FORGOTTEN SPACE

Constructing a relationship between the confluence of Architectural and Infrastructural space

By

Jean-David de Villiers

Submitted in the fulfilment of part of the requirements for the degree Master of Architecture (00) in the Faculty of the Engineering, Built Environment and Information Technology University of Pretoria

November 2019

Course Coordinator: Prof. Arthur Barker

> Study Leader: Jan Hugo

PROJECT SUMMARY

Programme /

Neighbourhood Library, service centre, public markets

Site Description /

Northern boundary of railway line, west of Doornfontein station, Located South of IH Harris primary school.

Site Location

Doornfontein Station, Johannesburg

GPS Coordinators

25 °11'49" S; 28 °03'10"

Research Field

Environmental Potential/Human Settlements and Urban Environments

Theoretical Premise

Regenerative and placemaking, focussing on non-place created by the remnants of the railway infrastrucutre.

Architectural Approach

Finding a relationship between people, place and existing infrastructure

ACKNOWLEDGEMENT

Jan Hugo,

Thank you for all your guidance, patience and encouragement during this year.

Prof. Arthur Barker,

Thank you for giving me this great oppertunity to complete my dissertation.

My friends,

Jaco, Tian, Ali - Thank you for all the encouragement and support over the years.

My uncle and aunt,

Oom Lourens en tannie Karien, dankie vir al julle bydra en dat julle altyd belangstel en glo in my ambisies.

My sister,

Michelle, dankie vir al die bydra wat jy gemaak om hierdie jaar moontlik te maak.

My parents,

Dankie vir al die jare se ondersteuning, geduld en bydrae wat julle gemaak het om my drome te bereik. Ma, dankie vir alles.

DECLARATION

In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertations and thesis, I declare that the thesis, which I hereby submit for the degree Master of Architecture [Professional] at the University of Pretoria, is my own work and has not been submitted by me for a degree at this or any other tertiary institution.

I further state that no part of my thesis has already, or is currently being submitted for any such degree, diploma or other quilification.

I further declare that the thesis is substantially my own works. Where reference is made to the work of other, the extend to which that work has been used is indicated and fully acknowledged in the text and list of references.

Jean-David de Villiers



ABSTRACT

Our modern urban environments consists of a complex system of interrelated infrastructures that give structure and order to our daily lives. The implementation and organization of these multi-layered elements has the ability to influence the daily rituals of society in a positive or negative manner.

The industrial revolution marked the beginning of a new technological era at the start of the twentieth century that inspired great technological innovations across various disciplines within the built environment. The modern ideals that were developed during this era embraced technology as a means to solve the issues associated with the rapid growth within cities, especially to allow for the movement of people over vast territories as the city dispersed outwards. However good the implementation of these new infrastructural networks were to connect people, it often neglected the immediate spatial conditions of the urban environment as it cuts through the fabric of the city.

These spaces have become disconnected, uncertain empty voids that do not contribute to the formation of the city. Such is the case of Johannesburg, where the railway line has created a definitive scar in the landscape that resulted in a series of barriers and isolated spaces along its edges, disconnecting people and places.

The dissertation offers a contribution to the contemporary discourse of architecture which is greatly concerned with the existance of lost space within our urban environments. It grapples with the issues associated with non-place, the construction of place and the relationship between infrastructural space and architectural space.

The project investigates the various issues that gives expression to lost space and non-place. Theories regarding place and place making are investigated through the lens of regenerative design in order to understand place and formulate an approach to the project.

Other theories regarding place making, such as legibility – especially the idea of edges and paths are investigated to formulate an approach that can contribute towards the design of place. The program of a neighbourhood library is envisioned for the site to contribute to the idea of place making and is used as a pragmatic device to mediate between the conflicted programmes of the existing train station and school on site.

The architectural response aims to construct place in a non-place by creating a series of spatial condition to connect people, places and infrastructure with the intention to allow for a more integrated relationship between infrastructural space and architectural space within the context of Doornfontein, Johannesburg.

LIST OF FIGURES

- Figure 1-01: Context of Johannesburg illustrating the ralway infrastructure dividing the urban fabric (Author, 2019).
- Figure 1-02: General issue (Author, 2019).
- Figure 1-03: Urban issue (Author, 2019).
- Figure 1-04: Architectural issue (Author, 2019).
- Figure 1-05: Dissertation approach and structure (Author, 2019).
- Figure 2-01: Bionic man, man as part of a mechanical world view (Hes and du Plessis, 2015)
- Figure 2-02: The modern idea of linear technological 'progress' through technological and infrastructural systems (Graham and Marvin, 2001: 48)
- Figure 2-03: Plan Voisin, proposal done by Le Corbusier in 1925 for the redevelopment of Paris showing isolated towers in the landscape (Graham and Marvin, 2001).
- Figure 2-04: A illustration for the invitation of the Winter 2011, University of Michigan Taubman College. The studio aimed to investigate alternative ways to redifine the monofunctional nature of the highways into a productive urban system (Hwang & Moon, 2011).
- Figure 2-05: Artist impression of Safavid-era Ishfan Described as the pinnacle of the garden cities characterised with harmoniously-designed pavilions and spacious throughfares (AJAM Media Collective 2012).
- Figure 2-06: Leon Krier on legibility: Krier illustrates the legibility of the environment by a series of layers that give structure to the city (https://www.architectural-review.com/leon-krier-on-sustainable-urbanism-and-the-legible-city/8659343.article).

- Figure 3-01: Diagram illustrating the concept of living systems as part of a larger network in which it is nested (Author, 2019).
- Figure 3-02: Diagram illustrating the concept evolution as a result of interacting elements and the exchanges between them (Author, 2019).
- Figure 3-03: Diagram illustrating the concept of regeneration as a nested system consisting of place, vocation and evolution (Author, 2019).
- Figure 3-04: Diagram illustrating the power of 10 (https://www.pps.org/article/the-power-of-10).
- Figure 3-05: Qualities of successful public places (https://www.pps.org/article/grplacefeat).
- Figure 3-06: Elements to construct the image of the environment (Lynch, 1960)
- Figure 3-07: Grading of edge conditions (Gehl, Johansen Kaefer and Reigstad 2006:40)
- Figure 3-08: Theoretical summary and continuum of Architectural discourse
- Figure 4-01: Aerial view of JHB and study area (Author, 2019)
- Figure 4-02: Figure ground of JHB illustrating railway line and site location (Author, 2019)
- Figure 4-03: Reason for lost space (Author, 2019).
- Figure 4-04: Johannesburg timeline (Author, 2019).
- Figure 4-05: Johannesburg 1886, early farms showing Doornfontein towards the west
- Figure 4-06: Johannesburg early mining camps, 1886
- Figure 4-07: Johannesburg, constructing the railway line (SA History online).
- Figure 4-08: Historical map of Johannesburg, 1902 showing grid layout (SA History online).

- Figure 4-09: Early mansions in Doornfontein
- Figure 4-10: Early Doornfontein farmland
- Figure 4-11: Aerial photograph before UJ, ()
- Figure 4-12: Google earth image showing UJ today, (Google earth, 2019)
- Figure 4-13: Macro analyses infrastructure and districts (Author, 2019)
- Figure 4-14: Macro analyses Permeability within districts (Author, 2019)
- Figure 4-15: Macro analyses Railway line sunken, level and elevated (Author, 2019)
- Figure 4-16: Macro analyses Movement, Social and cultural places (Author, 2019)
- Figure 4-17: Macro analyses Aeiral view of identified places of value within Johannesburg (Author, 2019)
- Figure 4-18: The Seam and the spine framework proposal by Newtown Landscape Architects (https://www.newla.co.za/projects/johannesburg_inner_city_park.php, 2019)
- Figure 4-19: The Seam and the spine framework proposal by Newtown Landscape Architects (https://www.newla.co.za/projects/johannesburg_inner_city_park.php)
- Figure 4-20: Urban Framework proposal (Author, 2019)
- Figure 4-21: Photo of the railway line on site (Author, 2019)
- Figure 4-22: Figure ground of Johannesburg showing position of site(Author, 2019)
- Figure 4-23: Site location (Author, 2019)
- Figure 4-24: Site analyses Zoning surrounding site (Author, 2019)
- Figure 4-25: Old nedbank building adapted to mixed use social housing (Author, 2019)

- Figure 4-26: Old industrial buildings south of the railway line (Author, 2019)
- Figure 4-27: Site Analyses Decay, New and adapted buildings (Author, 2019)
- Figure 4-28: Abandoned building north of the railway line
- Figure 4-29: Residential building north of railway line
- Figure 4-30: New mixed use development on Davies street (South)
- Figure 4-31: Site analyses Barriers, movement and access (Author, 2019)
- Figure 4-32: Site analyses Nugget street bridge over Noord street and railway line, accessed by staircase. (Author, 2019)
- Figure 4-35: Site analyses Station Access on the pedestrianised Currey street, providing access to station and Davies street (Author, 2019)
- Figure 4-33: Site analyses End street mall entrance, allowing access to Davies street and station (Author, 2019)
- Figure 4-36: Staircase and ramp access to station on Currey street (Author, 2019)
- Figure 4-34: Site analyses Station staircase on Davies street. (Author, 2019)
- Figure 4-37: Staircase access to station from the station plaza (Author, 2019)
- Figure 4-38: Site analyses Aerial view looking west of identified lost spaces (Author, 2019)
- Figure 4-39: Site analyses Plan view of identified lost spaces, movment and access points (Author, 2019)
- Figure 4-41: Site analyses Section through Noord street (Author, 2019)
- Figure 4-40: Site analyses Zone 1 key plan (Author, 2019)

- Figure 4-42: Site analyses Section through end street, illustrating active and inactive building edges and facades (Author, 2019)
- Figure 4-43: Site analyses Photo analyses of End street (Author, 2019)
- Figure 4-44: (Right) Site analyses Zone 2 key plan (Author, 2019)
- Figure 4-45: (Below) Site analyses Section through Zone 2 with existing buildings in elevation (Author, 2019)
- Figure 4-46: Site analyses Photo analyses of Zone 2 from entrance ramp to Currey street and End street park on the left (Author, 2019)
- Figure 4-47: Site analyses Photo analyses of Zone 2 from Nugget street bridge showing existing parking lot and buildings beyond (Author, 2019)
- Figure 4-48: Site analyses Key plan of Zone 3 (Author, 2019)
- Figure 4-49: Site analyses Section through Zone 3 (Author, 2019)
- Figure 4-50: Site analyses Photo analyses of Zone 3 from train station looking down (Author, 2019)
- Figure 4-51: Site analyses Photo analyses of Zone 3 showing dead edges and informal traders along the route (Author, 2019)
- Figure 4-52: Site analyses Key plan of Zone 4 (Author, 2019)
- Figure 4-53: Site analyses Section through Zone 4 (Author, 2019)
- Figure 4-54: Site analyses Photo analyses of Zone 4, showing the barrier between the station and school playground (Author, 2019)

- Figure 4-55: Site analyses Photo analyses illustrating existing school entrance on Davies street and dead end that prohibits access to the station beyond (Author, 2019)
- Figure 4-56: Site analyses Key plan of Zone 5 (Author, 2019)
- Figure 4-57: Site analyses Photo analyses, corner of Currev street and Buxton street showing empty plaza, defined by low density buildings with dead edges (Author, 2019)
- Figure 4-58: Site analyses Photo analyses, view from Sherwell st. Informal market structures with little activity (Author, 2019)
- Figure 4-59: Site analyses Photo analyses, looking west from station plaza, dead edges and low scale buildings define the plaza (Author, 2019)
- Figure 4-60: Site analyses outcomes Barriers diagram (Author, 2019)
- Figure 4-61: Site analyses outcomes Fabric in need of change or adaptation (Author, 2019)
- Figure 4-62: Site analyses outcomes Potential relation*ships within the context (Author, 2019)*
- Figure 5-01: The great library of Alexandra built in 283 BC (https://www.theapricity.com/forum/showthread. php?113730-The-Great-Library-at-Alexandria-was-de*stroyed-by-budget-cuts-not-fire*)
- Figure 5-02: Interior of Alexandra library as a social place (https://za.pinterest.com/pin/623256035904685025/?lp= true)
- Figure 5-03: Site plan of Library complex Kuyasa, Kayelitsha (Google earth, 2019)
- Figure 5-04: Model of library complex Kuyasa, Kayelitsha by CCNI
- Figure 5-05: Kuyasa, Ground floor plan (www.CCNI. co.za)
- *Figure 5-06: Kuyasa, First floor plan (www.CCNI.co.za)*

- *Figure 5-08: Kuyasa, Outdoor plaza (www.CCNI.co.za)*
- Figure 5-07: Kuyasa, Second floor plan (www.CCNI.co.za)
- Figure 5-09: Kuyasa Library, Interior photos 1
- Figure 5-10: Kuyasa Library, Interior photo children space
- Figure 5-11: Kuyasa Library, Interior photo entrance to library
- Figure 5-12: Kuyasa Library, Interior photo- entrance lobby
- Figure 5-13: Kuyasa Library, Interior photos Double volите ѕрасе
- Figure 5-16: Kuyasa Library, Interior photos study room
- Figure 5-15: Kuyasa Library, Interior photo informal meeting areas
- Figure 5-17: Accomodation schedule (Author, 2019).
- Figure 6-01: Concept sketch (Author, 2019)
- Figure 6-02: New movement and access points on site
- Figure 6-03: Concept Diagram illustrating connections and edges between existing and proposed
- Figure 6-04: Concept Diagram exploration of movement and links
- Figure 6-05: Concept model illustrating proposed movement and decking over the railway line.
- Figure 6-06: (Top and Bottom) Section exploration illustrating spatial relationships and links (Author).
- Figure 6-07: (Left, Top right, bottom right) Floor plan explo-
- Figure 6-08: Design developement 1 Sketch plan development in May (Author, 2019).
- Figure 6-09: (Left and right) Model built in June (Author, 2019).
- Figure 6-10: Concept sketch Threshold defined by staircase

- and edge conditions (Author, 2019).
- Figure 6-11: Fragmentation of downtown Seatle caused by the railway and main arterial road (Weiss and Manfredi, 2015).
- Figure 6-12: LEFT: Final design of Olympic park connecting the city to the waterfront (Weiss et al, 2015).
- Figure 6-13: BOTTOM: Concept sketch of the proposed design bridging over the existing infrastructure (Weiss et al,2015).
- Figure 6-15: Design 2 (Bottom left to right) Movement Figure 5-14: Kuyasa Library, Interior photos - entrance lobby and flows defined by edges (Author, 2019).
 - Figure 6-14: Design 2 Concept sketch illustrating building opening up allowing for the continuation of open spaces (Author, 2019).
 - *Figure 6-16: Design 2 3d site model showing larger* connection within the context (Author, 2019).
 - Figure 6-17: Design 2 Conceptual perspective sketch showing the intent of the mass to guide users towards the staircase (Author, 2019).
 - Figure 6-18: Design 2 Conceptual perspective showing the intent of the mass to guide users towards the staircase (Author, 2019).
 - Figure 6-19: Design 2 (Top) Section exploration of spatial relationships and multifuntionality of infrastructure as movement and space.(Author, 2019).
 - Figure 6-20: Design 2 (Bottom left and right) Section development.
 - Figure 6-21: Design 2 Level 0 floor plan development 1 (Author, 2019)
 - Figure 6-22: Design 2 Level 0 floor plan development 2 (Author, 2019)
 - Figure 6-23: Design 2 Level 1 floor plan development 1 (Author, 2019)

- Figure 6-24: Design 2 Level 1 floor plan development 2(Author, 2019)
- Figure 6-25: South elevation development, scaling edges and introducing rhythm (Author, 2019)
- Figure 6-26: East Elevation development, building fronting new plaza (Author, 2019)
- Figure 6-27: Site Plan (Author, 2019)
- Figure 6-28: Floor Plan Level 0 (Author, 2019)
- Figure 6-29: Floor Plan Level 1 (Author, 2019)
- Figure 6-30: Floor Plan Level 2 (Author, 2019)
- Figure 6-31: Cross Section through building and markets (Author, 2019)
- Figure 6-32: Perspective view: From station exit looking west (Author, 2019)
- Figure 6-33: Perspective view: Approach from End street park north, looking south towards AFHCO housing building (Author, 2019)
- Figure 6-34: Perspective view: Approach proposed station plaza extention, looking west (Author, 2019)
- Figure 7-01: Techtonic Concept (Author, 2019)
- Figure 7-02: Structural system (Author, 2019)
- Figure 7-03: Material paletteAuthor, 2019)
- Figure 7-04: Principle of displacement ventialtion (https://www.priceindustries.com/content/uploads/assets/literature/engineering-guides/displacement-ventilation-engineering-guide.pdf)
- Figure 7-05: Wall mounted/recessed wall diffuser(https://www.priceindustries.com/content/uploads/assets/literature/engineering-guides/displacement-ventilation-engineering-guide.pdf)
- Figure 7-06: Displacement floor diffuser (https://www.priceindustries.com/content/uploads/assets/literature/

- Figure 7-06: Displacement floor diffuser (https://www.priceindustries.com/content/uploads/assets/literature/engineering-guides/displacement-ventilation-engineering-guide.pdf)
- Figure 7-07: Ventilation diagram illustratin intent and position of displacement ventialation diffusers.
- Figure 7-08: Sound reflection, absorbtion and isolation diagram (Author, 2019).
- Figure 7-09: Final Site Development(Author, 2019).
- Figure 7-10: Ground Floor plan (Author, 2019).
- Figure 7-11: First Floor plan (Author, 2019).
- Figure 7-12: Second Floor plan (Author, 2019).
- Figure 7-13: Perspective from station towards new public plaza and library (Author, 2019).
- Figure 7-14: Cross section through library and public walkway (Author, 2019).
- Figure 7-15: Perspective from train station showing new walkway, informal markets and library (Author, 2019).
- Figure 7-16: Longitudinal Section through library (Author, 2019).
- Figure 7-17: Perspective view showing approach to library and school (Author, 2019).
- Figure 7-18: Technical section A-A (Author, 2019).
- Figure 7-19: Detail 1 (Author, 2019).
- Figure 7-20: Detail 2 (Author, 2019).
- Figure 7-21: Perspective of First Floor entrance (Author, 2019).
- Figure 7-22: Perspective2 of First Floor entrance (Author, 2019).
- Figure 7-08: Sound reflection, absorbtion and isolation diagram (Author, 2019).

- Figure 7-09: Final Site Development(Author, 2019).
- Figure 7-10: Ground Floor plan (Author, 2019).
- Figure 7-11: First Floor plan (Author, 2019).
- Figure 7-12: Second Floor plan (Author, 2019).
- Figure 7-13: Perspective from station towards new public plaza and library (Author, 2019).
- Figure 7-14: Cross section through library and public walkway (Author, 2019).
- Figure 7-15: Perspective from train station showing new walkway, informal markets and library (Author, 2019).
- Figure 7-16: Longitudinal Section through library (Author, 2019).
- Figure 7-17: Perspective view showing approach to library and school (Author, 2019).
- Figure 7-18: Technical section A-A (Author, 2019).
- Figure 7-19: Detail 1 (Author, 2019).
- Figure 7-20: Detail 2 (Author, 2019).
- Figure 7-21: Perspective of First Floor entrance (Author, 2019).
- Figure 7-22: Perspective 2 of First Floor entrance (Author, 2019).

TABLE OF CONTENT

CHAPTER 1

Introduction

1.1	Background and Context
1.2	Problem statement
1.2.1	General Issue
1.2.2	Urban issue
1.2.3	Architectural issue
1.3	Research questions
1.4	Research methodology
1.5	Limitations
1.6	De-limitations

CHAPTER 2

Prologue - Theoretical Context

2.1	Worldviews over the past century
2.1.1	Introduction
2.1.2	Modern city, ideals and ideologies
21.3	Failure of the Modern ideal
2.2	The need to rethink the relationship
	between architecture and
	infrastructure.
2.2.1	The remnants of the modern city
2.2.2	Architectures role to evolve

CHAPTER 3

Theoretical approach

3.1	Regenerative Design
3.1.1	Introduction
3.1.2	Design for evolution
3.1.3	Understanding place
3.2	Placemaking
3.2.1	What constitutes place?
3.2.2	The image and legibility of
	the environment.
3.2.3	Edges and the in-between

CHAPTER 4

Context

4.1	Context introduction
4.2	The Phenomenon of Lost Space
4.3	Brief history of Johanesburg
4.4	Doornfontein: Change over time
4.5	Macro Analysis
4.5.1	Infrastructure and districts
4.5.2	Permeability within districts
4.5.3	Socio-cultural places
4.6	The larger connection
4.7	Urban framework
4.8	Site location and Analysis
4.8.1	Zoning surrounding the site
4.8.2	Decay, Adapted and new buildings
4.8.3	Movement, barriers and access
4.8.4	Lost spaces
4.8.5	Zone 1:
4.8.6	Zone 2
.7	Zone 3
4.8.8	Zone 4:
4.9	Outcomes of Site Analyses

CHAPTER 5

Concept development

5.1	Introduction
5.2	The Libraries role in building

- social capital
- 5.3 Case study: Kuyasa Library
- 5.4 Spatial program
- 5.4.1 Program intention
- 5.4.2 Design elements and Accomodation schedule

CHAPTER 6

Design Development

- 6.1 Conceptual intentions6.2 Concept development
- 6.3 Design development 1
- 6.4 Design precedents
- 6.5 Design development 2
- 6.6 Sketch plans

CHAPTER 7

Technical Resolution

- 7.1 Technical concept
- 7.2 Structural system
- 7.3 Materials
- 7.4 Environmental considerations
- 7.4.1 Displacement ventilation
- 7.4.2 Earth tubes
- 7.5 Final drawings

CHAPTER 8

Conclusion

References

Appendix

- University of Pretoria Ethics clearance
- Article

