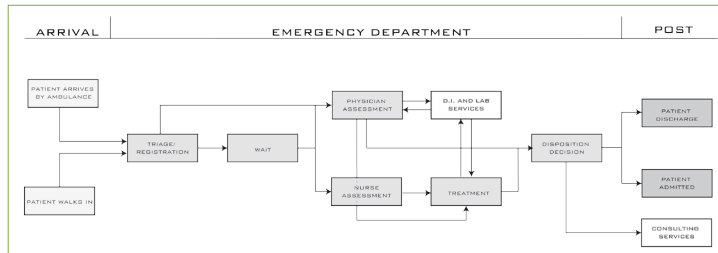
"Standard components room data sheets." Design
guidelines for hospitals and day procedure
centres

By examining the square footage requirement in relation to the level of care, severity of cases, noise levels, equipment space, work space, perceived stress levels there appears a linear relationship. Each area has a multiplier associated with it to accommodate all these factors, for example a storage space has a multiplier of 110% whereas, a normal patient room would have 135% and so forth. As all these factors increase as does the square footage associated with such a space.

Naturally, the areas with the most severe cases or the most associated stress enable the most intervention activity in order to counter such increased levels. These rising levels are shown in the graph to the right. Also shown is the inverse relationship that results from the inability to conform or to meet the need for the intervention space in severe areas. In this case the patients well being and ensuring the best treatment possible takes place over temporarily relief of stress or relating to nature. Running vertical on the graph is the representation of three separate severities of illness or emergency as they relate to the entire data group, as well as progression through a potential site intervention.



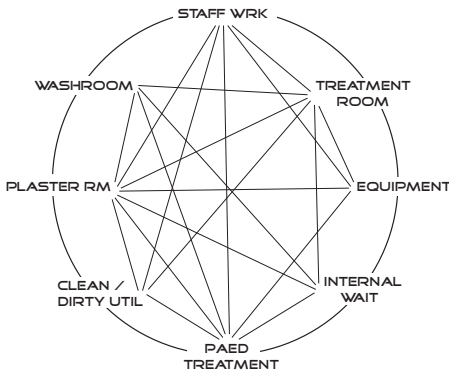
MOVE THROUGH SPACE CHALLENGING TRADITIONAL NOTIONS OF WHAT A HEALTHCARE ENVIRONMENT IS. ROUTE DEPENDS ON NATURE OF VISIT.



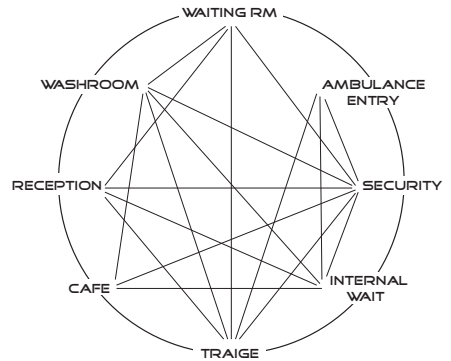
Spatial Diagram

Combining the relationship of a patient's trip through the various parts of the Windsor Regional Hospital and the data gathered by observing this progression begins to form the basis for a data driven design. Next the input of the above mentioned data and programming aspects shape the size and space relations that exist within a larger program.

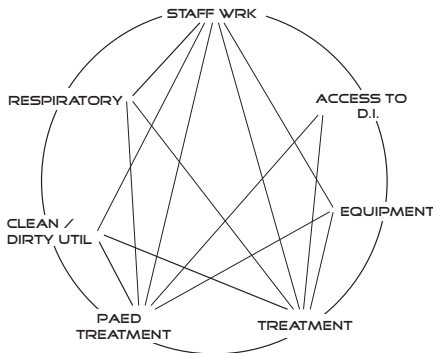
AMB + FAST TRACK



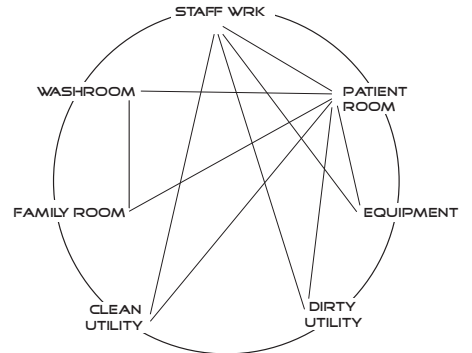
TRAIGE - RECEPTION



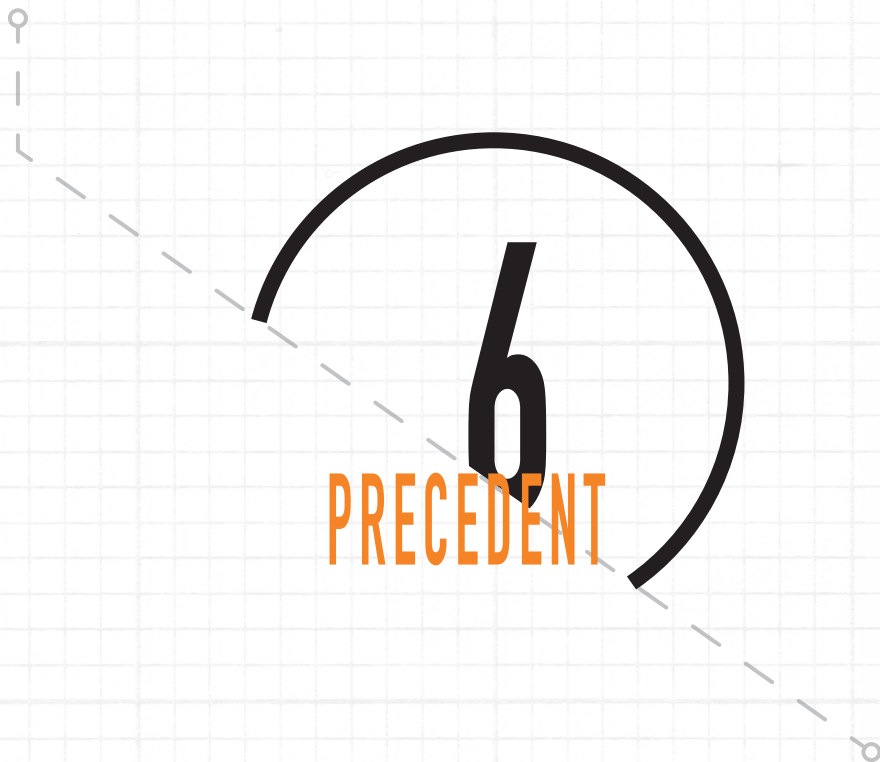
RESUS



SHORT STAY



Connection Diagrams



Hiroshi Senju Museum
by Ryue Nishizawa



Figure 20



Figure 21

*Pavilion France for
Shanghai Expo 2010*

*Seguin Island, Le Grand Jardin
France*

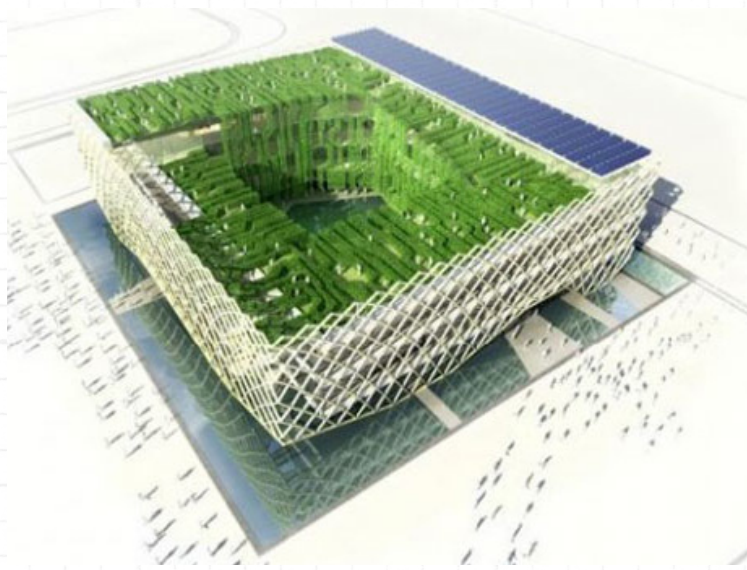


Figure 22



Figure 23

*Landscape design, hybride
English Garden*

Cancer Treatment Centre Lobby

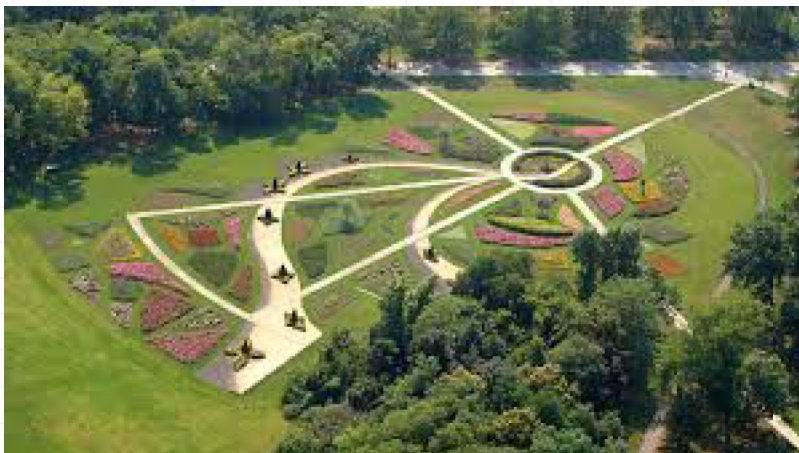


Figure 24

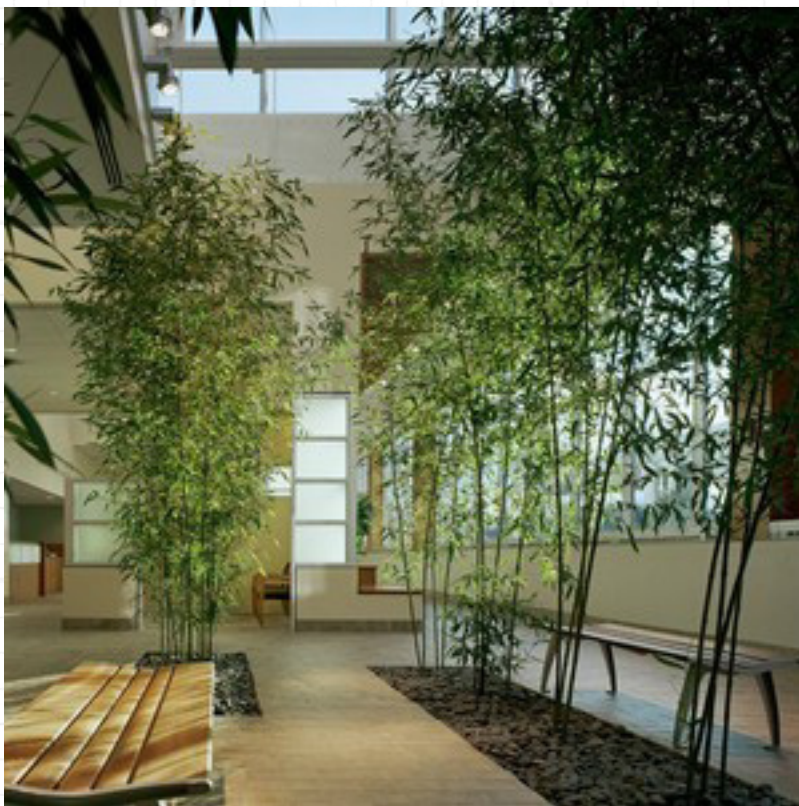


Figure 25

Health City Novena, Singapore

*Timeless Cube National Museum
of Afghanistan*



Figure 26



Figure 27



7

SITE SELECTION

Windsor, Ontario

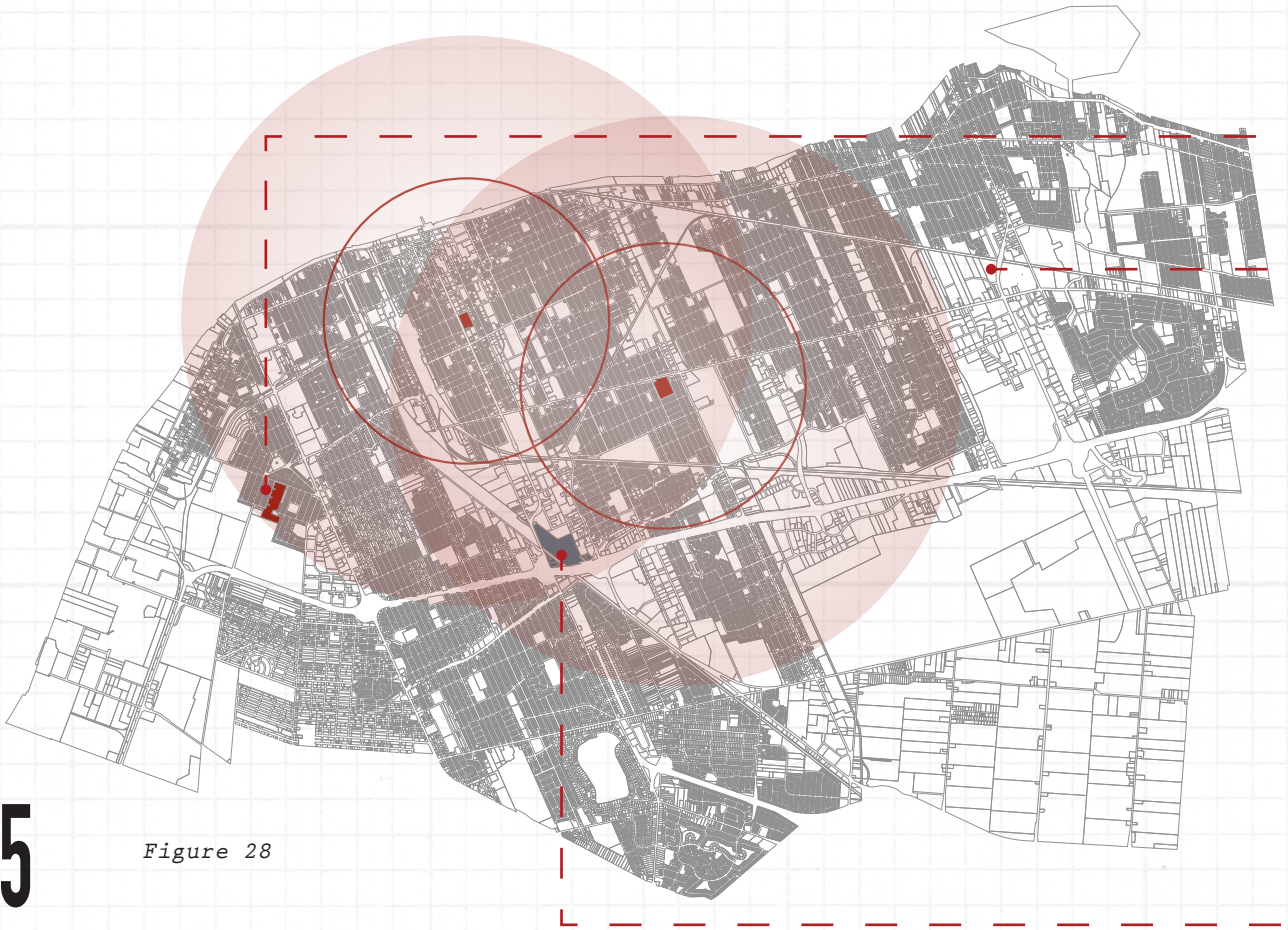
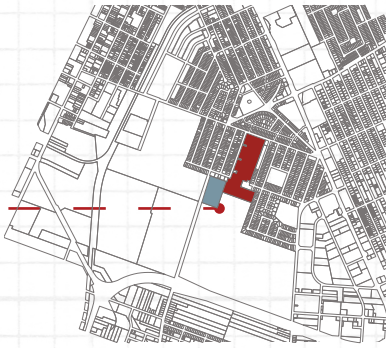


Figure 28

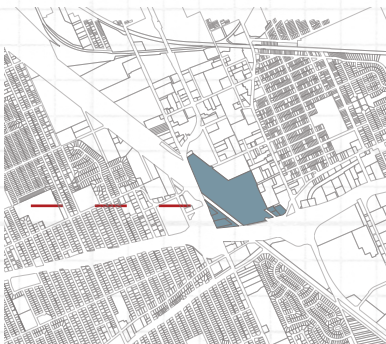
Based on the inspiration of this thesis being drawn from personal experience working within the healthcare system it seems only natural to focus on an area for intervention which also focuses on familiar grounds. This coupled with an ongoing push to develop a mega hospital within the Windsor-Essex Region, makes Windsor Ontario, an ideal focus. The on going discussions leave much open about the future project however the selection of a site will have to address one of two possible situations.



Site One



Site Two



Site Three

1) Development of a new hospital within the city which would serve the entire metropolitan area of approximately 389,000 people. This would call for a centralized site with easy access to major transportation routes. This situation raises challenges based on the current released information regarding site needs and conditions (namely a greenfield, 60 acre site)

2) Development of a new hospital outside the city effectively abandoning those without access to a private vehicle or those who rely on public transit. In this case the site could serve as purely an emergency centre to exist alongside the new major hospital.

Potential site one exists as an extension to the existing long term and complicated care site. To the North exists the existing campus, to the South and west is a naturalized area that has recreational areas incorporated. The site sits amongst a large residential area and has nearby access to West-East high capacity expressways. This site sits within the lower income area with close access to half the towns in the region. However, this site sits far from the East side communities which proves troublesome.

Potential site two, addresses the major downfall of site one, however it serves the East side rather than the West creating the opposite problem as well. The site is large enough to accommodate the proposed sixty acre site and is located close to major routes in all directions. This site has the ability to address both conditions listed initially.

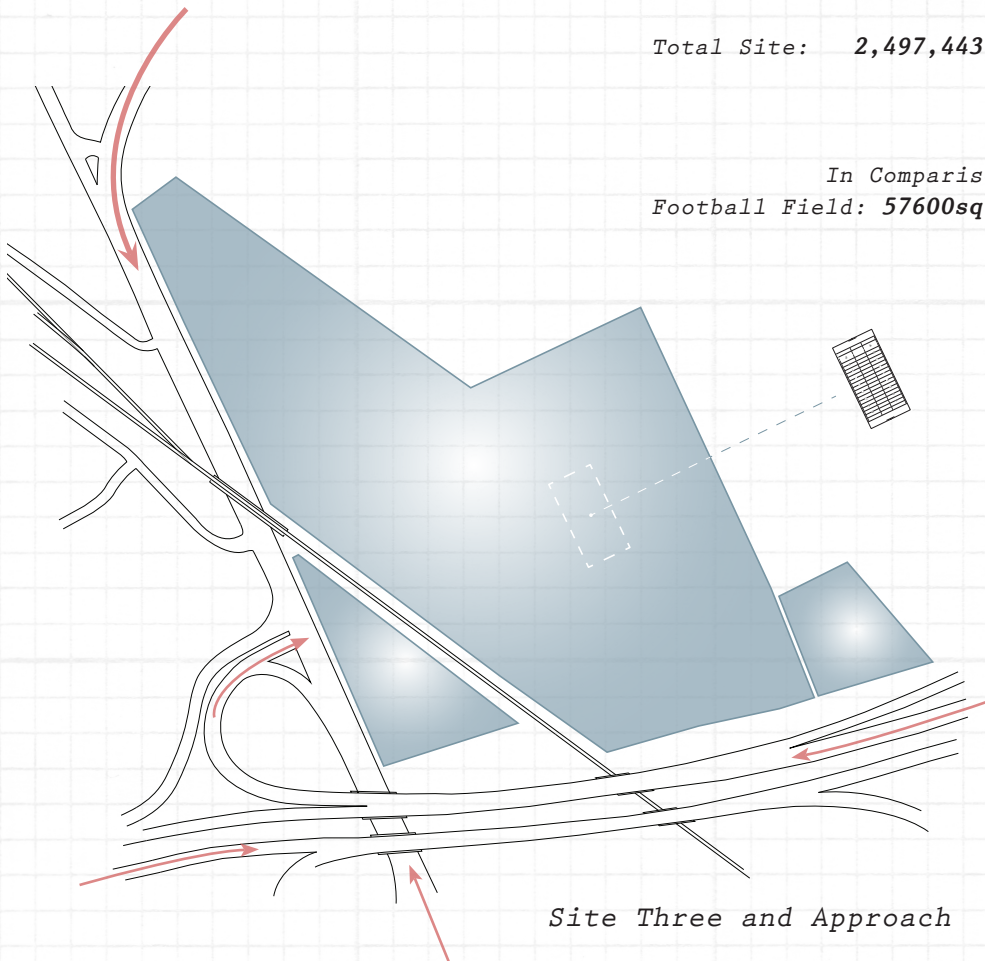
Potential site three is situated in a prime central region which has immediate access to all major routes through the city as well as from the county into the city. The site accommodate the large area required and has geographical benefits of being slightly secluded by raised hills from these major access routes. Relative to the entire region this site is situated

central with a slight advantage to the city which is representative of having the majority of the population. Based on these reasons site three is the recommended location for focus and will serve as the concentrated effort here forth.

Windsor Proposed Site

Parcel 1:	186,040sq-ft
Parcel 2:	2,134,816sq-ft
Parcel 3:	181,587sq-ft
Total Site:	2,497,443-ft

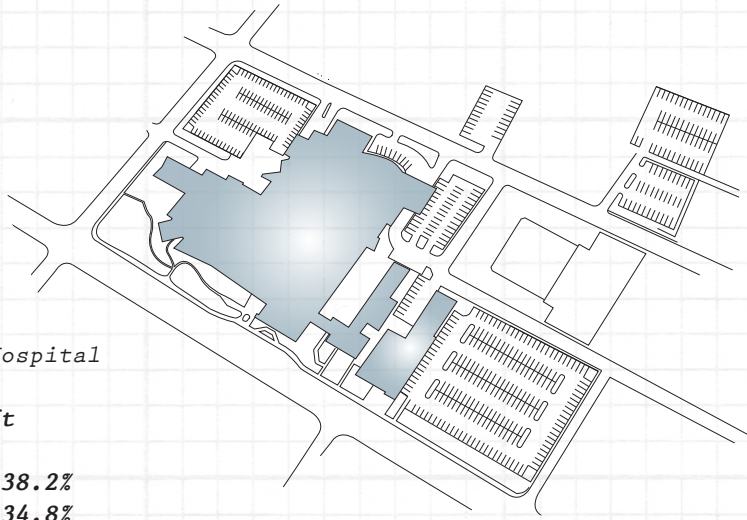
In Comparison:
Football Field: 57600sq-ft



Site Three and Approach

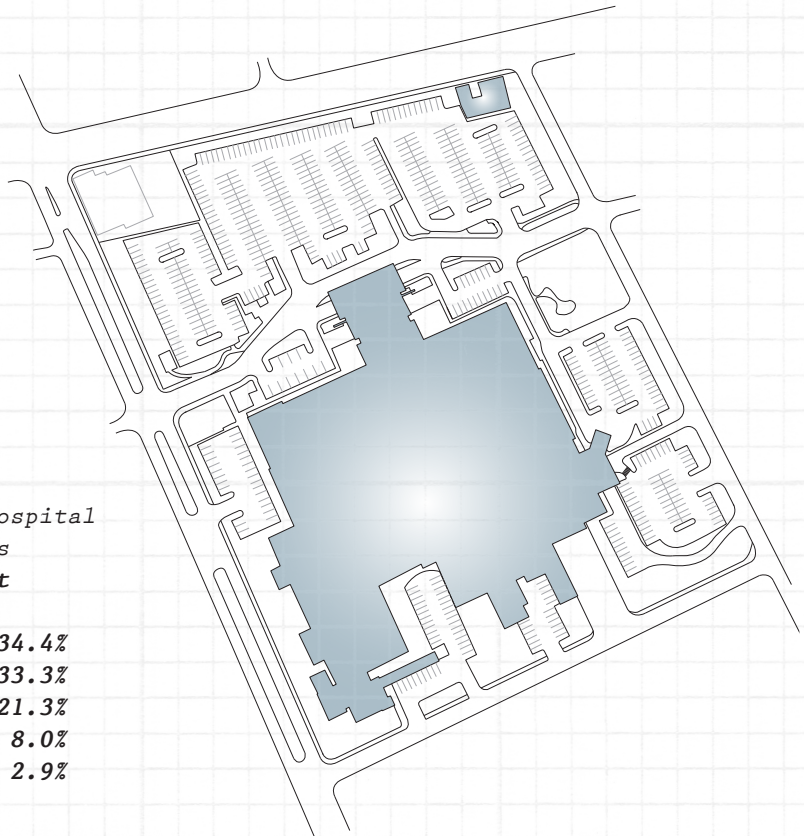
Currently the city of Windsor has two functioning hospitals which serve both the city and the surrounding area. These two hospitals have gone through various additions and remodels and host a variety of architectural styles. By analyzing the footprint each site occupies a general feel for the intention of these facilities can be established. With both sites having the majority of square footage occupied by parking followed by building area it can be clearly seen that integration with nature or green space is secondary to efficiency and appealing to the automobile.

In the design of the selected site, this relationship should be designed such that an inverse of these qualities exists. The dominant characteristic will be natural and green space, followed by walking paths and finally building footprint. The parking should be hidden from plain view while still serving those who choose to drive to the site.



Windsor Regional Hospital
Ouellette Campus
Site: **504,608sq-ft**

Parking: **38.2%**
Building: **34.8%**
Green Space: **17.0%**
Walks/ Plaza: **10.0%**

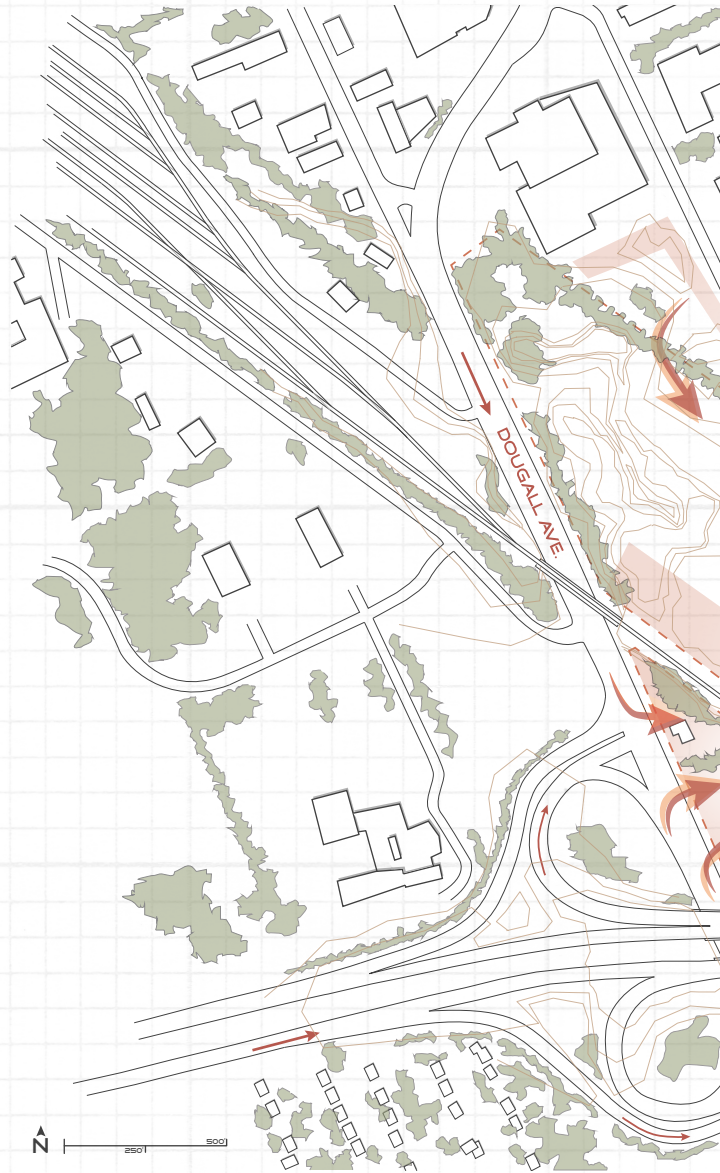


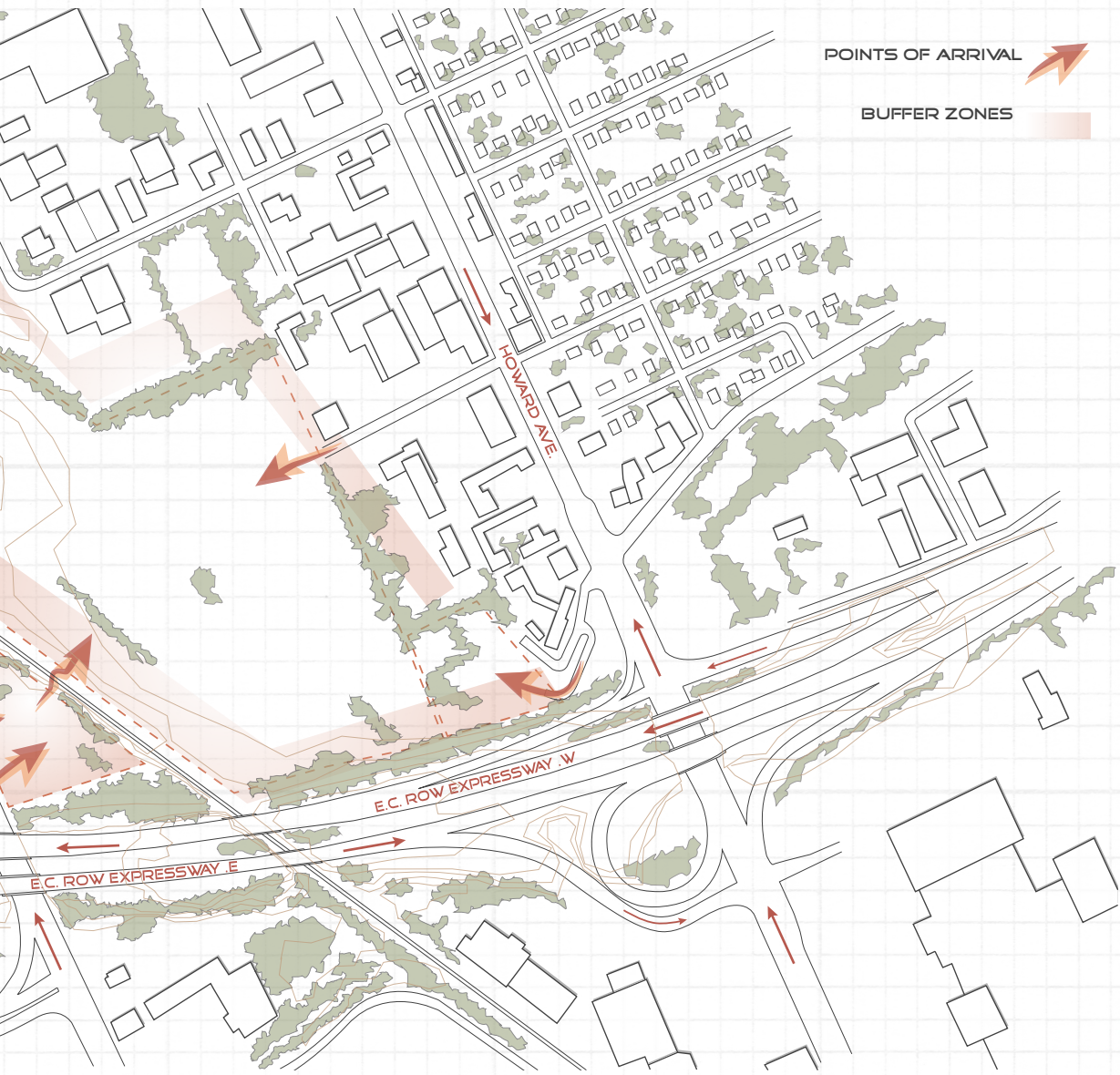
Windsor Regional Hospital
Metropolitan Campus
Site: **668,269sq-ft**

Parking: **34.4%**
Building: **33.3%**
Green Space: **21.3%**
Walks/ Plaza: **8.0%**
Other Structure: **2.9%**

Site Approach

Access into proposed site along with identified zones needing a buffer from any program





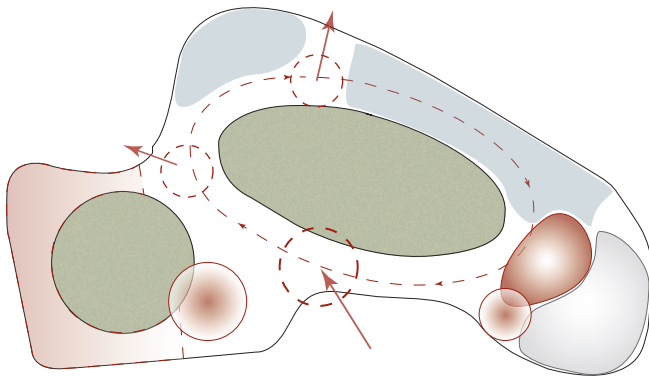
POINTS OF ARRIVAL

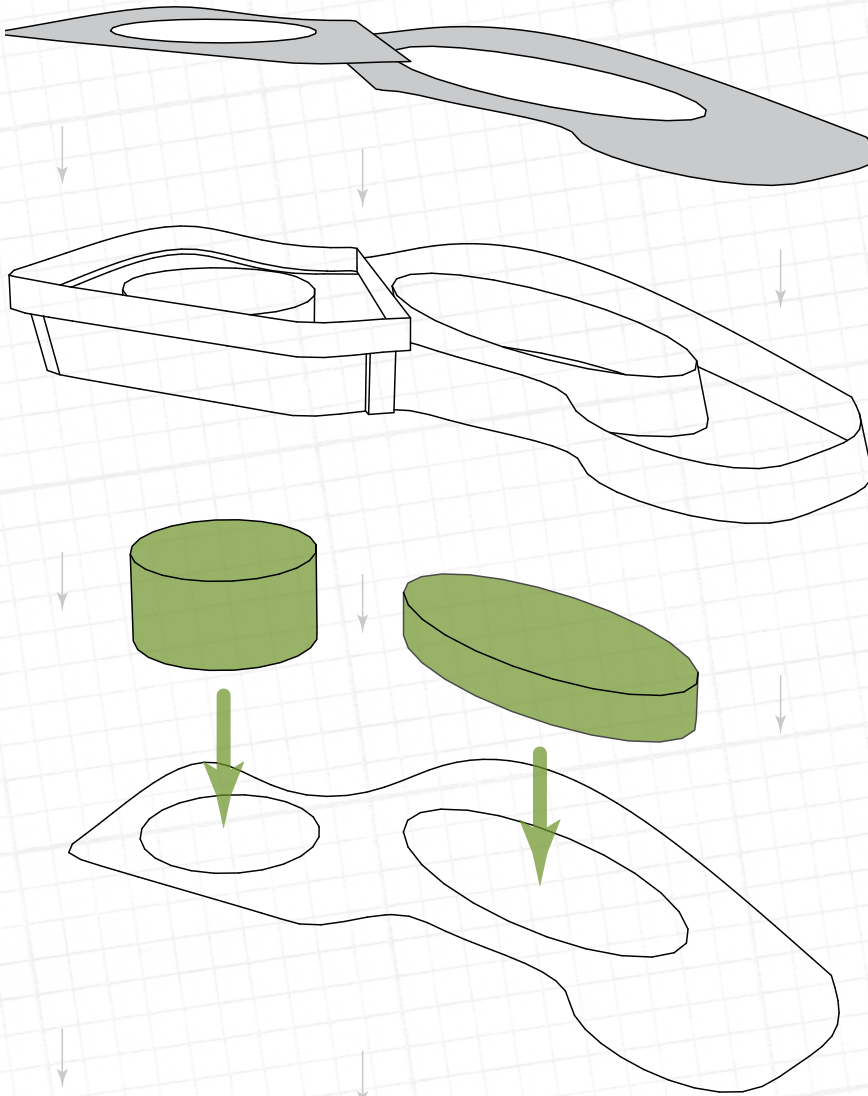


BUFFER ZONES



The early workings of the Emergency Department massing, space layouts and relationships. The areas within begin to appear and the most severe areas begin to emerge. The inner courtyards preserve their distinct appearance and act as major design element. On the following pages is a master plan showing element proposed for the site to establish a general theme and over arching hierarchy. The site reacts by keeping a natural feel, however, it begins to develop formally in the areas used most heavily. The approaches are designed to provide two distinct access routes into and out of the site depending on the severity of the case. While an early stage for an over all master plan, the idea to challenge the norm and begin to question of the layout is establishes is important. The relationships that exist between built and natural environment begin to emerge through this plan and the details within it.







1. Main Entry
2. Secondary Entry
3. Train screen
4. Walking Paths
5. Inner Circulation Path
6. Emergency Department
7. Short Stay Unit
8. Administration or further program
9. Parking Structure
10. Receiving Entry
11. Ambulance Depot
12. Formal Courtyard
13. Naturalized Fields
14. Buffer Zone

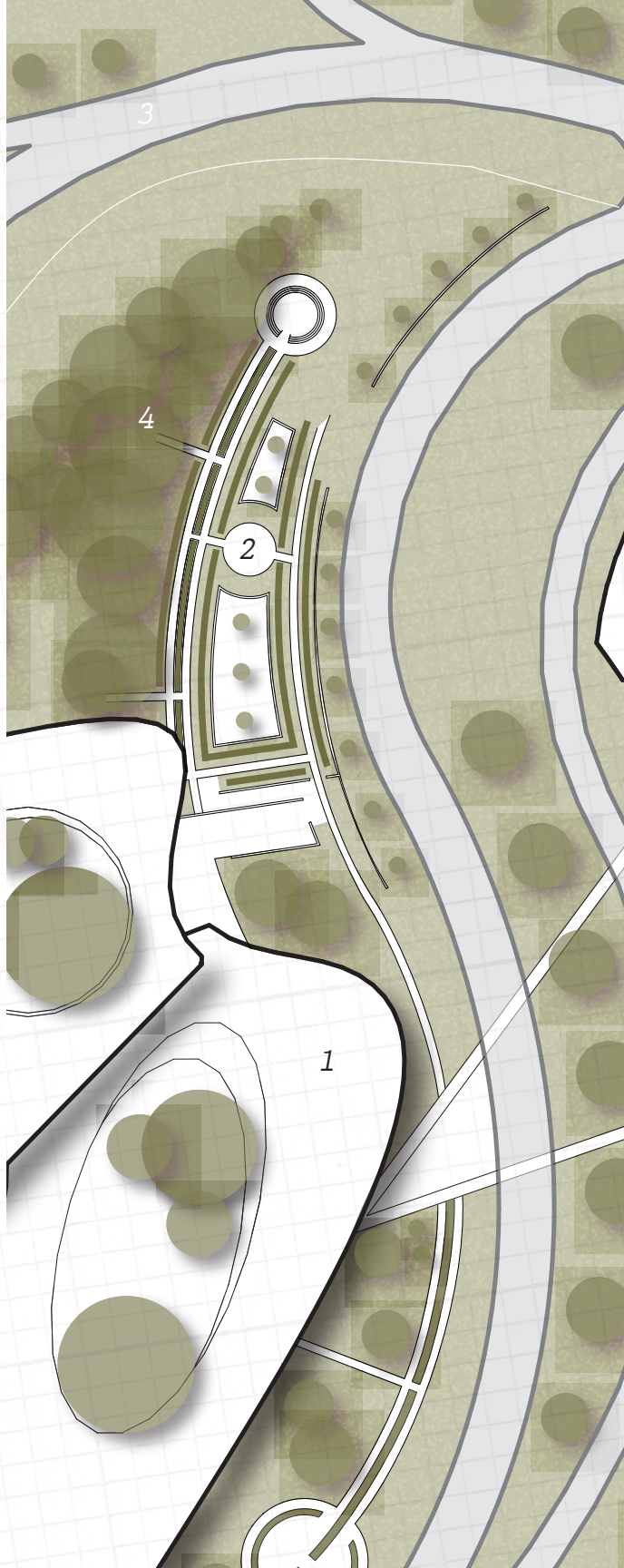




Entrance + Tunnel Detail

Main Entry to site along with the vehicle and pedestrian access tunnels. Train screen above providing protection from train and the elements.

1. Main Entry
2. Tunnel to Interior Campus
3. Train screen
4. Walking Tunnel
5. Inner Circulation Path
6. Walking Trail



Side Garden + Detail

Detail showing the interaction of the Emergency Department building with the immediate area. Included is a formal garden, Groomed natural environment which takes the form of the building as well as the approach roads.

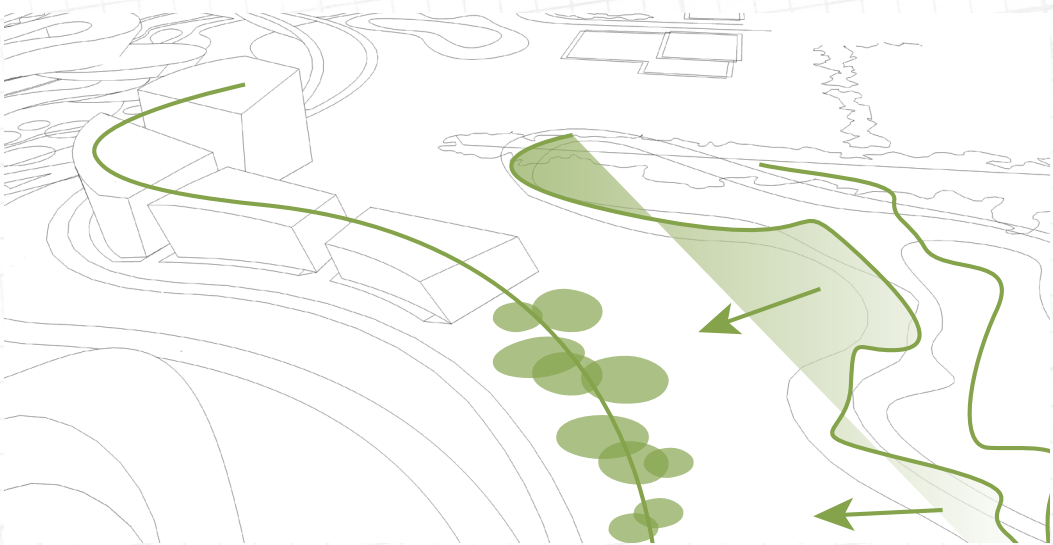
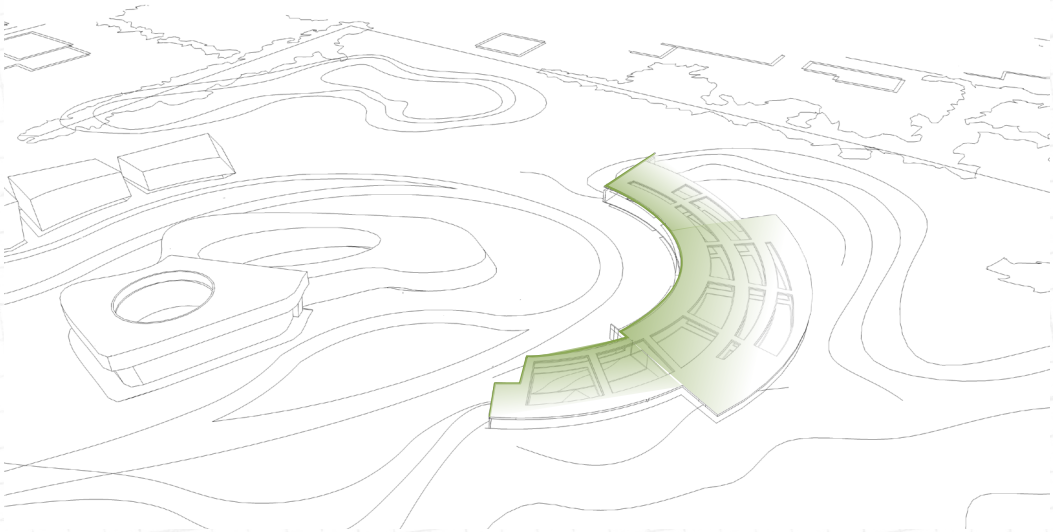
- 1. Emergency Department*
- 2. Formal Garden*
- 3. Approach Roads*
- 4. Nature integrating to form*



Parking Structure + Detail

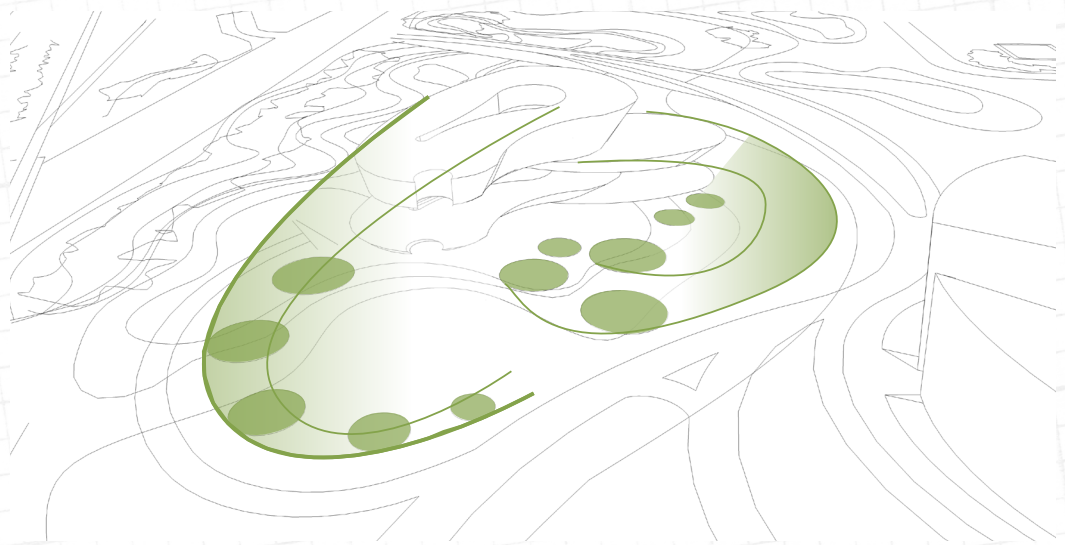
Detail showing the interaction of the Emergency Department building with the parking structure. Walking Paths serve to connect the two out doors while a direct cover entrance is below grade.

- 1. Parking Structure*
- 2. Field Covered Roof w/ Skylights*
- 3. Inner Circulation Path*
- 4. Walking Trail*
- 5. Emergency Department*



Sketch of general site conditions with an emphasis on parking and how the edge is used in the landscaping to end a raised hill. Large skylights allow an abundance of light to filter in while taking away the focus of a vast expanse of parking.

Shown is how the building massing is integrated into the trees off the end. The idea was to have the two merge rather than having the building end and trees start. As you pass by the two begin to meld together as the natural fields and low hill rolls into the paths and rear of the building complex.



A similar situation is created where the building forms and the landscape merge. Here the short stay unit to be on a slight rise, begins to follow the approach route but also frames the outdoor gardens.



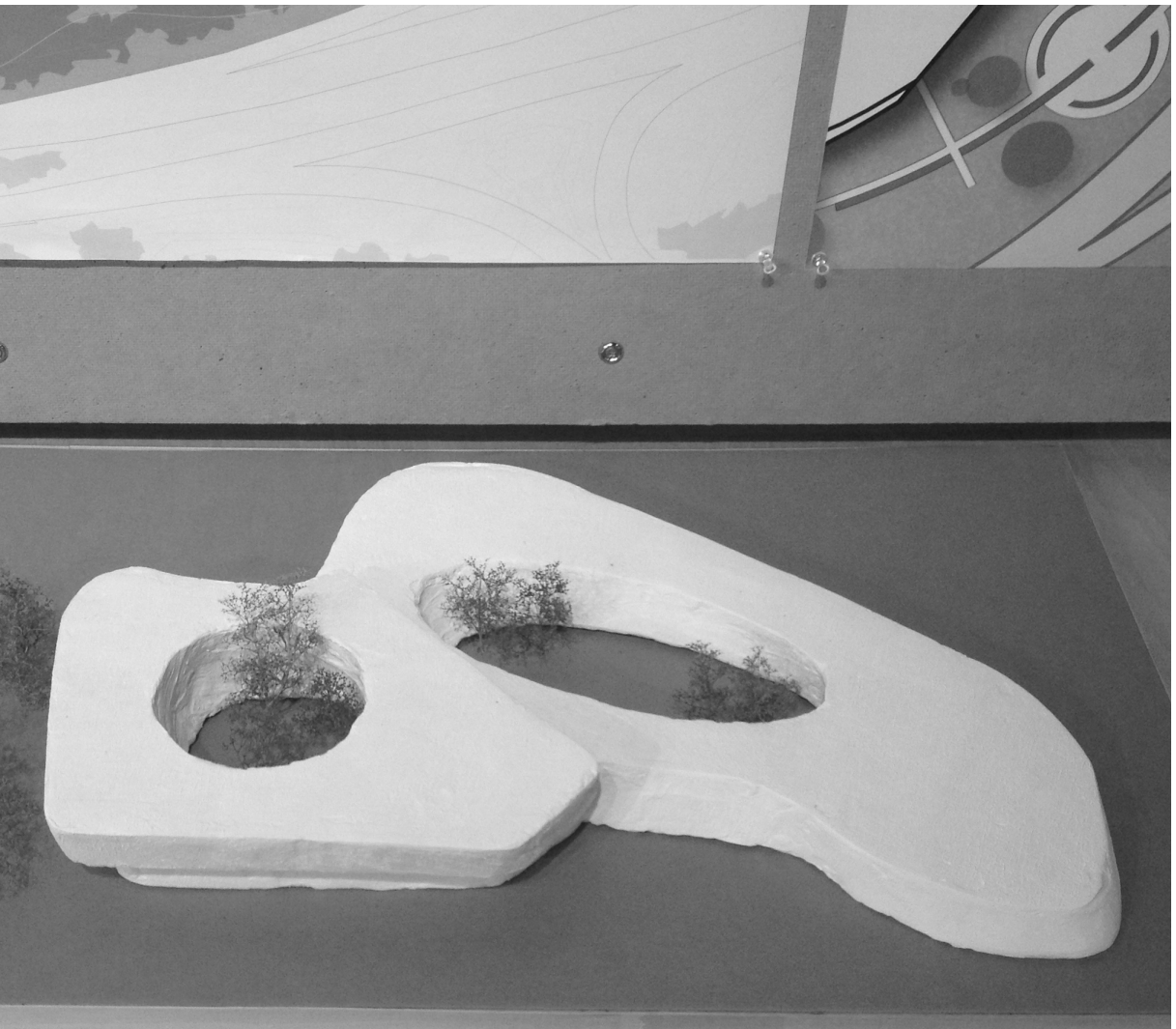
Site circulation: Blue representing the roads throughout the site. Note the two distinct entries and their relative placements to allow quick access when needed.

As a means to challenge the preconceived notions of the hospital, various points are established to frame views, either introducing new transition points, gardens, or parts of the campus. Often the views are framed by the buildings transitioning into the formed vegetation.

Potential massing of Emergency Department building with courtyard and nature extension. Note the continued form that begins to develop between the building form and the trees representing a harmonious integration.

Presentation Model



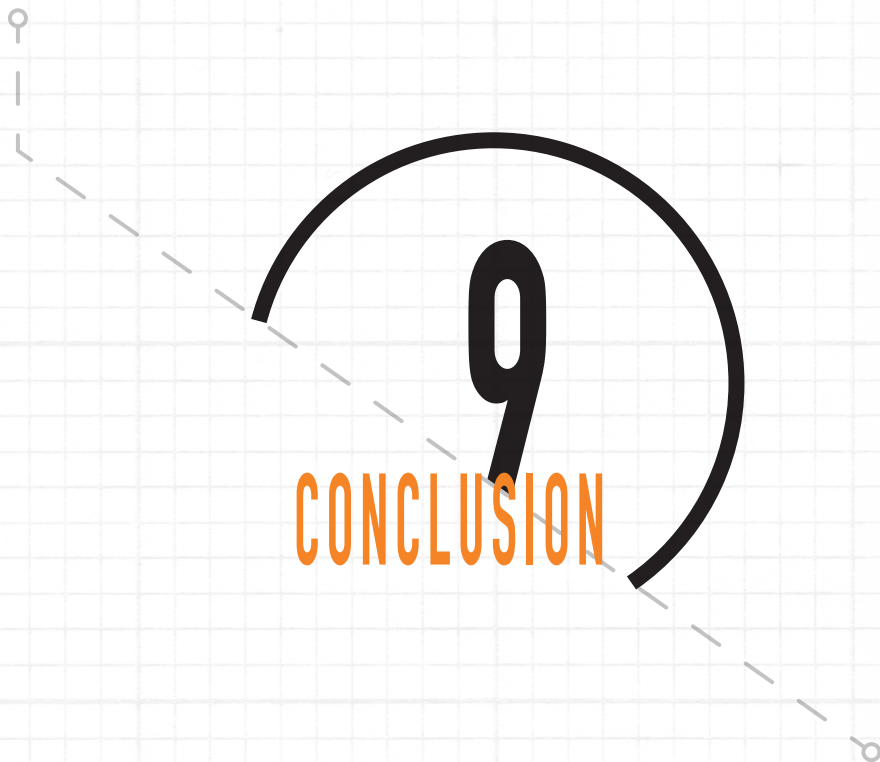




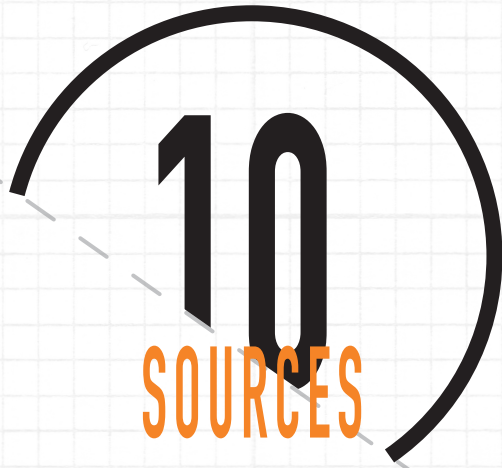
Presentation Model

*Potential massing of Emergency
Department building with courtyard
and nature extension.*





Humanity + Healthcare raises awareness to the idea that our current model of healthcare leaves much to be desired. By raising awareness and starting a conversation about the preconceived notions that exist regarding healthcare we can begin to make a change. By working off the basis that currently exists and using collaboration, the sky is truly the limit to what can be accomplished. Until we can approach healthcare with an open mind free of inset ideas of what must be, we are destined to repeat the same mistakes. If this thesis can inspire one change for the better it will have proved effective.



10
SOURCES

100

Sources

[1] Göran Schildt, Alvar Aalto. *The Early Years*. Rizzoli, New York, 1984.

[2] Kim, Hyon-Sob. "Alvar Aalto And Humanizing Of Architecture." *Journal of Asian Architecture and Building Engineering* 8.1 (2009): 9-16. Print.

[3] *ibid*

[4] *ibid*

[5] 26. Bardswell ND, Thompson JHR. Mortality after sanatorium treatment. *Med Res Committee Spec Rep* 1919;33: 1-112.

[6] Nolt, Jill. "The Sanatorium Landscape." *The Sanatorium Landscape*. N.p., n.d. Web. 24 Apr. 2014. <<http://www.faculty.virginia.edu/blueridgesanatorium/landscape.html>>.

[7] *ibid*

[8] *ibid*

[9] (Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science*,224: 420-421)

[10] Ulrich, R. S. (1999). *Effects of gardens on health outcomes: Theory and research*. Chapter in C. C. Marcus

and M. Barnes (Eds.), *Healing Gardens: Therapeutic Benefits and Design Recommendations*. New York: John Wiley, 27-86.

[11] Ulrich R. S (2002) *Health Benefits of Gardens in Hospitals*, Paper for conference, *Plants for People International Exhibition Floriade*

References

Krcmarova, Jana, "E.O Wilson's Concept of Biophilia" University of Prague, June 2007

"GUIDELINES ON EMERGENCY DEPARTMENT DESIGN." Australian College for Emergency Medicine G15 (2007): 1-25. Print.

Paul, Jomon Aliyas, and Li Lin. "Models for Improving Patient Throughput and Waiting at Hospital Emergency Departments." *The Journal Of Emergency Medicine* 43.6 (2012): 1119-1126. Print.

"Standard components room data sheets." *Design guidelines for hospitals and day procedure centres 1.1* (2004): 3-142. Victoria Health Projects International. Web. 24 Apr. 2014.

Ridley, Kim "Healing by design" January 21, 2007, 12:07 am, *The hospital of the future may not look like a hospital at all*, July 2006

Figures + Images

Figure 1: Author, Chris Zahlauk (all further images not represented under figures are original works).

Figure 2: Based off base image: [1]<http://ramtech.deviantart.com/art/Druzhba-Sanatorium-Yalta-163474214>

Figure 3: Author

Figure 4: <http://www.haaretz.com/print-edition/news/legendary-histadrut-hotel-on-the-carmel-getting-major-face-lift-1.346789> - Noam Dvir

Figure 5: http://ad009cdnb.archdaily.net/wp-content/uploads/2013/08/5200f878e8e44efff2000003_ad-classics-mivtachim-sanitarium-jacob-rechter_r1-_017a_ps2-1000x469.jpg

Figure 6: http://1.bp.blogspot.com/_QFPH1MxKGbc/ShCG-kWMphkI/AAAAAAAAA8/VX6psHISfwo/s320/Paimo_Main_Plan.jpg

Figure 7: www.freevectorimages.com/symbols

Figure 8: Evidence Based Design Charts, <https://www.healthdesign.org/sites/default/files/>

Figure 9: WRH Met ED Floor Plan Base - Chris Zahlauk - based off Murphy Hilgers Architects Inc, Design for WRH Metropolitan Hospital

Figure 10: *ibid*

Figure 11: *ibid*

Figure 12: *ibid*

Figure 13: *ibid*

Figure 14: *ibid*

Figure 15: *ibid*

Figure 16: *benefits courtesy of gsky green wall systems*
<http://gsky.com/green-walls/benefits/beautification/>

Figure 17: *ibid*

Figure 18: *Double Green Wall - Chris Zahaluk - based off* <http://gsky.com/CAD/DWG/GSky%20Green%20Wall%20Spec%20Drawing-5-p-3.dwg>, <http://gsky.com/green-walls/pro/cad-spec/>

Figure 19: *Assorted data gathered, see figure for sources*

Figure 20: <http://aasarchitecture.com/2012/11/hiroshi-senju-museum-by-ryue-nishizawa.html>

Figure 21: <http://aasarchitecture.com/2012/11/hiroshi-senju-museum-by-ryue-nishizawa.html>

Figure 22: <http://openbuildings.com/buildings/seguin-island-profile-38732>

Figure 23: <http://www.architecturelist.com/2010/01/11/pavilion-france-for-shanghai-expo-2010/>

Figure 24: http://25.media.tumblr.com/tumblr_m42jkcz-DT1lrdkwvol_400.jpg

Figure 25: <http://www.examiner.com/article/healthcare-design-healing-environments-oncology-facilities>

Figure 26: <http://www.e-architect.co.uk/images/jpgs/singapore/health-city-novena-b090913-1.jpg>

Figure 27: <http://wordlesstech.com/2012/10/15/timeless-cube-national-museum-of-afghanistan-by-mca-architects/>

Figure 28: Base Image: City of Windsor/ Residents/ Planning?

