WALINDI POINT

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Author/student: Axel Christian Borhaven
Examiner: Kerstin Barup
Tutor: Johnny Åstrand
Special gratitude: Armelle Breuil

CONTENT

BACKGROUND

This thesis has its origin in the proposal from a friend that I would help with the design and development of a small scale resort on an island in Lake Victoria, Uganda.
His family has developed deep ties with the country through their extensive work in the region, most notably through the family run non governmental organization Fontes Foundation working with the implementation of safe water systems and community development in the region. They are also involved in an IT company based in Oslo, but with a daughter company in Kampala. They want to create an escape from the crowds and pollution of the capital Kampala, and decided eventually on a plot called Walindi Point on Nsadzi Island in Lake Victoria, which they bought with the help of local facilitators in 2014. I agreed to provide the architectural services, on the premise that it would be part of my master´s thesis, and went shortly thereafter on an expedition to the Uganda and the site in question. Due to insecure fincancing the project was then put on hold until the end of 2016. The main body of the work with this thesis was done during and after a second trip to Uganda in January 2017.

PROJECT BRIEF

The project is to design a small scale lodge on Nsadzi Island in Lake Victoria. It should have the capacity to accommodate about 20 guests overnight, but the possibility for larger events if needed. Since it is crucial to the economical sustainability of the hotel to be able to accommodate a maximum of guests as early as possible, the development should be considered as a planned evolution from initially a mere camping site providing basic infrastructure like showers and sanitary functions, to a fully developed resort. Buildings providing sleeping quarters, social spaces and other facilities will be added in a pace determined by the availability of financial resources. The buildings themselves should also have the possibility to relatively easily be upgraded to a higher standard if it is necessary in order to attract guests. While meeting the specific technical requirements associated with building in the tropics, the hope is that the architectural solution will be unlike that of similar developments in Uganda. The vision is to create a locally run resort within the financial reach of middle class families, a place that will become a pioneering showcase of the value of the lake and help improve the local economy.

PROGRAM

- 10 bungalows of varying size
- Kitchen
- Storage
- Outdoor toilet and shower
- Office
- Bar
- Reception
- Lounge
- Dining / meeting room
- Living units for the staff (3-4)
- Outdoor dining area / bonfire place
- Swimming pool for children and adults
- Sun deck

THESIS STATEMENT

Since the present and future economical viability of the development is uncertain it will have to be ab extended process, where parts of the program will be added gradually over time. This limits my possibility to follow the construction process closely. Although the development must be considered as a whole regarding the architectural solution and it´s implementation on the site, it is not possible to with a large degree of certainty predict the future of the development. My research will elaborate on how to, within the specific context of the tropical climate zone, find an architecture that has the ability to undergo changes over time while keeping its architectural integrity.

Main research questions:

1. How can the notion of change over time inform the design approach?

3. Without the possibility to follow future construction and inevitable alterations ensure long-term technical, functional and architectural quality?

4. Will the resulting proposal have the potential for a wider application within the same climate zone?

METHODOLOGY

Main theoretical focus areas:

- Building in the tropical climate zone
- Material properties
- Adaptability in architecture
- Types of prefabrication

Practical research:

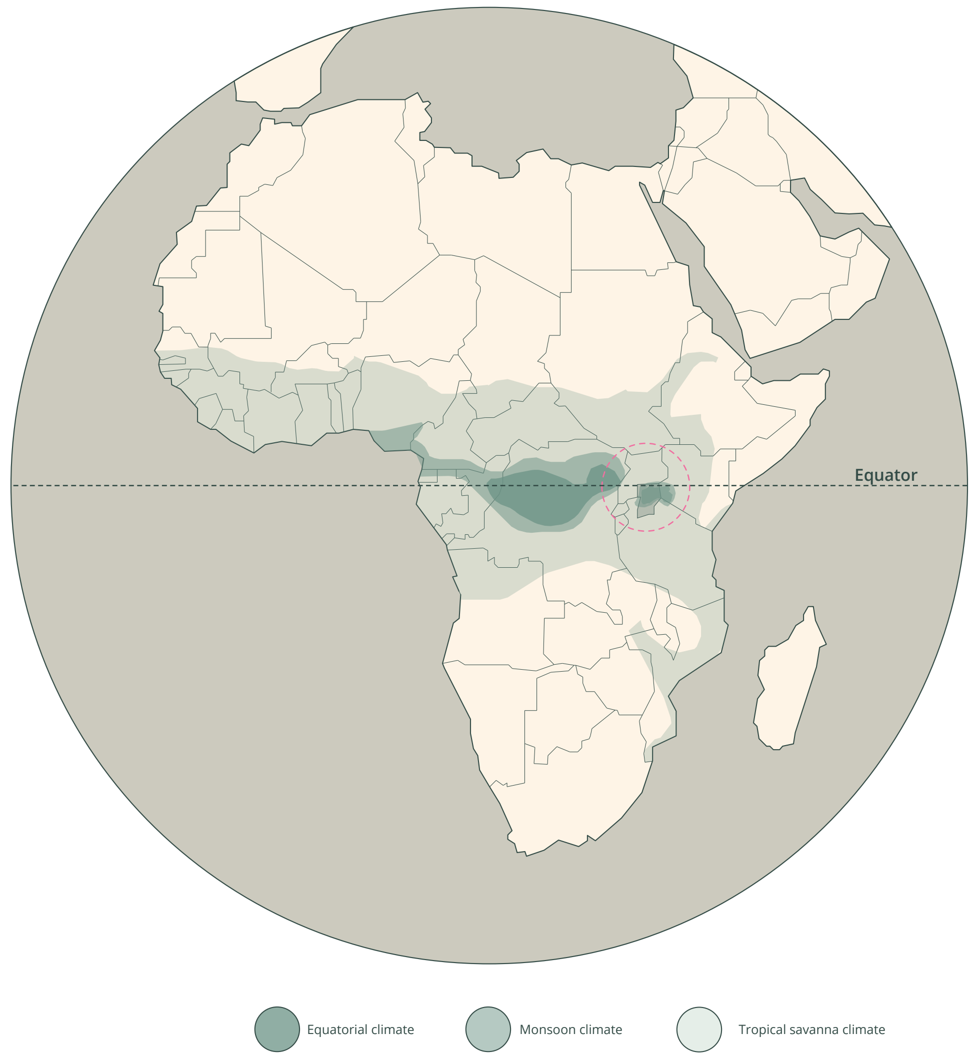
- Site surveys and other investigations in Uganda
- Feedback circle with the client and others involved
- Formal and technical investigations

THE EQUATORIAL CLIMATE ZONE

Uganda is situated in East Africa on the equator, where the equatorial line runs through the portion of lake Victoria that belongs to Uganda, and lies thus within the tropical climate zone. In comparison to other climatic zones, what characterises the tropical climate zone is that it has the least diurnal and annual temperature fluctuations. Therefore seasons are determined more by the amount of precipitation than variations in temperature.

The equatorial climate, also called tropical rainforest climate, in East-Africa is experienced within Lake Victoria and specifically on the islands within the lake. Typical equatorial climate is characterized by heavy rainfall of about 2000 mm evenly distributed throughout the year, high temperatures of about 27°C. on average, humidity of about 80% or more and double maxima of rain i.e. there are two rainfall peaks received during the year.

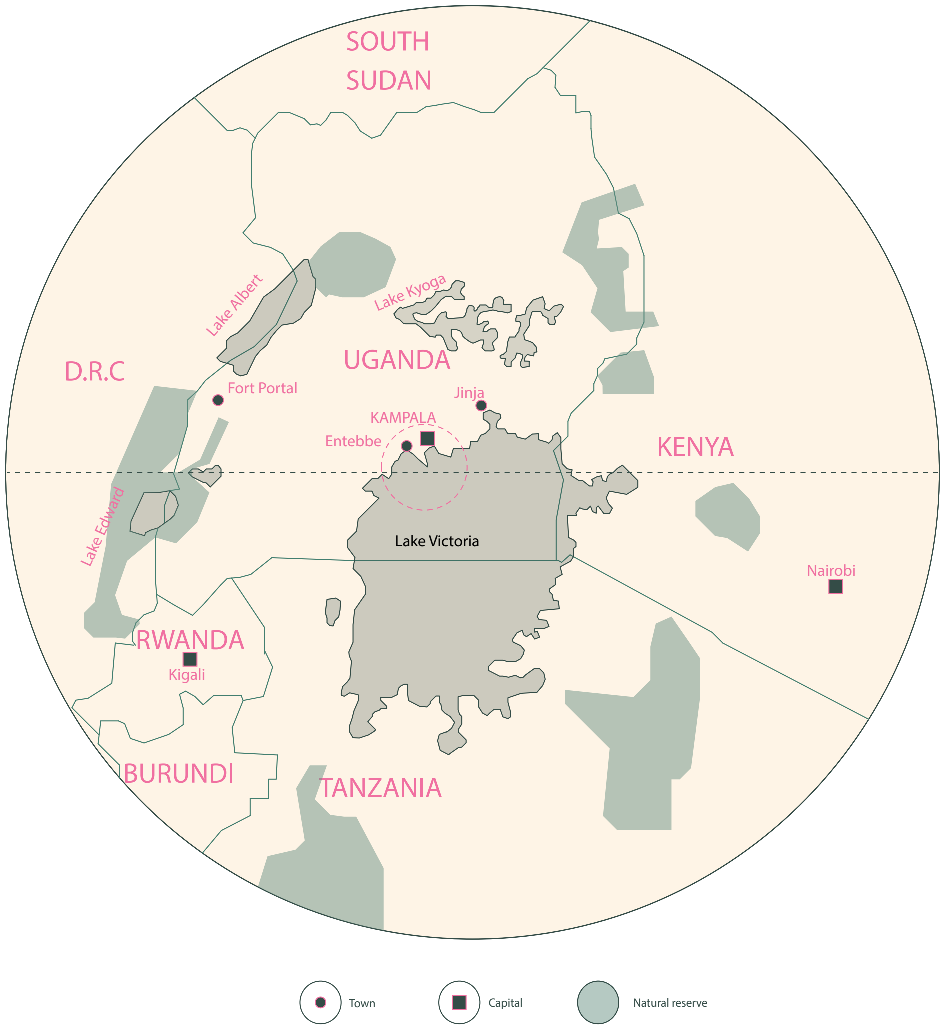
In East Africa however, because of factors such at altitude, the equatorial climate has tended to be modified, and is not typical that of the rest of the tropical regions. Therefore most of the areas fringing Lake Victoria are said to experience a modified equatorial climate rather than the typical equatorial /tropical rainforest climate. This is because the characteristics do not reflect typical equatorial type of climate e.g. heavy rainfall of about 1500 mm is experienced. Temperatures average 23°C. In addition humidity is less than 80%, and there is some distinct or short dry spell experienced in January or June.



UGANDA

Uganda is bordered to the east by Kenya, to the north by South Sudan, to the west by the Democratic Republic of the Congo, to the south-west by Rwanda and to the south by Tanzania. The southern part of the country includes a substantial portion of Lake Victoria, shared with Kenya and Tanzania. Uganda is part of the African Great Lakes region, a system of lakes in the east African rift valley. Lake Edward, lake Albert, lake Kyoga and lake Victoria lies within or on the border of uganda.

Uganda also has a rapidly developing economy and rich tourism traditions dating back to the early 20th century. Tourism has been propelled forward by foreigners during the last decade. A good example of the rapid growth is the Queen Elisabeth National Park which hosts a savannah habitat. Whereas in 2005 there only existed one high-end lodge and one poorly run hostel in the national park, there are now around 20 offerings in the area in all price ranges. Most notably, however, domestic tourism has started to pick up as a result of a growing middle class. As the urban areas where the middle class resides gets more and more crowded, the desire to get out away from the dusty traffic jams in town is increasing.

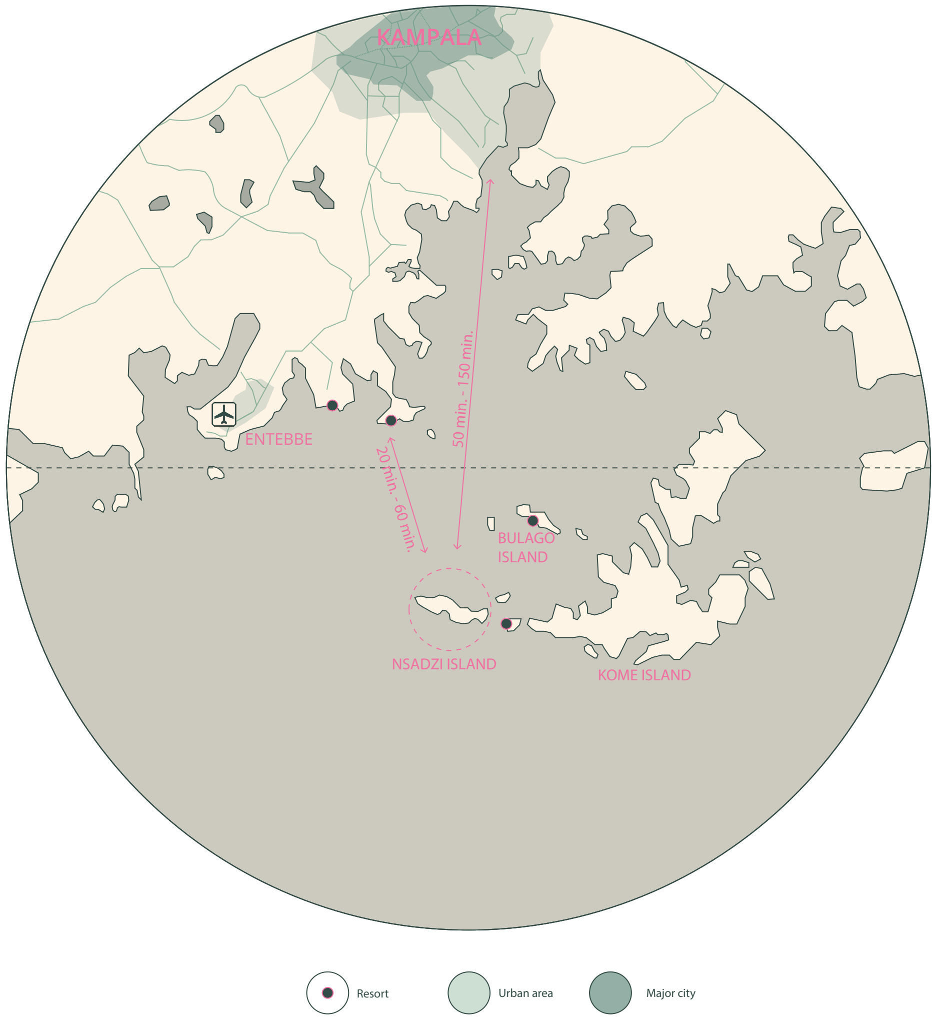


LAKE VICTORIA

With a surface area of 68,800 sq km, Lake Victoria is Africa's largest lake. In addition, it's the largest tropical lake in the world, and the planet's second largest freshwater lake. Nsadzi island, where the site is located in the North-Western part of lake Victoria, only 10 kilometers south of the equatorial line. It is part of a group of islands, the largest of which is Kome Island to the east. It has a strategic location regarding the potential for attracting tourism, as it is close to both the capital Kampala and Entebbe international airport. Depending on the boat it will take between twenty minutes and one hour to go from Entebbe to the island, and between fifty minutes and an hour and a half from Kampala.

Until now, Lake Victoria has primarily been considered a resource for fishing with a few niche resorts on the lake. The lake as an economic driver for domestic tourism is in Uganda still a somewhat novel idea. The current situation is very similar to what was found in the national parks ten years ago: A few high-end resorts that are out of reach for nearly all domestic tourists, and some poorly run low-budget offerings unable to get the attention of domestic tourists.

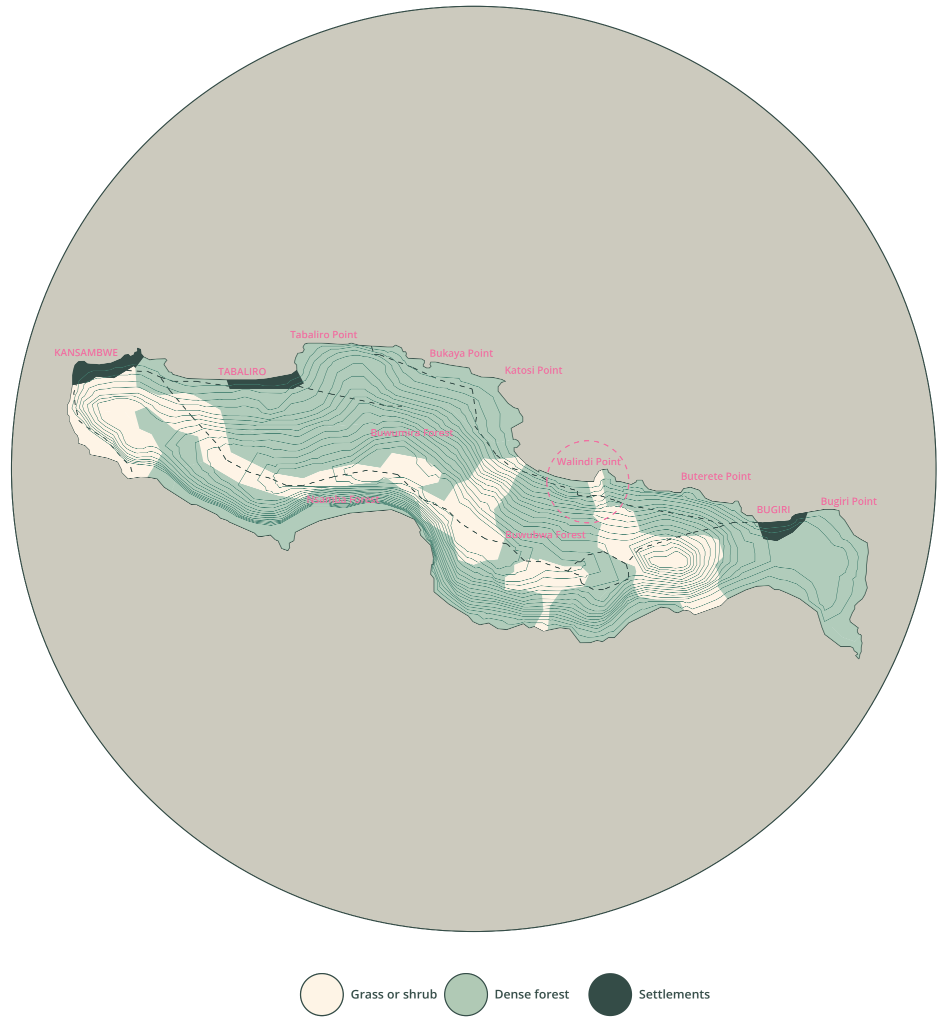
The owners of Walindi Point believe the same transformation will be seen in terms of tourism on the lake as was witnessed the last ten years in national parks. There is a chance both land owners and Ugandans soon will start to value the lake as an economic resource in terms of leisure and tourism, and the owners of Walindi Point believe the primary driver for this will be the upper end of the middle class. Hopefully this will help boost the confidence of the local fishing communities that struggle with depleting fishing reserves and the resulting widespread unemployment.



NSADZI ISLAND

Nsadzi island stretches out 6.3 km on the east-west axis and is 1.3 km across on the widest. The island is partially covered by forest of varying density, and partially covered with grass fields. It´s central ridge is 72 meters at the highest point, and functions as the primary communication artery on land, even if it´s not much more than a trail.

According to a 2001 census, the population was 3167, but this was also including some other islands. The western third of the island is government land, while the central and eastern thirds are privately owned. The eastern third is to be maintained as a conservation area with the possibility of some small scale environmentally sensitive tourist activities. This is also where the site is located.



There are three fishing villages on the northern shore of the island: Kansambwe and Katosi Landing in the west, and Bugiri Landing in the east. As is typical of fishing villages, their makeup is relatively fluid, and a large proportion of the inhabitants are neither native to the area nor permanent residents. Fishing is the main economic activity, but there are some cultivation or livestock keeping. There are few permanent buildings, and few or no services and amenities, and the families of many of the inhabitants live on the mainland. Kansambwe is the largest village on the island, is very dense. It almost exclusively has wooden houses with thatched roofs. The villages have generally very poor to non existing sanitary amenities. Fontes Foundation, the Norwegian NGO founded by the owners of Walindi Point hopes to instigate a safe water project on the island in the future, in order to improve the living conditions for, and strengthen the relationship with, the community.

Tabaliro Landing

Katosi Landing

Kansambwe

The north of the island is mostly covered by dense vegetation. The landscape on the south side of the island is sloping dramatically towards the lake, and has a spectacular scenery. The wind is however blowing more or less constantly from the south, which is why all the settlements are on the more protected northern side of the island. For the same reason the owners of Walindi point chose the plot on the northern side.

The island is fringed by a belt of low canopied forest with a moderate understorey and a dense low ground layer, which is also common on the north-western shores of Lake Victoria. In the centre of the island where soils are thinner there are patches of open grassland with a dense herb layer. There is substantial cultivation around Bugiri and cattle grazing in grassland areas, but otherwise disturbance of the nature is low.

Towards the south side

The central ridge

Aerial photo of the eastern half

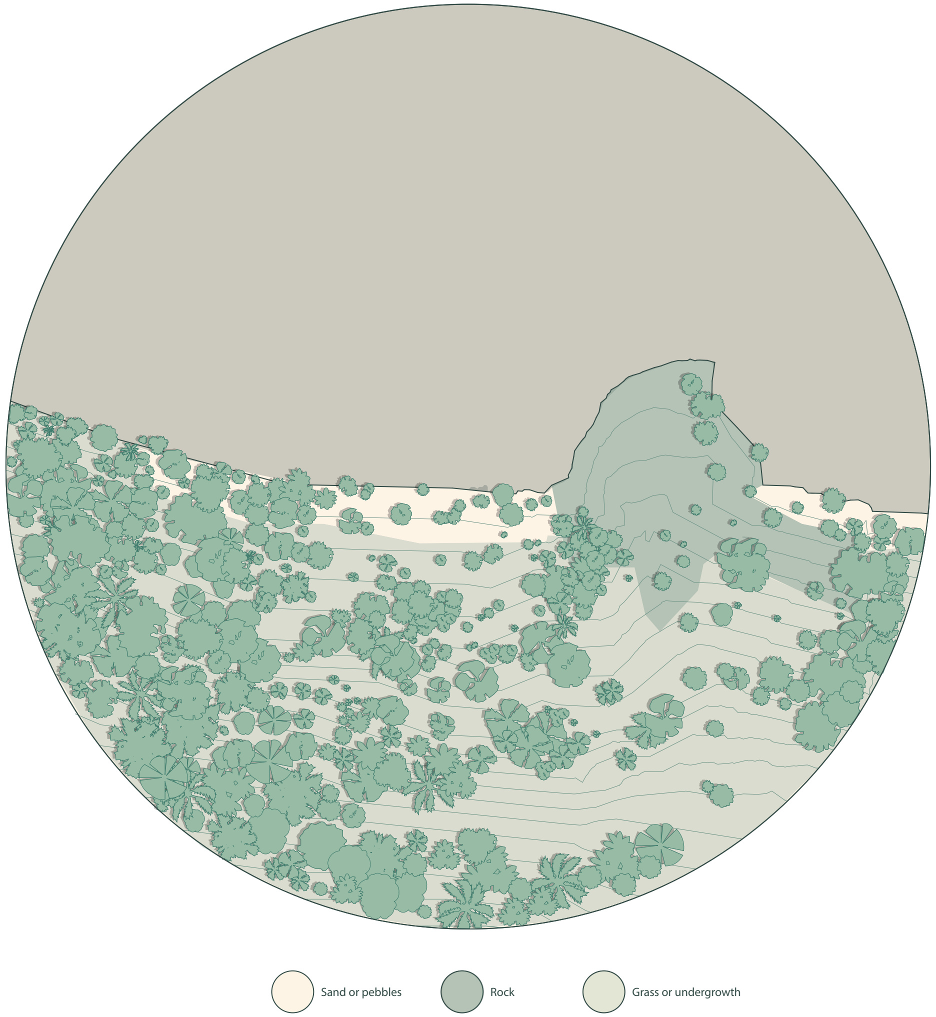
WALINDI POINT

The site is located on the north side of the island and consists of the peninsula called Walindi Point, and a stretch of beach and forest towards the west. The plot extends about 200 meters inland where it is gradually sloping upwards towards the central ridge. The north side of the island enjoys much better protection from the elements than the south, where there is more or less constant wind, which was the main reason for the choice of the plot.

On our first visit in the end of 2014 the lake was quite overgrown, to the extent that the beach could only be reached from the lake, but the plot has been partially cleared from undergrowth since then. All trees were initially meant to be kept, but some has been cut for firewood without the owners knowledge. The site appears however to be well suited for the intended development, and no extensive landscaping should be necessary, or even desireable.

The eastern shore of the peninsula is ragged and overgrown. It has small protective bays and the rock goes quite steep into the water, which could make it a good natural harbor.

There is a sand beach along the shore to the west of the peninsula, although the shore was quite overgrown on the first visit. The western third of the peninsula is bare with some grass cover, the rest is covered with shrub and some trees. Behind the beach, the land is fairly flat, before rising behind the clearings. The clear parts of the peninsula continue in a gradual grassy slope spotted with some trees all the way to the central ridge on the island.



1. Approaching uncharted territory.

2. The welcome commitee, a 2.5 m Nile crocodile, was waiting on the beach.

3. But the job had to be done, so we bravely disembarked.

4. The jungle behind the beach was very dense and would need significant clearing.

5. But we were well equipped with machetes.

6. We set up camp a bit further up on the grassy slope.

7. Unrefutable evidence of livestock keeping came to greet us.

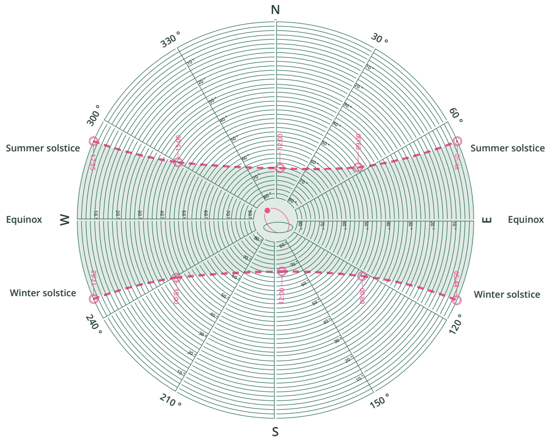
8. A nice natural harbour was found on the tip of the peninsula

9. We took water samples, because clean water is essential.

10. We tried a local moonshine, equally essential.

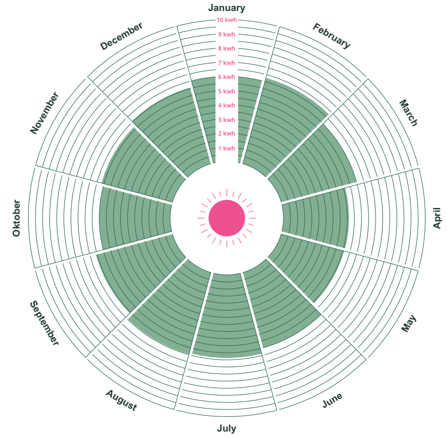
11. A bonfire keept the crocodile away all night.

12. The successful scientific expedition left the next morning, but was followed by several later expeditions.



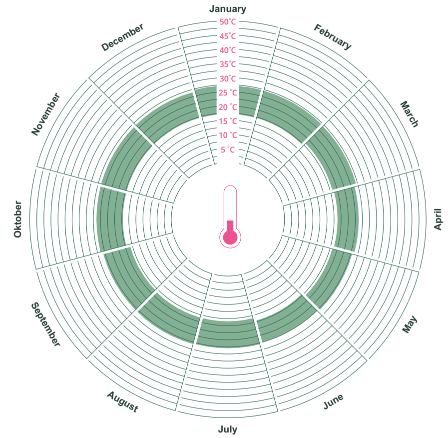
SUN PATH

Being situated the just south of the equatorial line the sun is most of the day close to zenith.



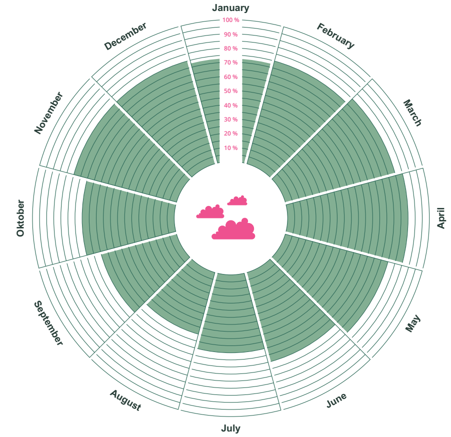
SOLAR ENERGY / M2

The amount of energy received monthly per square metre varies between 4 and 6 kWh, making solar panels an effective source of energy.



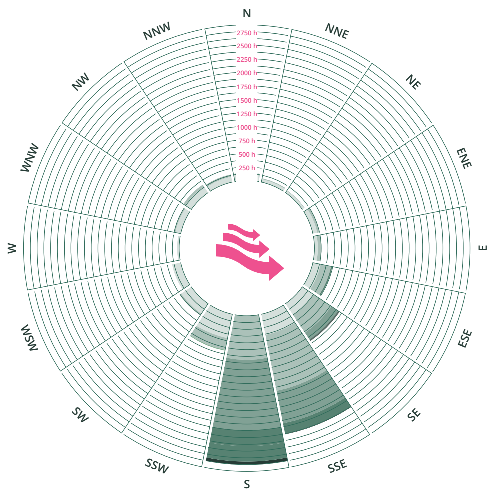
TEMPERATURE

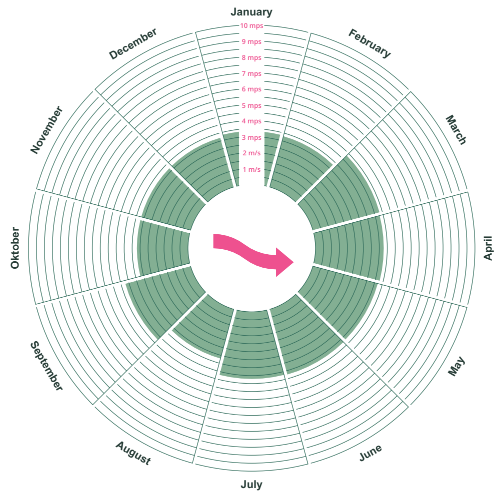
Given the high altitide of Lake Victoria, the tropical climate is moderated so the temperature is comfortable all year long, with small diurnal fluctuations.

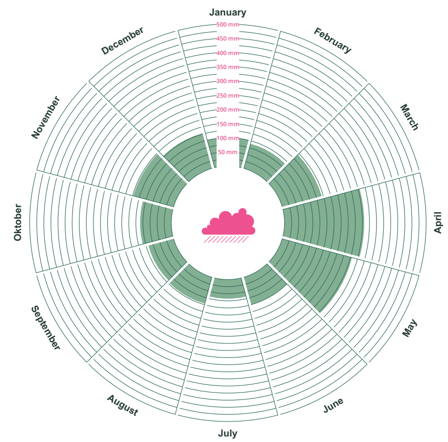


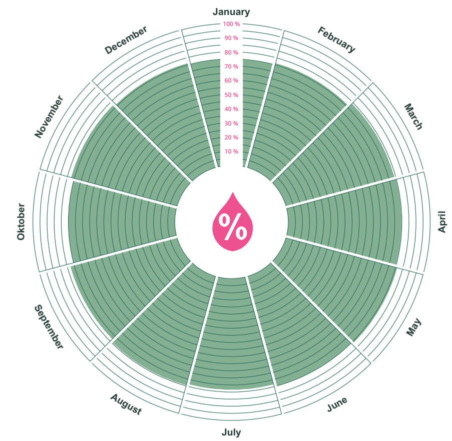
CLOUD COVERAGE

The cloud coverage is between 50 to 80%, with a tendency to more cloudiness at night.









WIND

The prevailing wind direction is from south to south south east. The wind is generally low to moderate, but stronger squalls can be experienced during thunderstorms. These can come from all directions.

PRECIPITATION

The area experiences heavier rainfall in the period March to April and October to December, but rainfalls are frequent throughout the year.

HUMIDITY

The air humidity lies stable aroing 75-80% most of the year, which means the perceived temperature will be abopput 1 degree Celsius above measured temperature.

LOCAL BUILDING TECHNIQUES

Ugandan architecture can be classified as either traditonal or foreign. The tropical climate that supports outdoor activity all year long has traditionally prevented the development of elaborate architecture, as the houses were used mainly for storage and protection from wild animals at night. Most rural Ugandan housing consists of simple round wattle-and-daub grass-thatched huts. This typology is often used as a model for tourist accomodation. A modern variation of this typology is the square hut with mud or brick walls and iron sheet roofs, a common sight in both urban and rural areas.

Foreign (so-called modern) architecture is predominant in urban areas. This architecture features European, middle Eastern and American designs and were first brought to Uganda during the colonial period (Uganda was a British protectorate, not a colony). Western influenced architecture has connotations of higher status, and is the norm for civic, adminstrative and cultural buildings, as these buildings types does not have a traditional precedent.

In Uganda the concept of a ”good house” is therefore one made out of masonry, brick or concrete, which might be more linked to perceived status rather than being especially well suited for the tropical climate. As a result buildings are often poorly lit and ventilated. This provides ideal conditions for insects and vector borne diceases, which is a serious public health problem in Uganda. There are some recent examples of brick buildings that use concepts of natural ventilation, and are therefore well suited to the climate, but they are far between. Most brick or concrete buildings in Uganda however are either dependent on mechanical ventilation, or as is the case in most rural buildings.

Wattle-and-daub hut with grass-thatched roof

Wattle-and-daube shed with sheet iron roof

Brick or concrete masonry building with sheet iron roof

BUILDING IN THE TROPICS

A building should first and foremost be a comfortable place to be in. In the warm-humid climate it does not work to shut out the environment in the attempt to achieve a comfortable indoor climate, like in temperate regions. To be reliant on mechanical means of temperature control is unreliable and energy consuming. The latter makes it unsuitable for the development in question, both since the island is not connected to the electricity network and because the aim of the development is to be of a low ecological impact. Therefore the buildings need to work with the climate.

Thermal mass:

The choice of constructon material is an important factor. In places where the climate alternates between dry and wet seasons buildings with high thermal capacity, like brick or masonry, tend to be comfortable in the dry season where the thermal mass can help moderate indoor temperature. In the rainy season however the humidity leads to unpleasant indoor conditions. Condensation can lead to mold growth, which is both harmful to humans and can lead to building damages . In the Lake Victoria region where the air humidity and temperature have only slight annual and diurnal fluctutations the use of thermal mass to moderate indoor climate have little potential. Instead a heavy construction would cancel out the diurnal fluctuations of temperature, while the drop in temperature at night is beneficial for sleep comfort. A construction of low thermal capacity is therefore more appropriate.

Ventilation:

A building relying only on natural means of achieving comfort needs to be carefully planned. The builiding geometry, layout and orientation needs to take into consideration local wind conditions. It should be placed and oriented towards the prevailing wind direction. In order to achieve cross ventilation each room should have two external walls with openings. The principle of stack ventilation can be used by having a low inlet and high outlet. Breezes can be pulled in by using external wing walls or shutter systems. Vegetation can be used to filter or lead the breezes in the desired direction. Buildings should furthermore be spaced out, in order to allow the breezes to pass through.

Shading:

Without the possibility to cool down the building, the important question is to avoid heating the building to a higher temperature than the outside. The most important factor is to keep direct sunlight off the building walls, and reduce incident solar radiation through the roof. A building should ideally be stretched out with the longest sides on the East-West axis, since this will let in less of the low angle morning and afternoon sun. Roofs should have large overhangs in order to shade the walls and windows during the hottest part of the day, where the sun will be close to zenith in the north or the south. Placing the building adjacent to shading trees, or planting new vegetation, is also a way to improve the comfort in and around the building.

MATERIAL AVAILABILITY ON SITE

The plot and the surrounding landscape is partially covered with dense forests, so there is a theoretical possibility to extract timber for construction. However the availability of suitable species for structural elements are limited, and drying the timber to correct moisture content has been deemed to unreliable and labor intensive to be a viable option since a kiln would need to be built for the purpose. The establishment of such infrastructure on the site prior to the construction was deemed impractical and uneconomical. We also considered the existing vegetation as a quality that should be kept, since we also want to limit the physical impact of the development on the site. For constructions needing a lesser degree of accuracy, for example fences or wooden pathways, the timber can be sourced on site or elsewhere on the island.

The peninsula on the northern part of the plot consists of a soft rock, whose properties makes it ideal for a swimming pool dug directly into the rock. This goes somewhat against the idea of limiting irreversible changes of the landscape, but a swimming pool is considered an imperative facility, given that the lake is infested with bilharzia parasites and crocodiles.

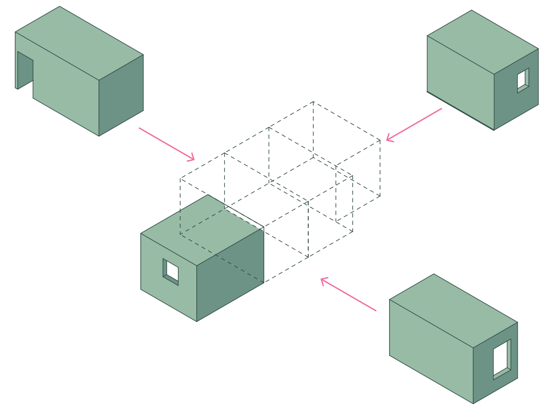
The excavated rock can however be re-used to make gabions for retaining walls. Aggregate for concrete can be assembled on the island, or on neighbouring islands. This can be used for foundations, or combined with the aforementioned rock be used for retaining walls and the construction of the swimming pool. Although there is evidence of production of bricks on the western part of the island, we did not find adequate clay soil on the site.

LOGISTICAL CONSIDERATIONS

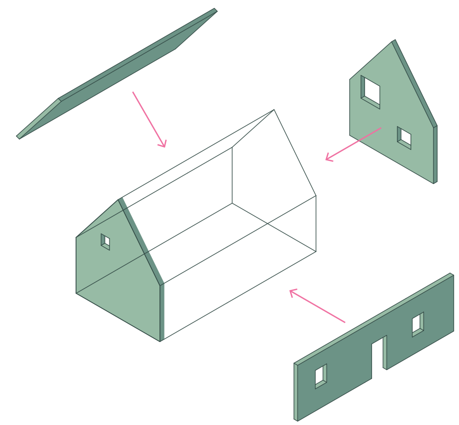
The limited availability of construction materials on the island means also that most materials will have to be transported to the site from the mainland by boat. It was decided we would instead source the primary construction materials on the mainland, and develop a solution addressing the logistical aspects of transportation and on-site assembly. This in turn limits the range of viable types of construction.

The relatively remote location of the site makes it difficult to supervise the construction process, and also sustain a skilled workforce over time before the necessary infrastructure is in place. The workers will need to be transported to and from the construction site with a fairly short rotation until critical amenities like water supply, sanitary functions etc have been established. Therefore it was deemed essential to limit the time needed for the more complicated parts of the construction. To rely on a high ratio of prefabricated elements will help mitigate this.

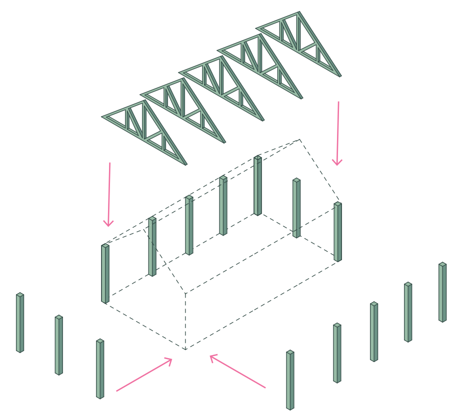
There are three main types of prefabrication: Pre-cut, panelized and modular, each representing an increased level of prefabrication. Since the site is only reachable by boat, and that there will not be any lifting equipment available on the island, a modular approach was considered unfeasable. Instead the decision was made to use a combination of pre-cut and panelized prefabrication.



Modular



Panelized



Pre-cut

CHOICE OF CONSTRUCTION MATERIALS

The necessity to transport the construction materials to the site by boat, along with the findings regarding how to best achieve building comfort pointed towards a lightweight construction. Since steel was considered inappropriate for economical and environmental reasons we chose to find a solution based on a timber frame construction.

Timber as a building material has a perceived lower status in Uganda, and is mostly used for sheds and temporary housing like the the fishing villages on Nsadzi island. Being generally poorly constructed and posing a fire hazard due to the use of open fire for cooking they pose a significant risk for the occupants, and their occupants will generally prefer a brick construction when they have the choice. We took this however as a challenge, in the hope that the development on the island instead can help raise the status of timber as a construction material in Uganda.

Most lumberyards in Kampala have a assorted selection of softwoods and hardwoods, most notably pine, eucalyptus muvule and mahogany. The two latter are considered endangered, and the timber comes often via illegal channels from the D.R.C. Eucalyptus is a very fast growing hardwood, that is extensively used for production of cellulose pulp, plywood and for telephone poles. It is however less commonly used for construction, as it is has a tendency to warp and bend if not seasoned correctly. Eucalyptus is a sustainable timber species since it only takes a few years to mature, and since it has very little taper over long lengths less timber goes to waste. These two characteristics led to the decision to try to use eucalyptus as the main construction material.

Rural shed with sheet iron roof

Rural shed with banana leaf roof

Lumber yard in Kampala

ADAPTABILITY

The solution for the development needs to be able to adapt to possible future changes in scale and function. Adaptability in architecture can be loosely defined within three main types representing different strategies: Versatility, transformability and convertibility. These types refers both to the amount of change that takes place in a building and to the degree of permanence of these changes.

Versatility:

Versatility is understood as the capacity of a building to support multiple functions without altering the building itself. Different activities are accommodated through repositioning of furniture or moveable partitions. The resulting changes of the space are not permanent.
An example is the universal floor plan, that can be temporarily subdivided based on the users´needs. This approach is in essence the opposite of the functionalist approach where the space is tailored to its function in order to achieve the most economical use of space, and relies often on a degree of spatial redundancy to allow different activities within the same space. In transitional periods functions might need to move between buildings or spaces, so the layout needs to have a degree of universality.

Transformability:

Transformable buildings have the ability to go between different physical states without the need to alter the structure. Moveable structures with the capacity to be repositioned allows the building to respond to shifting internal and external conditions, for example the retractable roofs at sports stadiums that allow both indoor and outdoor events within the same structure.

The possibility to open, close or subdivide the building will enhance the possibility for a building to accommodate the changing needs of the occupants within smaller timeframes., expanding the functionality of the building.

Convertibility:

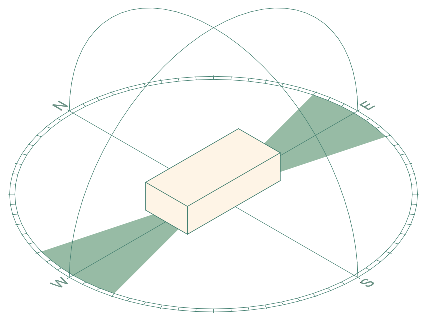
Convertibility accommodates changing functional needs through permanent alterations of the building. To design for convertibility means anticipating potential future needs and implement these predictions in the buildings´structure. By having a clear seperation between the different layers of the building changes in the structure is simplified. Since the scale of the development is porne to change the ability to expand or contract is an important factor.

These types of adaptability will need to be considered in concert, since the solution must both be able to accommocate changes in scale and function, while being economical in the use of materials and resources.

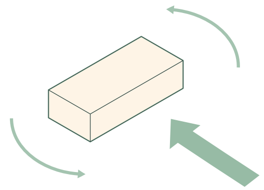
STRATEGY

The chosen strategy follows the idea of looking at the built environment as a hiercachy of layers with different capacities for change. In order to allow physical alterations with relative ease the different layers need to separated, i.e. the "friction" between the layers will have to be minimized. I therefore chose to develop a "kit of parts" based on the readily available construction materials, where the loadbearing structure will be cut to measure off site while the planar elements can be either prefabricated or made on site. The loadbearing structure can be fitted out with different kinds of partitions, allowing easy changes in both physical and spatial configuration within the constraints of the system, and will be the defining architectural element of the development. The approach where I provide the client with a catalogue of constructions from which they can choose according to their wishes reduces the need to follow the project, while architectural continuity is secured..

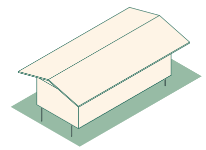
ENVIRONMENTAL ADAPTATION



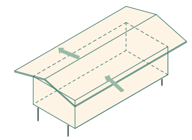
The building is placed along the East-West axis within 15 degrees of solar North in order to minimize sun exposure.



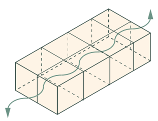
The building is oriented towards the prevailing wind direction.



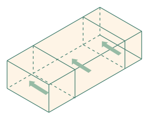
Large roof overhangs provides shade and protects the walls from rain.



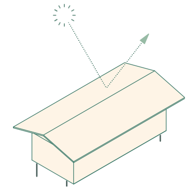
Ventilated roof to reduce internal heat build up.



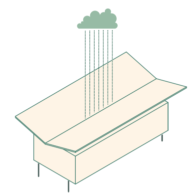
Construction with low thermal capacity to avoid heat gain.



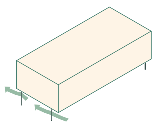
Functions are distributed on a single depth floor plan to facilitate cross ventilation.



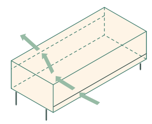
Reflective roof to reduce incident solar radiaton.



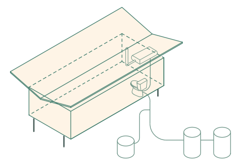
Rainwater harvesting system



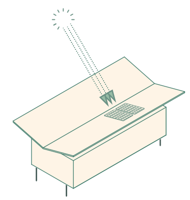
The building is raised on stilts for ventilation and protection from pests.



Low inlet and high outlet to use the principle of stack ventilation.



Self contained sanitary system.



Electricity generated by solar panels.

IMPLEMENTATION OF THE PROGRAM ON SITE

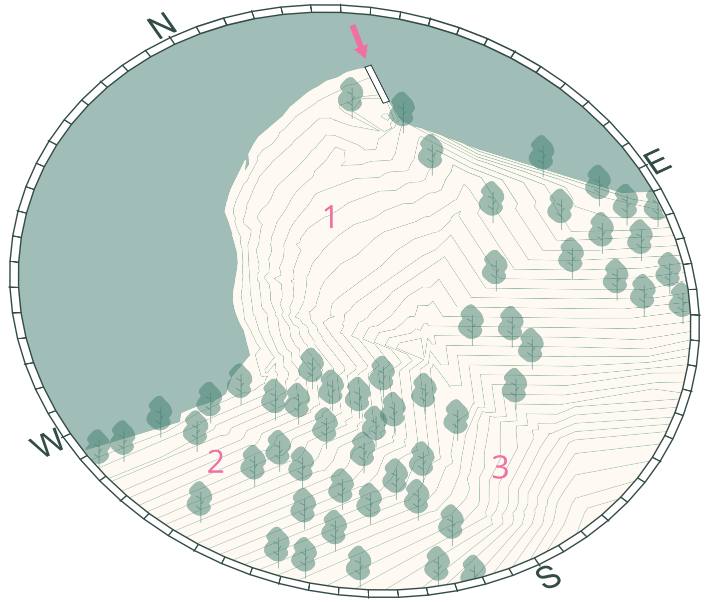
The plot is charecterized by three different conditions:
The rocky peninsula to the north, the forest and the beach to the west and the grass covered hillside. The natural harbor on the tip of the peninsula will be the access point.

Common facilities will be established a bit up on the peninsula, using the forests on each side for shading in the morning and evening while having an unobstructed view towards the lake. The quarter circle shaped area in front of the main building is fairly flat compared to the rest of the plot, and might in time be covered in grass and used for sports and other outdoor activities. The swimming pool, that is dug directly into the soft rock, and other outdoor functions are arranged on a parallell line with the main building. This creates a defined outdoor space, a path linking the different functions of the common facilities area with each other and the adjacent access point.

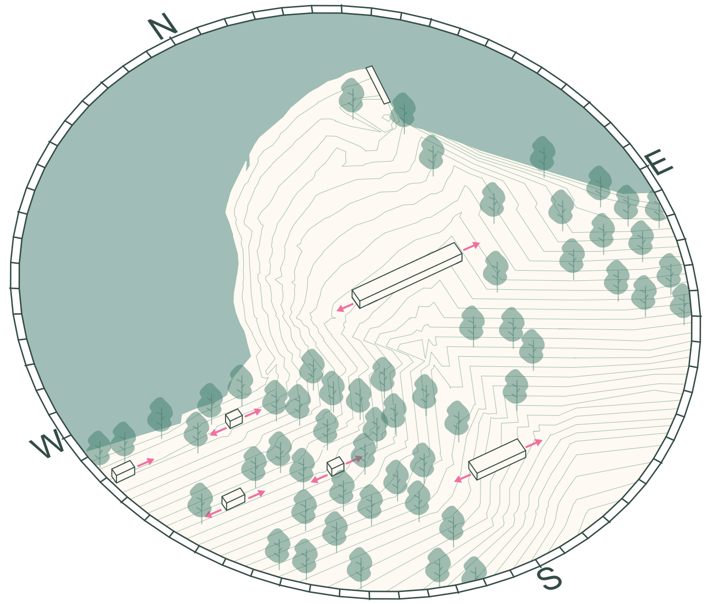
The accommodation in the form of bungalows of varying size are dispersed in the forest behind the beach to the west, where they enjoy the enhanced privacy and shade given by the vegetation as well as views to the lake. The bungalows are reached by paths leading through the common facilities area or along the edge of the peninsula from the harbor.

Living units for the staff is placed further up on the grassy slope, to provide privacy and increased security by having a overview of the facilities.

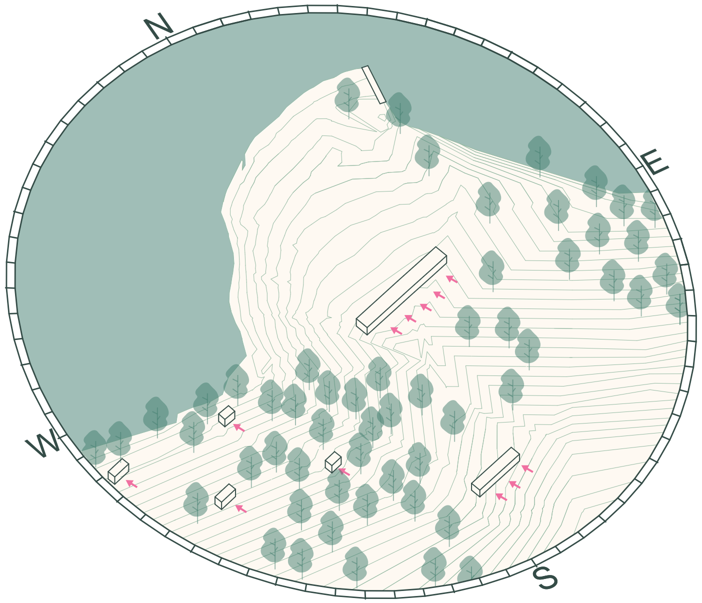
The program is generally distributed among many small buildings in order to facilitate a gradual development, and further articulation of the spaces between the buildings.



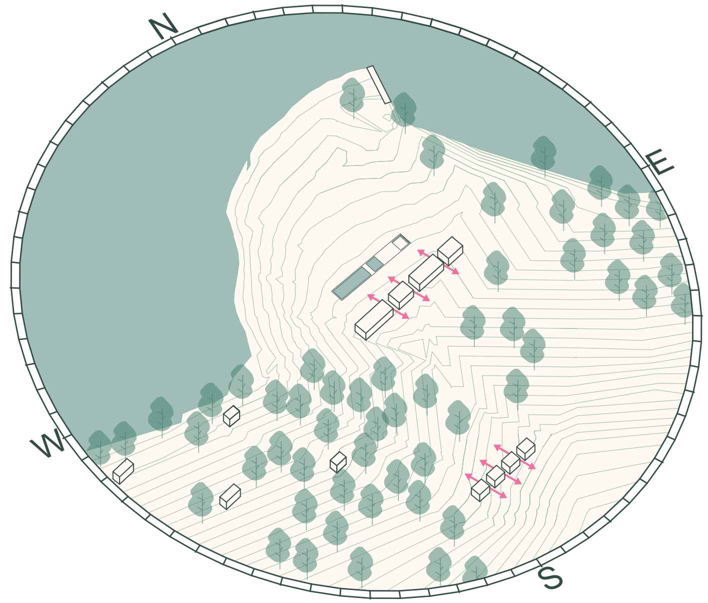
The site is accessed from the point to the North. Three areas of development are defined.



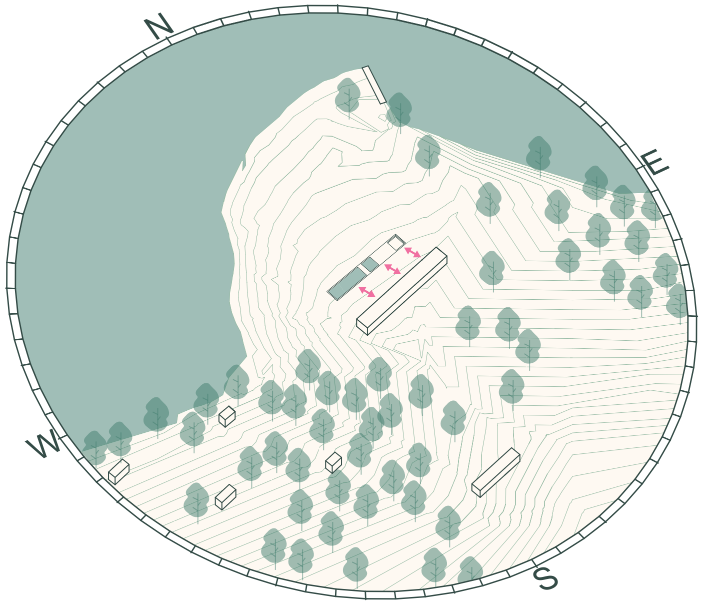
The buildings are distributed along the East-West axis.



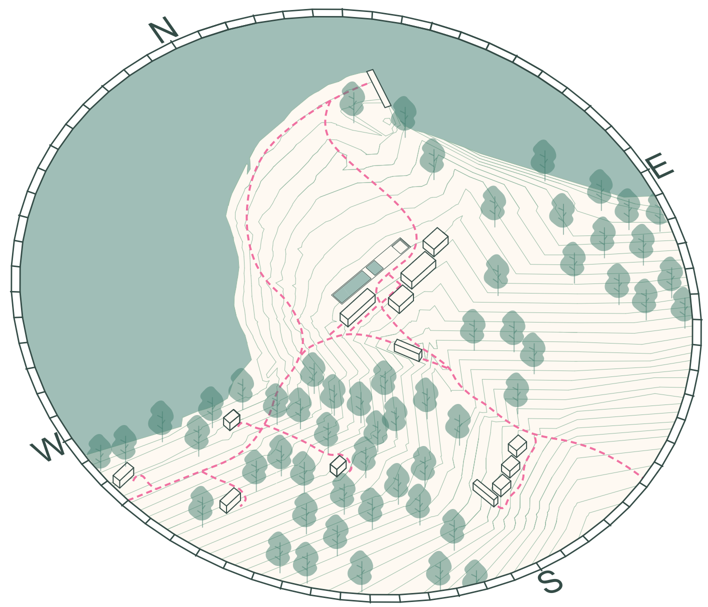
The orientation is adjusted to agree with the terrain and the prevailing wind direction.



The program is further subdivided to facilitate a piecemeal development.



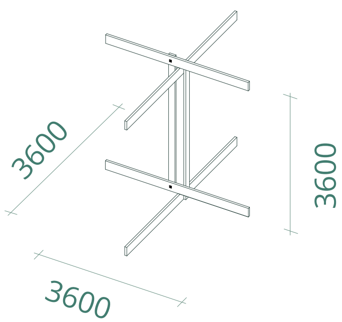
The swimming pool is placed parallelly with the main building.



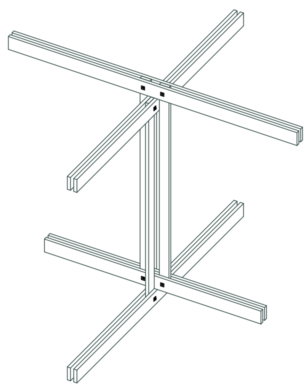
The buildings are arranged to define the outdoor spaces, and linked through footpaths.

STRUCTURE:

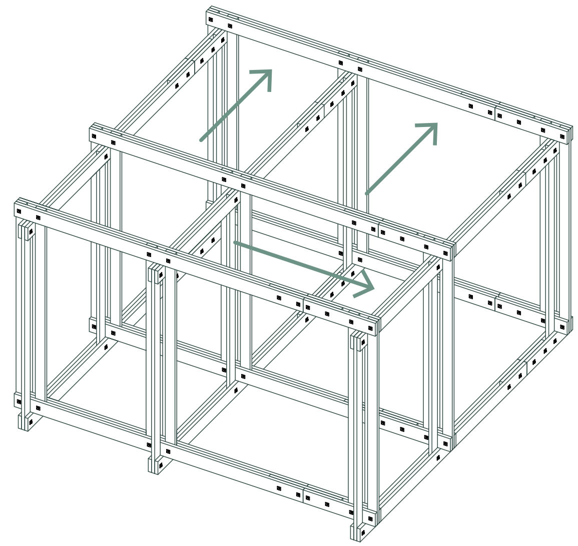
The structural concept was based on the available dimensions (40x170 and 40120) and lengths (3600) of seasoned eucalyptus in the inventory of Philippine Woodworks. In order to achieve a coherent archtiectural solution I chose to focus on the smallest common denominator, the joint between vertical and horizontal building parts. The solution is two pairs of crossed columns and beams (1.) that are crossed (2.) so they interlock without one being directly attached to the other. This gives the structure the ability to allow a degree of movement while still being structurally sound, which gives extra protection from strong winds. The joint makes it possible to change individual building members without disrupting the structural capacity.



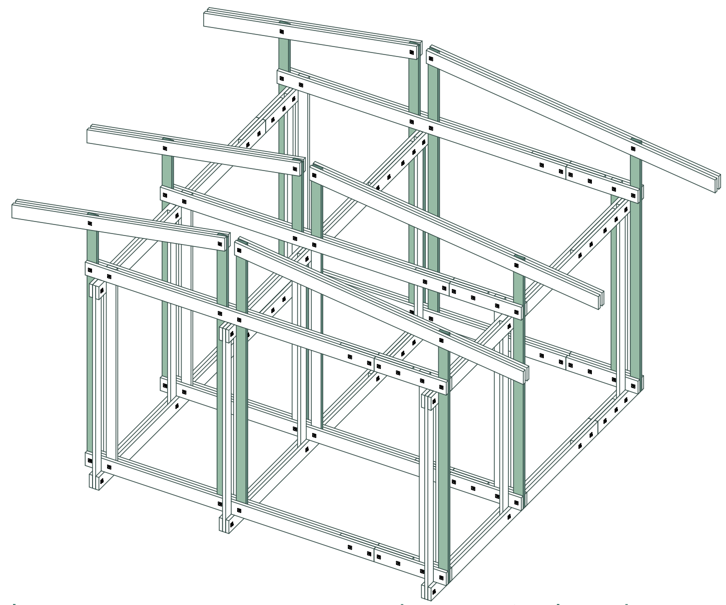
1.



2.

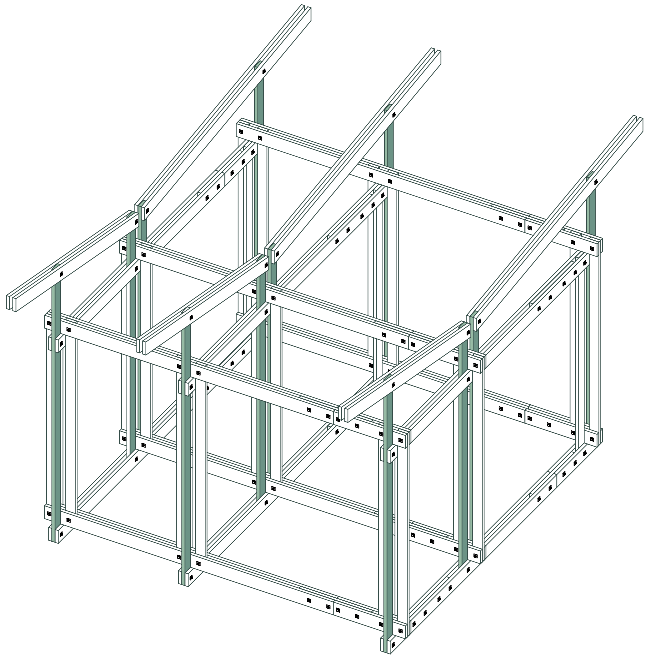


The junction of columns and beams is repeated following a module that is based on the available lengths of eucalyptus.

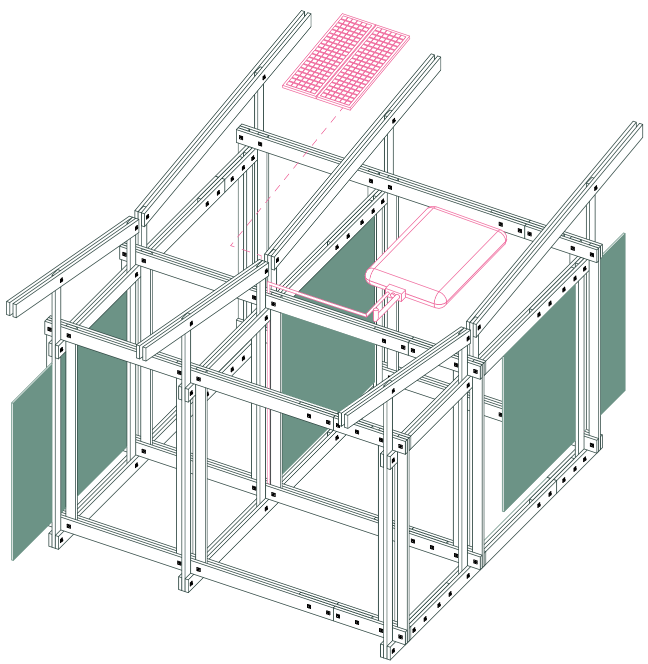


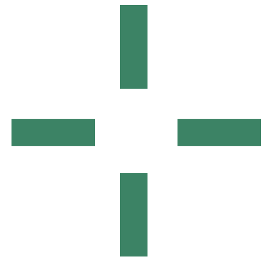
The taller columns (3300 - 3600) are used to manipulate the roof pitch.

The direction and typology of the roof can be changed by repositiong the same columns.



The space between the columns are used as vertical utility shafts, and also creates three indepedentslots for sliding and fixed partitions.

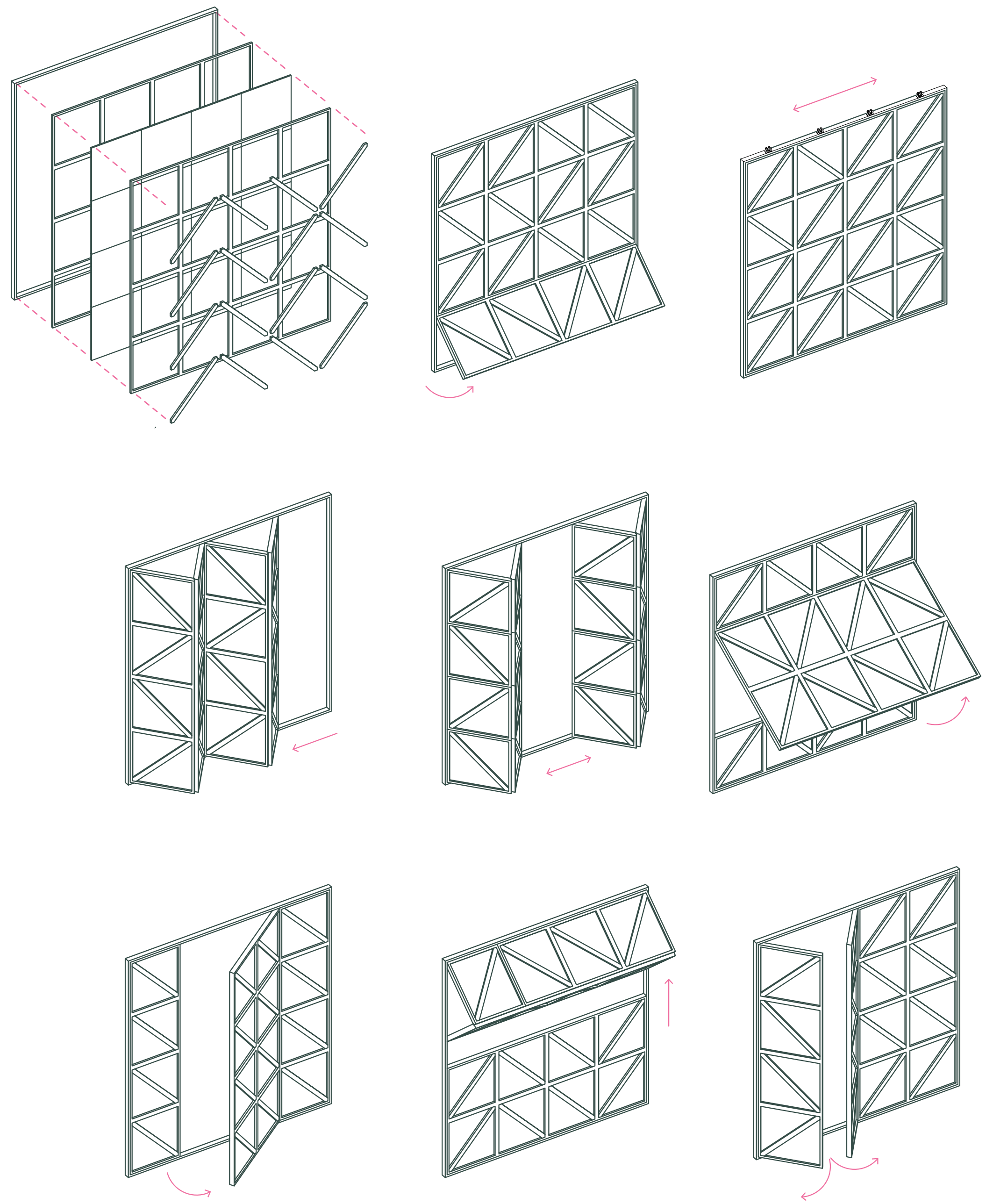


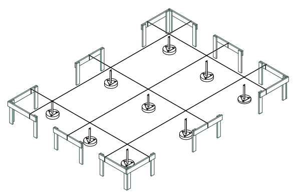


The resulting cruciform shape helps define the space by marking the corners, suggesting the ability for extension of the grid and becomes the defining recognizeable architectural element.

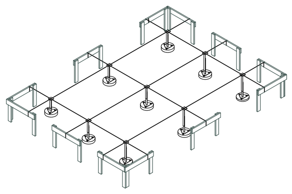
INFILLS:

The interior and exteror walls are elements made from eucalyptus slats, with the possibility to vary the infill according to the need for privacy or ventilation. The gridded construction allows the possibility for many different types of operation without changing the appearance. The diagonal slats stabilizes the construction. Through varying the direction of the struts effects similar to traditional tribal patterns can be achieved .

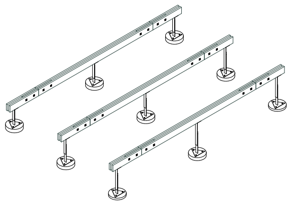




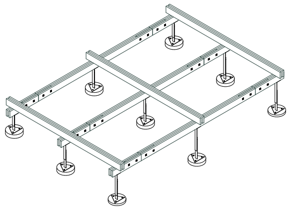
Set out construction grid and cast foundations



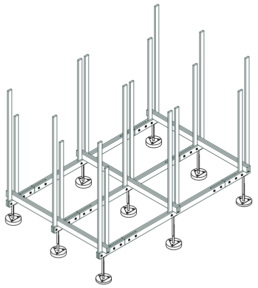
Adjust height of steel footings



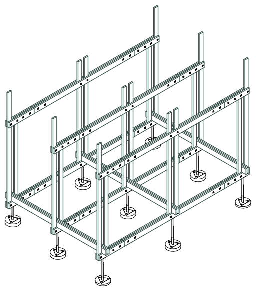
First floor girders



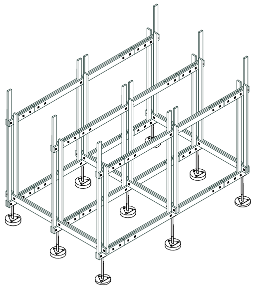
Second floor beams



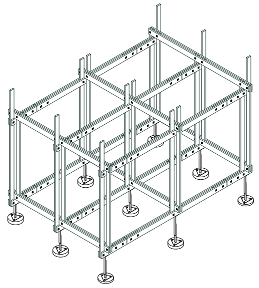
First columns



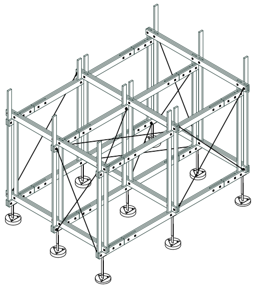
First ceiling beams



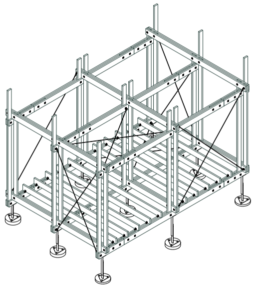
Second columns



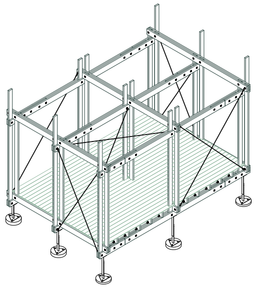
Second ceiling beams



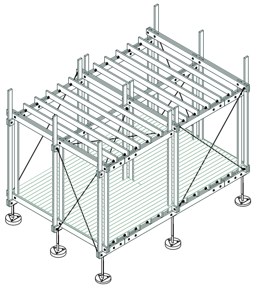
Cross wire bracings



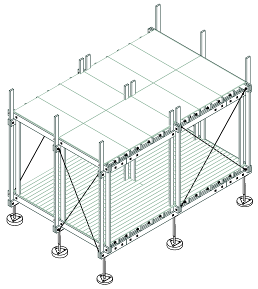
Floor joists



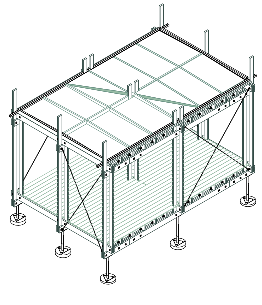
Hardwood floor



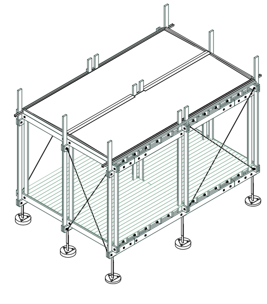
Ceiling joists



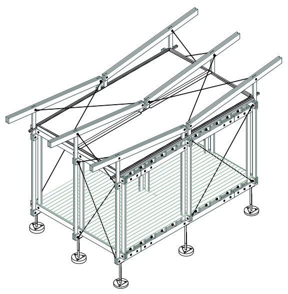
Plywood ceiling. Panels joined on center of ceiling joists.



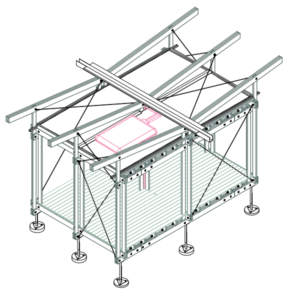
Timber battens and insulation for roof pitch build up.



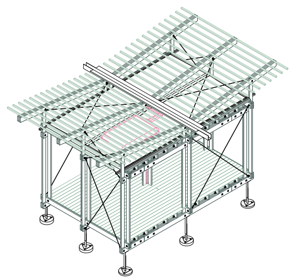
Polyethylene or sheet metal roof



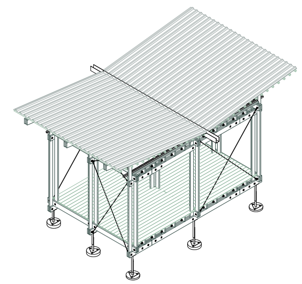
Rafters and cross bracings



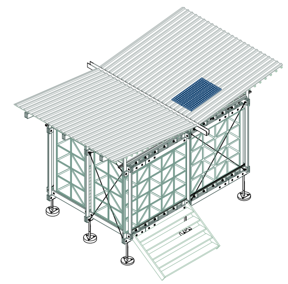
Gutter and rain harvesting system connected to bladder tank



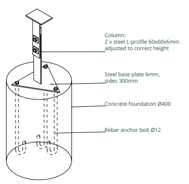
Pylons



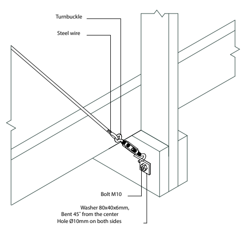
Super V white pre painted corrugated sheet metal roof



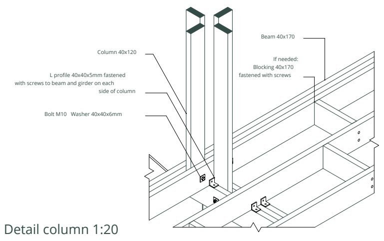
Walls, partitions and fit-outs according to chosen layout



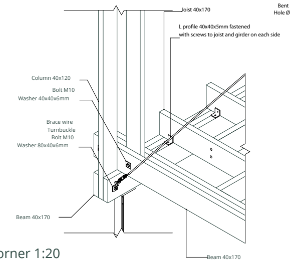
1. Detail footing 1:20



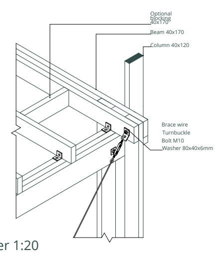
2. Detail turnbuckle 1:10



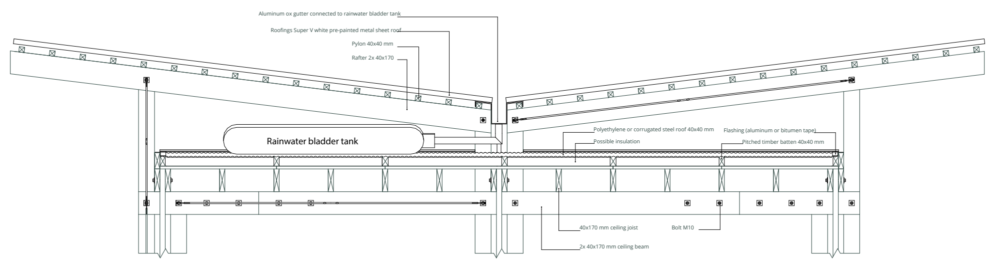
3. Detail column 1:20



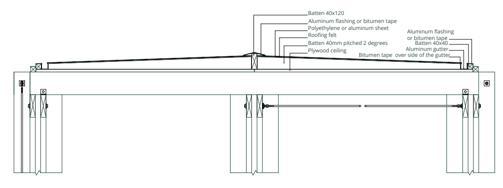
3. Detail corner 1:20



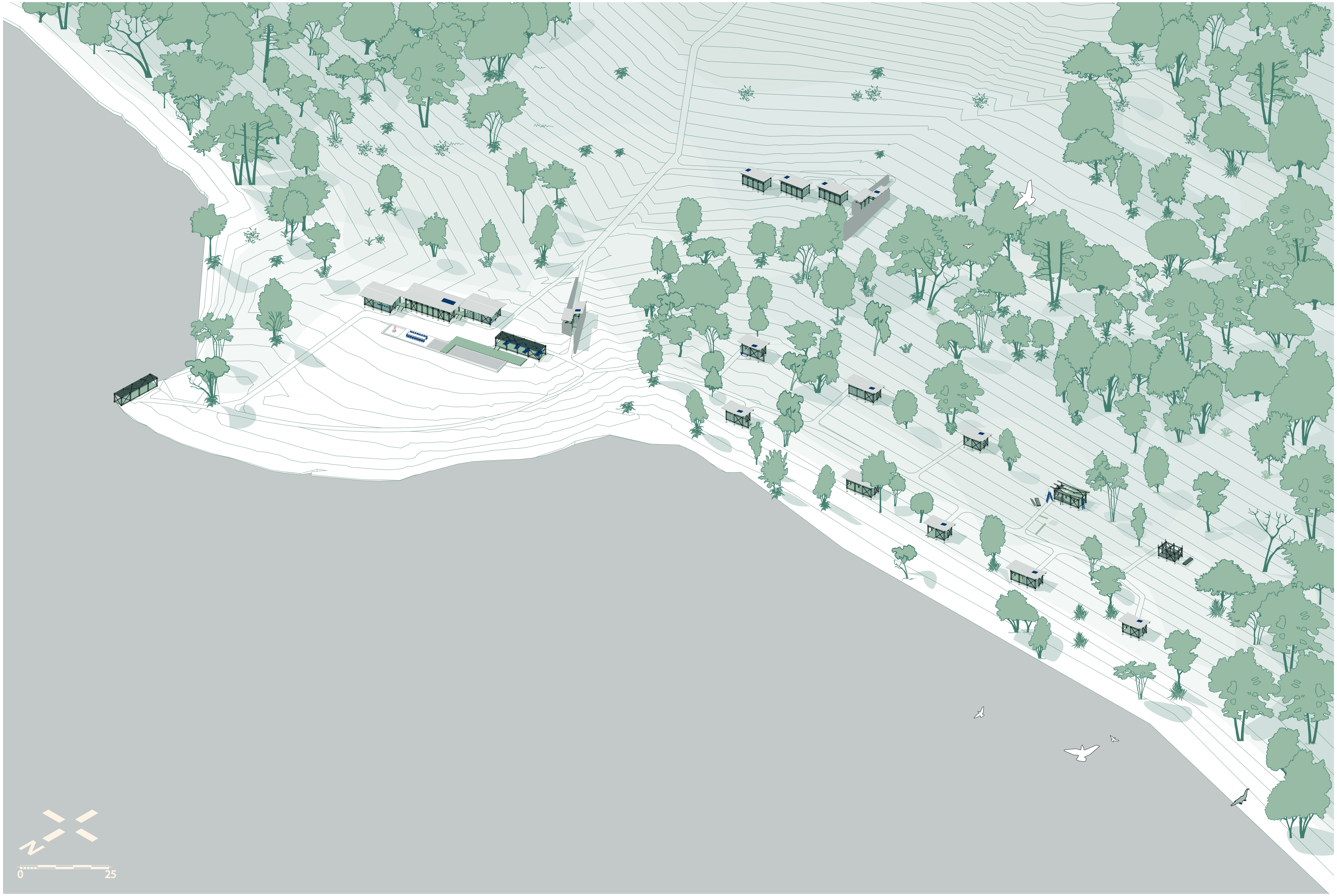
4. Detail corner 1:20



5. Detail roof 1:20



6. Detail lower roof 1:20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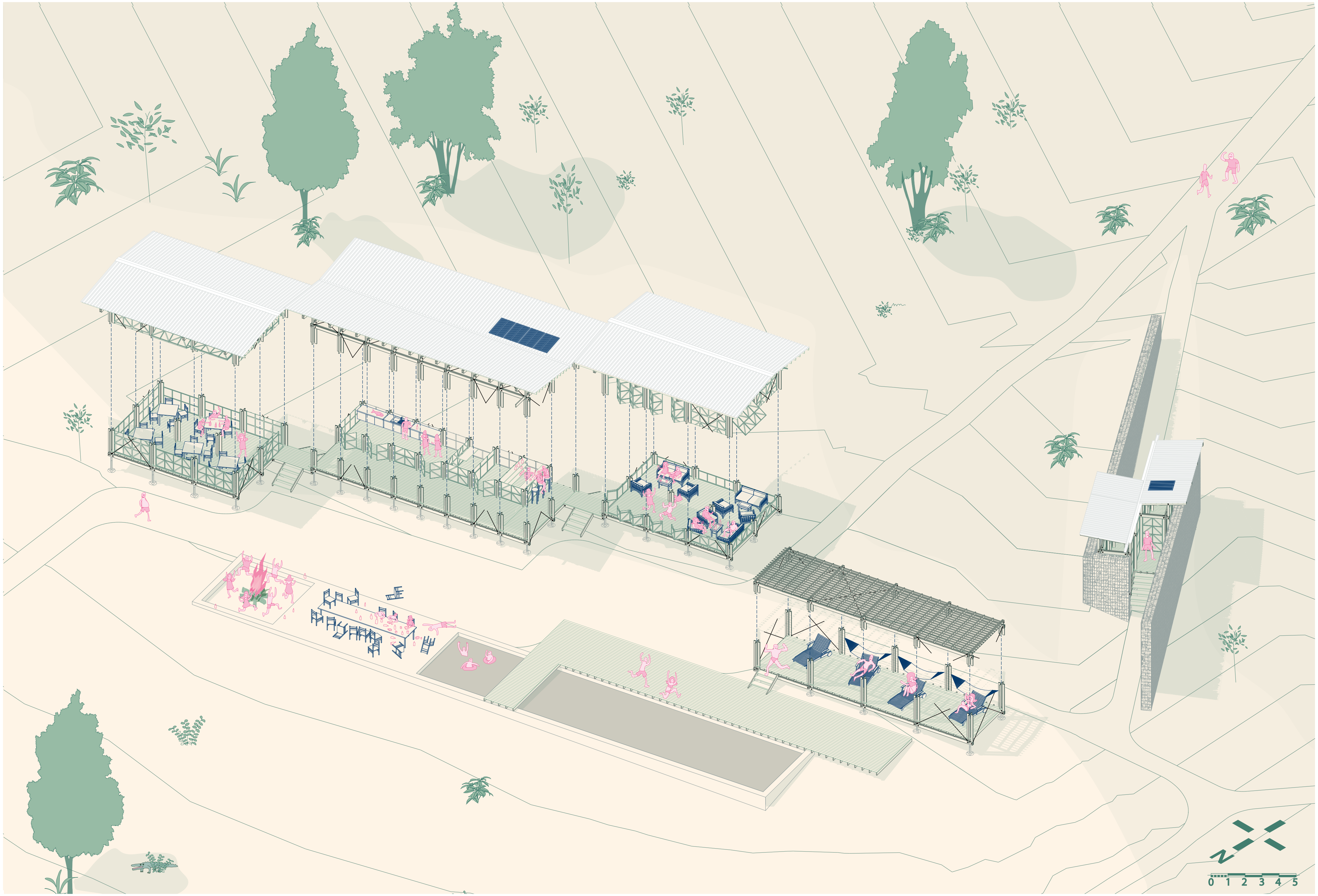
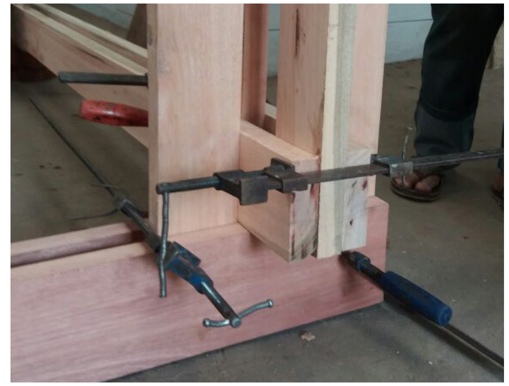

N
0 1 2 3 4 5


N
0 1 2 3 4 5

1. The inventory at Philippine Woodworks, Fort Portal. At last something to work with.

2. Inside the workshop

3. The eucalyptus timber is prepared



4. First mock up of the corner joint

5. Setting out construction grid and footings

6. First floor beams

7. First columns

8. First ceiling beams

9. Secondary ceiling beams and floor joists

10. Blockings added to stabilize the joists

11. Roof ridge beam. The solution with a ridge beam was later removed as the system evolved.

12. Football break.


13. Areal view of the workshop site in Fort Portal


14. Seeing the structure for the first time


15. Wonder and awe


16. Clients and architect inspecting the proceeding work.


17. The entrepreneur Rey and the client Marius discussing important stuff


18. Rafters


19. Pylons


20. Corrugated sheet iron roof


21. Wall panels are being tested


22. Window opening mechanism is being tested


23. Rail for sliding door


24. The bungalow is dismantled before the transportation to the island to be reerected.

25. Arial view of the onstruction site on Nsadzi island.

26. Concrete and steel footings

27. Most of the structure is reerected

28. Structure seen from the beach

29. Roof, cross bracings and gutter almost in place.

30. The floor

31. Ceiling and sub roof

32. Wall panel frames

33. Wall panels with canvas and mosquito net

34. Sliding bathroom door

35. View from the bedroom

36. Diffused light through the canvas

37. Soon finished, but it still misses a critical part

38. A way to access the bungalow: A stair.

39. Client posing in front of the bungalow, showing off the operation of the window and door.

40. The sliding door are reinforced for more reliable operation.

41. The bungalow´s exterior is completed.

42. It only needs some furnishing.

43. Like a queen size bed made to measure.

44. The first bungalow seen from the lake, soon to be joined by more bungalows.

45. Finished at last!

REFLEXIONS

While the development of the island is an ongoing project, and will continue to be so for many years, I must admit in retrospect that I had never imagined the process would be anything like how it turned out be. To choose to do a "real" project in Africa as a master thesis has had more drawbacks than benefits in terms of study progress, especially when all decisions are to be scrutinized by a client and that the process of establishing a group of builders and other key persons was immensely time consuming. In addition to that the timber had to be dried for several months, which led to further delays . That being said I think the feedback loop with the client has worked well and, apart from some unforeseen events, has pushed the project forward. Even if ever so slowly.

In terms of the resulting proposal I believe it answers my initial questions adequately, the solution has the tectonic quality I searched for and I think it has the potential to work as a system being architectonically congruent while allowing change. The possibility for a wider application of the concept is uncertain, since we have yet to get a good overview of the building costs. We have however received positive feedback from the potential target group, as well as from government officials. On the negative side I think the thesis as an academic work suffered from the situation where the design needed to be delivered in a matter of days, then followed by long stretches of time where nothing much happened. Except perhaps the drying of the timber.

In the months following the presentation of my diploma the "pilot" bungalow was

The "kit of parts" design principle is showing promise, as the clients and the builders are implementing it while doing alterations the scheme according to their preferences but still keeping within the constraints of the construction system. One particular problem has been the discrepancy between what I saw as the potentially most interesting way of solving the accommodation on the island, namely making the barrier between the inside and the outside as light as possible, and the percieved need for security and closedness. Keeping the bungalows closed, in order to not let in any insects, and at the same time keep a sense of openness has been especially difficult. The climate on the island has also turned out to be slightly cooler than in Entebbe, the closest station from where the weather data was collected.

The building costs for one bungalow has been higher than expected, but is partly due to a lot of trial and error and can surely be greatly reduced for future units when the system can implemented more efficiently on the site. In retrospect we should have opted for a process with a larger degree of on-site research and experimentation together, this could have reduced delays, misunderstandings and solutions that turned out sub-optimal. However both the client and I had no real experience from a building process in this context, so we learned on the go. Letting go of my control of the project has been somewhat difficult, being afraid the clients would somehow compromise it, but I think I have come to terms with that it will now live a life of its own. I therefore hope that the finished result will be in essence how I designed it, but surprising iterations and alterations by the users will be what proves the strength of the concept.

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