

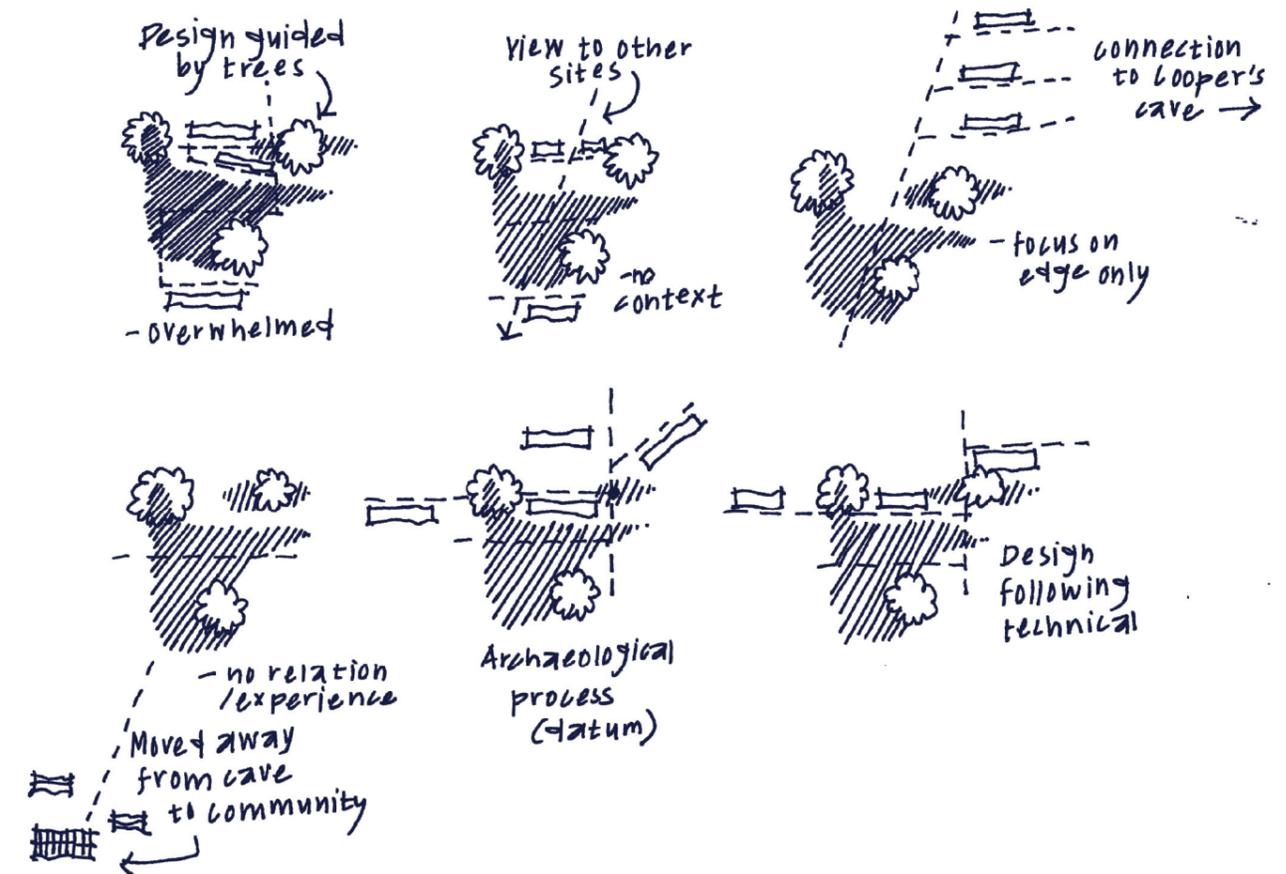
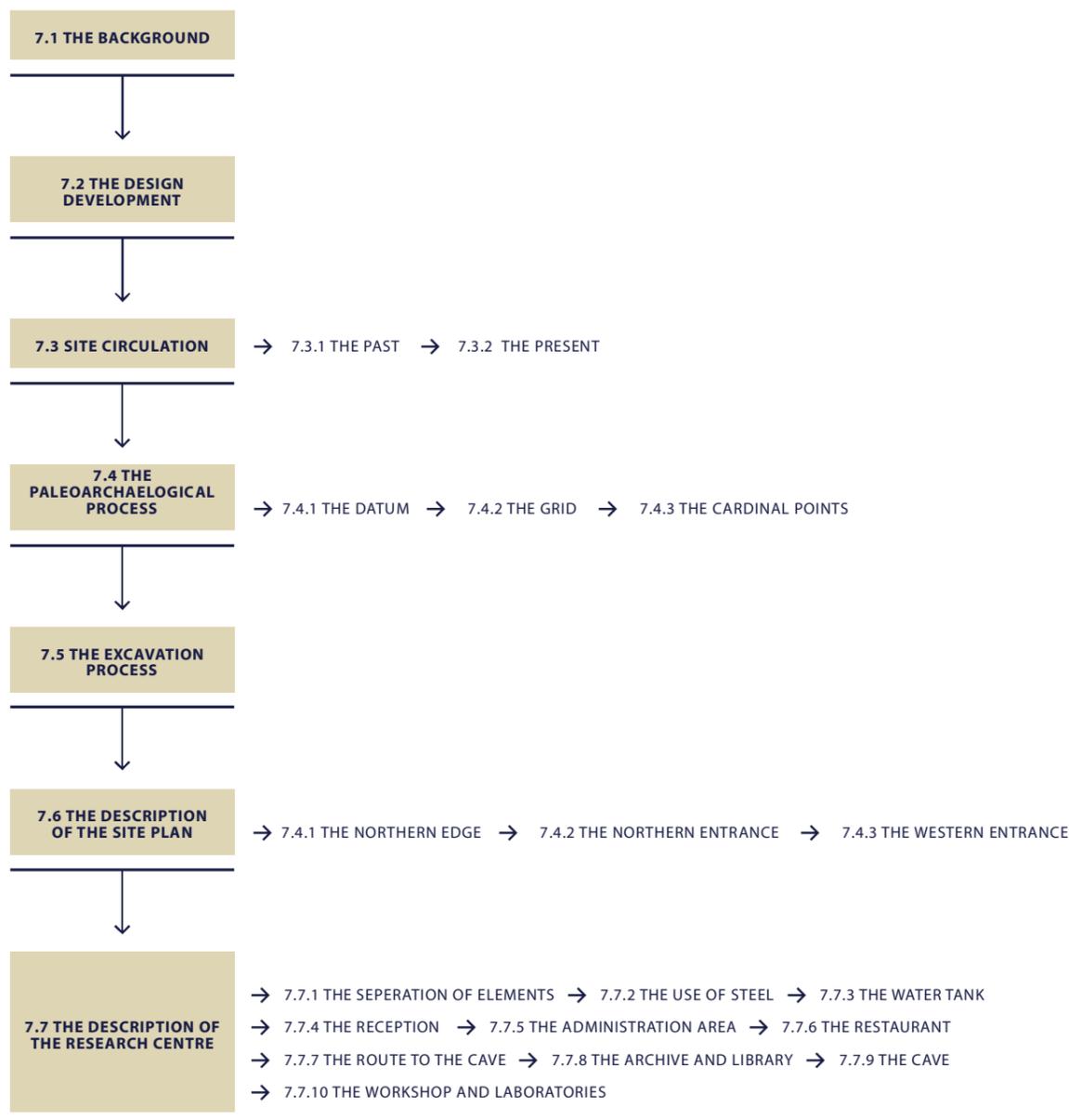
Chapter 7

Design development

This chapter provides an understanding of the main design generators and design process. The generators address design and heritage aspects developed from the background, analysis, frameworks, precedent studies and theoretical premise.

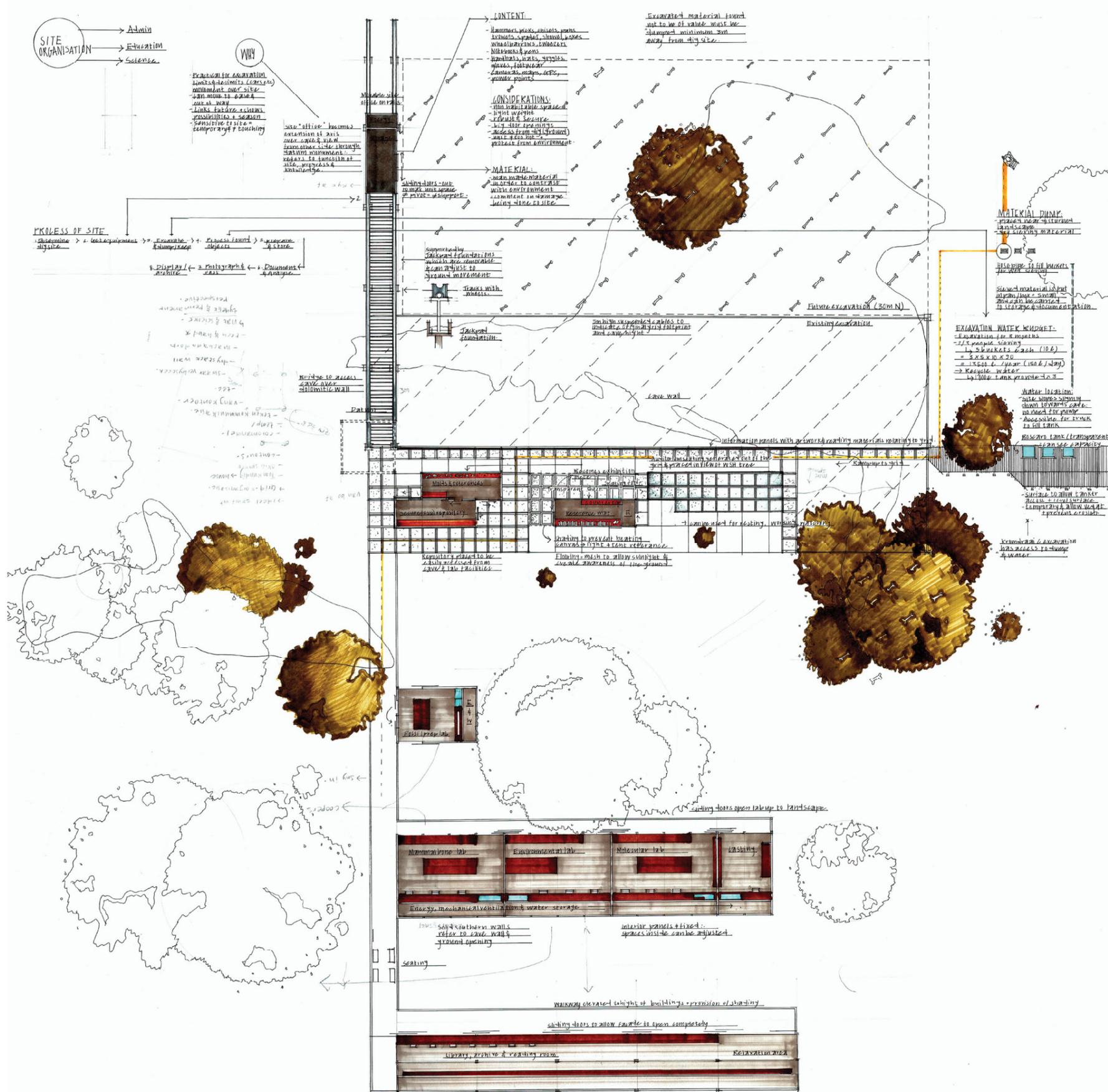
7.1 The Background

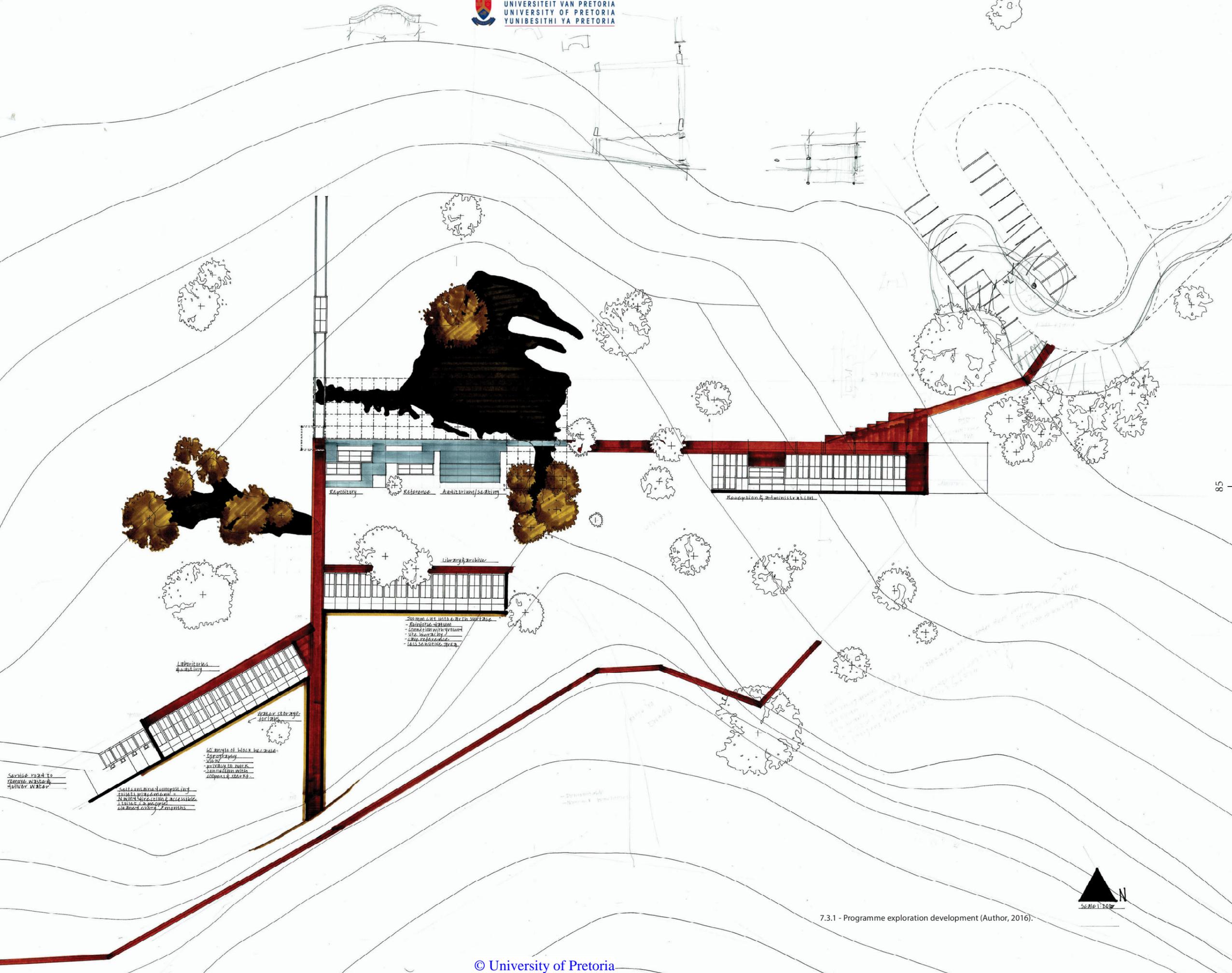
The project follows a series of interventions as finding limitations within the open landscape and lack of physical informants proved challenging. The first approach focused on the white stinkwood trees surrounding the caves, as the specific pattern of the trees indicate the presence of a cave in the Cradle landscape. The intervention proved to be overwhelming and dominated the cave site. The second approach relied on the paleoarchaeological process as the process relates directly to a method for understanding the prehistoric landscape in relation to the present. A series of interventions resulted from using the grid as a means of understanding the site, being distilled down to the simplest possible intervention. The site and precinct design were only properly resolved after the circulation on the site was resolved.



7.1 - Design development background (Author, 2016).

7.2 Design development





Service road to
 remove water &
 deliver water

Self contained composting
 toilet plant
 Non-potable water
 Non-potable water accessible
 toilet & shower
 wheelchair accessible

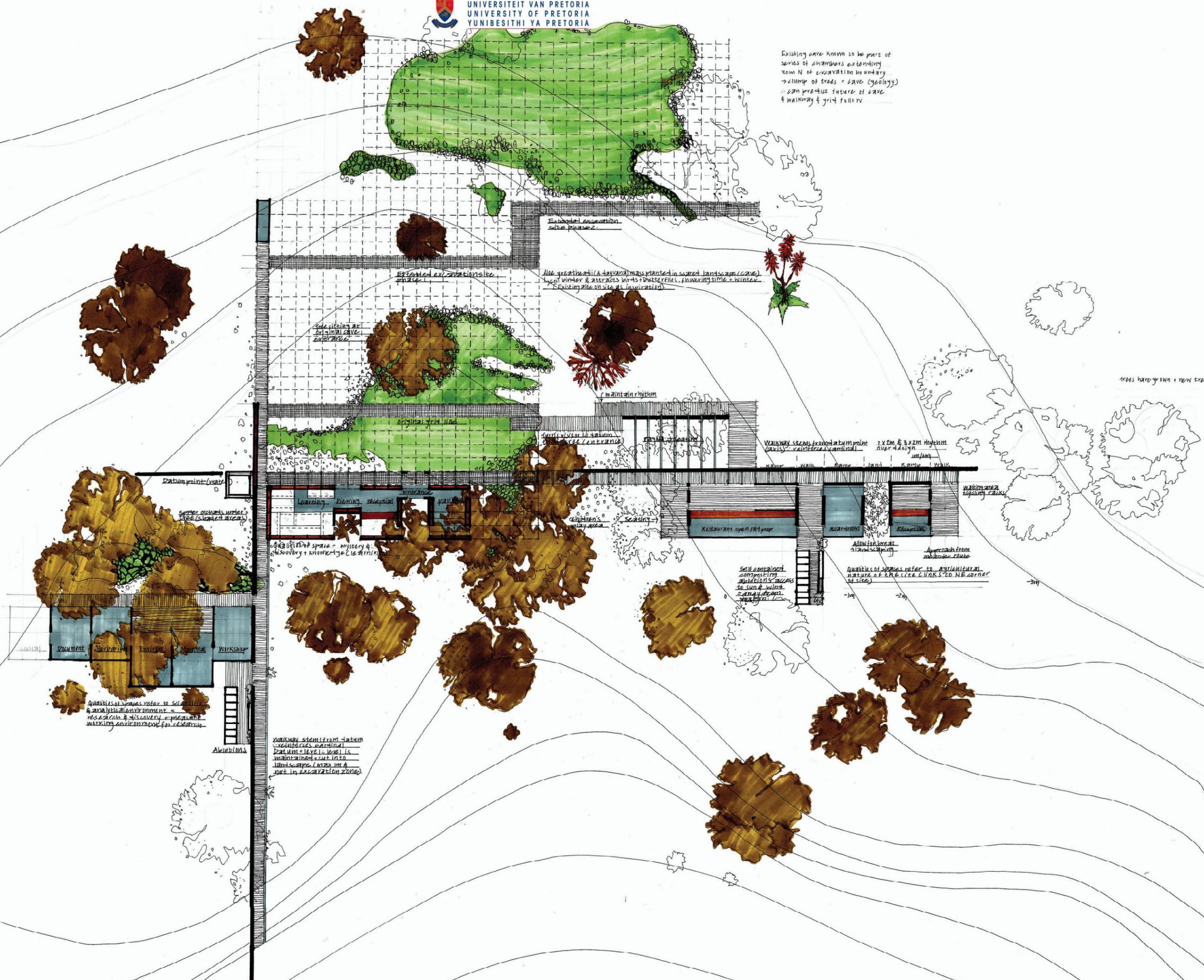
at angle of block because:
 - topography
 - privacy to users
 - land use policies
 - access & street

Don't mix with other materials
 - Rainwater - water
 - connection with system
 - site usability
 - some water use
 - less sensitive area

7.3.1 - Programme exploration development (Author, 2016).



Existing cave known to be part of series of chambers extending from N of excavation boundary
→ clump of trees = cave (geology)
→ can protect future of cave & walkway & grid follow



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Qualities of space refer to educational & analytical environment = research & discovery + pleasurable working environment for research

Walkway stems from datum coordinate system. Datum level is maintained out into landscape (max in & out to excavation zone)

Self contained courtyard providing access to sun & wind = environmental quality

Qualities of space refer to architectural nature of the site (links to NE corner of site)

trees have grown + new trees to North (wind + seeds)

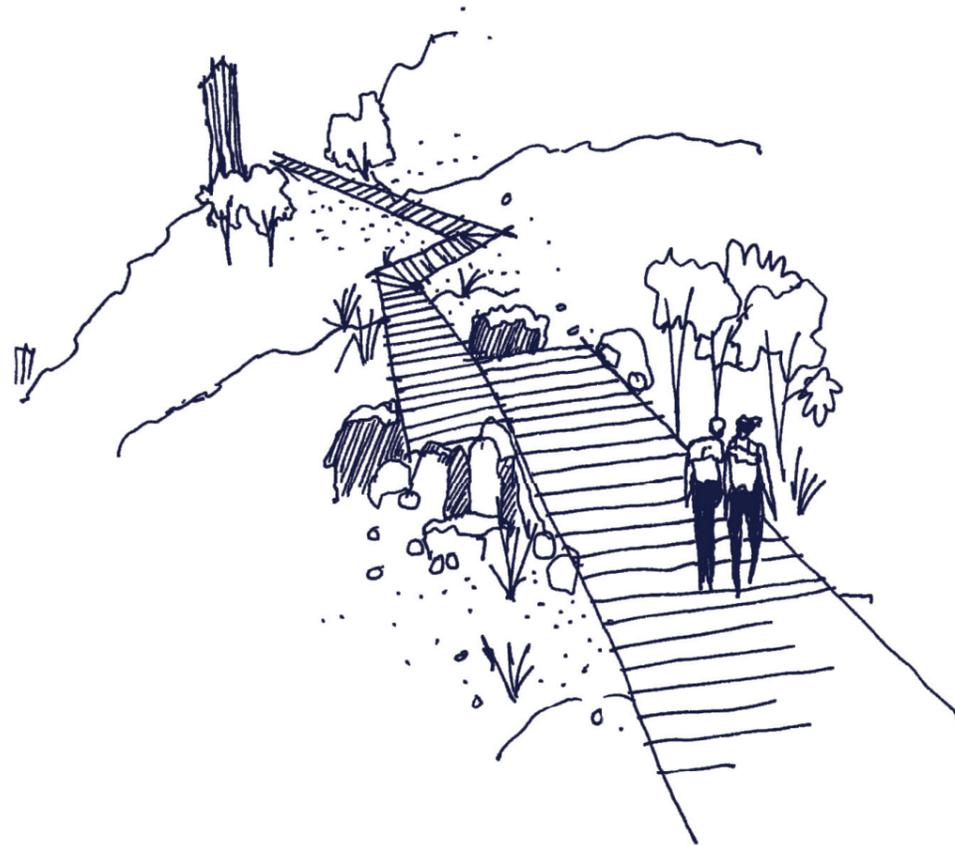
7.3 Site circulation

Circulation posed a challenge for the site design, resulting in much iteration during the design process. Taking multiple circulation routes on the large site into account the following challenges were posed:

- Circulation concerning a proposed route between Sterkfontein Cave, Coopers Cave and Kromdraai Cave from the North West. Users of this route do not necessarily want to enter the cave itself.
- Circulation concerning the proposed Cradle Corridor of the group framework from the south.
- Ease of access by the community, researchers and the disabled with a steep northerly slope.
- Sensitivity of the landscape.
- Experience of the landscape.

7.3.1 The past

The cave connects to Sterkfontein Cave, Cooper's Cave, Drimolen Cave and Gondolin Cave through the presence of *Paranthropus robustus*. Furthermore, Sterkfontein, Cooper's and Kromdraai caves have produced numerous stone tools from the Oldowan Age. This connection is realised through a meandering route between the nearby Sterkfontein Cave and Cooper Cave. On route the features of landscape are presented to the visitor through a series of resting points and artworks. The typography allows for the connecting caves to be pointed out to the visitor. A landmark system indicating the presence of caves is proposed.



7.4 - The past (Author, 2016).

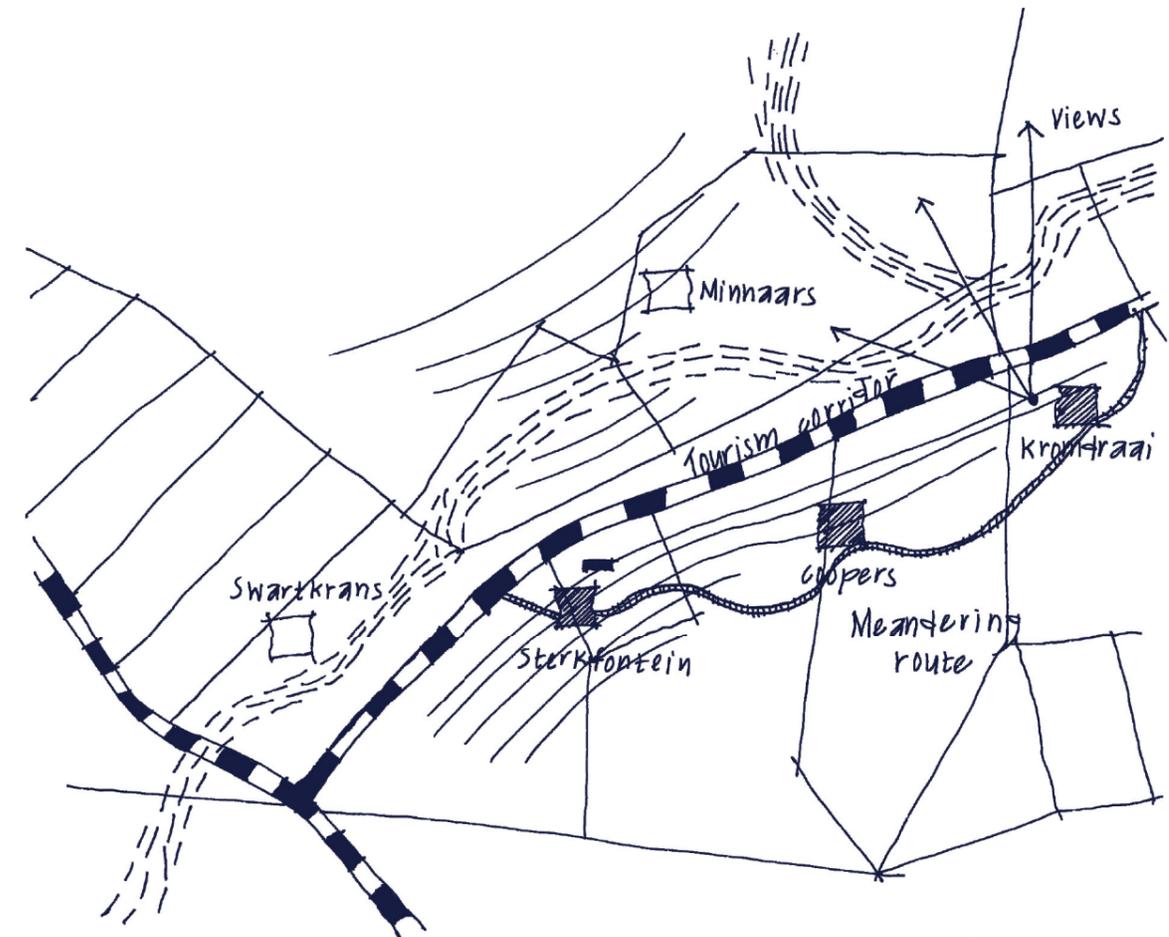
7.3.2 The present

The proposed area of intervention is located on a disturbed and relatively flat area to the east and south of the cave. The road permits researchers and logistical vehicles to easily access the site, with the proposed shuttle service being able to drop tourists off if need be. The informal farming community can access the proposed design easily from this road. A landmark is provided within the design to indicate the presence of the cave as well as to provide a method of orientation within the site.

The northern route towards the cave starts at and runs through a growth of indigenous trees, filtering the visitor into the landscape. The visitor passes through the informal farming community while moving up the slope. The visitor is met by the reception building, with the reception area forming the connecting point between the hiking route from Sterkfontein and the group framework access route

from the south. The visitor here has the option to move past the building to continue through the landscape, or through the reception to gain access to the cave. This form of security is necessary to prevent theft or damages to the site.

In this landscape trees function geologically as indicators of the presence of a cave, as the seedlings are able to grow easily in a protected environment. This concept of a vertical reference point leads to the use of the archaeological datum point to provide a reference from which the archaeological system is set out. This in turn orientates and leads the visitor through the landscape. Circulation within the vertical element directs the visitor to specific views in the landscape. In the present, circulation is therefore focused on highlighting archaeological processes and values, as well as the geological qualities of the landscape.



7.5 - The present (Author, 2016).

7.4 The paleoarchaeological process translated within the design

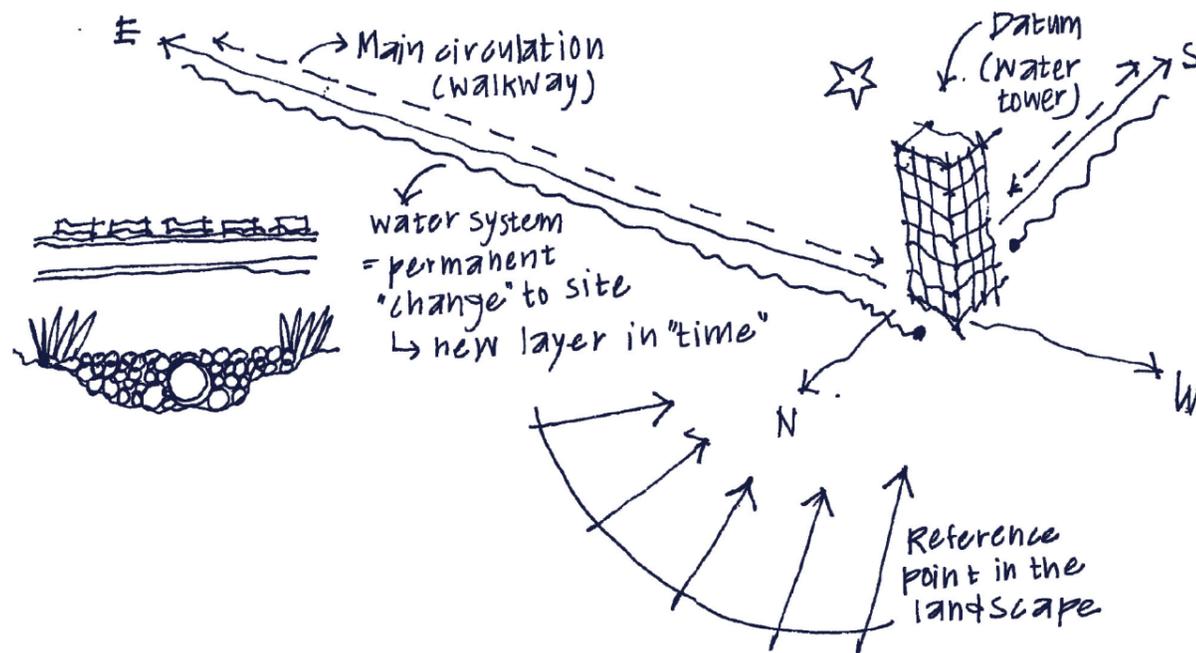
Background to the paleoarchaeological process is provided in Chapter Two. The design responds to the process in the following manner:

7.4.1 The datum

Before starting the excavation process on an archaeological site, a datum point is established in order to provide a reference point for the setting up of the grid as well as for the stratigraphic layers of the studied area. The datum point, given the coordinate 0.0., is reinforced in the design as a reference point in the landscape which guides the visitor to the cave site. The datum point is translated into a water tower referring to the rural nature of the site, as water towers are scattered over the landscape. Clumps of trees usually suggest the presence of caves and in this instance the water tower reinforces the idea of a vertical indication of a cave. Originally the datum was intended to act as a lookout point, but the nature of the site already provides adequate views without the need for elevation.

As vertical element the water tower symbolically becomes a gnomon, one of the first instances of man using a vertical element to enable the keeping of time. The word gnomon when translated refers to "knowledge", indicating the purpose of the site.

The datum point refers to the origins of the cave and the starting point, and in this instance is kept as a permanent reference for future generations of the importance the cave held for the current civilisation. The concrete support structure – concrete referring to lime mining in the area – will stand as a permanent monument representing the status, value and memory of the site.



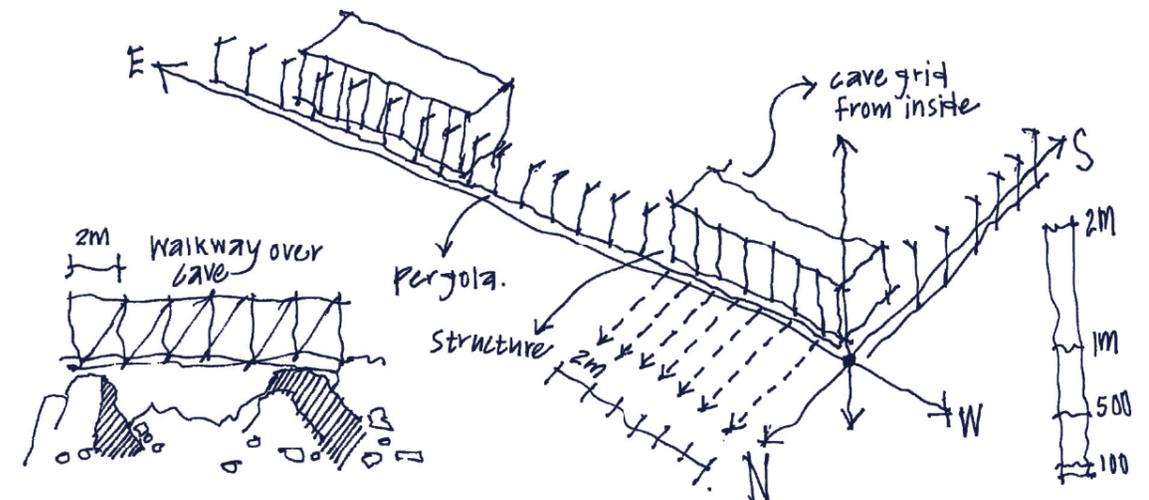
7.6 - The datum (Author, 2016).

7.4.2 The grid

The grid is the most important design informant. The grid not only allows for archaeological objects to own coordinates within the cave, but is also used as a device in astronomy to locate and position celestial objects. The grid has been implemented throughout time in design and architecture, with multiple meanings and implementations. The intention is to extrude structures through the grid onto the site while expressing the geometric and ridged nature of the grid – which relates to the scientific rationalisation of man – and placing it in opposition to the organic natural shapes and order created by nature. The grid is expressed in the use of modular units in steel construction and the connection between the units, the lines created by the addition of panels to the structure, the coming together of the floor, wall and ceiling, and the expression of shadow and light.

A study of the cave grid revealed much about the excavation timeline. Originally the design intended to use variations in the thickness of the grid to explain the period in which excavations were done. This intervention was found to be too dominating over the cave. The solution was to provide a simple walkway over the cave (relating to the two-by-two-meter archaeological grid) and introduce information panels along the way identifying and explaining the discovery of artefacts directly above the place of discovery.

The library is placed within the negative space of the cave grid and completes the grid. Here information can once again be accessed in direct view of the cave and landscape.



7.7 - The grid and cardinal points (Author, 2016).

Extending from the datum, the two-by-two grid is used in the design as an indicator for the placement of structures. The two-meter unit grows into a two-by-two-by-two and a two-by-two-by-three rhythm – rhythm being a means of keeping time in music.

The architecture becomes a celebration of the grid, as a steel exoskeletal frame provides the support for the infill structures and roof. The infill structures become boxes pulled 100mm back from the skeleton to accentuate the grid and to accommodate the addition or omission of spaces.

7.4.3 The cardinal points

The combination of the datum and archaeological grid extends into the design along an east-west axis and north-south axis. Cardinal points historically provide a means of orientation and navigation and are therefore the navigation routes within the design from which the buildings are accessed.

A masonry wall celebrates the cardinal points along the envisioned walkway and becomes a part of the landscape as a "ruin". This intervention relates to time in the sense of weathering and creates a dialogue between matter and time. A swale aqueduct is placed underneath the walkway as it follows the brick wall. The origins of the cave are rooted in the erosive effect of water on the landscape, and in the powers of water to attract prehistoric life to the area. The swale below the structure is celebrated by a pergola above the structure as life and nature's ability to rejuvenate is symbolized by the plants growing along the pergola.

7.5 The excavation process translated within the design

To understand the workings of the Kromdraai site the process of excavation was investigated. Understanding the excavation process dually determined the future of the site and lead to a prediction of what the site will be when the archaeological process has ended.

The destructive nature of excavation not only robs the landscape but also scars it. The loss of value is addressed through architecture in the provision of the Library and Museum at the cave site. An answer to addressing the scarred landscape was found in the existence of a particular plant on the site. The indigenous and valuable plant in the Cradle of Humankind, the Aloe greatheadii, a spotted aloe, attracts birds, bees and butterflies and stimulates new life in the cave. The introduction of a mass display of the plants gives life to the site and pays homage to the death which has occurred in the cave. The plant is also used as a soil binder, healing the scar.

7.6 The description of the site plan

7.6.1 The Northern edge

Connecting to the proposed Cradle corridor and as a device for celebrating the edge of the farm, a swale system is proposed where Kromdraai farm meets Sterkfontein Road. The swale filters water running down the slope before meeting the Blaauwbankspruit and creates a landscaping edge to the site. Indigenous plants such as Aloe greatheadii (the spotted aloe), turning pale pink or red during the winter months when the site is most active, are used to indicate the entrance to the site..

7.6.2 The Northern entrance

The northern entrance extends southwards up the steep slope and is designed to have an incline no greater than 10m horizontally for every 1m vertically, thus decreasing the threat of erosion. The route allows visitors from the Cradle Corridor to access the site by tourist shuttle or bicycle. The route moves past the historically important plaque put up at the first commemoration of the site being declared a World Heritage Site. It is articulated and framed, incorporating the site into a cave identification system for the whole Cradle. The route moves through a cluster of trees in order to introduce the visitor into the site by a change in light, air and sound. Once through the trees, the visitor will see Brahman cattle and the activities of the informal farming community. The option is given for tourists to explore this area. The informal farming community will house the scientific and international community as a way of providing year-round financial security, and the route makes access from the accommodation to the cave easy for the community and scientists. Parking is afforded away from the view of the pristine landscape of the site. The Nirox Foundation Sculpture Park is incorporated into the route as a means of leaving temporary landmarks for visitors and children to explore.

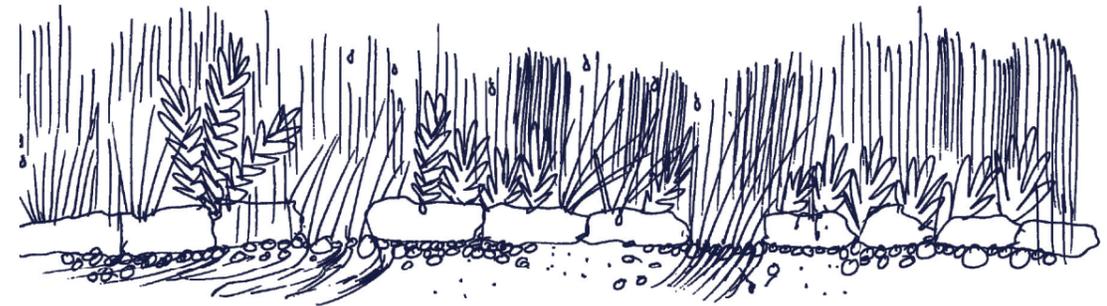
7.6.3 The western entrance

Tourists or scientists visiting the Sterkfontein Interpretation Centre are given the opportunity to walk or cycle a route connecting the Sterkfontein Caves, Cooper's Cave (1500m west of Sterkfontein) and then Kromdraai Cave. What is interesting on this route is the progression of weathering between the caves, as the Sterkfontein Caves are intact, Cooper's Cave is mostly intact, and Kromdraai Cave has completely caved in. Fossils in Sterkfontein are only visible in the interpretation centre where they are imbedded into rock, and at Cooper's Cave they are scattered along with stone tools in the landscape. At Kromdraai Cave, fossils lie scattered in the landscape and cave. The water tower acts as a navigation device indicating the presence of the cave to visitors. The route is designed to provide the best view of the landscape as well as elevate visitors next to the hill, making them walk down the slope to the cave. This device allows visitors to see the site in its entirety in order to orientate themselves. The Nirox Foundation Sculpture Park is once again incorporated into the route and unifies the northern and western routes.

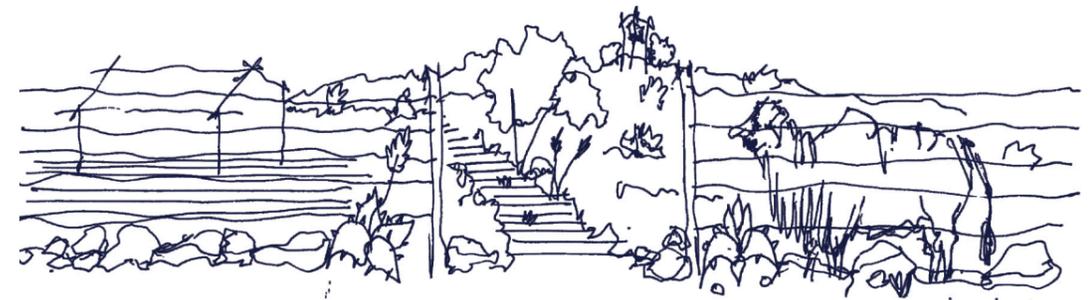
7.7 The description of the research facility

7.7.1 The Separation of elements

The roofs of the new structures form a part of a separate system to make the visitors aware of the cave's missing roof. The repetitive roof trusses form a rib-like system, relating to the nature of the fossils in the area. During the formation of the cave, a hollow was carved into the landscape as walls, floors and ceilings become one. The new structures celebrate this with the placement of separate boxes within the structure, suspended in space. The buildings and ground are separated from one another as the design of the footings allow the structures to float within the landscape. This device points to the temporality of the intervention and permanence of the landscape.



7.8 - The Northern edge (Author, 2016).



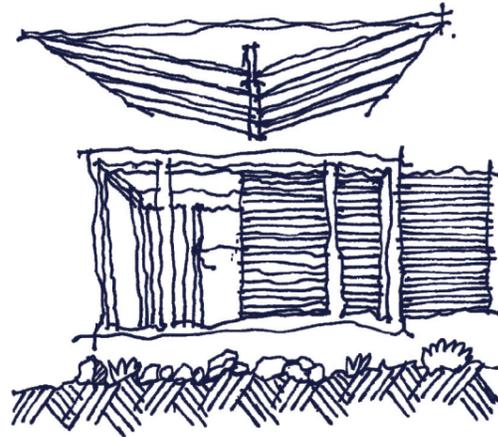
7.9 - The Northern entrance (Author, 2016).



7.10 - The western entrance (Author, 2016).

7.7.2 The use of steel

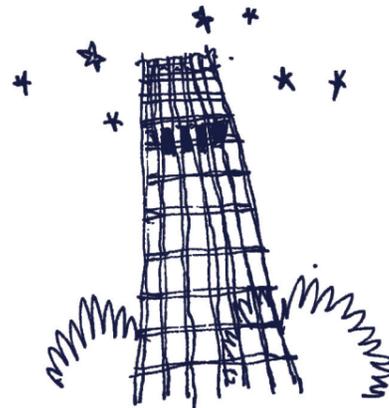
In order to celebrate the nature of the site steel is juxtaposed to natural elements. The archaeological grid, as well as the industrial mining nature of the site inspired the use of steel, while the intangible natural qualities of the site inspired the use of timber cladding. What makes the cave itself so special is the natural stone wall displaying the geology of the area. A prehistoric stone that was transported from 5km away and that was used for the breaking of bones, was found during the early periods of excavation. This stone inspired the use of brick wall near the restaurant.



7.11 - The use of steel (Author, 2016).

7.7.3 The water tank

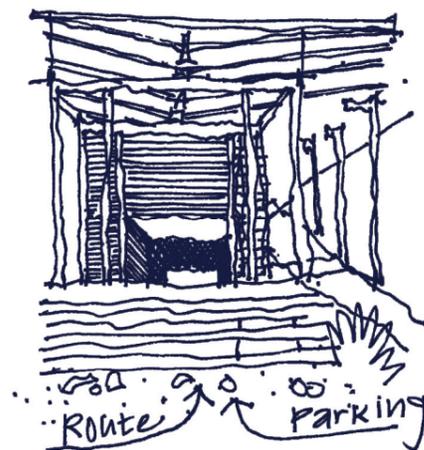
As an infrastructural aspect facilitating the functioning of the place for gathering knowledge, the agricultural typology of a water tank serves as a vertical coordinate for the site. The water tank does not only 'link' the heavens and the earth, but celebrates the keeping of time and the movement of the sun, the giver of life. The tower symbolically indicates the search for knowledge and on plan serves as a point in time or, so to say, a coordinate in time. At this point the past, present and future come together.



7.12 - The water tank (Author, 2016).

7.7.4 The reception

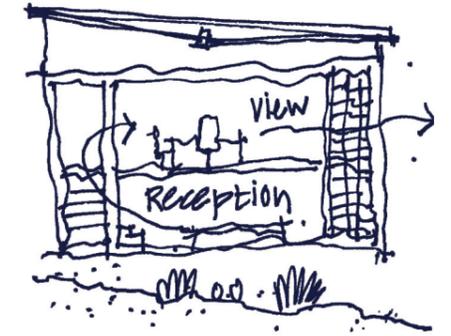
The reception is the meeting point between the two circulation routes and controlled movement into the cave. Located between two clumps of trees, the reception offers filtered light and shading to the visitor. The balustrade in the form of a brick wall and planted pergola progressively make more of the landscape visible to the visitor. During spring the flowers provide a strong scent along the walkway, creating a sensory association with and memory of the landscape. The location of this block stems from the axis created by the datum and expresses a more "solid" approach to the design. The grid is visible within the structure as well as the finer details.



7.13 - The reception (Author, 2016).

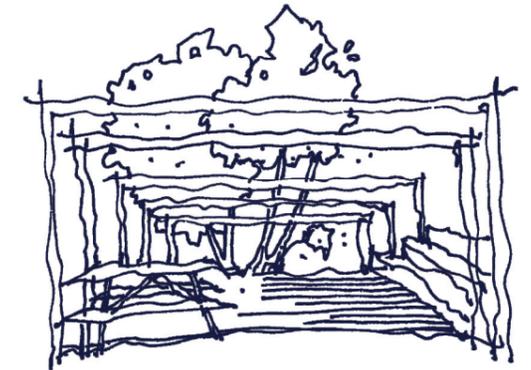
7.7.5 The administration area

The south-facing administration block is placed facing the slope of the Highveld landscape. The staff area is afforded privacy from the caving activities but is easily accessible from the reception.



7.7.6 The restaurant

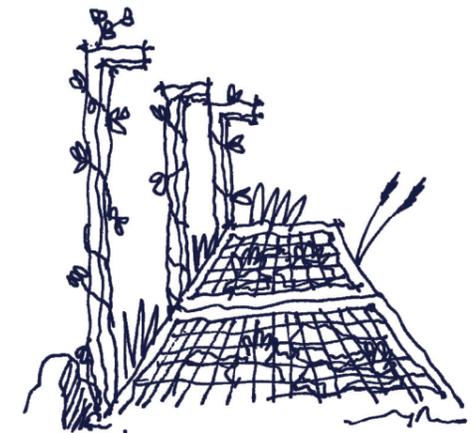
The planted pergola, as well as the view over the farming area reinforce the agricultural nature of the site, as well as creating a mutually dependent relationship between the design intervention and the informal farming community.



7.14 - The administration area and the restaurant (Author, 2016).

7.7.7 The route to the cave

The approach to the cave is envisaged as one of exploration and discovery. The visitor is slightly elevated above the ground by a ramp creating a sense of awareness of the ground level, but which also speaks to the sensitivity of the area. From this standpoint the light grid spread across the site starts to create axes and frames around views, leading the visitor into the cave while presenting the landscape. The visitor follows a set of displays which hold specimens and moulds of fossils found in the cave, while the displays correspond to the coordinates within the cave. The visitor can then see where the fossils were found.

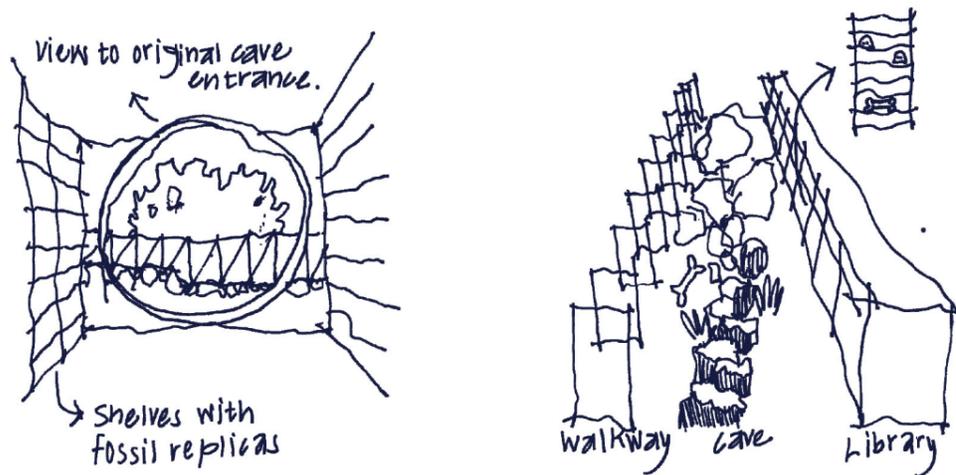


7.15 - The route to the cave (Author, 2016).

7.7.8 The archive and library

Initially the library was placed to the south of the site along the Southern axis created by the datum. After much consideration, the decision was made to place the library in a direct relationship with the cave grid, thus reinforcing the concept. The archive and library are not constrained by the external walls but spill over into the landscape to provide a living exhibition. The building is envisioned as a place of learning and education, allowing for the community to interact with the gathered knowledge on the Cradle landscape. In doing so they will generating value for the site as well as for the community.

Shelves reinforcing the notion of the grid form the primary elements within the library, directly relating knowledge to site. The grid is extruded vertically to provide a pavilion seating space, while also providing an exploration of information in the reading area. The entrance is placed in relation to the white stinkwood tree which grew at the original cave entrance.

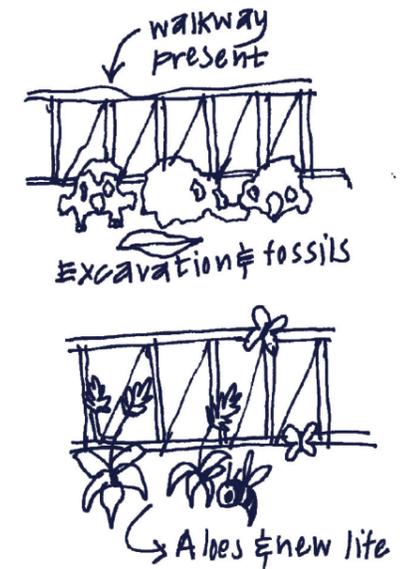


7.16 - The archive and library (Author, 2016).

7.7.9 The cave

Platforms hovering sensitively above and in the cave allow the visitor to experience Kromdraai cave itself. The important aspect here is the cave wall, which displays important geological formations and scars created by excavation. This system also functions to enable the excavation team to access the excavation area and for fossil finds to be easily carried into the workshop area.

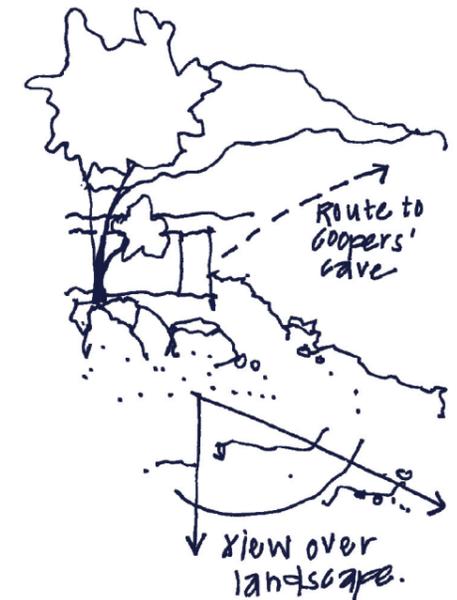
The walkway refers to the future of the cave, in that the walkway is shaped according to future excavations. The walkway follows the grid across the past limit of excavation, the current location of excavation and the future of the excavation. The walkway is predicted to outlive the demountable structures in the intervention, thus allowing for future exploration of the cave as explained previously. Resting places with seating, as well as exhibition boxes framing aspects important to the landscape, are provided.



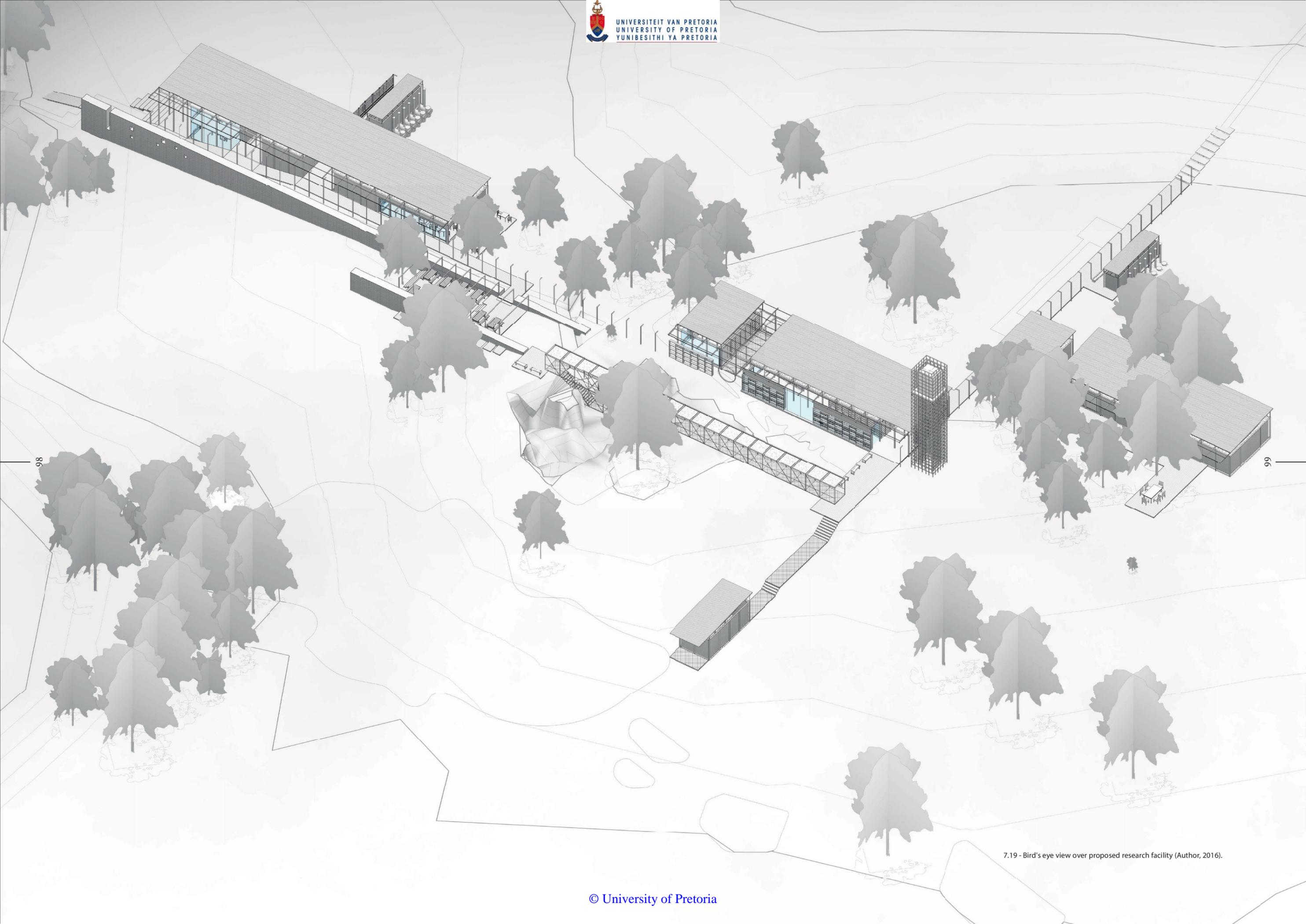
7.17 - The cave (Author, 2016).

7.7.10 The workshop and laboratories

The laboratories are placed in between the trees of Kromdraai A excavation site, as the placement allows for a sense of privacy and connection to Cooper's Cave excavation site. The laboratories are separated to correspond to the hierarchy of the site, as well as to allow for social spaces between the structures.



7.18 - The workshop and laboratories (Author, 2016).



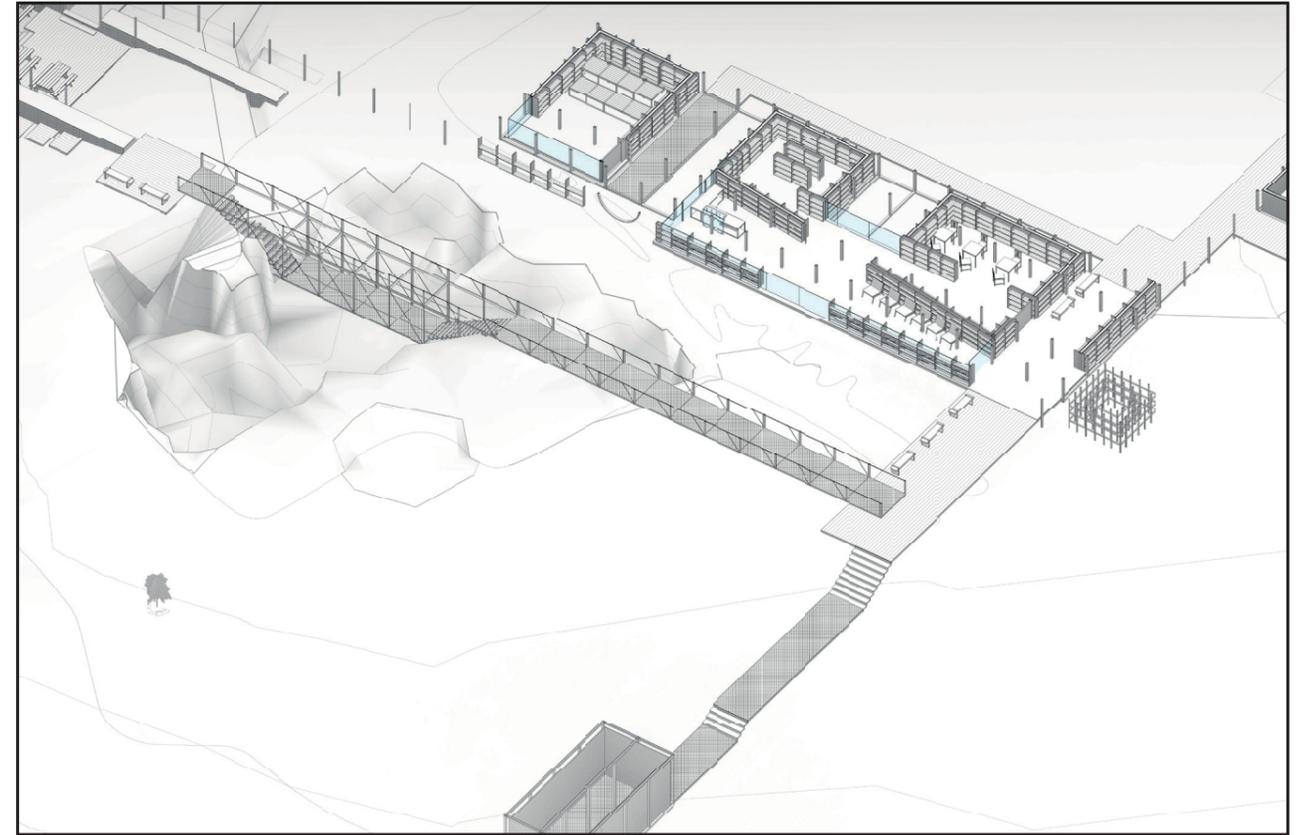
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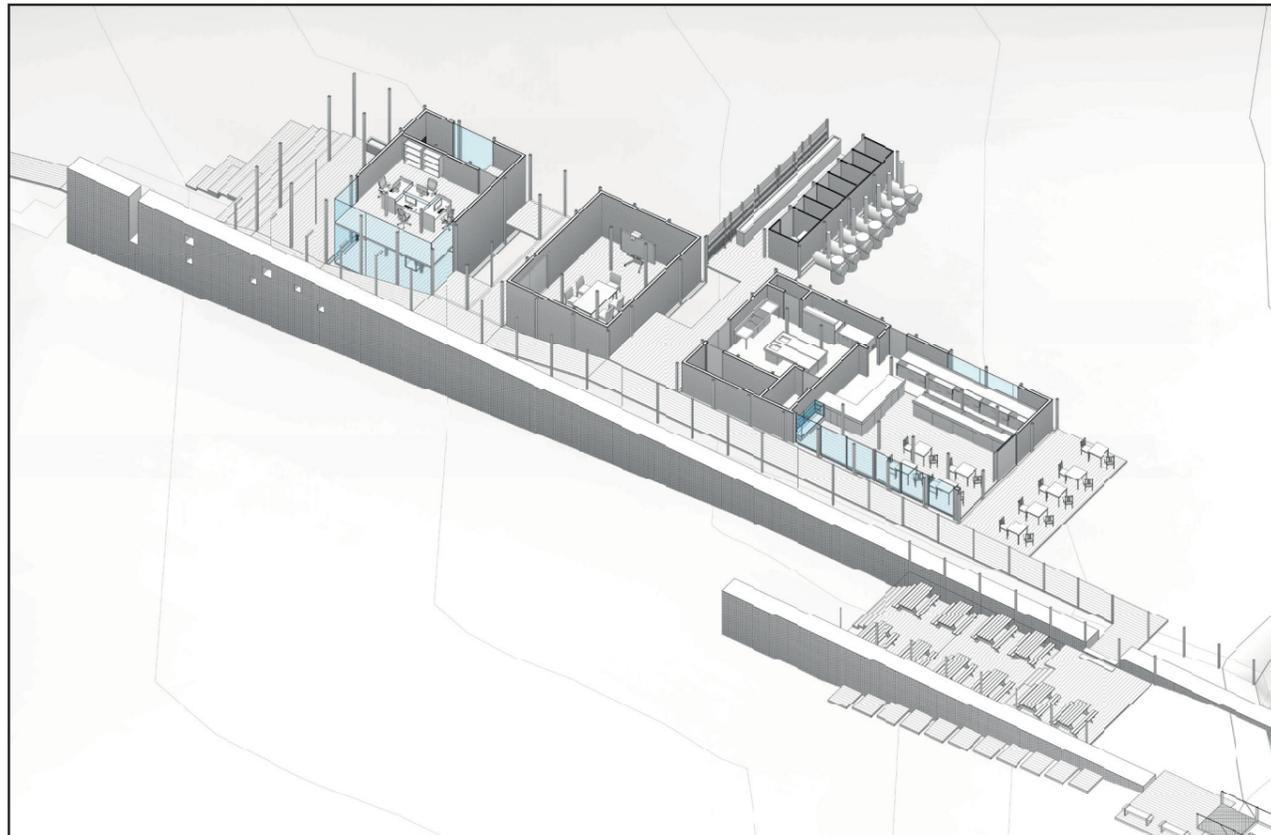
7.19 - Bird's eye view over proposed research facility (Author, 2016).



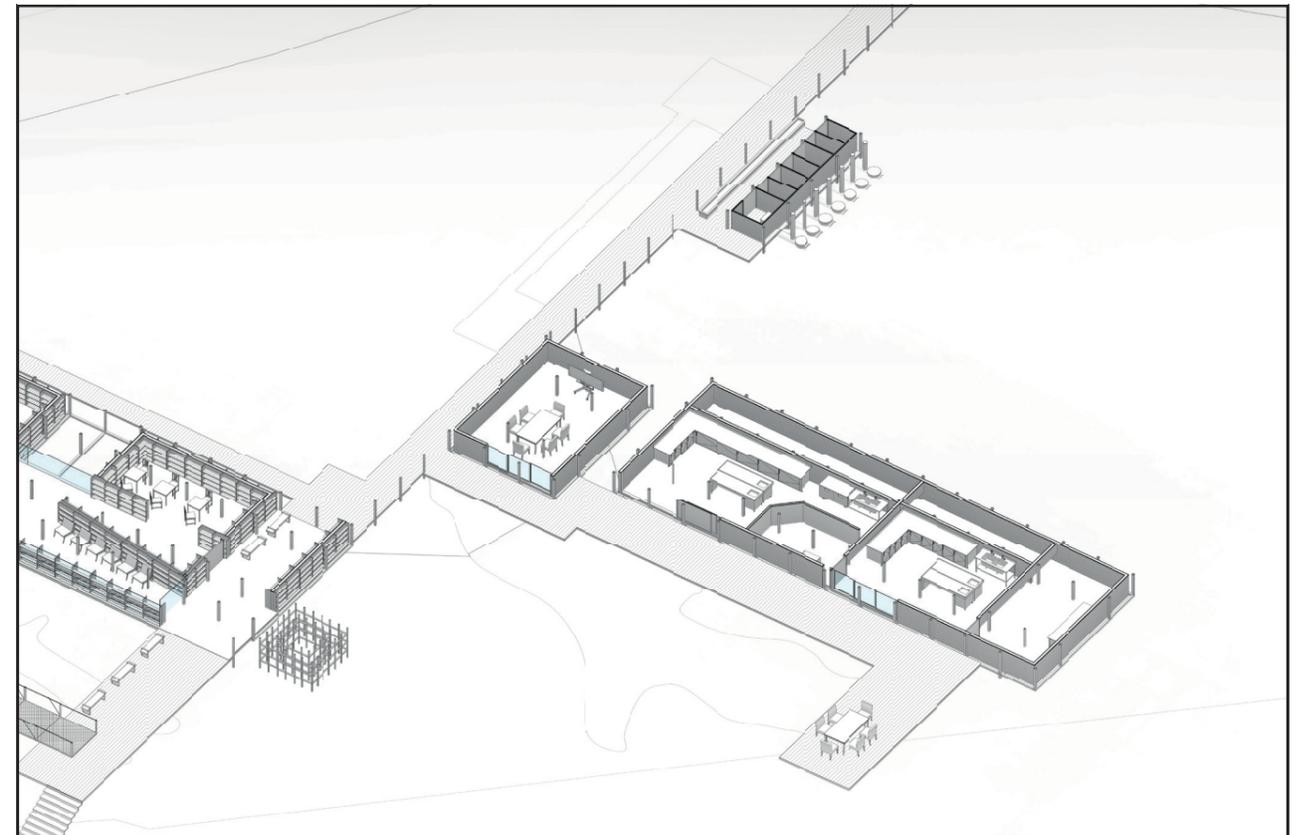
7.20 - Section perspective over proposed research facility (Author, 2016).



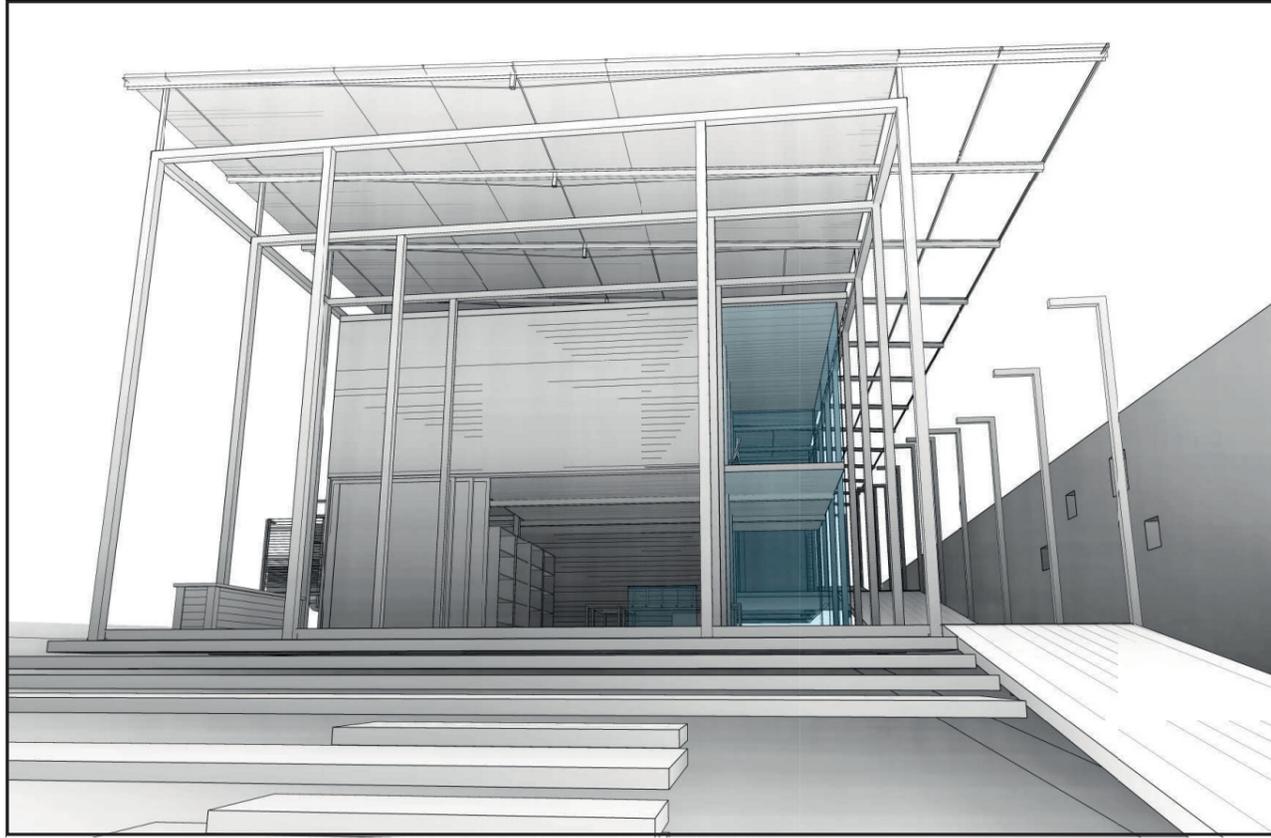
7.22 - Section perspective over proposed library and archive (Author, 2016).



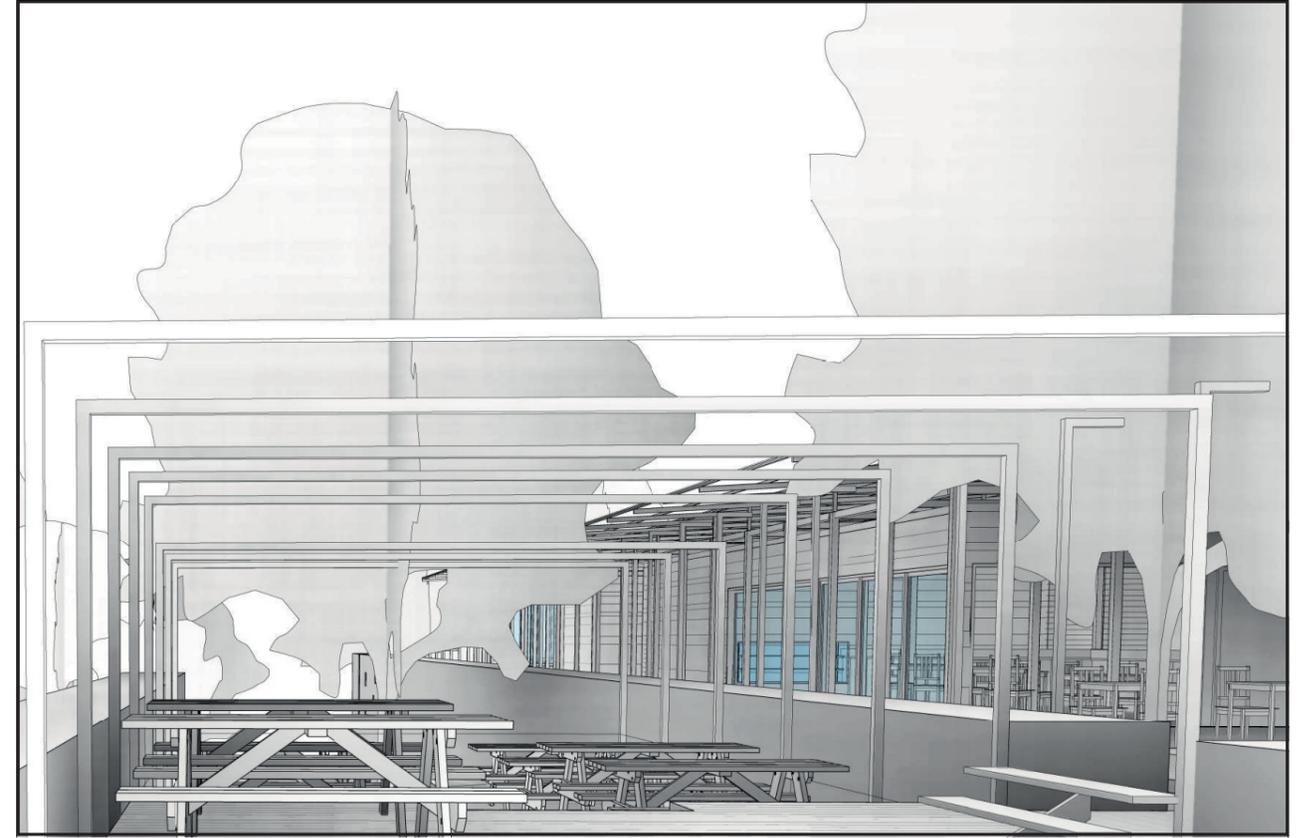
7.21 - Section perspective over proposed administration block (Author, 2016).



7.23 - Section perspective over proposed laboratories (Author, 2016).



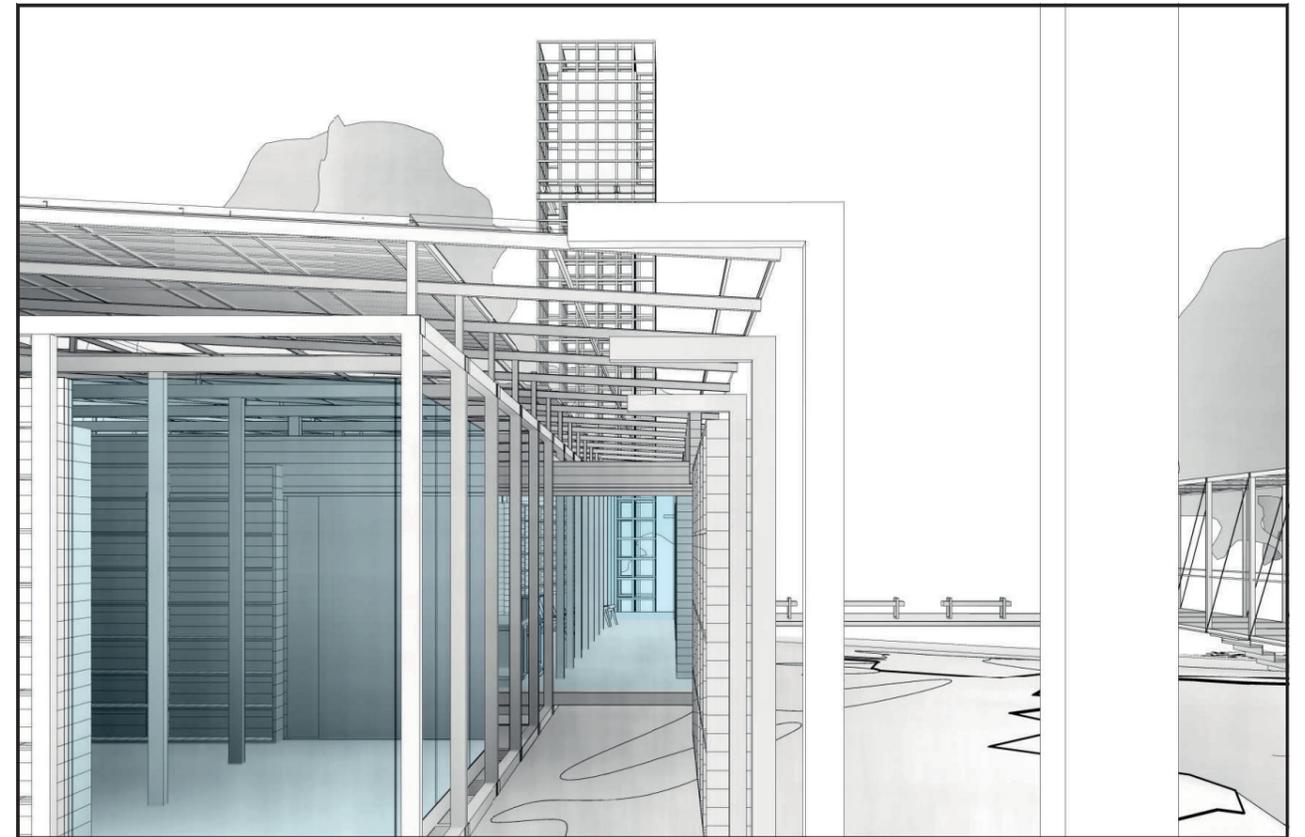
7.24 - Perspective of reception (Author, 2016).



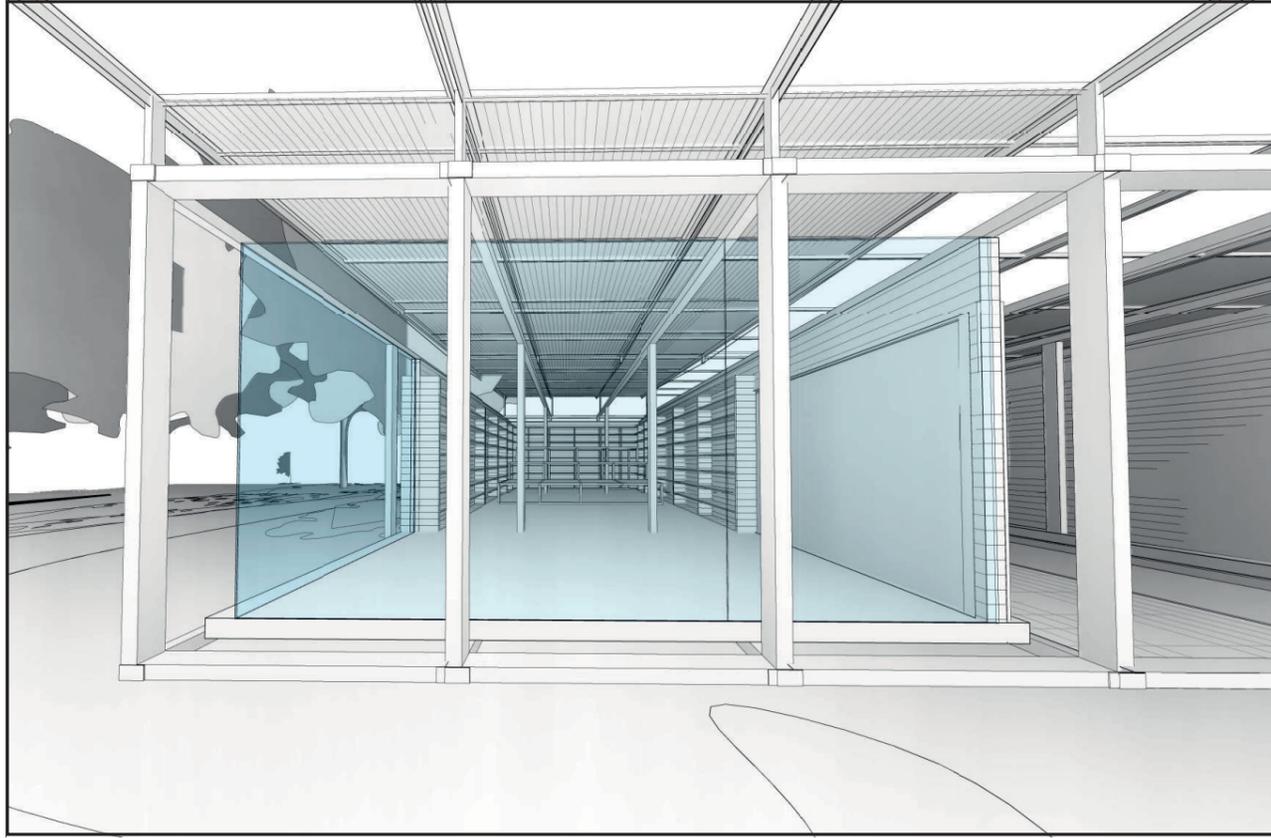
7.26 - Perspective of outside seating area (Author, 2016).



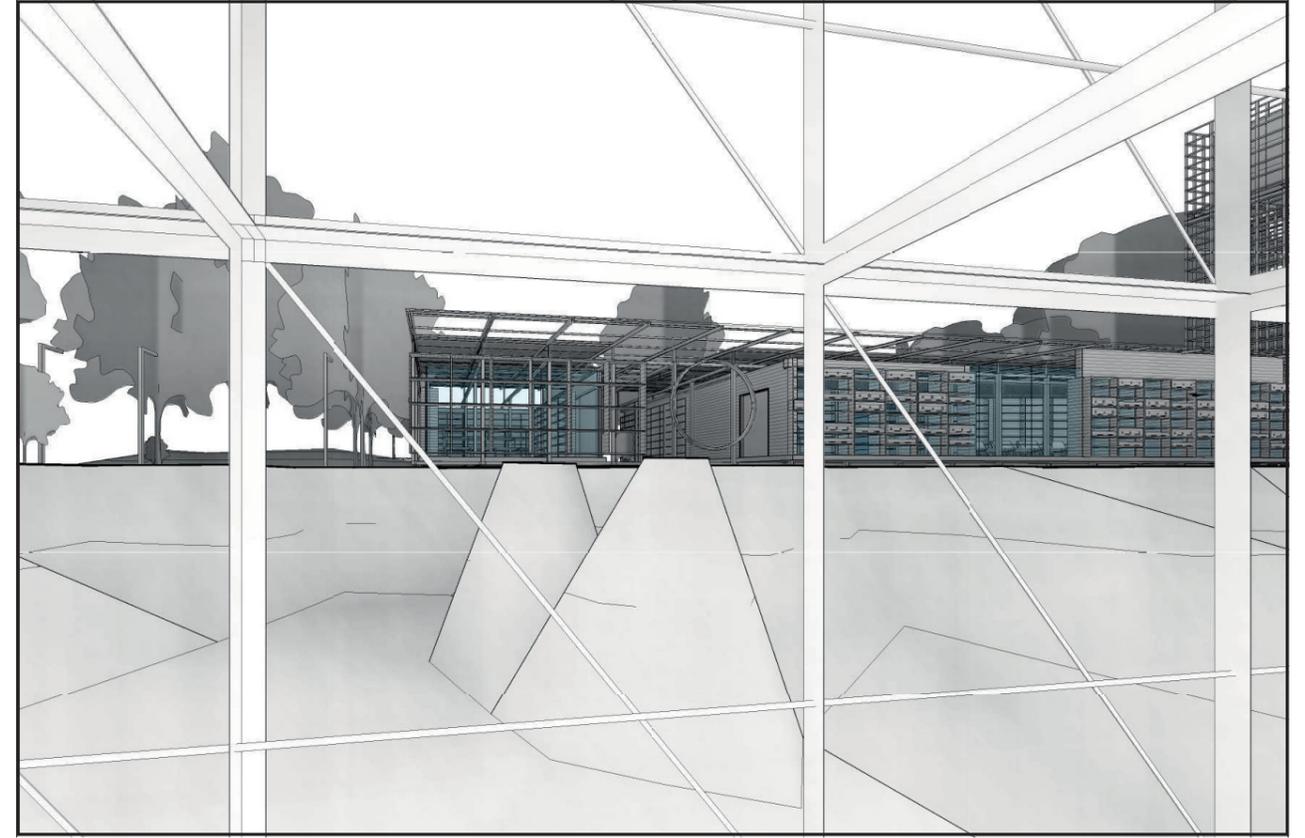
7.25 - Perspective of walkway between restaurant (Author, 2016).



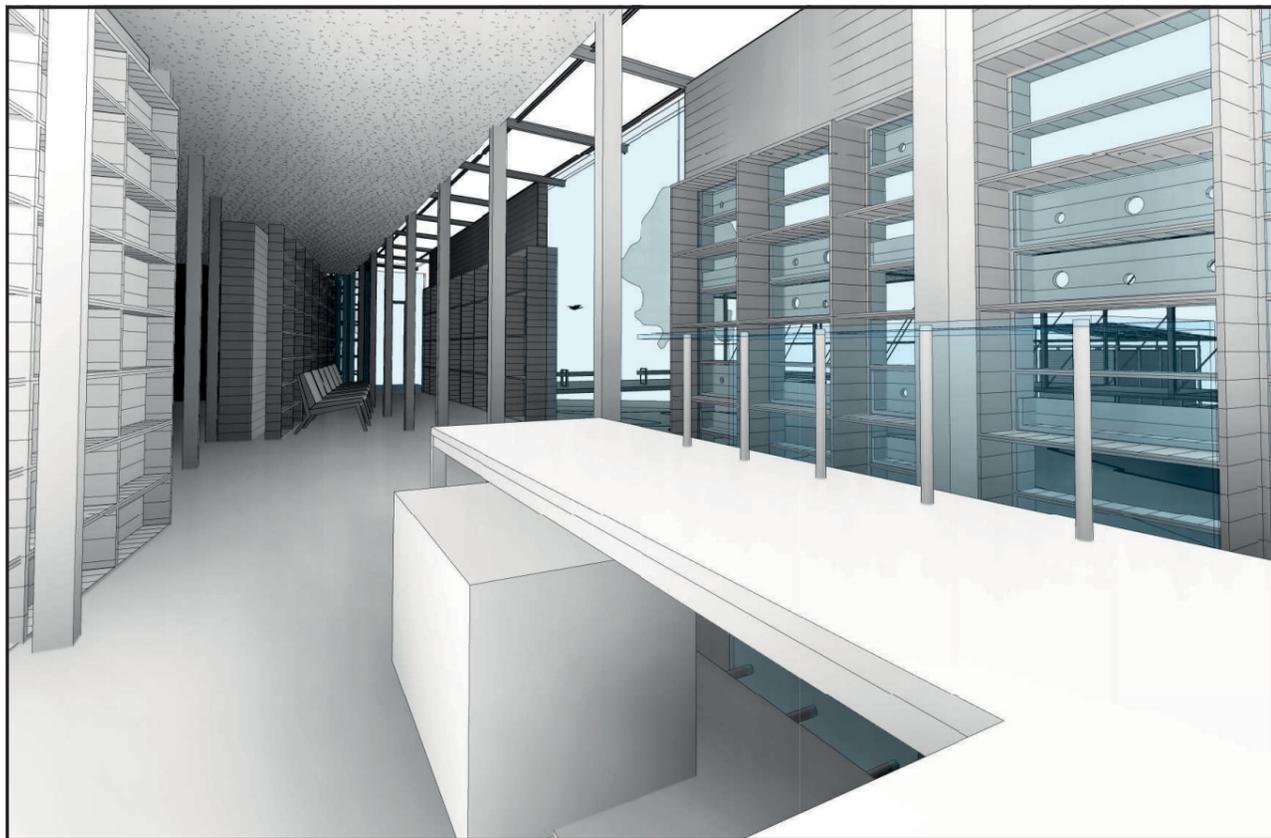
7.27 - Perspective of library entrance (Author, 2016).



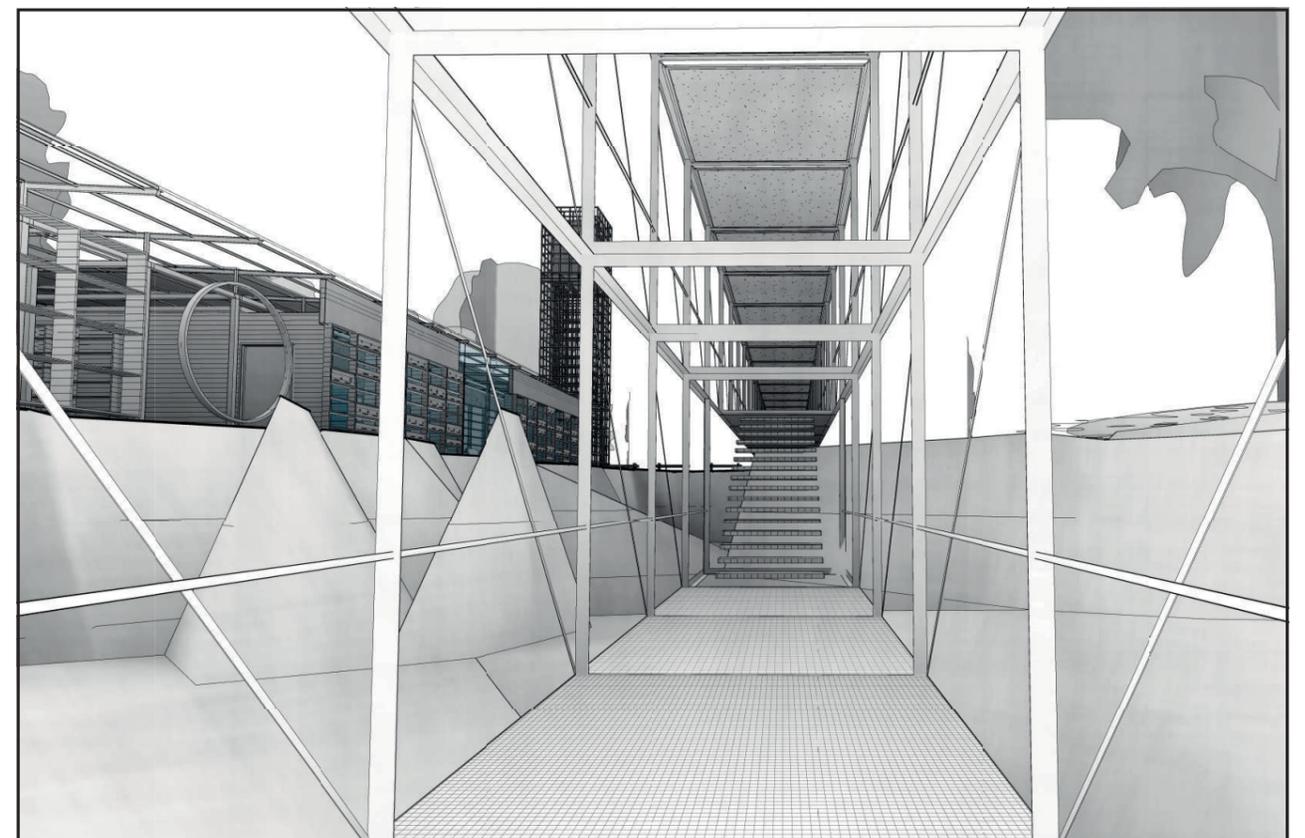
7.28 - Perspective of pavilion (Author, 2016).



7.30 - Perspective of cave walkway (Author, 2016).



7.29 - Perspective of library interior (Author, 2016).



7.31 - Perspective of cave walkway (Author, 2016).