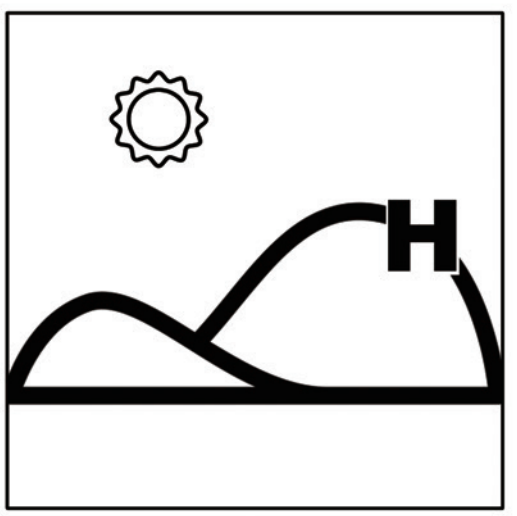


HOPE

Committee

Chair

Liliana Beltrán

Co-chair

Zhipeng Lu

Member

Bruce Dvorak

Studio Professor

A. Ray Pentecost

Content

Performance

Bird view

Emergency entrance rendering

Emergency entrance rendering

Site perspective rendering

Project research

Texas Children's Hospital®

Texas Children's Cancer and Hematology Centers, the Baylor International Pediatric AIDS Initiative at Texas Children's Hospital and the Bristol-Myers Squibb Foundation, in partnership with the governments of Botswana, Uganda and Malawi, plan to create an innovative pediatric hematology-oncology treatment network in southern and east Africa. The comprehensive initiative, called Global HOPE (Hematology-Oncology Pediatric Excellence), will build long-term capacity to treat and improve the prognosis of thousands of children with blood disorders and cancer in the region.

The project will create three full service Children's Cancer and Blood Disorders Hospitals (CCBDH). A conventional design/construct process will be employed on green field sites. Level of treatment in these facilities will go well beyond what can be provided in the phase one clinics. Services include outpatient and inpatient treatment, surgery, radiology, central support, urgent care, emergency procedures, laboratory, transitional research and family amenities. The CCBDH will be configured to expand into a complete Pediatric Hospital that deliver all medical services for the children in Africa. The facilities will be welcoming environments, integrated with nature, supportive of technology and flexible for future needs.

For my final project, I focused on bringing a full function pediatric hospital in Uganda.

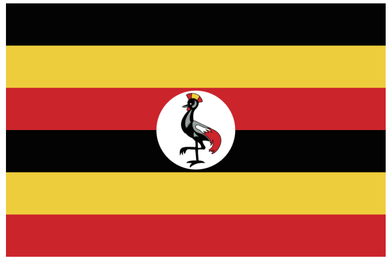
Figure 1

Figure 2

Figure 3

Figure 4

Figure 5



Uganda as a sub-Saharan Africa country, It located on equator area. The southern part of the country includes a substantial portion of Lake Victoria. The population has over 32 million. the population living below poverty line is about 85 percents and the total fertility rate is over 7. All this public situation make Uganda has a very poor healthcare system. HIV/AIDS, Malaria, respiratory infections are the top three disease that causes people death in Uganda. The lack of healthcare worker and medical infrastructure makes people is hard to get treatment immediately in Uganda. Nowadays, which globalization, Uganda's infrastructure start getting more and more hospital has been built around Mulago area. But it still cannot meet the population need for healthcare facilities. That is why Texas Children Hospital wants to bring a pediatric hospital in Uganda.

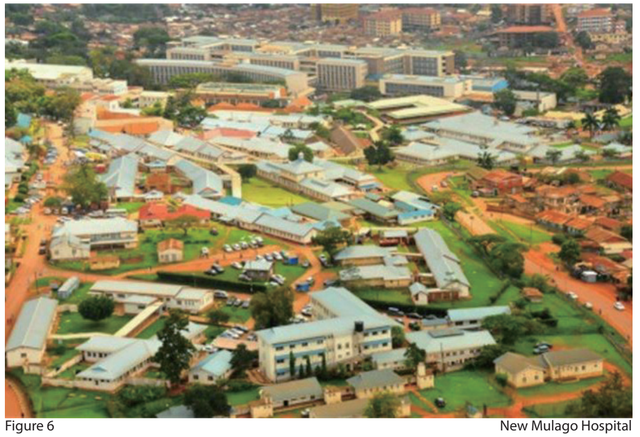


Figure 6 New Mulago Hospital

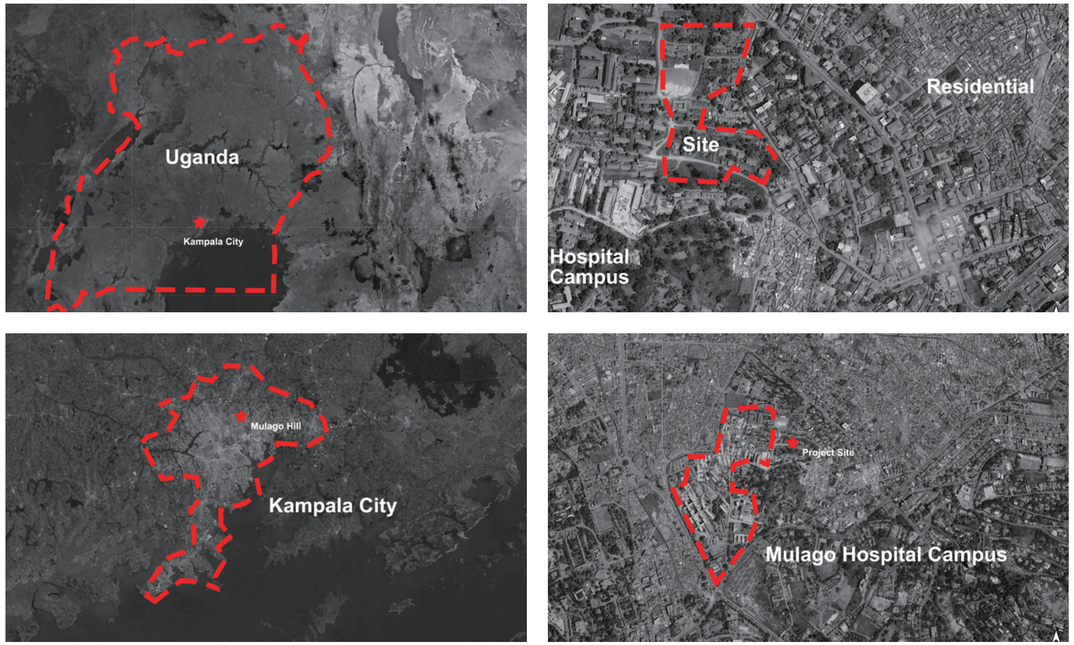
Figure 7

Figure 8 New Mulago Women Hospital

Figure 9

Figure 10

Figure 11 Uganda Cancer Institute



Uganda has population slightly over 34 million with all races of people. The country has over 50 local languages. Kampala city as the capital of Uganda, it has over 150 thousands people which make it become the most populous area in Uganda. Our site located at Mulago hill area which is the largest medical area in Kampala. It has a full function general hospital and serval specialize medical institute, which allows the HOPE project cooperate with them to give a better treatment to patients.

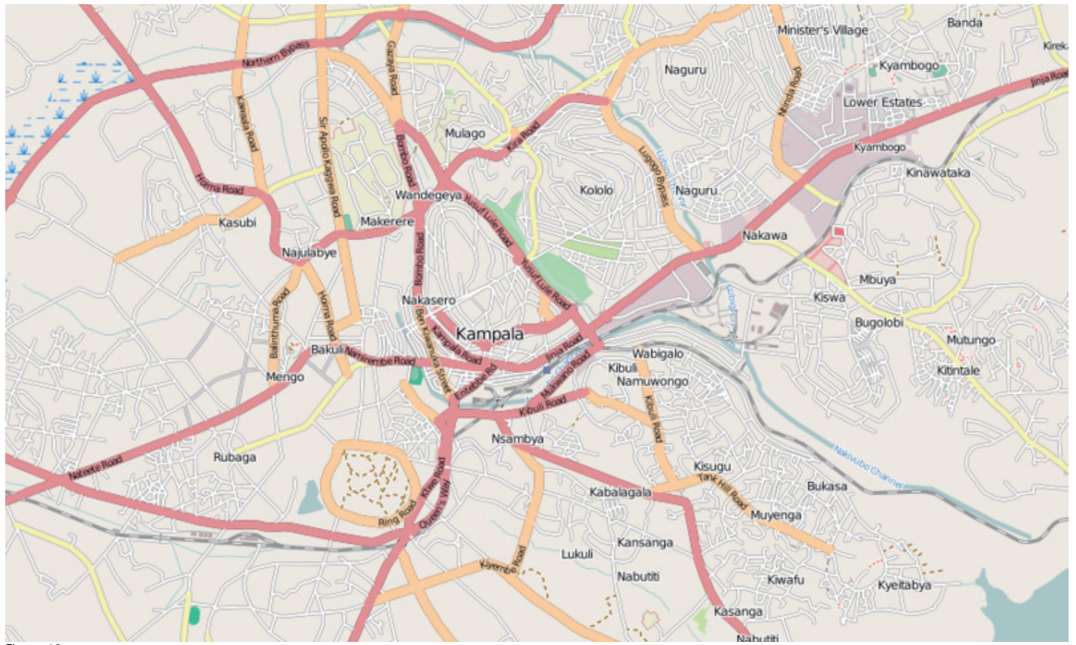


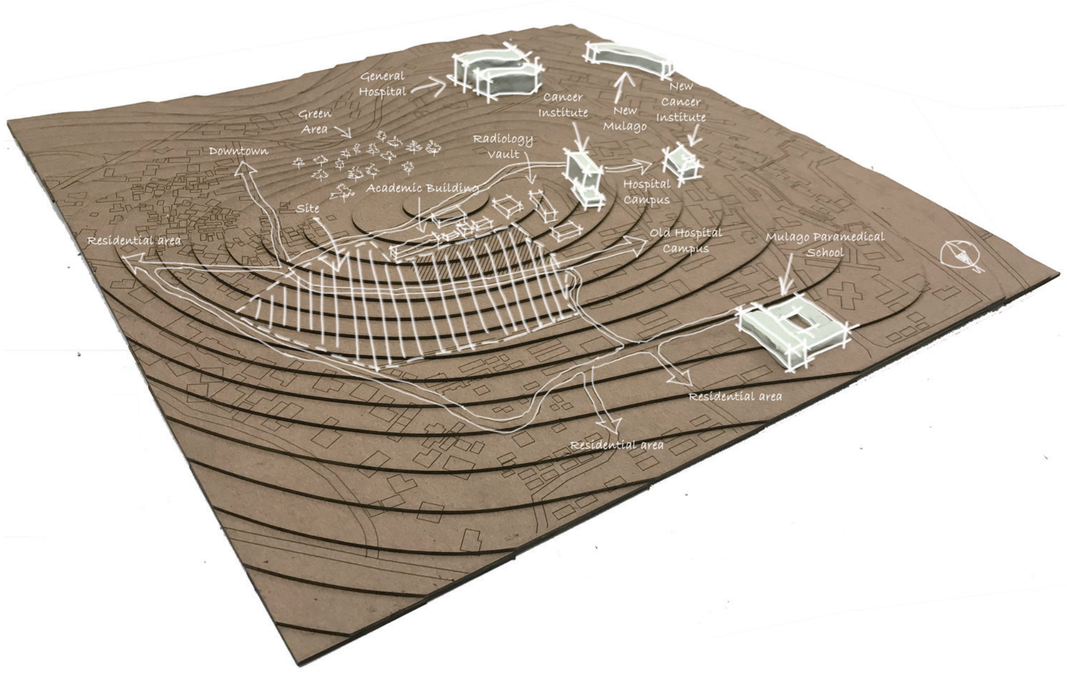
Figure 12

In Kampala, Motorcycle and Minivans are the main transportation tools for local people. And most of the road is not have pavement, The roads with color are the main roads with pavement in Kampala city. Other white roads may only have simple hardening treatment. Mulago Hill, as the main hospital campus, it services the whole Kampala city, There are several main transportation routines can lead people from the city reach the campus area.

Site context

The site has been chosen at the top of the mountain because the local area has serious flooring issue during the raining season. Also, the higher location makes the building more close to the Uganda Cancer Institute where will share the radiotherapy facilities with the new pediatric cancer hospital.

Around the site area, there are serval hospital facilities at west and a nursery school at the lower level of the hill slope at the north side. The east side is the residential area and at south over the mountain will be the direction to the downtown area of Kampala.



Climate

The local climate is very comfort, Kampala has been classified as tropical monsoon climate. It makes this area has two rainy seasons and two dry seasons which make it not too hot or too humid during different seasons.

The average temperature for the year in Kampala is 68.0°F (20°C). The warmest month, on average, is January with an average temperature of 71.0°F (21.7°C). The coolest month on average is May, with an average temperature of 68.0°F (20°C).

The average amount of precipitation for the year in Kampala is 47.7" (1211.6 mm). The month with the most precipitation on average is April with 7.1" (180.3 mm) of precipitation. The month with the least precipitation on average is July with an average of 2.1" (53.3 mm).

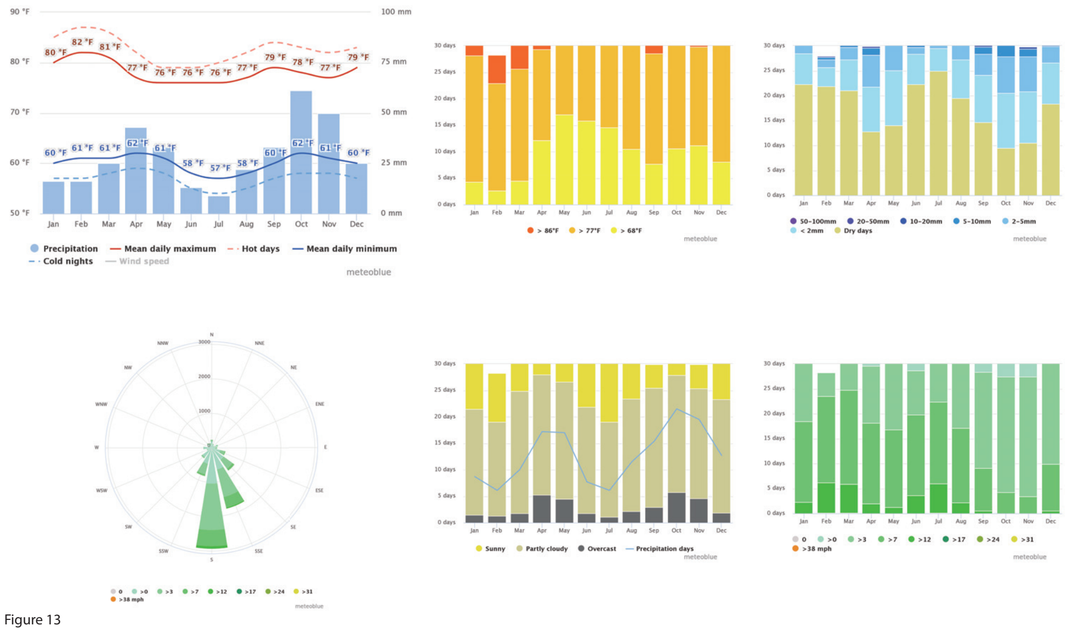


Figure 13

Figure 14 Public transportation

Figure 15 Local Building

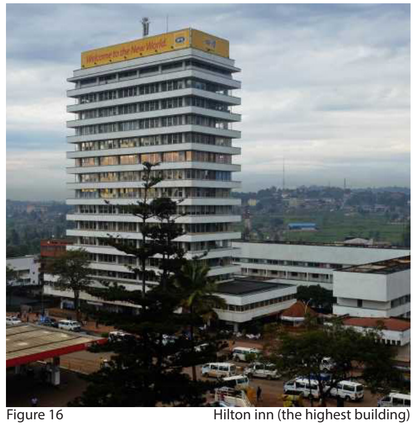


Figure 16 Hilton inn (the highest building)

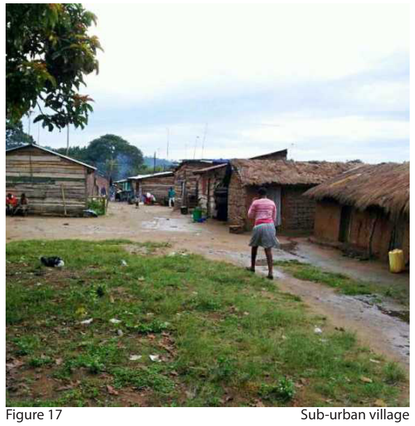
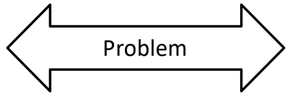
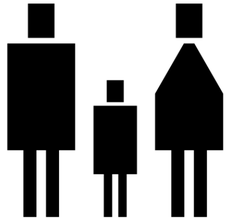


Figure 17 Sub-urban village

All photo above come from the project area. Based on the colonial history, the local culture contents lots of foreign cultures. According to the 2002 census, Christians made up about 85 percent of Uganda's population. The next most reported religion of Uganda was Islam, with Muslims representing 12.1 percent of the population. Agriculture, building and tourism is the main industry for the local economy. Most of the buildings in town are using modern building materials with local building form. Because of the poverty problem, the public transportation system use minivan as buses for city commuting tools. The highest building in Kampala is Hilton Inn hotel, which is a typical modernism-style building. There are several concrete plants in Kampala area. It makes the concrete building is quite popular in the local building industry.

Doctor from America





Africa local family

Problem Statement

Through problem seeking process, the program statement of this project cannot avoid the problem of the culture difference between patients and healthcare provider, The treatment for the disease, the family care after treatment and the communication between patients and doctors. To deal with the communication issue, the idea is design more space where pediatric patients can play with or parents can take care of their children or doctor can talk with the parents.

What Texas Children Hospital want to bring to this city is a way to make people get healthy and have a happy life. Now, the local people is lack of public space for them. The Hospital campus can be a public area for citizens to play with, rather than just a refuge for patients.

For more development, this site has a two-level height difference, we can bring multiple possible function arrangement for it. The basic idea will create the green environment with the building. Use daylighting and green building technology to make the building more sustainable.

Program



In this project, the main problem about function will be three different points. The communication between physician and patients, the special treatment for children of different age, the need for local family culture.



Design a hospital in Africa is different from America. The climate, local environment and building industry is different. Adopt the advances of local technology could be a good strategy for design process.



Local community did not have type of any American healthcare treatment before. The hospital in Kampala was building in 1970s which are total different from American modern hospital. Bring sustainable design and introduce America high quality healthcare model will help local population health be more healthy.

Space List

Outpatient

Outpatient			8400
exam room	160	24	3840
nurse station	240	3	720
medication	200	3	600
nourishment	120	3	360
soild hold	200	6	1200
supply storage	300	2	600
toilet	80	8	640
holding wait	400	1	400
			8360

Infusion			4800
Infusion seat	120	12	1440
toilet	80	4	320
med	300	3	900
soiled	160	2	320
prepare	300	1	300
pharmacy	500	1	500
			3780

Pentamidine			1800
treatment room	160	4	640
med	300	1	300
toilet	80	2	160
soiled	150	1	150
dict	150	1	150
			1400
Phlebotomy	160	4	640
Med	260	1	260

Lab	4800

Pharmacy	2700

Inpatient

Inpatient			
ICU			7,200
ICU room	300	12	3600
toilet(in room)	40	12	480
toilet	80	4	320
nurse station	500	2	1000
med	300	1	300
clean	300	1	300
conf	300	1	300
dict	300	1	300
Storage	500	1	500
			7100

AU			24,000
room(include toilet)	600	12	7200
nurse station	500	4	2000
med	300	4	1200
dict	300	4	1200
toilet	80	8	640
Med/Surg waiting	500	4	2000
clean supply	300	4	1200
pharmacy	500	2	1000
Respiratory Therapy	60	8	480
			16920

Imaging Department			
CT TOTAL	1500		840
CT RM.	400	1	400
CTRL	200	1	200
PAT. HOLD	120	1	120
TECH.	40	1	40
PACS.	80	1	80

Ultrasound	800		690
US RM.	200	2	400
TLT.	65	2	130
PAT. HOLD	80	1	80
ULTRA. WORK	80	1	80

R/F TOTAL	2200		1080
R/F RM	360	2	720
CTRL.	35	2	70
TLT.	65	2	130
PAT. HOLD	80	2	160

MRI TOTAL	2350		1580
MRI RM.	600	1	600
CTRL	200	1	200
EQUP.	300	1	300
PAT. HOLD	160	1	160
PAT. Toilet	80	1	80
Storage	180	1	180
TECH.	40	1	40
PACS.	20	1	20
SOIL. UTIL.	160	2	320
CL. SUPPL.	200	1	200
COMM. RM.	120	1	120
EVS. CL.	40	2	80
STR. STG.	80	3	240
SERVICE TOTAL			960
READ	100	3	300
			4370

Emergency

ED			6000
exam	160	6	960
exam	160	6	960
nurse station	240	2	480
med	120	2	240
dict	120	2	240
Triage	240	1	240
Trama	240	2	480
toilet	80	8	640
decon	160	1	160
result waiting	200	2	400
storage	80	4	320
			5120

Surgery			7000
O.R	600	2	1200
Clean supply	900	1	900
PACU	120	8	960
Perp	100	4	400
nurse station	300	2	600
med	150	2	300
nourishment	150	2	300
soiled	150	3	450
storage	150	3	450
locker	240	2	480
changing	240	2	480
			6520

Procedure room			9000
proc room	600	6	3600
prep/rec	120	10	1200
toilet	40	4	160
nurse station	300	2	600
med	150	2	300
soiled	150	2	300
storage	150	2	300
sterile	900	1	900

Literature review

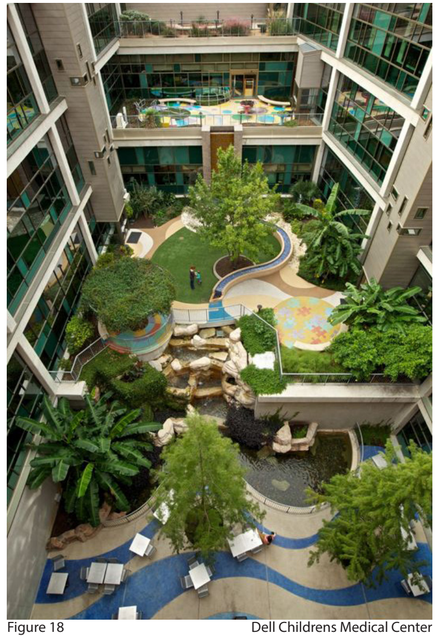


Figure 18 Dell Childrens Medical Center

Figure 19 Phoenix Children's Hospital

Several studies indicate that nature distraction can produce substantial and clinically important pain mitigation. Patients recovering from abdominal surgery needed far fewer potent narcotic pain doses and had better emotional well-being and shorter hospital stays if they had bedside windows with a nature view (trees) than if their windows overlooked a brick wall(Ulrich, 1984)

Viewing unthreatening natural stimuli reduces the stress response while accelerating psychological and physiological recovery. Ulrich theory suggests that positive distractions like natural elements help in pacifying the stress and pain encouraging restoration. (Ulrich RS. 1984)

Colour is believed to be a fundamental element of environmental design, especially in healthcare spaces as it is linked to psychological, physiological, and social reactions of human beings, as well as aesthetic and technical aspects of human-made environments. Choosing a color palette for a specific setting may depend on several factors including geographical location, characteristics of potential users (dominant culture, age, etc.), type of activities that may be performed in this particular environment in specific wards/hospitals in hospitals according to each function (paediatric wards/ cancer hospitals etc) , the nature and character of the light sources, and the size and shape of the space (Ruth et al., 2004).

The healthcare environment color design is using color's physical, psychological, and physical characteristics to create a comfort and aesthetic space. According to research, the warm tone could enlarge pupil, increase pulse. Especially for yellow, red and orange, those colors could make people feel the energy. Cool tone can make people calm down, reduce eyestrain and release stress. For the pediatric patient, bring lighting carton and toys could make space more children-friendly. Green as the natural color, even though we cannot bring plants in the patient room, but put some green plants out of the window, make patient can see and feel the natural could make them feel better. Nature light will make the patient feel natural and time changing. Warm sunlight can bring patient the hope of alive. Nevertheless, direct light will make the patient feel anxiety. Using shading device to get diffuse reflection light could be a good idea.(Bai Xue. 2007)

In China, people will go to hospital to make an appointment with doctor, lots of people will gather in lobby area. Architects will design a huge lobby connect with hospital “street” to access to different departments.

In American hospital, people will make an appointment at home. It avoids too many people gather in same place at same time. Patients have been separated to different waiting area, which will not have an over scaled lobby area.

Combined with American design concept and Chinese situation, we can design some middle-size hospital(500-1000beds), by separating waiting area, hospital street has been minimized to 25 meters and corridor width will only be 7-8 meters. The separate plan makes a close connection between outpatient department to image department.

Figure 20

Figure 21

Figure 22

American Emergency department has triage, treatment and observation, three difference parts. Emergency department design as pod type, each cluster has a central nurse station. And using single treatment for patients’ privacy. In China, the resuscitation, observation and emergency ICU designed like a lobby space. Open space design is convenience for healthcare team deal with multiple patients, but there is not privacy for patients.

Figure 23

For inpatient tower, American hospital makes patient bed around the building and put the support units at the middle. The circulation is like a circle. And by using decentralize nurse station to reduce nurse walking distance. Normally, American will use single bed units, each nursing cluster service for 16 beds. Based on daylighting requirements, Chinese hospital bed units will be designed at single side and become a linear or race track plan type. And add the nurse station at middle of the linear plan, which is far away from the bed units at the end of corridor. Normal bed unit will have 2-3 beds and each nursing cluster will server 45-50 beds.

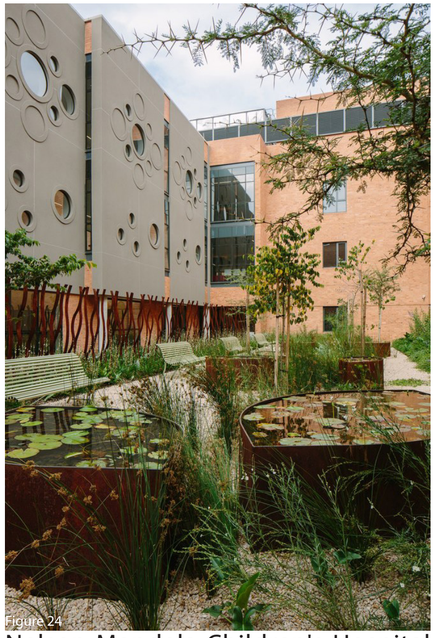


Figure 24

Nelson Mandela Children's Hospital

Designer: Sheppard Robson + John Cooper Architecture + GAPP + Ruben

This project is a successful precedent showed how the modern healthcare model fit for the special culture and cooperating with topo level difference. The design is a 200-bed, eight-theatre facility, with advanced diagnostics, and plans for expansion to 300 beds. It will operate in partnership with the University of the Witwatersrand Medical School as a primary base and will engage with all medical training facilities across the region.

At the same time, it contents many creative ideas for pediatric patients. Like taking off the feeling of institutional to reduce stress by using multiple color windows and shading device and shaping the design of the project to connect to nature which starting point to creating a welcoming, safe environment for both children and parents.

Figure 25

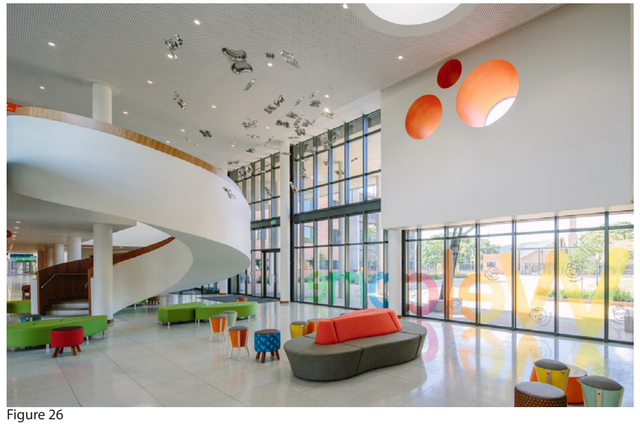


Figure 26

Figure 27

Figure 28

Figure 29

Figure 30

Figure 31

Figure 32

Figure 33

Eugene Gasana Jr. Foundation Paediatric Cancer Centre

Designer: Adjaye Associates

This project located on a four-hectare site in Kigali, Rwanda, the centre will include a 100-bed hospital, lodging for outpatients and residential housing for hospital staff. The design is inspired by the region's vernacular architecture, and by the local Imigongo art form, which often includes black, white and red geometric patterns.

It shows how to cooperate with local culture by choose local material and adopt local culture context into façade design. Also, this project shows that the necessary of adding shading and balcony space in building located near equator area.

1)Ceiling fans or indoor air motion can make it seems cooler by 5F or more, thus less air conditioning is needed.

2)Flat roofs work well in hot dry climates

3)Window overhands or operable sunshades can reduce air conditioning

4)Use light colored building materials and cool roofs to minimize conducted heat gain

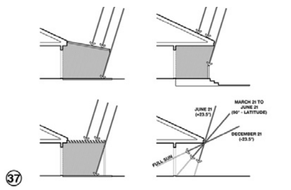
5)Use open plan interiors to promote natural cross ventilation, or use louvered doors, or instead use jump ducts if privacy is required.

6)To produce stack ventilation, even when wind speeds are low, maximize vertical height between air inlet and outlet.

7)Climate responsive buildings in hot windy dry climates used enclosed well-shaded courtyards, with a small fountain to provide wind-protected microclimates.

8)Long narrow building floorplan can help maximize cross ventilation in temperate and hot humid climate.

9)Viewing unthreatening natural stimuli reduces the stress response while accelerating psychological and physiological recovery.



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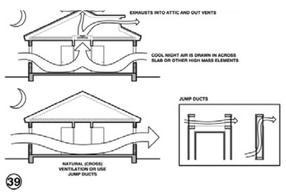

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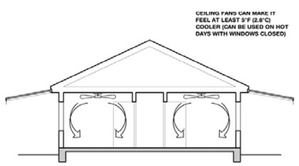

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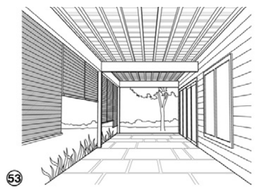

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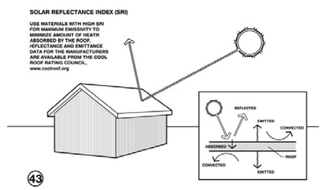

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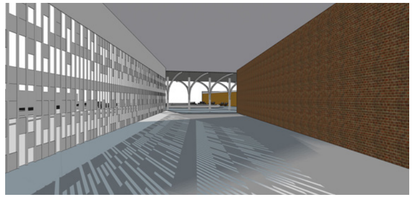
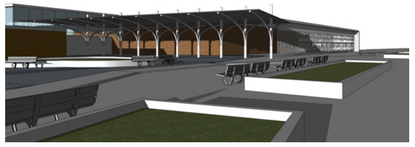
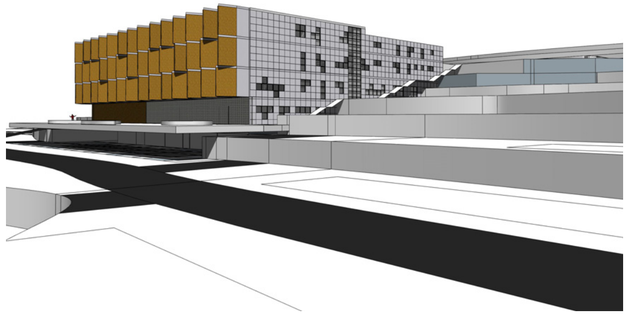
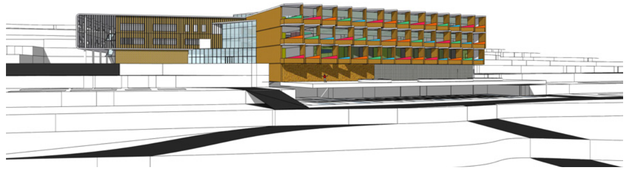
Figure 34

Concept



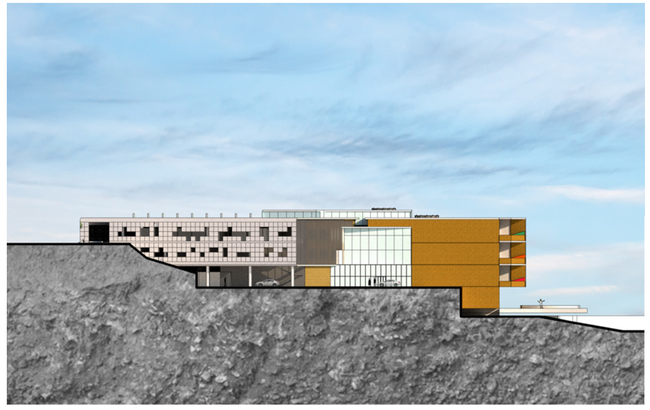


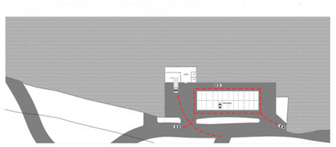


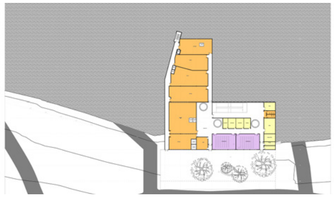


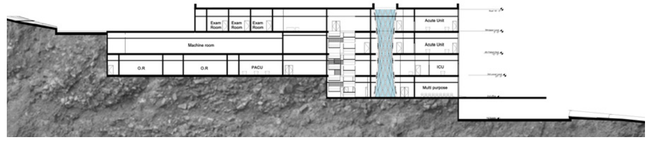
Parti 1:

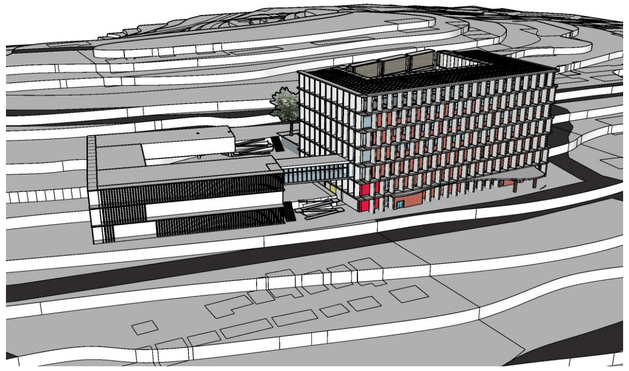
The first parti comes to my mind is create a community friendly children hospital which has reasonable circulation and becomes the solution to the people who are using this building as their home, their office and their shelter. During the concept design process, I put a lot of attention on how to bring a solution for American healthcare team. In this parti, I ignored the local climate and other limitation. I developed an over-scaled, American style hospital complex. It looks like a typical American hospital and works like one of them. Somehow, it should not be the solution for this site specifically. The site just cannot support an over 200,000 sqft hospital have continuous HVAC.





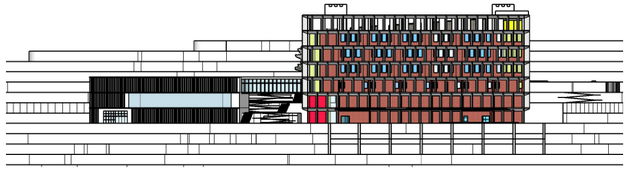


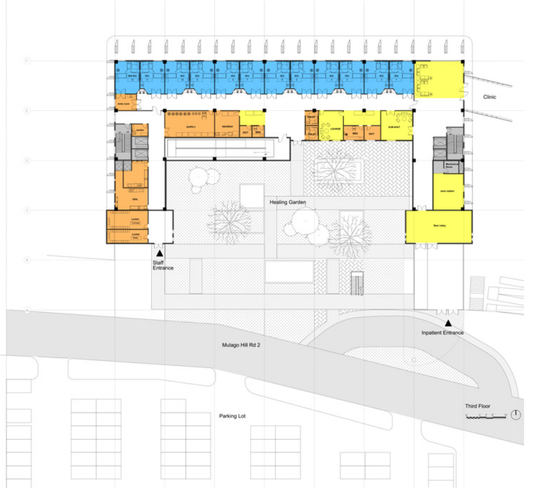




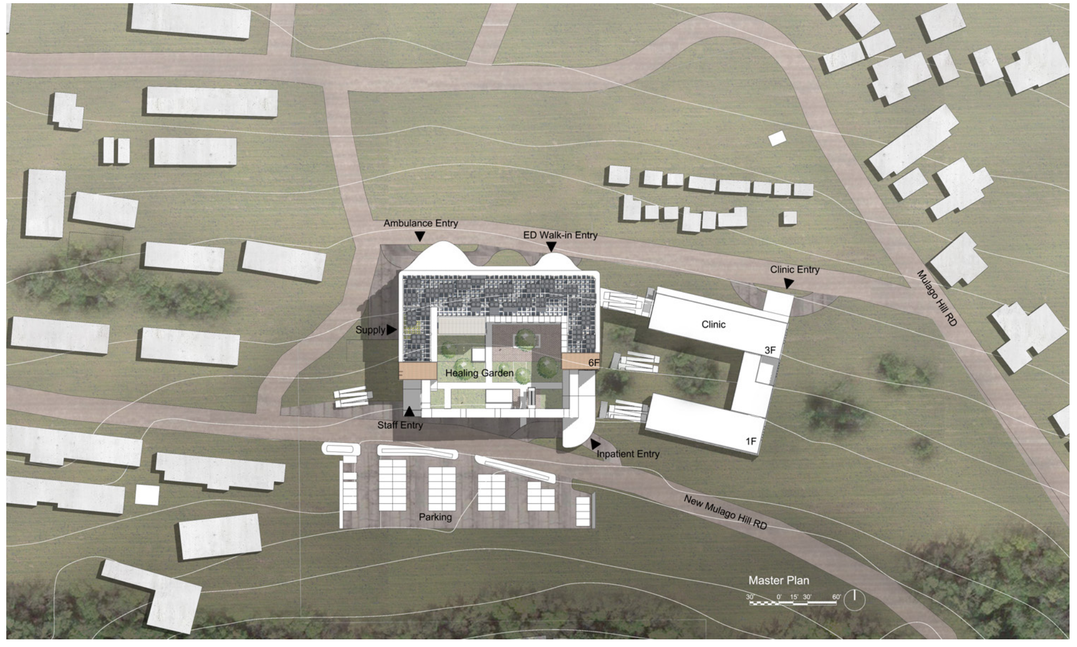
Parti 2:

with the experience of parti 1 which I got from the first semester, I simplified the hospital function, and create them as I mention in design process part. The outcome has both air ventilation and mechanical air condition system which allows the operator to choose. And I keep the advantage of terrain to create multiple entrances indifference level to separate circulation. I adopted the concept of the shading device and uniform them as one main design language to make the building can be recognized from every side.



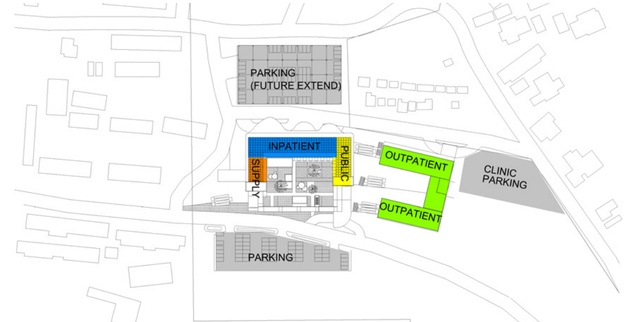


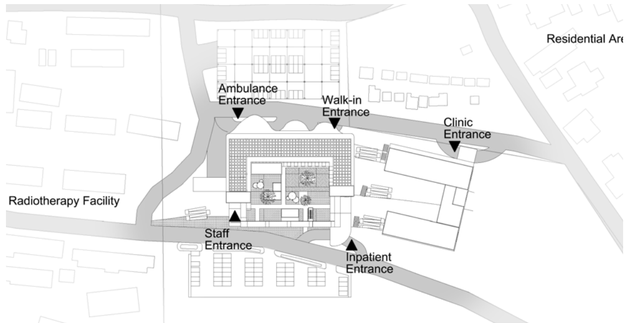
Master plan

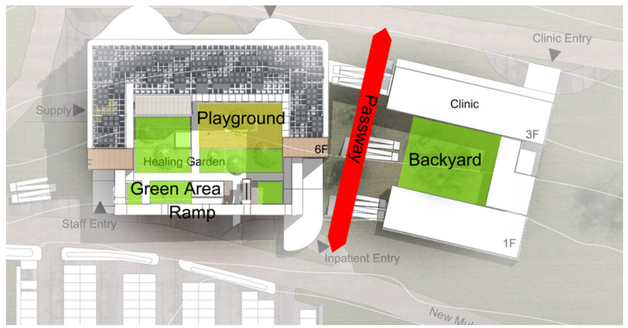


When I choose the building site, the first consideration is the flood issue in Kampala city. The more close to the top of the hill, the building will be safer from the flood. The other reason for the site choice is because of there is a radiotherapy facility near the west side of our site. The main residentials around the site are the east and north side, so the main entrance has been set face north. the south side becomes staff entry and inpatient visiting entry. There is a parking lot for them to park their transportation tools.

Master plan







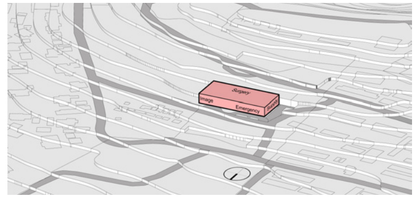
I use two “C” shapes block to get a long narrow building plan and two courtyards as outdoor space. The one at the east side where near the residential is the clinic building, it includes outpatient exam, infusion and laboratory function. The one on the west side which is near healthcare facility is the inpatient tower. It includes Emergency and Surgery department at below, the upper part is ICU, acute units, and office space.

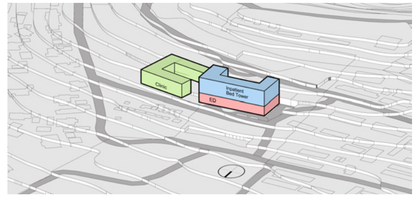
For the outpatient center, the lower level will be used as the main entrance and exam rooms, more exam rooms and office will be located above the lower level and the third floor will be infusion center connect with laboratory. The south part will mainly be office space and education space for doctors and nurses.

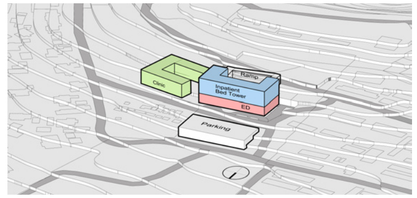
For inpatient tower, the open part of “C” shape face the mountain and I add a ramped corridor as a bumper to reduce traffic noise from the street and as an emergency vertical transportation for patients. Moreover, the ramp can be a play zoom for children to meet with others from other level and create the facade of the ramp structure. The enclosed space become a healing garden for patients, close to the building is a fountain square allow children to play with. Near the ramp structure, there are more landscape elements allow patient can see from corridor area. To give the best sight for patients, I Make acute units on the north side of the building where can see through the suburban residential area. The south side will only be a corridor. With the narrow plan, my building could have cross ventilation. The east and west winds could be the server space and office area for staff to use.

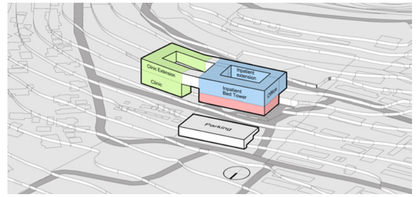
In the lower level of inpatient tower, the emergency, image and surgery department, because those departments will half have buried into the mountain, I try to use an open plan for department function and use the indoor ramp to create a vertical ventilation.

Building steps

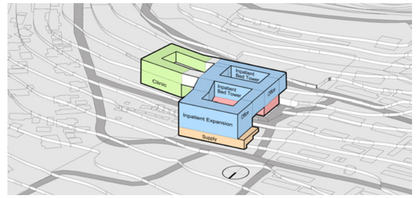




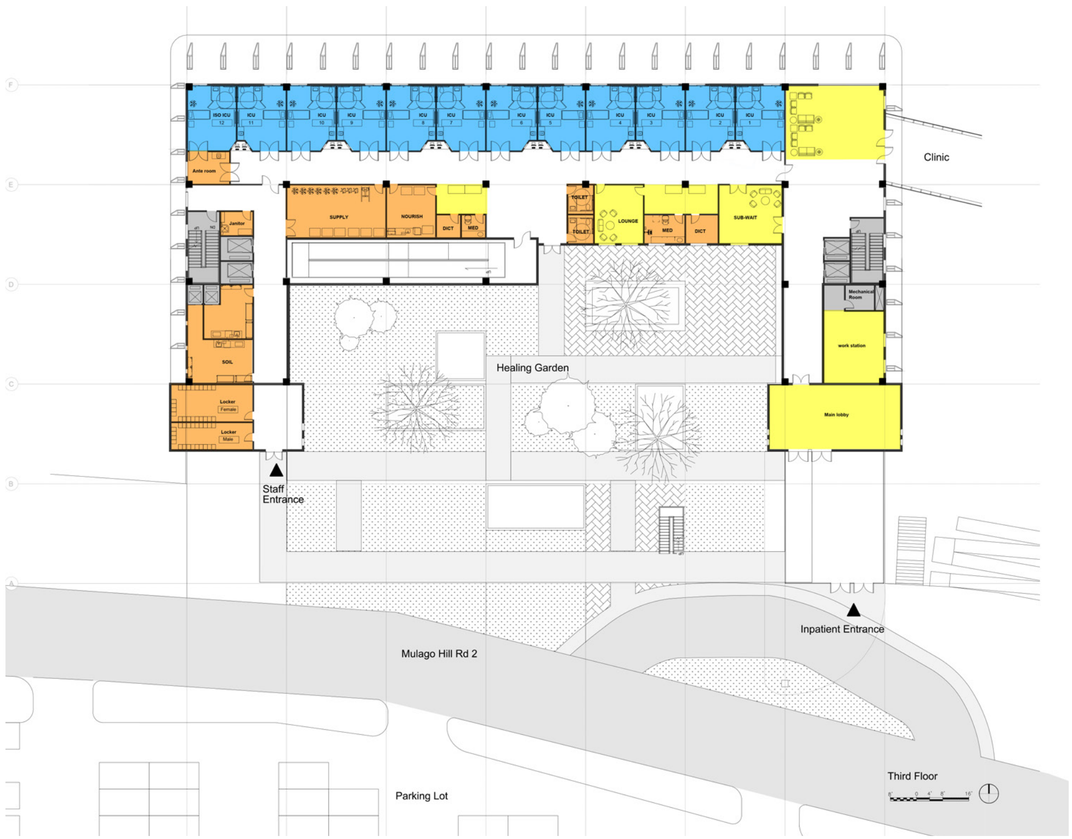




Based on the building process, the structure could be built step by step. At first, the base structure conld server as a emergency center, After future expantion is ready, it can expand to a full function pediatric hospital with inpatient bed tower and outpatient clinic. In the future, the buidling may expand to 3 main part, which allows it has more beds and clinic space to serve more patients.

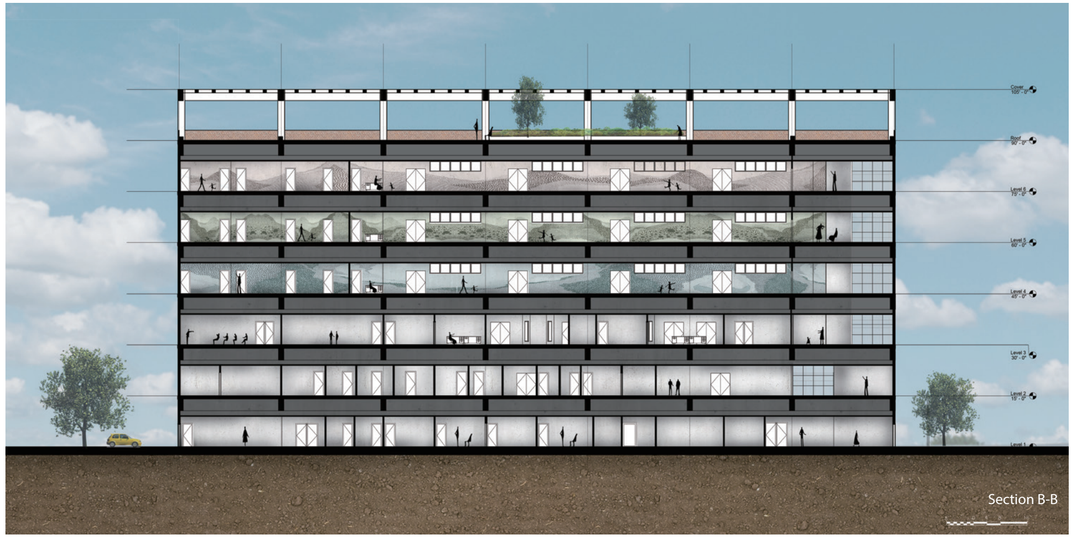


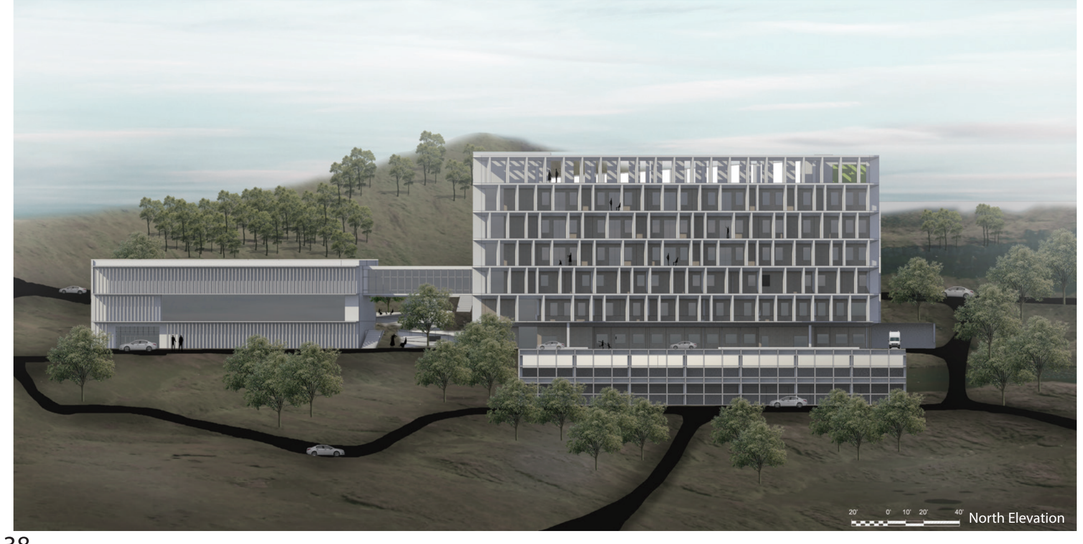
Plan Elevation Section


ISO ICU
ICU
Ante room
SUPPLY
NOURISH
DICT
MED
TOILET
TOILET
LOUNGE
MED
DICT
SUB-WAIT
Clinic
Janitor
SOIL
Mechanical Room
work station
Healing Garden
Locker
Female
Locker
Male
Main lobby
Staff Entrance
Inpatient Entrance
Mulago Hill Rd 2
Parking Lot
Third Floor


Conference room
Office
Office
Office
Prepare
Acute Unit
Acute Unit
Acute Unit
Acute Unit
Sub-prepare
Sub-prepare
Sub-prepare
Sub-prepare
TOILET
TOILET
Janitor
Nurish
Dict
MED
Clean
Soil
Mechanical Room
work station
Playroom
Playroom
4th-6th Floor

Elevation & Section





Perspective section

Through section, I am showing my concept about interior design. In patient bed level, I add some cloor and text to the corridor wall, to make the spcae be more easier to recongnize and remember. The are lots of mountain in East Africa. So, I use some abtract mountain shape sketch with light color to paint the interior walls.

For interior natural air ventilation, the elevation perspective view show the indoor ramp system as a ventical value which allows air from lower level to higher level and get out of the building. The software ArchPlus shows a typical example of this phenomeno.

By the same time, the section and elevation drawings show the level different and how the building cooperate withit. the lower level as emergency entrance and the high level as inpatient visitor entrance and a healing garden where will not be effected by the noise from the north side.

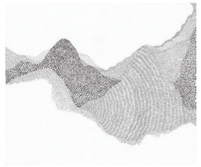


Figure 35

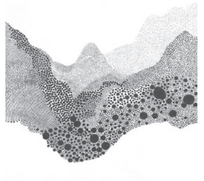
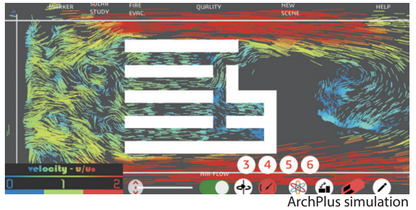


Figure 36

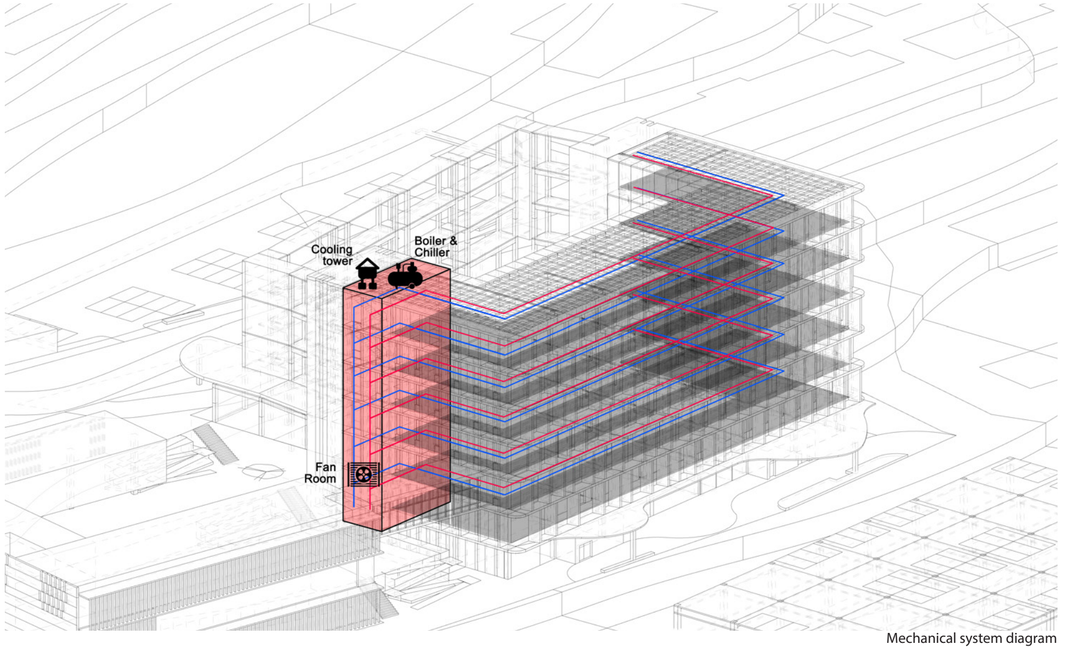
Figure 37



ArchPlus simulation

Sustainability

HVAC system



Mechanical system diagram

According to the Mechanical and Electrical Equipment for Buildings, the building I have design should have about 1000 sqft space for boiler and chiller and 2100 sqft space for the fan room.

I attached mechanical rooms to an egress transportation core. lower level has the space for the fan room. On the roof, there are chiller, boiler and cooling tower. Each level will have a mechanical room to refresh air for rooms on each floor.

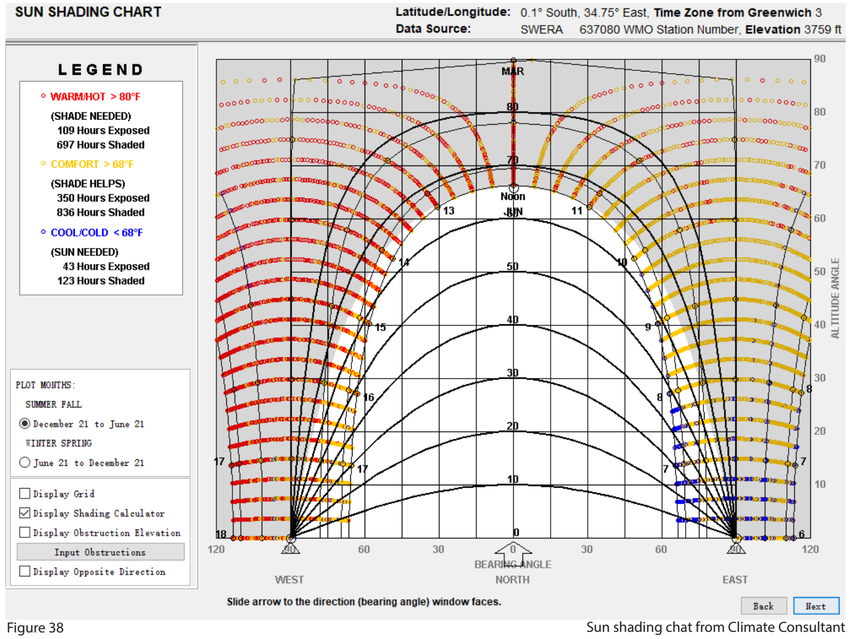
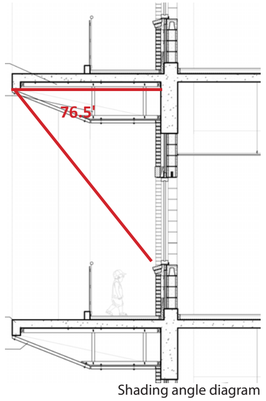


Figure 38 Sun shading chat from Climate Consultant

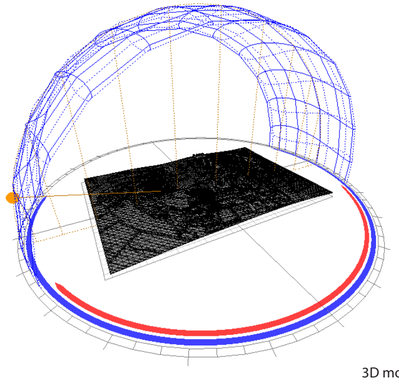
According to the Climate Consultant, the site will get sunlight from North and South. Half year for each side. For the angle of shading device will equal to 90' minus latitude of tropic(23.5'). The edge of the shade should be 76.5' angle with the lower edge of the window.



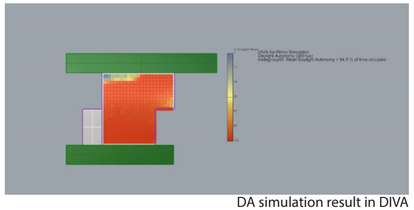
Shading angle diagram

Through the image of the 3D model with sun path. we can see that the building will get direct sunlight equally from north and south side. Because the building is located near the top of a mountain, there are no other building can provide shade in the building. And the building itself can provide a nice shading space in the courtyard area.

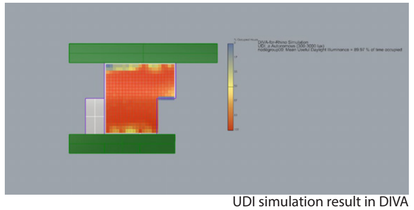
In DIVA for Rhino, I can simulate the indoor daylight quality. I made a simplified patient room model to see the patient room indoor quality. The daylight Autonomy is over 90%, which is required for a healthcare facility. And the UDI shows the light value is quiet even in the space, there is no glare issue for this room. Also, the daylight performance passes the LEED requirement and it gets 3 points.



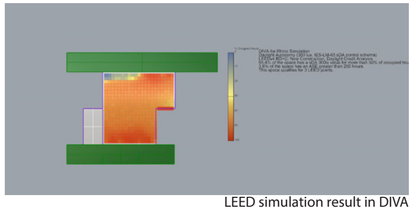
3D model with sun path



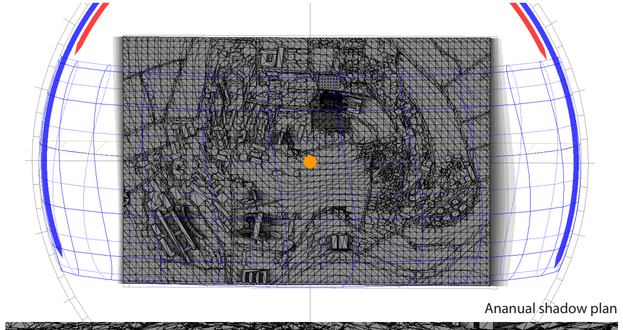
DA simulation result in DIVA



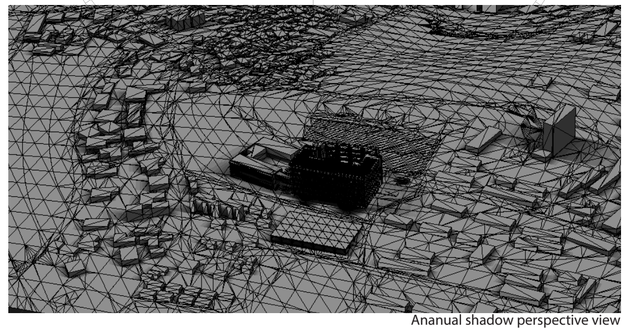
UDI simulation result in DIVA



LEED simulation result in DIVA



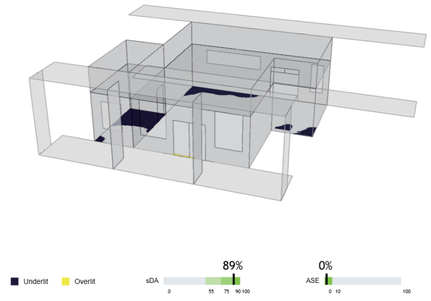
Ananual shadow plan



Ananual shadow perspective view

Model with heliodon

Figure 39 Heliodon



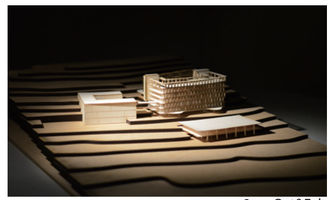
Sefaira simulation

By using heliodon, I can test my calculation for my shading device. Through this method, we can found out that the local daylight situation is totally different from what we normal experience at the Northern Hemisphere. In this case, because the building located near equator, the building will have half getting direct sunlight from the north and half year from the south, which required us to provide shading at both side. In my design, I put concret grid shading at north, east and west side to block direct sunlight get into occupants' room. At south side, I put a corridor to create a middle space between patient room and outdoor space to avoid direct sunlight.

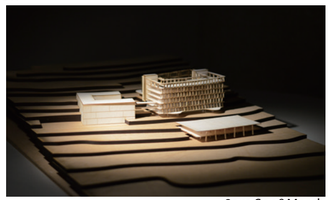
With simulation software Sefaira, I double checked the indoor light environment of the patient room. The result shows the similar outcome like DIVA, the room light quality is pretty high and no light lit.

9am Dec

9am Nov&Jan



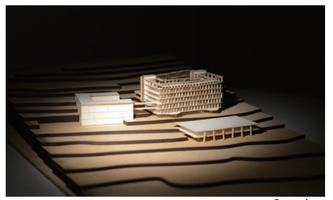
9am Oct&Feb



9am Sep&March

9am Aug&Apr

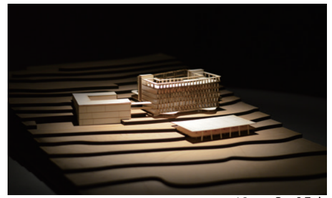
9am Jul&May



9am Jun

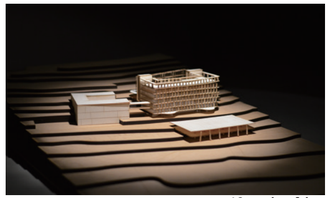
12pm Dec

12pm Nov&Jan

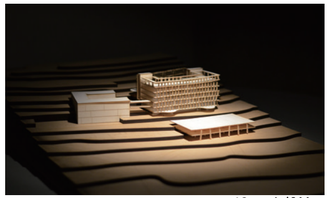


12pm Oct&Feb

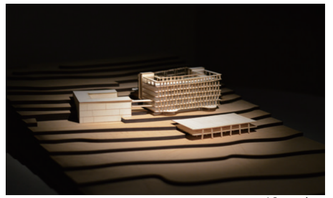
12pm Sep&March



12pm Aug&Apr

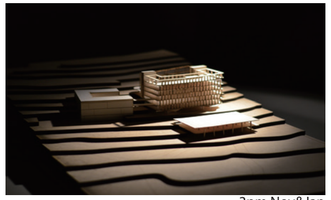


12pm Jul&May



12pm Jun

3pm Dec

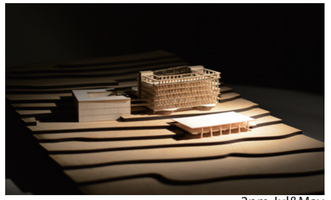


3pm Nov&Jan

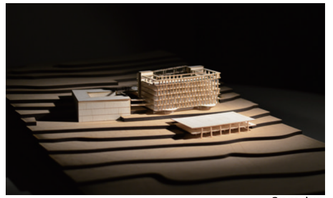
3pm Oct&Feb

3pm Sep&March

3pm Aug&Apr

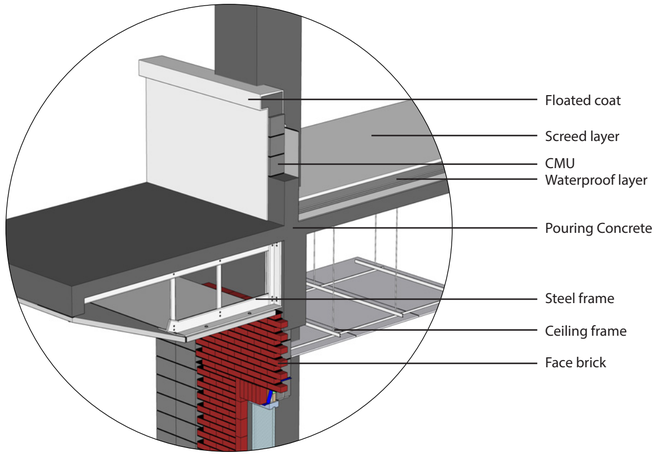


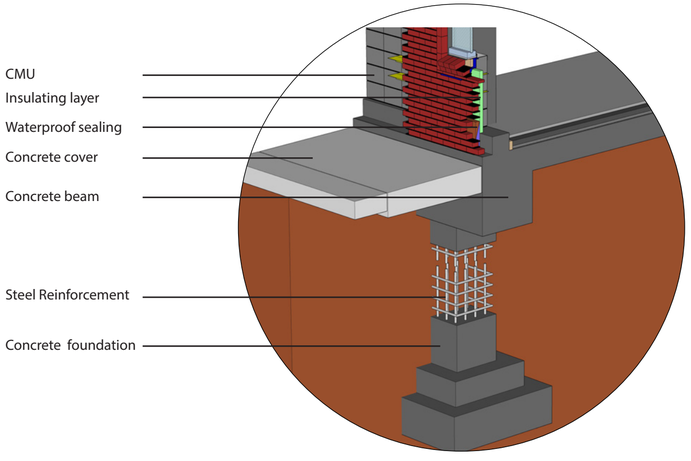
3pm Jul&May



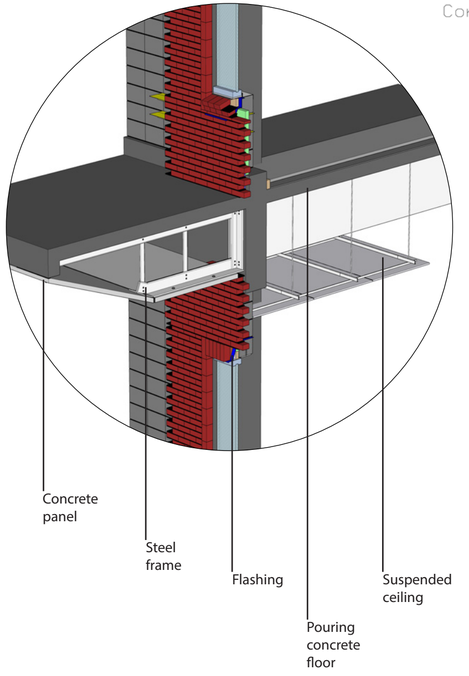
3pm Jun

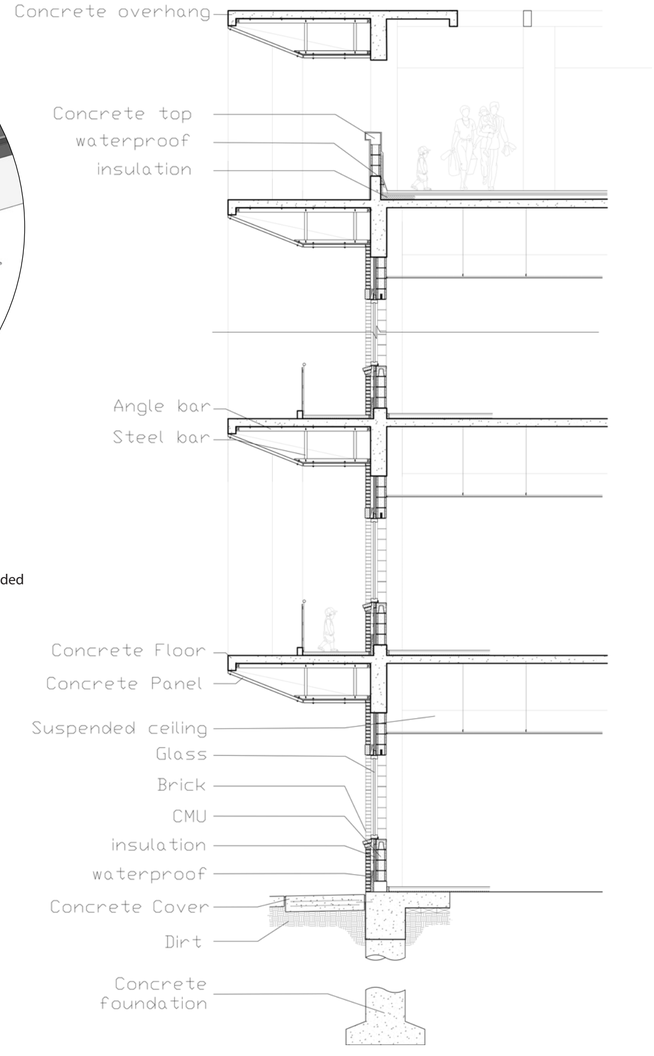
Wall section





Wall section





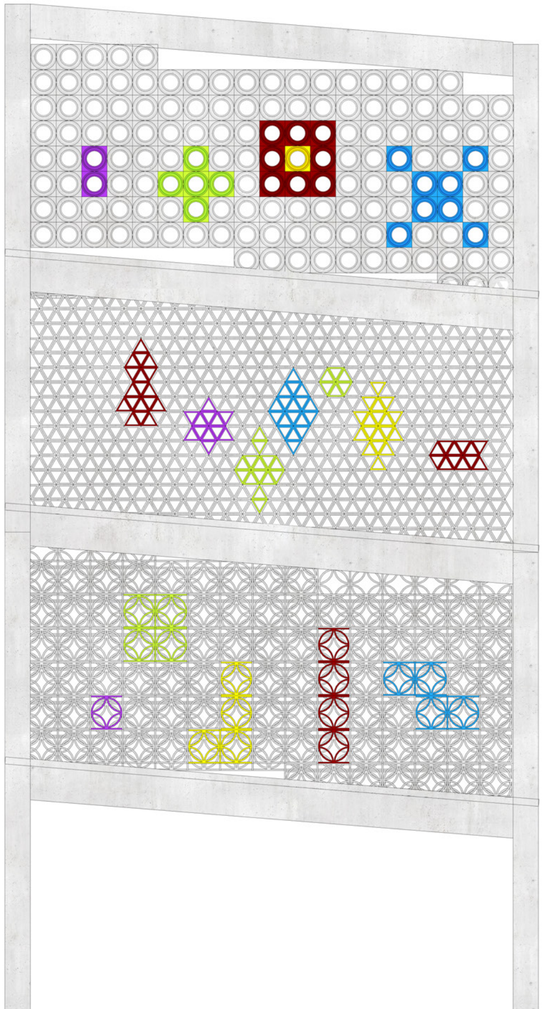
Corridor facade

The outdoor corridor is created to be a playground for pediatric patients who are under treatment. At the same time it could be a buffer for healing garden to block light and noise.

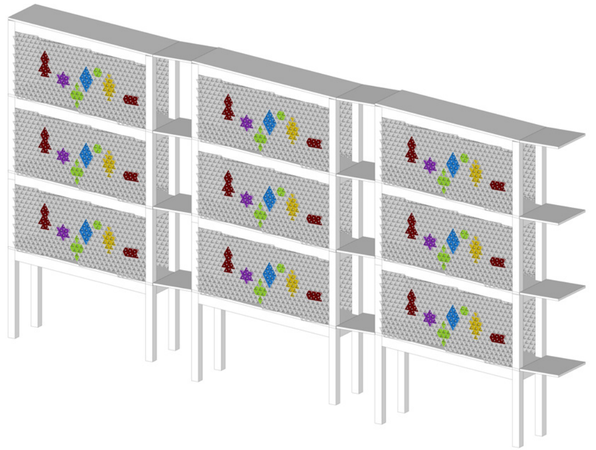
The pattern of the corridor is come from a map of Africa made by mutilple texture. It reminds me that how texture play a important role in African arts. Through the Google map, we can see lots of buildings in Kampala have hollow brick with different patern.

In this case, I choose trangles as the brick pattern, because it is more flexable and easy to make and replace. The patients may have chance to create the pattern with the color they like and put it on the corridor during the time they live in the hospital. I believe that will make them have more sense of belonging in this hosptial which will reduce their stress level and help them to recover.

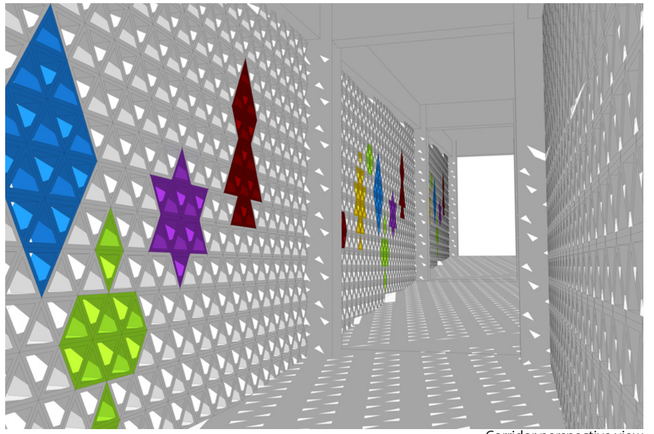
Figure 40



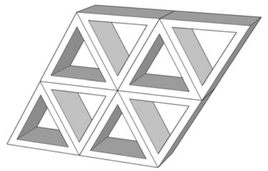
Corridor brick pattern



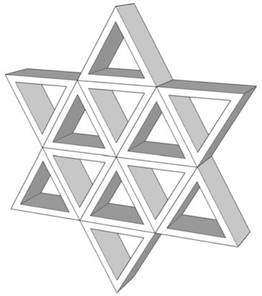
Corridor axonometric drawing



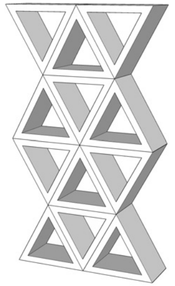
Corridor perspective view



potential pattern type 1



potential pattern type 2



potential pattern type 3

Conclusion

Reflective statement

Design a community friendly children hospital should not only focus on a reasonable circulation but also more focus on how to bring a solution to the people who are using this building as their home, their office or their shelter. During the design process, I put a lot of attention on how to give a solution for American healthcare team at the begin. Somehow, I ignore the local climate and other limitation to make sure the plan can work as well as precedents in America. At the end of first semester, an over-scaled, American style hospital complex come out. It looks like a typical American hospital and works like one of them. Somehow, it cannot be the solution for Uganda site specifically. I did add a large space for mechanical system to cooperate with local climate, but the limitation of power will not support an over 200,000 sqft hospital have continuous HVAC. This critical comment tells me there are no project can be done if it ignore the local context. Therefore, I must put more focus on air ventilation, and find a compromised solution for building circulation.

During the second semester, with the experience I got from the first semester, I simplified hospital function, and redevelop the building shape with the nature air ventilation thought. The final outcome has both air ventilation and mechanical air condition system which allows the operator to choose. And I keep the advantage of level difference to create multiple entrances in different level to separate circulation. I adopted a low-tech shading structure and uniform them to each elevation. with the continous building language, the building can be recognized from every side.

Though this complicate design process, I start to understand how important to communicate with the client and understand the needs of them. Architecture design is not an image of the designer, it should be an outcome of client's need, site's context, and designer's creative. As an architect student, we should never work behind closed doors, keep read, learn and communicate is the key to designing a good architecture. Moreover, from learning and using Evidence-Based Design process, I start to understand more about the research method in architecture design side. It should not have limited in program part. With the intention to improve hospital environment, I searched a lot evident to help me improve my design, in the end, the searching process helped me a lot to develop my design project. Evidence-Based Design itself should be a learning process. And that is what I have learned from this design process.

For the whole design process, I really learned lot. There are three things I have to summarize as the clusion of my final project precess.

1)**Focus on the main problem.** I started my project with a very wide conside ration, like the project could be the prototype of African hospital cooperate with American healthcare team. At the end, The real problem become the local climate. the other problems may influence the design process, but the main problem decide the project can success or not.

2)**Do the part which you can handle.** Full-functional hospital design needs lots of cooperation and knowledge to develop. A single person may not consider carefully for whole project. Focus on some critical departments could make the project come out more perfect.

3)**Do not ignore the local context.** The local context should be one of the most important elements we need to cooperate during the whole design process. It can help to begin, develop, and finish the project.

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Figures and Table

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P.11 Figure 12. Mulago Hospital is located in Kampala[Map]. https://upload.wikimedia.org/wikipedia/commons/8/8b/Location_map_Kampala.png

P.13 Figure 13. All weather diagram from Meteoblue website. https://www.meteoblue.com/en/weather/forecast/modelclimate/kampala_uganda_232422

P.14 Figure 14. Matatu (mini-van taxi) Station in Kampala city center[Photograph]. https://www.istockphoto.com/photo/matatu-station-in-kampala-city-center-uganda-gm887969266-246372930

P.14 Figure 15-17. Qianyexun.(2016). What kind of country is Uganda?[Photograph]. https://www.zhihu.com/question/20579220

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About the author

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Shi Shu's research interests are in healthcare and sustainable design in architecture and urban planning fields. He is currently researching on the benefits of daylight for indoor space about visual comfort and building occupant's health. In his design projects, he focuses on healthcare design method and daylighting and sustainable technologies application in healthcare facilities. He will graduate in May 2018 with a Master of Architecture.

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