

07

CHAPTER SEVEN

DESIGN DEVELOPMENT

Introduction
Design development Iterations

7.1 Introduction

The design concept as defined by the contextual, conceptual and programmatic intentions of the project are developed into a set of diagrams that encapsulate the conceptual and architectural intention of the project.

Figure 7.1 to Figure 7.3 diagrammatically illustrates the three primary conceptual intentions of the project as:

- A - Sculpting the landscape through a reinvention of the existing water infrastructure, with the new interventions as contextual response.
- B - The structural and service spine becomes an extension of the sculpted landscape as stereotomic boundary wall and structural cores.
- C - The internal and external edge conditions, as serviced by the structural and service spine, respond to the different contextual conditions.

Selected significant design iterations, as documented throughout the design process, are introduced through their main objectives and discussed according to the development of the three primary conceptual intentions as outlined above, in order to illustrate a collective image of how the development influenced all three of the conceptual intentions concurrently.

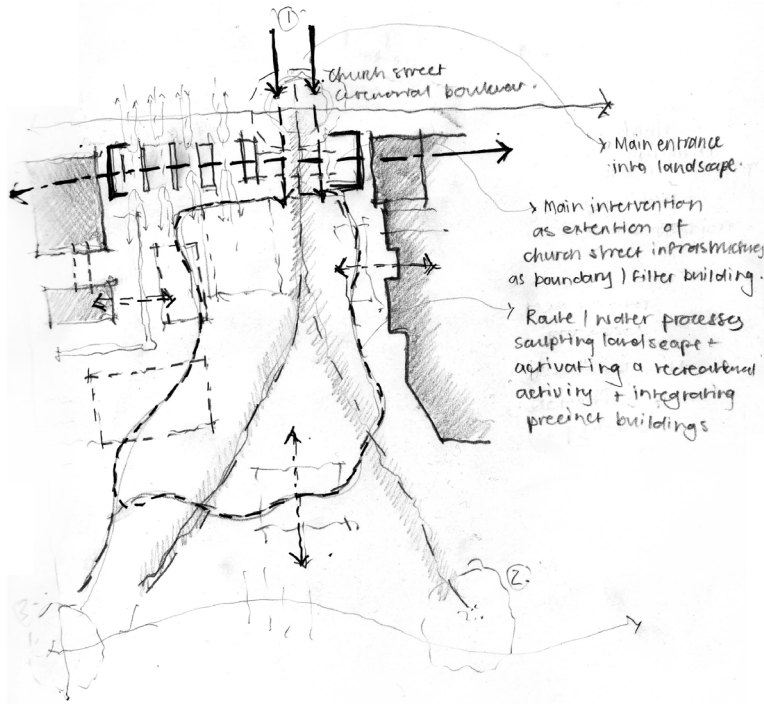


Figure 7.1: Plan diagramme of the conceptual intentions for the site, illustrating the primary continuing the infrastructure of the ceremonial boulevard across the Apies River channel as architecture emphasising boundary and filtration into the landscape. (Author 2015)

The route and water processes along the landscape activates the programmatic intentions while simultaneously integrating the existing conditions within the precinct.

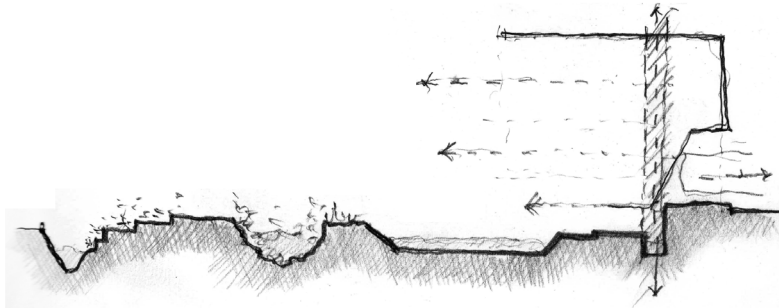


Figure 7.2: Section diagramme of the conceptual intentions for the site, illustrating the sculpting of the landscape that activates and integrates water ecological and socio-economic intentions. (Author 2015)

The primary intervention responds to the internal and external edges as filter and boundary structure.

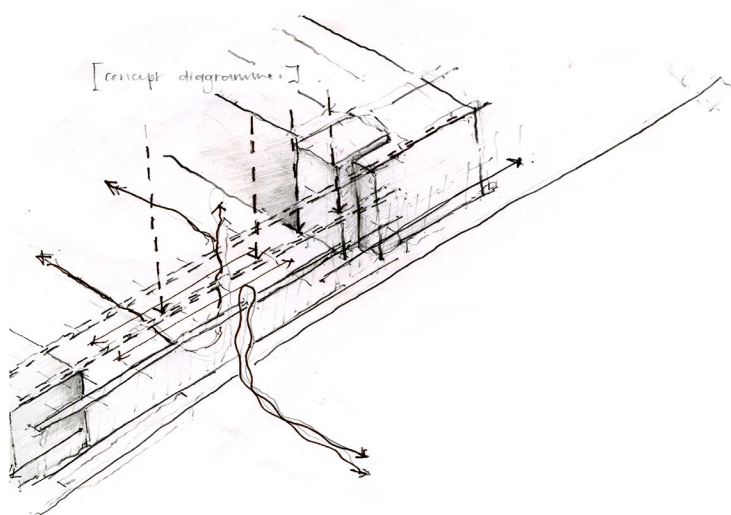


Figure 7.3: Perspective diagramme illustrating the primary intervention as extension of the Ceremonial Boulevard Infrastructure and continuation of public activities along the street edge, while simultaneously acting as boundary and filtration structure to the potential of the landscape. (Author 2015)

7.2

Design development Iterations

7.2.1

Iteration 1:

A return to the 'natural' significance

Inspired by the historic identity of the Apies River Corridor as significant natural and recreational resource in the city of Pretoria, the first iteration proposed an attempt to reinscribe this significance and its associated biophilic potential through the construction of an artificial wetland as an integration of the city's natural systems and cultural engineering arsenal. The proposal of this constructed wetland aimed to enhance the biodiversity, water quality and recreational opportunities of water in an urban context as well as provide a more sustainable approach to urban stormwater treatment.

In many suburban areas, wetlands are among the last remnants of natural vegetation in the landscape. Wetlands are thus important elements of the natural capital of urban ecosystems. They often serve or are expected to serve multiple functions within the system: storm water detention, water storage, treatment of wastewater/ water quality improvement, maintenance of wildlife habitat, human recreation, education, and aesthetics. As more land in the surrounding area is converted to development, and population densities and demography change, increasing pressure is placed on those wetlands that remain to serve these multiple functions, some of which are incompatible. The potential for cumulative impacts of stressors on urban wetlands means that these impacts cannot be analysed in isolation (Hemond & Benoit in Ahlers 2006: iv).

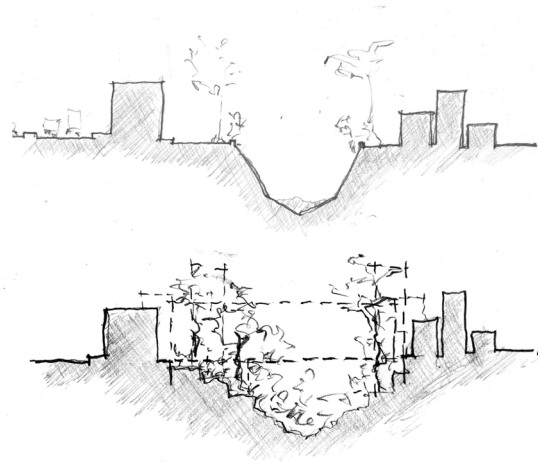


Figure 7.4: Conceptual diagramme illustrating the intentions of iteration 1: A return to the natural significance (Author 2015)

A
Sculpting the landscape

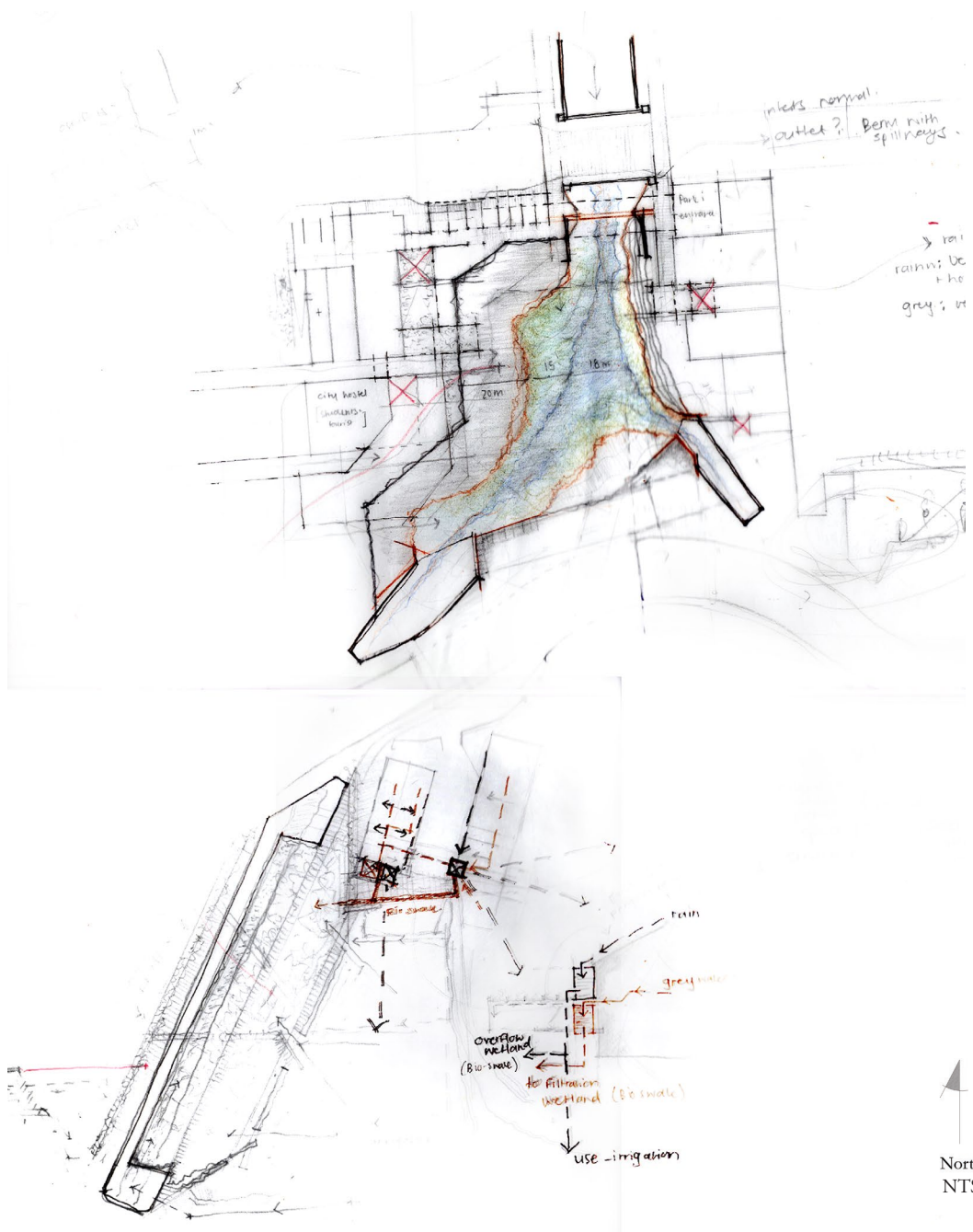


Figure 7.5: First site development of the interventions within the existing concrete channel and proposal of the constructed wetland and adjacent structures. (Author 2015)

Figure 7.5 and Figure 7.6 illustrate the first iteration of strategically selecting areas of the concrete channel to be removed and replaced by natural rock barriers and terraced landscaped surfaces, constructing a wetland in the central area of the three identified sites on the Apies River.

Figure 8.5, 8.6 and 8.7 illustrate the double-ended conceptual approach, as discussed in the previous chapter, of simultaneously sculpting the landscape whilst developing a vision for the new architectural intervention through identifying contextual points where opportunities exist for utilising water.



Figure 7.6: First site development of the structural interventions as contextual and programmatic response within the constructed wetland. (Author 2015)

Figure 8.6 and 8.7 both diagrammatically indicate the opportunities for integrating the water processes of the existing precinct, as identified through the mapping of the existing water infrastructure, with the new intervention and recreational activities, such as the development of a pedestrian route, with the aim of establishing a relationship between and consequently exposing significant contextual informants within the precinct and site. This development, as illustrated through the conceptual drawings, aims to resemble the former natural state of the river, exploiting the possibilities of a water system towards making an aesthetic, ecological and recreational contribution to the city context.

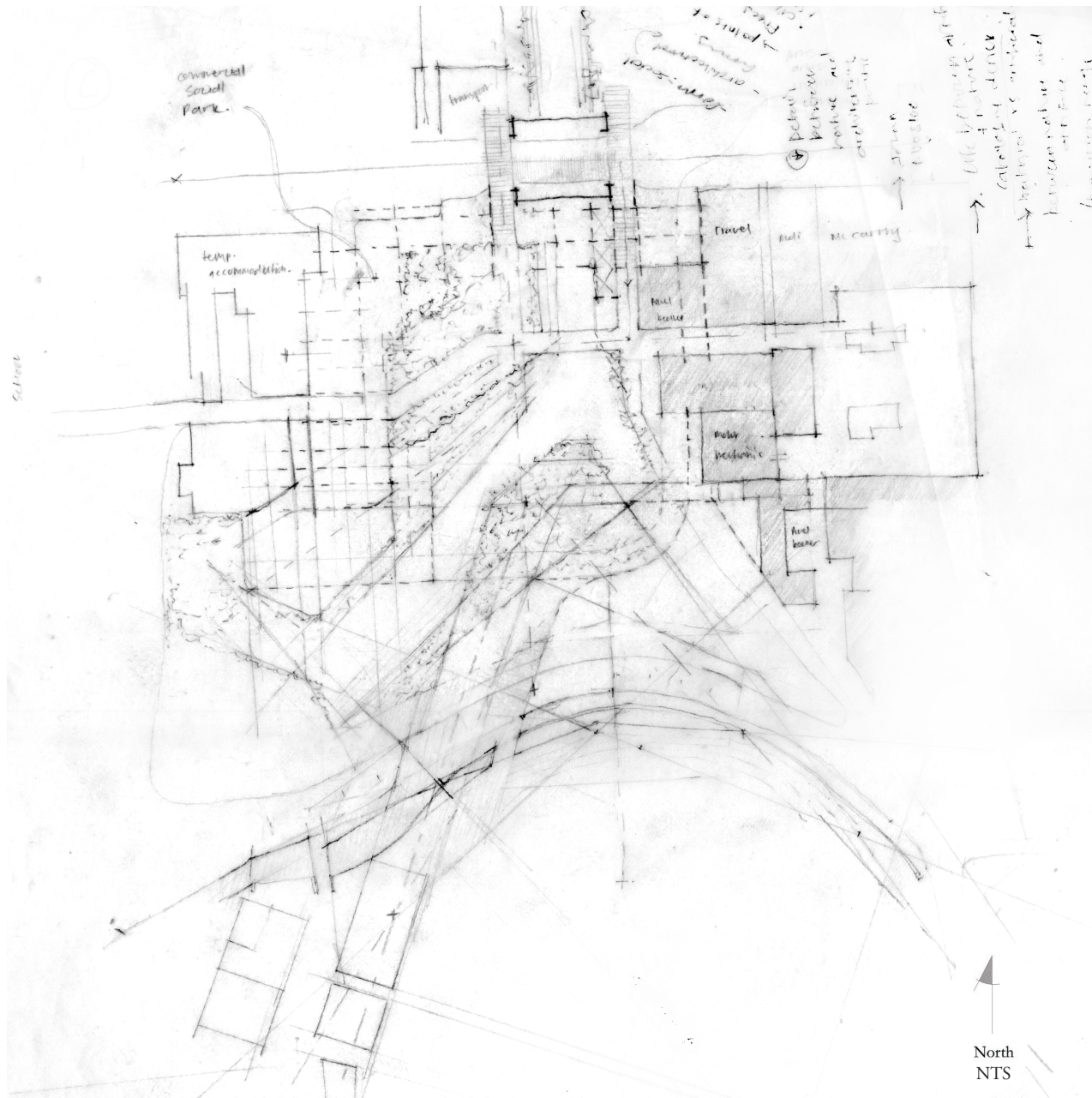


Figure 7.7: Further development of the structural interventions as contextual and programmatic response, containing the central onstructed wetland landscape. (Author 2015)

Figure 8.8 and 8.9 illustrate the sectional potential of sculpting the landscape into a constructed natural entity, as well as the identification of consequential recreational and spatial opportunities.

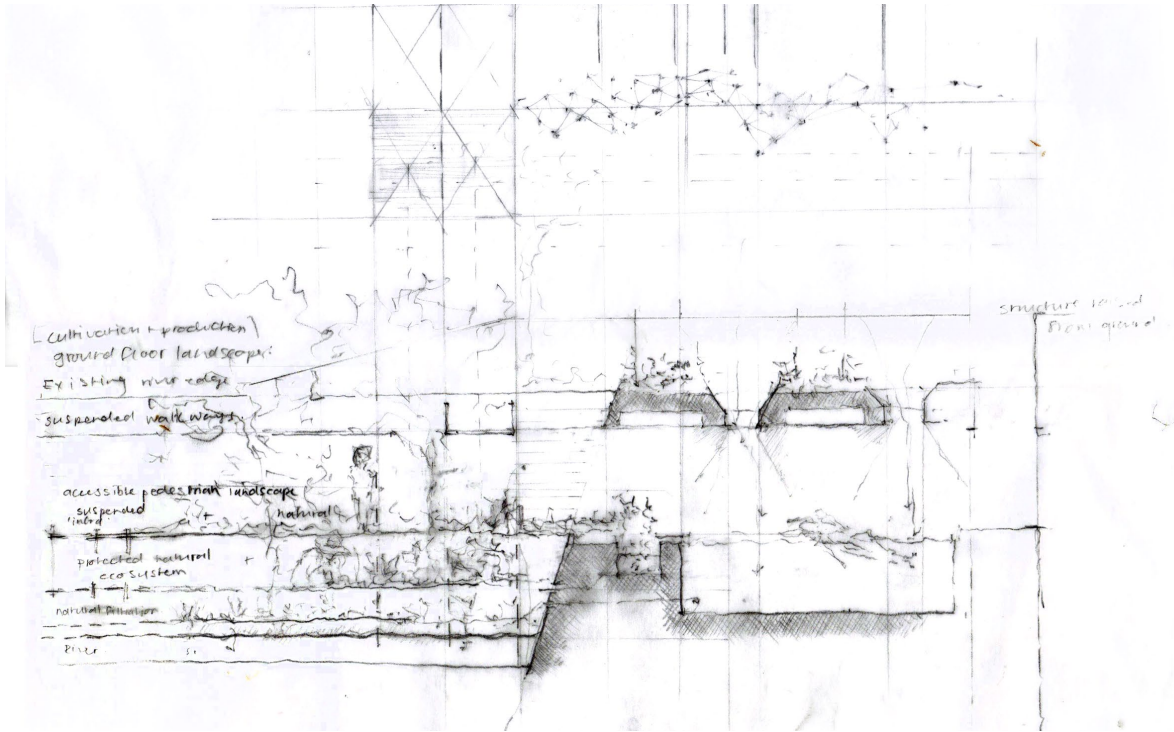


Figure 7.8: First conceptual sectional development of the spatial and programmatic opportunities within the reconstructed landscape. (Author 2015)

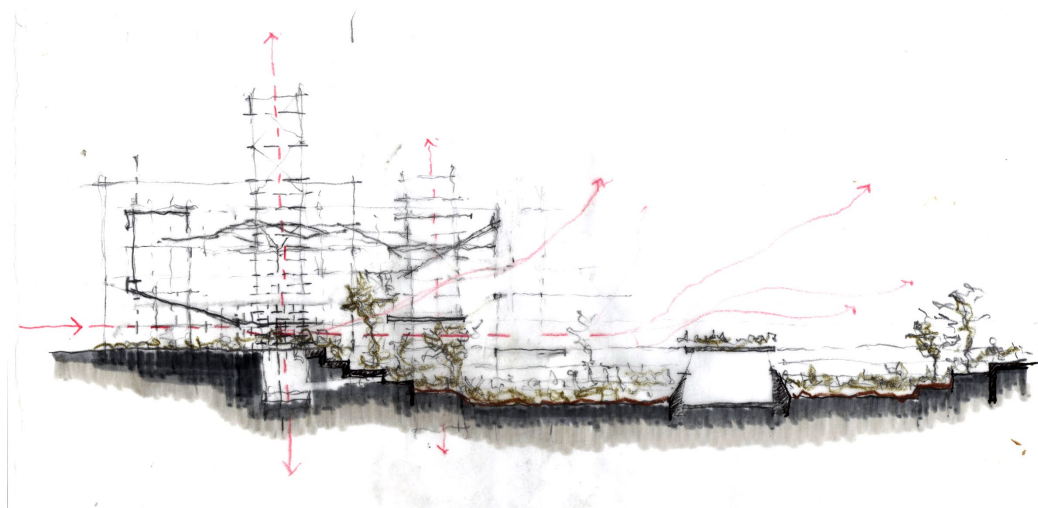


Figure 7.9: First sectional development of the structure as a response to the reconstructed 'natural' landscape and natural water processes of the site. (Author 2015)

C

External and Internal edge response

Figure 8.8 and 8.10 illustrate the sectional potential of integrating water infrastructure as spatial and structural informant for developing a contextually appropriate formal response to the water systems, sculpted landscape, and both external and internal edge conditions of the intervention.

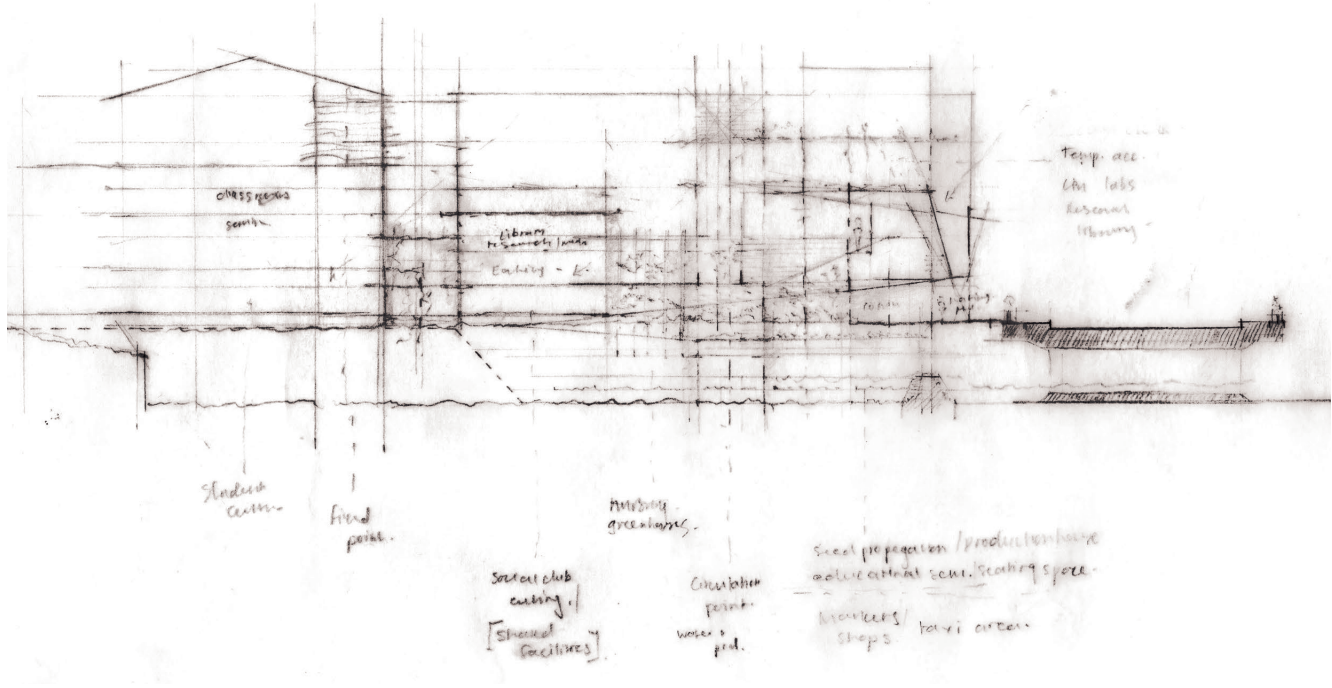


Figure 7.10: First sectional development of the structural interventions as contextual and programmatic response towards the internal landscape and external street conditions. (Author 2015)

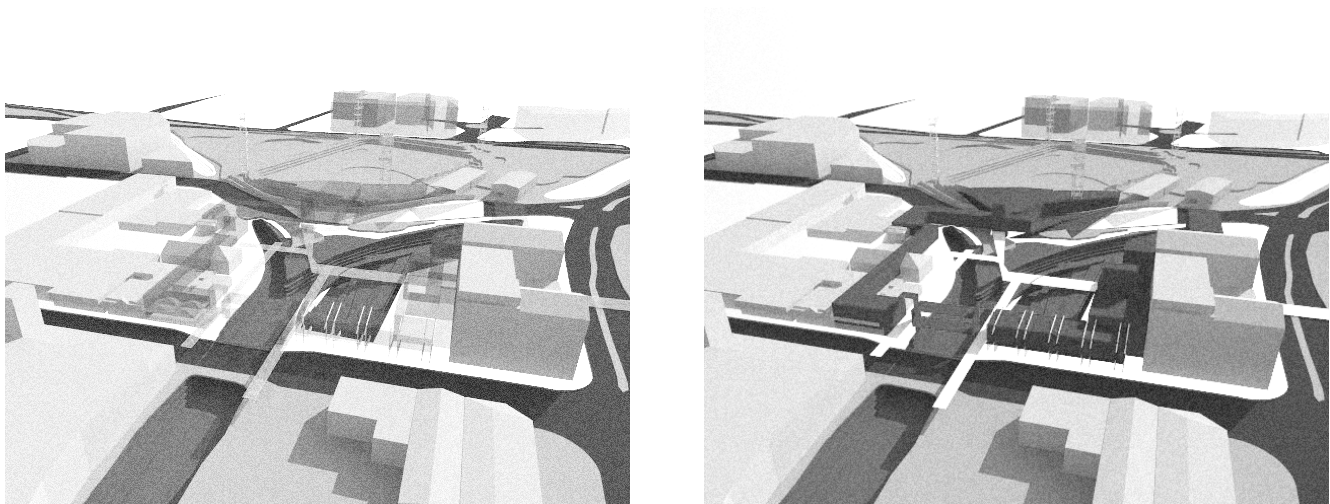


Figure 7.11: First sectional development of the structure as a response to the reconstructed 'natural' landscape and natural water processes of the site. (Author 2015)

7.2.2

Iteration 2:

Exploiting ecological, water and spatial opportunities through a reconstruction of an integrated artificial system

Due to the 'removal' of the natural water system and its ecological potential from the city through the extent and depth of the concrete stormwater channel, and urbanisation that consequently grew towards the edge of the channel, an immense challenge is presented: to return the river to its historic natural significance through an actual return to the construction of a 'natural ecological system' within this densely developed context. In order to successfully implement an intervention on such a vast scale, the water system of the Apies River Corridor in its entirety needs to be evaluated and reconstructed selectively to prevent the return of the ecological threat and hazards that led to the implementation of its concrete entombment. The various strains and impacts that urbanisation and the development of cities have on natural entities, however, demand an alternative approach towards exploiting the range of biophilic qualities and the potential of these natural systems through an artificially constructed realm that would allow for a return to an ecological and recreational identity without literally reconstructing the 'natural'.

The iteration therefore proposes a constructed artificial landscape that collectively harvests, treats and reuses water from the precinct and intervention itself for various activities, as filtration point to the site and larger river network. It subsequently feeds excess treated water back into the river system to be used for agriculture in the northern areas beyond the city, aiming to enhance the quantity, quality and biodiversity of water in natural areas, as well as the river's ecological potential and presence within the city.

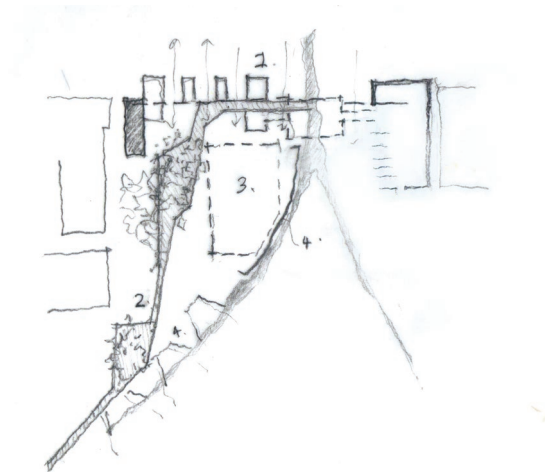
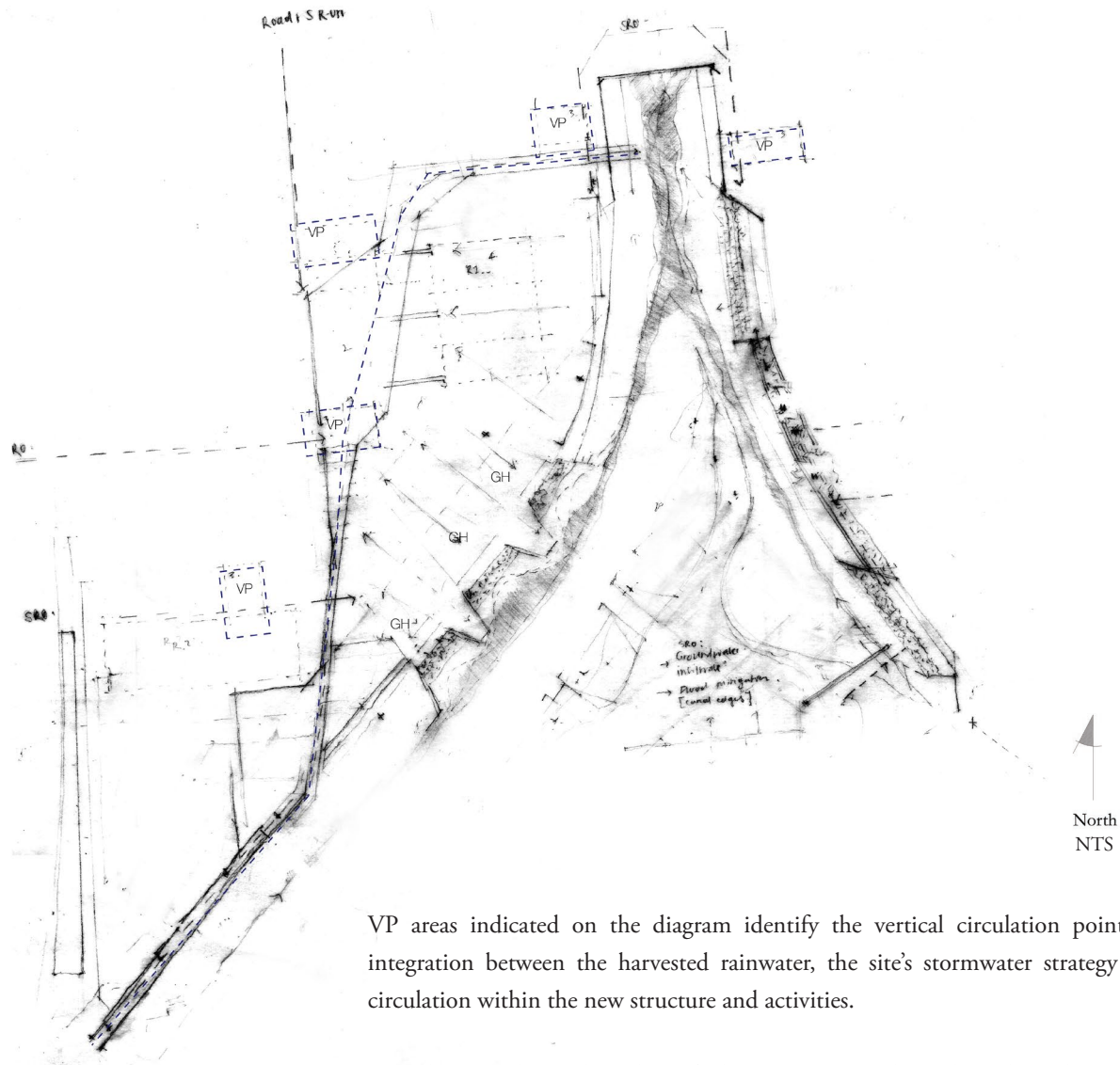


Figure 7.12: as parti diagram to the site vision, illustrates the reconstruction of the artificial landscape through the creation of four primary elements, as discussed below. (Author 2015)

1. The proposed building intervention becomes an extension of the collective existing infrastructures (ecological, water, social and transportation) as filtration boundary structure between the Ceremonial Boulevard as active urban realm and the contained regenerated landscape.
2. An artificially constructed processional water channel, informed by the mapping investigation of the existing water infrastructure of the precinct, is proposed as a continuous entity throughout the site and building, activating the site activities through the exploitation of its recreational, aesthetic and ecological potential.
3. The multifunctional outdoor court is proposed as the central public gathering space, and is sunken into the landscape as part of the sculpted form to act as detention structure in the event of flooding at the confluence of the Apies River and Walker Spruit.
4. The edges of the concrete stormwater channel are reconstructed in various ways at identified strategic points, as a response to the adjacent activities.

A
Sculpting the landscape



VP areas indicated on the diagram identify the vertical circulation points of integration between the harvested rainwater, the site's stormwater strategy and circulation within the new structure and activities.

Greenhouses along the edge of the stormwater channel (indicated as GH) are irrigated with the harvested water in the channel system. A terraced edge is proposed that would allow spatial access to the currently inaccessible lower level of the channel that is contained within the 75 year floodline. The lowest levels of the terraced edges within the indicated floodlines are proposed to be vegetated as bioswale filtration edges to the irrigation runoff channels from the greenhouses.

Figure 7.13 illustrates the processional water channel and related water process informing the sculpting of the recreational landscape through harvesting stormwater runoff collectively throughout the site, and channelling it to a central small-scale constructed wetland, from which it is channelled to an underground storage reservoir for reuse within the precinct, with excess water fed back into the Apies River Corridor. (Author 2015)

The primary intervention, the boundary filtration structure between the Ceremonial Boulevard and the landscape, becomes the main inception point for internal activities and positions itself between the eastern and western adjacent buildings, bridging the channel at a higher level and therefore continuing activities across the currently fragmented condition resulting from the site being dissected by the channel. It addresses the industrial eastern edge of the informal motor mechanics and provides access and integration from the eastern edge of the site to the reconstructed landscape.

The identified route throughout the site aims to connect significant contextual conditions and selectively filter activity into the contained landscape at strategic points, while simultaneously exploiting the potential of integrating precinct activities with the site activities.

Activities along the extent of the site include the wetland area providing an aesthetic landscaped barrier and seating edge between the western adjacent residential building and the recreational public space, as well as the horticulture workshop and greenhouse walkways extending across the channel into the natural park, forming a pedestrian connection to the newly proposed Caledonian Commons to the south of the site that contains market spaces with public transportation and parking along Pretorius Street.

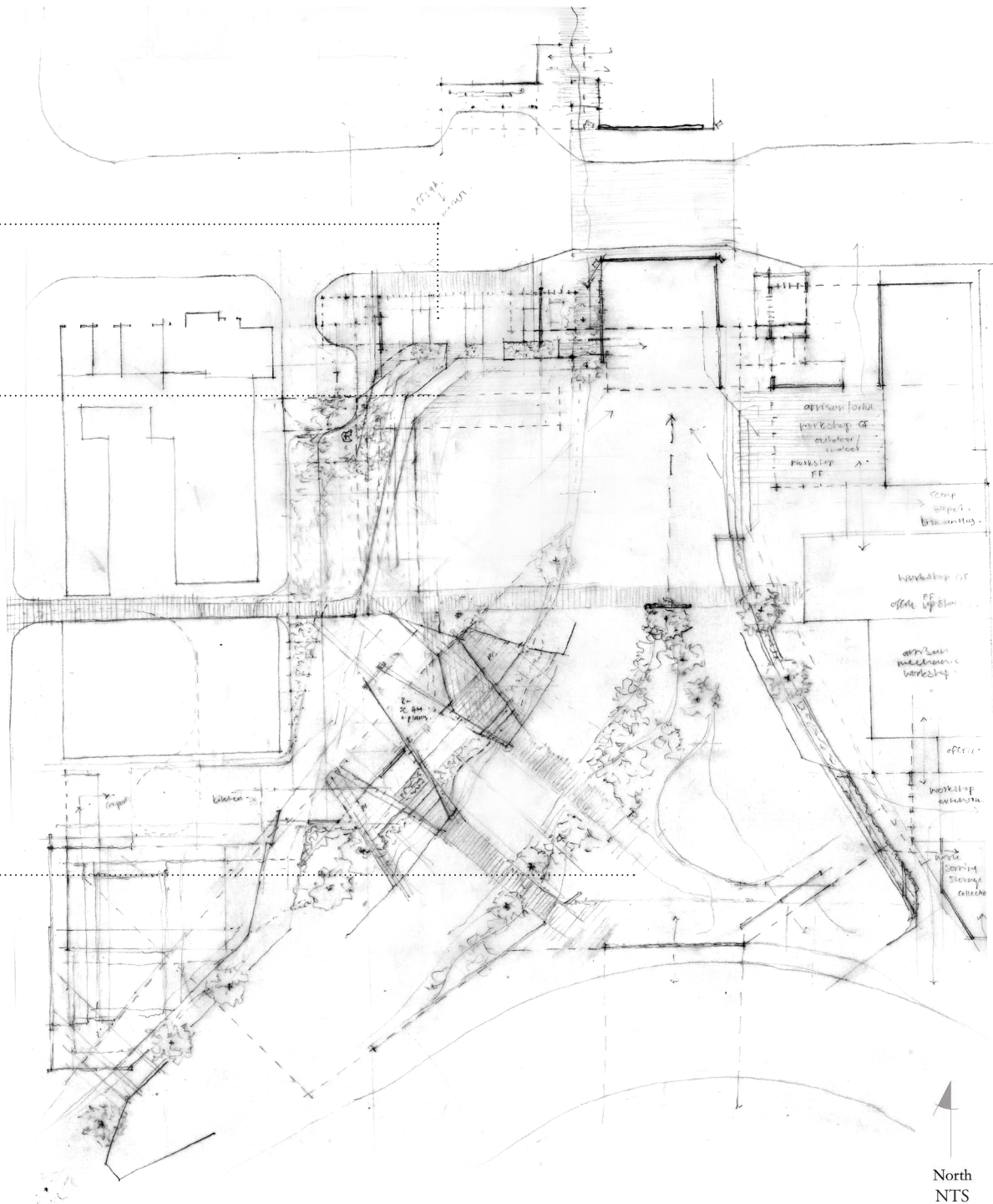


Figure 7.14 illustrates the programmatic and spatial activation of the site, developed from the iteration parti diagram as a simultaneous response to the sculpting of the landscape shown in Figure 7.12. (Author 2015)

B
Structural and service spine

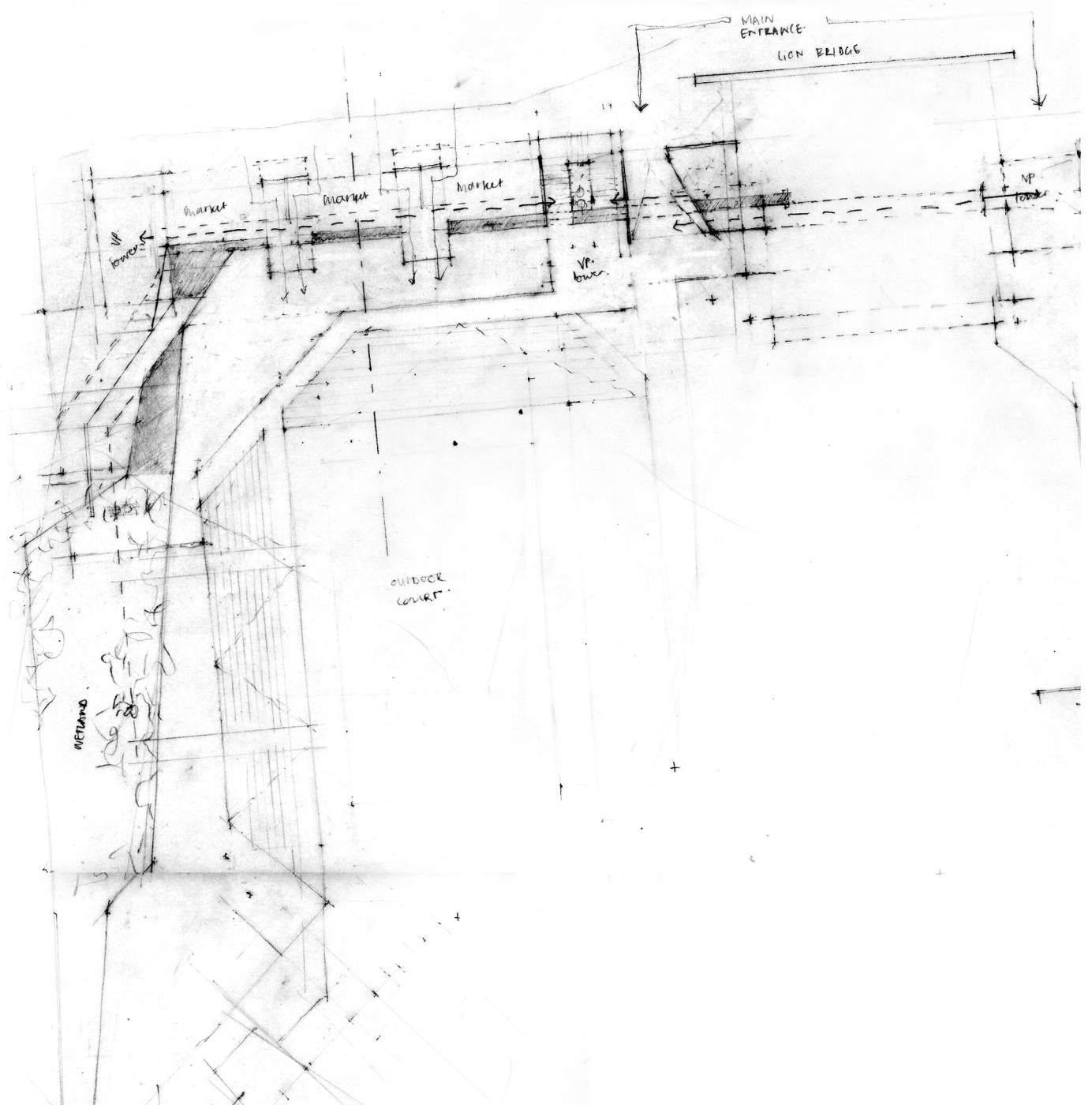


Figure 7.15: Further development of the primary building and structural interventions during iteration 2. (Author 2015)

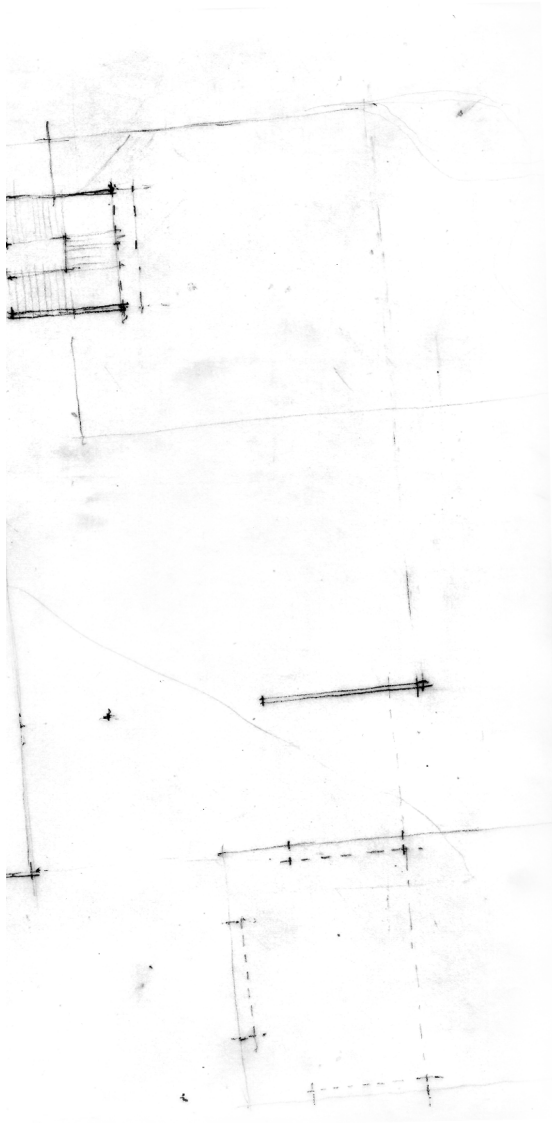


Figure 7.15 extends the development of the site response as discussed above into the building and structure itself. The contained landscape is extended into the ground floor space through the sloped edges of the public outdoor court and the adaptable thresholds and continuous surfaces defined by the circulation route through the site.

The vertical points of integration between water processes, circulation and activities, as identified in Figure 7.13, are developed into the three primary structural cores that serve the adjacent spaces, informing the development of the structural and service spine.

Access and circulation through the building itself become important informants of the design development. A central circulation route adjacent to the water channel all along the length of the building proposes a central circulation and service spine connecting the three primary structural and service core towers.

The main access points to the landscape and building are identified as the two edges adjacent to Lion Bridge and a long the circulation route through the site or into the opposite parts of the building. These emphasise and expose the significance of this historical structure under the expanse of the building. Secondary entrance points are proposed through the market spaces as identified in the drawing.

C
External and Internal edge response

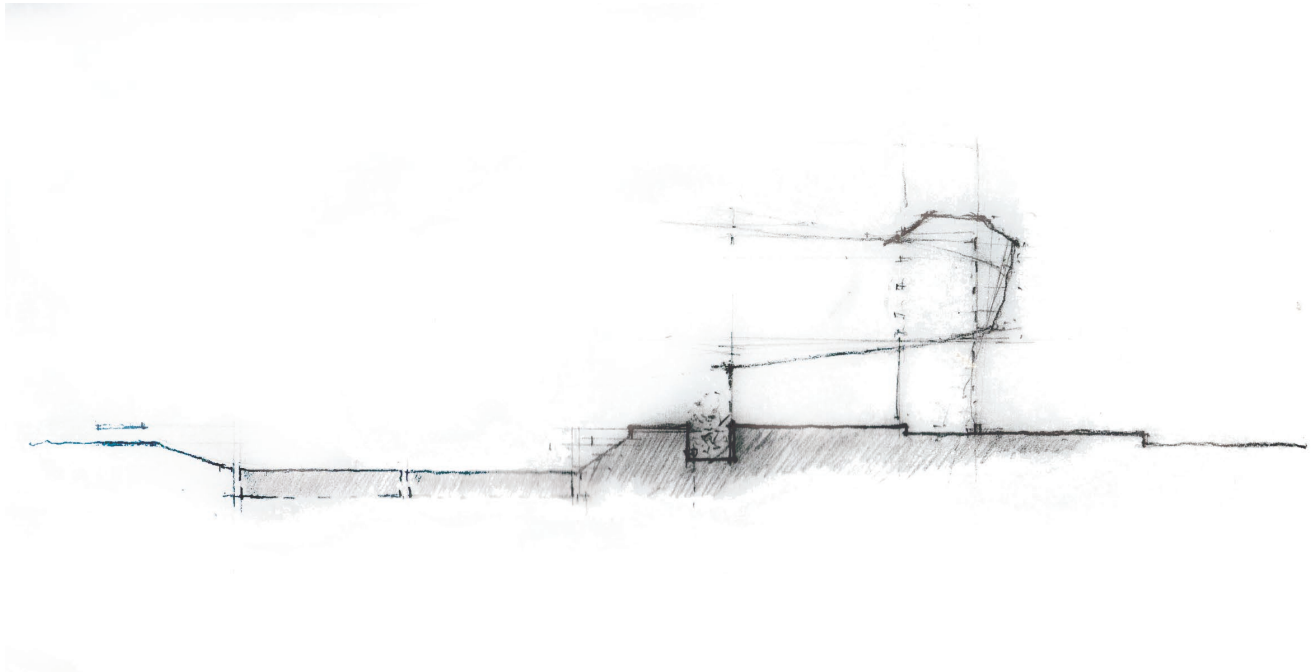


Figure 7.16 illustrates the sectional development of the continuous sculpted ground floor and water channel extending through the building, creating open thresholds from the street into the landscape. The external façade on the first floor contains and encloses activities to the open internal edge conditions that extend into the landscape. (Author 2015)

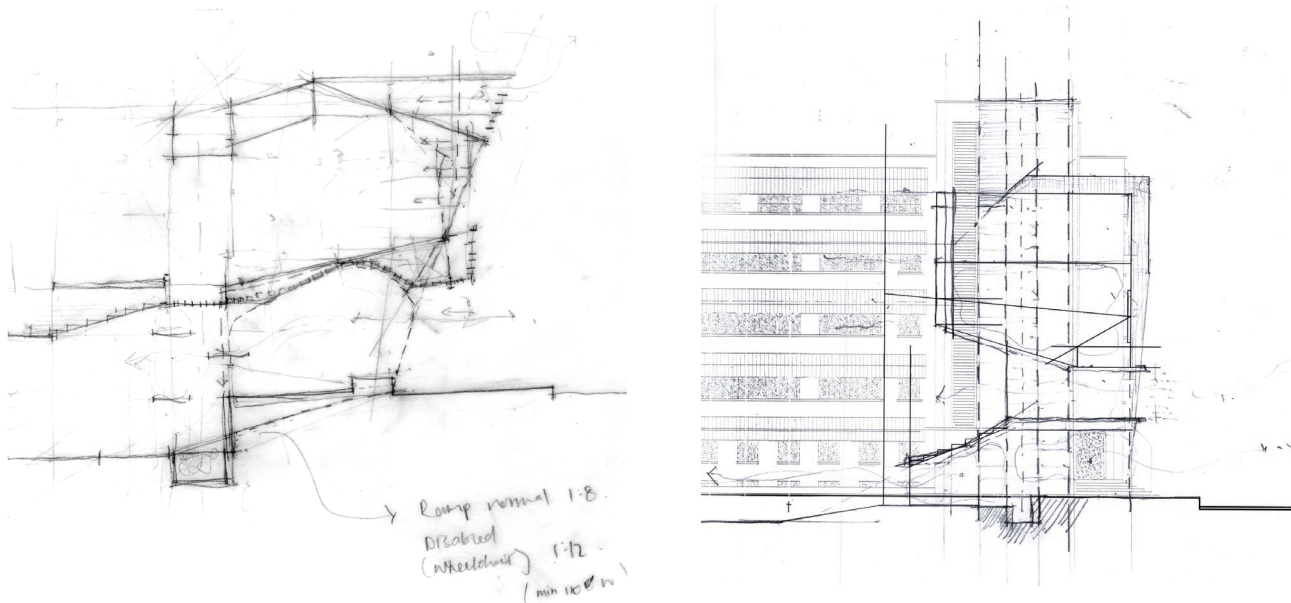


Figure 7.17 illustrates a further sectional development of the internal and external edge conditions through the extended landscape sunken below street level, continuously becoming the boundary wall to the structural and service spine that extends throughout the building and facilitates public circulation ramps to higher levels. (Author 2015)

To be drawn

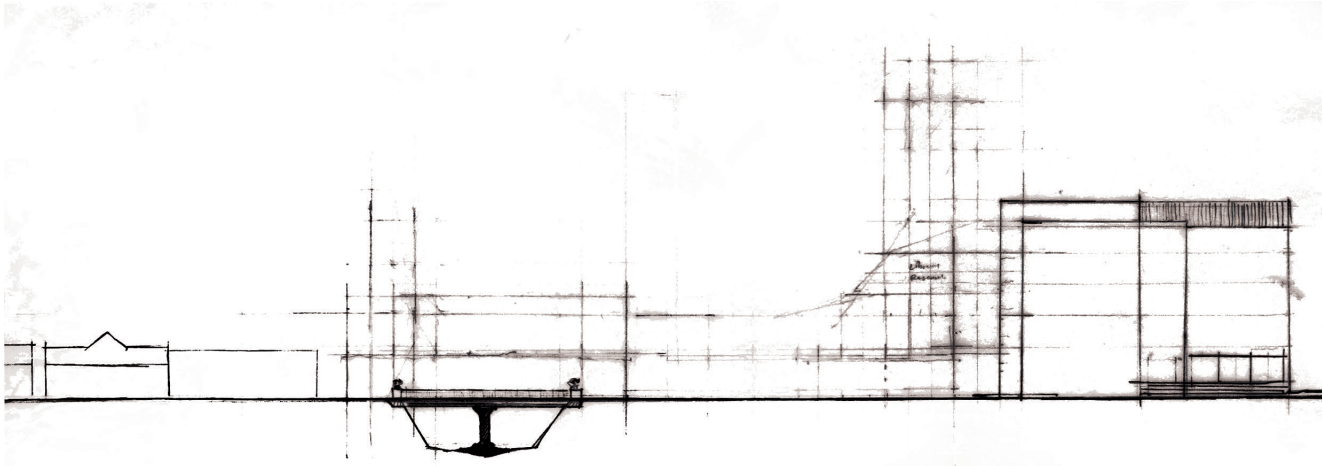


Figure 7.18 illustrates a first translation of the section and plan to elevation, considering an appropriate spatial and formal translation between the mass and scale of the adjacent buildings . (Author 2015)

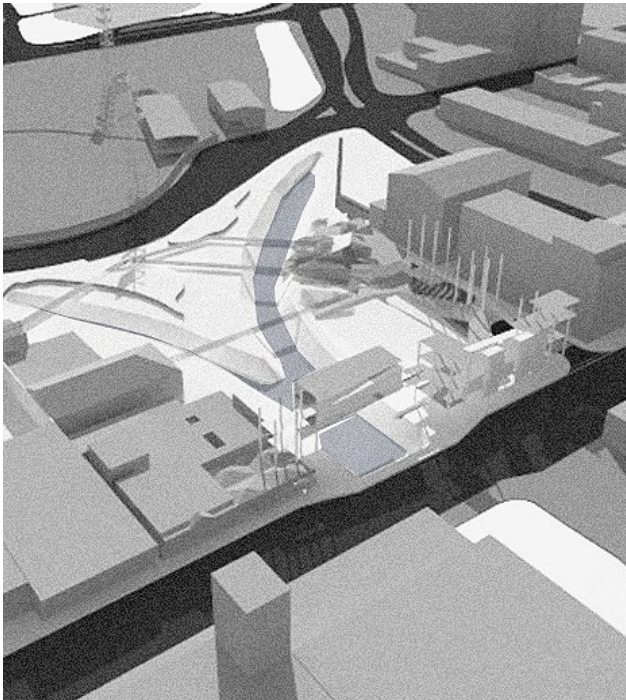


Figure 7.19: Northern birds eye view perspective drawing of the structural, formal and spatial development during iteration 2. (Author 2015)

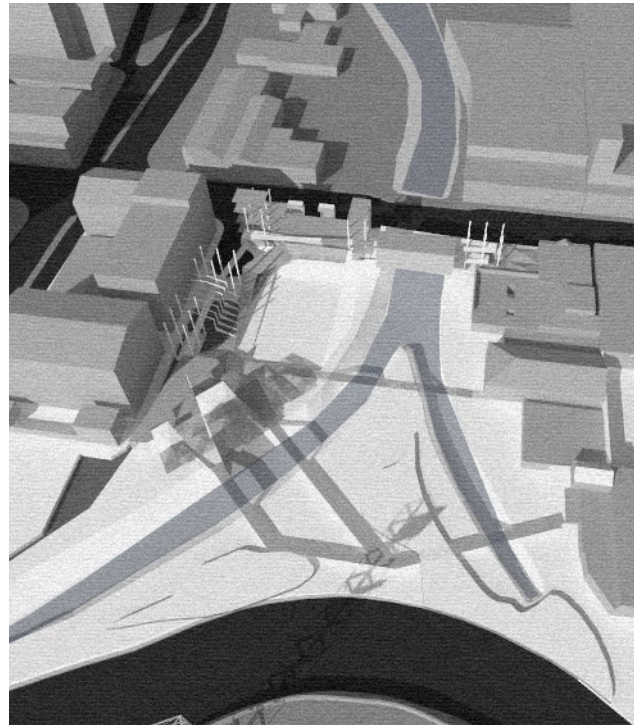


Figure 7.20: Southern birds eye view perspective drawing of the structural, formal and spatial development during iteration 2. (Author 2015)

7.2.3

Iteration 3:

Development of the water system and structural core

Iteration 3 is discussed as a development of the main conceptual intentions as determined and discussed in the first two iterations, and focusses on the development of refining the water system, and on the structural and service spine as spatial agent, influencing the development of the activities it services and both the internal and external edge responses.

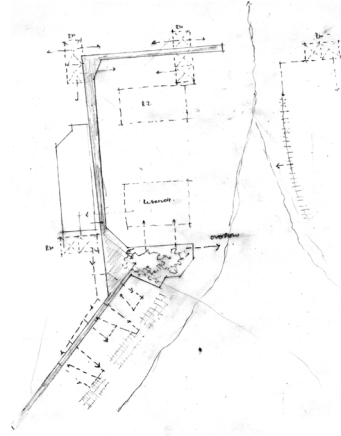


Figure 7.21: Conceptual diagramme of the development of the constructed water channel and landscape. (Author 2015)



Figure 7.22: Site parti diagramme illustrating the intentions of iteration 2 as a reconstructed artificial landscape. (Author 2015)

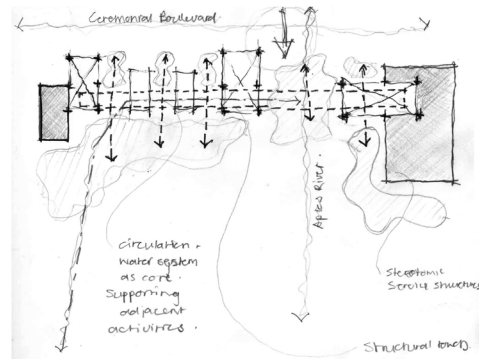


Figure 7.23: The building parti diagramme illustrating the intentions of the structural towers, circulation and water channel becoming the structural core and supporting adjacent activities. (Author 2015)

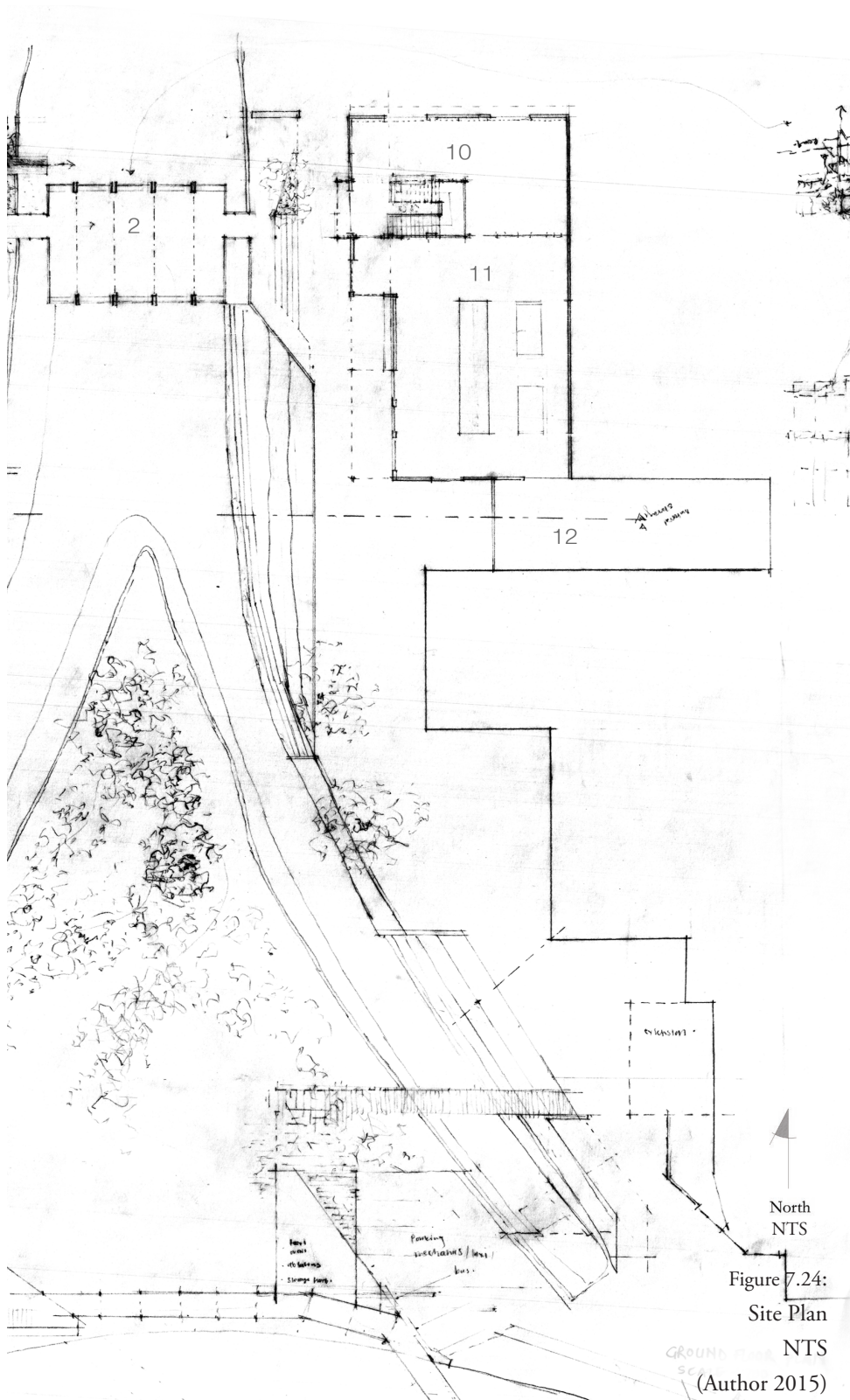
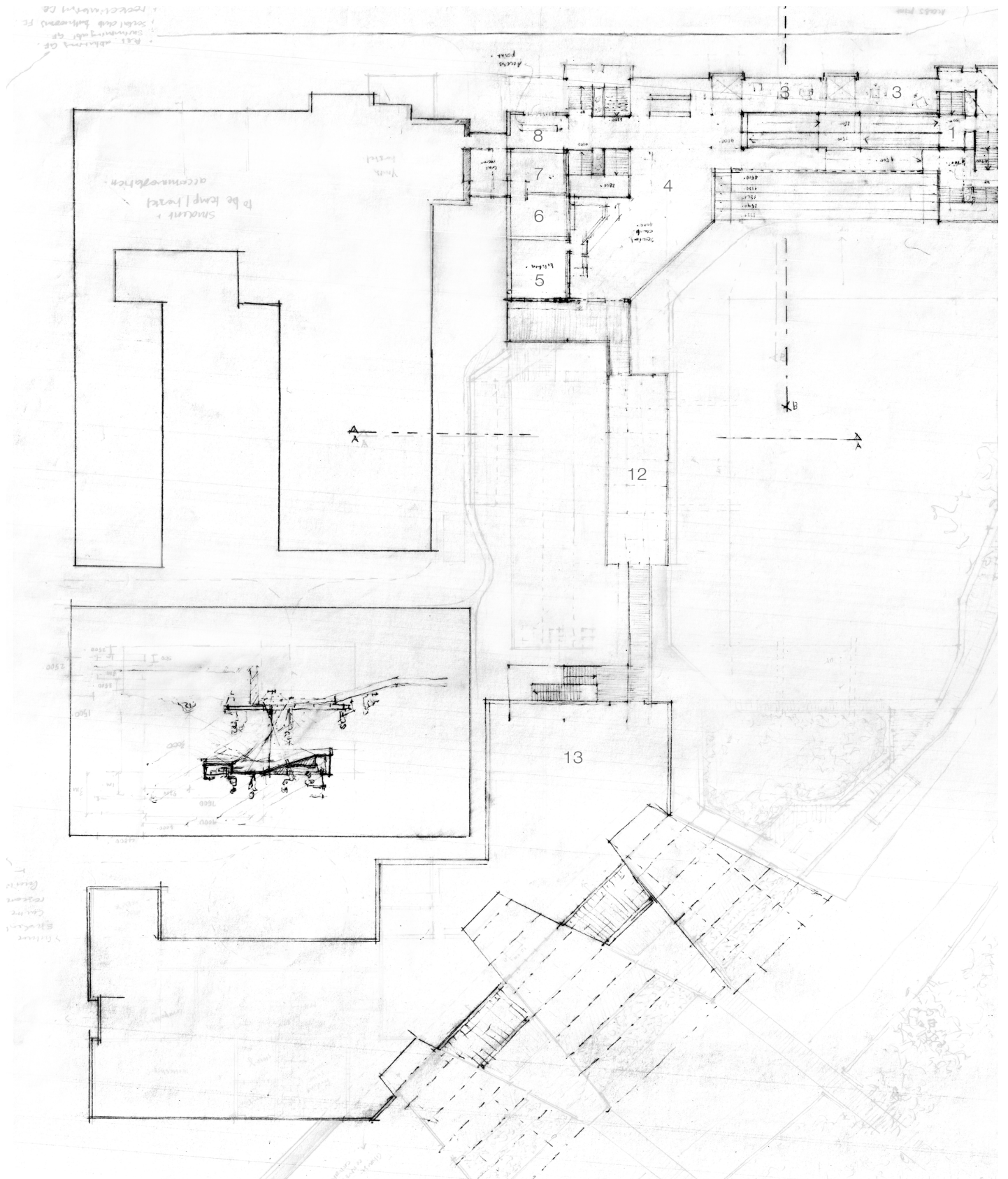


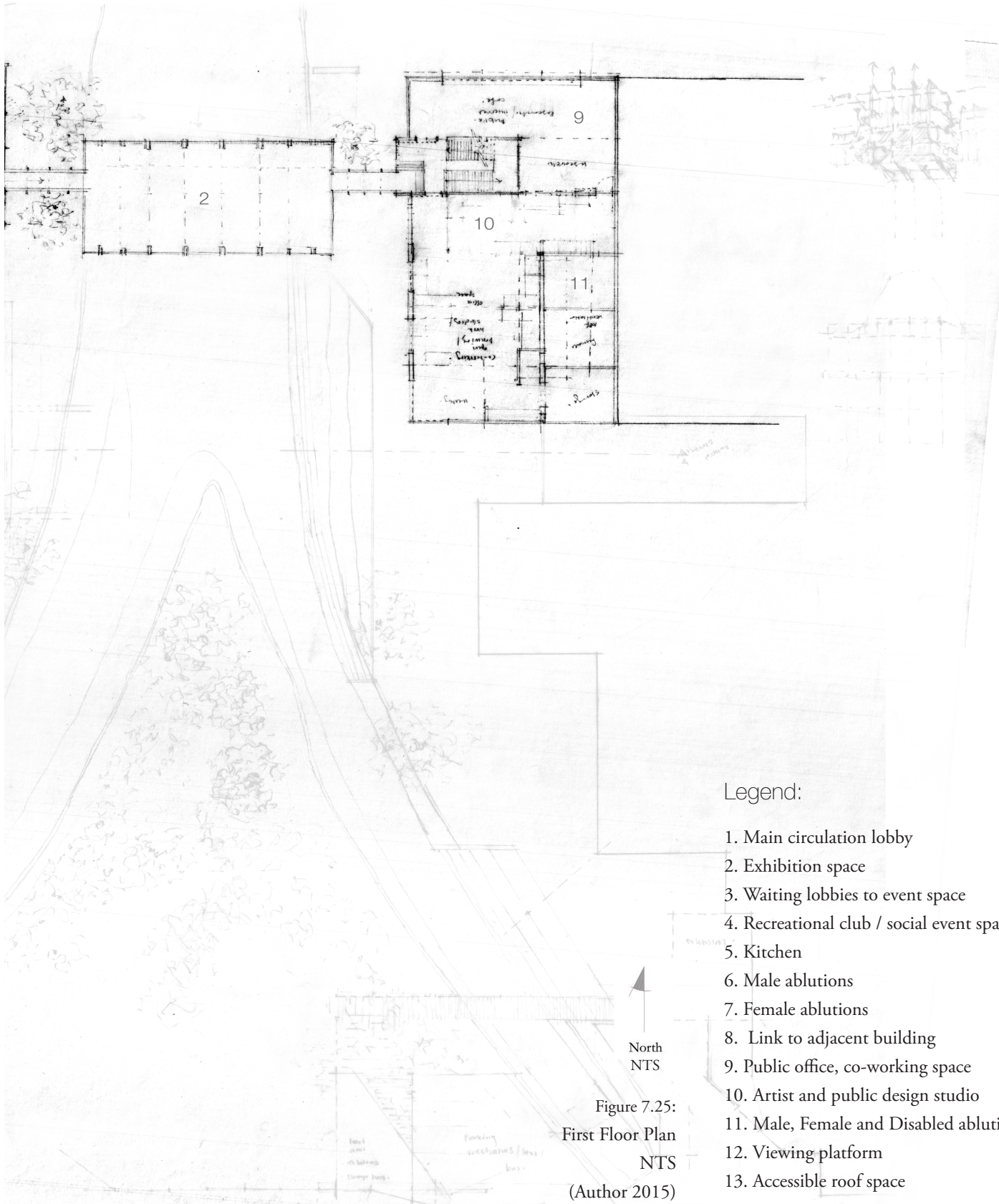
Figure 7.24 illustrate the refinement of the development of the water channel throughout the site. The position of the constructed wetland is moved to a central point along the water channel that creates a landscaped boundary between the southern edge of the public court and the transition to the horticulture workshop and landscaped park bordering the channel. The repositioning of the water channel and constructed wetland, along with the position of the public swimming pool, enables more recreational opportunities along the water channel.

Legend:

1. Main entrance and circulation lobby
2. Entrance lobby and visitor's information centre
3. Market space with lockable storage
4. Recreational social club and event space
5. Kitchen
6. Male ablutions and changing rooms, Disabled abluion
7. Outdoor public sports court
8. Public swimming pool
9. Female ablutions and changing rooms
10. Retail space: Artist furniture, sculptural and installation art
11. Artist and public workshop
12. Material Storage and collection point from site
13. Greenhouses
14. Horticulture workshop
15. Proposed future development: Restaurant and Student Centre

Figure 7.24:
Site Plan
NTS
(Author 2015)

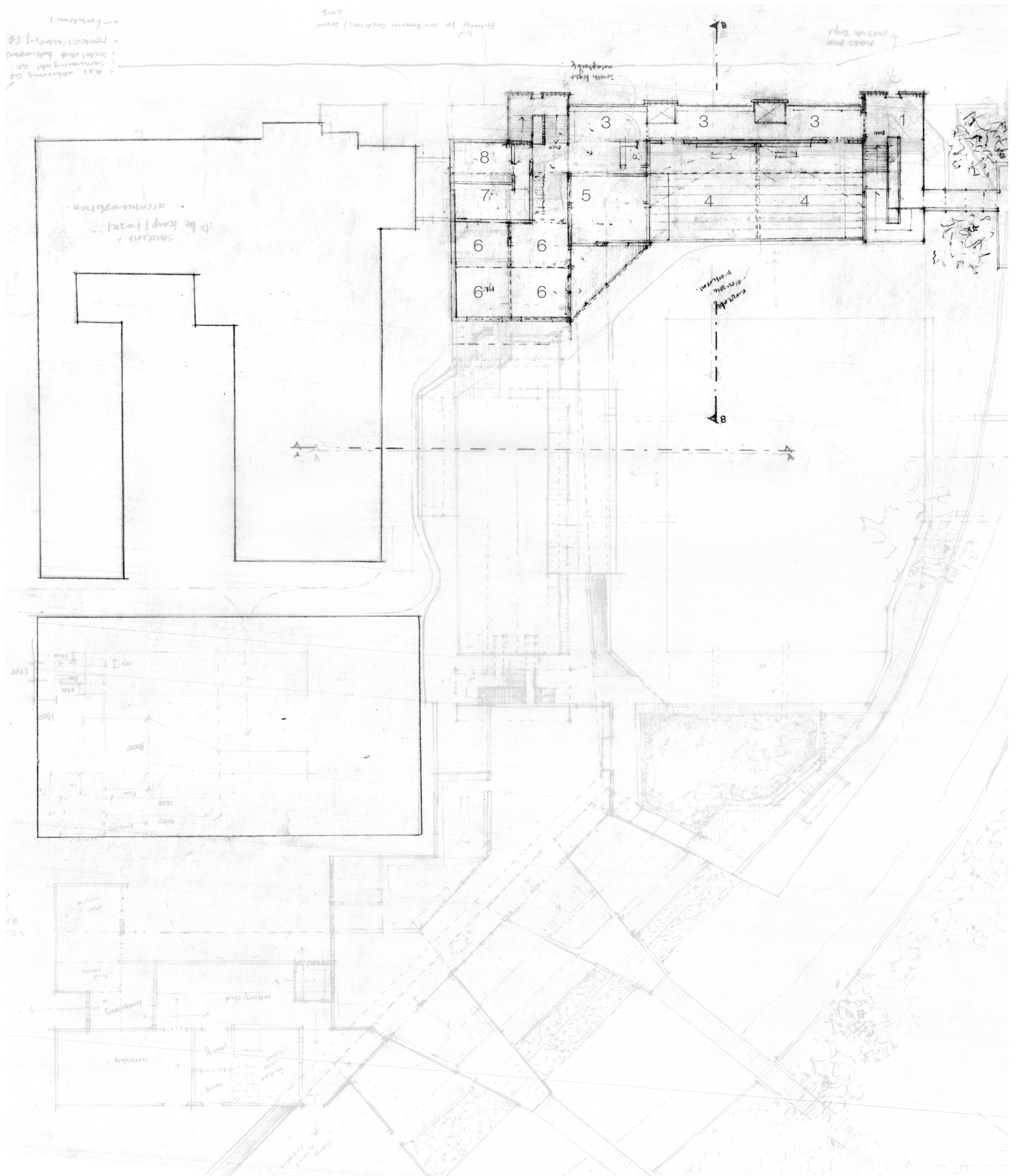


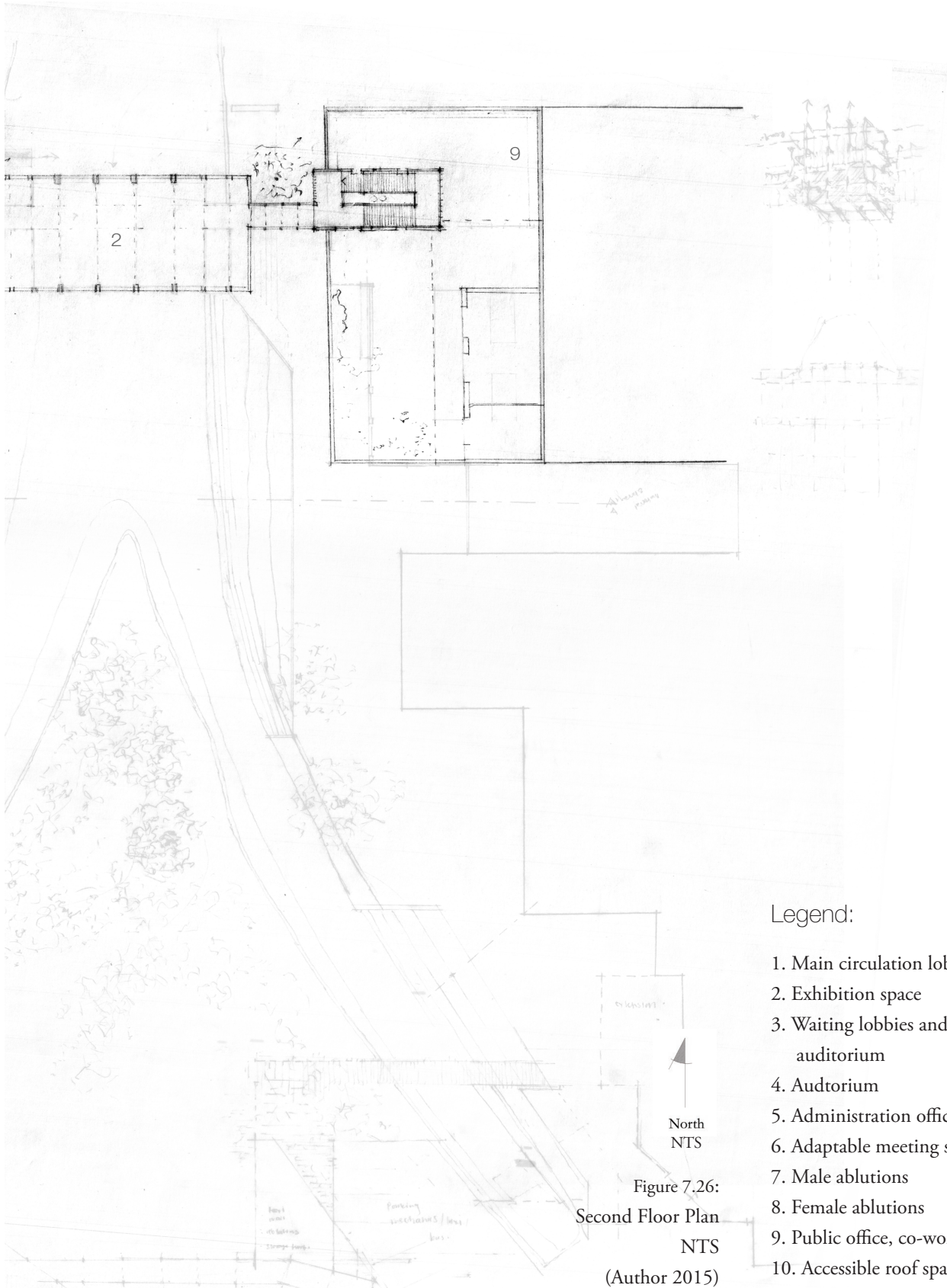


Legend:

1. Main circulation lobby
2. Exhibition space
3. Waiting lobbies to event space
4. Recreational club / social event space
5. Kitchen
6. Male ablutions
7. Female ablutions
8. Link to adjacent building
9. Public office, co-working space
10. Artist and public design studio
11. Male, Female and Disabled ablutions
12. Viewing platform
13. Accessible roof space

Figure 7.25:
First Floor Plan
NTS
(Author 2015)





Legend:

1. Main circulation lobby
2. Exhibition space
3. Waiting lobbies and reception to auditorium
4. Auditorium
5. Administration office
6. Adaptable meeting spaces
7. Male ablutions
8. Female ablutions
9. Public office, co-working space
10. Accessible roof space

Figure 7.26:
Second Floor Plan
NTS
(Author 2015)

B
Structural and service spine

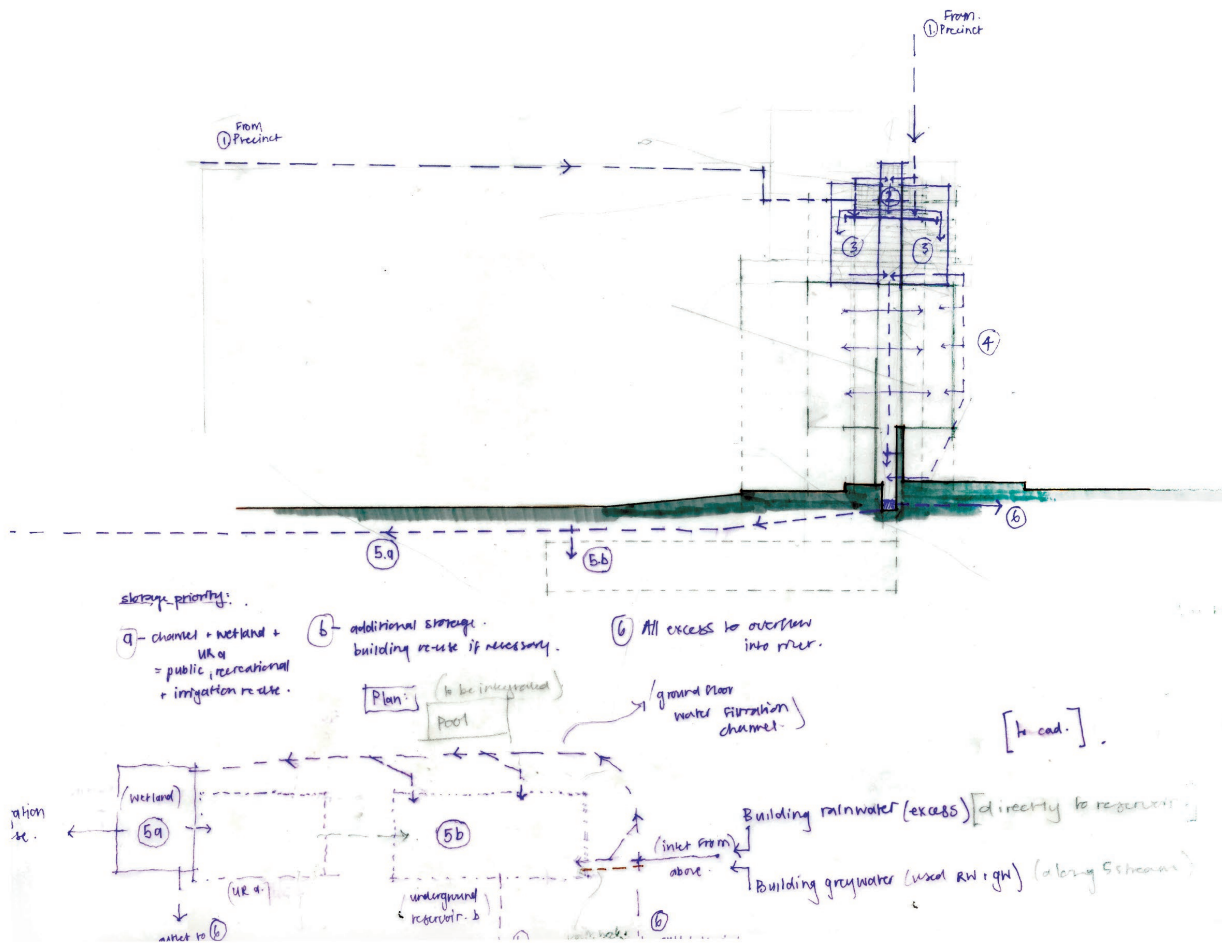


Figure 7.27: Sectional development of the structure spanning the Apies River channel during Iteration 3. (Author 2015)

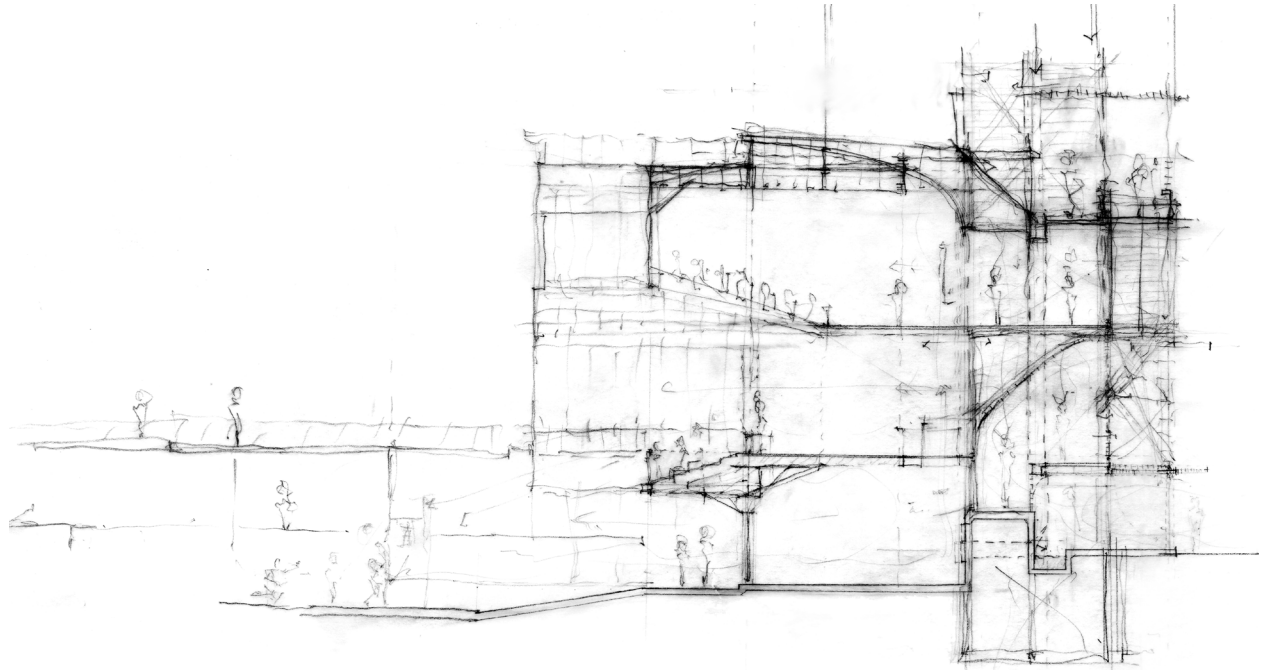


Figure 7.28: Development of section a-a during iteration 3, as a response to site activities, the sculpted landscape as well as water processes along the building and site. (Author 2015)

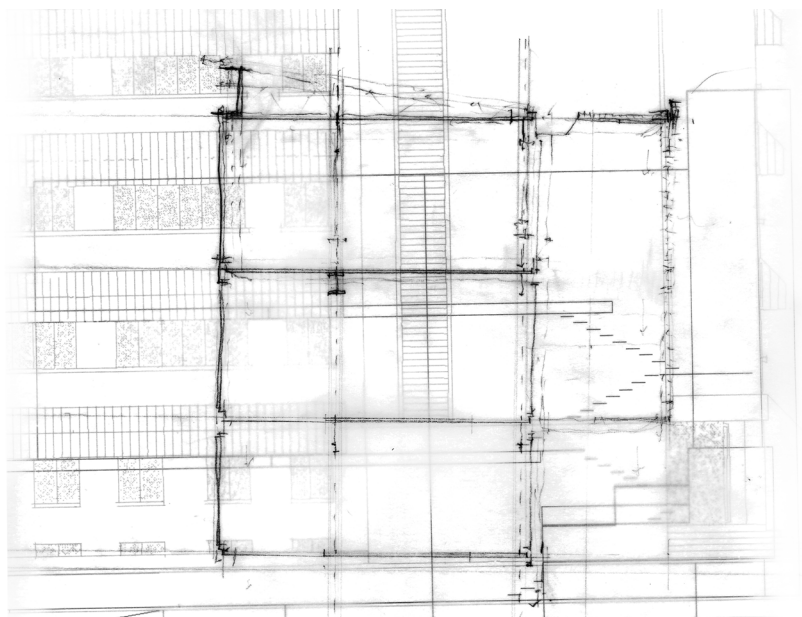
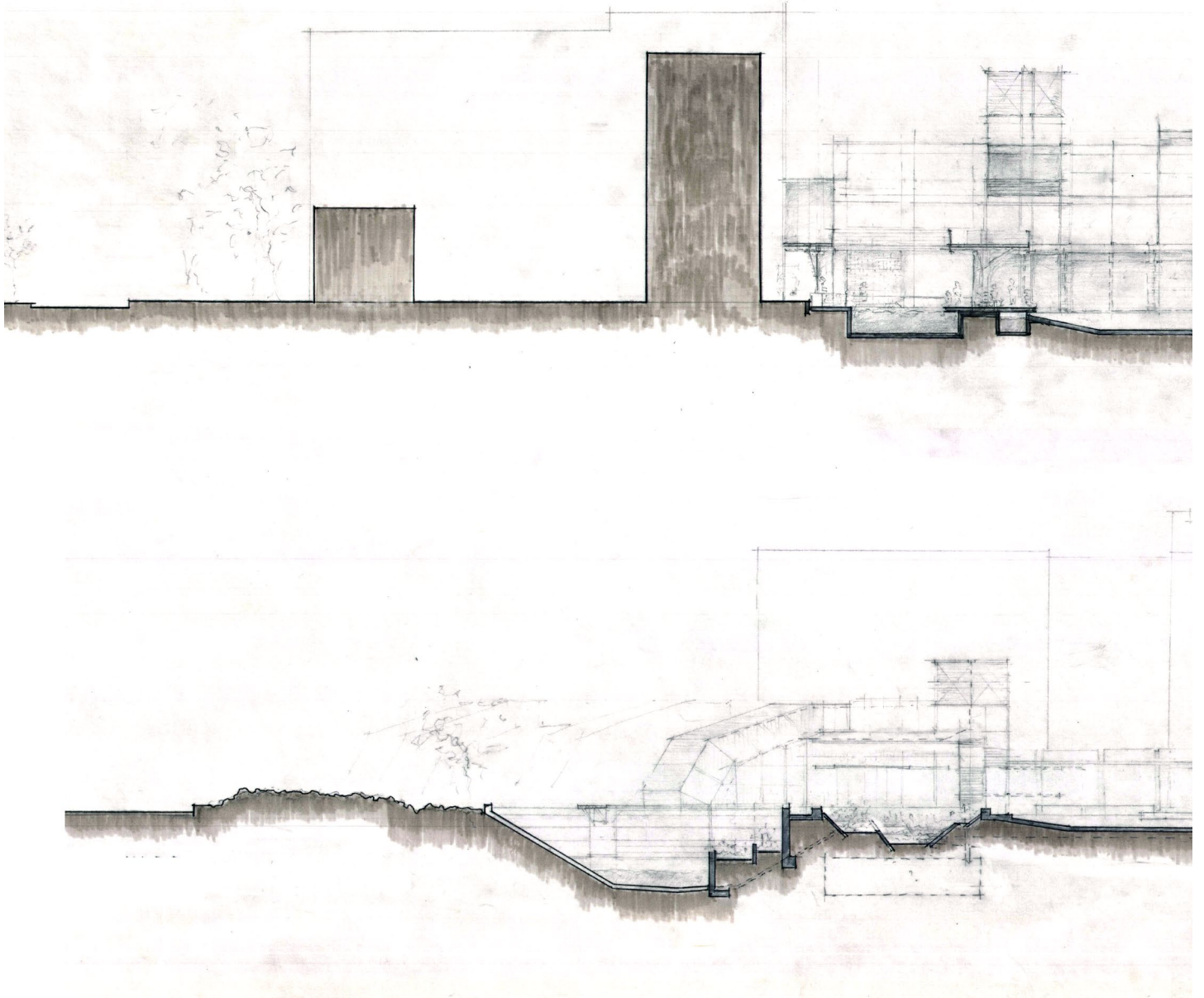


Figure 7.29: Diagrammatic section of the water processes along the roof and ground level as informant to the sectional development of the structural and service spine of the building. (Author 2015)



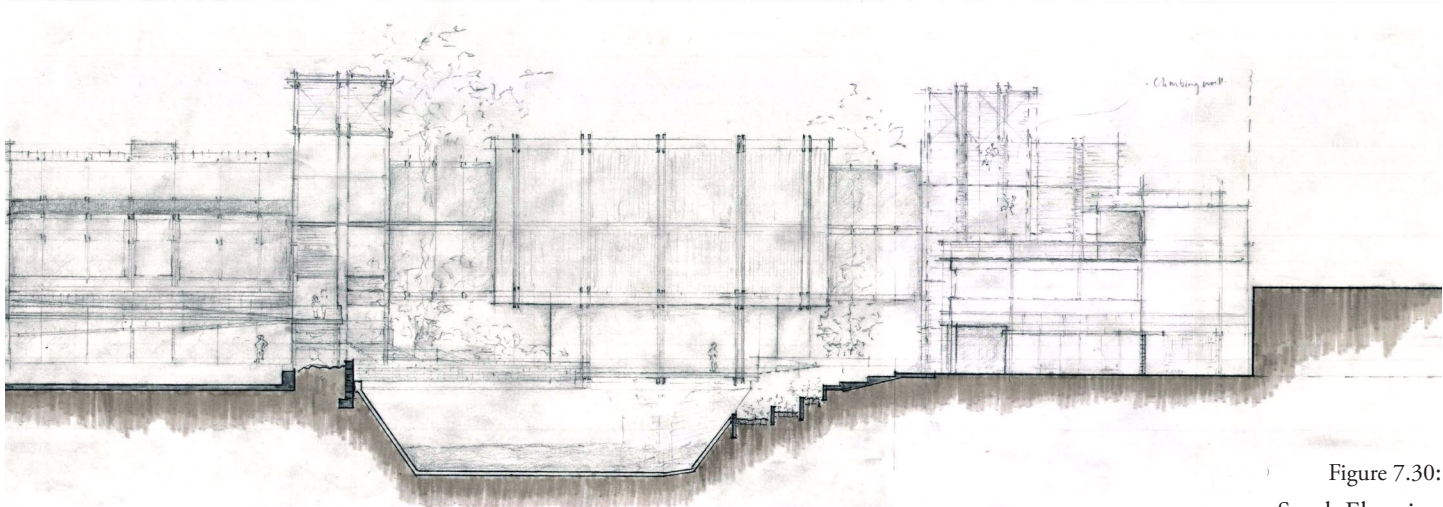


Figure 7.30:
South Elevation
NTS
(Author 2015)

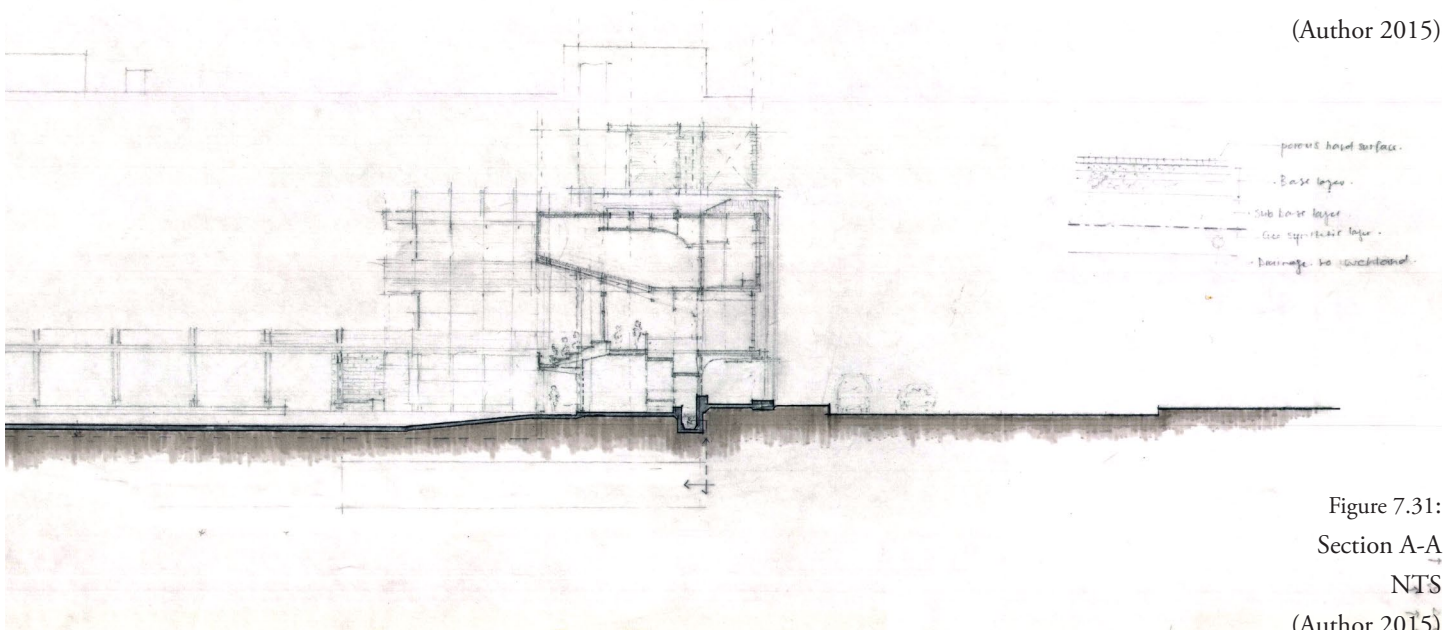


Figure 7.31:
Section A-A
NTS
(Author 2015)

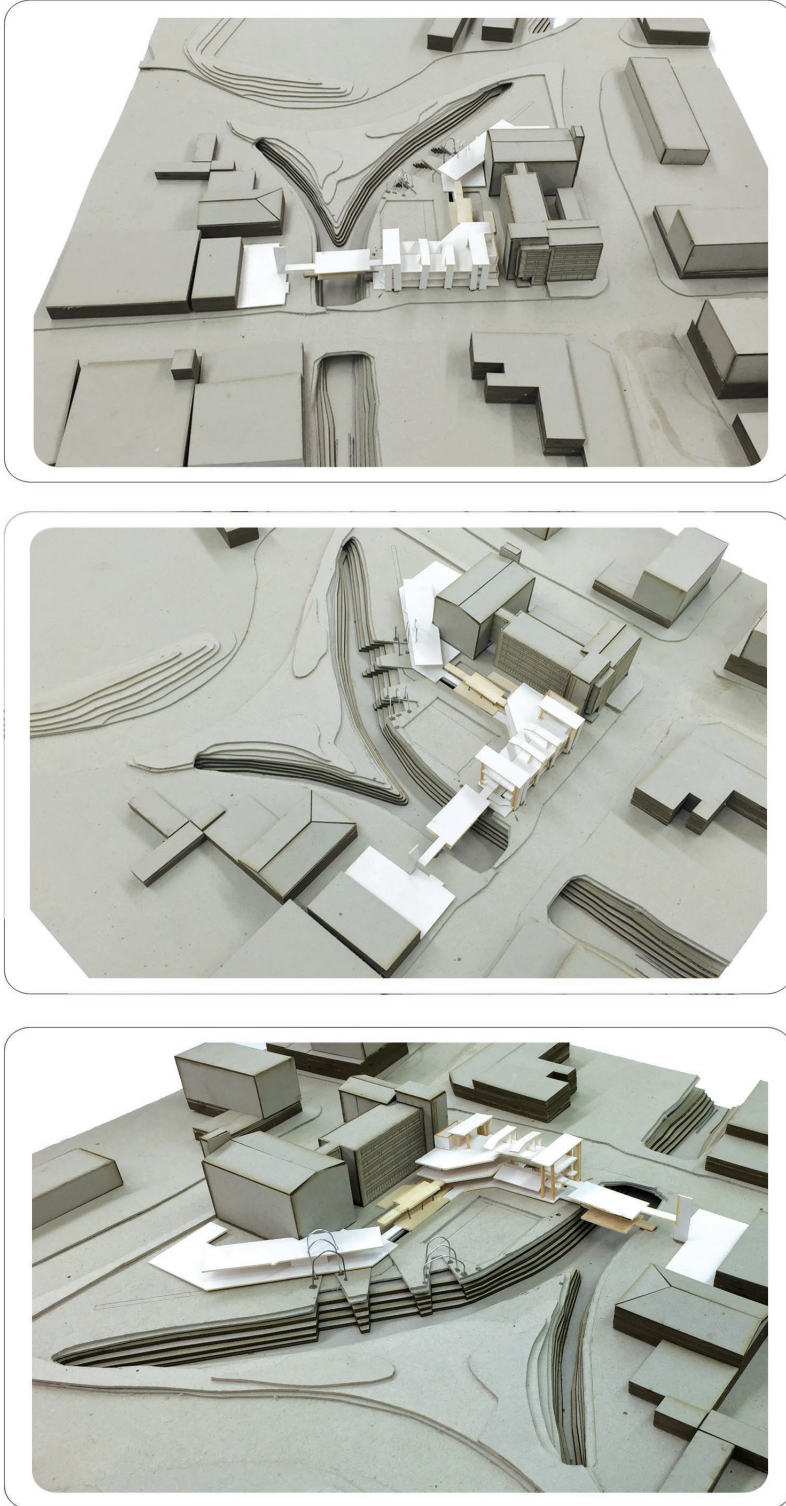


Figure 7.32: Photographs of model development during iteration 3
(Author 2015)

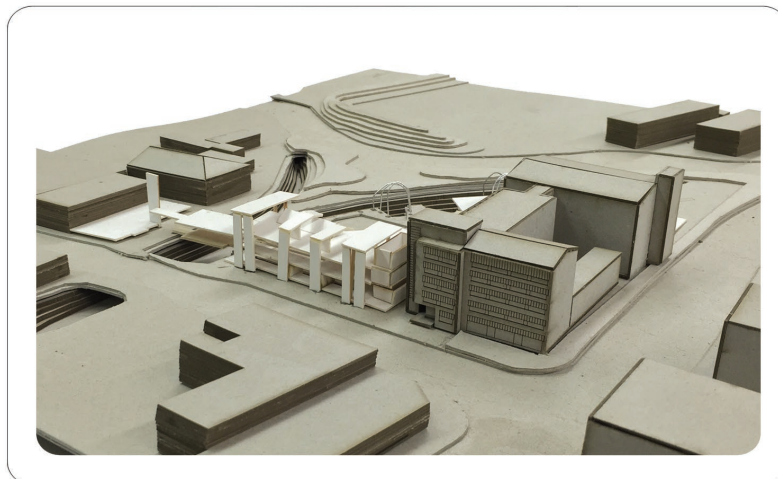
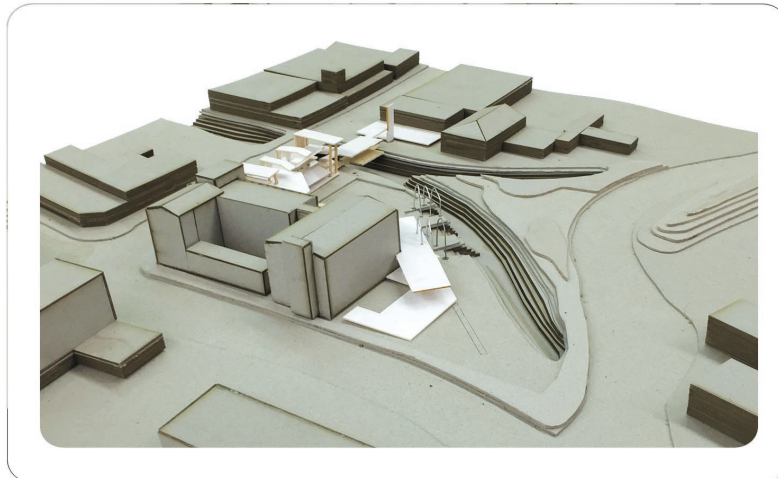
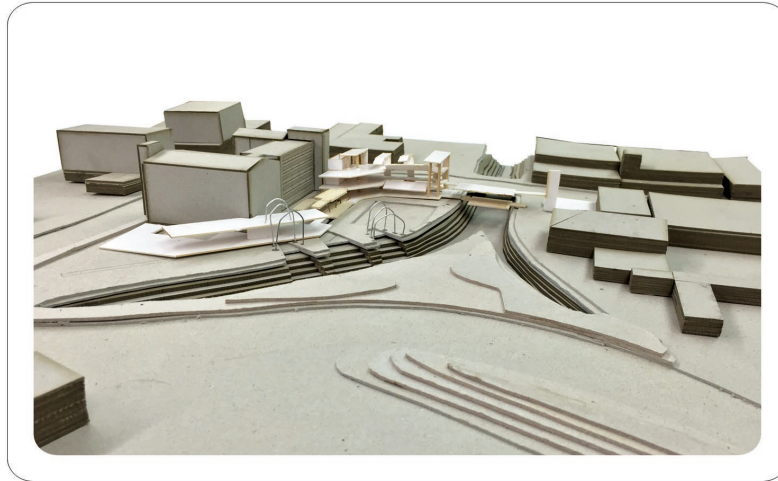


Figure 7.33: Photographs of model development during iteration 3.
(Author 2015)

7.2.4

Iteration 4:

Development of the structural and service core influencing the external edge response

B

Structural and service spine

The development of iteration four focussed on the emphasis of the structural and service core of the building as unifying entity establishing a continuity in the reading of its horizontal nature on all plans, as well as its vertical continuity as read throughout all sections of the building. Figure 7.34 as building parti diagramme illustrates the main conceptual developments of iteration four. Figure 7.35 as sectional diagramme illustrates the significance of the continuous landscape becoming the structural and service core, supporting the internal and external edge conditions.

The uniformity of the architectural language of the structural core towers on façade and plan becomes integral to the continuity of the building. (See Figure 7.36)

The stereotomic boundary structure as an extension of the sculpted landscape is emphasised through a continuous concrete wall containing internal activities, while simultaneously expressing the structural spine at ground level. The discontinuity of the wall at the channel aims to emphasise the significance of the contextual response to Lion Bridge and the channel axis. The main entrance adjacent to the channel is emphasised through the concrete wall continuing behind the tower, exposing the open entrance through the ground level steel structure. (See Figure 7.34 and Figure 7.37 to Figure 7.44)

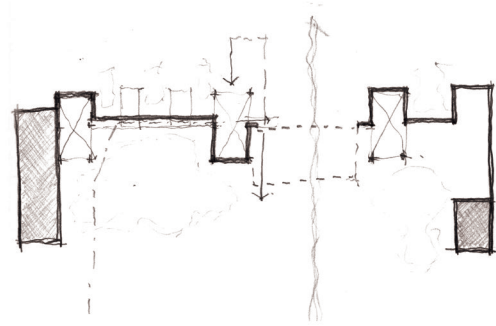


Figure 7.34: Plan parti diagramme illustrating the conceptual intentions of the development of the structural core as horizontal continuous element throughout the building. (Author 2015)

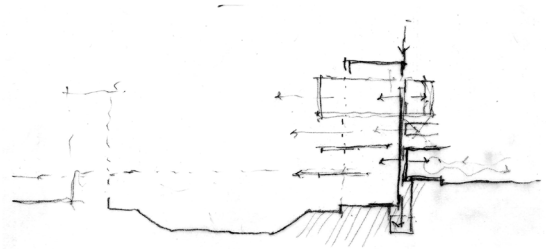


Figure 7.35: Sectional diagramme illustrating the conceptual intentions of the development of the structural core as vertical continuous element throughout the building. (Author 2015)

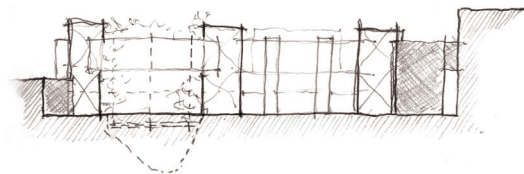


Figure 7.36: Conceptual diagramme of the elevation development in iteration 4. (Author 2015)

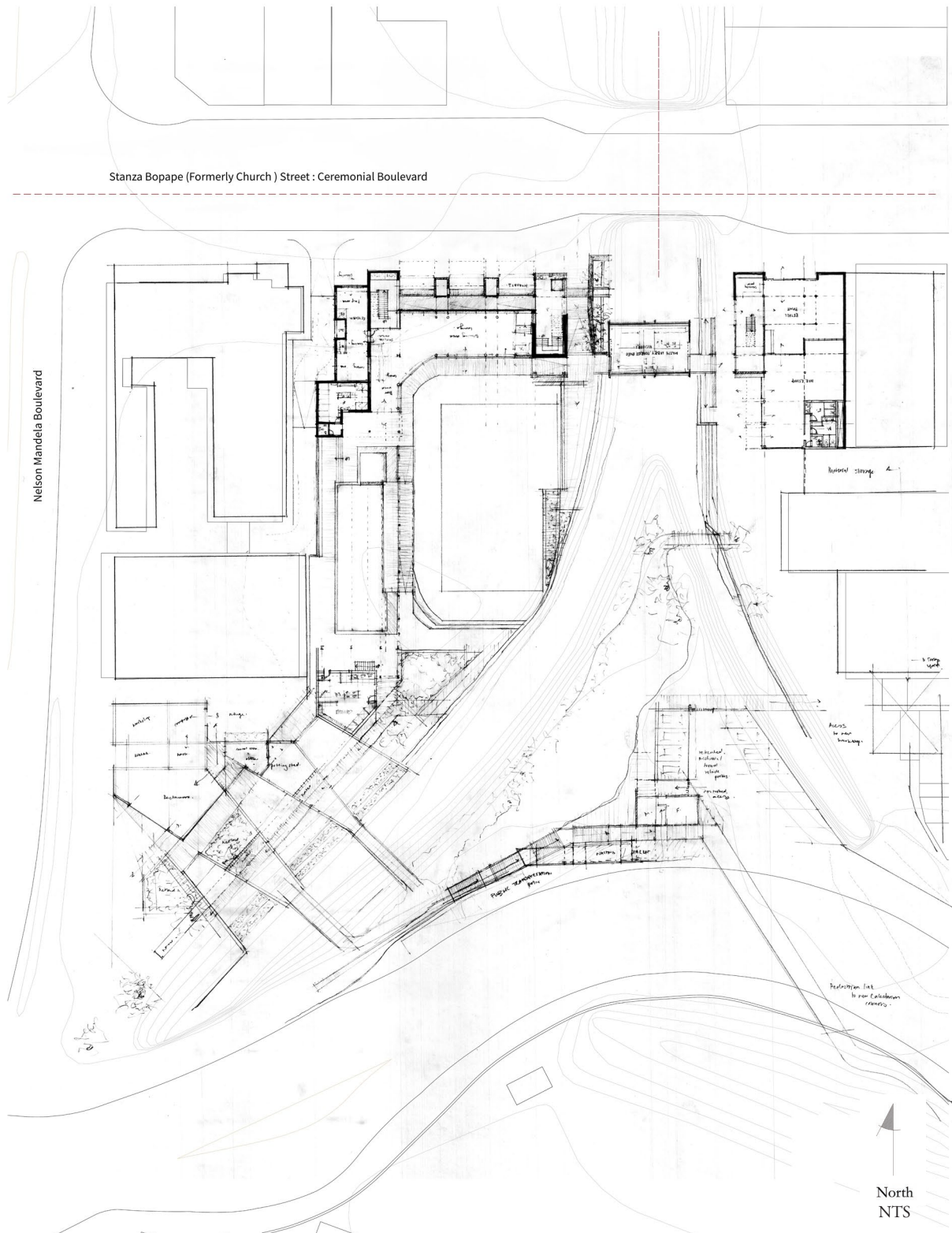


Figure 7.37: Site plan development during iteration four illustrating the resolution of conceptual intentions to the organisation of spatial relationships. (Author 2015)

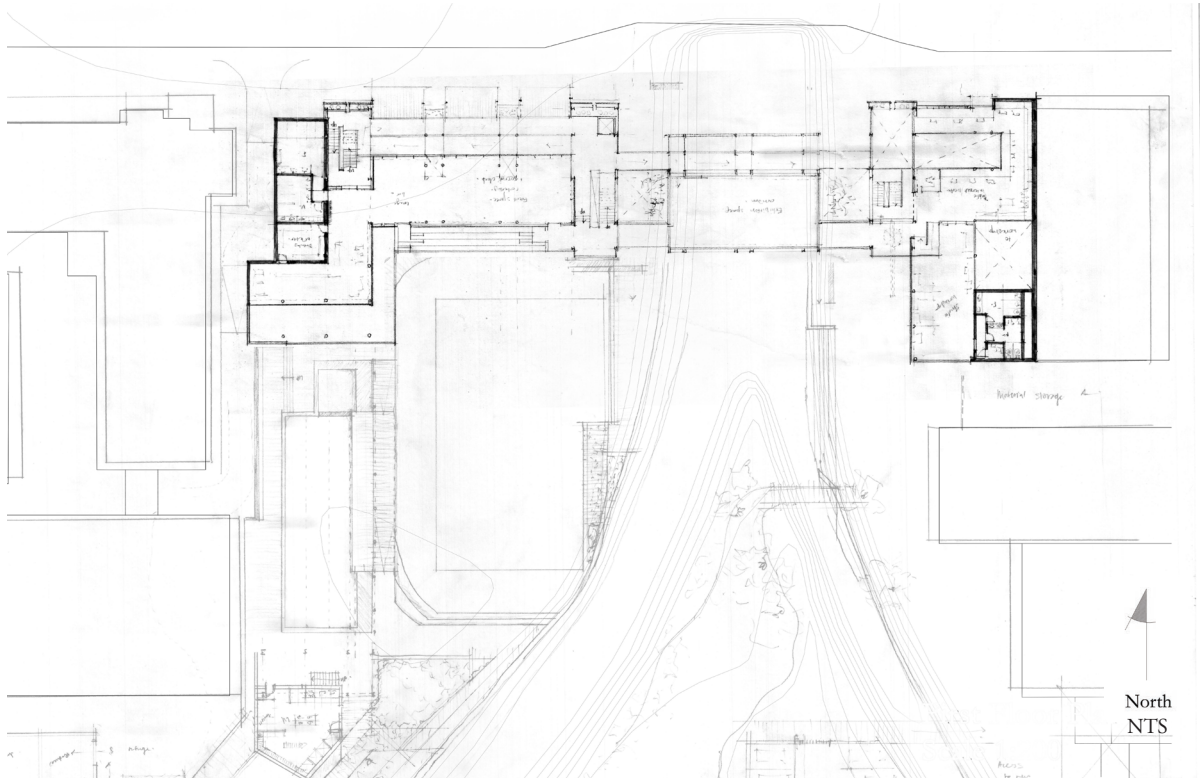


Figure 7.38: First floor plan development during iteration four. (Author 2015)

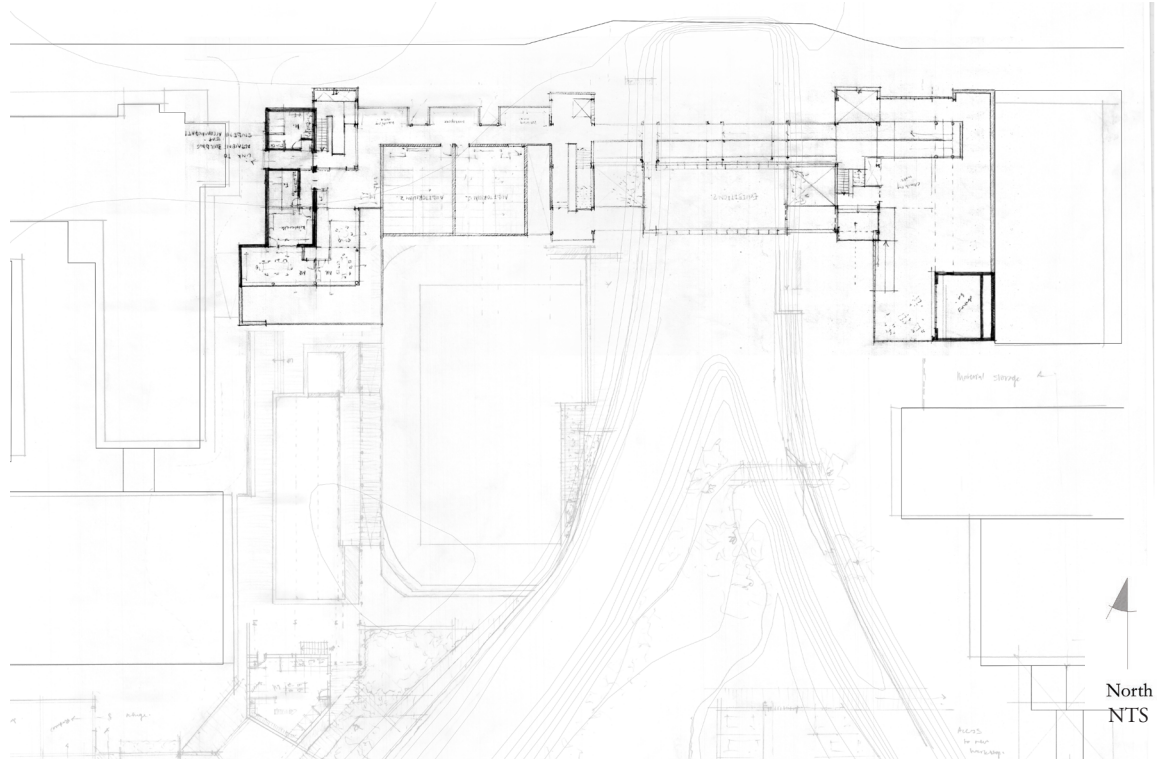


Figure 7.39: Second floor plan development during iteration four. (Author 2015)

C
External and Internal edge response

Figure 7.40 illustrate the development of the suspended entrance platform structure as a response to the significance of the Lion Bridge and Apies River channel. The transparency and height of the proposed intervention become important to the emphasis of the existing views and sightlines along the river axis, providing relief when moving into the densely vegetated landscape in the urban context. As illustrated in the drawings and photographs of the conceptual model, the structural cores adjacent to the channel edges are braced to act as singular structural entities supporting the structure that bridges the channel. The second-floor steel wall structures are designed to act as beams, creating a 4 m deep support from which the first floor and ground floor structure are suspended. The façade of the exhibition spaces continues the activated circulation skin throughout.

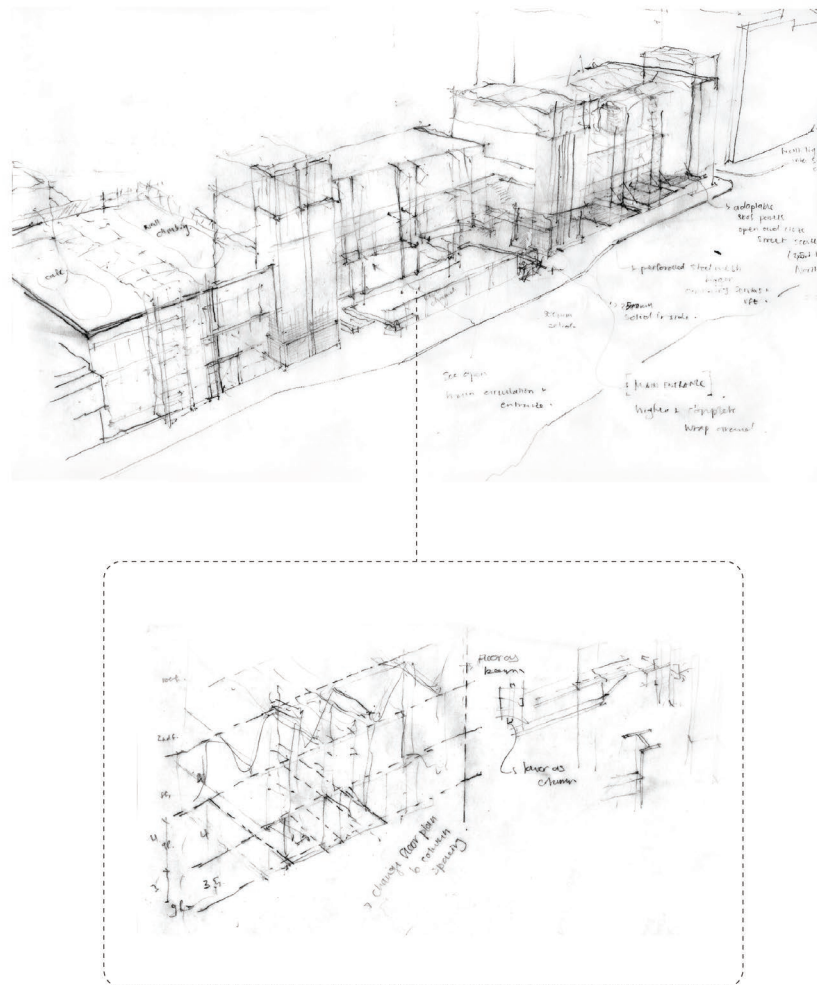


Figure 7.40: Perspective development of the building and structural development of the central spanning exhibition spaces. (Author 2015)

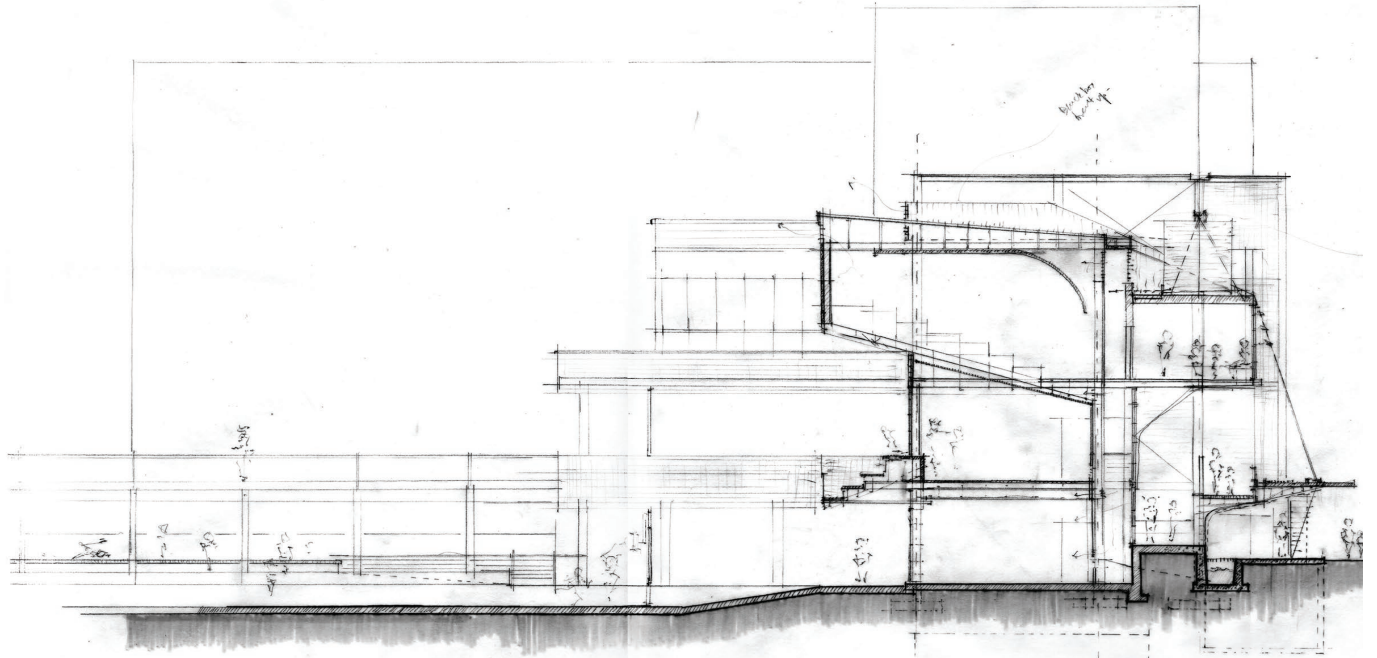


Figure 7.41:
Section A-A
NTS
(Author 2015)

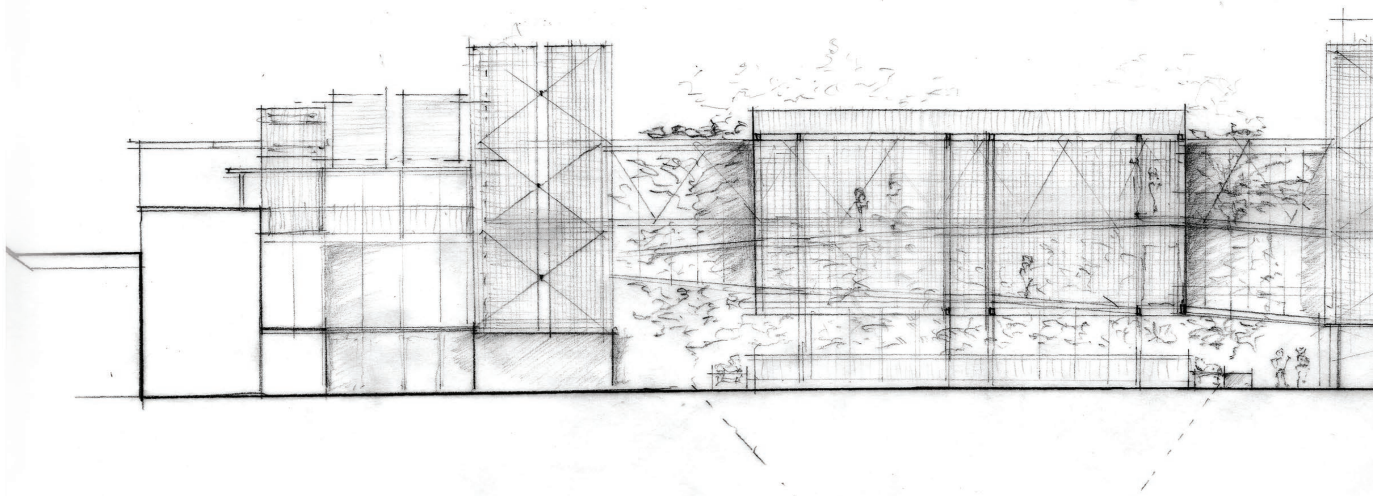


Figure 7.41, Figure 7.42 and Figure 7.43: The horizontal circulation throughout the building is moved from the structural spine to the external façade as an extension of the public street activities throughout the extent of the building, spanning the channel and animating the façade through an activated 'skin'. Access points along the route into spaces on the first and second floors are identified.

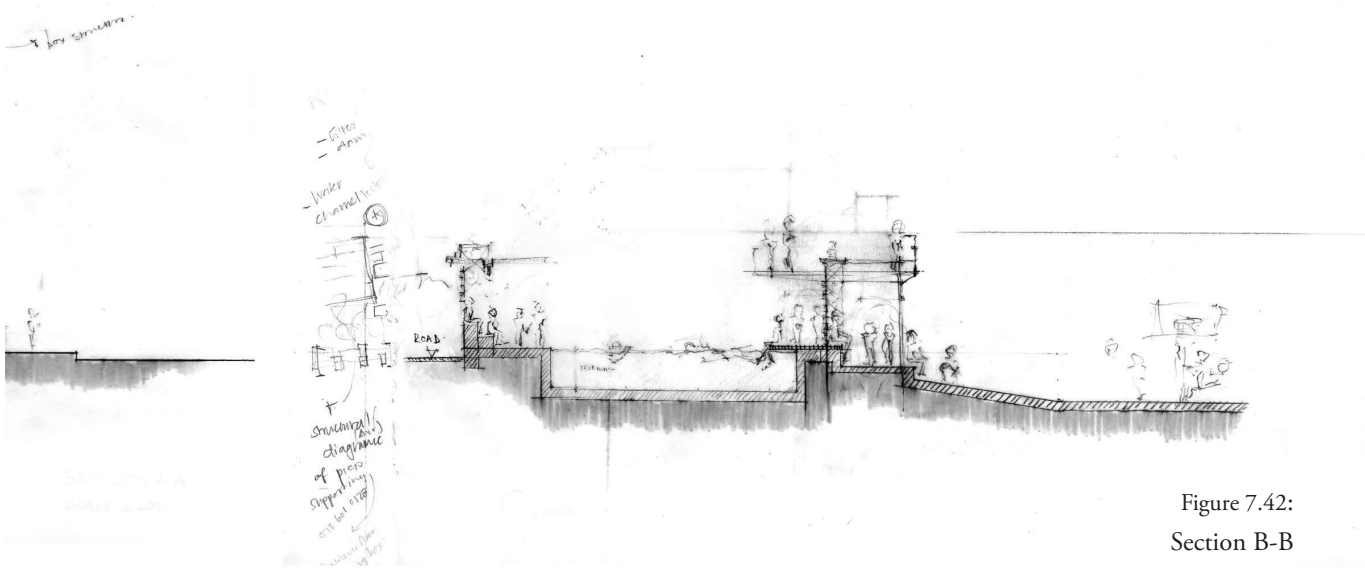


Figure 7.42:
Section B-B
NTS
(Author 2015)

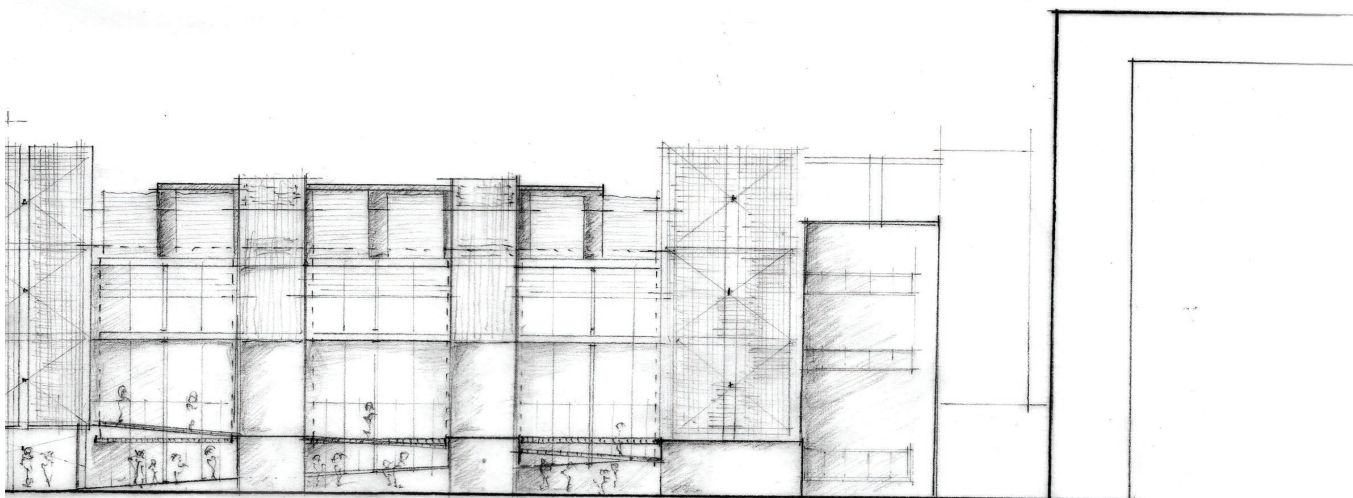


Figure 7.43:
North Elevation
NTS
(Author 2015)

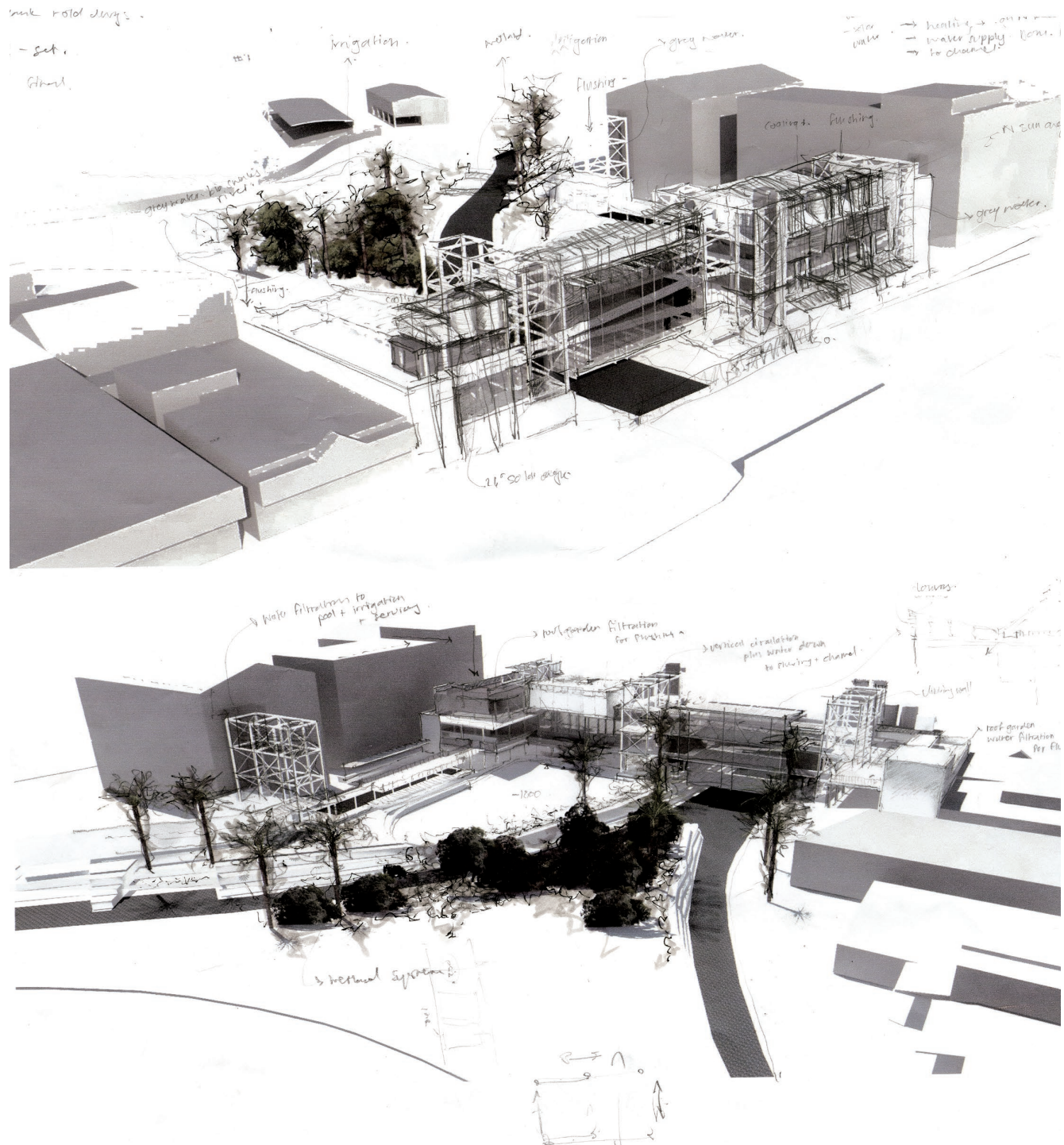


Figure 7.44: Northern and Southern birds eye view perspectives of the structure in context as developed during iteration four. (Author 2015)

7.2.5

Iteration 5:

Developing the internal spatial conditions through a refinement of the main conceptual intentions

B

Structural and service spine

The final iteration synthesises the most significant design development decisions with regards to the diagrammatic conceptual components, and extends the discussion of the various developments towards their spatial implications, with the aim to address the architectural intentions and research questions set out in the introduction.

Figure 7.45 to Figure 7.47 illustrate the final development of the structural and service spine through an emphasis on the boundary wall structure continuously extending into concrete structural fins that facilitate the services and environmental systems within the spine. These also support the internal and external adjacent spaces between the structural core towers.

The uniformity of the building and structural spine on the ground floor is extended vertically, throughout the section of the building, into a proposed lightweight roof structure as continuous entity in the language of the structure. See Figure 7.46 and Figure 7.47. The continuous roof aims to aesthetically tie the three structural core towers and the intermediate structural fins together as well as create an extension of the continuous water system at roof level, while still allowing the various building sections to respond contextually.

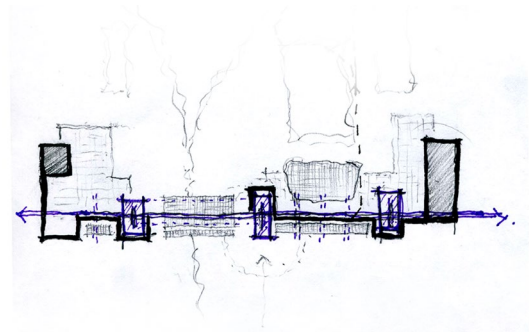


Figure 7.45: Plan parti diagramme illustrating the conceptual intentions of the development of the structural core as horizontal continuous element throughout the building

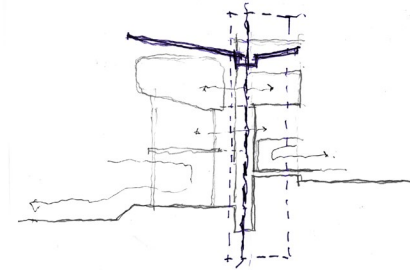


Figure 7.46: Sectional diagramme illustrating the conceptual intentions of the development of the structural core as vertical continuous element throughout the building

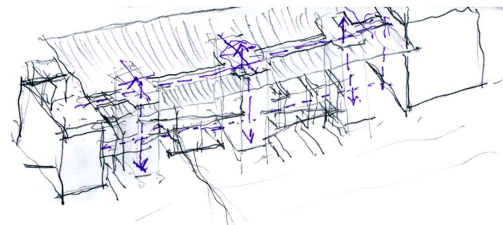


Figure 7.47: Conceptual diagramme of the elevation development in iteration 4

C
 External and Internal edge response

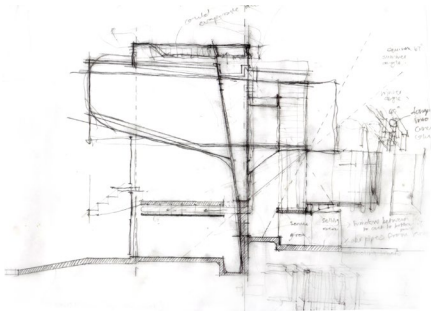


Figure 7.48: Sectional development 1 of the internal and external spatial conditions

The development of the form and space of the auditorium, according to the conceptual intentions as well as specific acoustic requirements, proposes a loose internal organisation, separated from the structural and service spine but connected through circulation bridges. This separation and loose organisation of the internal spaces articulate the placement of these structures within the contained landscape, and emphasise a vertical and horizontal spatial and visual relationship to the structural and service spine throughout all internal circulation spaces.

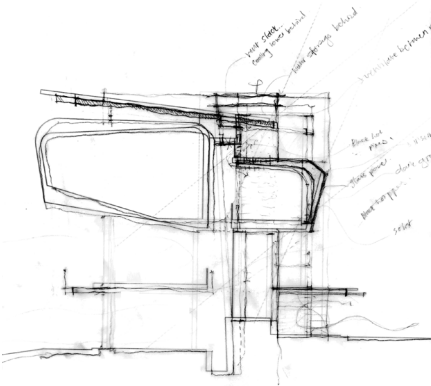


Figure 7.49: Sectional development 2 of the internal and external spatial conditions

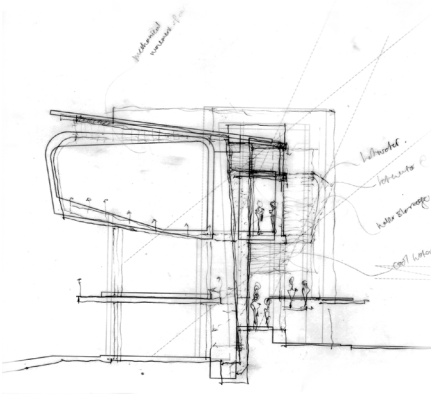
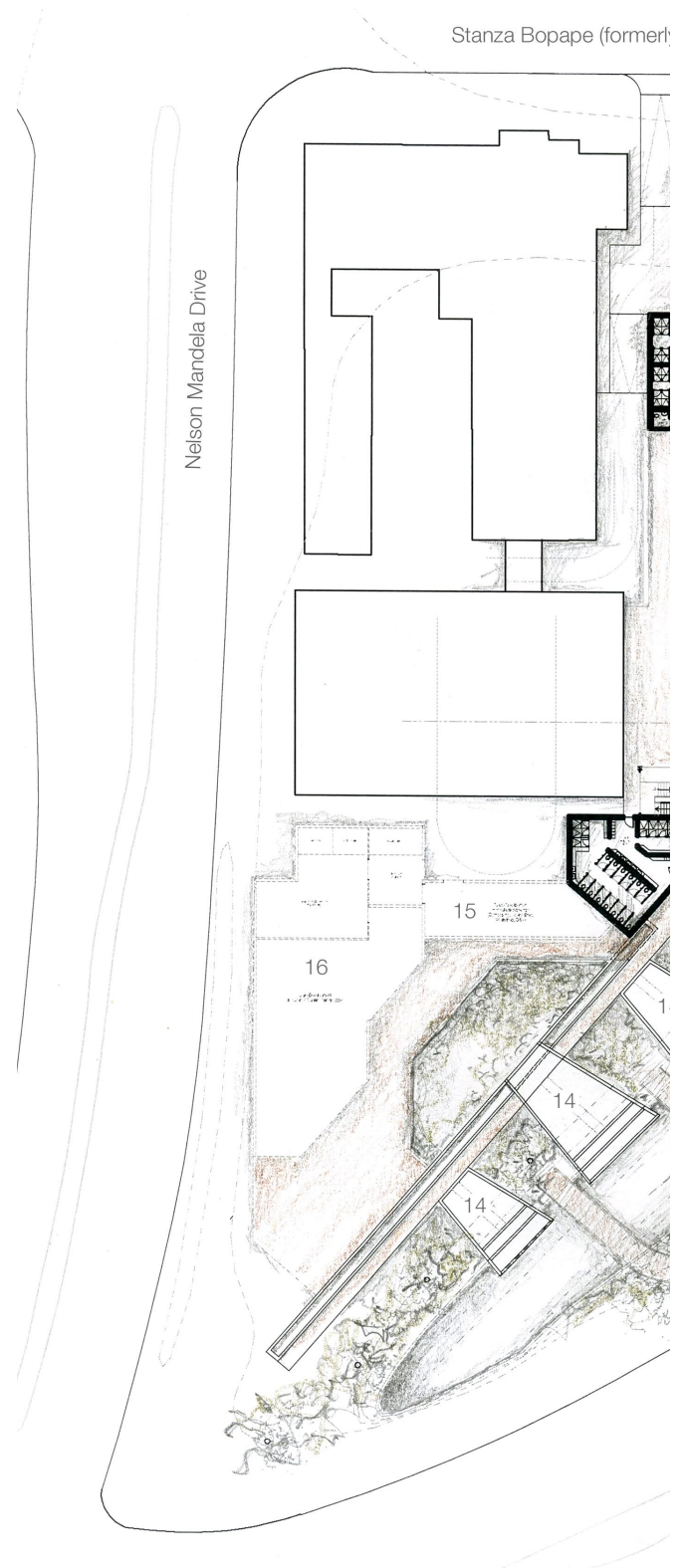


Figure 7.50: Sectional development 2 of the internal and external spatial conditions

8.2.6
Iteration 6:
Design Proposal drawings

Legend:

1. Main entrance and circulation lobby
2. Entrance lobby and visitor's information centre
3. Market space with lockable storage
4. Recreational social club and event space
5. Kitchen
6. Male ablutions and changing rooms, Disabled abluion
7. Outdoor public sports court
8. Public swimming pool
9. Female ablutions and changing rooms
10. Retail space: Artist furniture, sculptural and installation art
11. Artist and public workshop
12. Male, Female and Disabled ablutions
13. Material Storage and collection point from site
14. Greenhouses
15. Horticulture workshop
16. Proposed future development: Restaurant and Student Centre



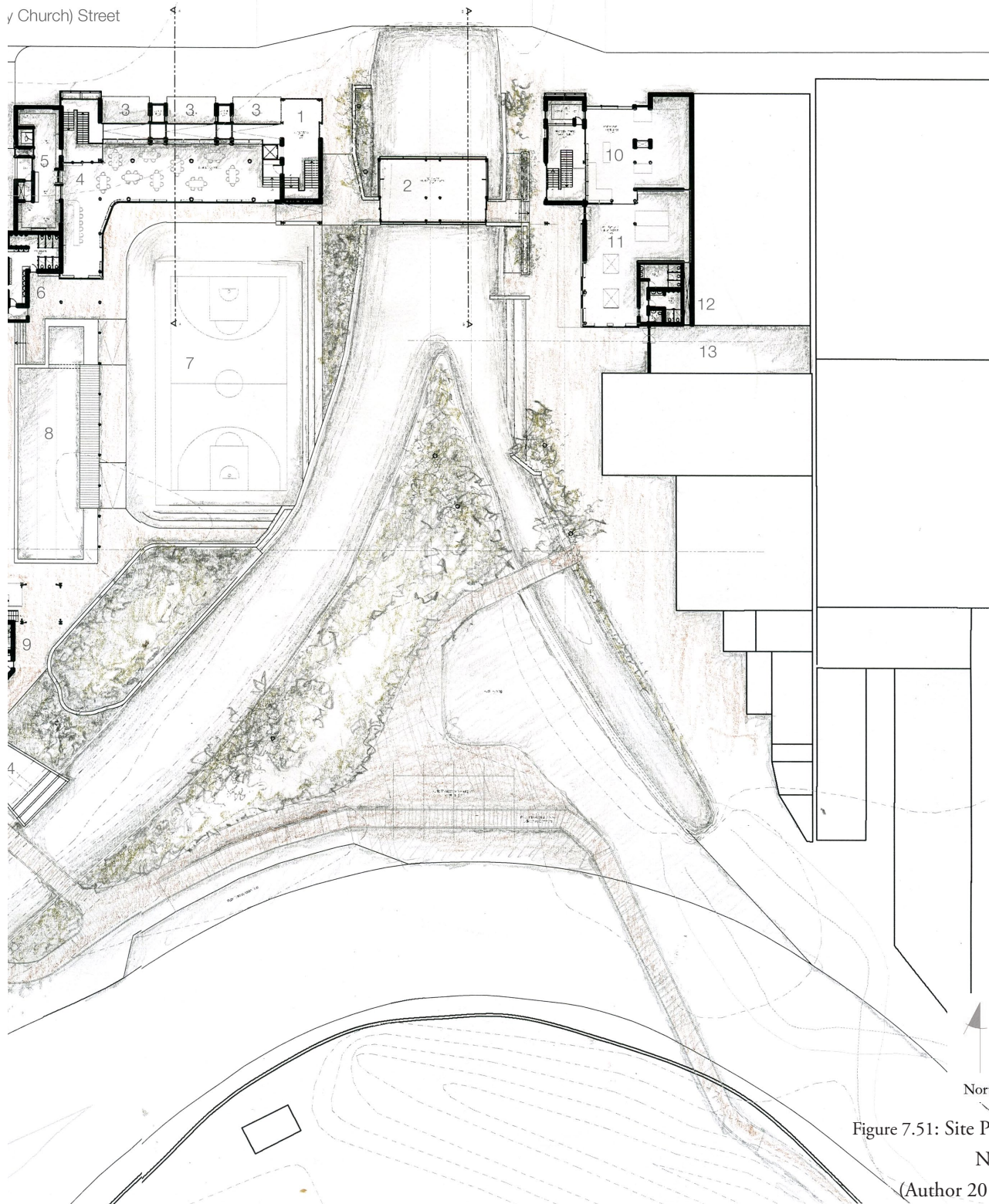


Figure 7.51: Site Plan
NTS
(Author 2015)

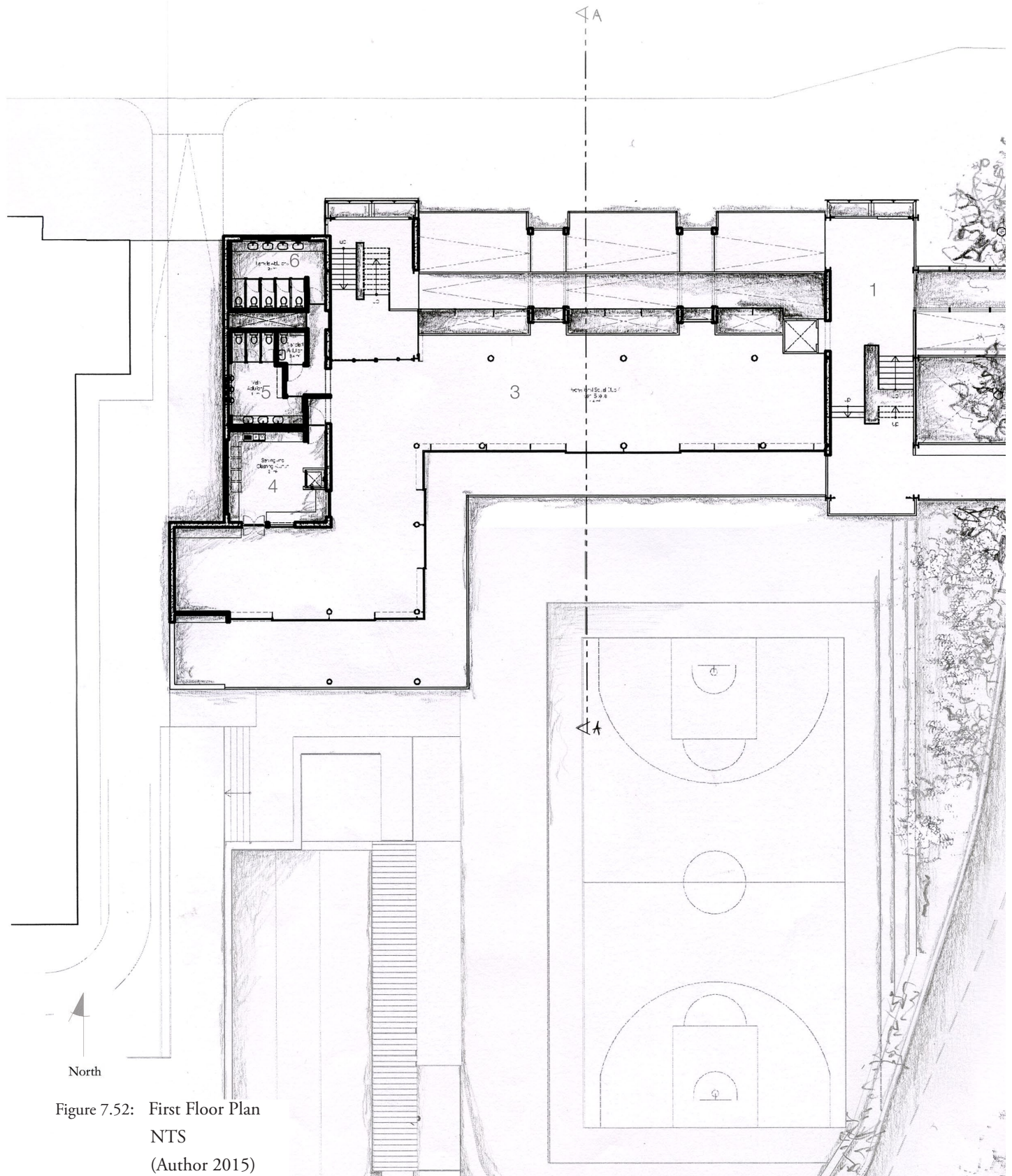
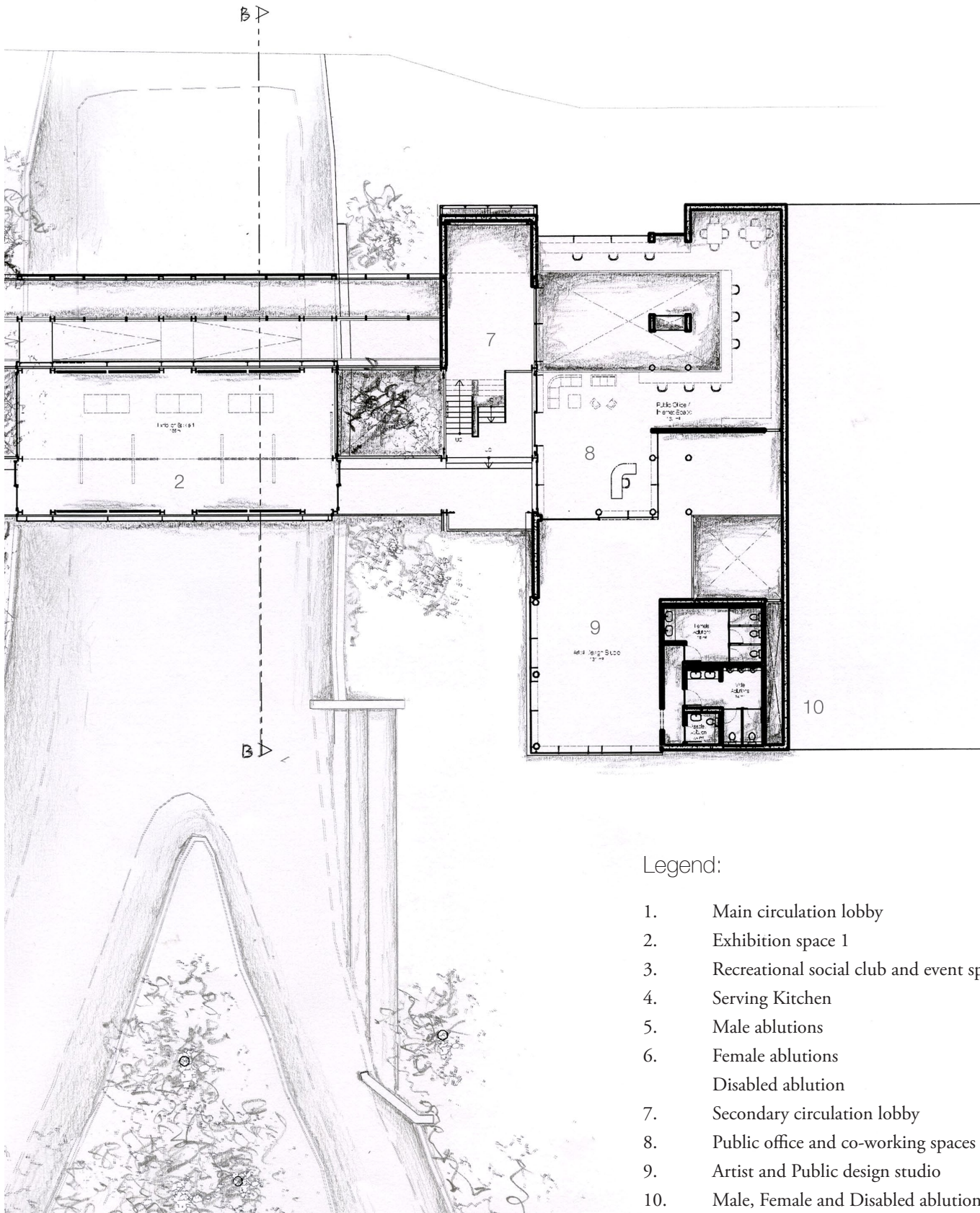


Figure 7.52: First Floor Plan
NTS
(Author 2015)



Legend:

1. Main circulation lobby
2. Exhibition space 1
3. Recreational social club and event space
4. Serving Kitchen
5. Male ablutions
6. Female ablutions
7. Disabled ablution
7. Secondary circulation lobby
8. Public office and co-working spaces
9. Artist and Public design studio
10. Male, Female and Disabled ablutions

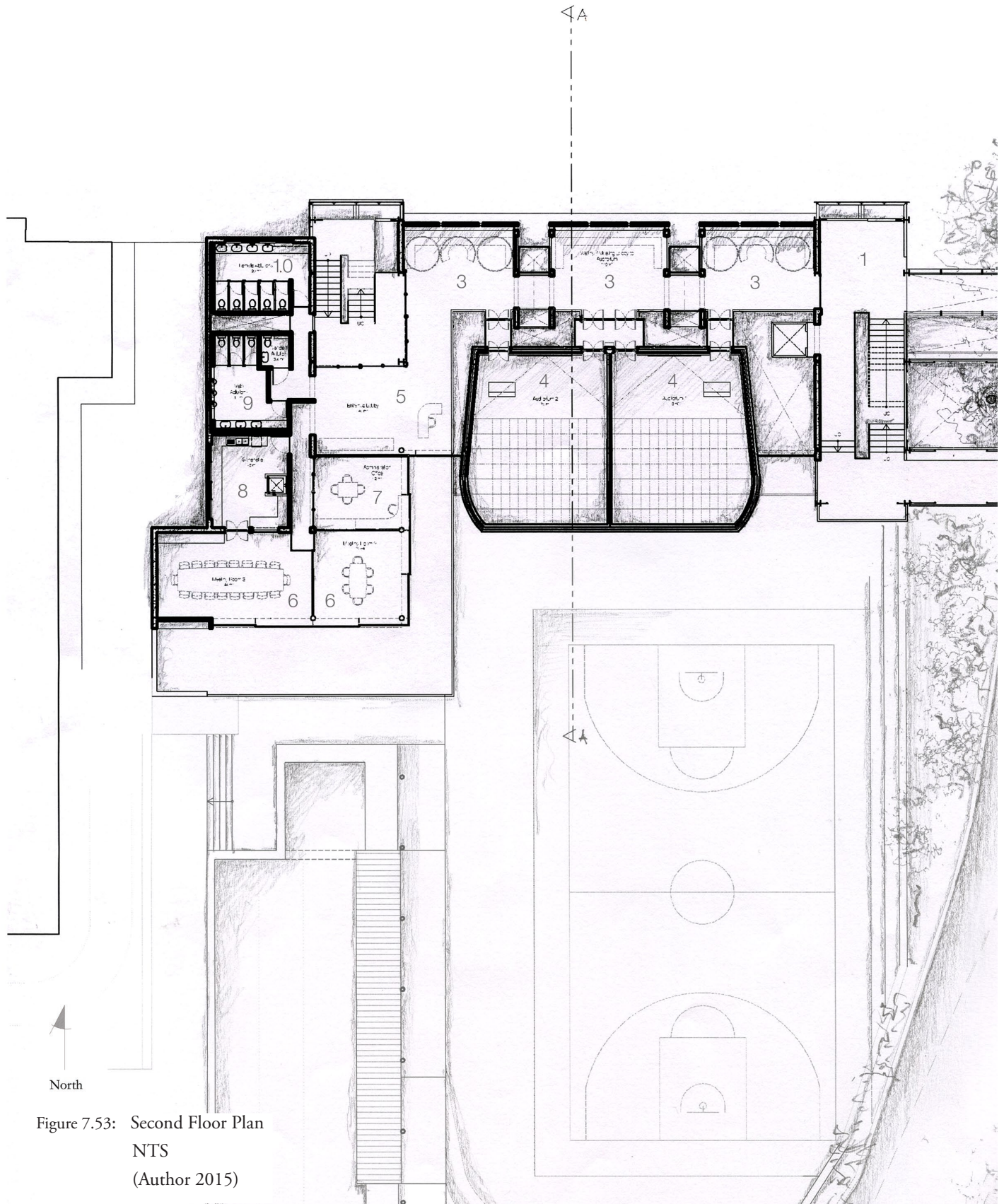
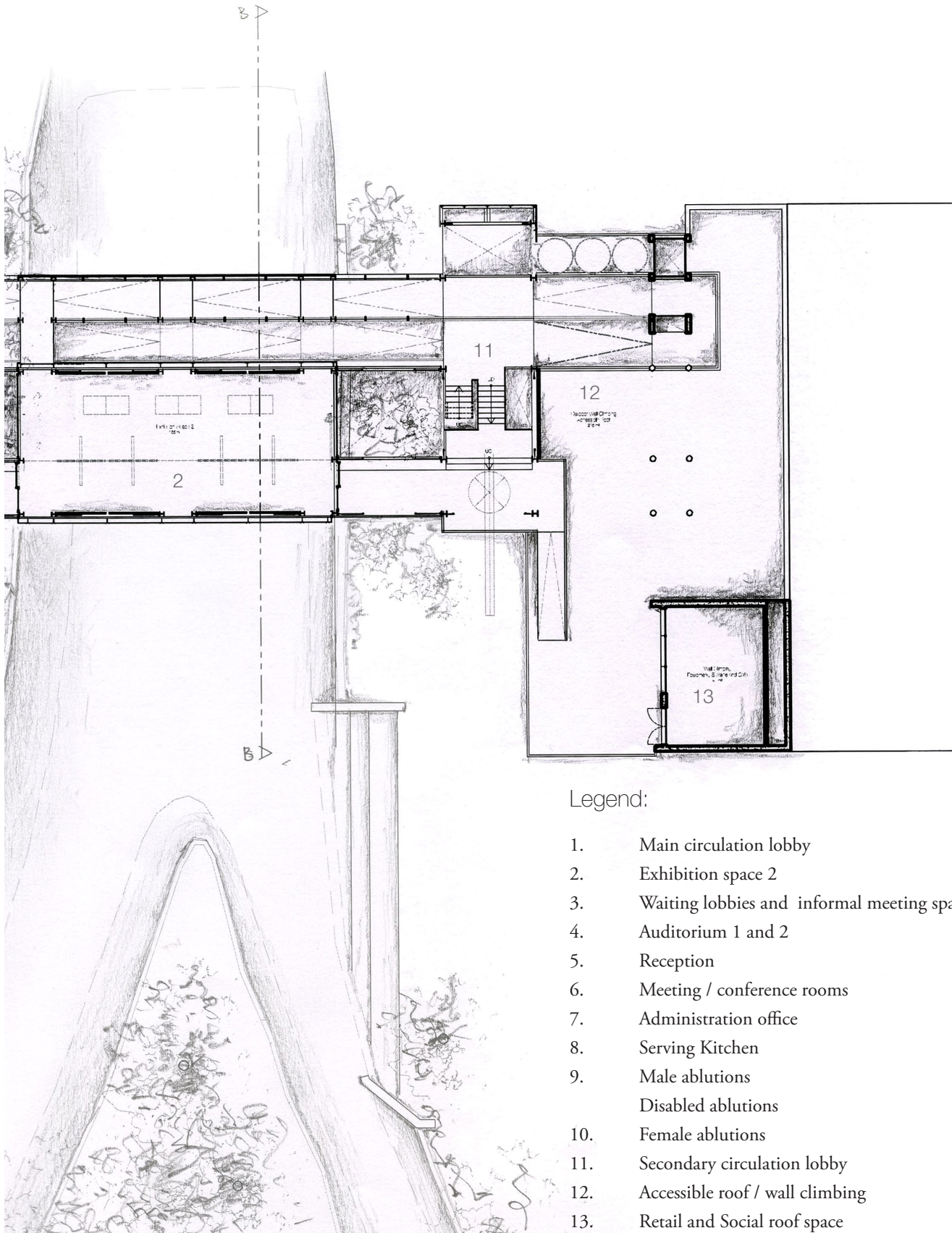


Figure 7.53: Second Floor Plan
NTS
(Author 2015)



Legend:

1. Main circulation lobby
2. Exhibition space 2
3. Waiting lobbies and informal meeting spaces
4. Auditorium 1 and 2
5. Reception
6. Meeting / conference rooms
7. Administration office
8. Serving Kitchen
9. Male ablutions
10. Female ablutions
11. Secondary circulation lobby
12. Accessible roof / wall climbing
13. Retail and Social roof space



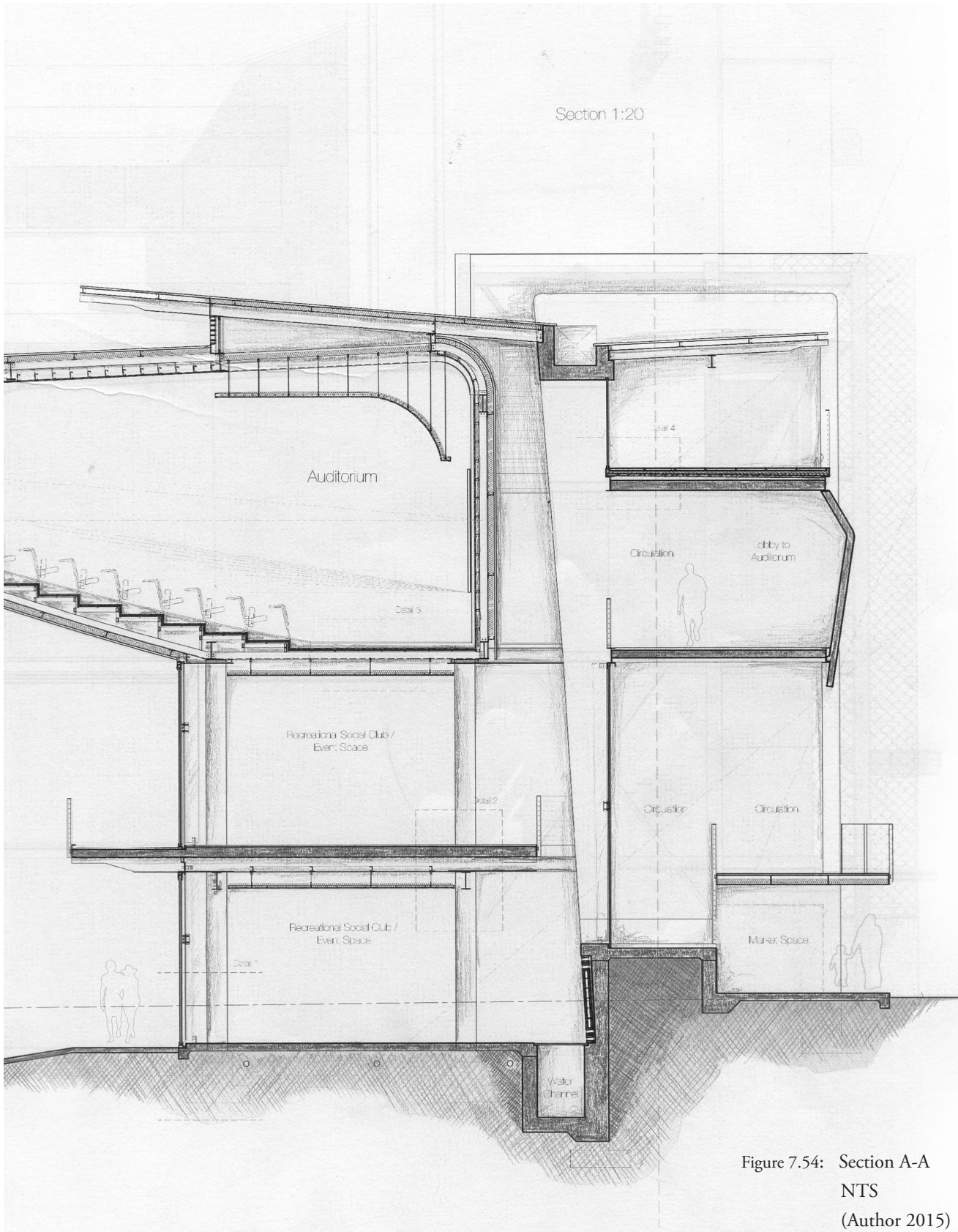


Figure 7.54: Section A-A
NTS
(Author 2015)

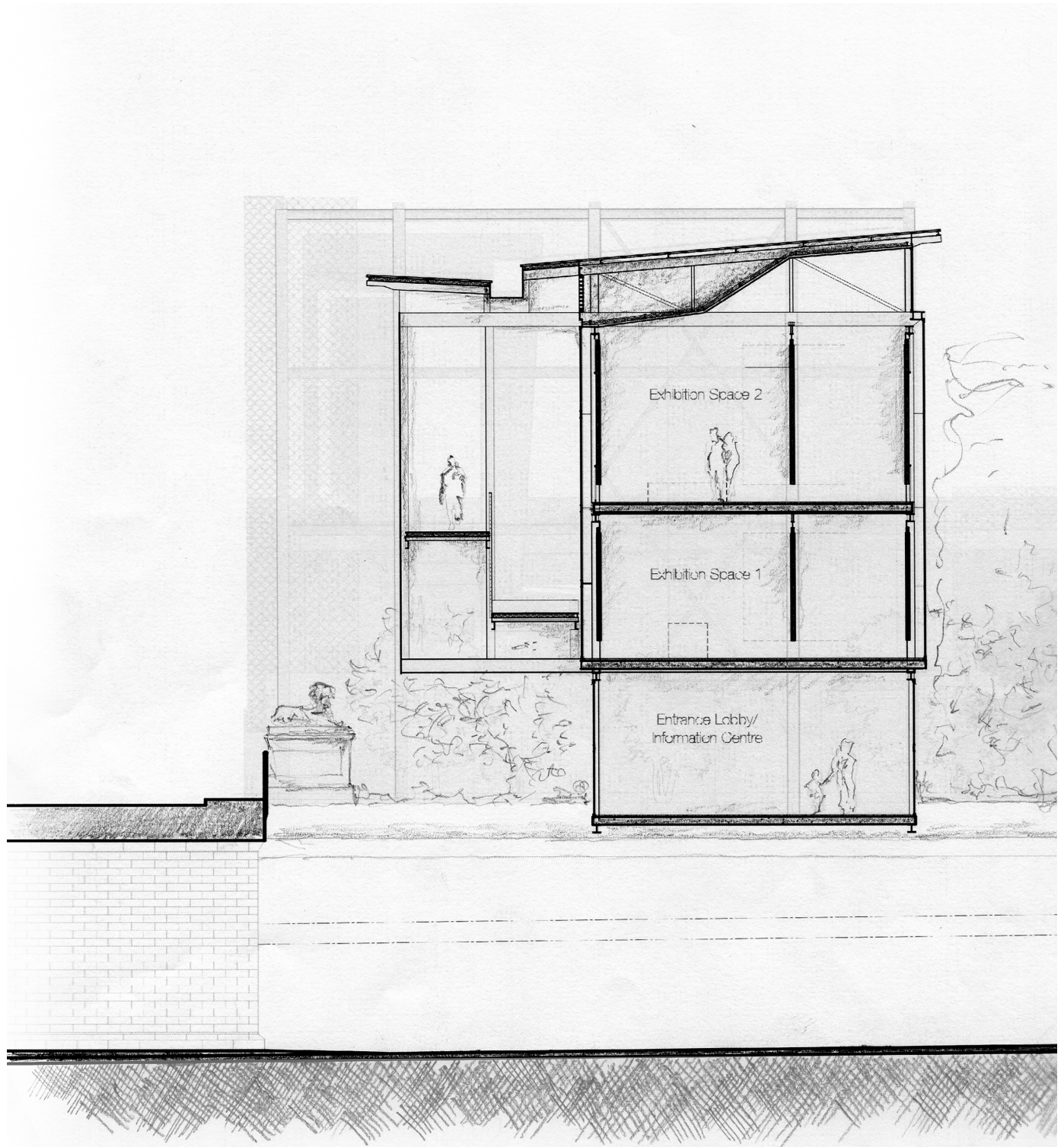
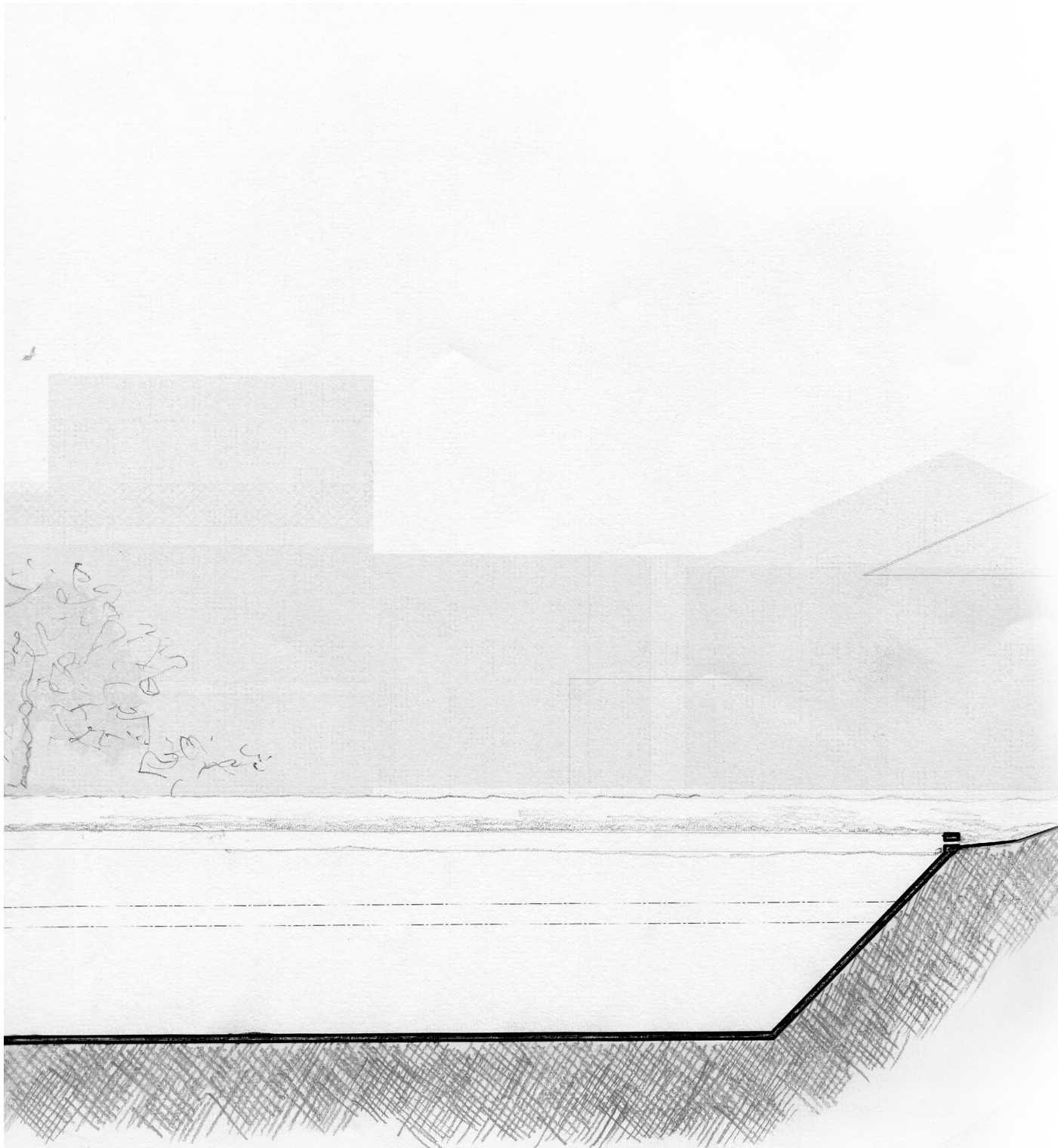
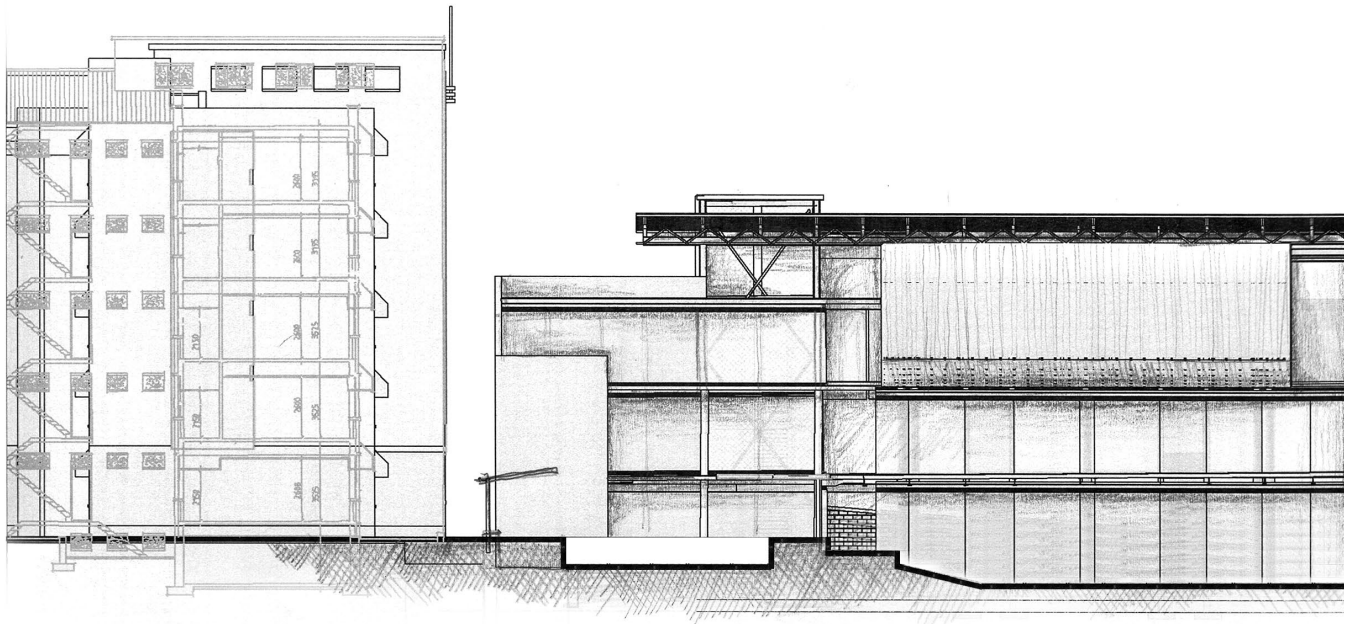
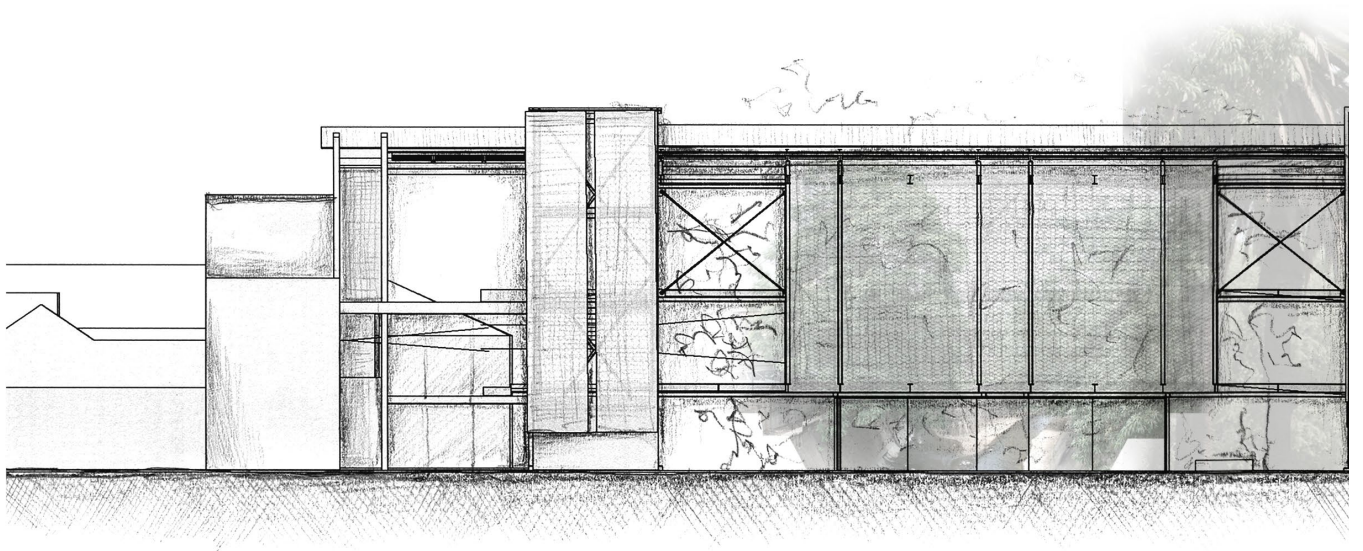


Figure 7.55: Section B-B
NTS
(Author 2015)





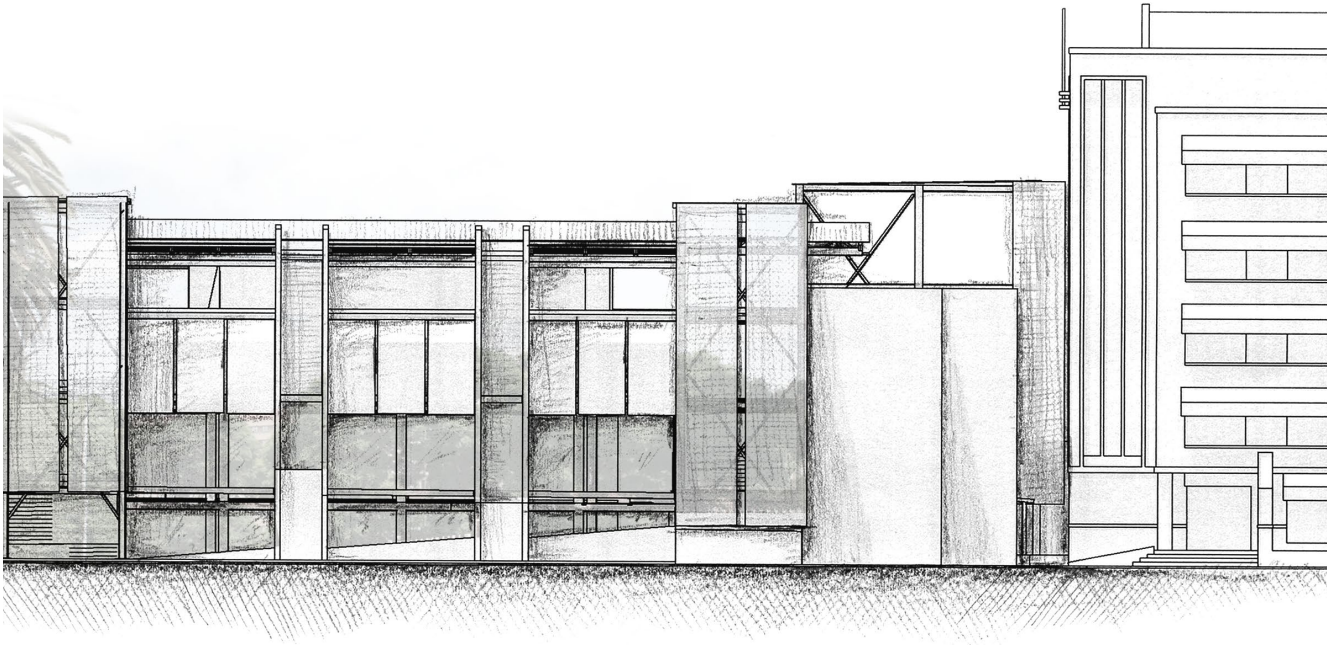


Figure 7.56: North Elevation
NTS
(Author 2015)

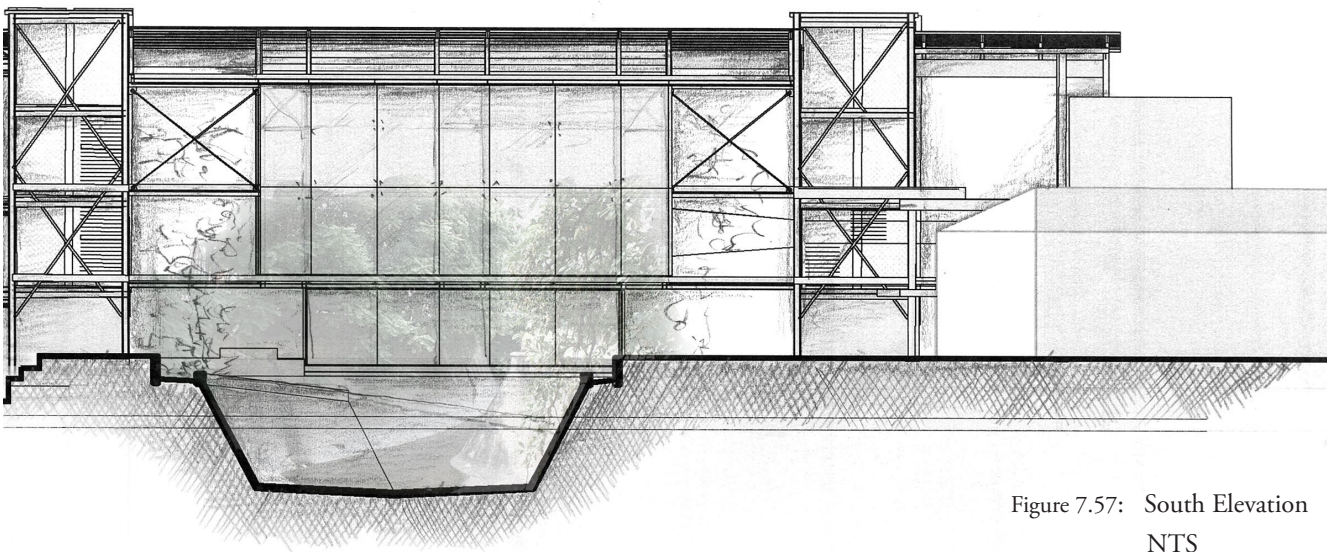


Figure 7.57: South Elevation
NTS
(Author 2015)

