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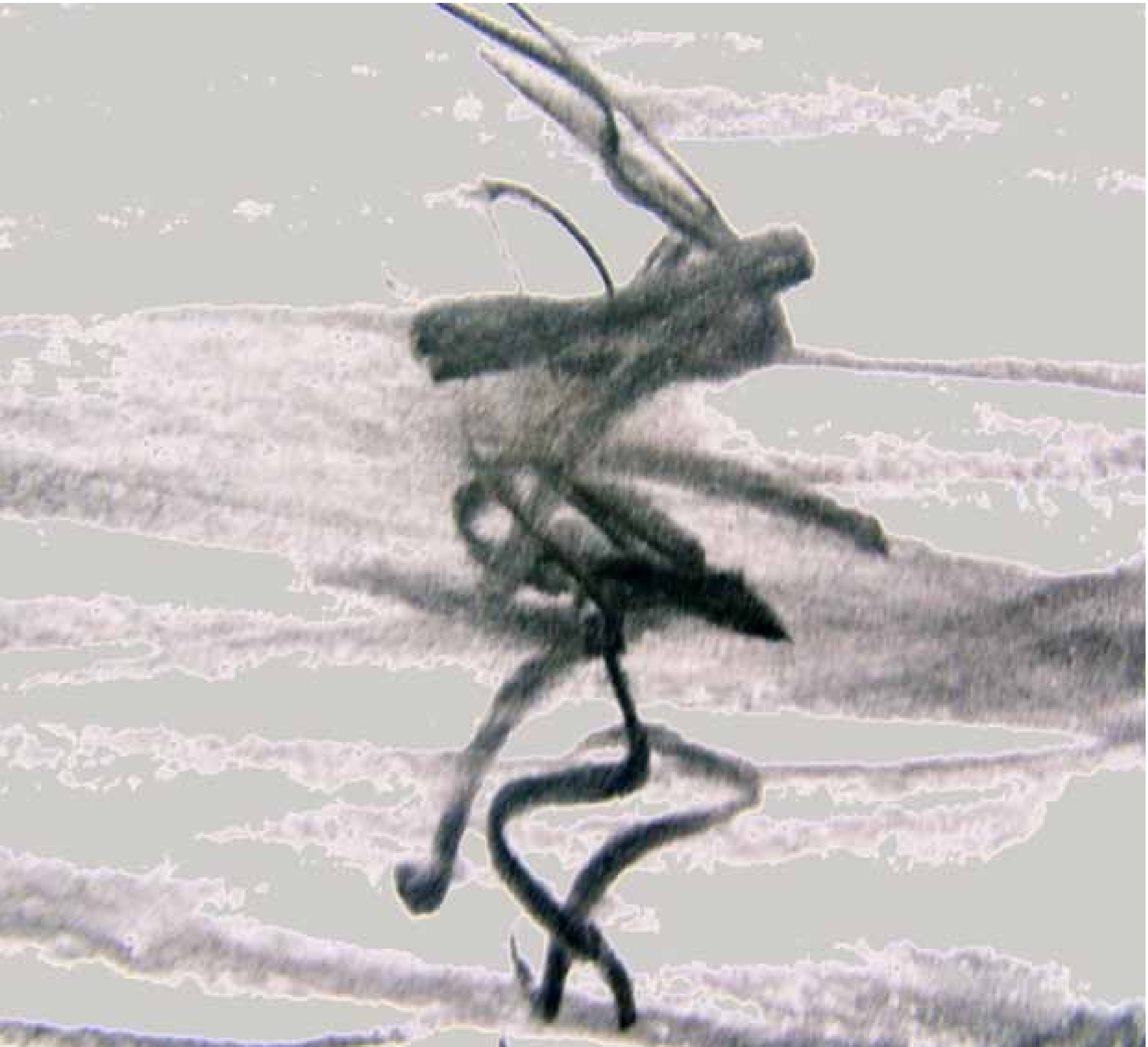
chapter 07 technical discussion



introduction

This chapter briefly discusses the technical elements of the proposed project. Included are structure and cladding among relevant systems, typical drawings of the proposed project are presented.

structural systems

A reinforced concrete system is used in the basement construction and dressing rooms section of the Contemporary Dance Company. A drained basement system will be employed because of the relative high water table. In addition natural ventilation of the basement will take place. The basement will be divided into two areas: the first area will collect rain that enters the basement thought the natural ventilation openings. The other area will collect ground water as it penetrates the basement. In both cases the water will be collected by a sump at the lowest point and pumped to the municipal storm water connection (see figure 194).

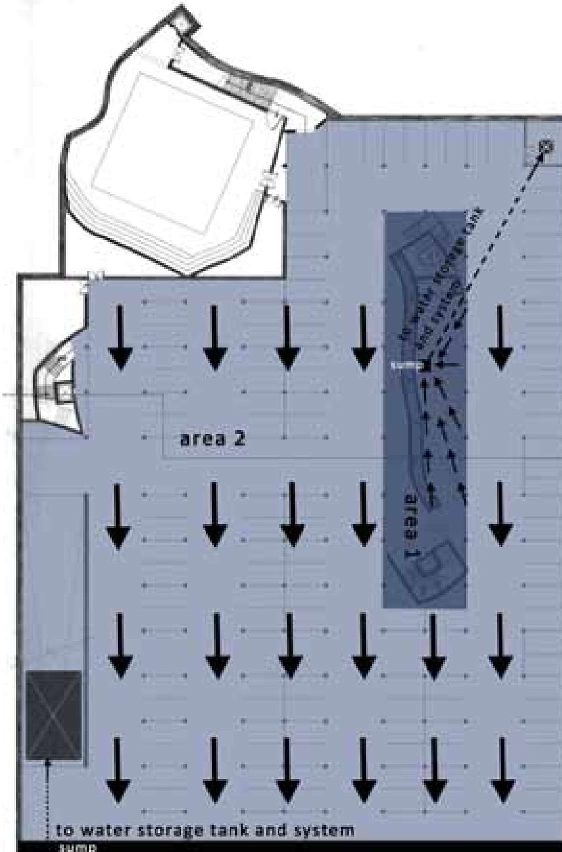


Figure 194 - diagram indicating drainage areas and directions of basement levels.

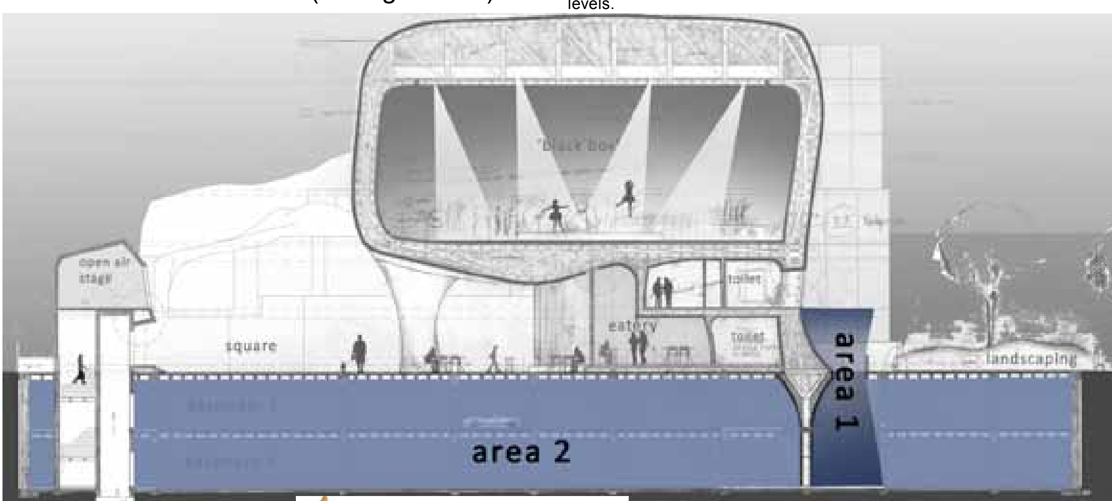


Figure 195 - sectional diagram of basem ... al ventilation opening.

Reinforced concrete walls are raised vertically from the basement to act as columns for the reinforced concrete 'box' that house the dressing room facilities. This section is the only area where major concrete construction occurs above ground level.

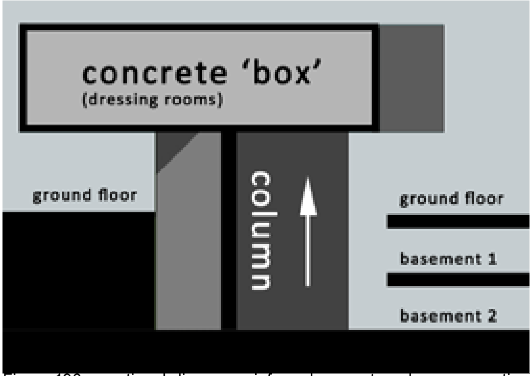
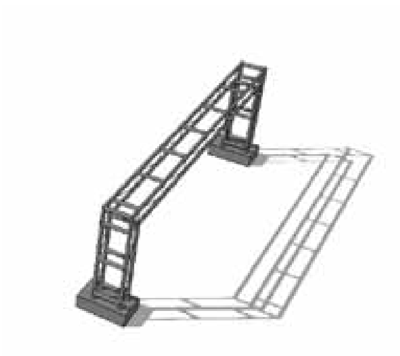


Figure 196 - sectional diagram reinforced concrete column supporting dressing room area.

The steel structural system consists of primary trusses that span the width of the building and secondary trusses spanning the length. Steel frames are connected to these trusses. These frames act as fastening connections for the cladding system as well as ensuring structural rigidity. For the 'Black Box' Theatre a beam had to be inserted on the one side of the structure to support the primary trusses (see figures 197-202). The interior walls consist of steel frames that are clad with GRP panels (see discussion on cladding).



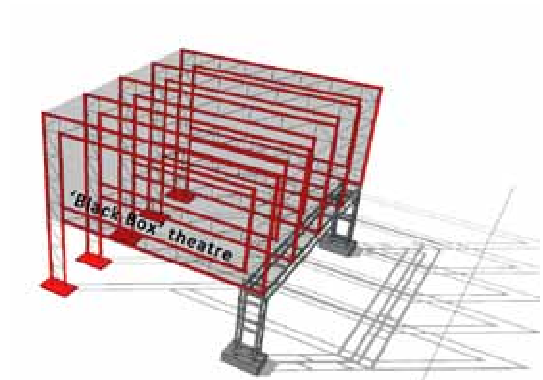


Figure 197 - diagram of the supporting steel beam structure used to support the primary trusses of the 'Black Box' theatre.

Figure 198 - diagram of primary trusses spanning the width of the building and supported by the steel beam structure on the one side.

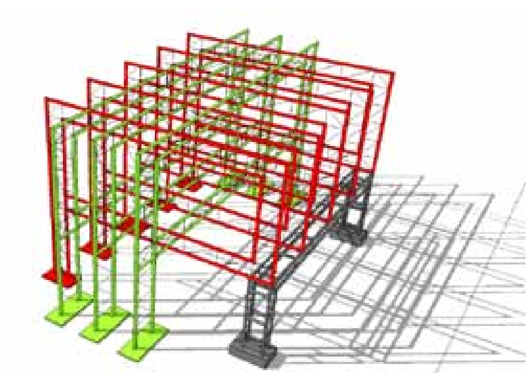
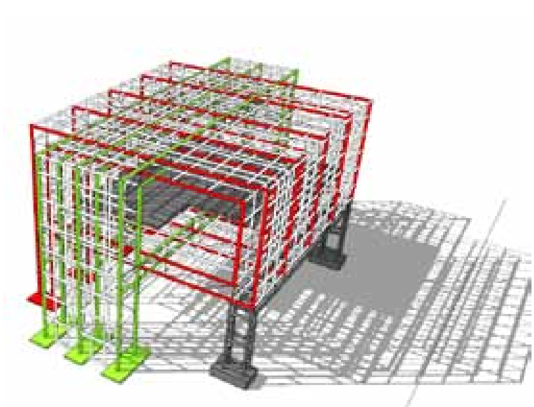


Figure 199 - diagram of secondary steel trusses spanning the length of the structure. trusses are supported on both sides.

Figure 200 - diagram of supporting steel frames used to fix cladding to and to make structure rigid.



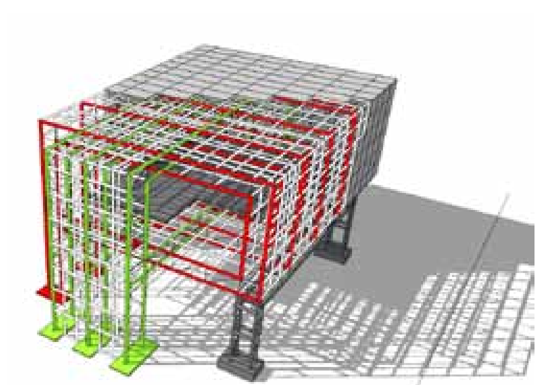


Figure 201 - diagram indicating rigid floo

'02 - diagram indicating cladding covering the structure.

The relationship of these two structural systems represent the 'classical' and the 'contemporary'. The reinforced concrete basement (the 'classical') forms a solid 'base' for the hot dipped galvanised steel frame and plastic cladding structure (the 'contemporary'). The 'classical' penetrates the 'contemporary' and makes its influence visible. This occurs with the reinforced concrete dressing room area and the tree and outside lighting grid on ground floor based on the basement column grid. Opposing this, the 'contemporary' infiltrates the 'classical' indicating its origin. This is achieved with the vertical circulation shafts that connect the basement with the upper levels (see figure 203).

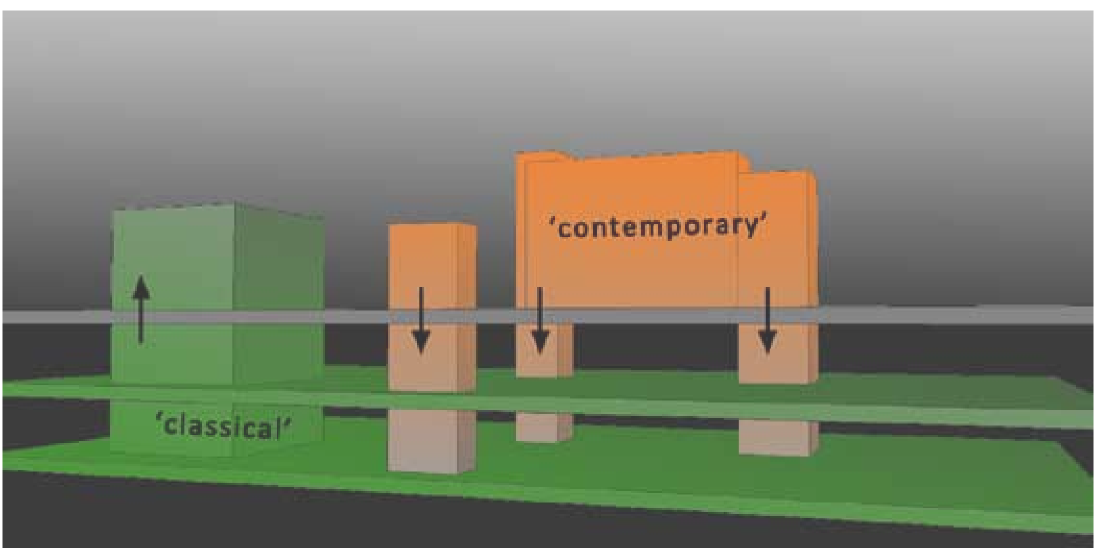


Figure 203 - diagram indicating the relat sical'.

cladding systems

A cladding layer is applied over the structural system to weatherproof the building. The cladding provide the desired expressive shapes that were developed during design process. Two cladding systems are used; Glass Reinforced Polyester (GRP) system, and a stainless steel and polycarbonate 'curtain wall' system.

GRP is a composite material formed by reinforcing flexible fibreglass mat or fibres with thermosetting polyester resins that provide high tensile and compressive strengths (Watts, 2005: 162-173). GRP's are not combustible and can be made to form translucent roof lights and opaque self supporting segmented shells. The production process is labour intensive, and requires no heavy machinery or expensive equipment, making it a craft based technique rather than an industrial process (Watts, 2005: 162-173).

An example of an application of GRP panels is the Bus Station, Hoofddorp, Netherlands, by NIO Architects 2003. This is the largest structure built entirely by synthetic materials. It consisted of factory-cut polystyrene foam with a GRP skin (Internet: Galinsky, 2005)

GRP structural shells are used to clad the majority of the development (above ground level). Panels are formed off site, transported to site and fixed to the hot dipped galvanised steel structural trusses (see figure 211). Due to the structural system, two skins of cladding are installed. An outer shell as discussed and inner shell, these are separated by an accessible service area. In certain instances where the programme has unique requirements, the inner cladding shell is replaced with other materials. For example, with the 'Black Box' theatre sound absorbing panels are installed for acoustic quality.

Figure 204 - image of application of GRP's in the Bus Station, Hoofddorp, Netherlands by NIO Architects 2003.

Figure 205 - image of application of GRP's in the Bus Station, Hoofddorp, Netherlands by NIO Architects 2003.

06 - images of application of GRP's in the Bus Station, Hoofd- etherlands by NIO Architects 2003.

The construction of the GRP panels is similar to that of fibreglass boat construction: A mold is formed to the desired shape. A layer of release wax and then a gel coat (for colour) is applied. After this the laminating process follows. Layers of glass reinforced polyester are built up on each other until the desired thickness is reached.

For the GRP panels the process continues. Structural rib cavities are formed and then filled with polyurethane foam. The other cavities are filled with thermal insulation. Two separate panels, an inner and outer panel, are constructed of site to make assembly on site simple. These panels are fixed to each other with double sided structural tape. The outer panel is finished off with a polypropylene honey comb sheet.

Figure 207
boat consti

Figure 208 - image of gel coat being applied.

Figure 209 - image of first layer of fibreglass being sprayed on.

Figure 210 - image of 'core' material being added for stability and bulk.

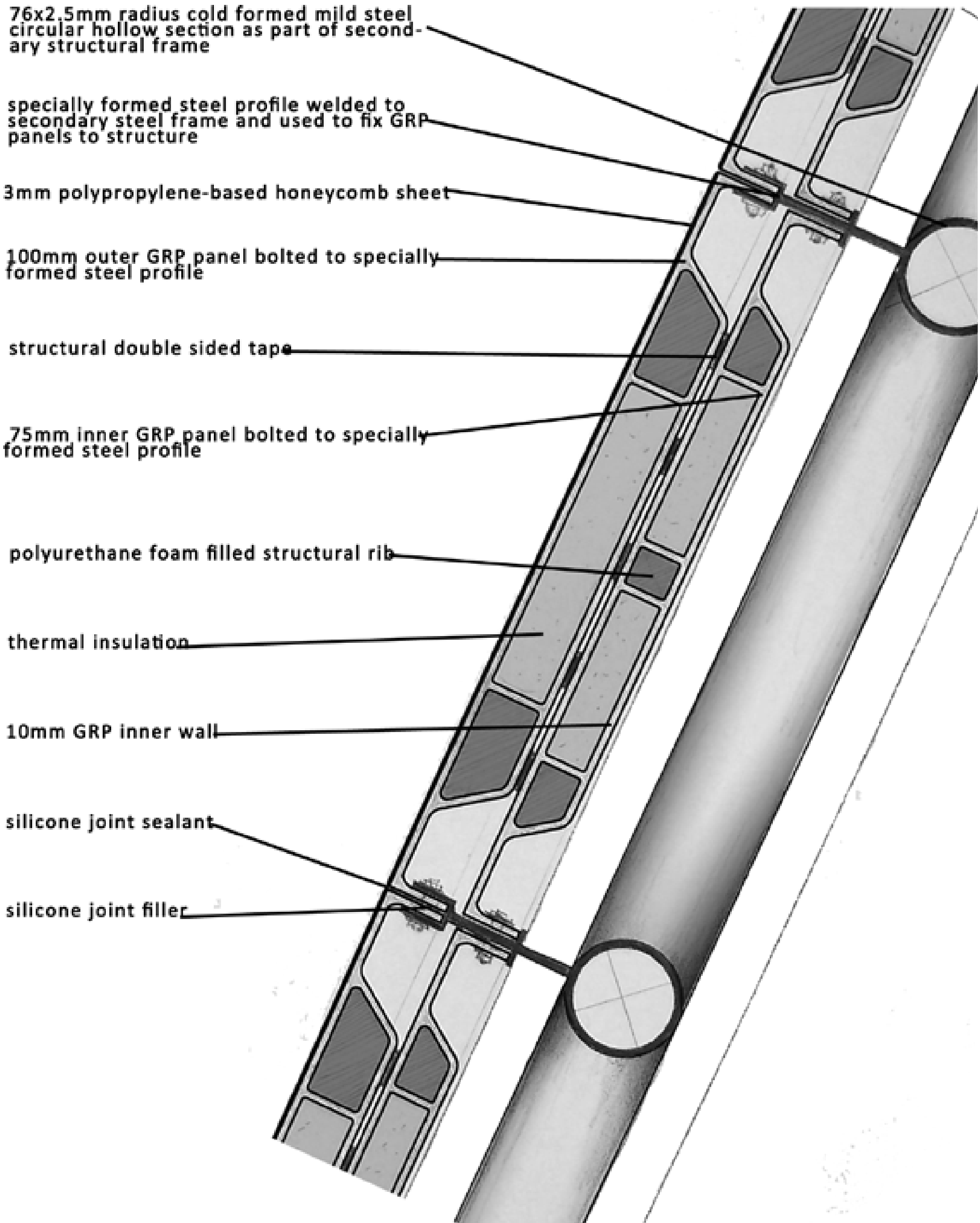


Figure 211 - proposed detail of typical G

The second cladding system employed is a combination of a stainless steel frame filled with translucent polycarbonate sheets and adjustable louvres. Hot dipped galvanised welded steel mesh panels are used for shading (see figure 215). Polycarbonate sheets and louvres are arranged within the stainless steel frame to form a desired pattern on façade (see figure212). The shading mesh is a rigid prefabricated welded stainless steel mesh, similar to that used in the Kew House, Melbourne, Australia by Sean Godsell Architects 1996-1997 (see figures 213-214).

Figure 212 - sketch indicating, as an example, the layered effect on facade.

Figure 213 - image of similar stainless steel cladding used in Kew House, Melbourne, Australia by Sean Godsell 1996-1997.

Figure 214 - image of similar stainless steel cladding used in Kew House, Melbourne, Australia by Sean Godsell 1996-1997.

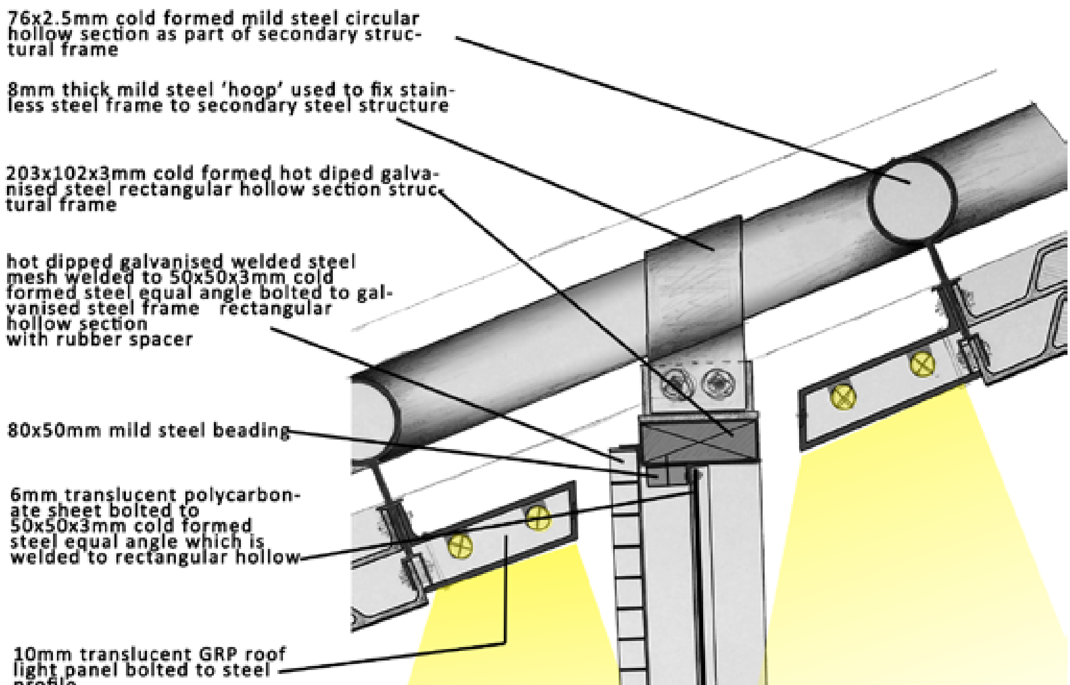


Figure 215 - proposed detail of hot c ... ame and polycarbonate sheet and louvre system with roof light connection.

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Floor systems

The floor system for the upper levels will consist of a ‘QC flooring’ system (Internet: HH Roberson, 2009). This is a composite steel and concrete slab system that forms a solid base for a floor finish that varies with the programme.

Temporary stages are used throughout the performance areas. These systems are adaptable as per requirement and may range from extravagant sets to standard platforms.

Figure 216 - example of temporary stage systems assemble and storage.

Figure 217 - example of temporary stage systems.

Figure 218 - example of temporary seating system.

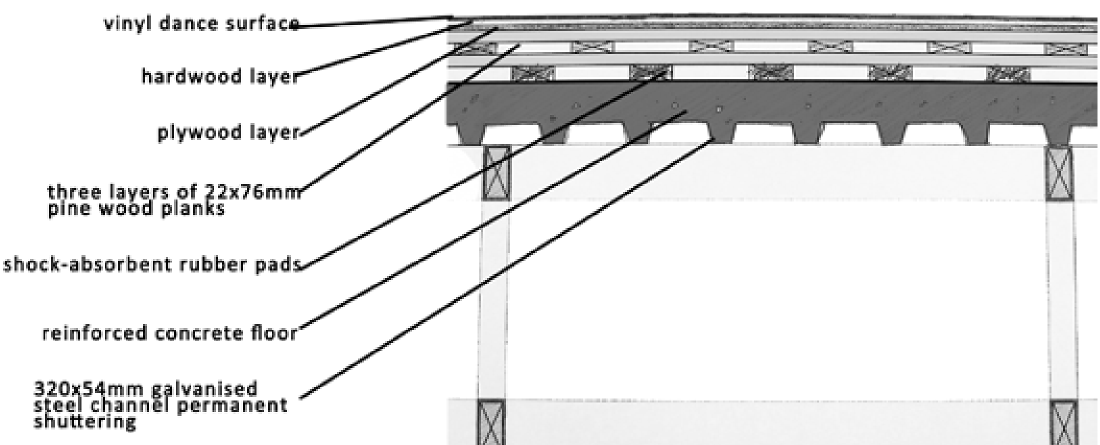


Figure 219 - proposed detail of ‘QC’ floo r finish for studios.

Lighting system.

GRP roof lights are used throughout the proposed project. These lights are inserted between the GRP cladding panels where specified. Where two opposing materials join a GRP light panel is fixed to the more rigid of the two, thus emphasizing the connection by deliberately creating a divider.

Ventilation

Both the proposed buildings consist of areas with varied needs in terms of maintaining comfort levels. Mechanical ventilation systems are introduced for both buildings. To accommodate the difference in comfort levels a de-centralised HVAC (Heating Ventilation and Air-conditioning) system is installed. The unit size is five percent of the floor area and is accommodated on the roof or in the basement. If placed in the basement additional mechanical ventilation is provided to get rid of excess heat.

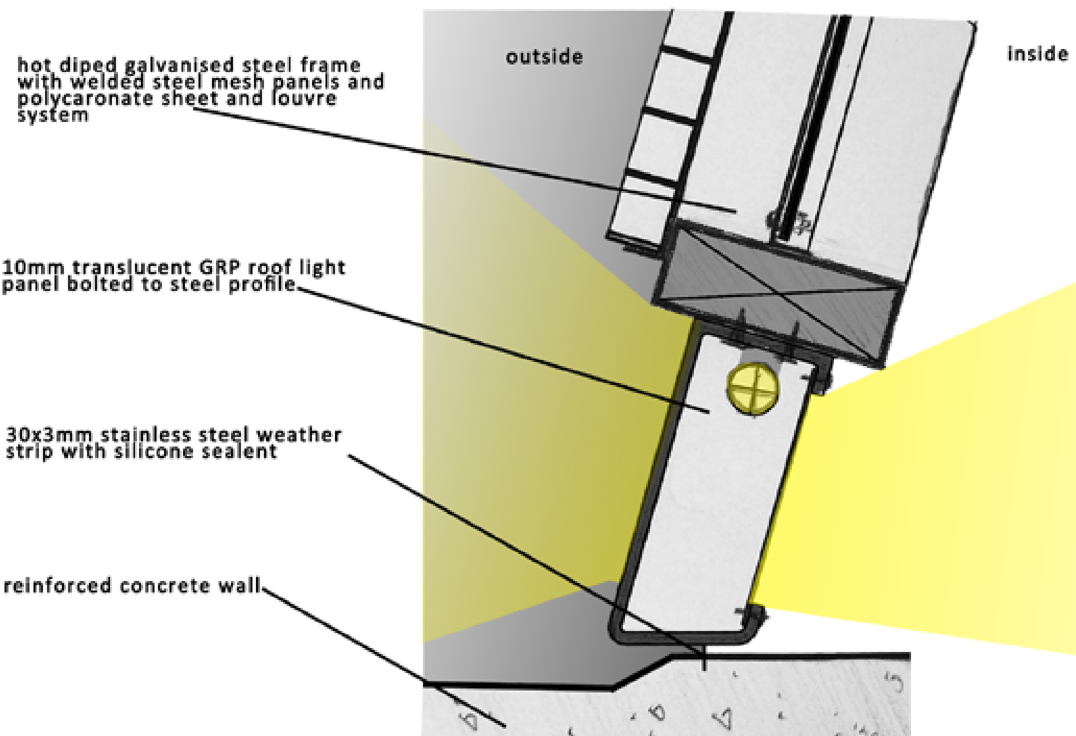


Figure 220 - proposed detail of light bein ... terial.

Circulation

Vehicles enter the basement on the South West corner from Visagie Street. From the basement level there are four possibilities of vertical circulation:

- On the west side there is an lift and stairs that connects basement levels with the public square and the raised open air stage.

- Stairs connect basement level 2 with the Contemporary Dance Company. These stairs are semi public and is mostly used by the inhabitants of the Company and the Unisa Little Theatre.

- Stairs and lift connects the basement levels with the ground floor foyer and the front of house of the 'Black Box' theatre.

- Stairs connect the basement levels with the ground floor, back of house and administration areas of the 'Black Box' theatre. These also act as emergency exit for the theatre and are stepped on ground floor level to accommodate this.

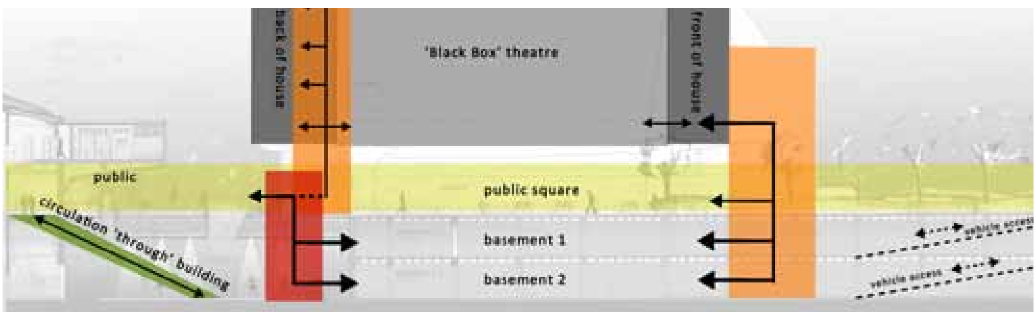


Figure 221 - sectional diagram indicating vertical circulation from basement levels to ground floor and upper levels.

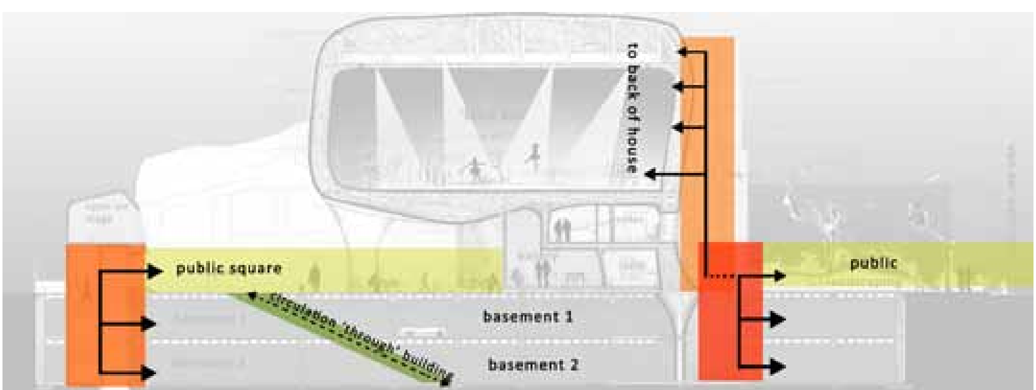
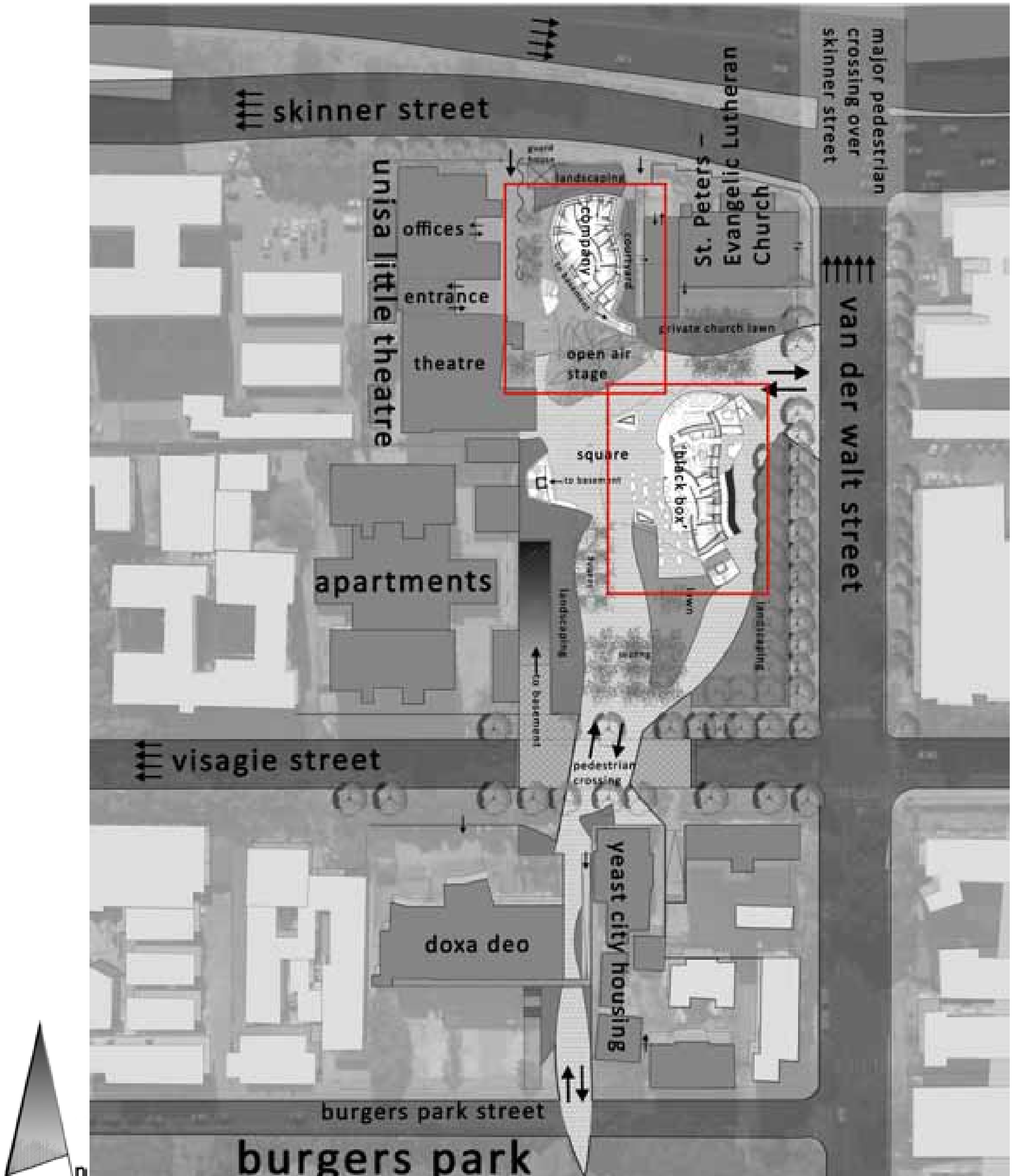


Figure 222 - sectional diagram indicating ... round floor and upper levels.

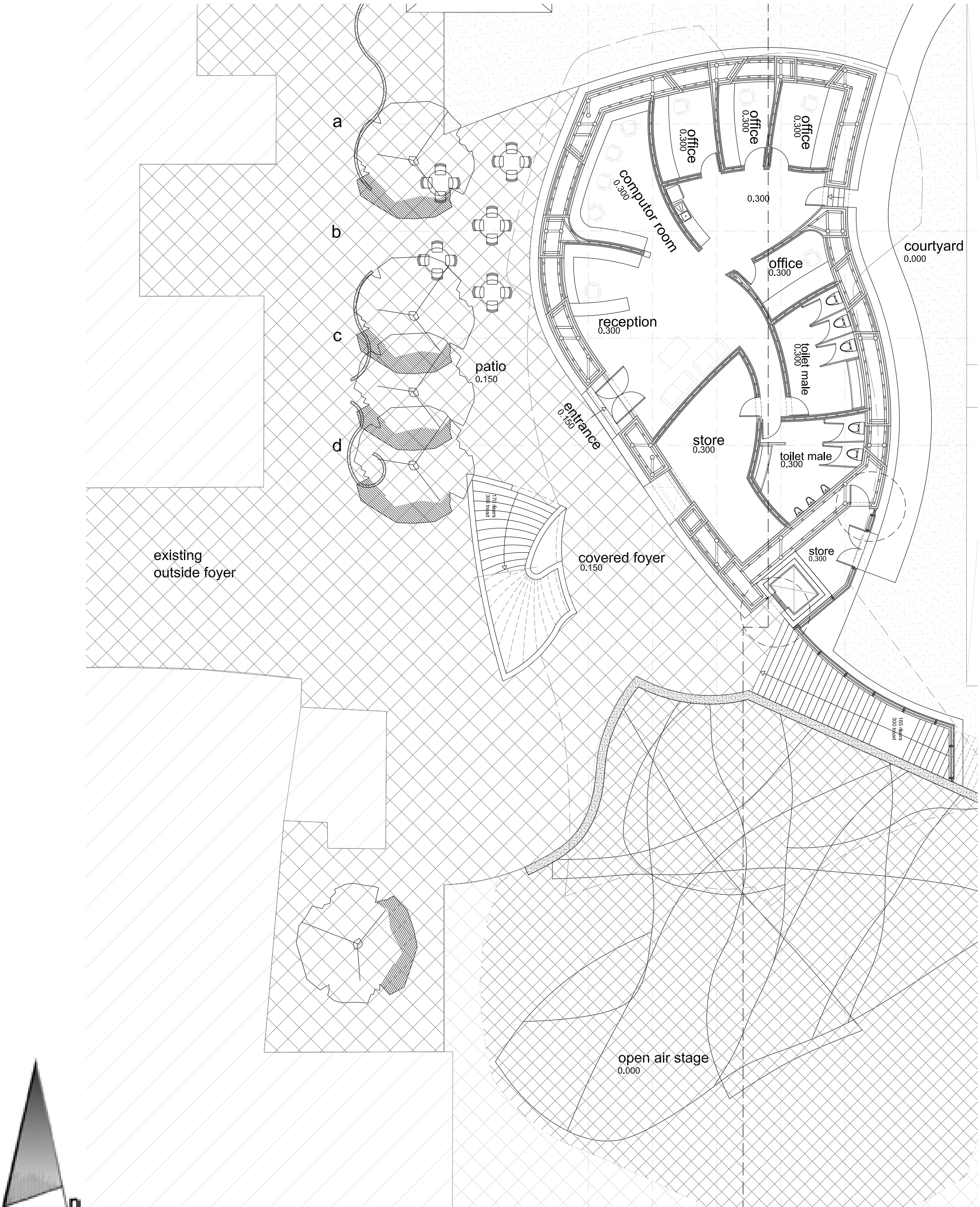
summary

The technical resolution process did not happen in isolation from the design process. This was done for two main reasons: to support the authors believe for the importance of tectonics and to ensure a balanced process is pursued between the freedom ('fantasy') and the technical ('reality').

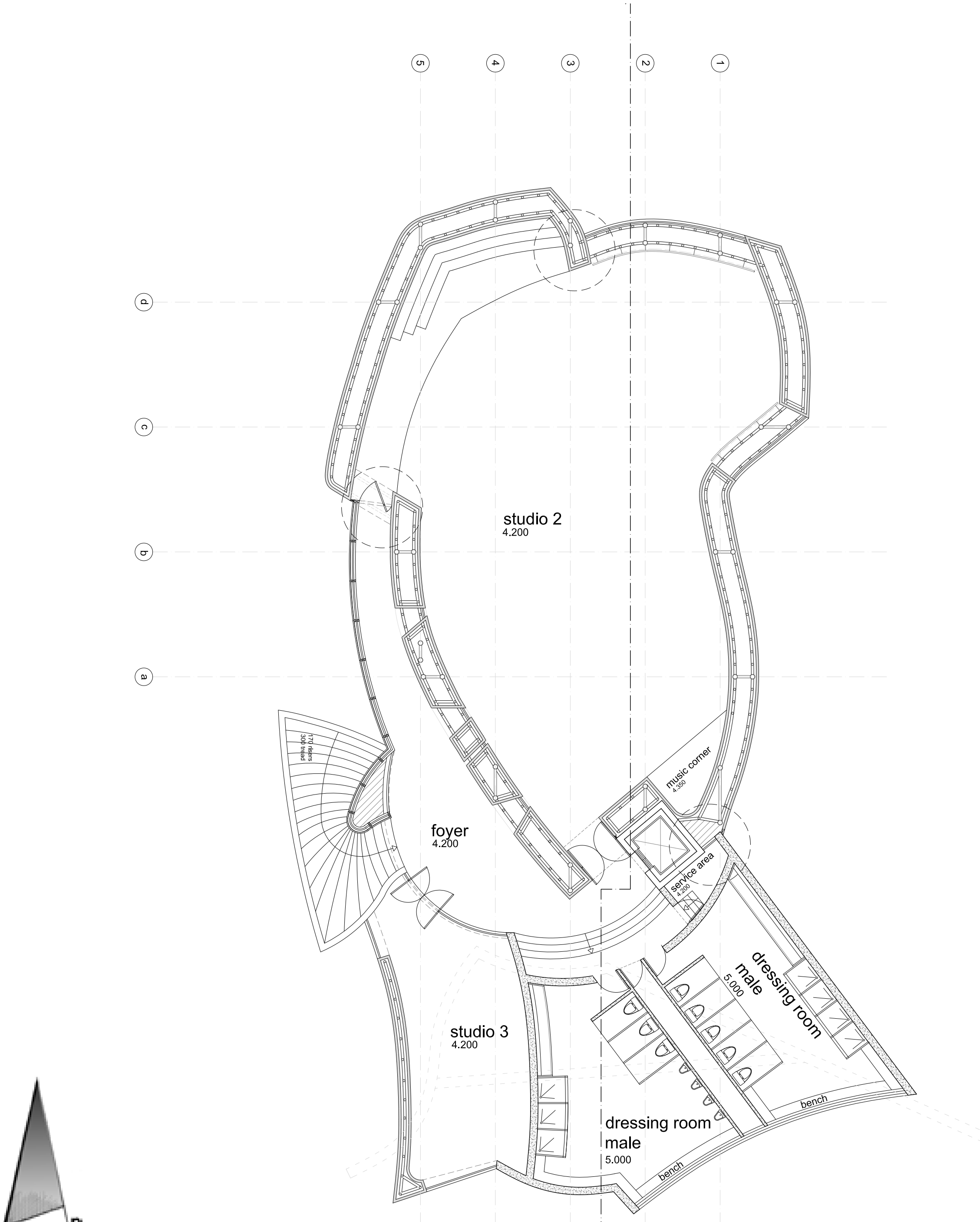
typical drawings



site plan



contemporary da **nd floor plan**



contemporary da **loor plan**

‘black box’ theat

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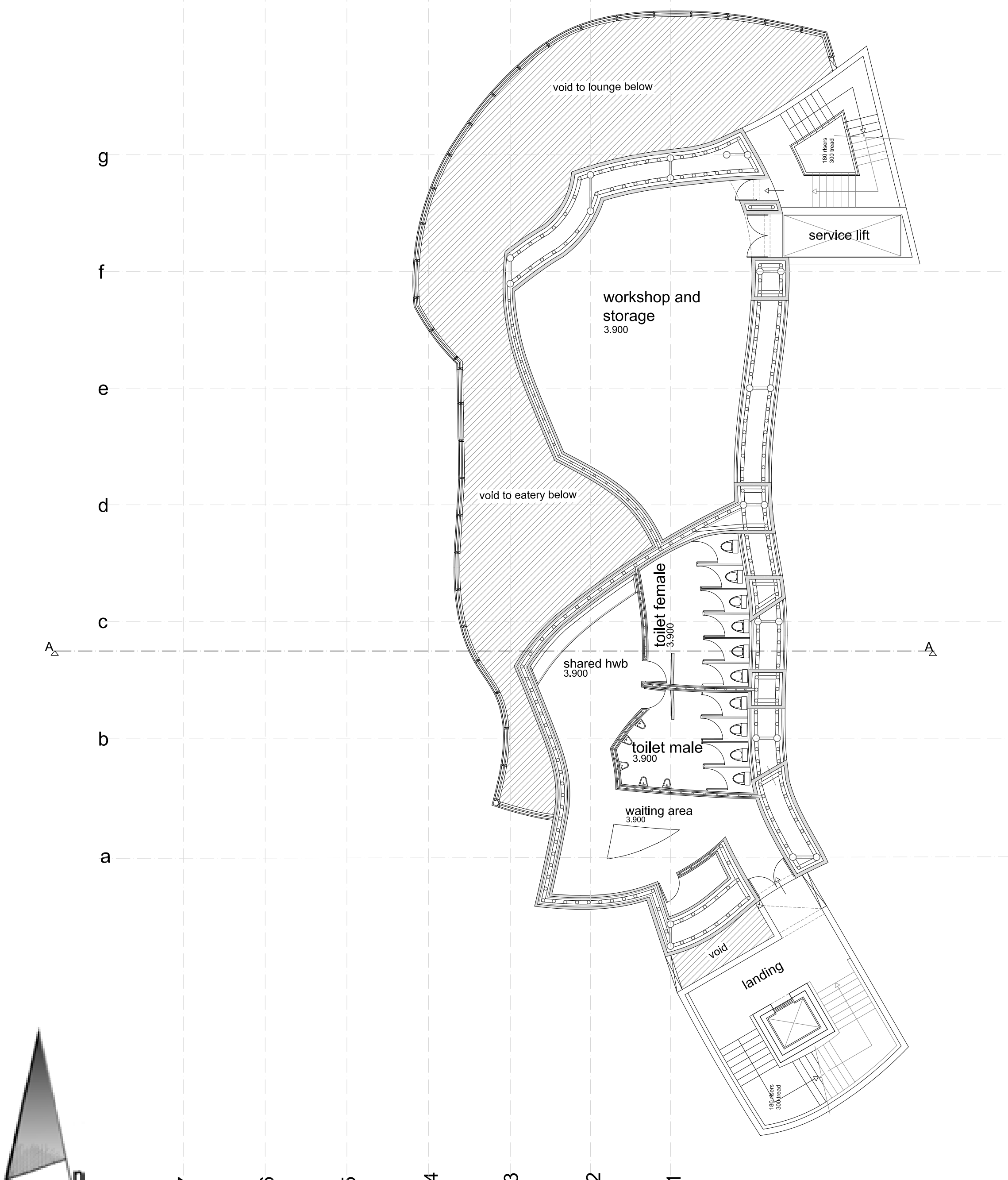
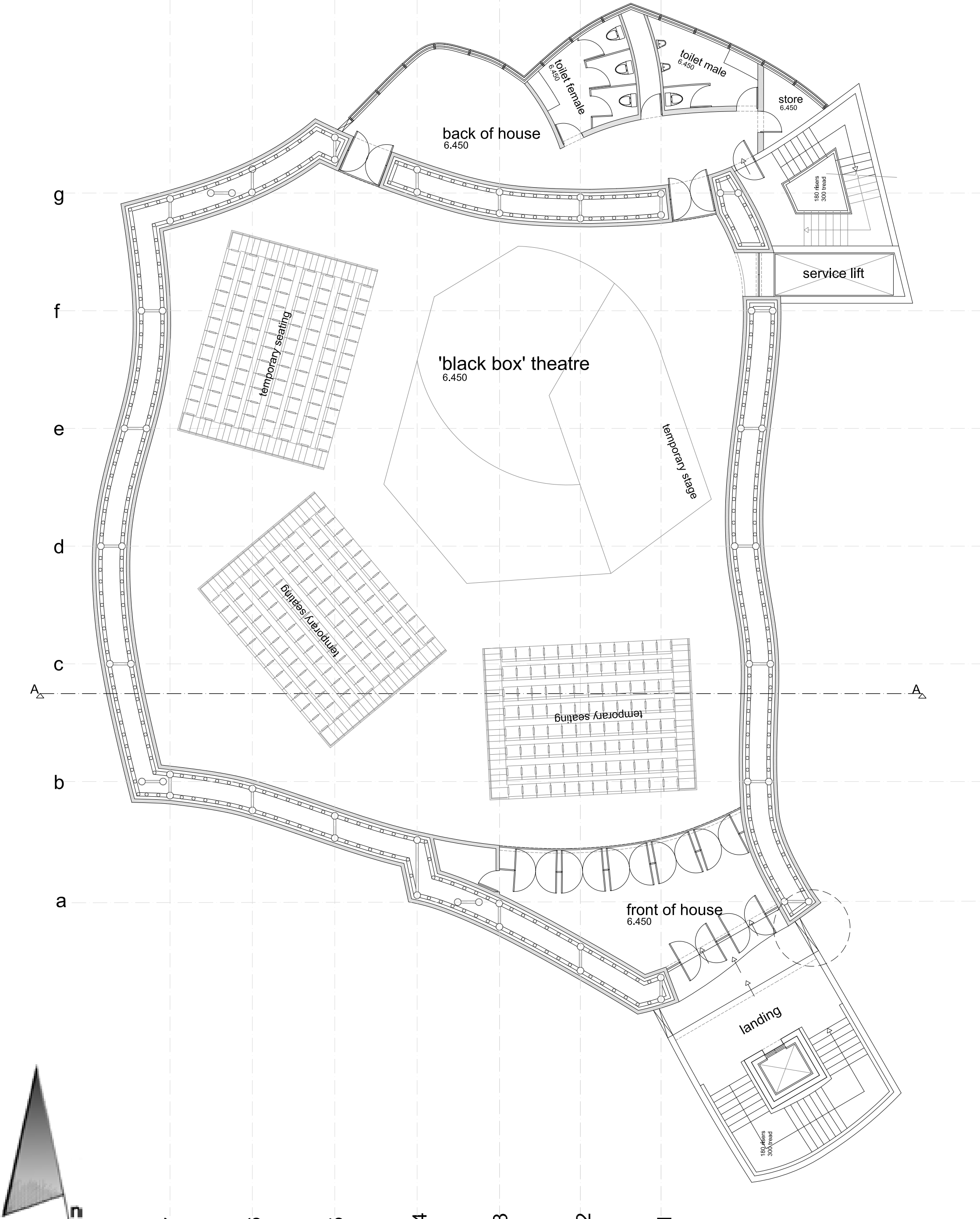


‘black box’ theat



‘black box’ theat

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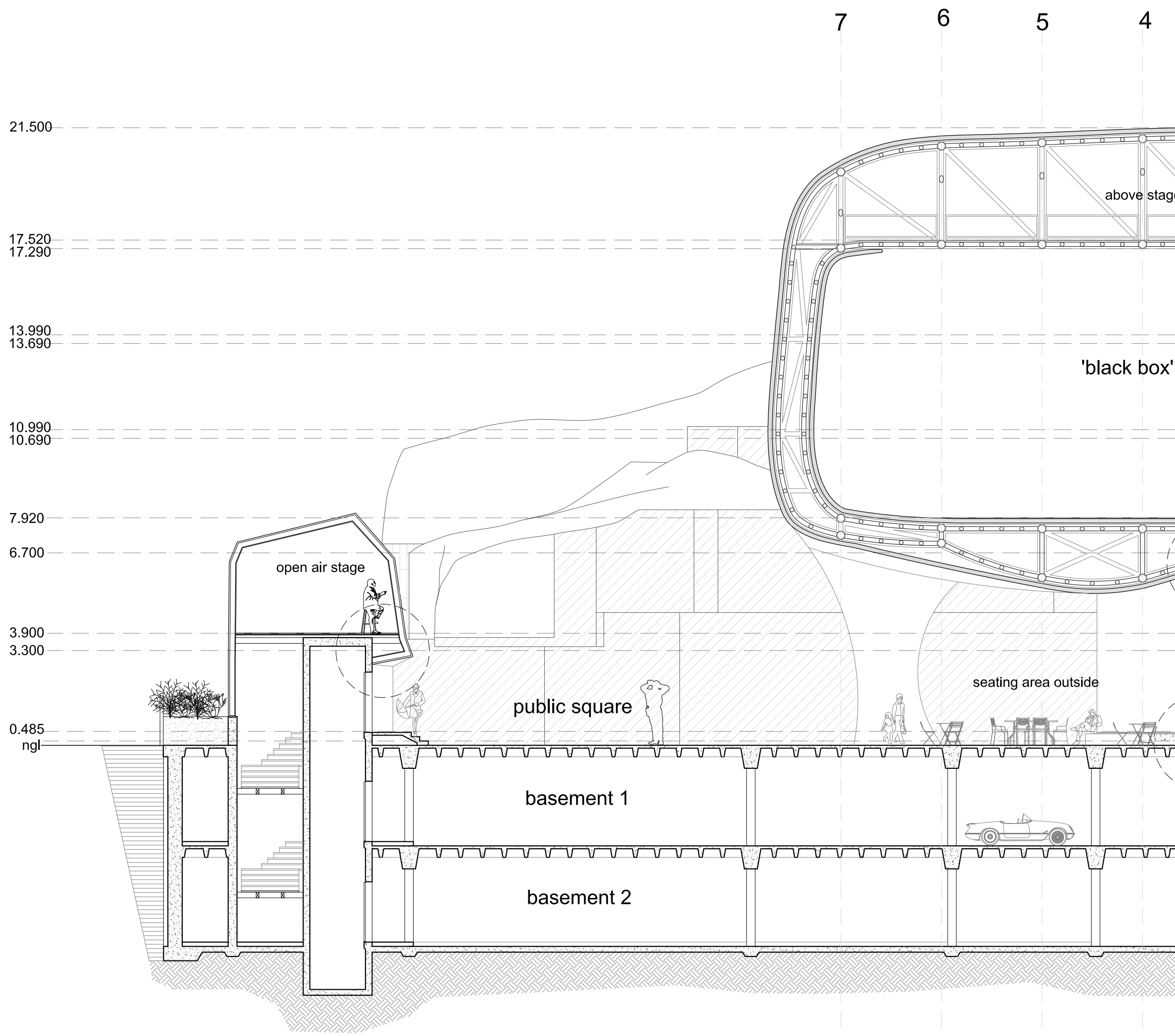
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6
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4
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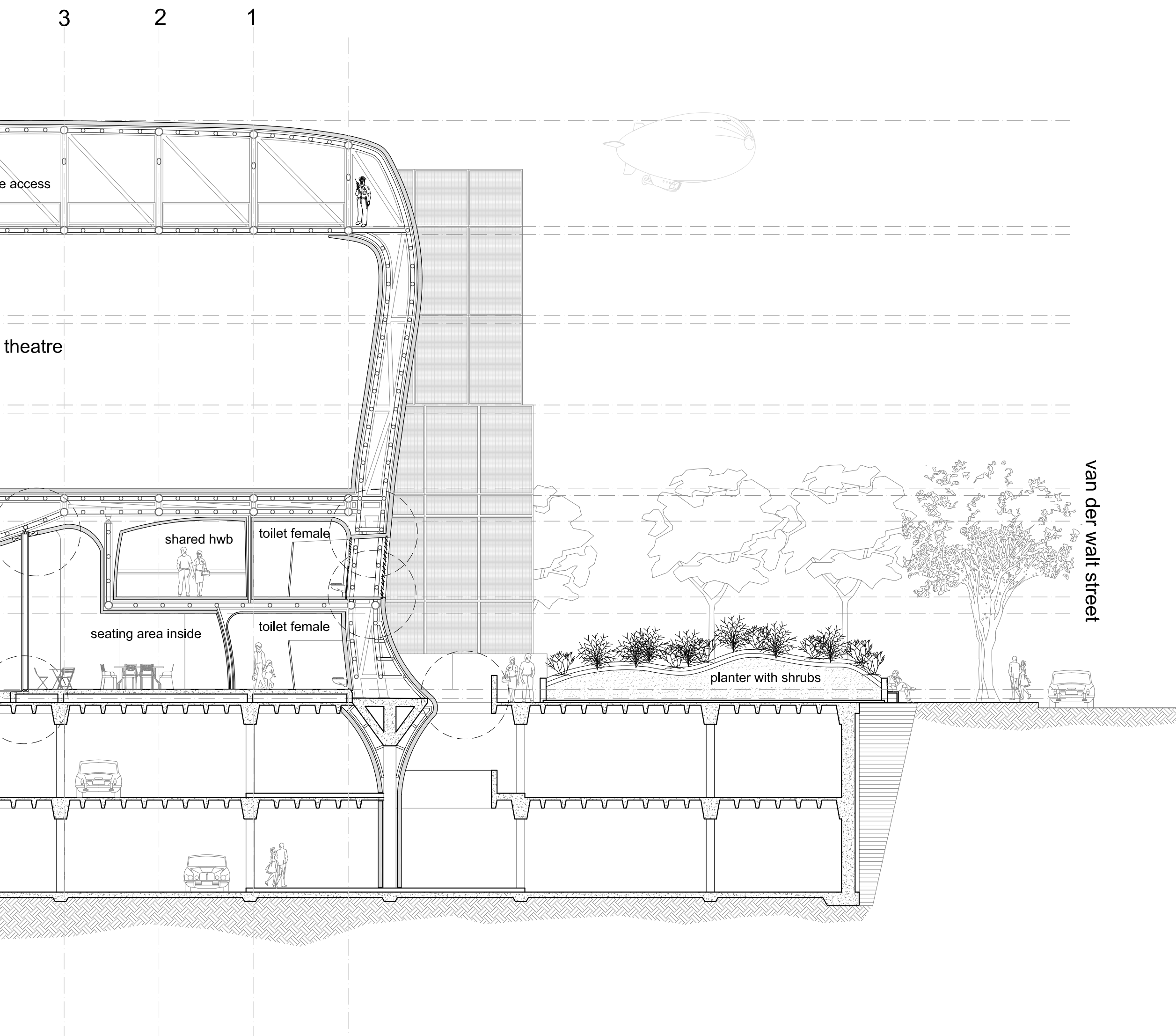
13.990
13.690
10.990
10.690
7.920
6.700
3.900
3.300
0.485
ngl
above stage
'black box'
open air stage
public square
seating area outside
basement 1
basement 2

section a-a



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project conclusion

From the outset, this year intended to serve as a stepping stone for the development of the author as designer and architect. A different design process was explored deliberately. This was done largely as a reaction to the perceived monotonous and restrictiveness of the current architectural education system. This project represents an attempt to change the design outcome by challenging the process. This proved necessary to expand on the freedom (‘fantasy’) of the designer/architect.

It is the author’s opinion that architects should strive to be artists, despite the restrictive nature of architecture. The successful amalgamation of idea and exploration should elevate architecture to its rightful place, as the highest form of art.

The proposed design project attempts a coherent relationship with the SchizoCity framework. Furthermore, it underwrites an advanced role of the architect – the artist within society.

The design was process orientated. Various experiments served as possible design generators. Although challenging, it proved to be stimulating, exciting and rewarding.

The proposed design represents a challenge within the realm of tectonics and construction. Various structural systems, material relevance and construction methods were explored as a direct result.

This dissertation emphasized the importance of the design process for the author. It provided an environment where the exploration was launched from an urban framework and creates a base for future exploration and development.

Finding the balance between freedom (‘fantasy’) and ‘reality’ as expressed in the execution of this dissertation, render a positive contribution to the architectural community and reinstates the author’s ardour for the art of architecture.