# 07

## *[ technical investigation ]*

urban decay as a result of neglected infrastructure

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*The following chapter focuses on the technical resolution of the design based on the theoretical and programmatic requirements within the context of Brown Street.*

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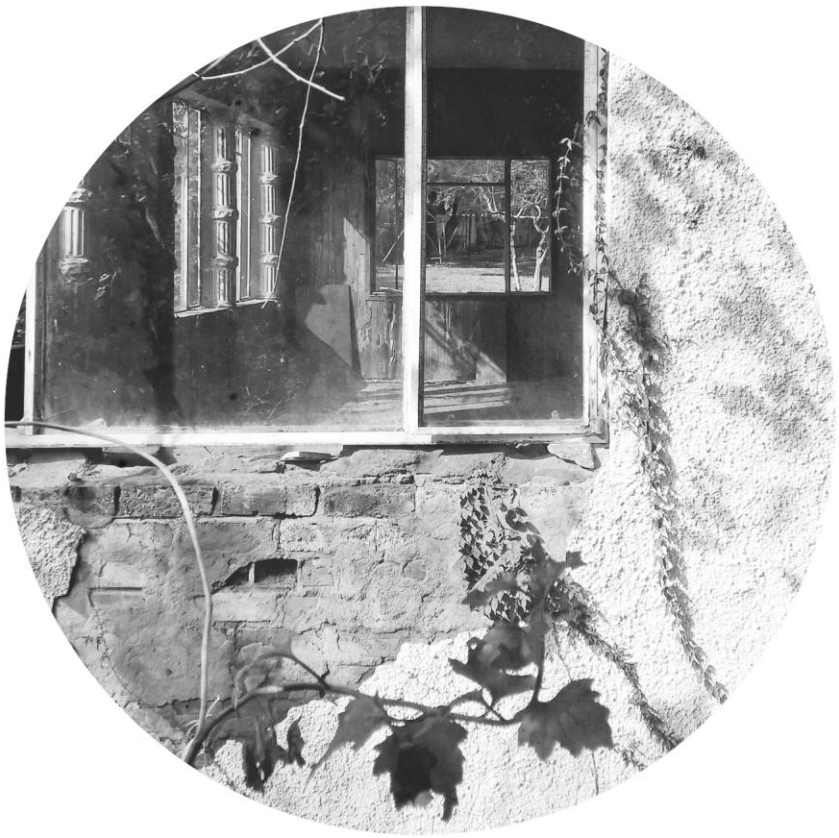


*Entropy*


**Figure 7.1** : Street View showing the stereotomic character of existing fabric within the block of Brown Street (Google Street View, 2015).

# THEORETICAL ARGUMENT

*[ architecture as infrastructure ]*

The structural investigation of the proposed urban [infra]structure focuses of the theoretical premise of Gottfired Semper (1803-1879). The theoretical premise explores the tectonic relationship of architectural materiality. In his book entitles "Die Vier Elemente der Baukunst" (Four Elements of Architecture), the German architect argues that architectural composition can be divided into two distinct opposites: the stereotomic and the tectonic. The stereotomic relating to solidity and the tectonic defines dematerialization (1995: 3).

As most appropriate to the design intentions, the distinction between the two element of stereotomic and tectonic is best defined by Kenneth Frampton (1990: 518). Frampton states that the inherent opposites in architectural materiality forms cosmological opposites to each other, where the stereotomic mass symbolizes earth and the tectonic, the sky. IT is argued by ..... that the way in which these two elements, the stereotomic of the earth and dematerialisation of the tectonic, constitutes the essence of construction.

Rooting from this, as previously discussed in chapter 7, the decaying fabric of brown street forms the tectonic of the site while the very unarticulated ground plan acts as the stereotomic. It is within this theoretical premise that the relationship between ground and sky. the tectonic and the stereotomic is explored.

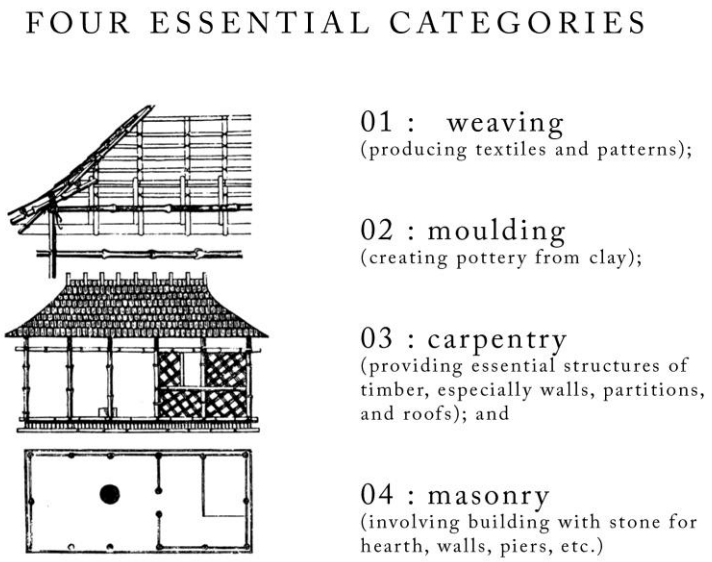



**Figure 8.2** : Drawing illustration of Gottfrield Semper's Four Elements of Architecture (Semper, 1851).

**Figure 8.3 :** Photo illustration of entropy in architecture (Author, 2015).

*[technical concept ]*

*Vittorio Gregotti (1983, 8) states that "... Through the concept of the site and the principle of settlement, the environment becomes[on the contrary] the essence of architectural production. From this vantage point, new principles and methods can be seen for design. Principles and methods that give precedence to the sitting in a specific area. This is an act of knowledge of the context that comes out of its architectural modification."*

The development of the technical concept roots from the investigation which explores the relationship between the two main structural concepts of stereotomic and tectonic, specifically the poetics which emerge from the way in these two opposing architectural elements meet. The proposed architecture also expresses this relationship in the way in which infrastructure and architecture are accommodated simultaneously, how infrastructure and architecture are expressed through the way the in which each component is assigned an aesthetic role. The role of stereotomic as consistent through time and the role of the tectonic as adaptable and the flexible. The materiality of existing buildings within the context of Brown Street demonstrate an aesthetic dimension to these roles. The process of entropic decay communicated in the layering of change over time.

## ROLES

STEREOTOMIC (EARTH) = CONSISTANCY

TECTONIC (FABRIC) = CHANGE AND DECAY

## MATERIALITY

TECTONIC (FABRIC) = CHANGE AND DECAY : ROOF SHEETING

STEREOTOMIC (EARTH) = MASSING : BRICK ON CONCRETE BASE

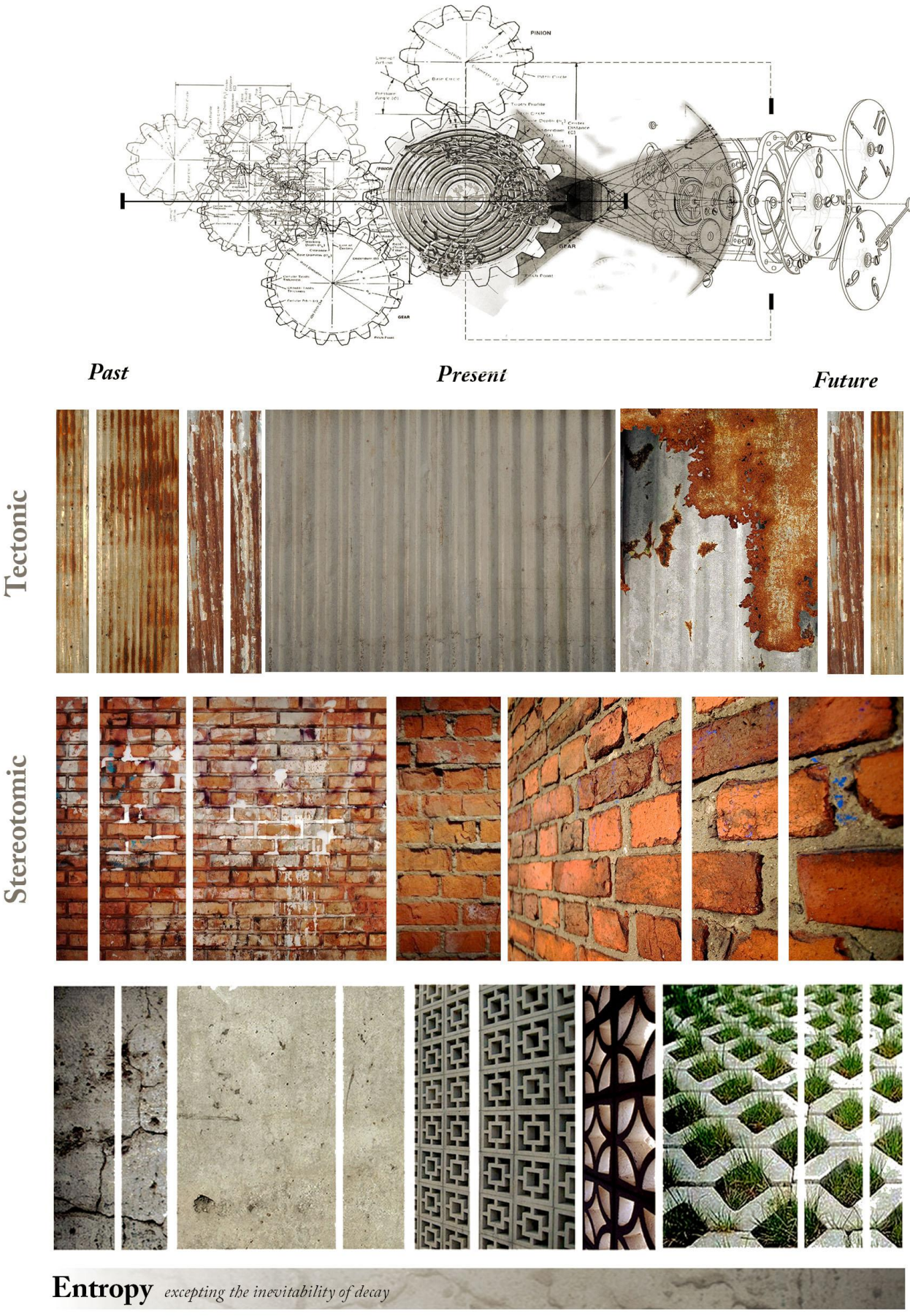



**Figure 8.4 :** Illustration of entropy in proposed materiality of the Urban [infra]Structure (Author, 2015).

# [infra] : latin for "below". Origin- Expand

Following on from this argument is that, that which is contained within the ' earth' demonstrates a similar permanence and consistency. As stated in chapter #, the infrastructure of water has through its faithful supply remained the one consistent element throughput the development of the city due to it being accommodated below ground in the form of furrows and storm water channels. The etymology of the word, referring to the current and conventional nature of water infrastructure within the urban environment was being 'below' surface. However, such a condition offers little opportunity for not only the unveiling of waters regenerative potentials but also of the infrastructure's potential in becoming spatially included within an architecture.

Therefore, because on the submerged nature of the existing infrastructure (storm water channels) within the earth, it is represented as part of the stereotomic landscaping component of the architecture. The proposed infrastructure addresses this poetic relationship by displaying how the existing stereotomic of the site is manipulated in such a way as to set in place a series of architectural potentials. The ground plane is manipulated in such a way as to accommodate for the engineered requirements of the wastewater treatment system, as well as becomes the substructure of the proposed fabric.

The second structural concept rooting from the theoretical argument of architectures entropic inevitability, through its process of decay. The proposed materiality and detailing is design to anticipate, not only for change but also for the process of decay. The resolution of this concept saw the hierarchical allocating of materiality to the various functions of the infrastructure relating to either permanency of temporality. The permanence of infrastructure versus the temporality of which is contained within "inevitable architecture". In this way the architecture will express, through its tectonic, the inevitability of decay as well as the permanence of which is associated with the need for infrastructure. "Unlike conventional architecture, they are not an end in themselves but encourage the continual necessity for change" (Price, 1996).

# PLANS AND CIRCULATION

*- private, public and servicing -*

As an anticipatory architecture, the proposed [infra]structure of Brown Street functions as a series of superimposed buildings which, similar to Cedric Price's *Magnets*, would through the way in which the building is designed, generate new kinds of access, views, sanctuary, safety and delight. Designed to overload underused or misused sites , the buildings are both pragmatic and polmatic in the way that they turn space to the public advantage. The approach to planning is both theoretically and contextually, contain the need to be flexible.

The padestrianization of North-South service alley throughout the length of Brown Street results in the fragmentation of the building fabric as to "provide amenities and stimulate new patterns of public movement" as well as due to periodic padestrianization of the entire city block, these transformed alley ways serve as routes between the recycling workshops and the central core of the [infra]structure (Price, 1996). It is through the integration of existing and new circulation routes that Brown Street will be re-inhabited and thus rehabilitated. It is in through this re-inhabitation that the site potentials are not only realized but celebrated by the way it which the [infra]structure prioritizes the expanding of existing and not the introduction of the new.

## [ public circulation ]

In the design, public circulation is not reduced to a predetermined route, instead the individual is allowed to experience the and discovery the site on his/her own terms. The visitor may either enter the building at the main water tower or stairs set out between the offices / workshops. In both cases the individual will experience the various components of the water treatment process or depending on the occasion, become part of the recycling process.

## [ private circulation ]

Private circulation is incorporated into the design of the building by means of a privatized corridors and series of bridges which allow access to office as with the core or to workshops within recycling plants. These circulation routes function in accordance with the required flows of the infrastructures such as the process of water treatment. Private vehicle access is provided to the Western perimeters of the building. These private access points relate to functions of refuse and waste collection, delivery of supplies, and servicing.

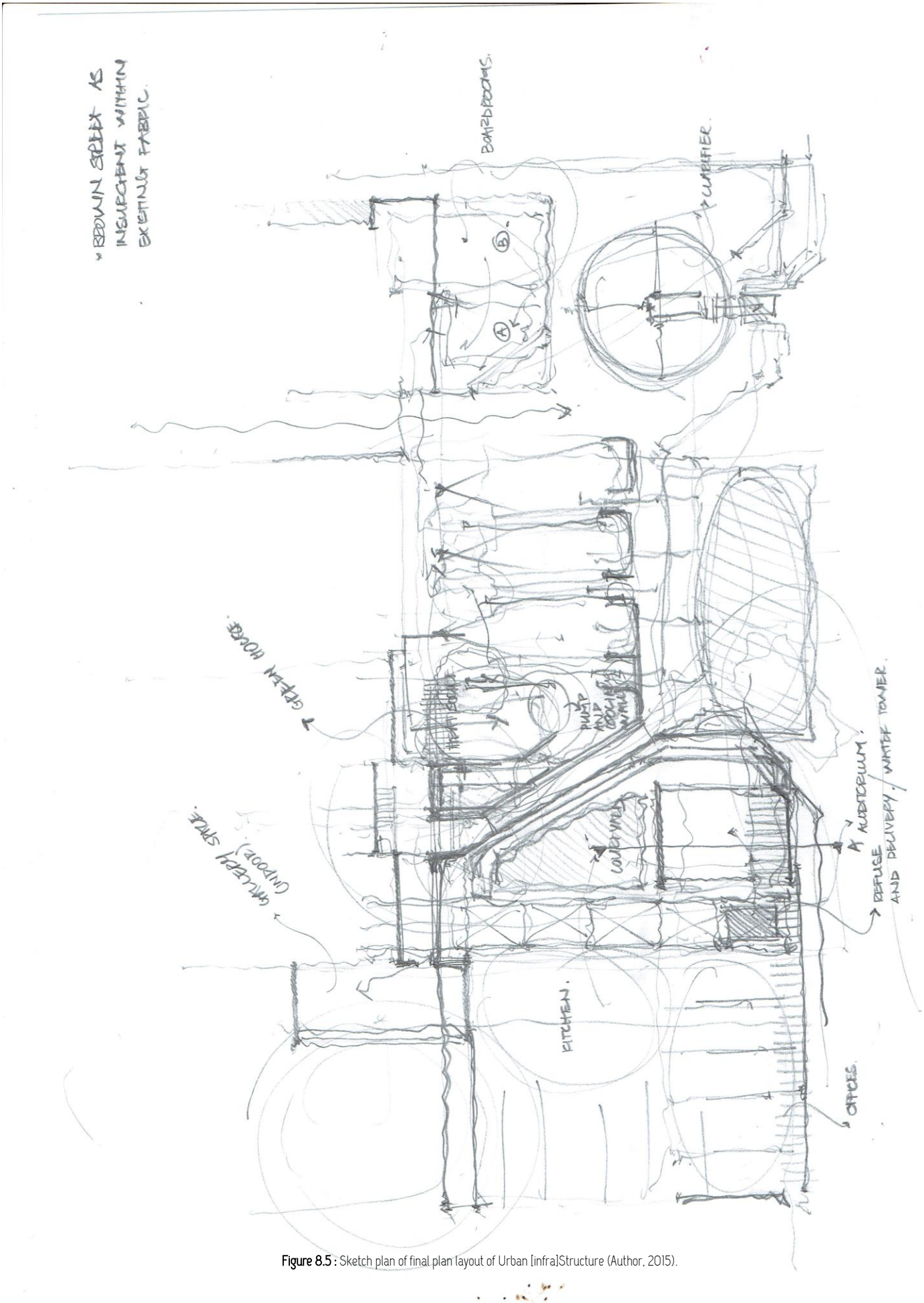
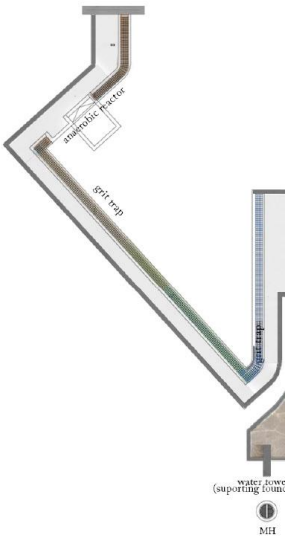
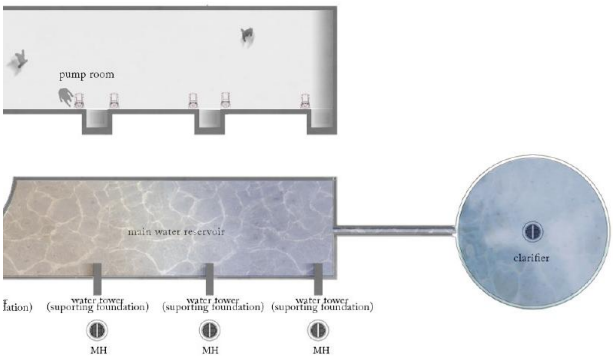



**Figure 8.5 :** Sketch plan of final plan layout of Urban [infra]Structure (Author, 2015).



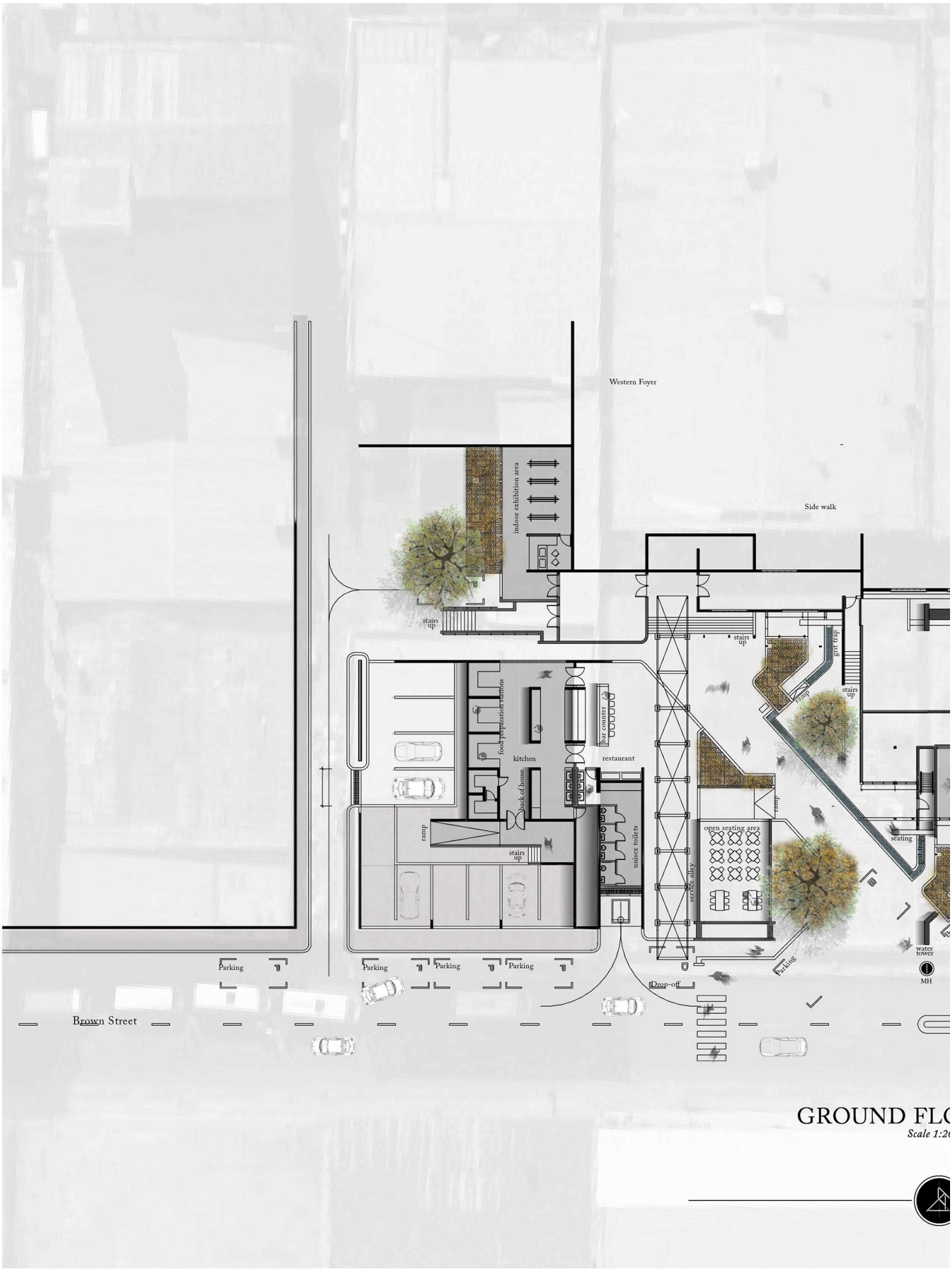

Brow

BASEMENT F
*Scale 1*

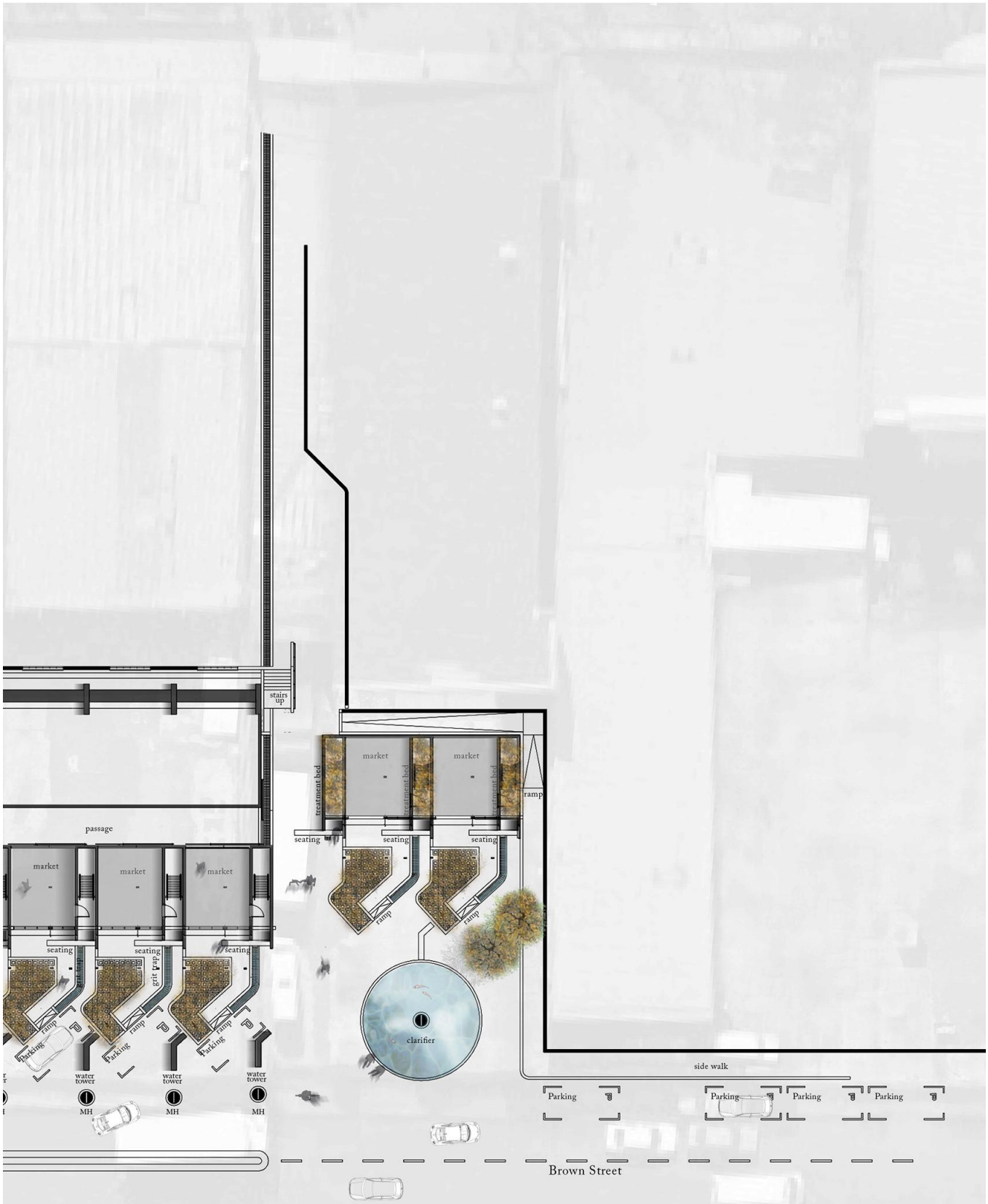



n Street

'LOOR PLAN
:200

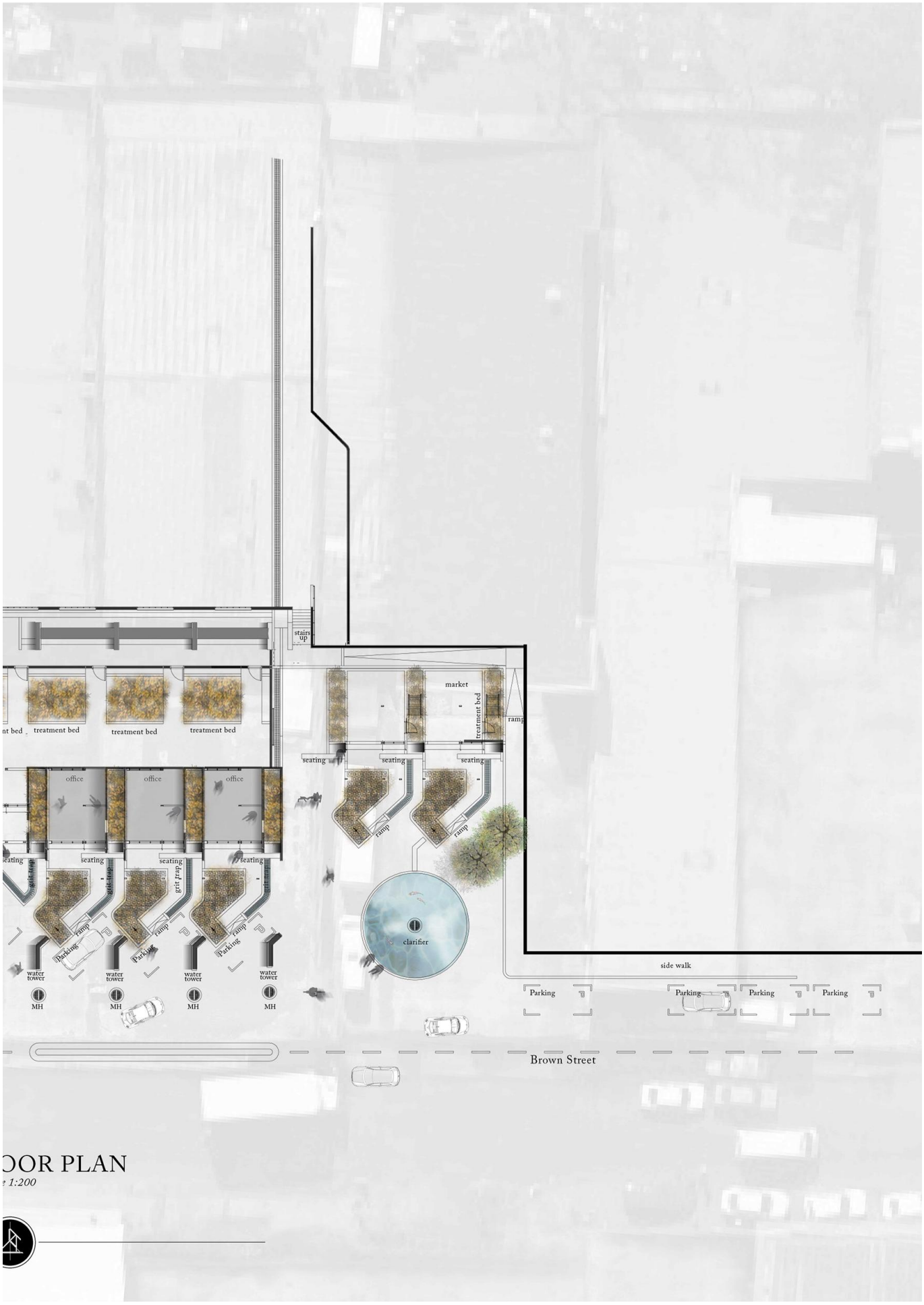



GROUND FL
*Scale 1:2*

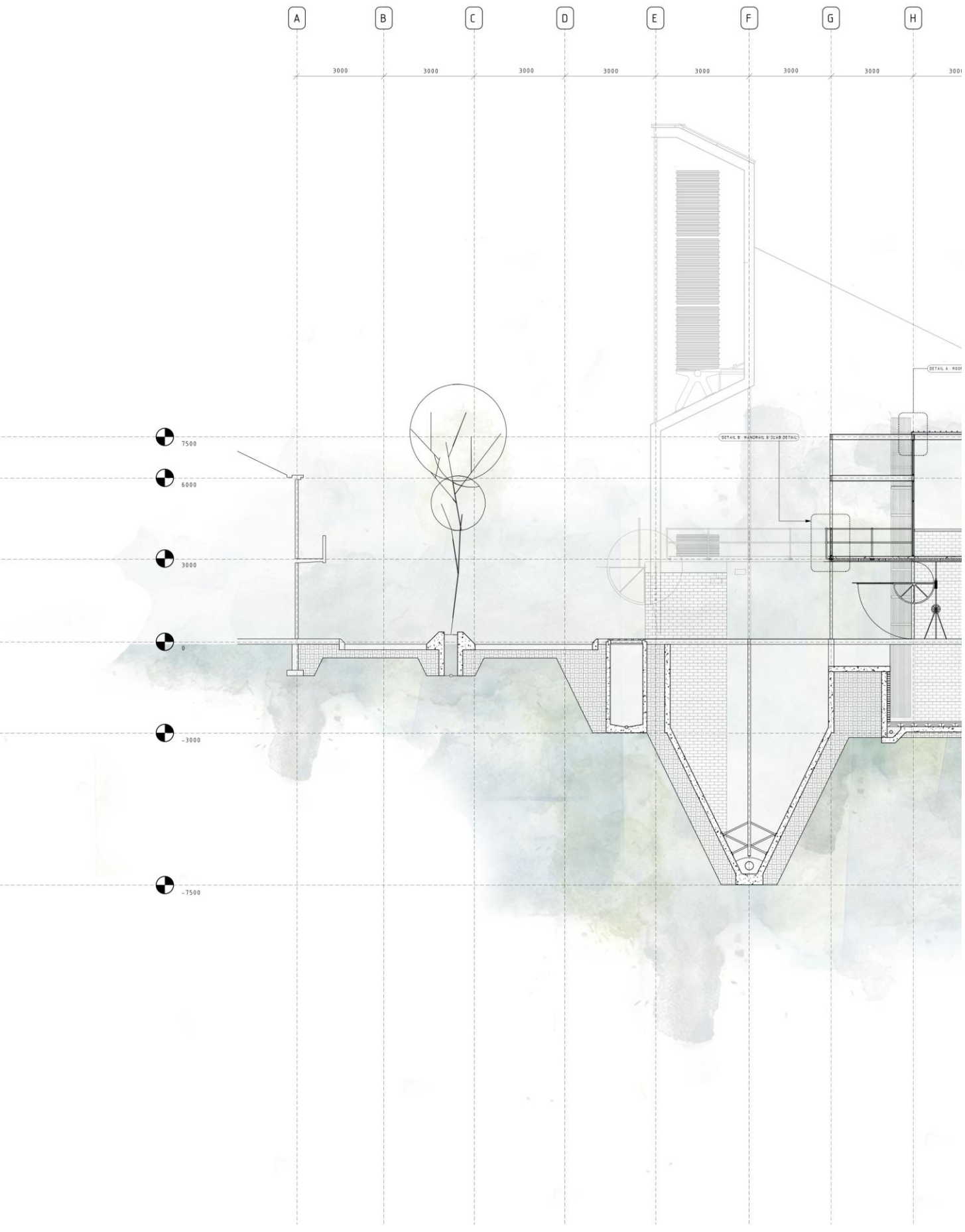


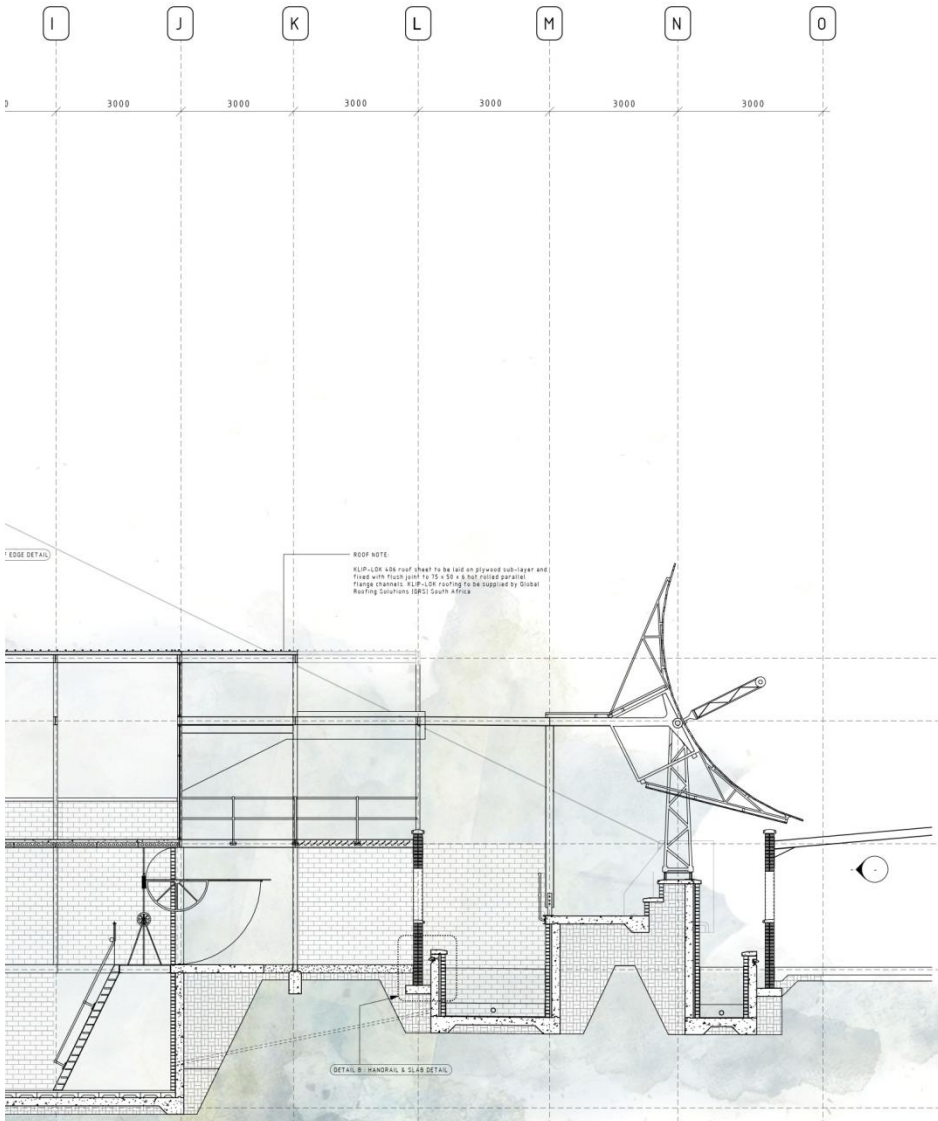

LOOR PLAN
1:200


FIRST FLO
*Scale 1:2*




OOR PLAN
e 1:200






SECTION A – A

*Infrastructure*

*WATER*

*The Third and Forth circulation routes deal with the distribution of wastewater throughout the treatment process as well as the recycling of scrap metal throughout the workshops. From the point at which the untreated water forms a threshold toward Brown Street in the form of parking bays, the water is gravitated in parallel from South to North through the site, linking designed spaces throughout the treatment stages. The integration of water treatment and circulation strengthens the experiential quality in terms of a sensory experience. The sound of water circulating from tanks to tank as well as the aesthetic appeal of the vegetation.*

## 8.5

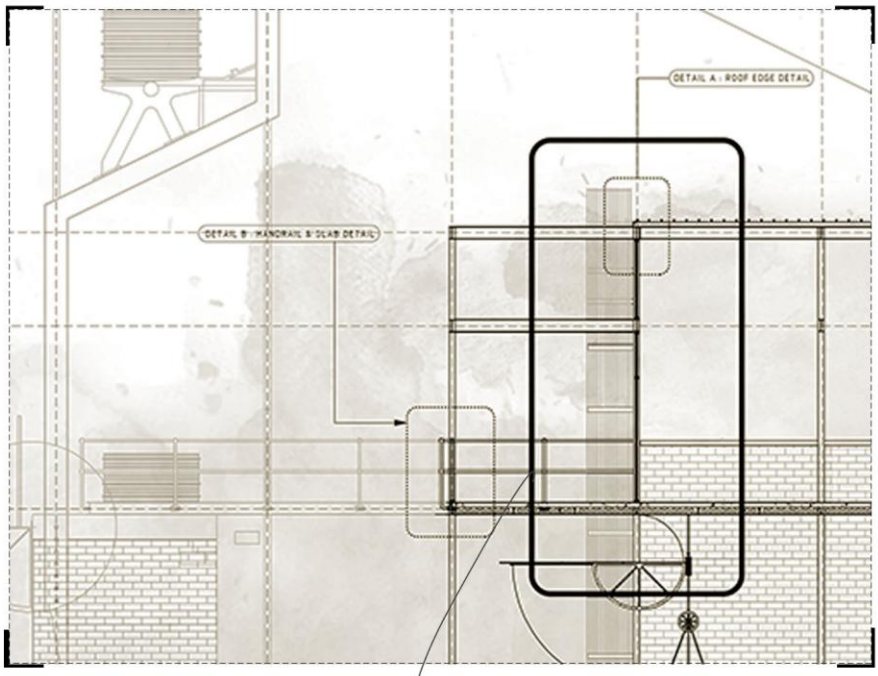
## [structural systems]

*- sequence of [infra]structure construction -*

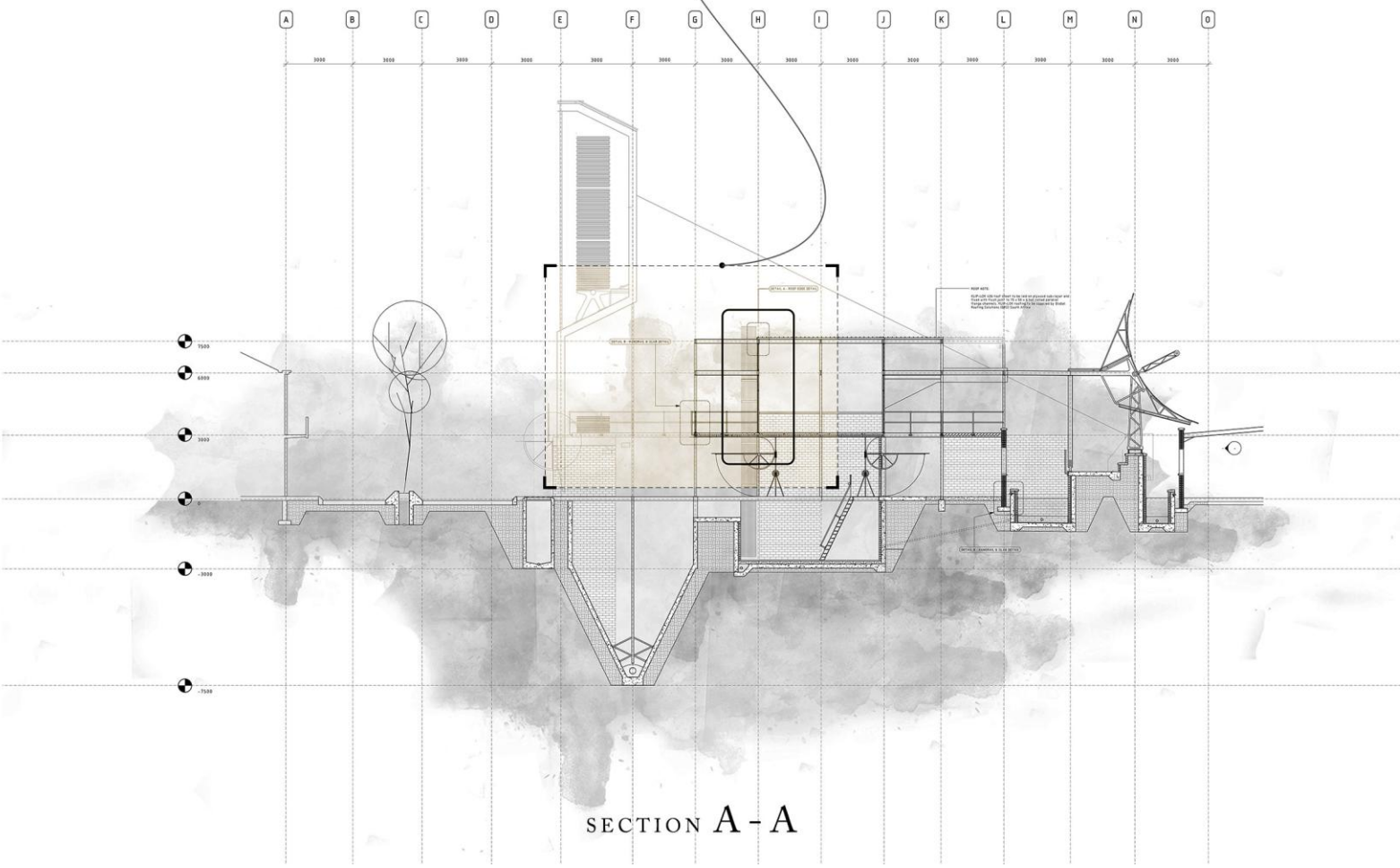
The structural system of the proposal Urban [infra]Structure is discussed below as three interdependent structural entities which constitute the buildings syntax, namely substructure, superstructure and layered skins. (reference / quote )

### 8.5.1 Substructure

This construction element does not only support the lateral imposed loads of the superstructure, it also serves as the newly proposed ground plane. The substructure introduces a level change of up to 3 meters allowing for a ..... connection to existing buildings on site. The stereotomic nature of the substructure, deliberately contrasting with the existing construction typology Brown Street, and is to be read as a manipulation of the existing ground plan in order to access the potentials of that which is contained within. It also allows for the poetic integration between existing as stereotomic and the new as tectonic which is to be perceived as an addition. The substructure therefore forms the supporting foundation of the tectonic which contains a series of multi-programmable spaces including a basement which acts as a central pump room for the wastewater treatment system.




PERSPECTIVE DETAIL




SECTION A - A

Figure 7.6 : callout of section indicating the selected TECONTIC illustrated in the follow development. (Author, 2015).

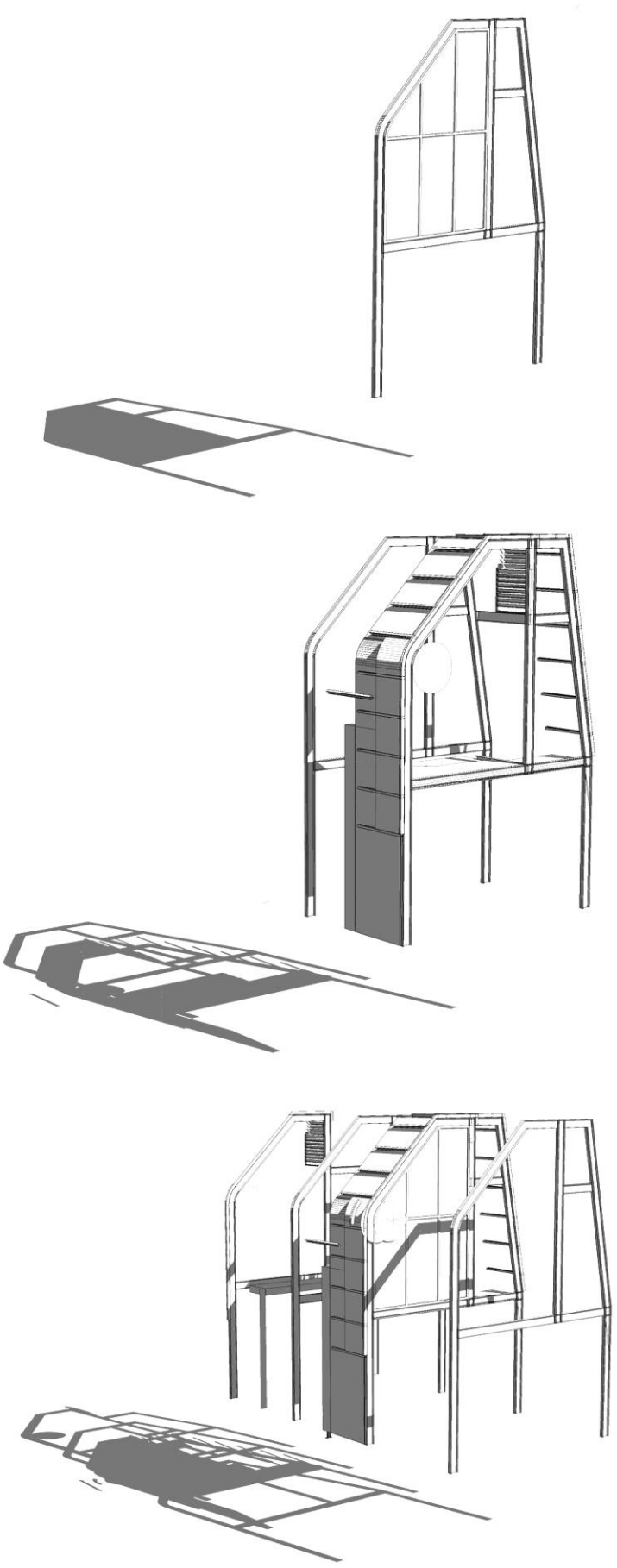


**Figure 7.7** : TECONTIC development (Author, 2015).

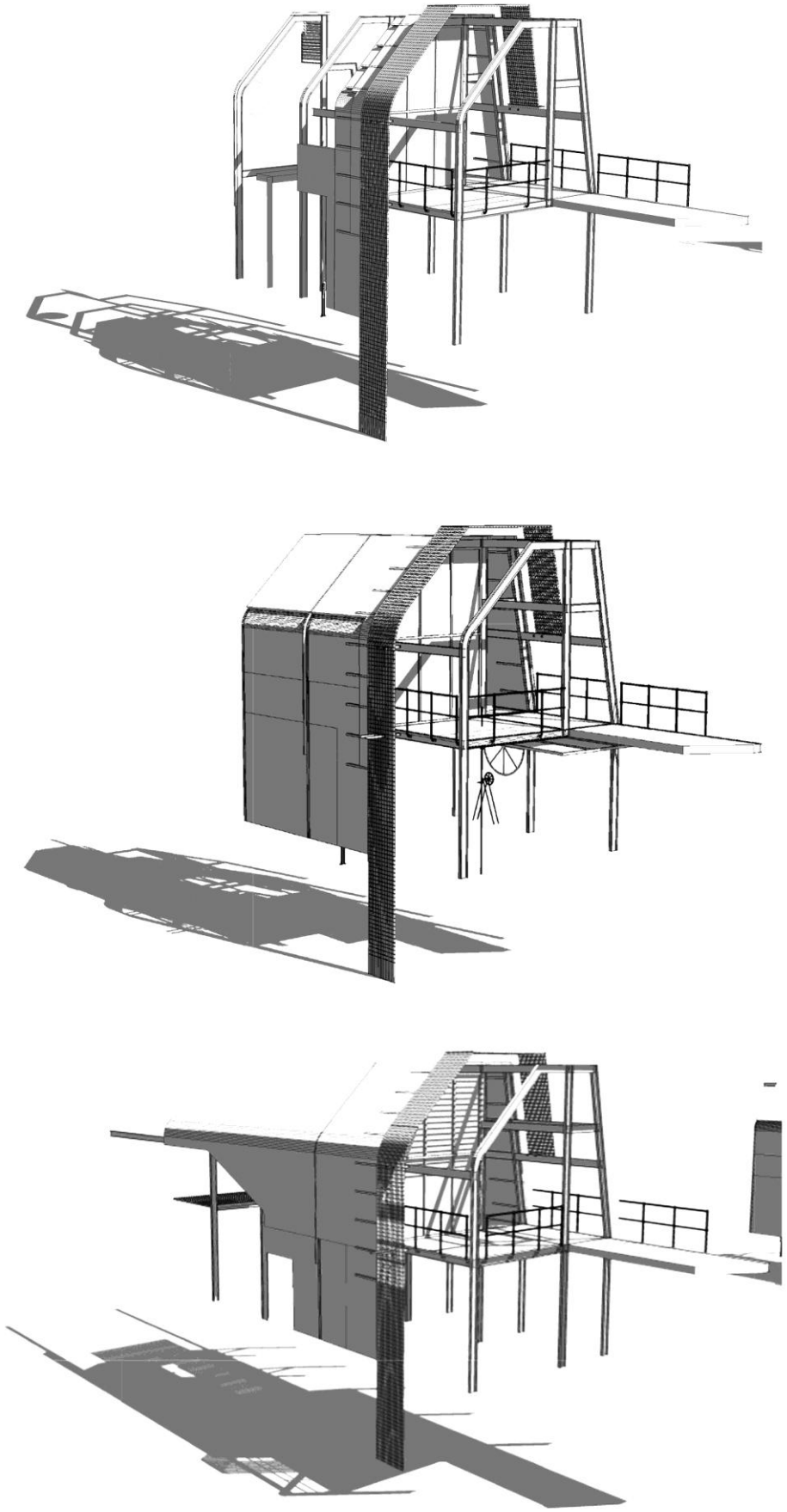
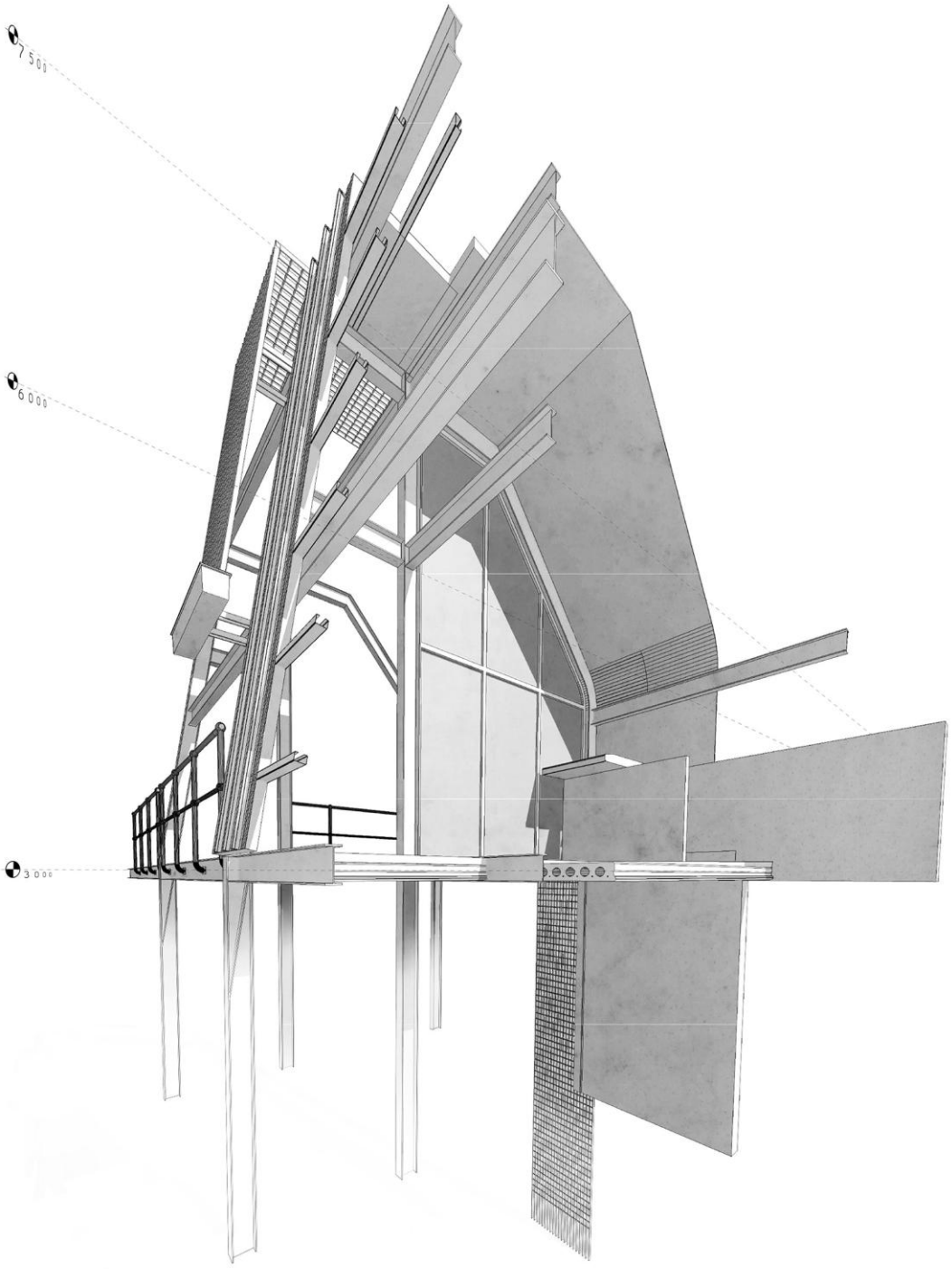


**Figure 7.8** : TECONTIC development (Author, 2015).

# 07|2

## [ tectonic materiality ]

The proposed architecture also expresses this relationship in the way in which infrastructure and architecture are accommodated simultaneously, how infrastructure and architecture are expressed through the way the in which each component is assigned an aesthetic role. The role of stereotomic as consistent through time and the role of the tectonic as adaptable and the flexible. The materiality of existing buildings within the context of Brown Street demonstrate an aesthetic dimension to these roles.




*Office / Workshop / Green House Tectonic clay Rendering*

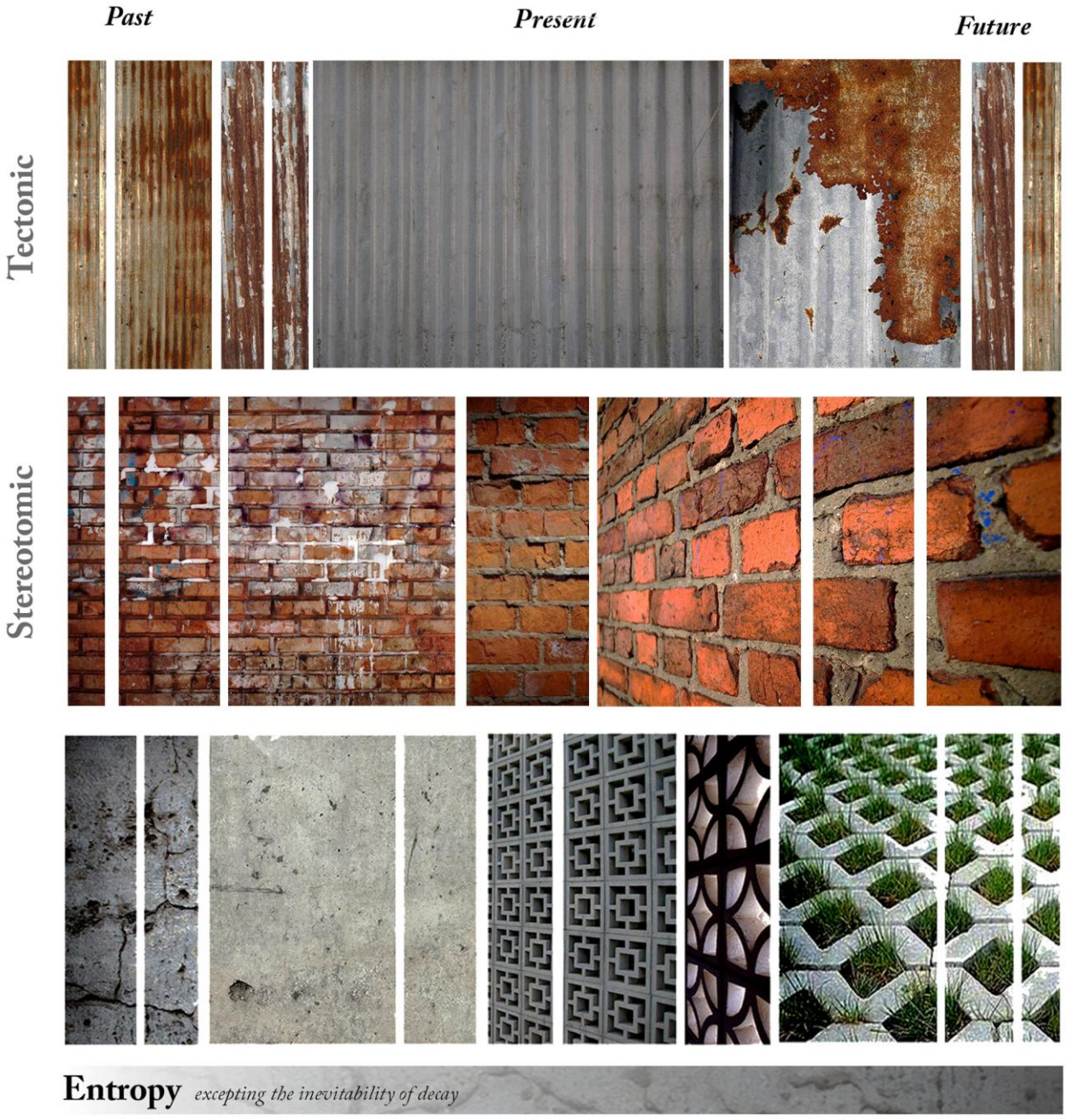
# 07|3

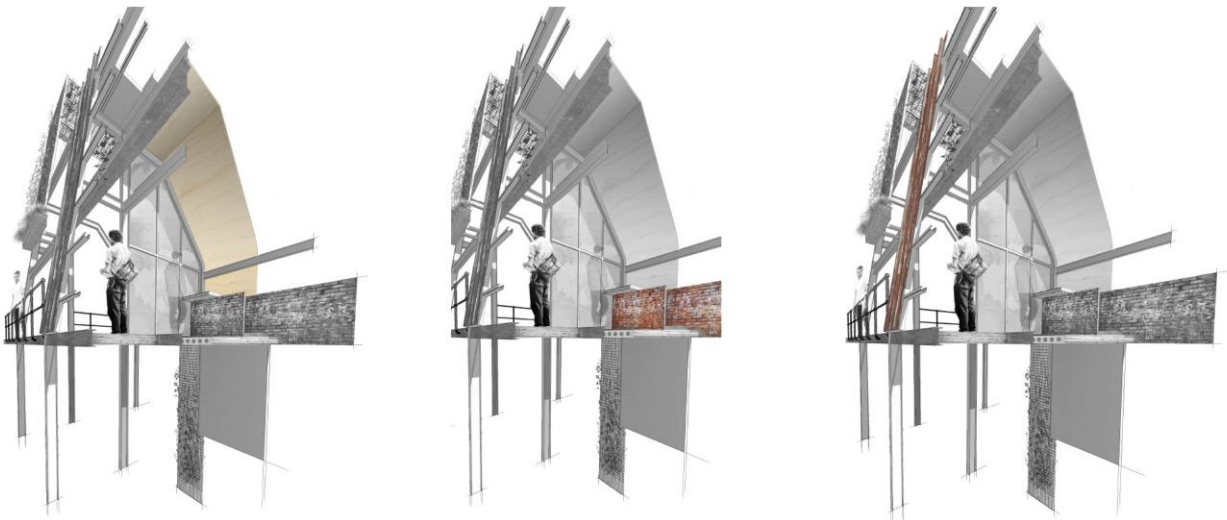
## [ tectonic materiality ]

The proposed architecture also expresses this relationship in the way in which infrastructure and architecture are accommodated simultaneously, how infrastructure and architecture are expressed through the way the in which each component is assigned an aesthetic role. The role of stereotomic as consistent through time and the role of the tectonic as adaptable and the flexible. The materiality of existing buildings within the context of Brown Street demonstrate an aesthetic dimension to these roles.


*"The process of entropic decay communicated in the layering of change over time"*

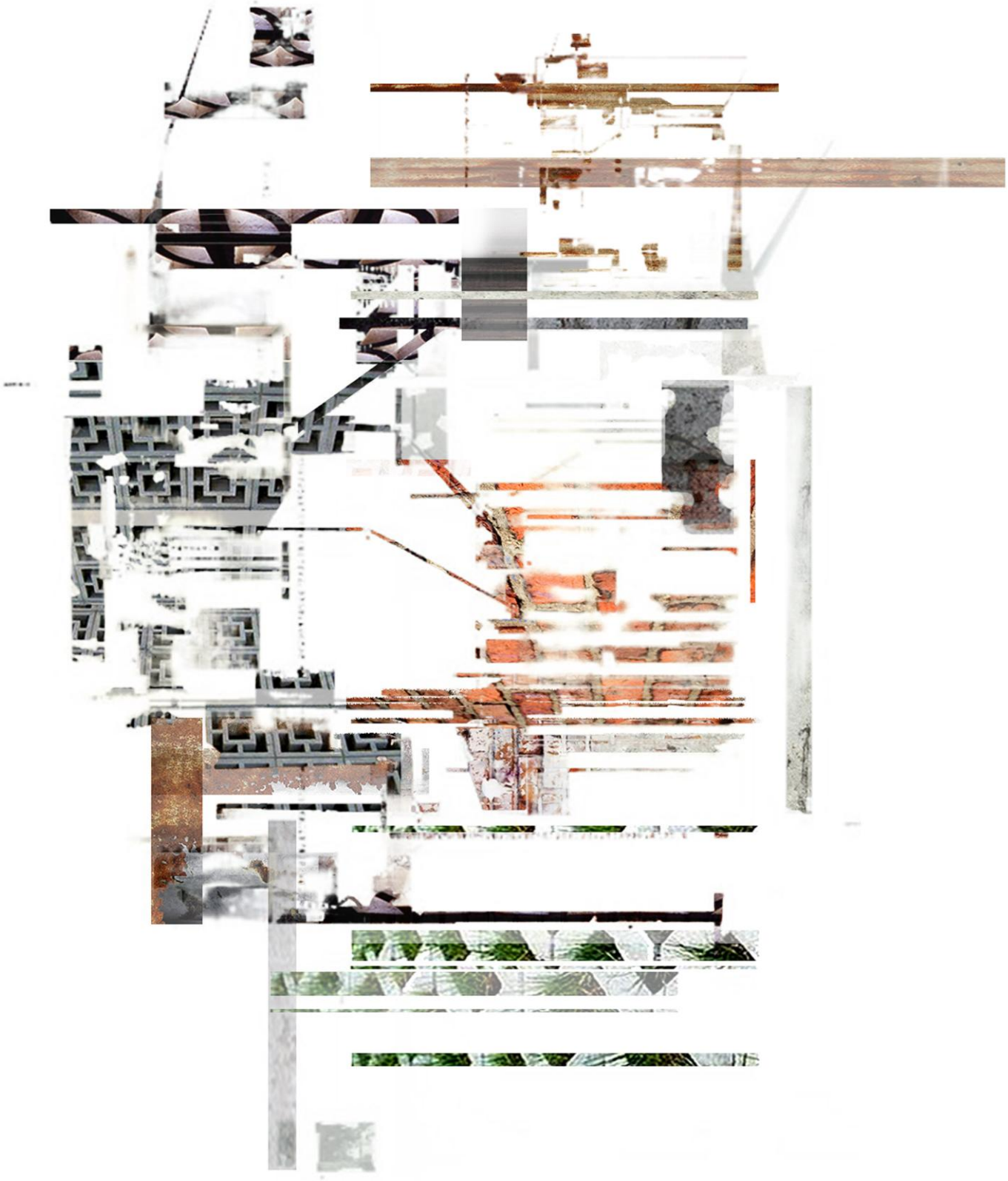
(Woods, 2012)

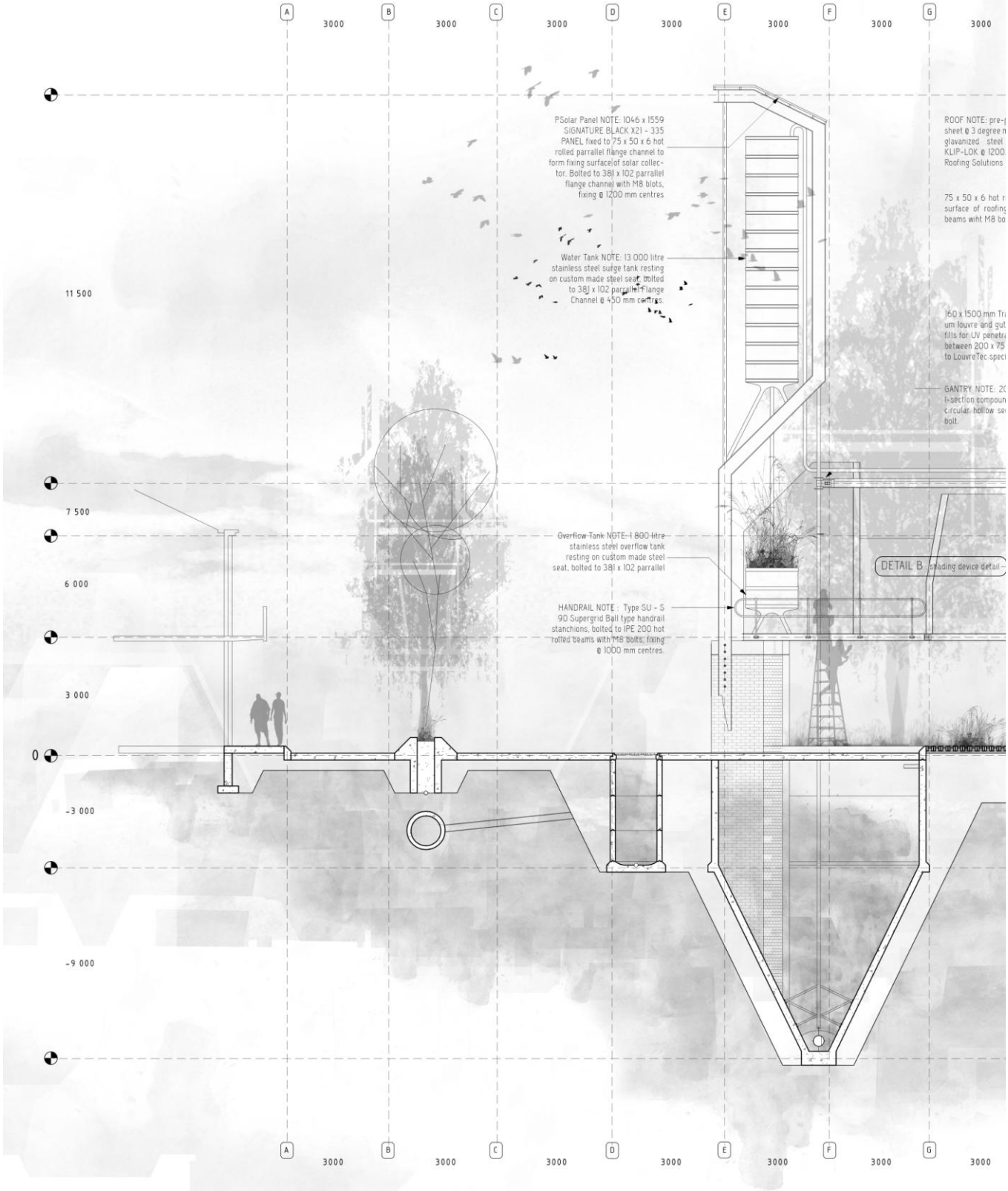


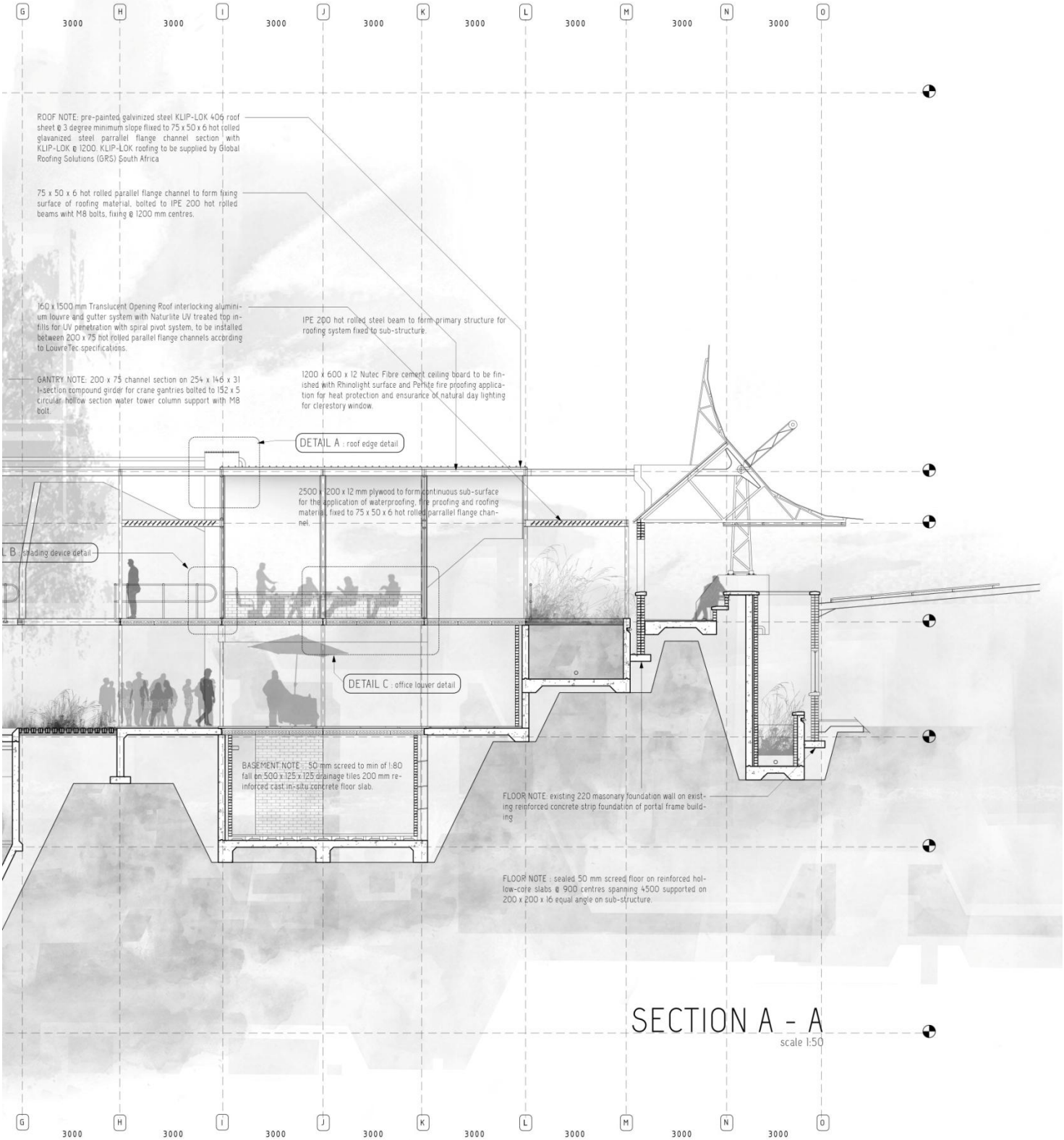



# MATERIALITY

*STEREOTOMIC (EARTH) = MASSING : BRICK ON CONCRETE BASE*
*TECTONIC (FABRIC) = CHANGE AND DECAY : IBR ROOF SHEETING*

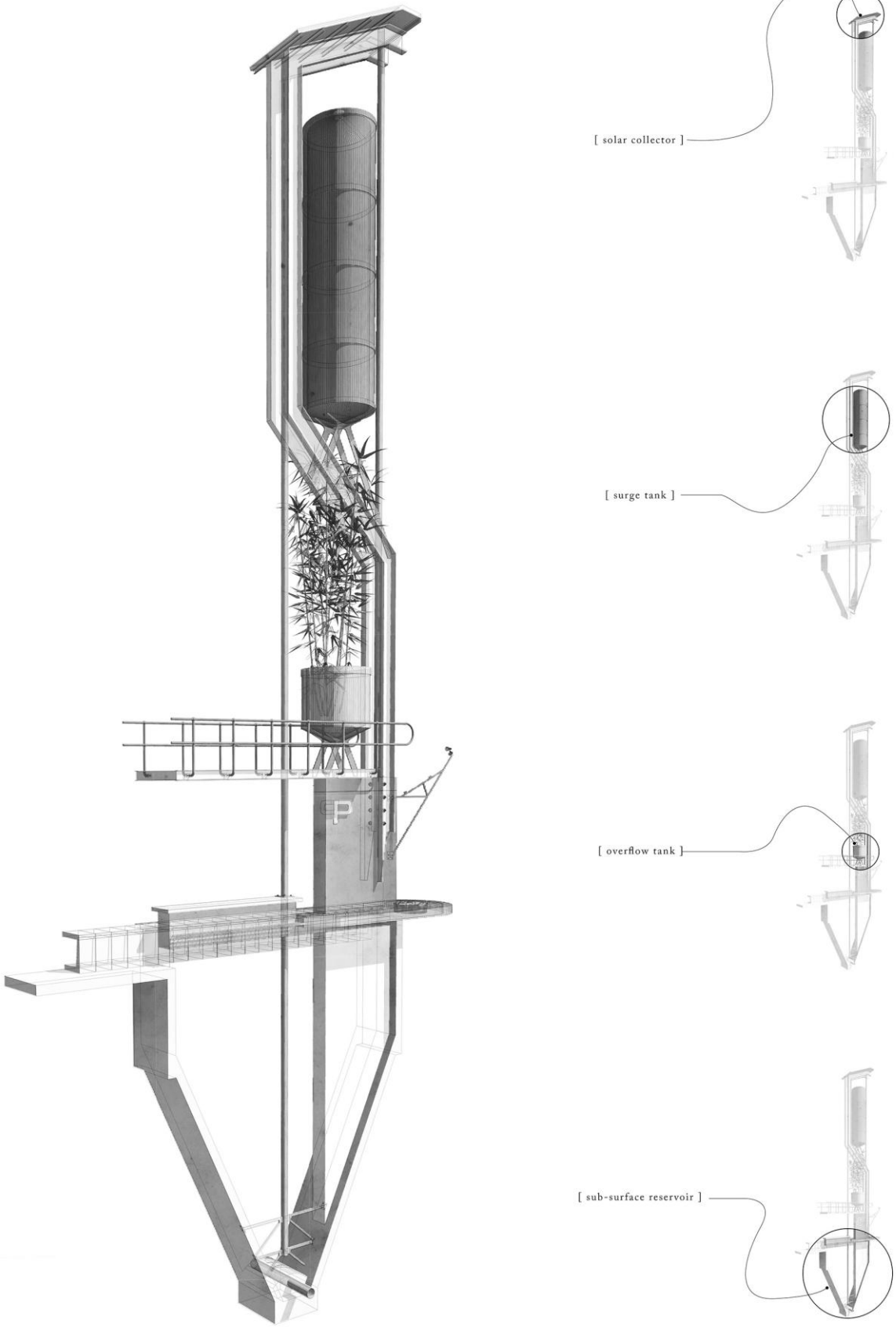






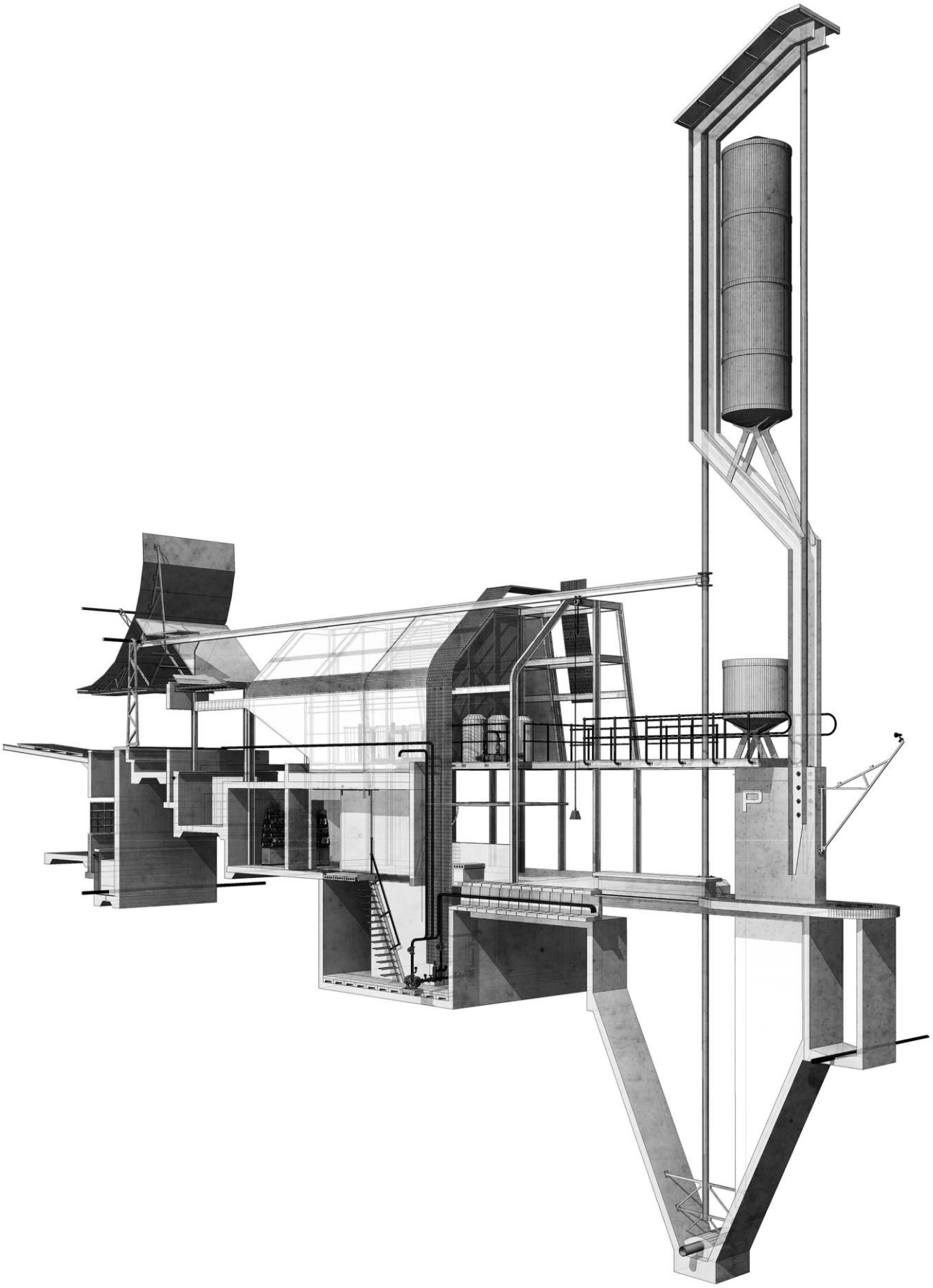

# SECTION A - A

scale 1:50



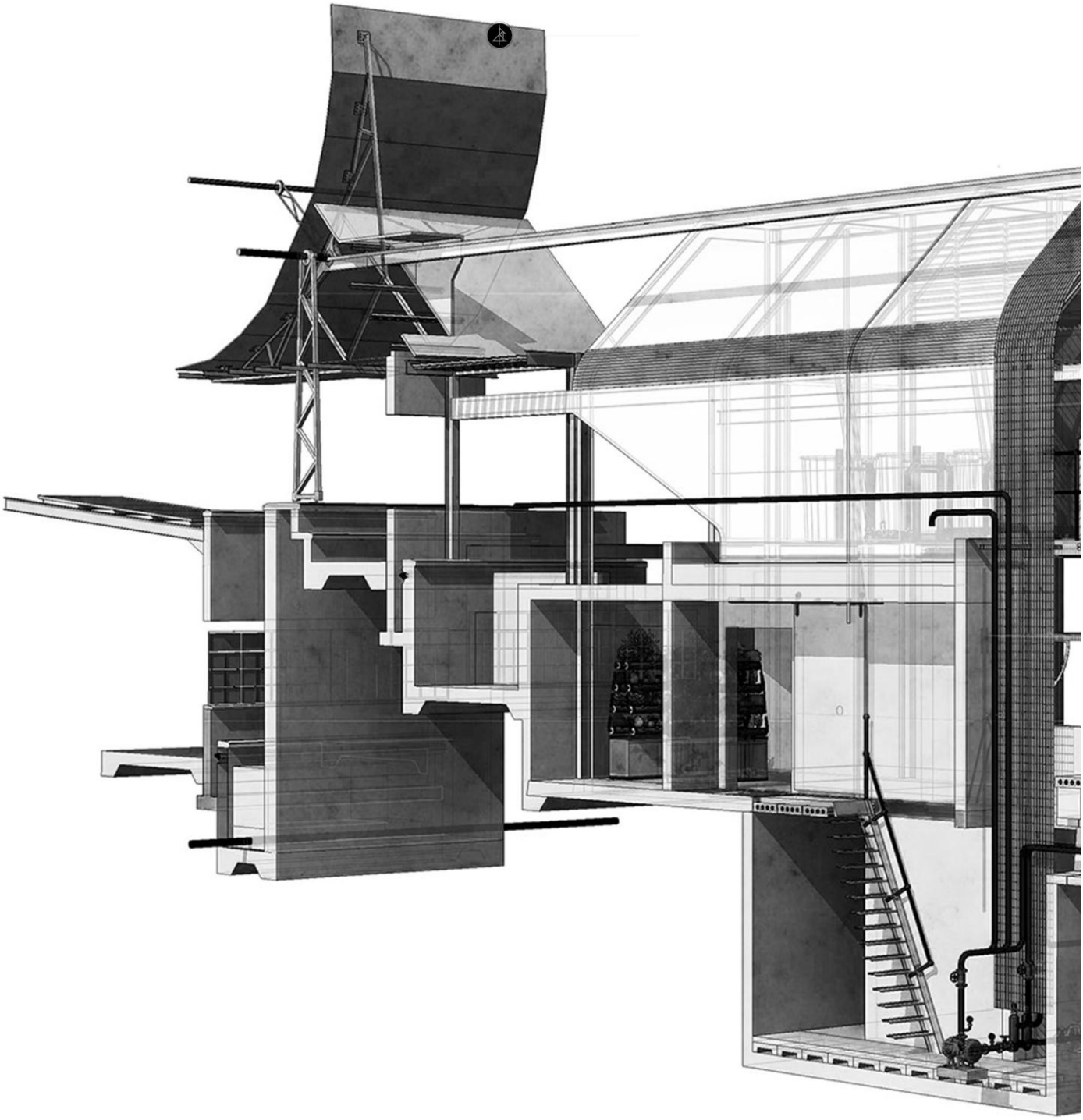

# BROWN STREET [infra]STRUCTURE

*- surge and overflow tanks as component of sub-surface water reservoir -*



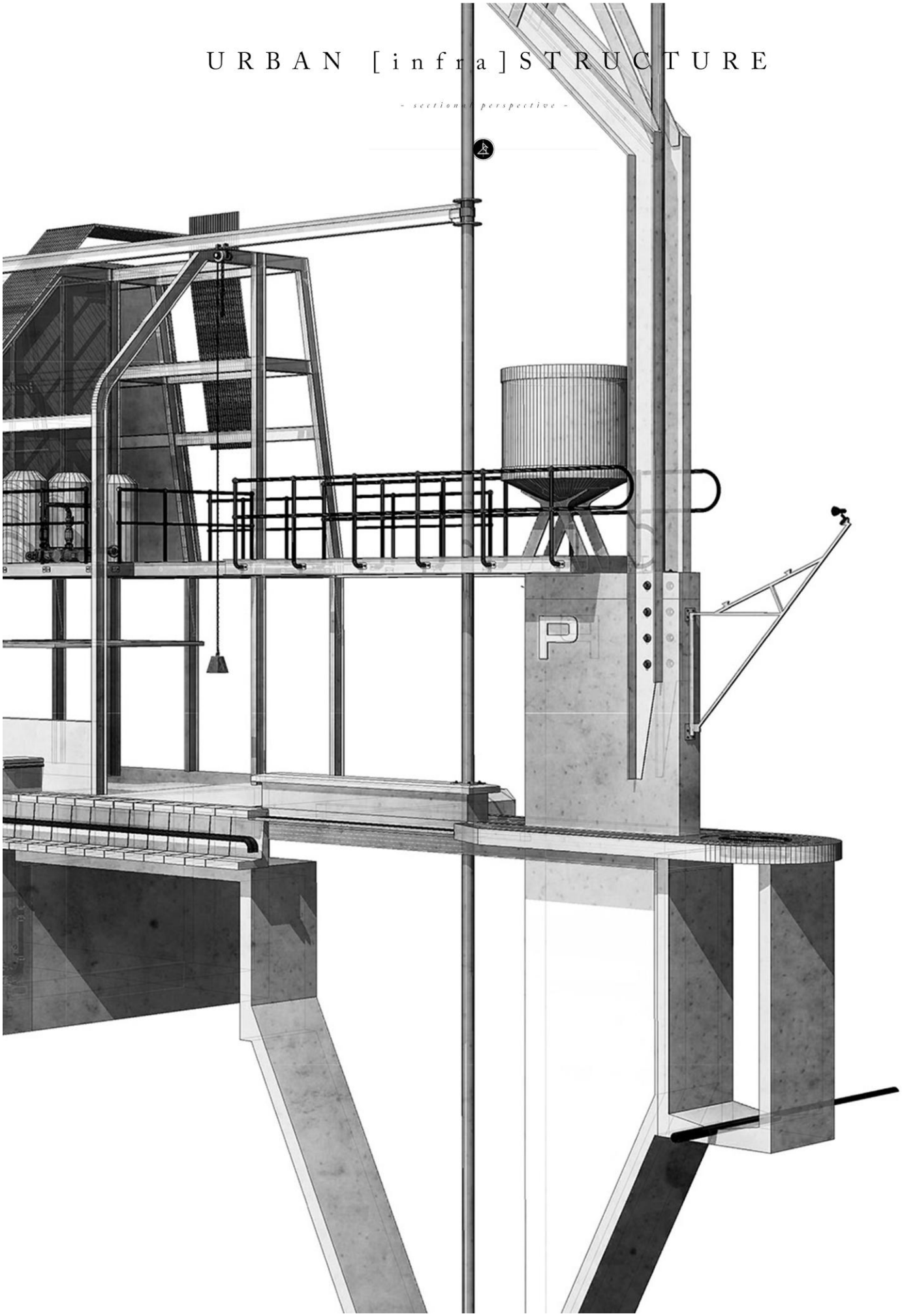
# U R B A N [ i n f r a ] S T R U C T U R E

*- sectional perspective -*



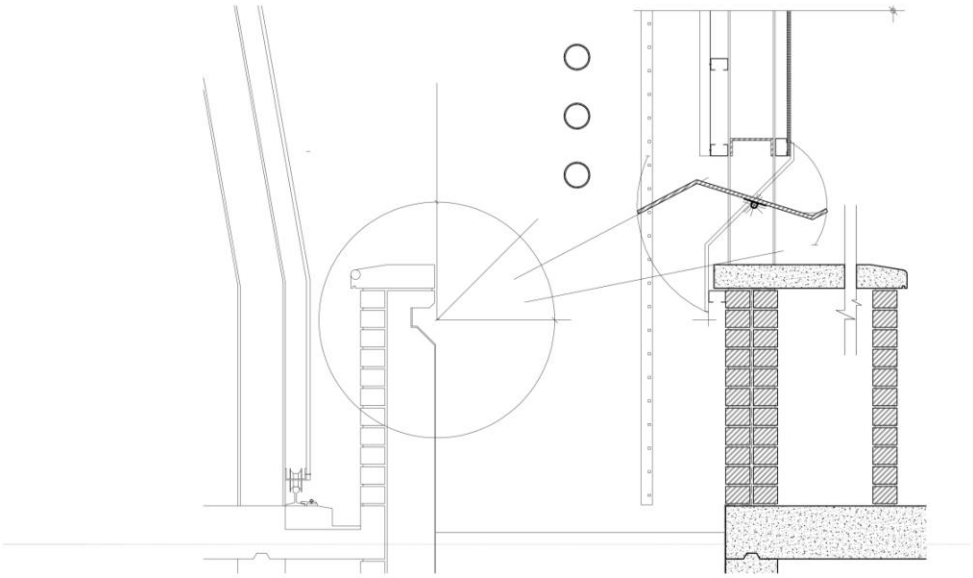
# U R B A N [ i n f r a ] S T R U C T U R E

*- sectional perspective -*



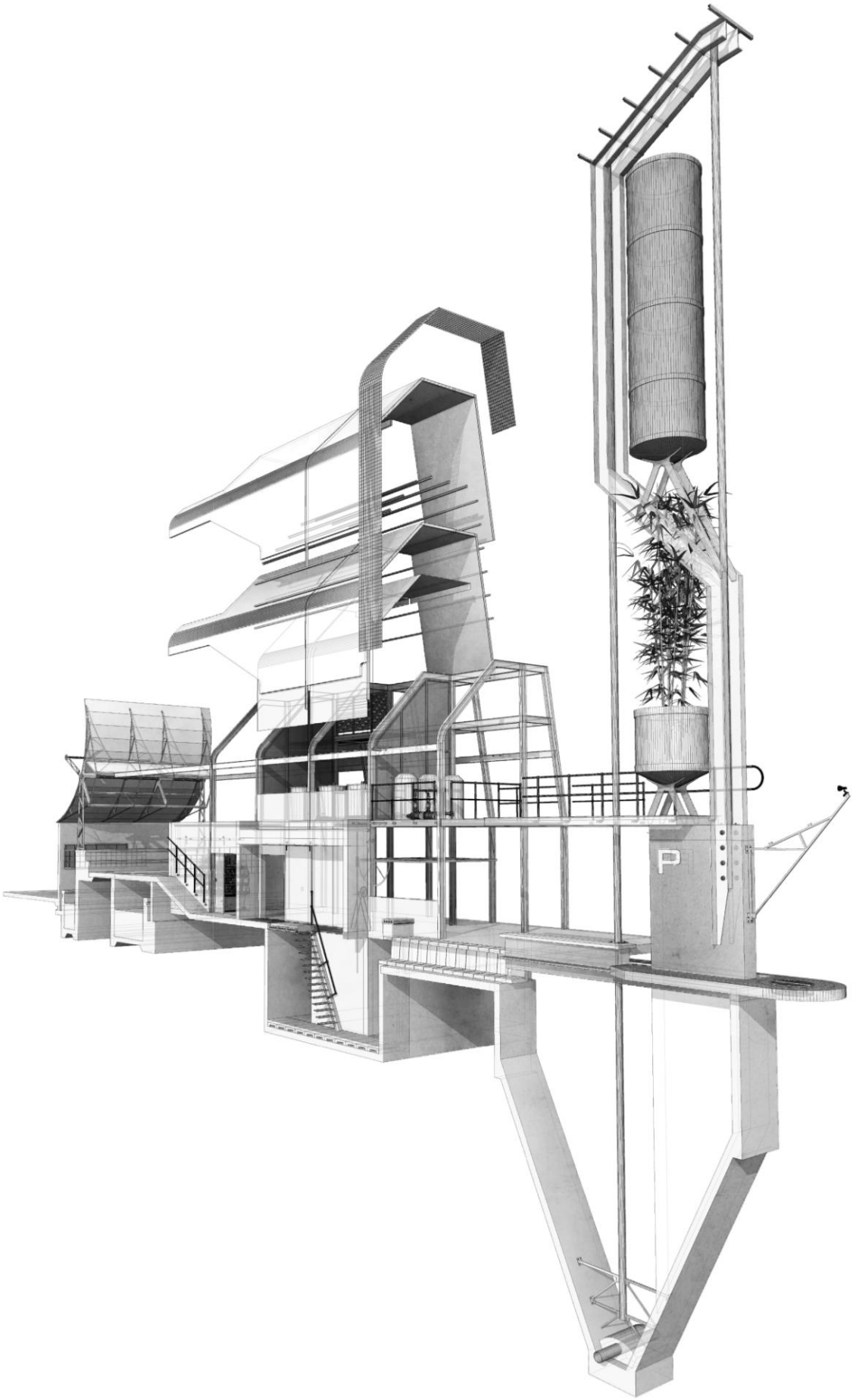
# STEREOTOMIC AND TECTONIC

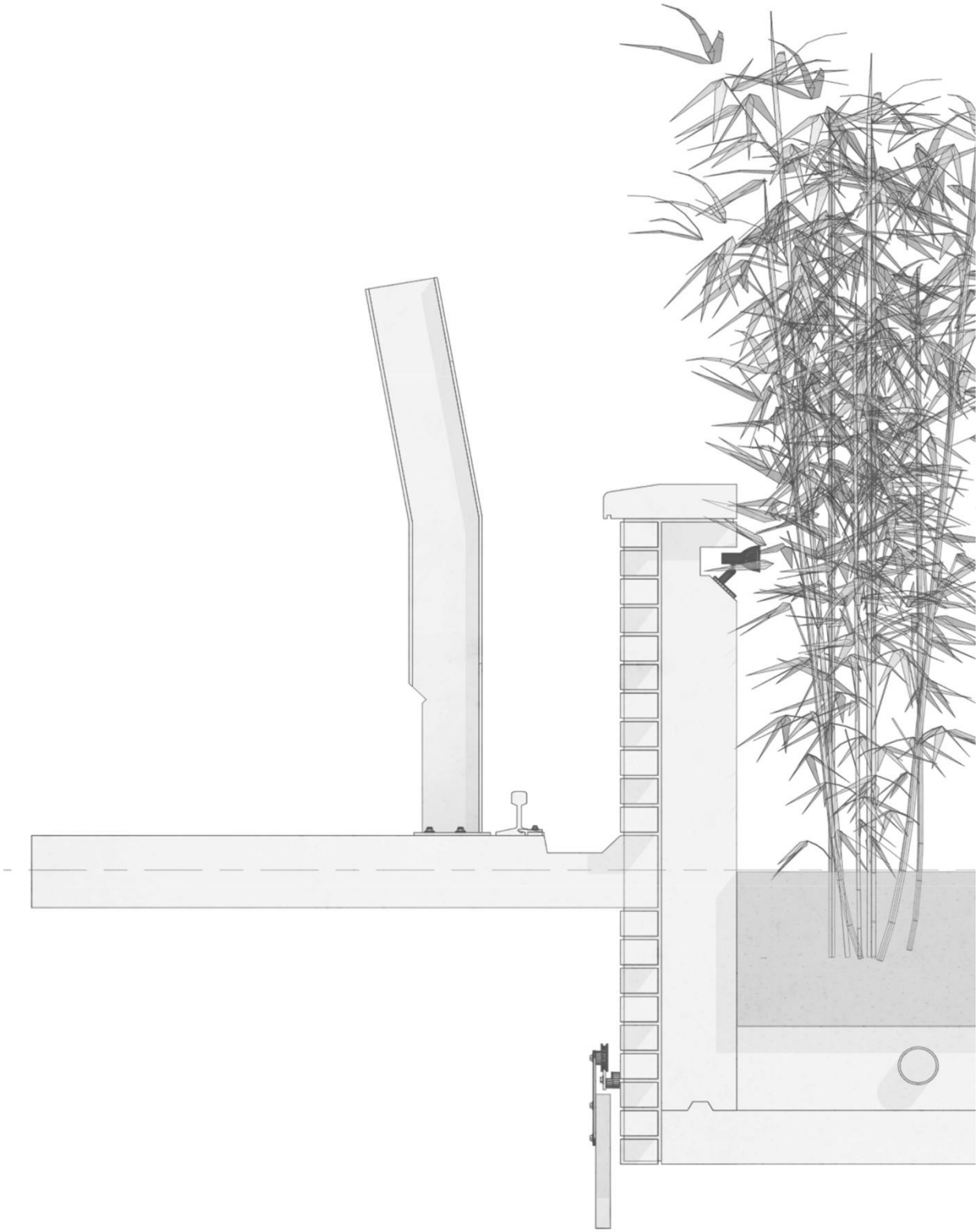
*- POETIC design of FUNCTIONAL components -*



# URBAN [ infra] STRUCTURE

*- exploded tectonic -*





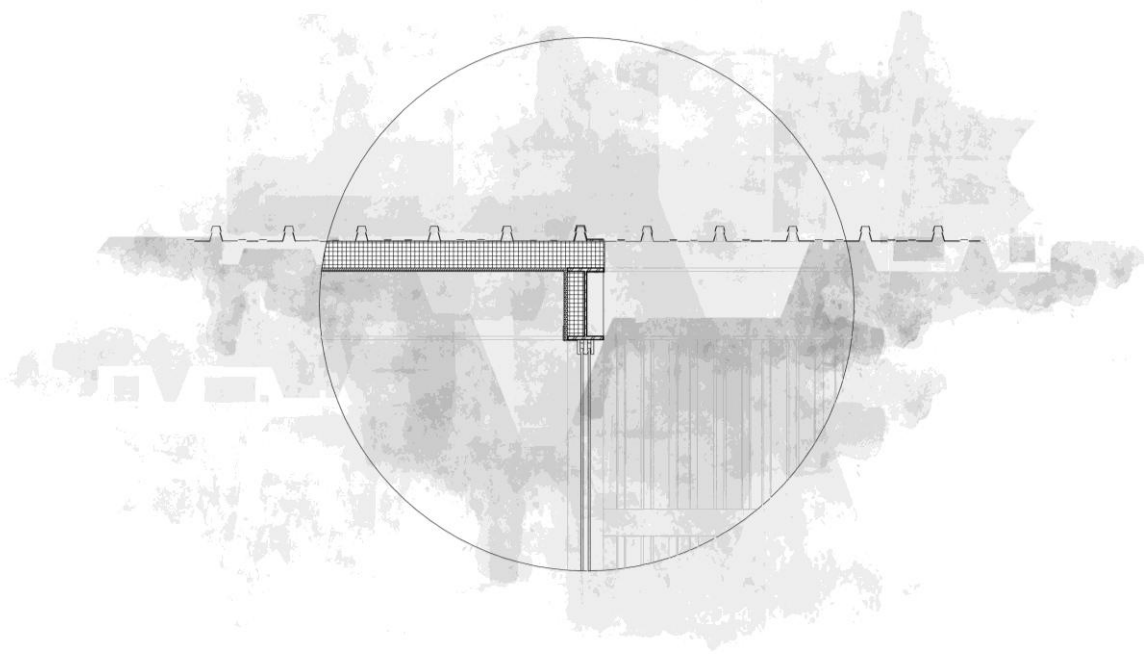


**Figure 8.31:** DETAIL A: DETAIL illumination of (TECTONIC) ROOF DETAIL. (Author, 2015).

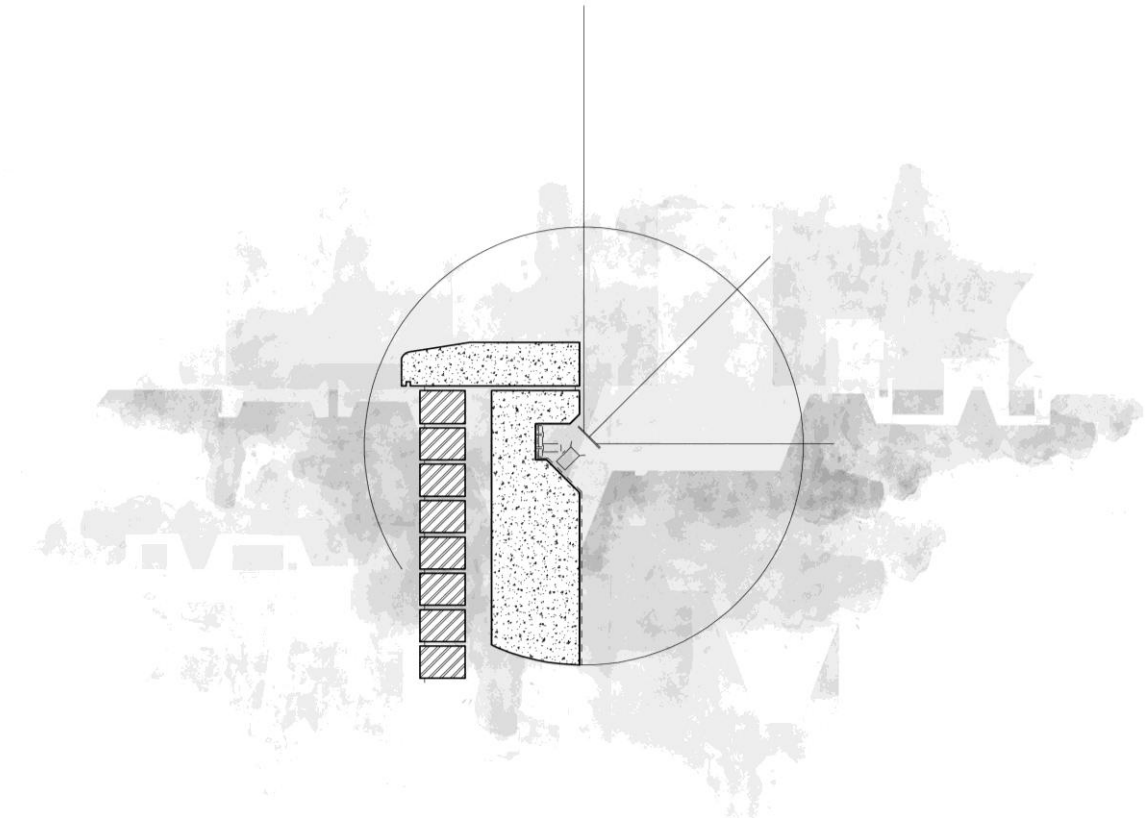
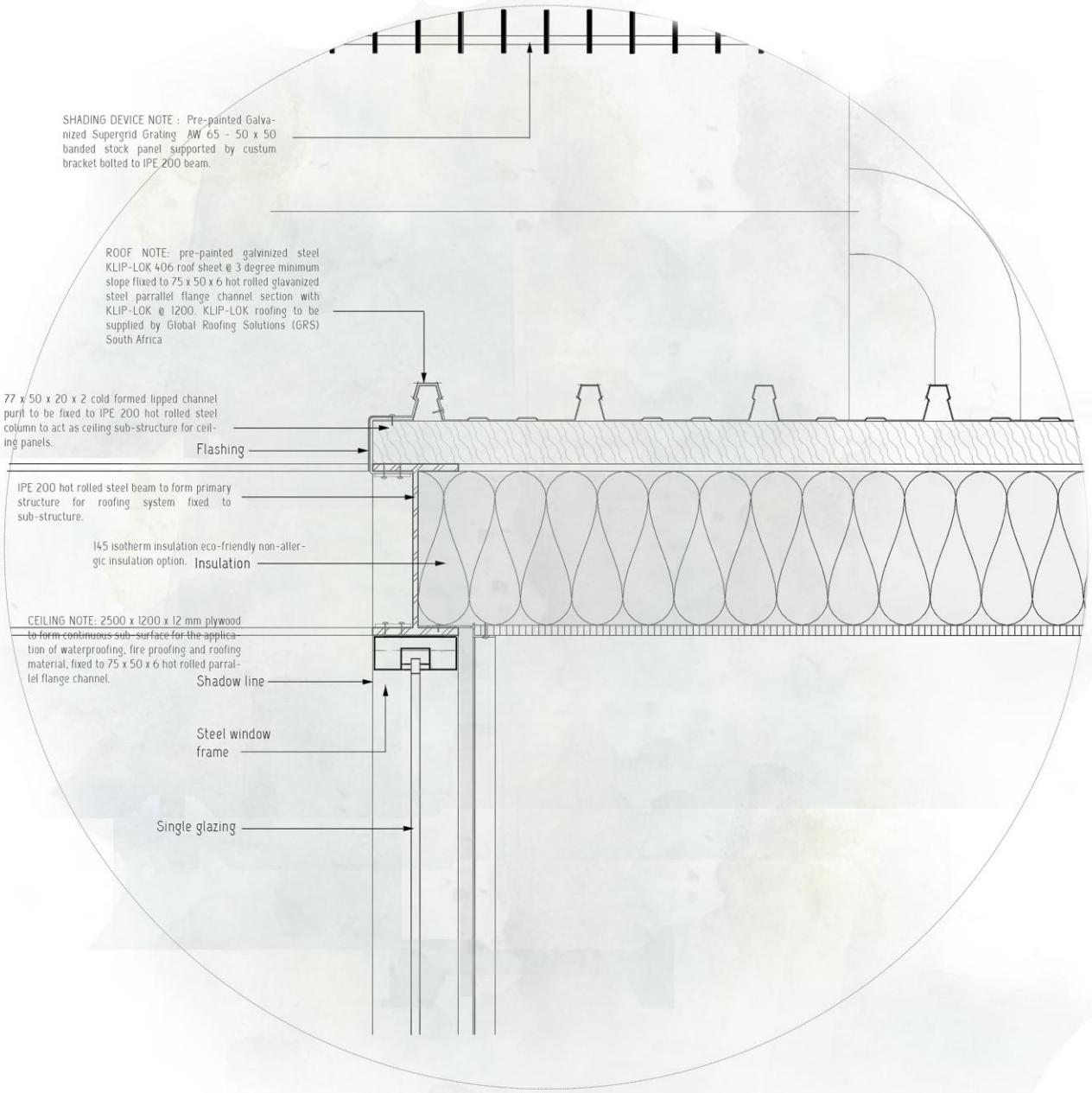


**Figure 8.31:** DETAIL B: DETAIL illumination of (STEREOTOMIC) water basin LIGHTING. (Author, 2015).

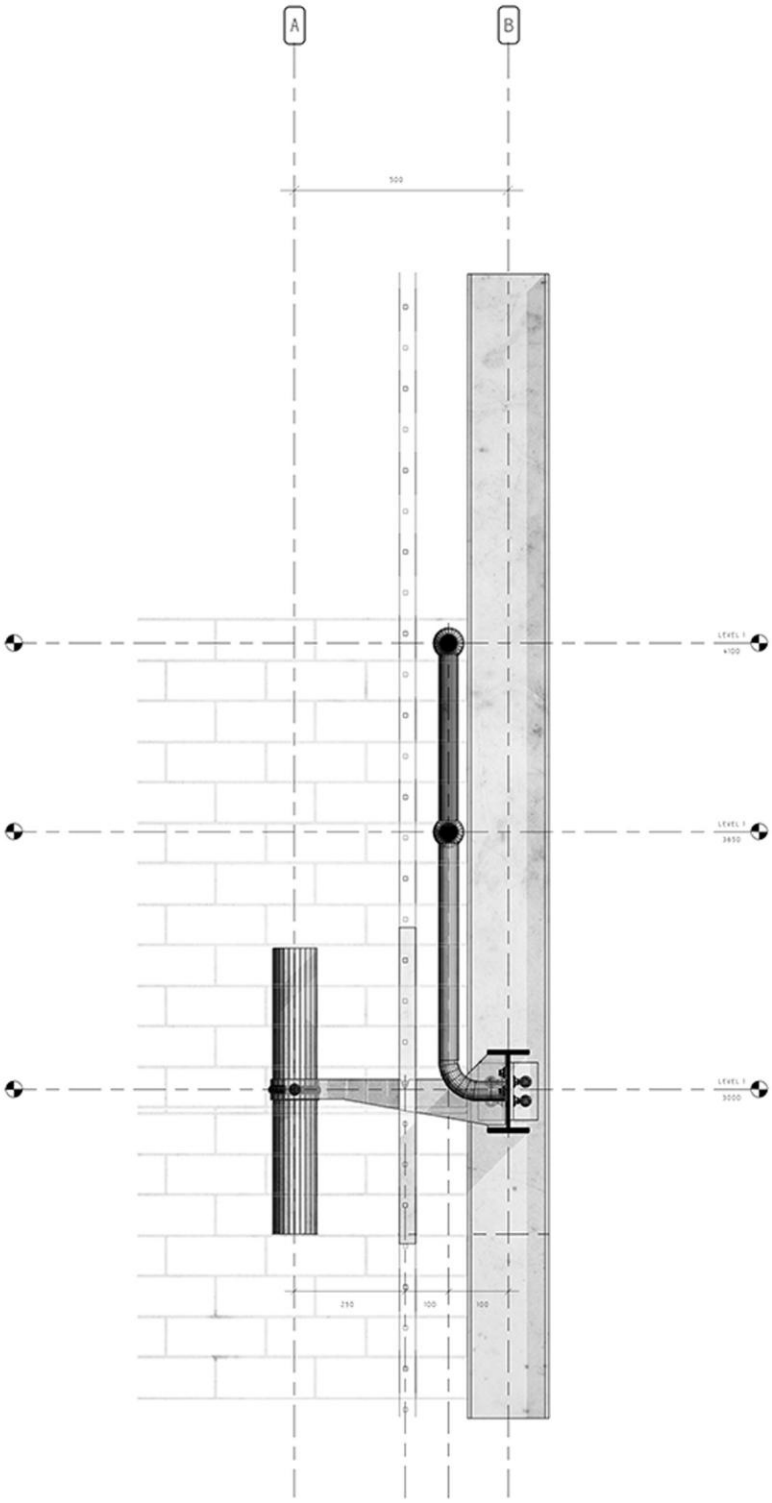



# ROOF DETAIL

*Scale 1:5*

# MENTIS GRATING SHADING DEVICE

*- the design of regenerative components -*

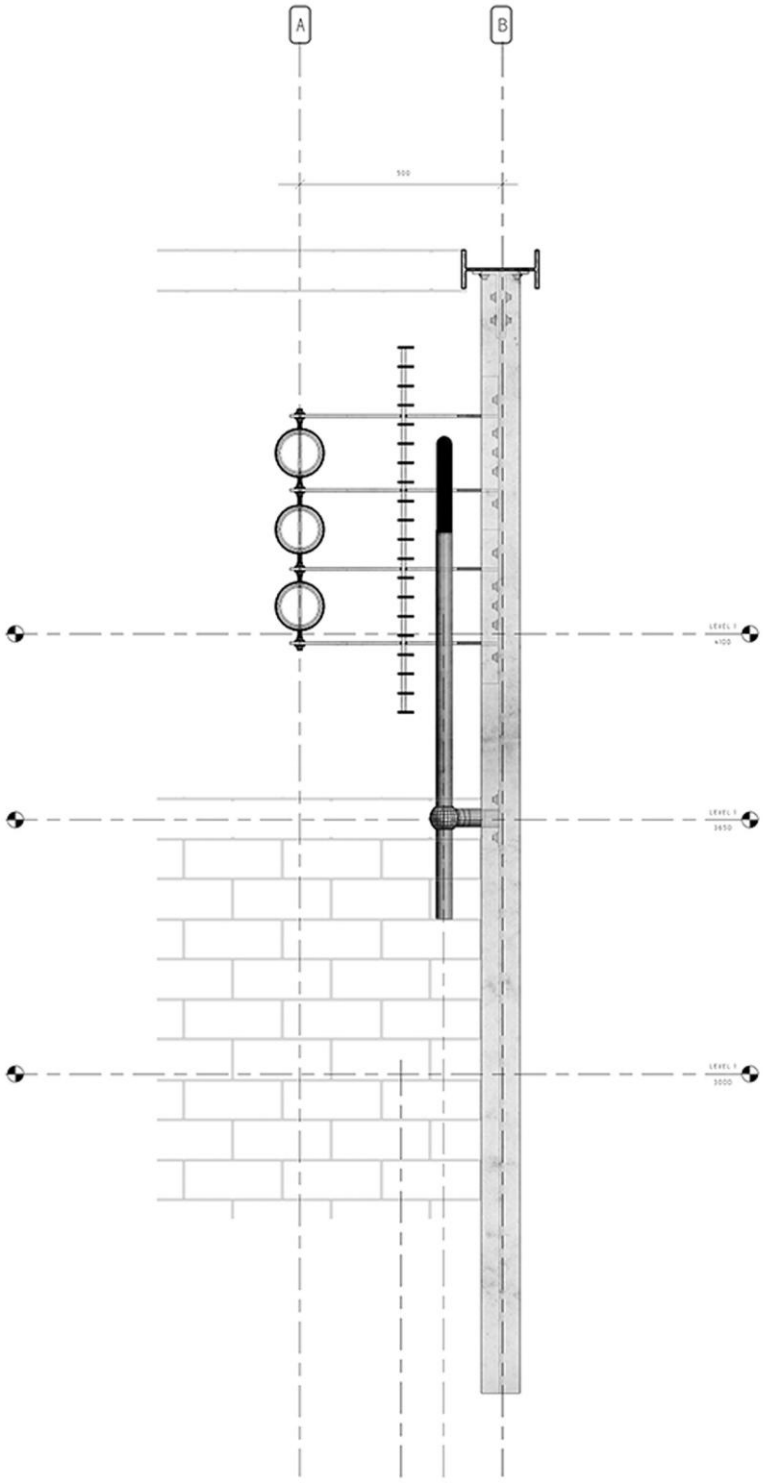



DETAIL B : VERTICAL SECTION

Scale 1 : 10

# MENTIS GRATING SHADING DEVICE

*- the design of regenerative components -*

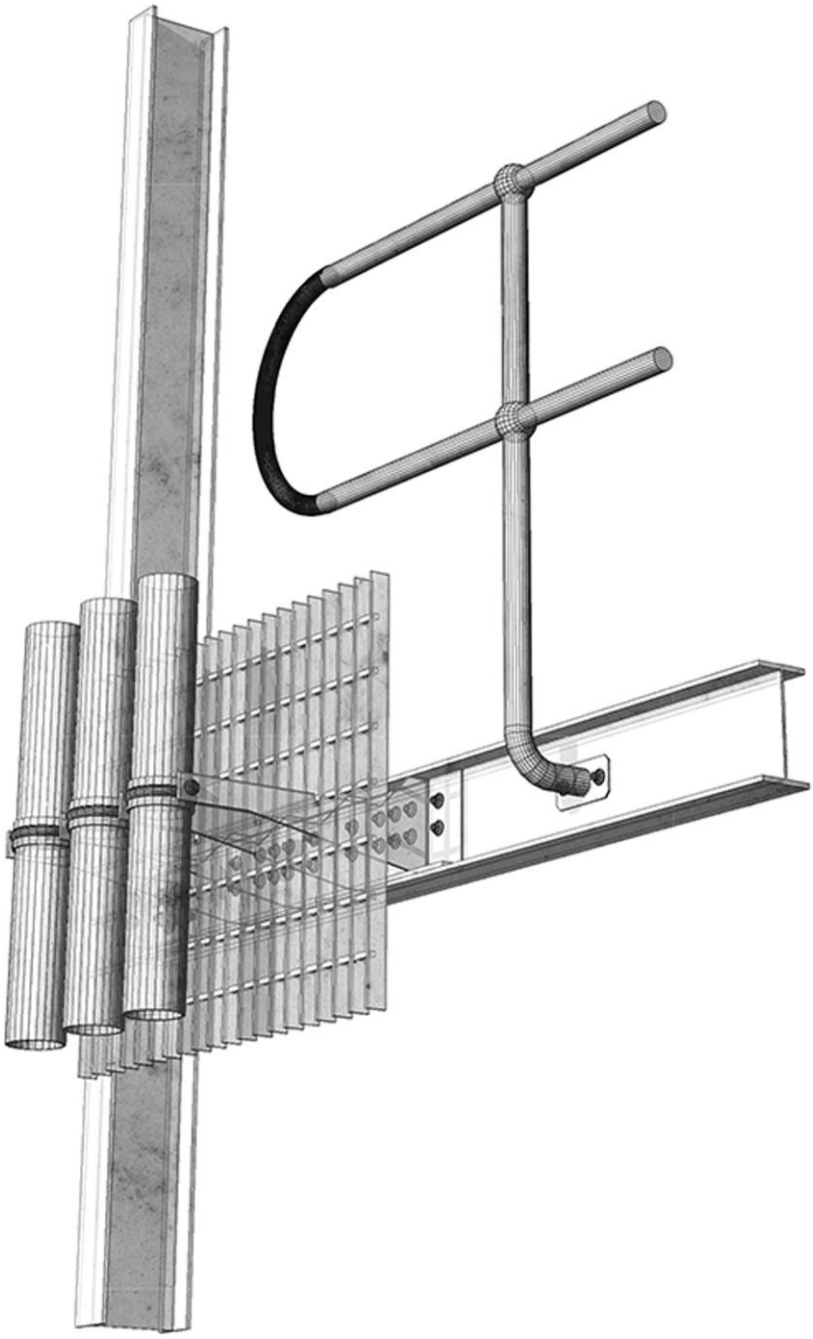



DETAIL B : HORIZONTAL SECTION

Scale 1 : 10

# MENTIS GRATING SHADING DEVICE

*- the design of regenerative components -*



DETAIL B : PERSPECTIVE

Scale 1 : 10

USER SIDEWALK WATER CHANNEL PERSPECTIVE

USER GREEN HOUSE LOUVER DETAIL PERSPECTIVE

# 07|7

[ SBAT analysis ]

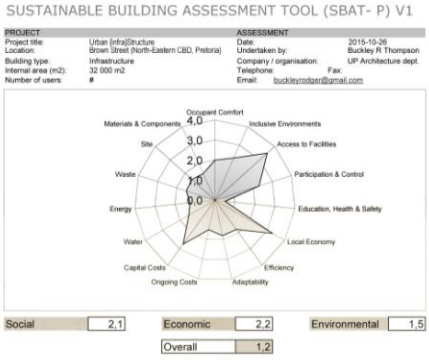
SBAT ANALYSIS

[ A comparative study ]

In order to compare the effect of the proposed infrastructure on the site in terms of sustainability the SBAT analysis tool was utilized. The diagrams illustrate this comparison. The study has made it evident that numerous social, economic and environmental issues have been improved by the proposed [infra]structure.

The areas that show the most improvement are capital costs, energy, waste, materials and components, occupant comfort, inclusive environments, participation and control. Improvements were successfully achieved by reusing salvaged and reclaimed structural components and raw materials available on site resulting from the demolition of non-contributively buildings.

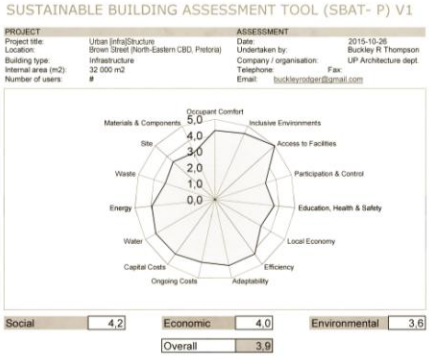
By using appropriate natural ventilation strategies and environmental control, passive water heating and effective water management systems are the factors which contribute significantly to the im-


SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1

| PROJECT | | ASSESSMENT | |
|---|---|---|---|
| Project title: | Urban [infra]Structure | Date: | 2015-10-26 |
| Location: | Brown Street (North-Eastern CBD, Pretoria) | Undertaken by: | Buckley R Thompson |
| Building type: | Infrastructure | Company / organisation: | UP Architecture dept. |
| Internal area (m2): | 32 000 m2 | Telephone: | Fax: |
| Number of users: | # | Email: | buckleyrodger@gmail.com |



| Social | 2,1 | Economic | 2,2 | Environmental | 1,5 |
|---|---|---|---|---|---|
| | | Overall | 1,2 | | |


SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1

| PROJECT | | ASSESSMENT | |
|---|---|---|---|
| Project title: | Urban [infra]Structure | Date: | 2015-10-26 |
| Location: | Brown Street (North-Eastern CBD, Pretoria) | Undertaken by: | Buckley R Thompson |
| Building type: | Infrastructure | Company / organisation: | UP Architecture dept. |
| Internal area (m2): | 32 000 m2 | Telephone: | Fax: |
| Number of users: | # | Email: | buckleyrodger@gmail.com |



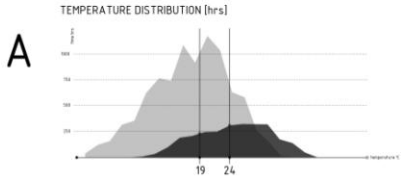
| Social | 4,2 | Economic | 4,0 | Environmental | 3,6 |
|---|---|---|---|---|---|
| | | Overall | 3,9 | | |

*SBAT spreadsheet result comparison. Before(top) and After (below).*

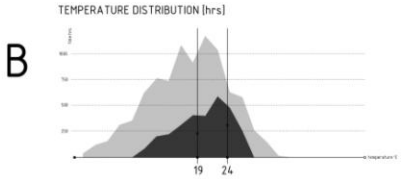
# 07|6

[ Ecotect ]

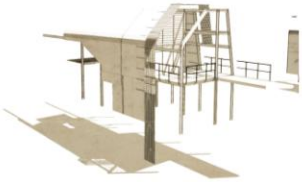
Office Component

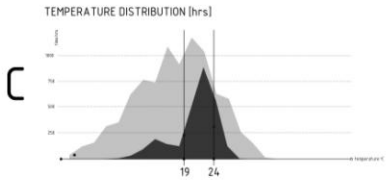



A 31%




B 49%






C 74%

*photographic illustration of center pumpidou services and resultant space making*

# CONCLUSION

In conclusion the initial intention of the creation of a machine resulted in the design of Urban [infra]Structure. Regenerative infrastructure which through the way in which it harvests and treats water, facilitates the creation of space. Therefore, the design of infrastructural architecture.

# RESULTS

*[ book ]*

CPD 810 : 80%

*[ design ]*

DPD 801 : 81%

*[ technical ]*

DIT 801 : 79%

YEAR AVERAGE:

# 80%

- END -