

Technological development

Building on the points argued throughout essays one and two, the project's approach to technical design and development is to protect the existing heritage layers, but not allow them to exist as sole focal elements and only attractions on the site. Second, to represent and express the forgotten and lost historic narratives and marginalised or misrepresented groups that once played a role on the site. And lastly, the stance is taken that a heritage site such as the Union Buildings that has been used all these years as a public park but is not ideally adapted to it, should be designed as a public park to allow these heritage spaces to also be robust and functional and not only passive spaces of commemoration.

As such, the technical investigation is focussed around the topics of inclusive design, designed spatial experience, and site water and ecology:

Representation and access:

- The first investigation focuses on the lack of inclusivity of the site and how the site can be re-imagined and designed to include people of all backgrounds and physical abilities and allow them to experience and enjoy the site and its attributes.
- The second investigation focuses on the lack of inclusive representation and how the forgotten and lost narratives discussed in essays one and two (concentration camp, kraal, and women's protests) can be expressed on the site. The investigation entails experimenting with materiality and planting design to manipulate the phenomenological representation and atmosphere or experience of these spaces.
- The last investigation focuses on a more sustainable water system design and improved ecological qualities of the newly designed site.

Both the first and second technical investigations react to the second research question posed in essay one:

2. How can a landscape intervention be applied as a medium for heritage transformation to act as an all-inclusive park that reflects the broader society and democratic spirit of South Africa?

The inclusivity of the site as mentioned in the question is thus addressed both in terms of accessibility and heritage representation in the design.

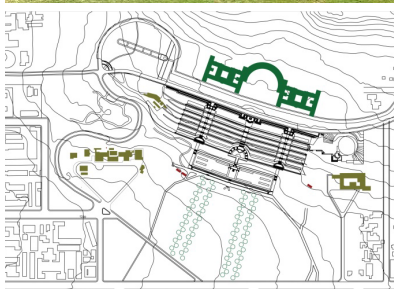


Figure 208-211. Technical issues defined (Varies)

Figure 212. Kraal on Meinjieskop (Crane 1877)

Figure 213. Concentration camp (Alberton Record 2016)

Figure 214. 1956 women's march (Mail & Guardian 2016)

Investigation one: Inclusive design

The unique quality and character of every heritage site, specific to a culture, an event, or a place can to some seem exclusive and can lead to its heritage value in a contemporary society to be doubted or contested. However, even though it might be exclusive in its representation a heritage site should not in my opinion deliberately exclude history, people, and events that played a role in the shaping of that place, and neither should it be exclusive in terms of its accessibility to any person that wishes to visit the site.

The Union Buildings, as such a heritage site, is inherently patronizing, selectively representative, and exclusively accessible, furthermore, despite the fact that the management of the site claims to have attempted a more water-wise planting palette, the site makes little attempt to be more sustainable and ecologically friendly with its water use and monotonous plant beds.

As a designed landscape on the slope of a ridge with a 100 m elevation climb from its lowest point of the site to the ridge of the hill, and with 459 steps on the garden terraces alone, the site is inherently and patronizingly inaccessible to anyone who is not at full-body strength and capability. The intervention thus aims at creating an inclusive design in the form of a series of ramps and landings (to the specifications of SANS10400) that will allow these former marginalised and excluded groups to access and enjoy the site and more specifically the historical terraced gardens

The following table shows that the designed ramps and handrails meet SANS10400 requirements in terms of inclusive design (Author 2021).

SANS10400 requirements	Union Buildings inclusive design
Ramps must not have a gradient steeper than 1:12 as measured along the ramp's center line.	The ramp gradient proposed at the Union Buildings is 1:15
Ramps must be at least 1100mm wide and have a clear trafficable surface.	All ramps are 1500mm wide
Ramps must have a surface in accordance with SANS10400 regulations	
Ramps must have a landing at the top and bottom of each ramp at least as wide as the ramp and with a minimum length of 1200mm.	Each landing has a minimum width of 1500mm and length of 2000mm
At the maximum gradient of 1:12: a ramp must have a landing at every vertical rise of 500mm and every 6m length of ramp.	The gradient proposed is 1:15
At the gradient of 1:15: a ramp must have a landing at every vertical rise of 665mm and every 10m length of ramp.	These standards are used to create a module that is repeated in the ramp design
Ramps must have a handrail on both sides of the ramp	These standards are met
At a vertical rise of more than 600mm the ramp should be staggered	The ramps are staggered to prevent a single line of long ramps in one direction and monotonous experience for the user
All circular handrails must have a diameter between 35 and 50mm wide	The diameter proposed is 45mm
The height of the handrail should be consistently throughout the length of the ramp be between 900mm and 1000mm from the surface of the ramp	The height of the handrail is consistently 950mm high
The handrails shall extend 300mm beyond the top and bottom of the ramp onto the landings	These requirements are met
These extensions act as tactile aid for persons with visual impairments	The extensions will act as tactile aids among other proposed details

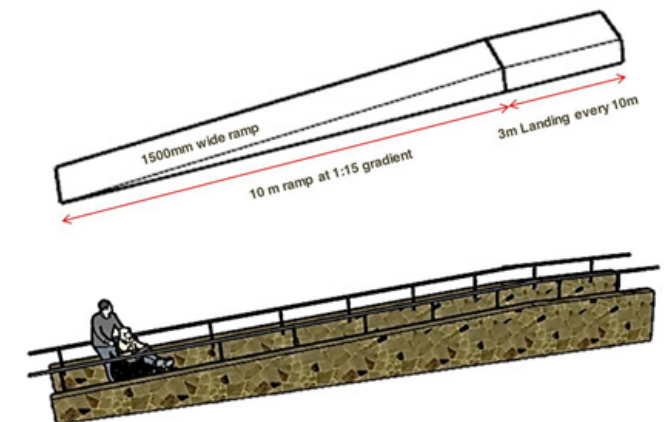


Figure 215-217. Inclusive design
(Author 2021)

Terrace number / name	Terrace height	1:15 ramp length	Ramps every 10m 1,5m wide	Total length	Ramps every 10m 3m wide	Total length	1:20 ramp length	Ramps every 15m 3m wide	Total length
1 – Terrace to UB	6,274 m	94,11	9 (13m)	107,11	9 (27m)	121,11	125,48	8 – 27m	152,48
2 – Delvillewood memorial - wall	4,24m	63,6	6 (9m)	72,6	6 (18m)	81,6	84,8	5 – 15m	99,8
3- Small terrace 1	1,352	20,28	2 (3m)	23,28	2 (6m)	26,28	30,44	1 - 3m	33,44
4- Small terrace 2	1,522	22,83	2 – 3m	25,83	2 – 6m	28,83	30,44	1 - 3m	33,44
5- Small terrace 3	1,182	17,73	1 - 1,5m	19,23	1 - 3m	20,73	23,64	1 – 3m	26,64
6- Small terrace 4	1,182	17,73	1 – 1,5m	19,23	1 – 3m	20,73	23,64	1 – 3m	26,64
7- Small terrace 5	1,711	25,665	2 – 3m	28,665	2 – 6m	31,665	34,22	2 – 6m	40,22
8- Small terrace 6	1,711	25,665	2 – 3m	28,665	2 – 6m	31,665	34,22	2 – 6m	40,22
9- Large terrace to NM statue	3,96m	59,4	5 – 7,5m	66,9	5 – 15m	74,4	79,2	5 – 15m	94,2
10- Large terrace to War memorial	3,92	58,8	5 – 7,5m	66,3	5 – 15m	73,8	78,4	5 – 15m	93,4
11- Medium terrace	2,56	38,4	3 – 4,5m	42,9	3 – 9m	47,4	51,2	3 – 9m	60,2
12- Small terrace 8	0,85	12,75	1 – 1,5m	14,25	1 – 3m	15,75	17	1 – 3m	20

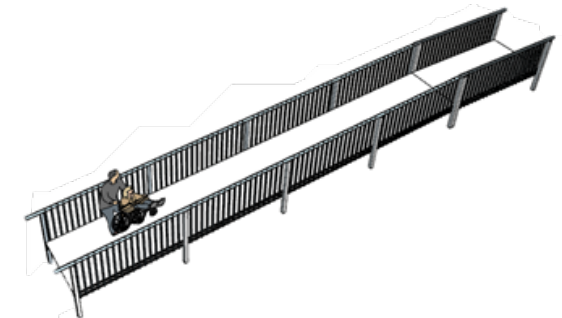
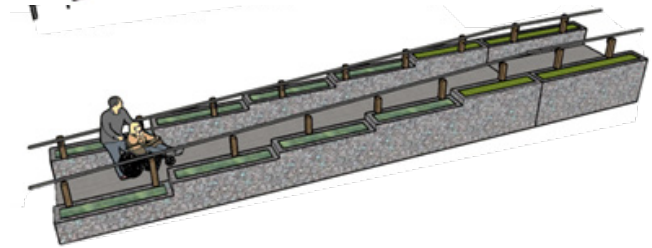
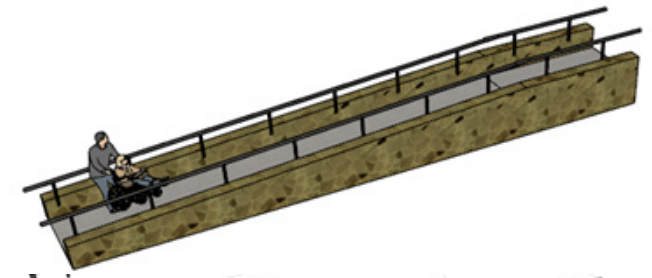


Figure 218-222. Inclusive design ramp calculations and design (Author 2021)

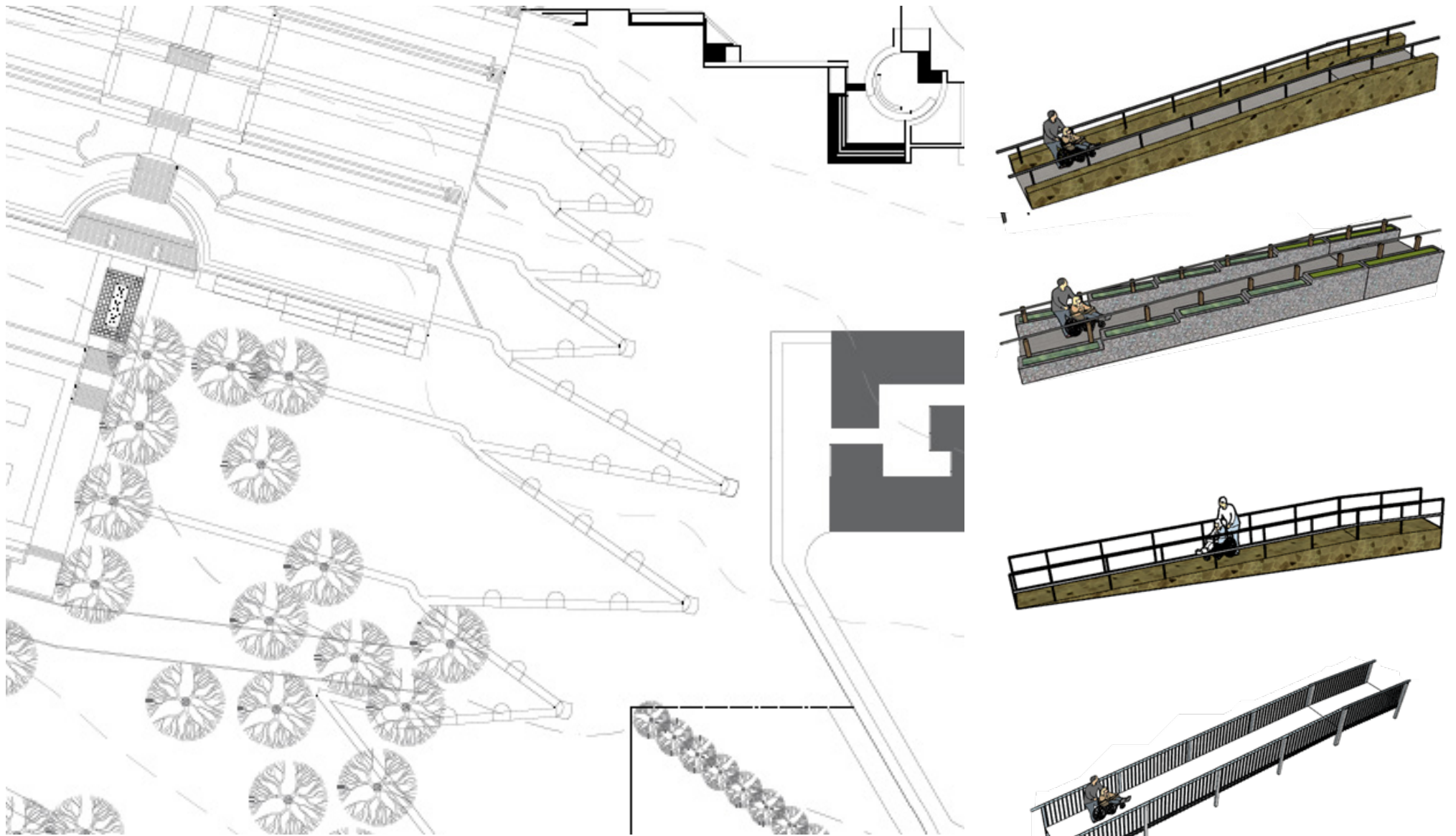


Figure 223-227. Inclusive design ramp placement and materiality (Author 2021)

Materiality options were weighed between stereotomic structures of either stone masonry ramps or tectonic structures of aluminium ramps and lastly, a combination of the two was considered in the form of a stone alternative such as gabions. However, in order to maintain the spirit of Arts and Crafts stone walls and the integrity of the heritage site, the conclusion to the materiality investigation was to build the new ramps using stone masonry walls. The heritage walls are protected by the National Heritage Act, as structures older than 60 years and also as part of the registered protected national heritage site. Thus the ramps providing access between the different terraces will have to be constructed on the lawn slope, east of the terrace walls that was identified as an area with little to no heritage value where new interventions can be proposed. Building these ramps on the sloped lawn areas allow for the landscaping to be designed between the staggered ramps to create a multi-sensory experience between the terrace levels, and properly designed landings and resting areas can contribute to the overall experience of the site.

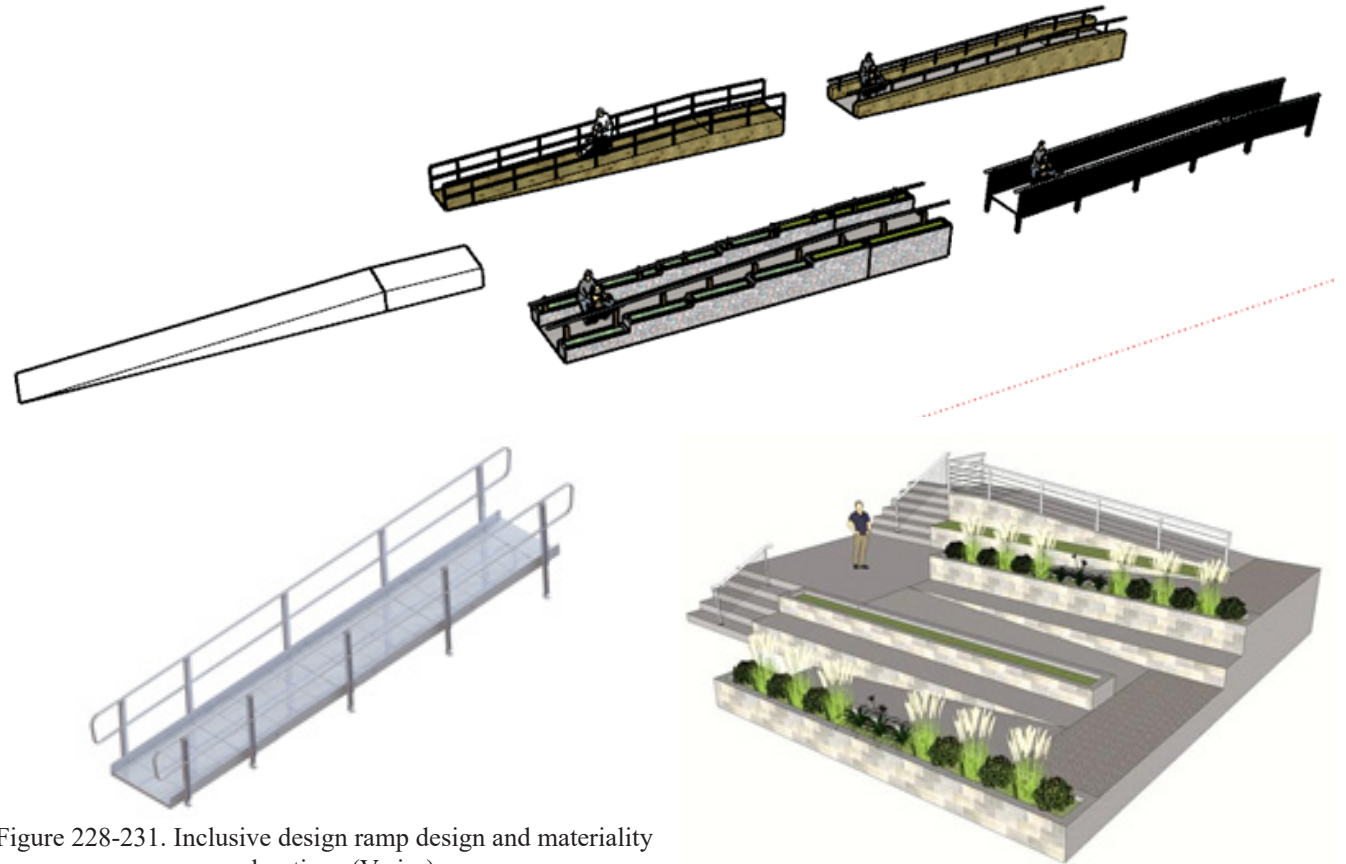


Figure 228-231. Inclusive design ramp design and materiality explorations (Varies)

One ramp, however, is proposed to be built on the eighth terrace against one of the heritage terrace walls. This proposed ramp is in an area where the wall has been badly ruined and lack of maintenance has led to further decay, it is also on the Easternmost edge of the terrace wall where it will be able to integrate with the new proposed ramp system. The direct access between two of the terraces will provide a unique experience similar to what an able-bodied person would experience using the heritage stairs on the terraces.

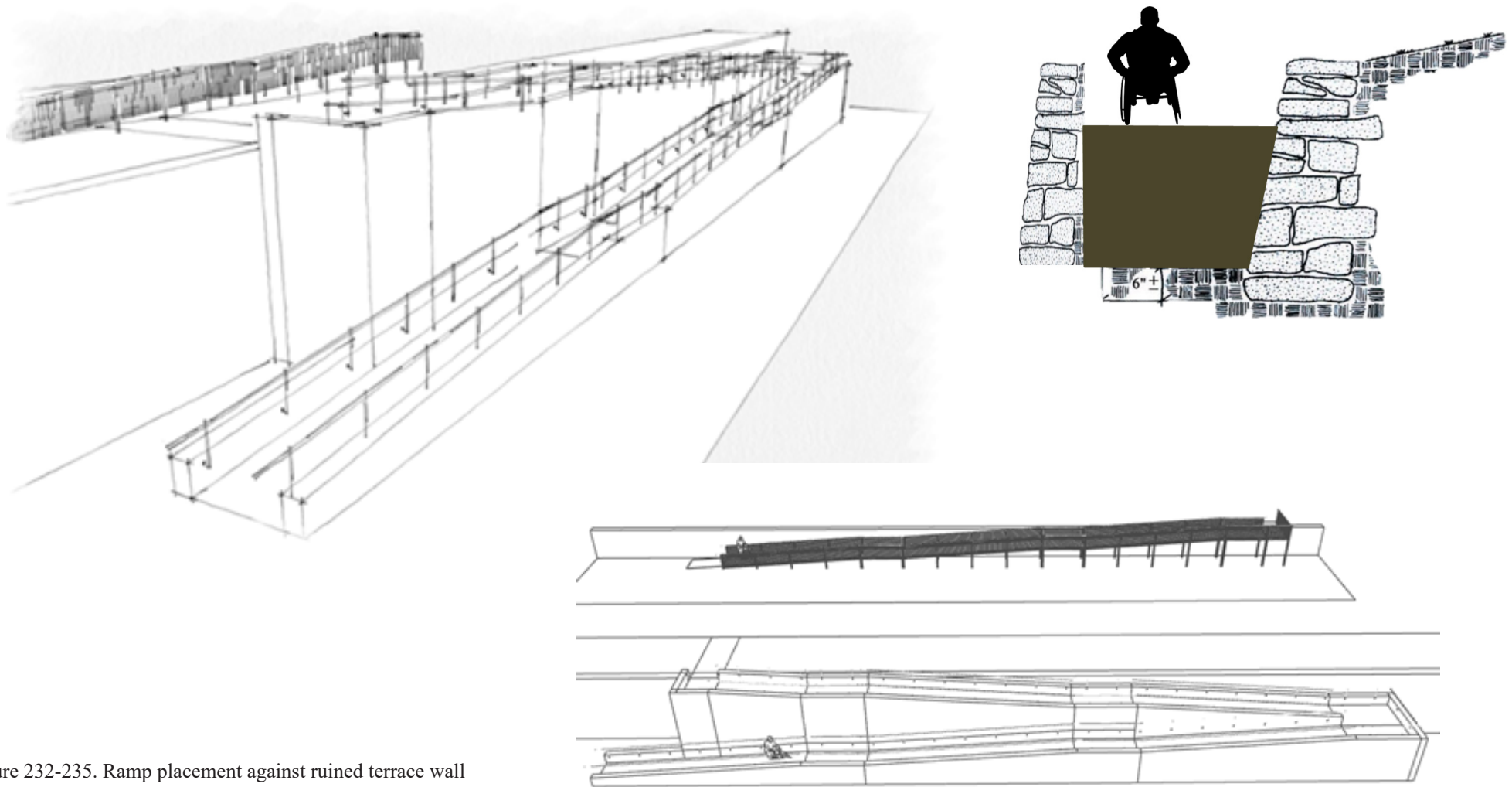


Figure 232-235. Ramp placement against ruined terrace wall
(Author 2021)

Model explorations of terrace wall ramp

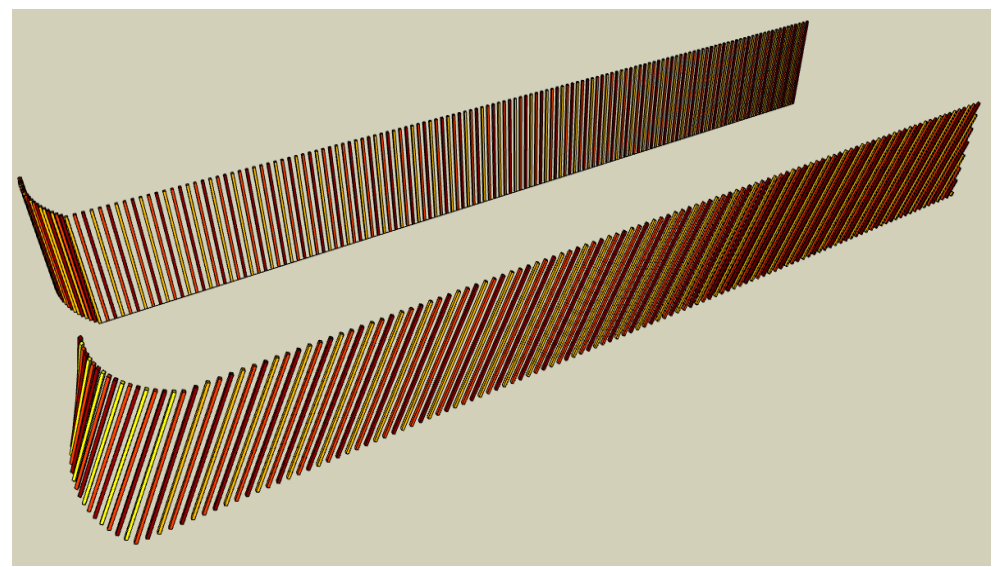
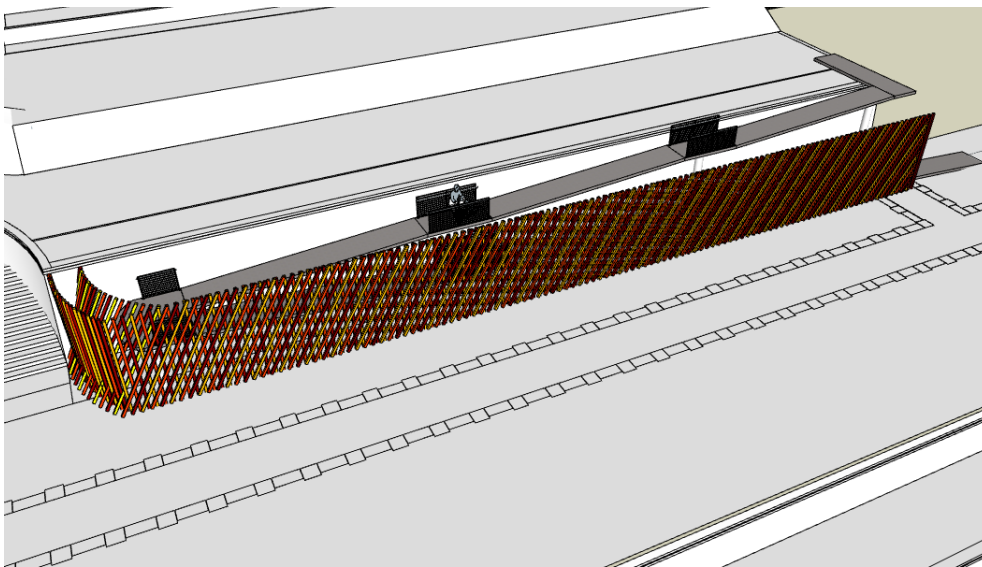
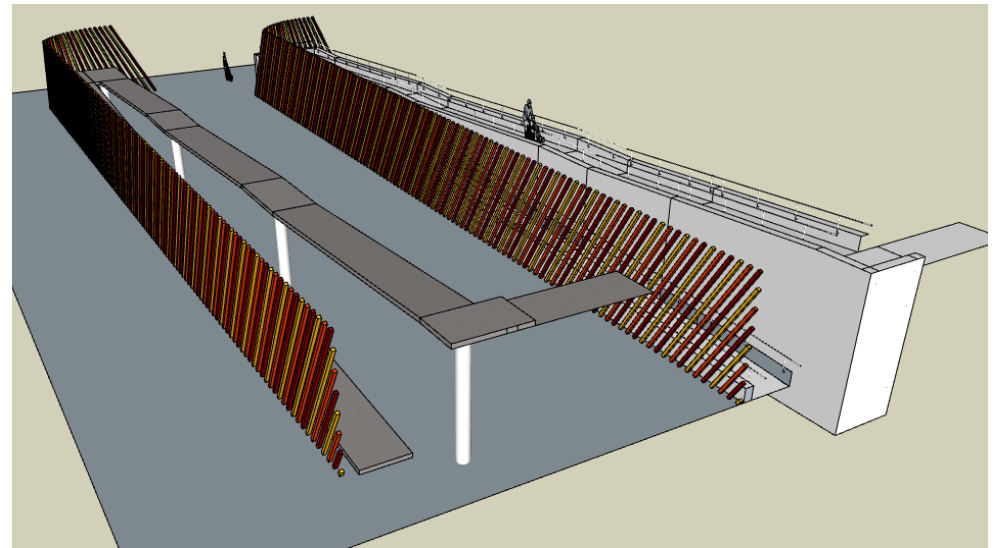
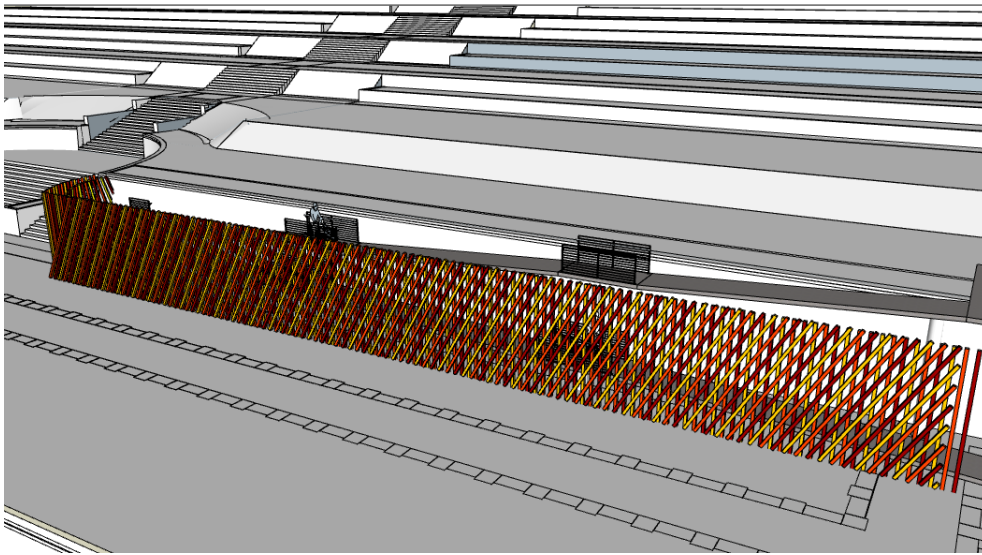
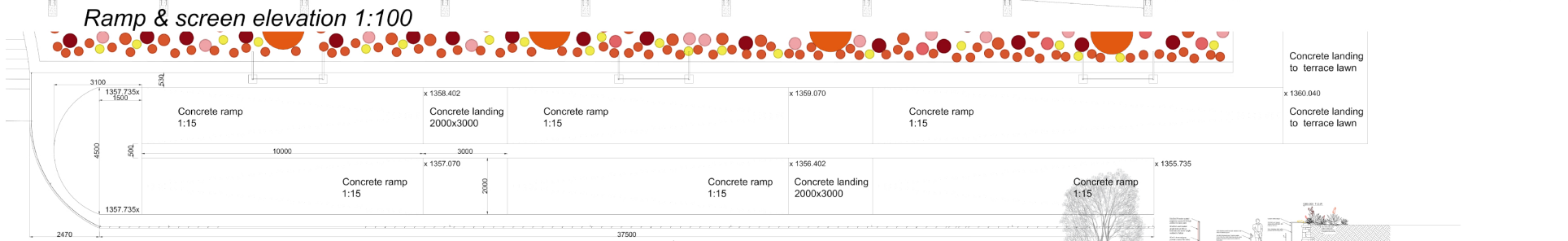
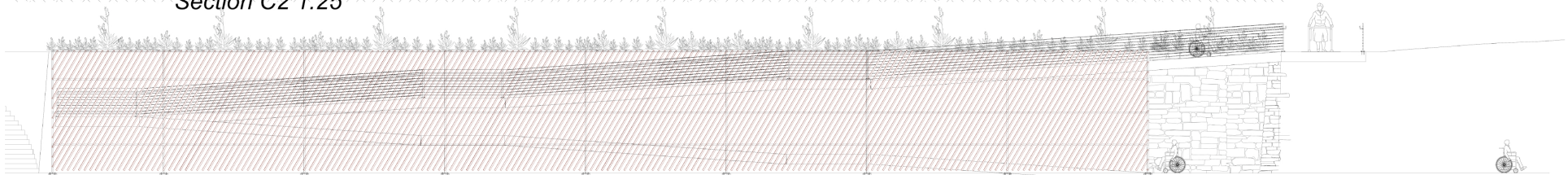
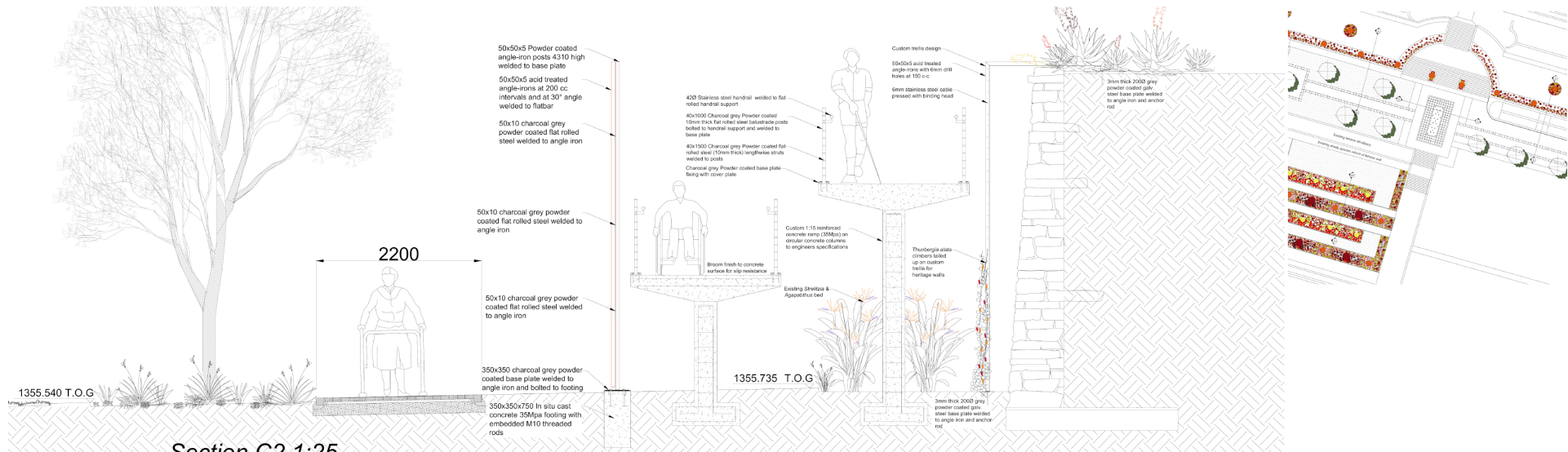


Figure 236-239. Ramp model explorations(Author 2021)



Ramp plan 1:00

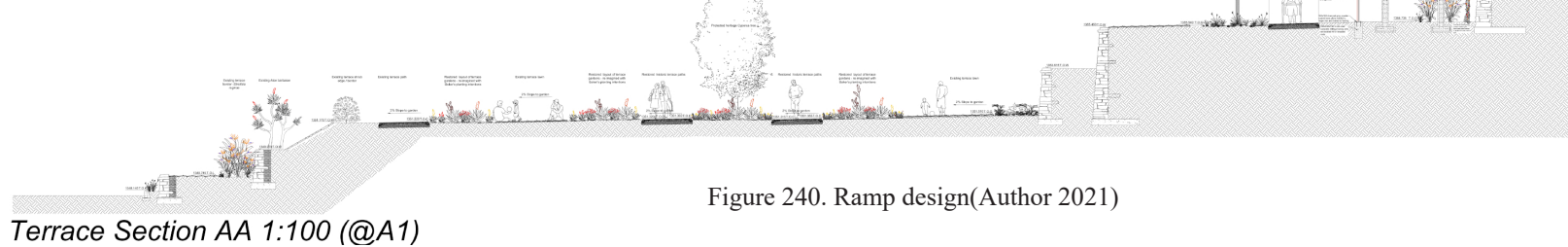
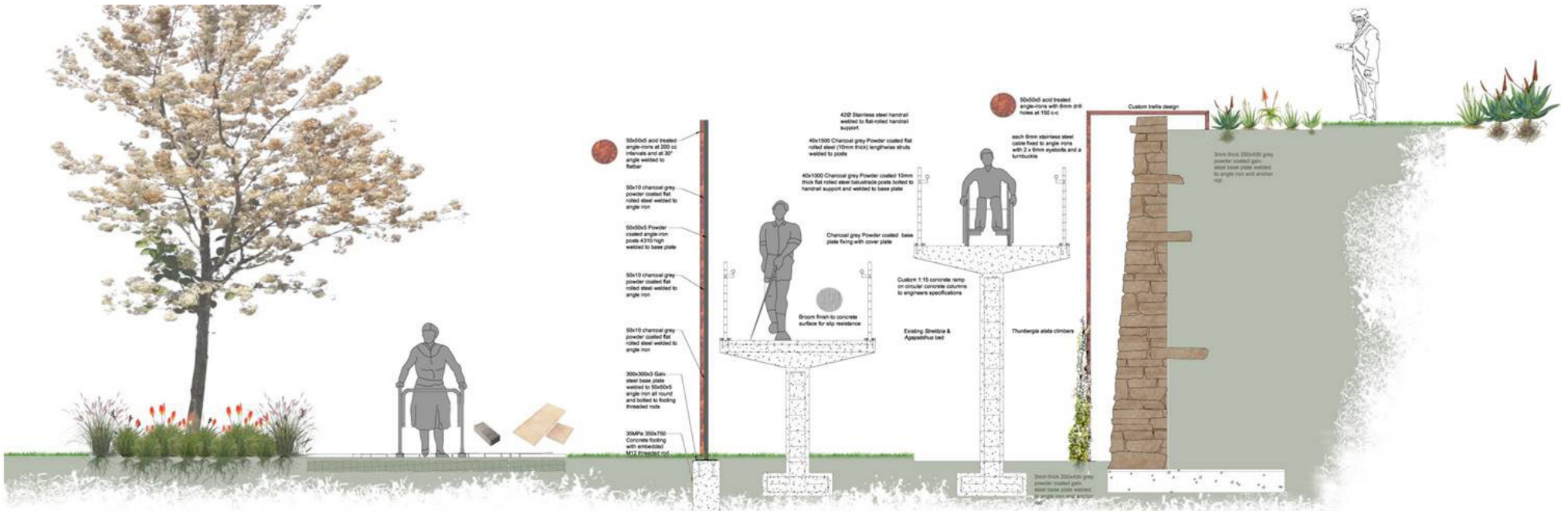


Figure 240. Ramp design(Author 2021)



1:20 Details of terrace wall ramp, screen and trellis

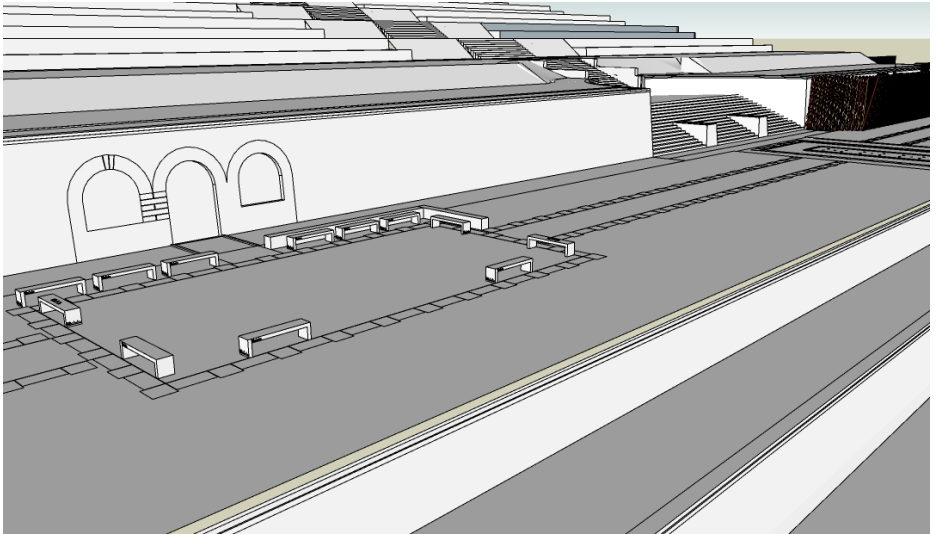
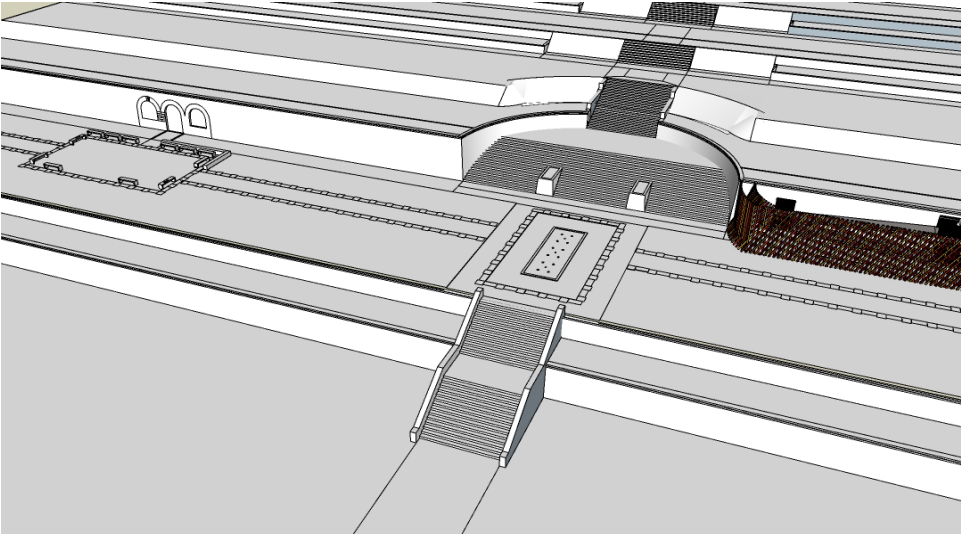


Figure 241. Ramp and terrace design(Author 2021)

Phenomenology

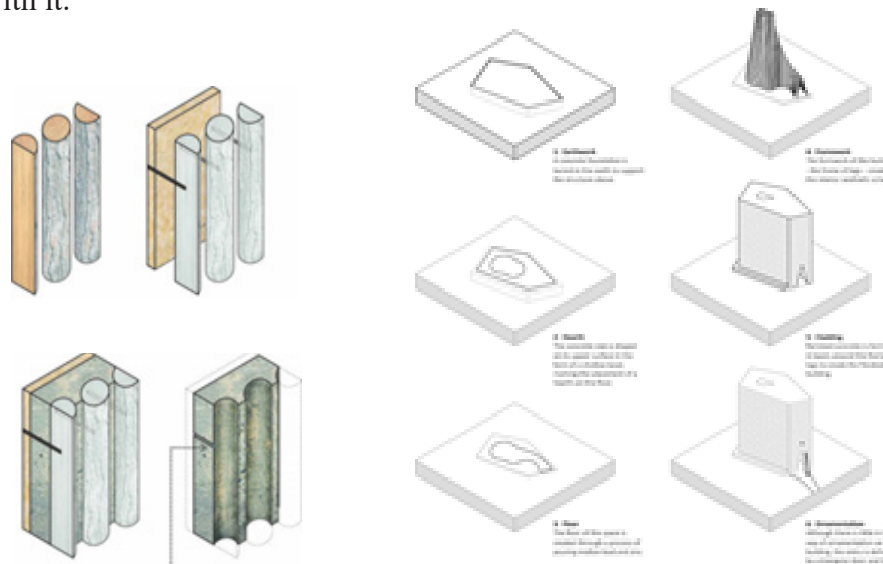
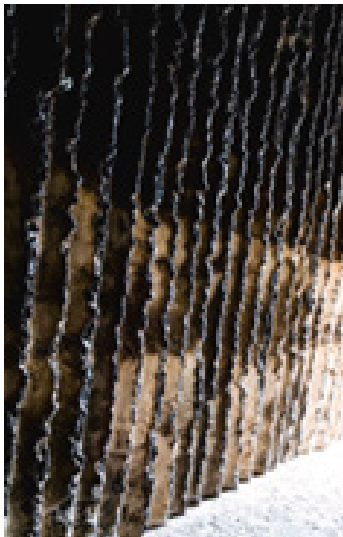
How can an appropriate memorial space be designed to articulate the loss of concentration camps – The scorched earth policy was chosen as inspiration for the atmosphere and materiality of the designed space, to represent the destruction, loss and death of the concentration camps and Anglo-Boer War. Since fire also plays an important role in highveld ecology with the regular occurrence of veld fires, fire and a charred landscape also became an important informant for the planting where fire can be used and represented in the design.

The technical experiment entailed investigating the possible aesthetic effect fire can have on construction materials where fire becomes more permanent in the colour and texture of the surface materiality.

The Bruder Klaus Field Chapel (2007) of the well-known phenomenologist, Peter Zumthor was studied and informed the material investigation for the project.

Concrete was chosen, where the formwork is burnt after the concrete has been set, which alters the texture and colour of the finished product, making the after-effects of fire permanent in the landscape. This material will be used to build walls, seating walls and floor surfaces. and charred timber poles

The concentration camp memorial route sits as a permanent reminder of the loss within the natural landscape on the hill, in contrast with it.



**Concentration camp remembrance
(Collage by Author 2021)**

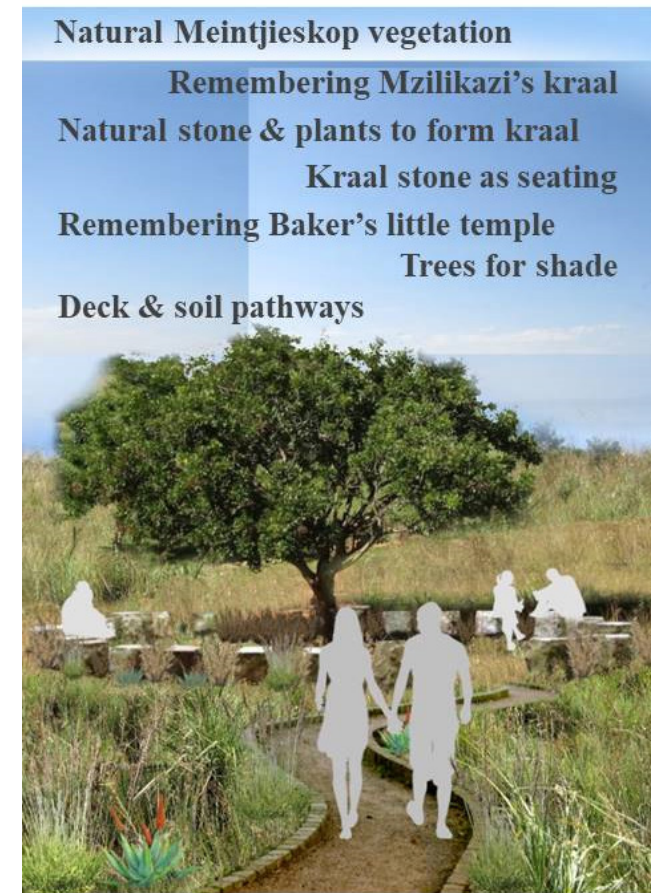
Concentration camp remembrance collage by Author 2021
Figure 242. Bruder Klaus field chappel (Archdaily 2016)
Figure 243. Bruder Klaus field chappel (CJS Research & teaching anthology n.d.)
Figure 244. Bruder Klaus field chappel (Moodydesigns 2019)

How can an appropriate passive gatherings space be designed to articulate the lost kraal narrative – Stone, natural environment, seating place, viewpoints, informal pathways
Research into materiality & planting of kraal typologies and the natural vegetation of the area.

Neither the concentration camp nor kraal can be placed in their exact historic position on the site, and their narratives are similar where the original Mzilikazi kraal was built as part of a military kraal associated with war and the concentration camp was part of the Anglo-Boer war. Since the programming of these contemporary spaces is similar in the form of passive gathering space on the hill that allows for elevated views over the city, the two spaces are arranged as a series of places along one trail on the koppie. Location, form and materials are chosen as indirect representation and for spatial experience and atmosphere of these narratives rather than a direct duplication of these historic places and their location.

To represent the theme of the natural occurrence of veld fires in the grassland and bushveld of South Africa burned concrete is used as material. To represent the theme of stone kraals, plants are chosen that naturally grow on rocky outcrops as well as for their fire resistance and plants that according to academic documents were planted around kraals.

The designed spaces manifest as a viewing platform on the hill, taking the shape of a platform on the slope acting as a kraal on the hill. The outer face of the walls that surround this space, will be the first view a visitor would see of the space from the Union Buildings and nature walk.



**Kraal re-imagined as final destination
on koppie (Collage by Author 2021)**

Figure 245. Kraal remembrance collage (Author 2021)

Investigation two - material (fire and concrete)

The investigation was based on the precedent of Peter Zumthor's Bruder Klaus Field Chappel where the chapel was constructed by burning combustible material used as part of the formwork.

Method: The investigation was done by building six pine timbre boxes of 400x400 mm large after which concrete was cast into these boxes at 50 mm thick and six different types of combustible materials were placed onto these surfaces and partially embedded into the wet concrete. The combustible materials were: Eucalyptus tree lathes, pine cones, bamboo lathes, bark chips, SA pine timber planks, and grass. After a week of curing the concrete, the outer formwork boxes were removed and the combustible material was set on fire. The materials were allowed to burn away to create both unique textural and pigmentation alterations to each of the blocks. Two days after burning the combustible materials away the blocks were sprayed off with a light spray using a hose, removing the ash from the blocks it washed away the light grey colour off the blocks and highlighted the black soot colour that stained the concrete, the spray also removed all loose debris that filled the crevices formed by the fire and allowed the full textural changes to appear.



Timbre formwork –
400 x 400 blocks



Combustible material – wood
lathes



Combustible material – bark
chips



Combustible material – Cut grass



Combustible material – planks



Combustible material – reed lathes

Figure 246. Fire experiments - combustible materials and formwork (Author 2021)



Figure 247. Fire experiments - Curing and burning



Figure 248. Fire experiments - After curing fires

Conclusions: Although some of the materials such as the timber planks, bamboo, and wood lathes could simply be removed instead of burning it away, the fire creates the added advantage of coloured concrete and the fire allows finer textural details to be formed on the concrete where the removal of the formwork will chip it off.



Figure 249. After cooling, wash and cleaning
(Author 2021)

With the smaller and more complex shapes of combustible material such as the grasses, pine cones, and bark chips, trying to remove them by hand-made the concrete break and crumble away instead of allowing the fire to burn the complex patterns and shapes into the concrete.



Figure 250. Fire experiments - post wash colour and textures
(Author 2021)



Figure 251. Fire experiments - Final colour and texture
(Author 2021)

Kraal memorial place Palette - fire

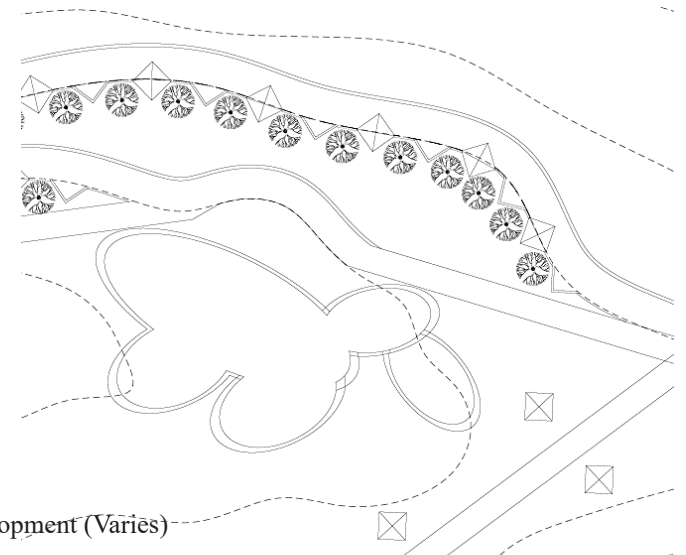
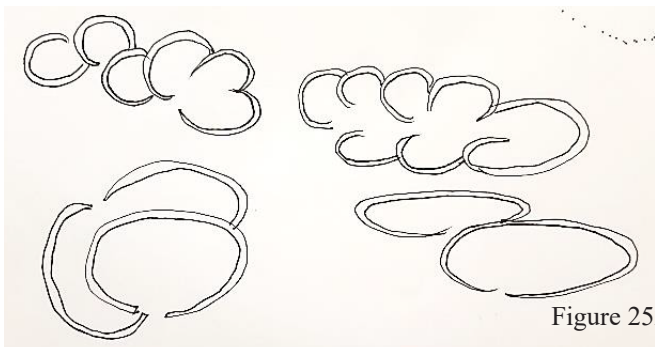
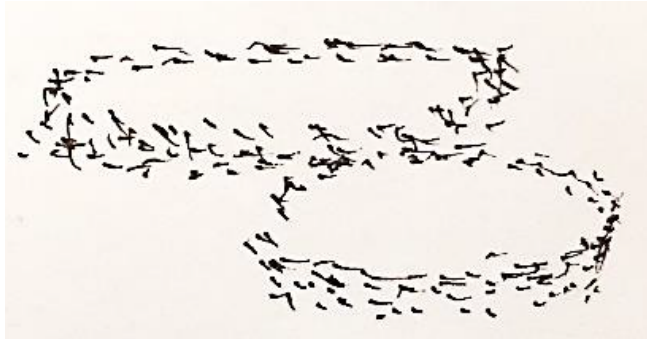
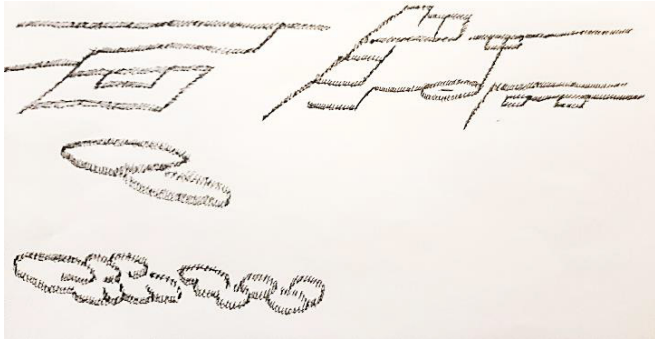
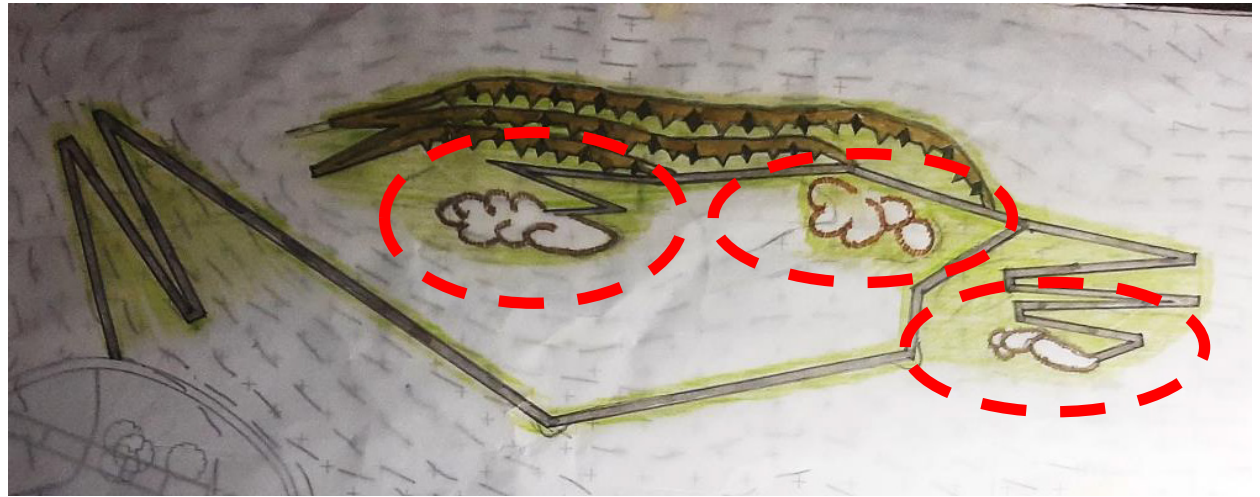


Figure 252-257. Kraal memorial space design inspiration and design development (Varies)

Section through Kraal and Concentration camp memorial areas

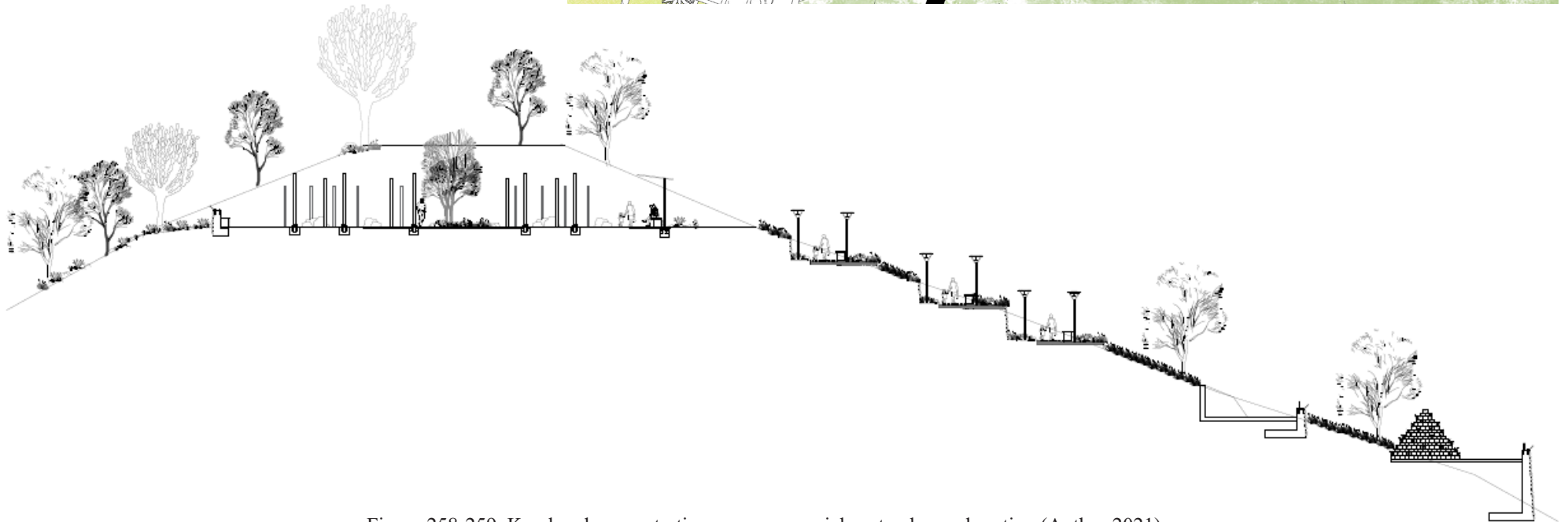
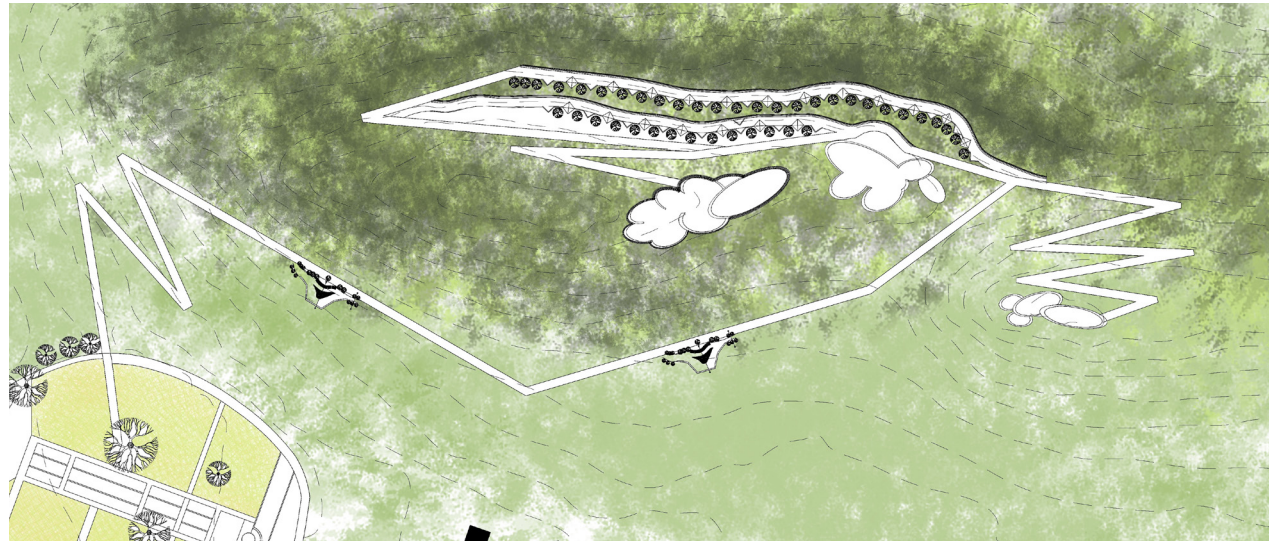


Figure 258-259. Kraal and concentration camp memorial route plan and section (Author 2021)

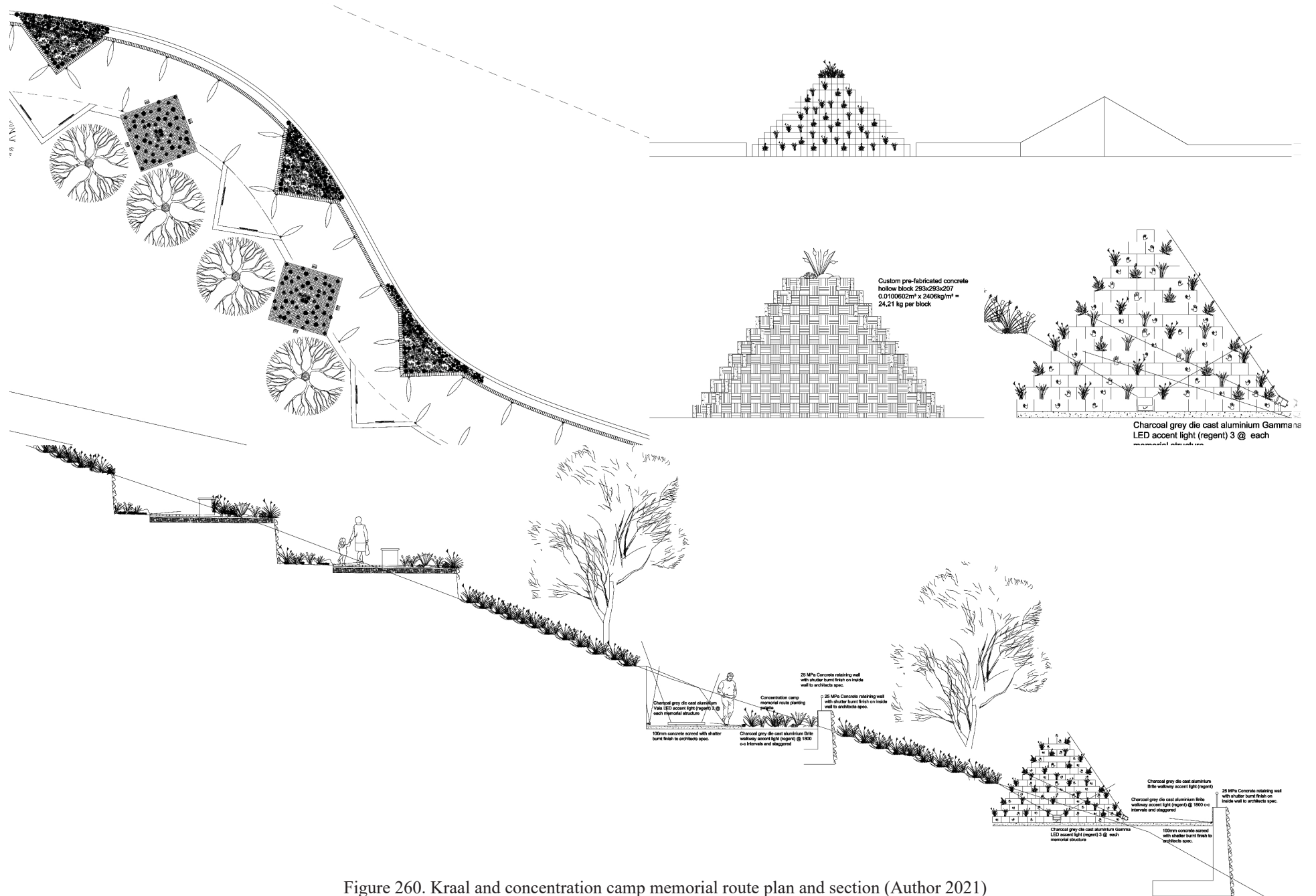


Figure 260. Kraal and concentration camp memorial route plan and section (Author 2021)

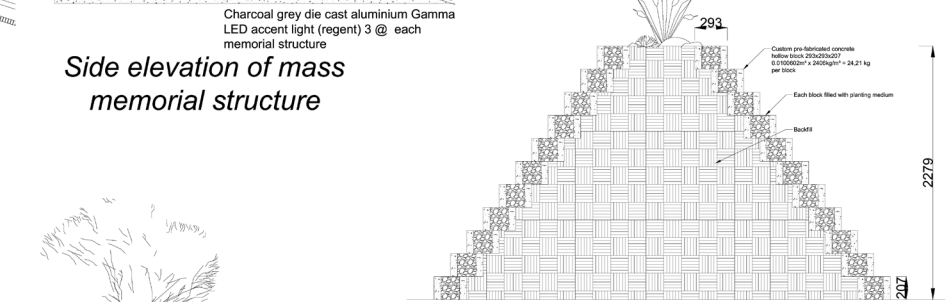
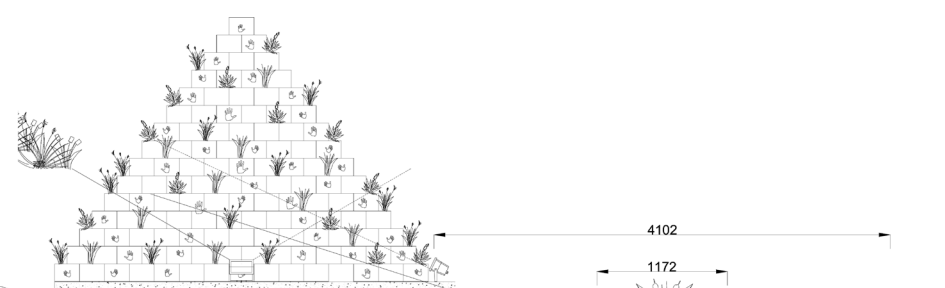
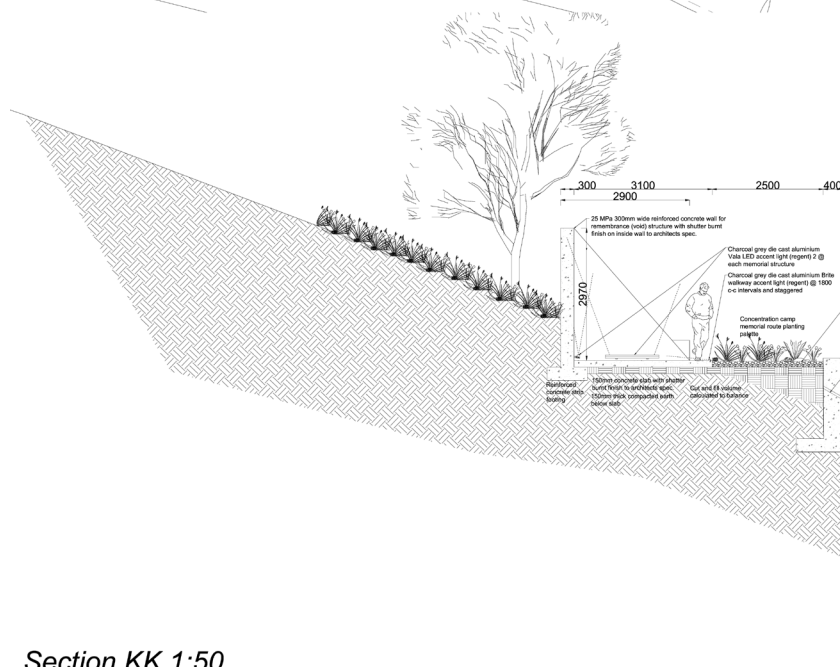
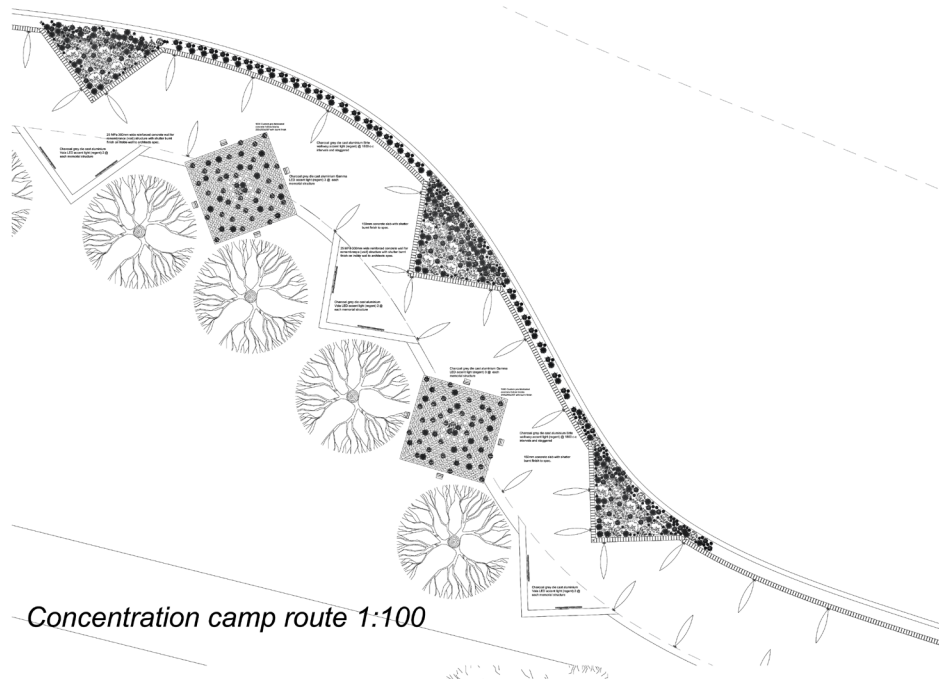
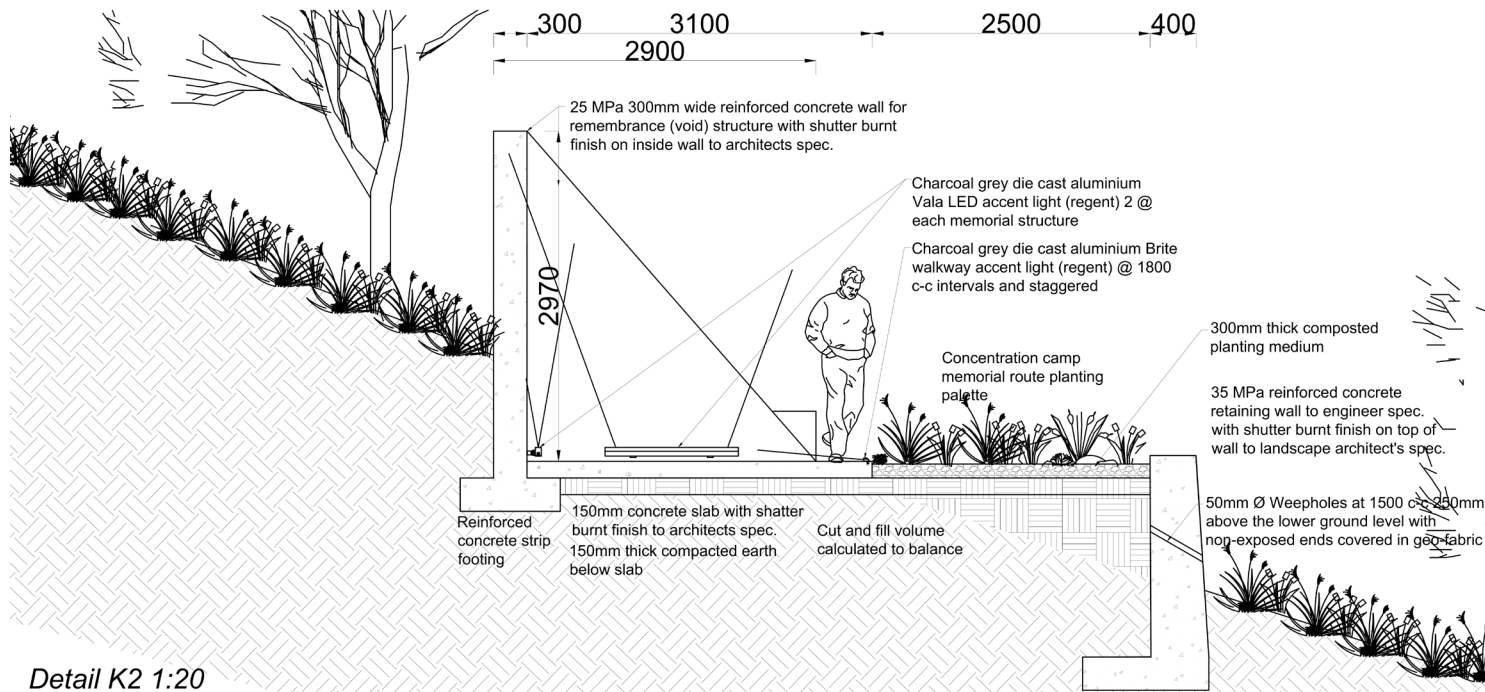
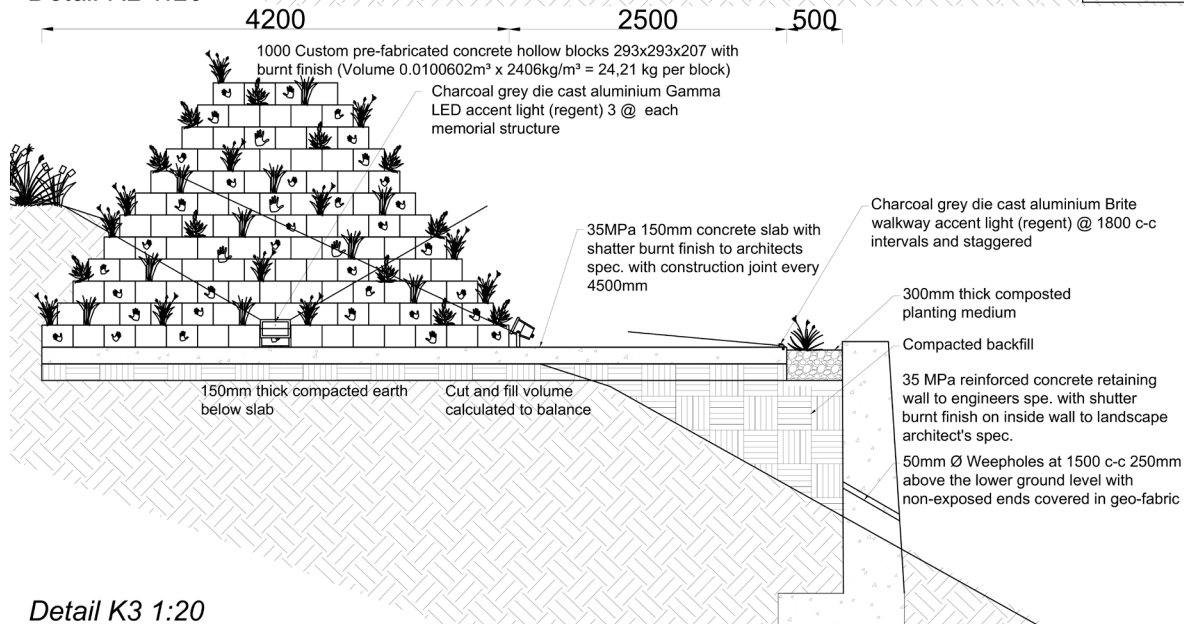


Figure 261. Kraal and concentration camp memorial route plan and section (Author 2021)



Detail K2 1:20



Detail K3 1:20

Figure 262. Kraal and concentration camp memorial route details (Author 2021)

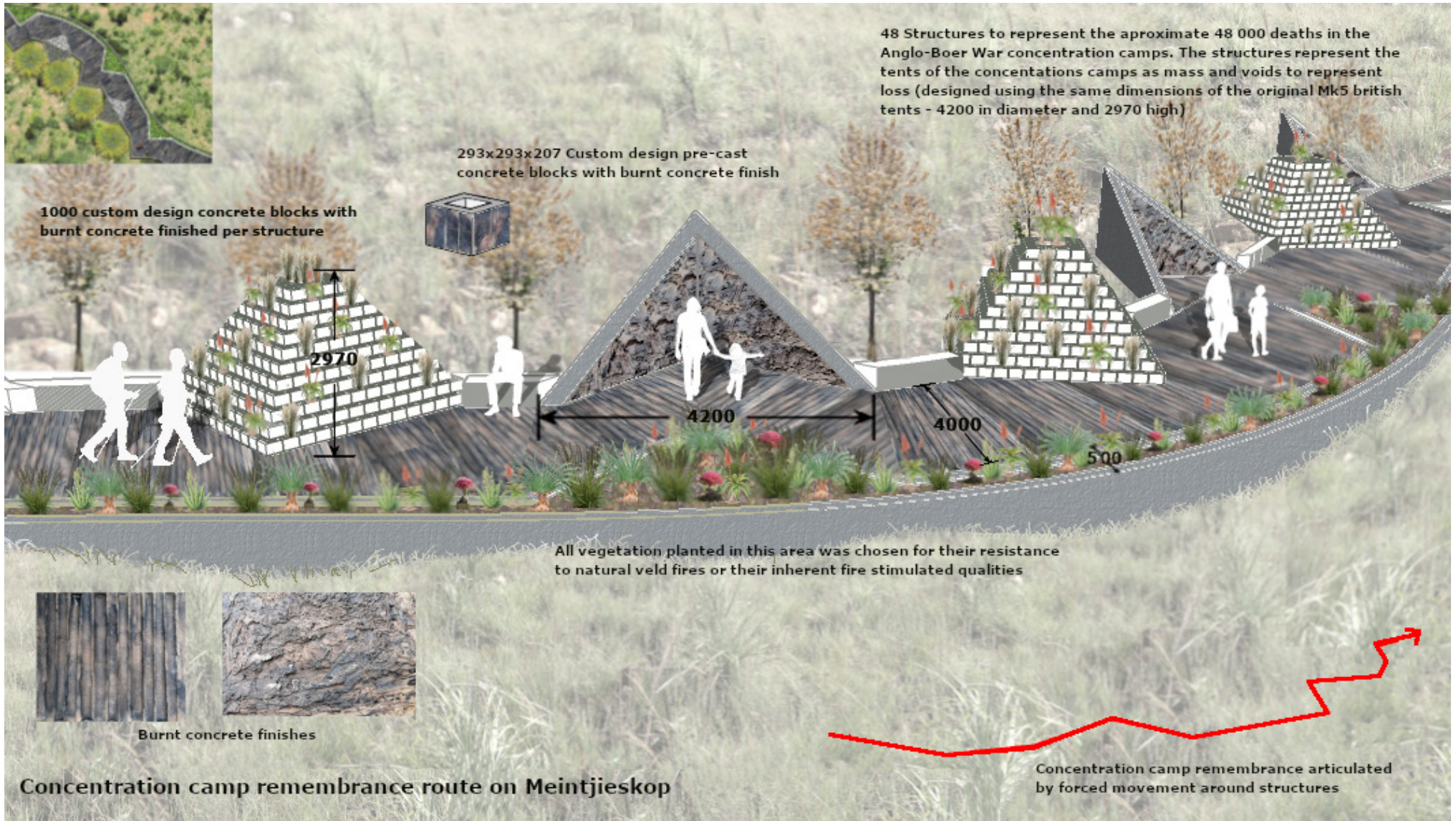


Figure 263. Kraal and concentration camp memorial route Axonometric (Author 2021)