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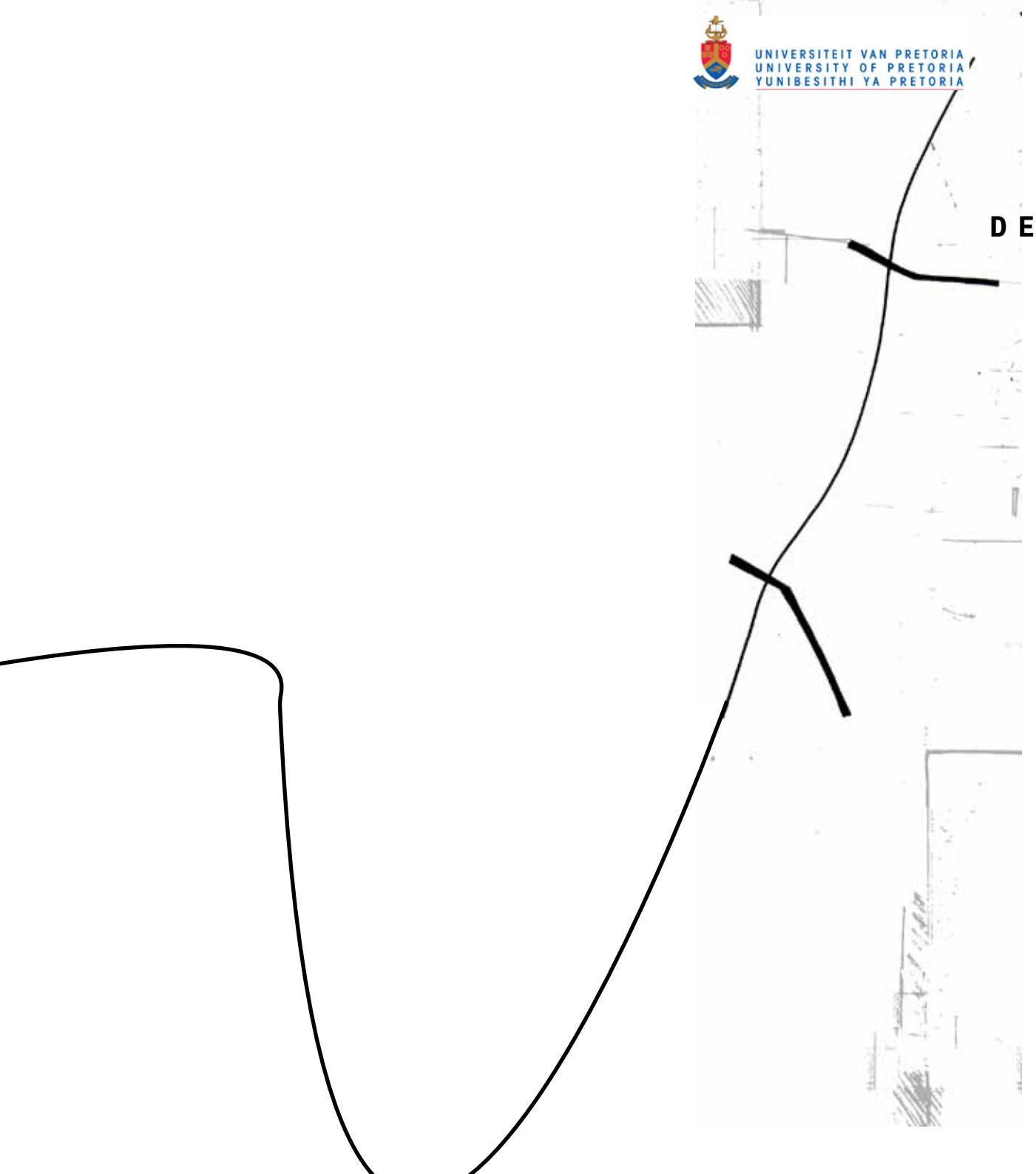
6

DESIGN DEVELOPMENT



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The design of a BRT terminal building integrated the low carbon construction theories with an architectural response to the expected climate change in the urban environment.

The design also exploited the opportunity of linking with the Salvokop precinct by developing a functioning bridge structure.

The first step was to accommodate the new BRT transport system. This had a significant influence on the building's orientation and placement. This was done from the principle that in order for a public transport system to work,the transfer between the different systems must be as efficient as possible [Alexander 1977:92;183].

Once a good quality mass transport system works, more pedestrian orientated areas will develop around the stations and corridors [Newman & Jennings 2008:133]. This will lead to large amounts of greenhouse gasses being saved.

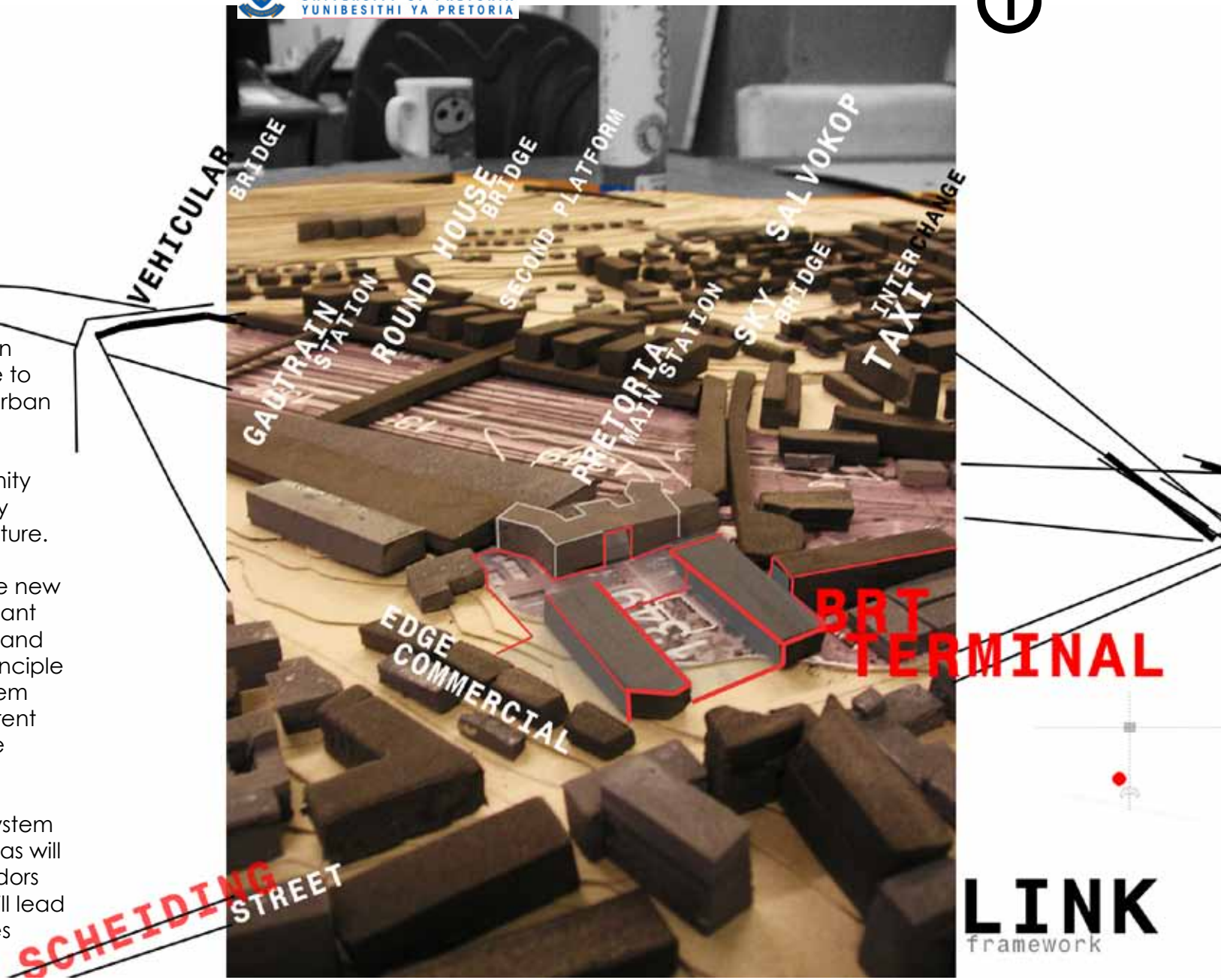

Figure 7-01: Design development 1: Framework [Source: Author]

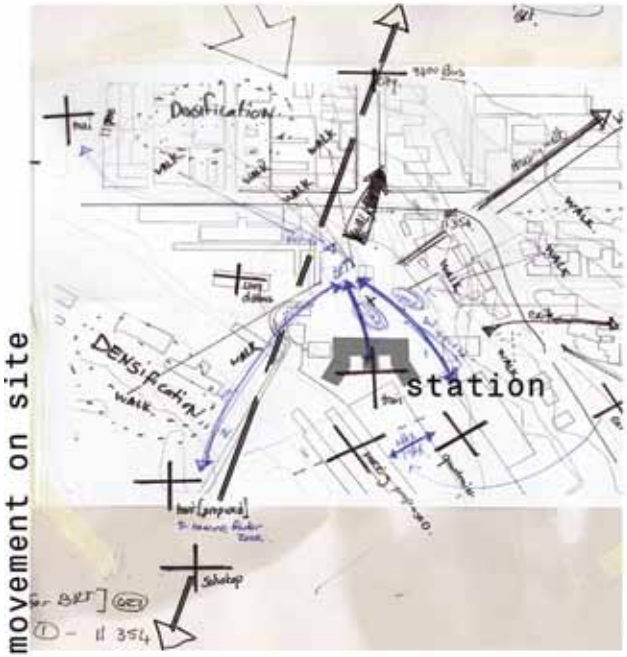

Figure 7-02: Design development 2: Movement on site [Source: Author]

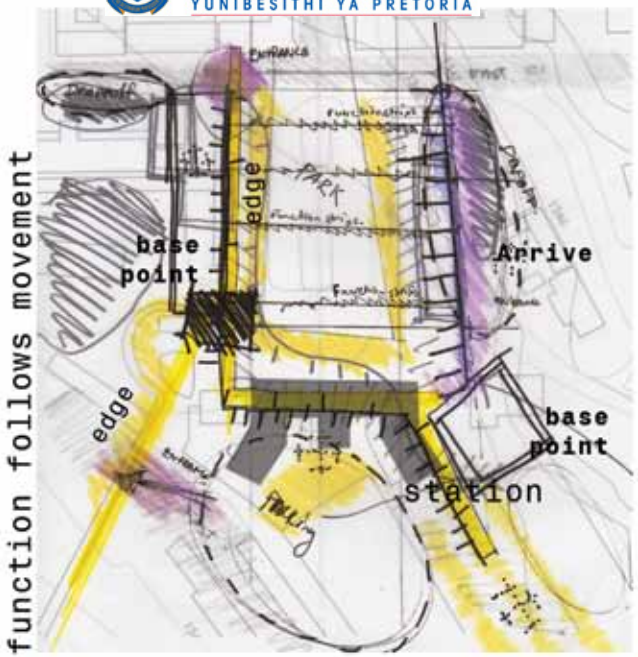

Figure 7-03: Design development 2: Functions on site [Source: Author]

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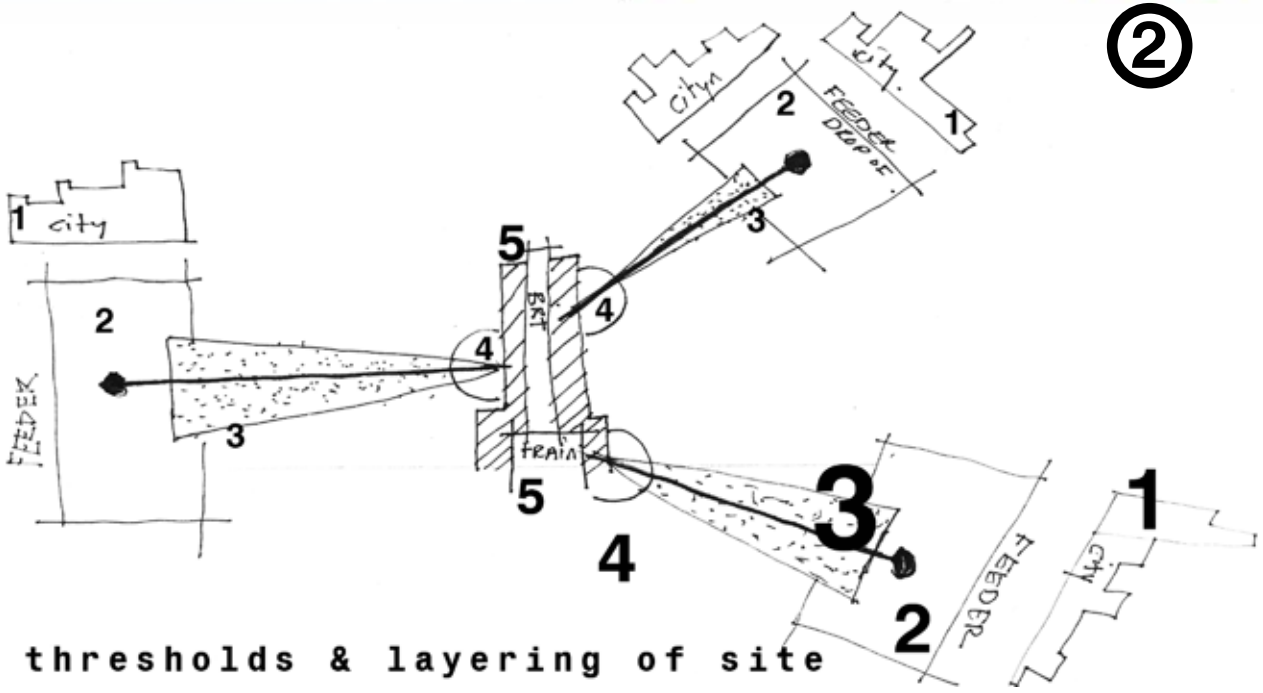


Figure 7-04: Design development 2: Threshold into intervention [Source: Author]

1- Precinct layout as proposed by LINK framework - informing the design decisions

2- Mapping of potential space use, speed of movement and functions on site.
Arriving on the site and through a series of thresholds and layers, use a central spine to link it all.

3- Explored two options of where to place the intervention on site.
OPTION 2 was chosen with bridge connection and retains most energy generated by movement on site.

Option 1 _proposed an underground station on eastern edge of the station square gardens.
Option 2 – proposed two stations that frame the gardens – all on grade while integrating the bridge with the design.

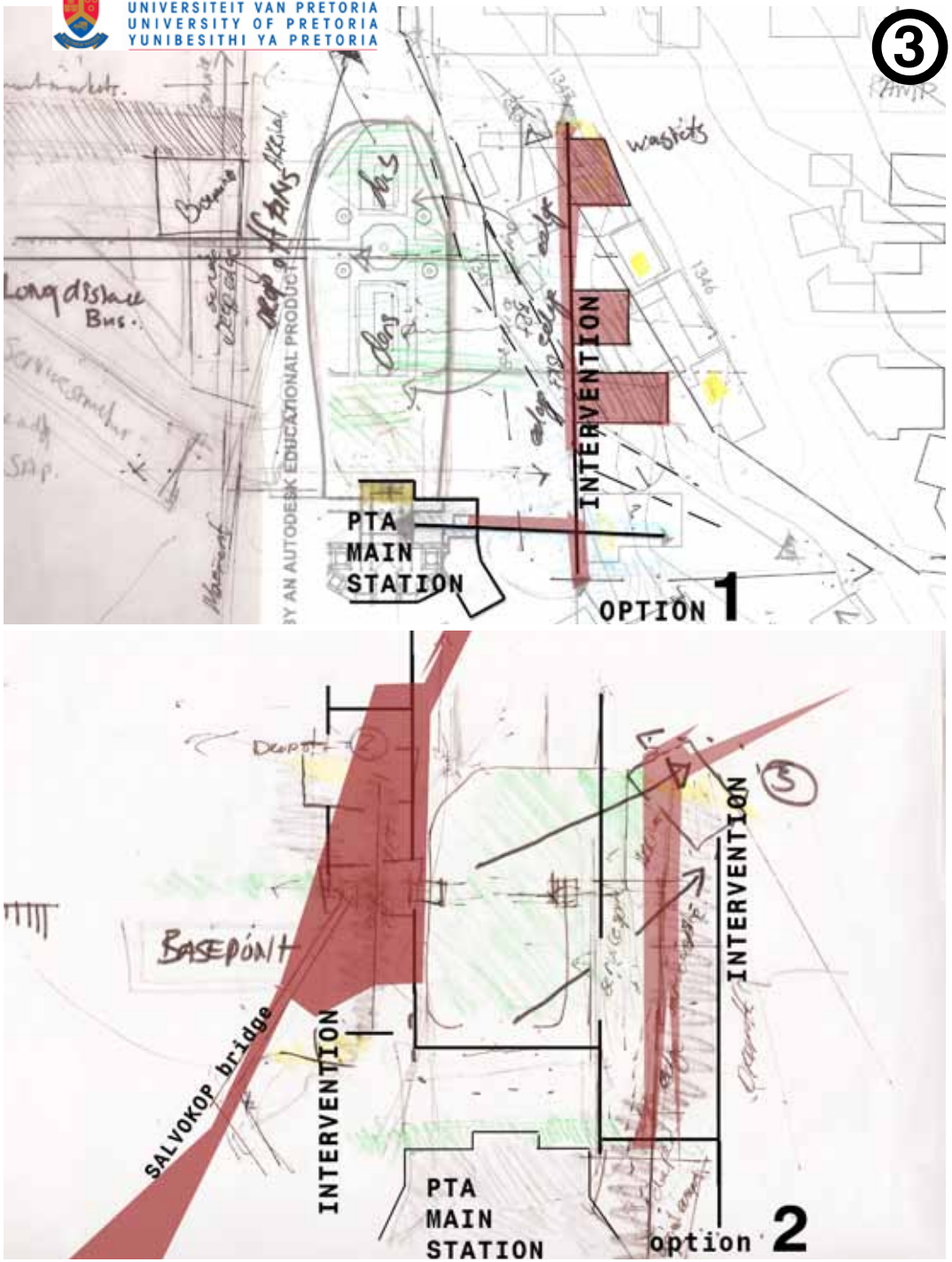


Figure 7-05: Design development 3: Options 1 + 2[Source: Author]

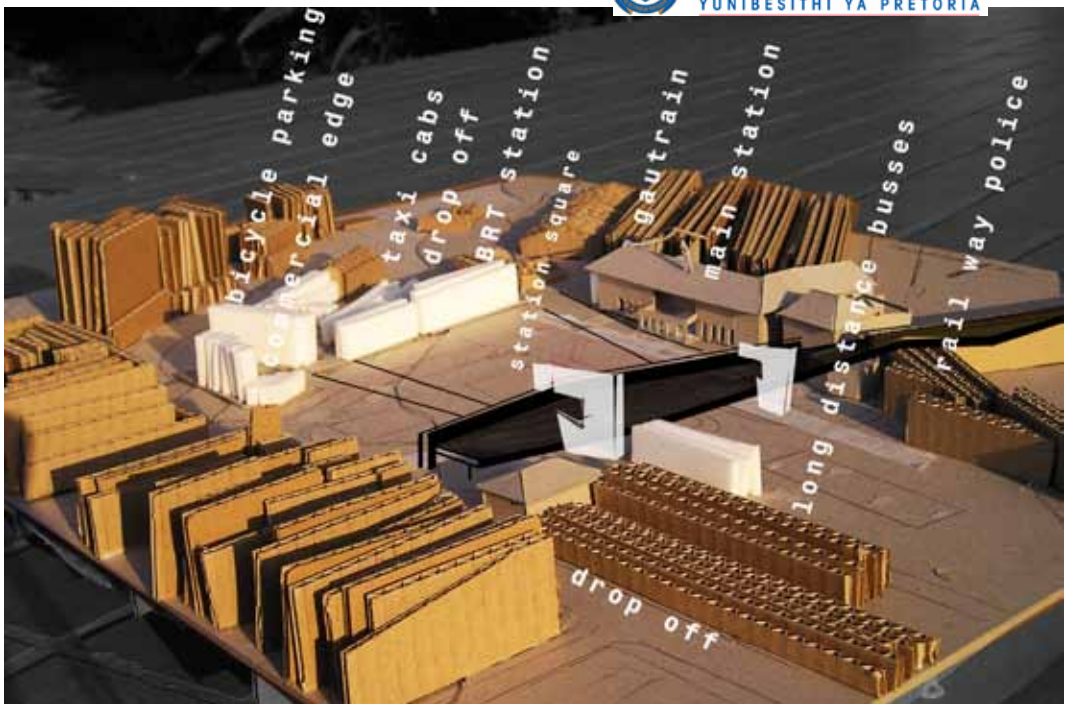


Figure 7-06: Design development 4: Whole site & intervention [Source: Author]

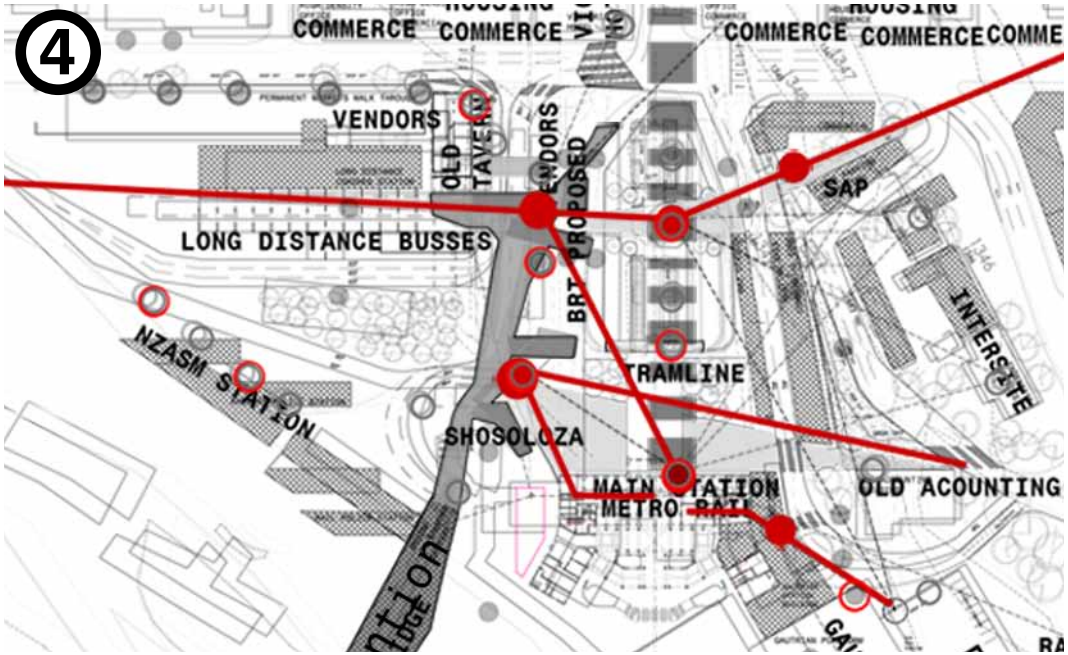


Figure 7-07: Design development 4: Linking site with historic and future points [Source: Author]

4- The square design was developed around the linking of important points **[present, past and future points]** and placing a new movement layer on the site.

From this important intervention points were mapped and developed.

The block layout was developed to accommodate the ease of transfer, while retaining the cultural and historical value of the station buildings, station square and historical buildings.

The Station Square were reinterpreted as functional public space and "air conditioning unit" for the intervention.

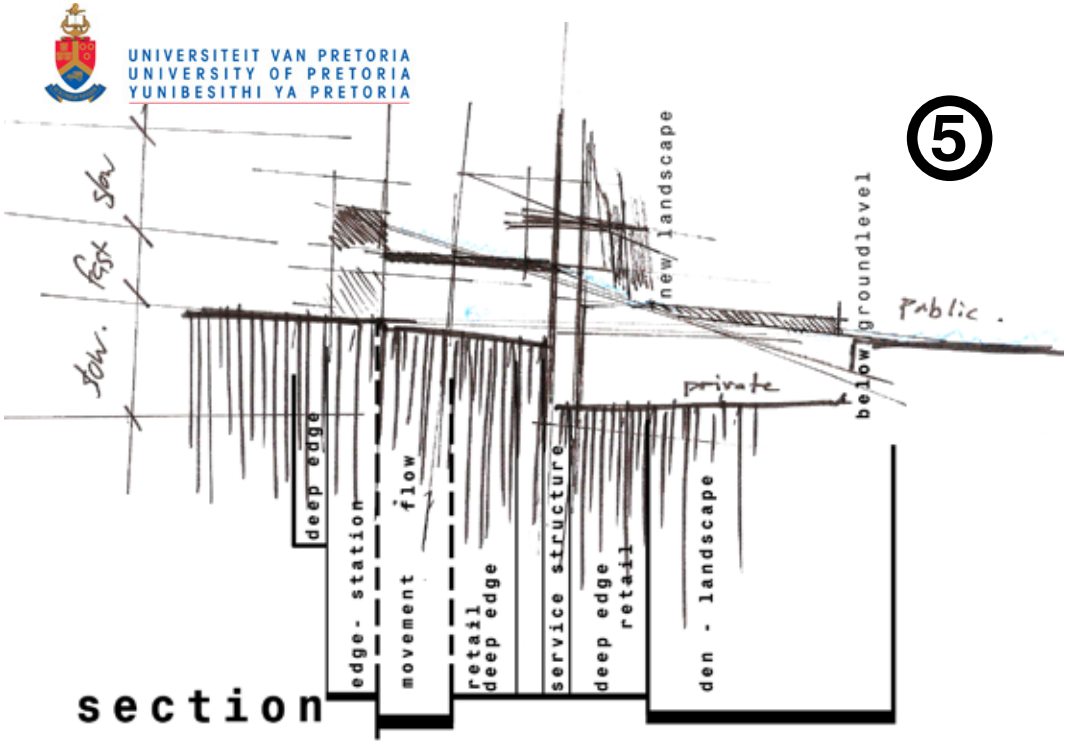
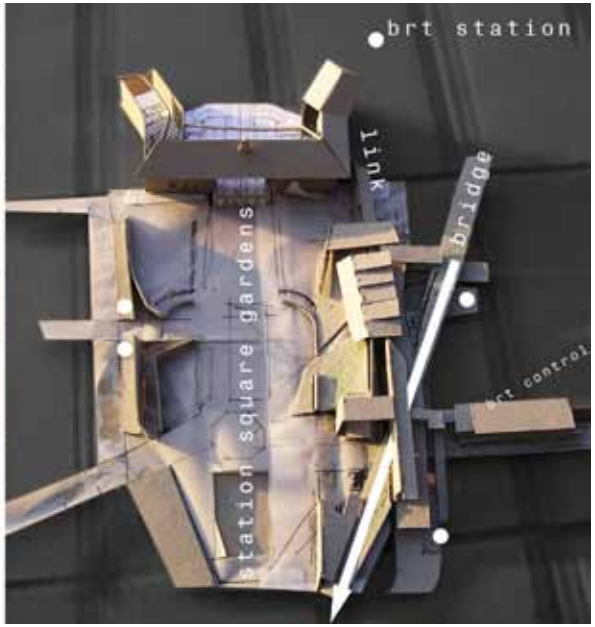
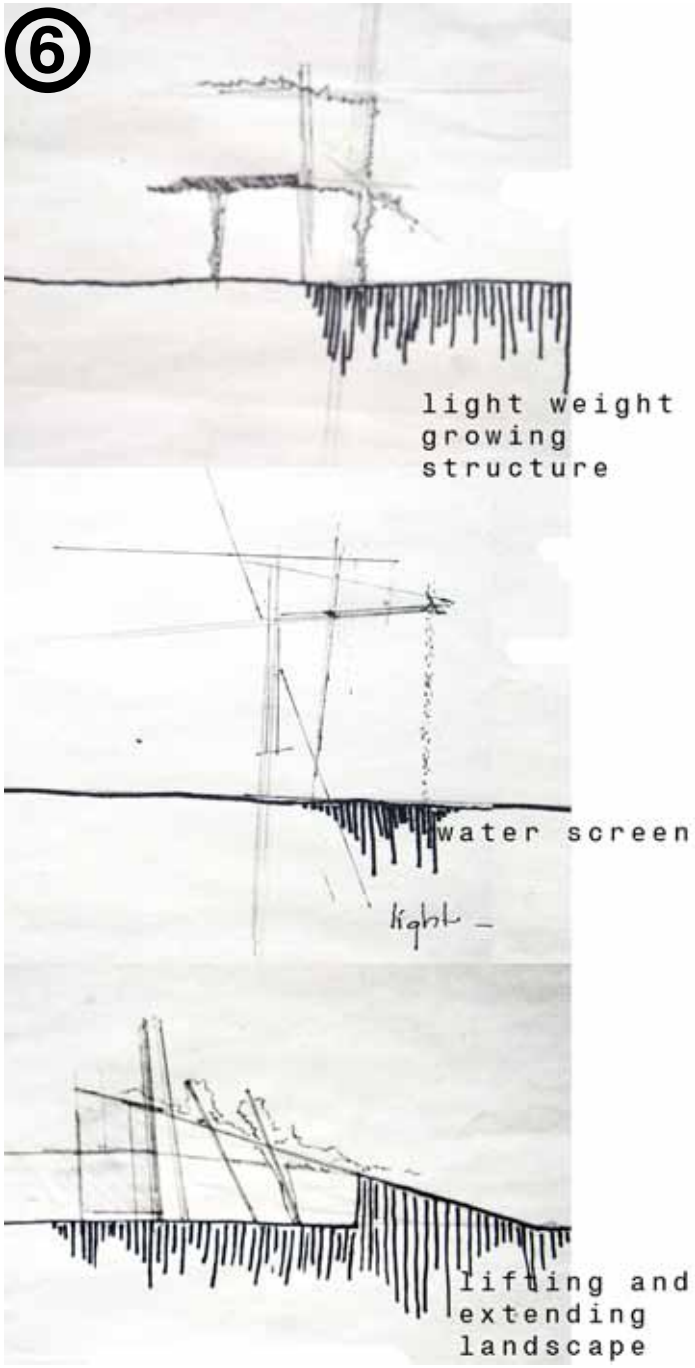


Figure 7-08: Design development 5: Design developed #1 _section [Source: Author]

Figure 7-09: Design development 5: design developed #1 _model [Source: Author]



5- Design linked with Salvokop bridge – guiding pedestrians into the Station Square. Part of the structure was proposed to be underground, underneath the Station Square
- it was not used as the impact on the square was too imposing and space is limited.



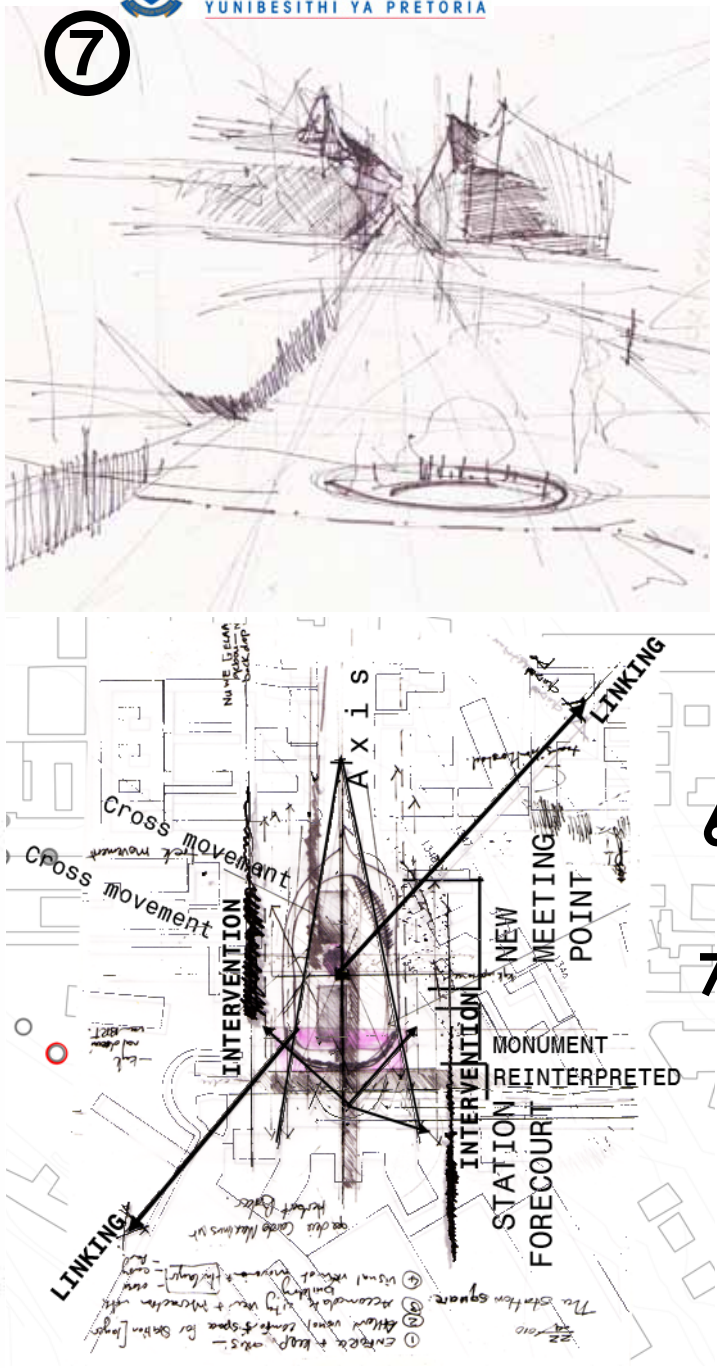


Figure 7-10: Design development 6: integrating planting and landscape in structure[Source: Author]

Figure 7-11: Design development 7: Enforcing the axis[Source: Author]

Figure 7-12: Design development 7: Zones of the station square gardens [Source: Author]

6- Landscape lifted as new layer linking with bridge level. All movement functions on top of each other.

7- The station square gardens reinterpreted:
linking the landscape with buildings and functions.

Enforcing existing axis by opening and moving existing museum [material and content retained on site] and developed new functional zones in landscape.

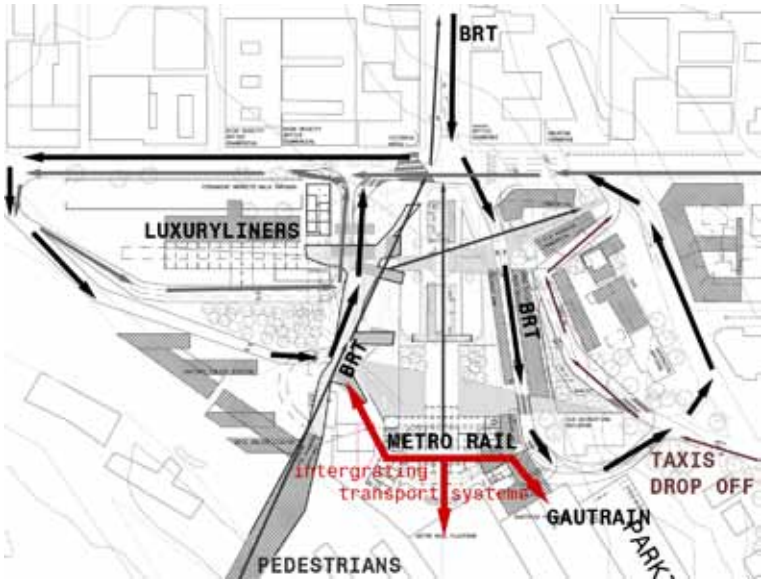


Figure 7-13: Design development 8: Movement on the site [Source: Author]

8- Landscape design developed to integrate the different transport systems and points – A second planted layer was added as a floating layer @ 60° angle grid [responding to the angle of the station eastern en western wing].

The second angle layer was discarded.

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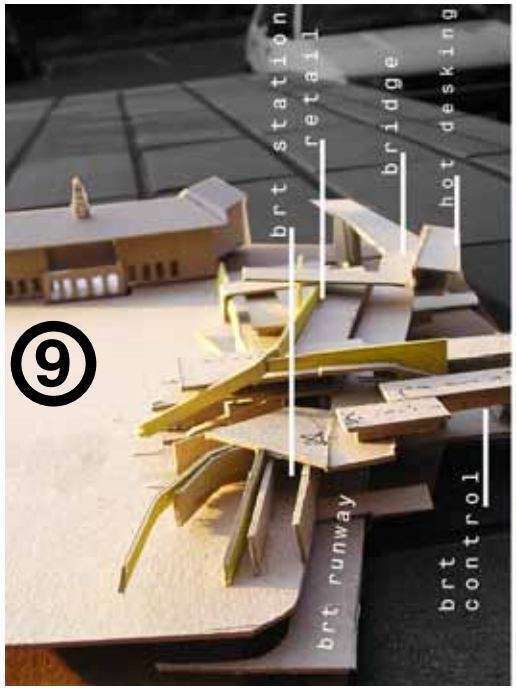
Figure 7-14: Design development 8: intitial landscape design [Source: Author]



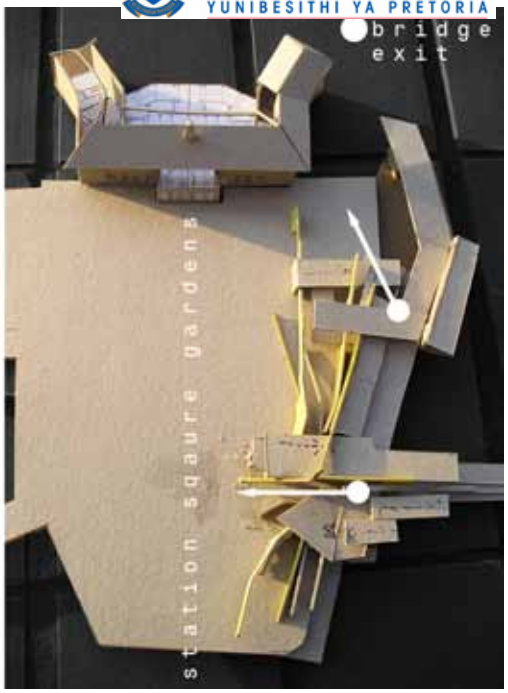
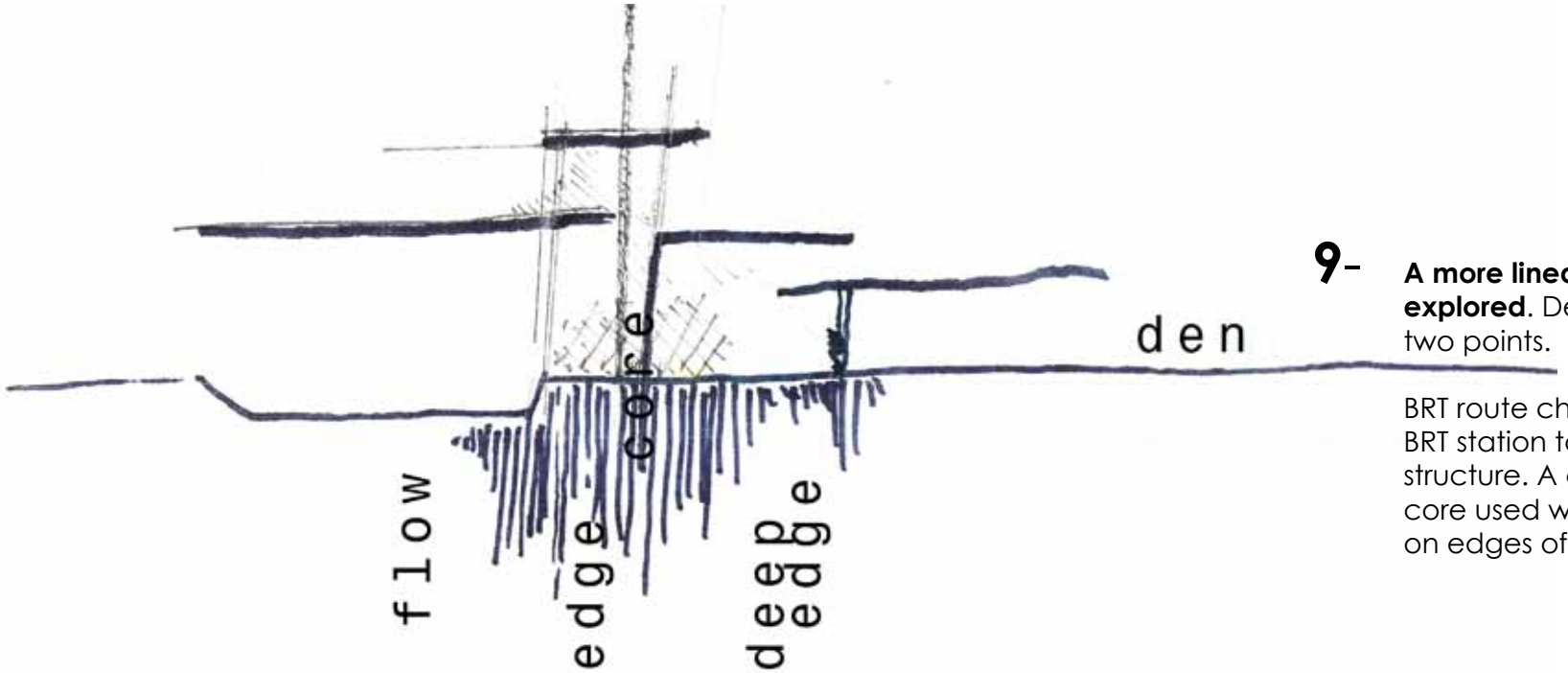


Figure 7-15: Design development 9: Design developed #2 _ Model [Source: Author]

Figure 7-16: Design development 9: Cross section through building. [Source: Author]



9- **A more linear and layered design explored**. Design still centred around two points.

BRT route changed to allow for BRT station to link with rest of the structure. A central service core used with pedestrian walking on edges of structure.

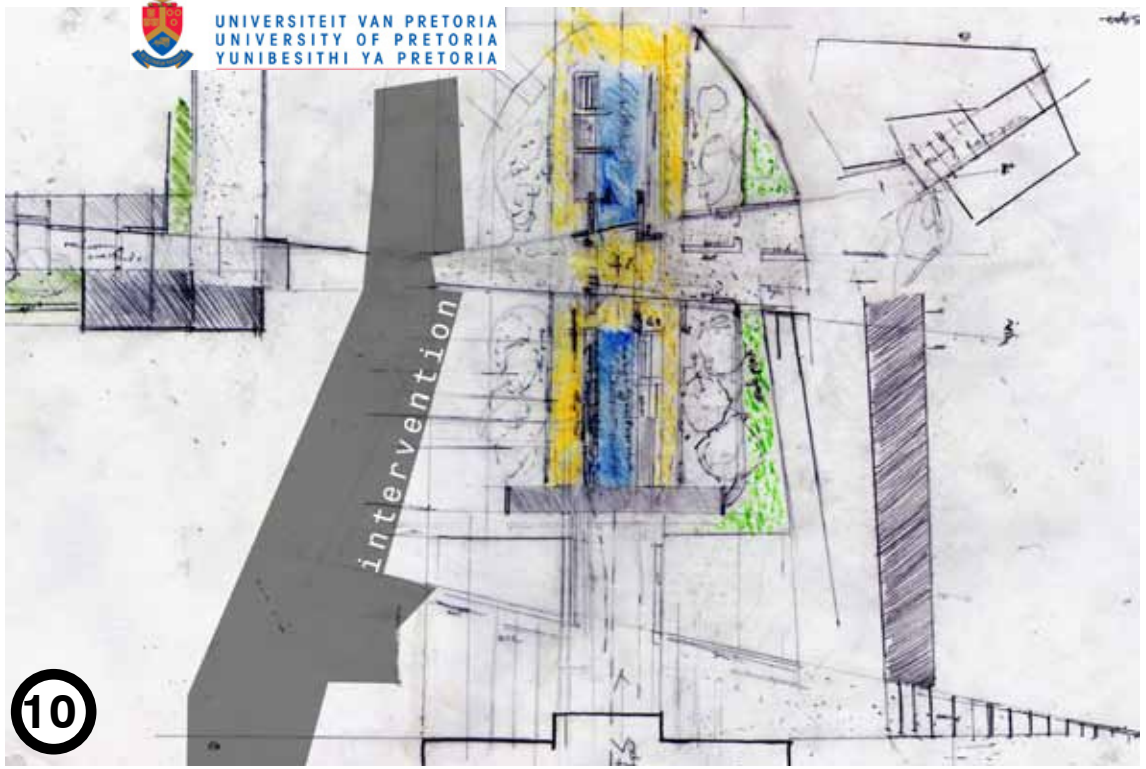


Figure 7-17: Design development 10: intervention responding to Station square gardens[Source: Author]

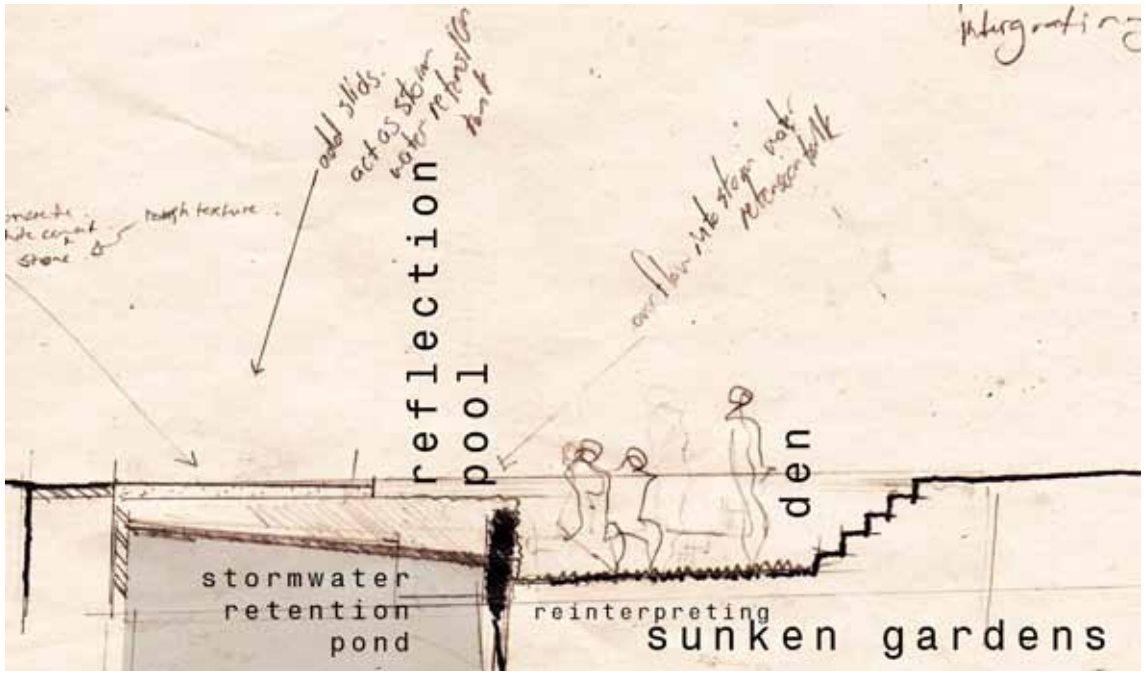


Figure 7-18: Design development 10: Sunken gardens detailed [Source: Author]

10- The Station Square was developed to inform the design. Design adjusted to respect existing Neo Classical design, by adding a more subtle movement layer on top.

Sunken gardens reinterpreted as reflective ponds / stormwater retention ponds.

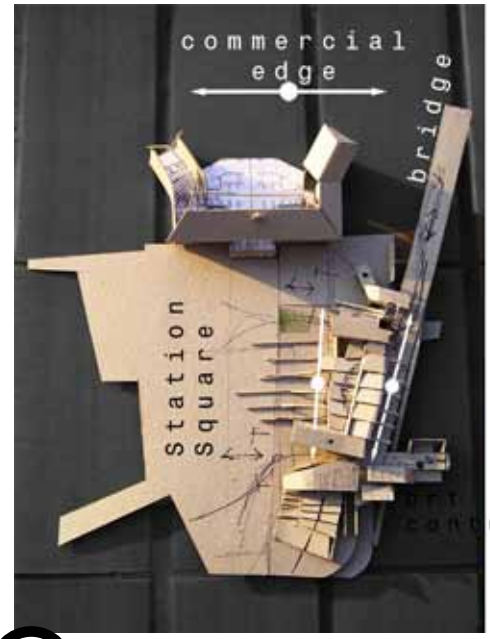


Figure 7-19: Design development 11: Design developed #3 _ Model [Source: Author]

Figure 7-20: Design development 11: Cross section through building. [Source: Author]

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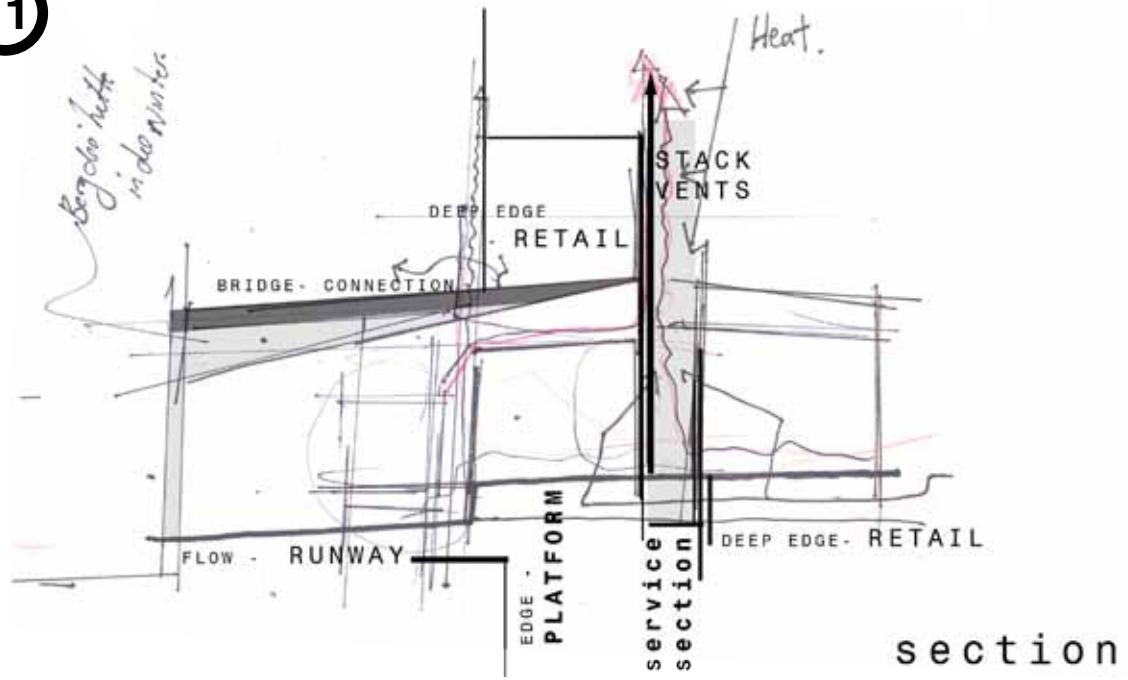


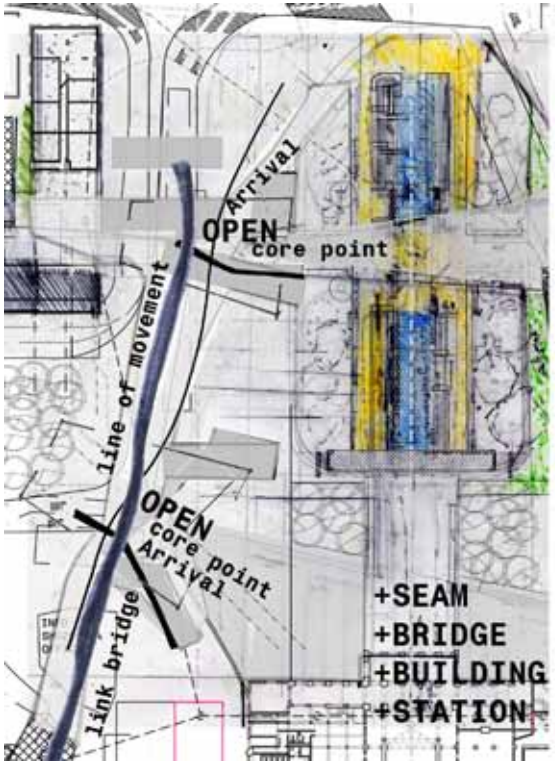
11- Explored the use of cross sectional structural beams.

The service edge is integrated with the ventilation system – ensuring enough air movement to ensure cross ventilation.

Movement is still manipulated around the building – in essence creating a "street" edge next to the intervention.

Figure 7-21: Design development 12: Elevation planted - ribs [Source: Author]

12- Elevation explored as a screened structure from which the cross-sectional beams protrude.



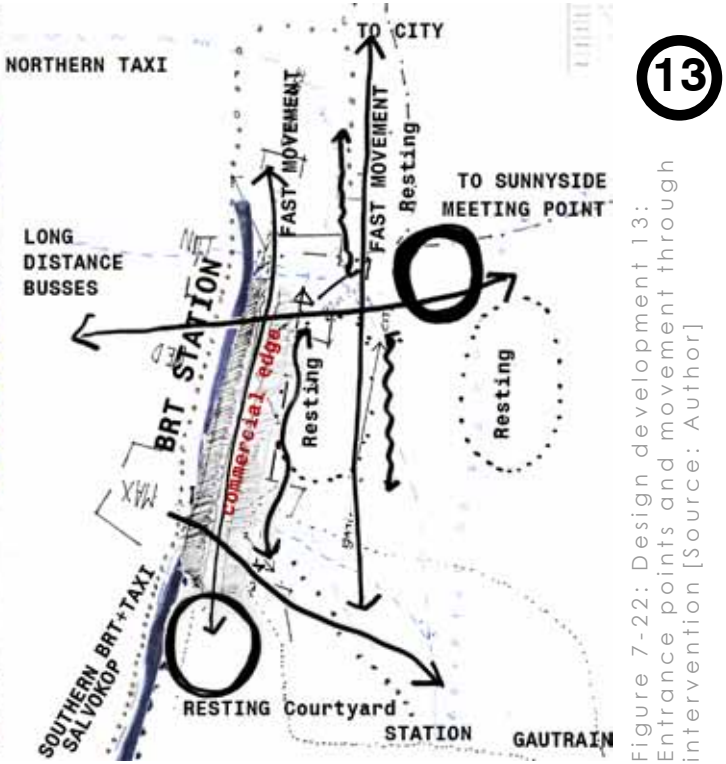


Figure 7-22: Design development 13: Entrance points and movement through intervention [Source: Author]

13- Building entrances integrated into landscape. Entrance used a directional objects that guide the user through structure. Bridge structure changed into a more movement design – precedent studies of work of Zaha Hadid and Gunther Behnisch.

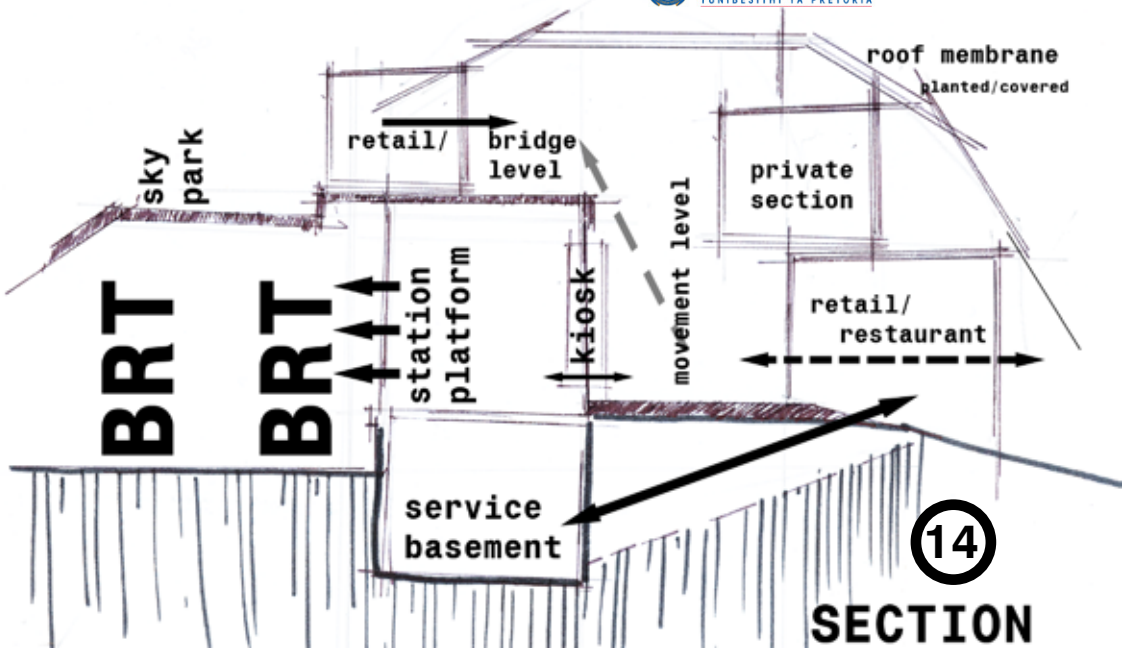


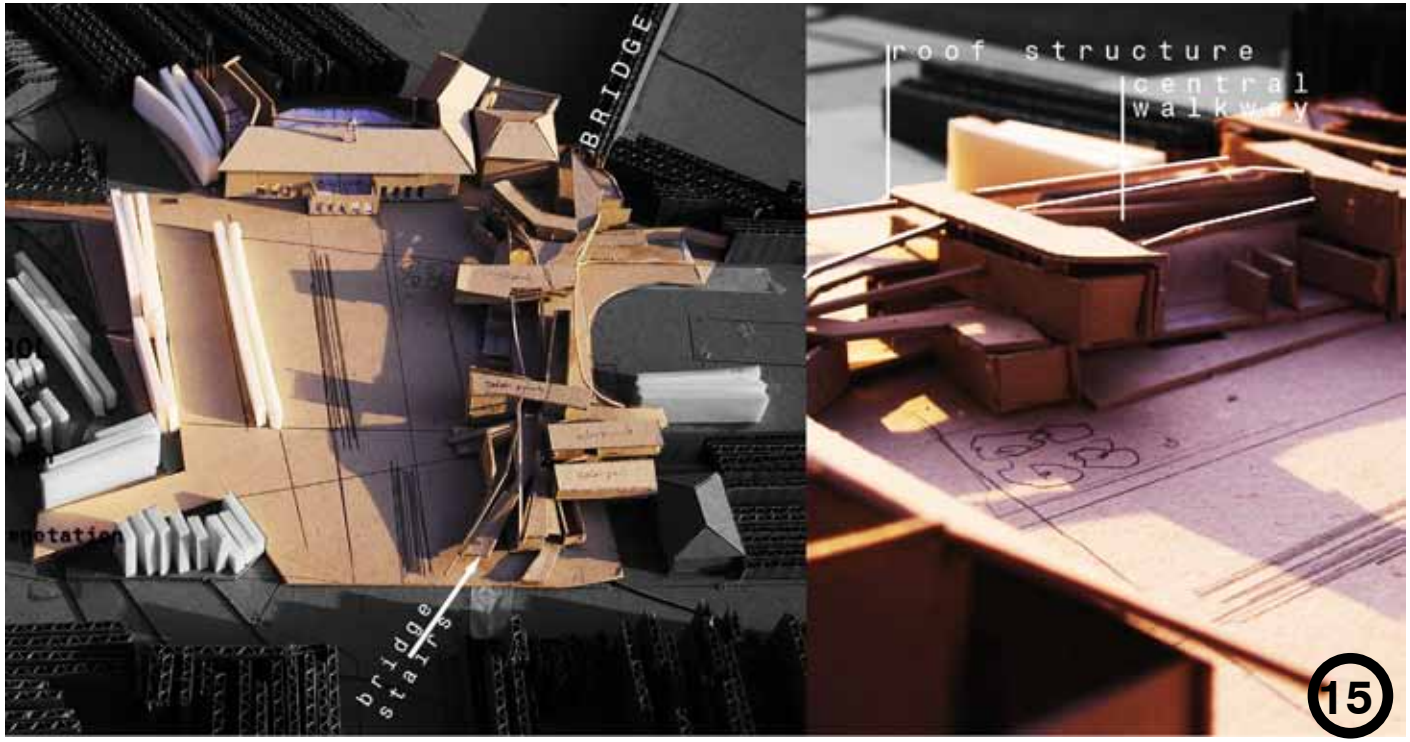
Figure 7-23: Design development 14: Schematic Section [Source: Author]

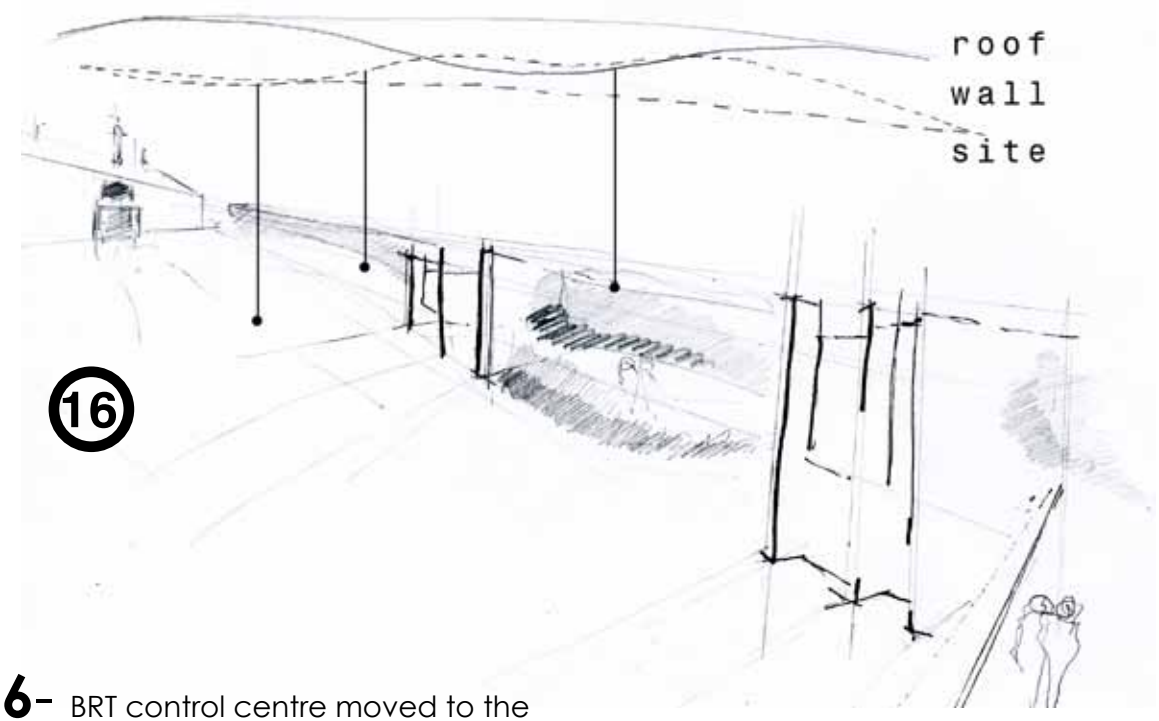
Figure 7-24: Design development 15: Design developed #4 -model and roof [Source: Author]

14- The design adapted to allow for the user to enter the structure and creating a spatial experience of movement between the layers/skins. This also protects the user from the natural elements.

The central walkway used a chimney for stack ventilation, while semi basement added to accommodate the services.

15- The roof structure was adapted to a linear structure, while integrating planting and polycarbonate roof sheeting with the roof structure.





16- BRT control centre moved to the central entrance structure in aims to condense and simplify the design.

The approach of a more organic roof was investigated – it was discarded as being overly complex for a design that aims to minimise on material use.

Opted to use a single flat roof to link the whole structure.

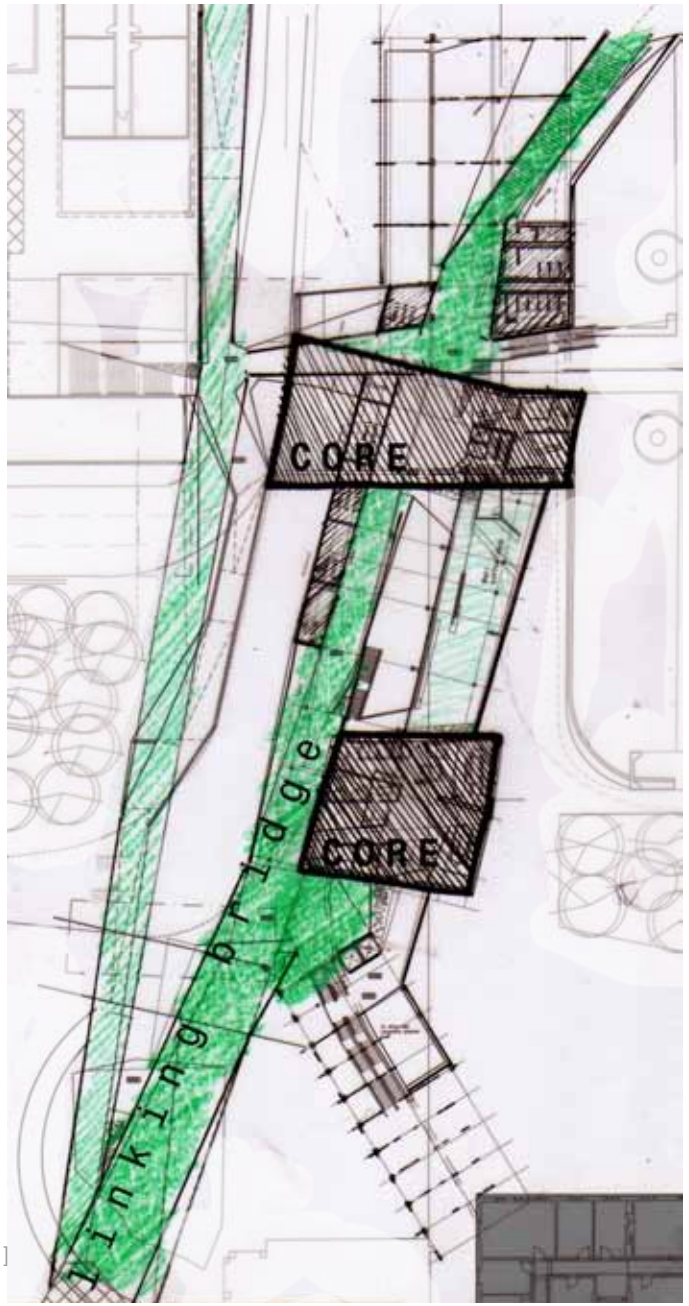


Figure 7-25: Design development 16: Skin: wrapping -ROOF/WALL/SITE [Source: Author]

Figure 7-26: Design development 16: Linking bridge and core[Source: Author]

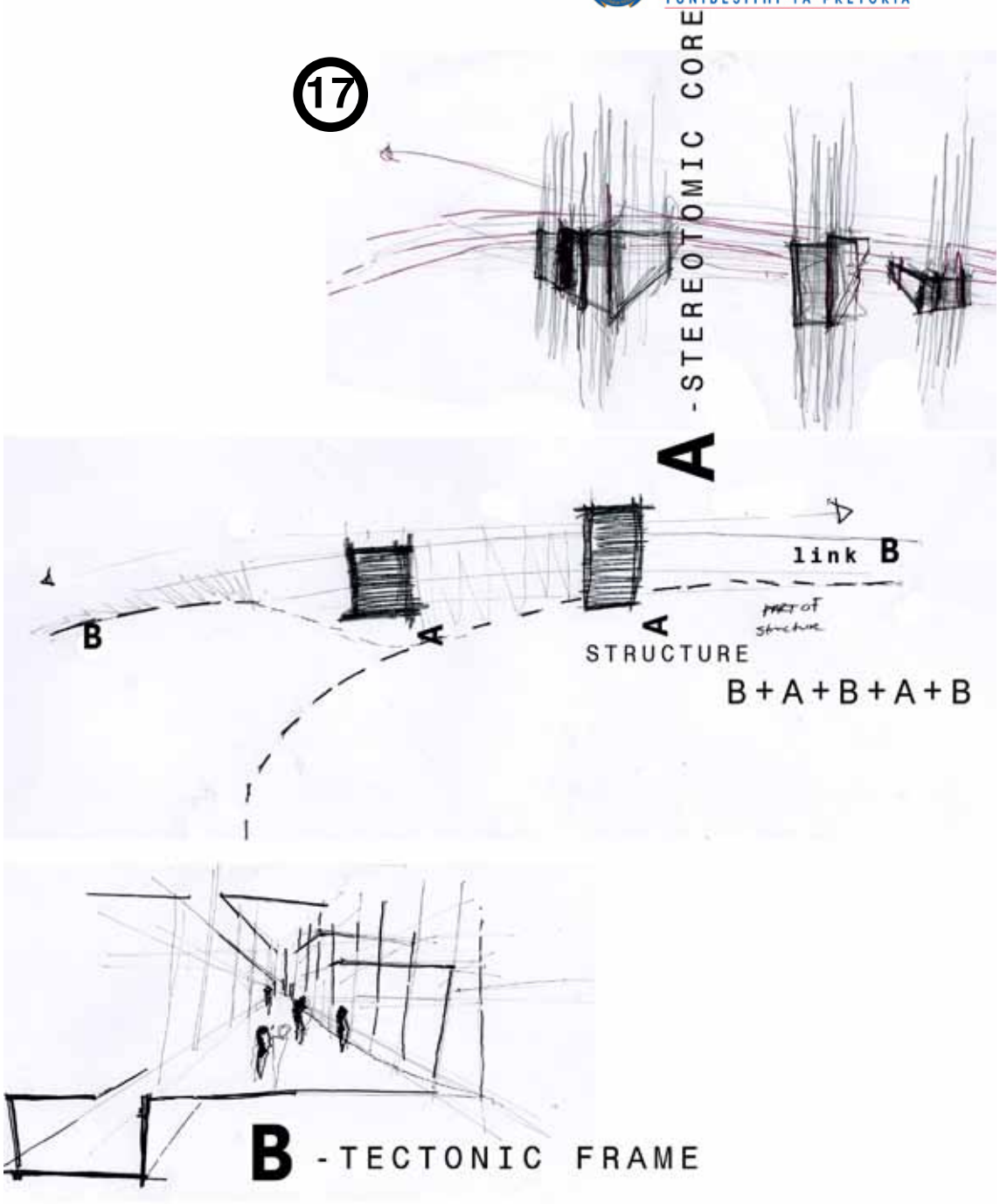


Figure 7-27: Design development 17: Structural system & tectonic approach. [Source: Author]

17- The use of structural systems and a tectonic approach was investigated – two systems were chosen one being a framed tectonic system – referring to the landscape as a lifted skin. The second system is a solid stereotomic system derived from the solid facade of the Pretoria Main Station.

After consulting the structural engineer it was decided to change the stereotomical structure to a framed structure with concrete blocks as infill material. This was done to ensure simplicity of the design and its future adaptability.

18- Design simplified and densified to use less materials, and allow for an easier construction process. All office functions were restricted into two defined points in the whole. This allows for a less imposing structure on the station building and a more direct bridge connection.

The site lines to the Pretoria Main Station was also cleared and the intervention were moved back.

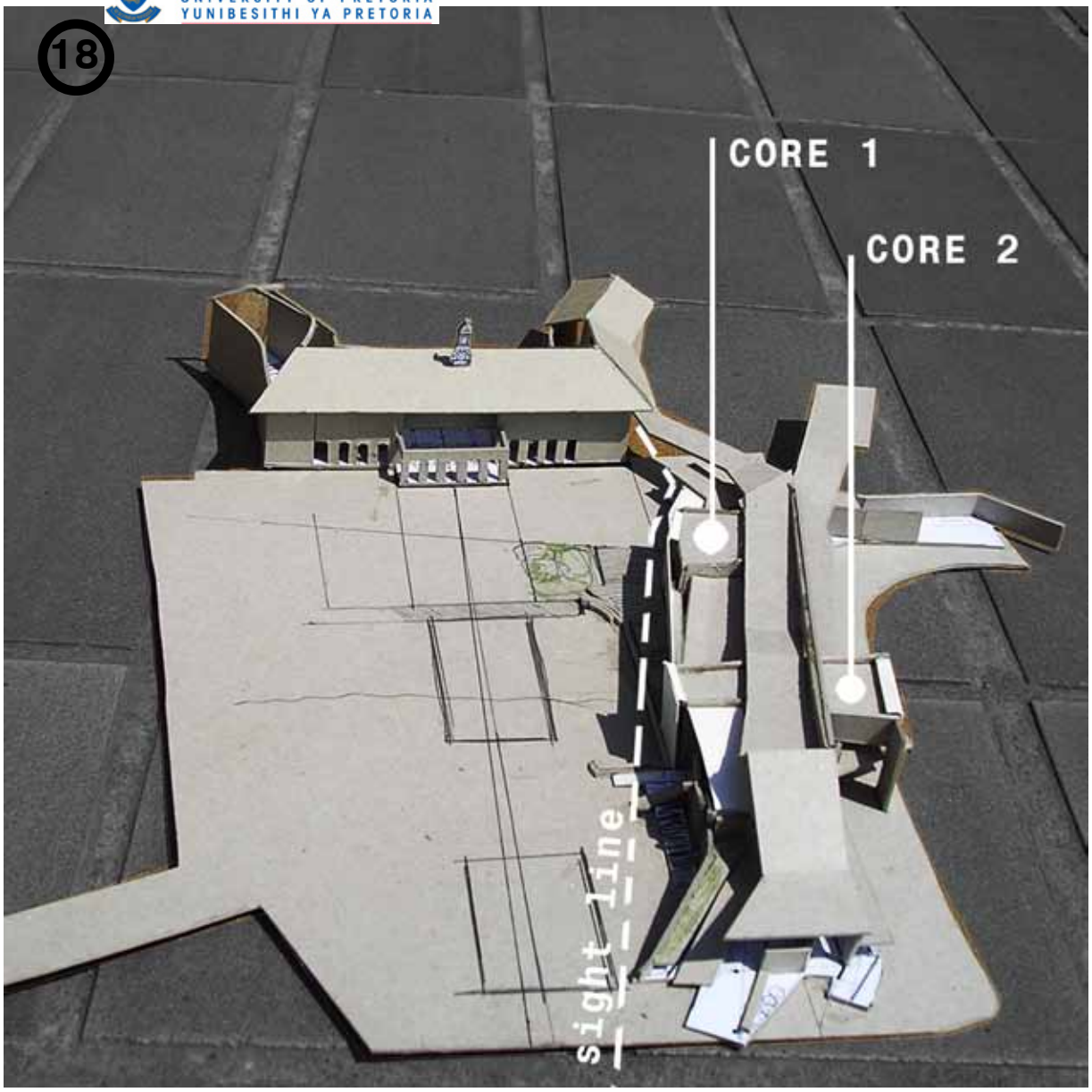


Figure 7-28: Design development 18: Simplifying the design[Source: Author]

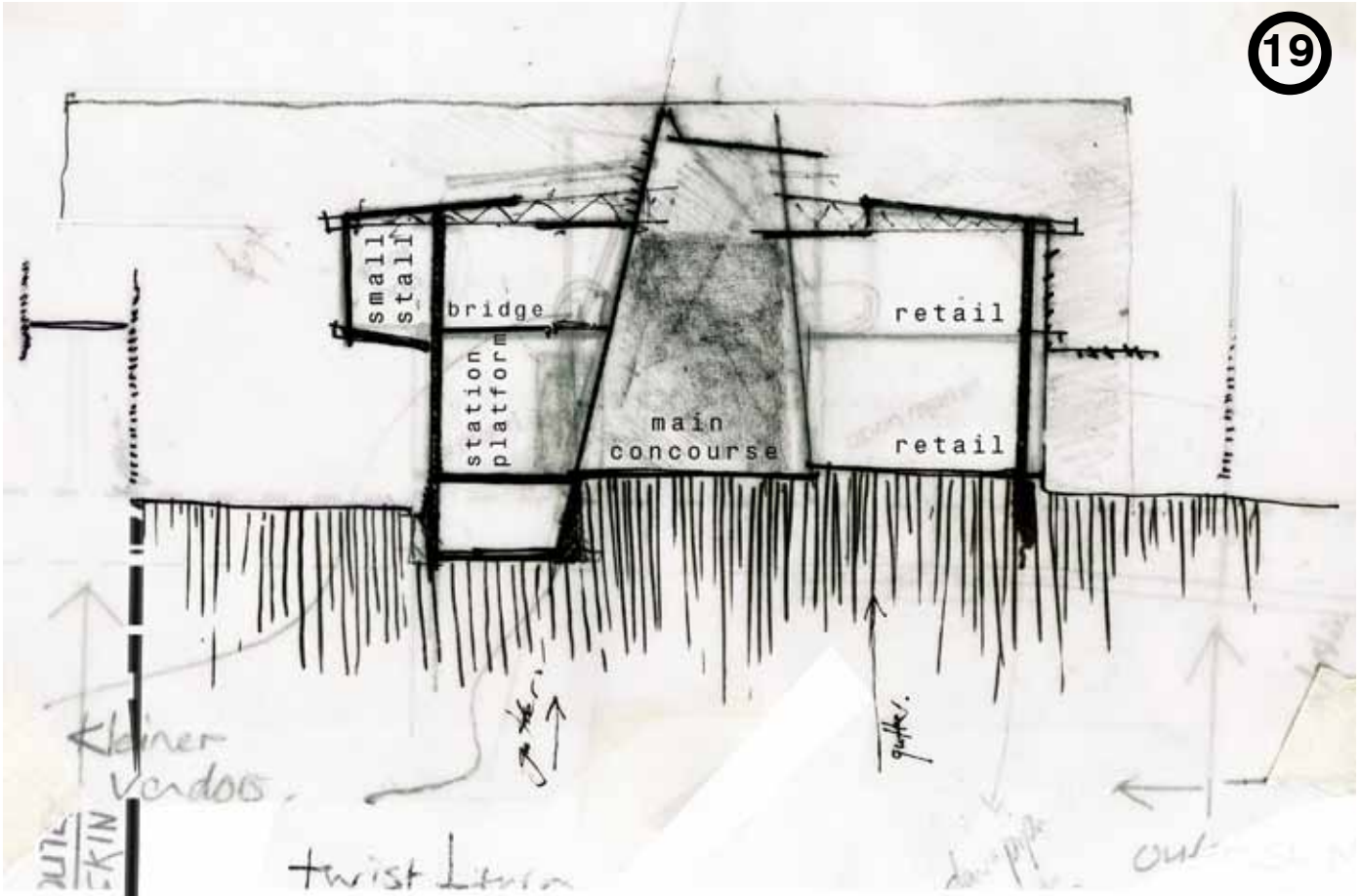
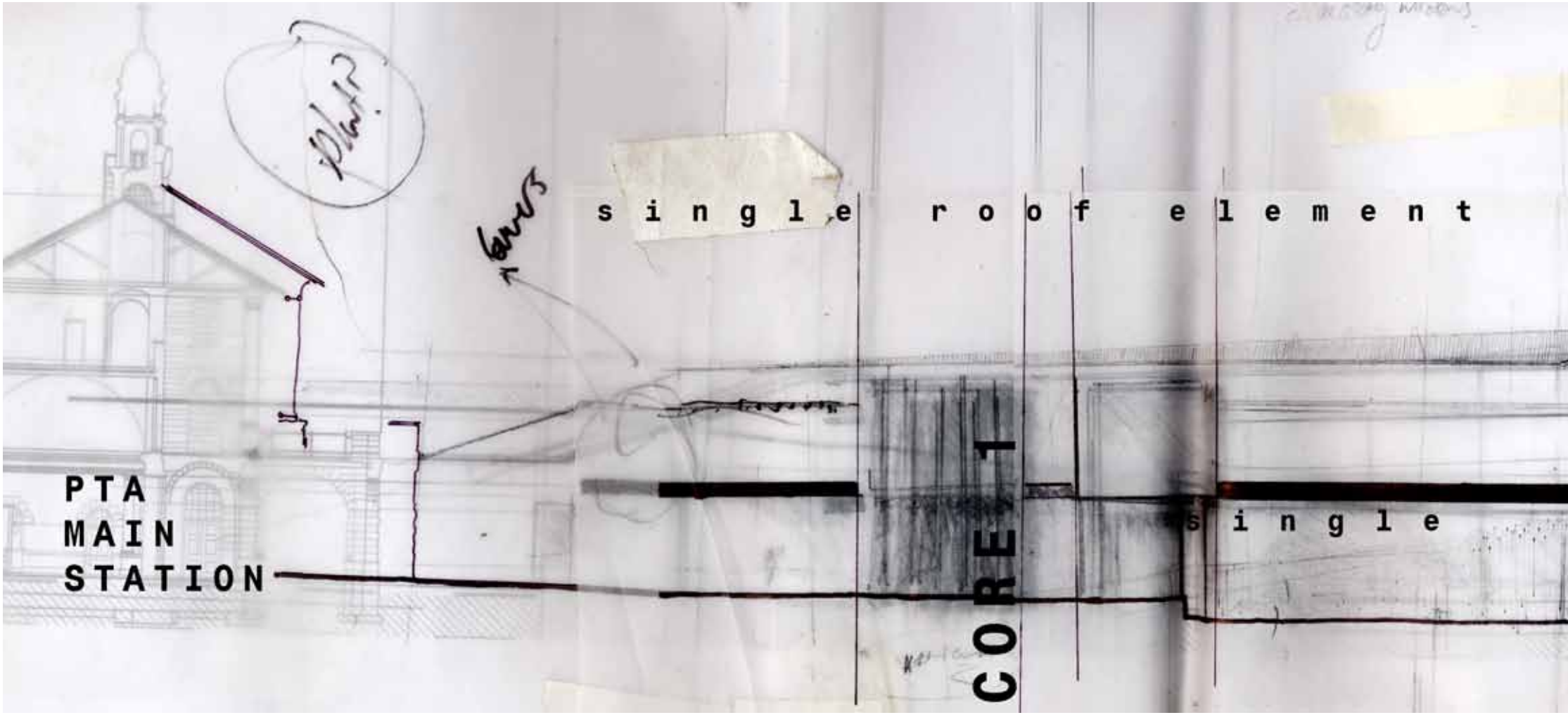


Figure 7-29: Design development 19: Cross section through building [Source: Author]

19- Roof structure was as a series of low roofs, and a steel and glass skin structure that folds over the whole. This allowed for a more economical use of material and systems. Ensuring that the floor planes are carried by the same roof structure.

The floor slabs are carried on a column structure, this also allows for a more versatile ground floor.


single roof element
PTA
MAIN
STATION
CORET
single

20- Elevation: A single "linking" roof investigated to cover whole intervention.

The floor slab articulated to reflect horisontality of Pretoria Main Station facade.

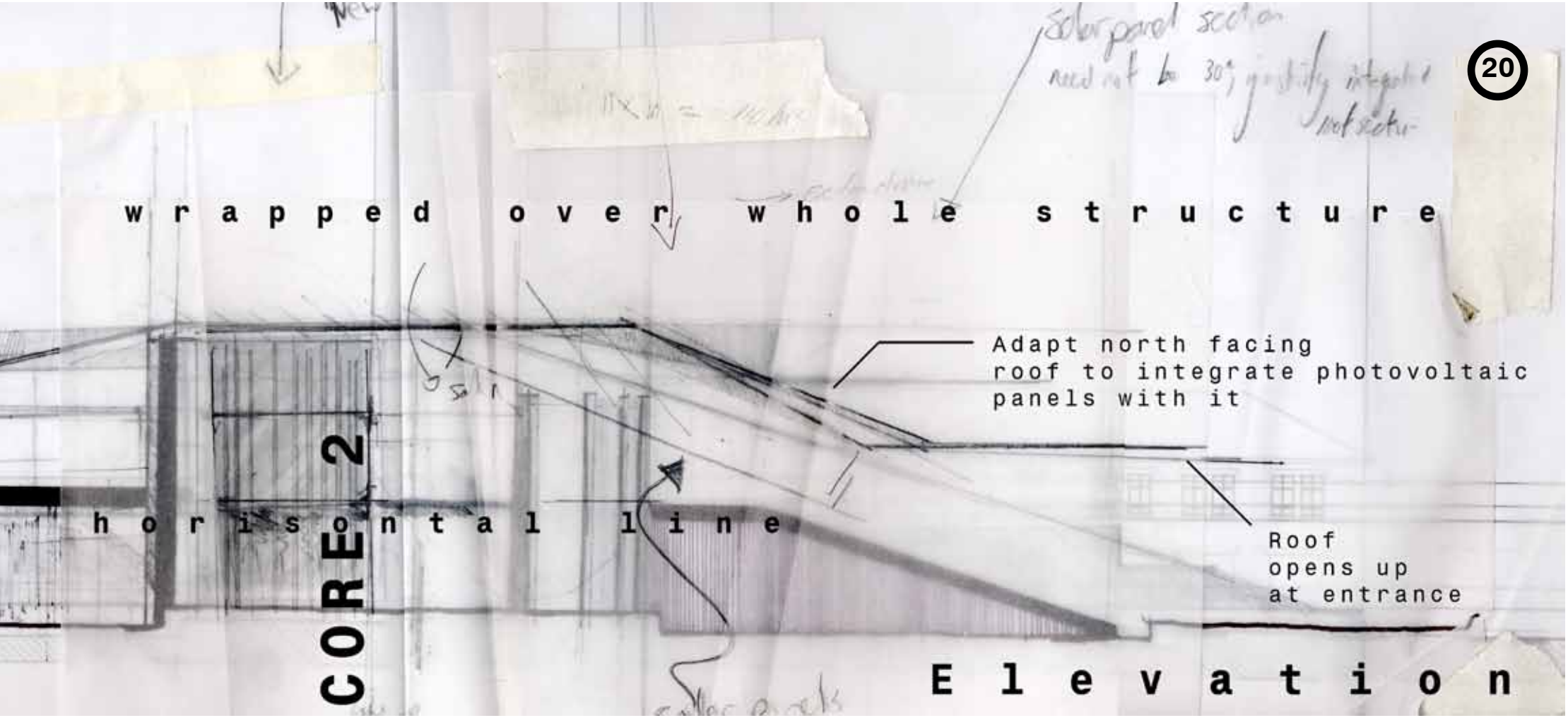


Figure 7-30: Design development 20: Facade study [Source: Author]