Protect & Play

Village 0001

Design Document

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Design Project Discourse DPD 801

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2024/11/06

DECLARATION OF ORIGINALITY

I declare that the assignment, *A Village in the City: Protect and Play*, which has been submitted in fulfilment of part of the requirements for the module of DPD 801 at the University of Pretoria, is my own work and has not previously been submitted by me for any degree at the University of Pretoria or any other tertiary institution.

I declare that I obtained the applicable research ethics approval in order to conduct the research that has been described in this dissertation. I declare that I have observed the ethical standards required in terms of the University of Pretoria's ethical code for researchers and have followed the policy guidelines for responsible research.

Signature: 

Date: 2024-11-11

PROJECT DETAILS

Title: Protect & Play: A Village in the City
Program: Housing, Gyms, Studios, and CID Community Hub
Address: HB Philips Building, 320 Bosman St, Pretoria Central, Pretoria, 0001
Departmental Research Field: The Role of Alternative Building Technologies in Sustainable Human Settlements.
Client: Pretoria CBD Central Improvement District (CID) – Proudly Serving Pretoria.
Theoretical Underpinning: The project looks to redefine urban living through sustainable design and technology. On a macro -city-scale, the project promotes adaptive reuse as opposed to demolition. Reusing existing building stock takes advantage of existing materiality and restores historical infrastructure for a new generation. On a meso-building-scale, principles and strategies play, passive security, and biophilia can assist to transform multi-story buildings from sole use offices into mixed use residential. Solutions are strategized for notoriously difficult aspects of office-to-residential adaption, like service relocation, sufficient lighting, and structural grids that do not align with traditional apartment layouts. Traditional solutions, developed in the 20th century, are adopted, and iterated to align solutions to adaptive reuse and spatial principles. Building technologies assist this adaption, like lightweight materials associated with fast paced construction, limiting obstructions on city environments. Mass timber is a lightweight, quick, renewable, and workable material. While sustainable development is the quantifiable underpinning of the project, the qualitative lived experience, or phenomenology of city-living, explored by promoting well-being, community engagement, passive safety, creative use of infrastructure (play), and a strong connection to nature. Research reveals inner-city living, particularly in multi-story buildings, contribute to high stress levels and problematic childhood development. Additionally, residents of multi-story buildings feel disconnected from society and nature. It is therefore, vital for the project to challenge negative connotations of inner-city living with positive spatial solutions.

Abstract

Despite its proud architectural heritage, Pretoria's city center now faces underuse, infrastructure decay, and abandoned offices amidst a national housing crisis. Public social housing efforts have been implemented in distant, remote areas, far away from the social, infrastructural, and financial amenities of cities. This has forced desperate residents to neglect social housing schemes that have raised the cost of living, prompting illegal appropriation of abandoned city buildings. Pretoria has the potential to address this need and fulfil the demand for city living.

Inner-city living, however, presents unique challenges, from high noise levels and limited green space to unsafe infrastructure, all affecting the well-being of adults and stunting childhood development. This project tackles these issues by adapting an abandoned office building into a supportive mixed-use residential space. The project establishes a Central Improvement District (CID) to oversee the infrastructural, social, cultural, and economic revitalisation essential for comprehensive urban renewal.

Office-to-residential conversions face numerous challenges, namely- service installations, typically embedded within floor slabs, must be expanded building-wide to support additional bathrooms; the existing structural grid often misaligns with standard apartment layouts, while shallow floor depths limit natural lighting. Developing effective strategies to address these obstacles is essential to advancing adaptive reuse solutions.

The project employs innovative building technologies (IBTs), particularly mass timber, to reconfigure the structure. The design maximizes rentable floor area and lighting through efficient apartment configuration. Additionally, services are repositioned, with new voids cut through the existing structure which are then stabilized. The spatial design incorporates biophilic principles and playful elements to create restorative social environments through various 'moments' of connection. Through these approaches, this project looks to redefine solutions for inner-city living and office-to-residential adaption

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DEFINITIONS

Adaptive Reuse: is renovating a building for a purpose other than what it was originally built or designed for. It involves renovating and modifying a structure to suit a new function while retaining its historic features.

Mass Timber: A category of engineered wood products including glue-laminated timber (GLT) and cross-laminated timber (CLT).

Innovative Building Technologies: A construction method or material that is considered new, advanced, or non-traditional compared to conventional building practices.

Central Improvement District (CID): A city Improvement District (CID) refers to a clearly defined geographical area, in which property owners contribute additional rates to fund supplementary municipal services for that specific area as per a community supported Business Plan approved by Council. Council determines an area as a special rating area, which then functions as a CID to improve and upgrade the area for an initial 5-year term.

Desegregation: The reversal of segregation policies implemented by the Apartheid rule, and specifically the Group Areas Act of 1950.

Resegregation: Continued establishment, support, development, and investment into areas previously established during implementation of segregation policies.

Phenomenology: A study that concentrates on the consciousness and the objects of direct lived experience.

Biophilia: Looks at the evolution of biophilic design in architecture and planning and presents a framework for relating the human biological science and nature.

Catalytic Projects: Initiatives that focus on addressing pressing housing and development challenges through mixed use and multi-income residential for shared economic prosperity.

“It takes a village to raise a child.”

Jane Cowen-Fletcher

Tshwane Region Mapping

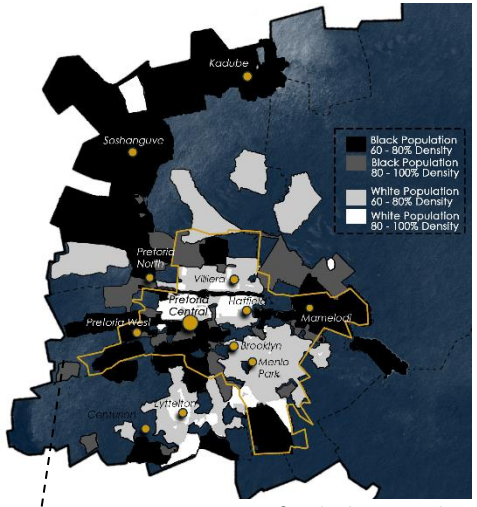


Figure 2: Segregation of Black & White Demographics in Tshwane and Pretoria Central (Gold Outline)
Adapted from Haman & Horn (2011)

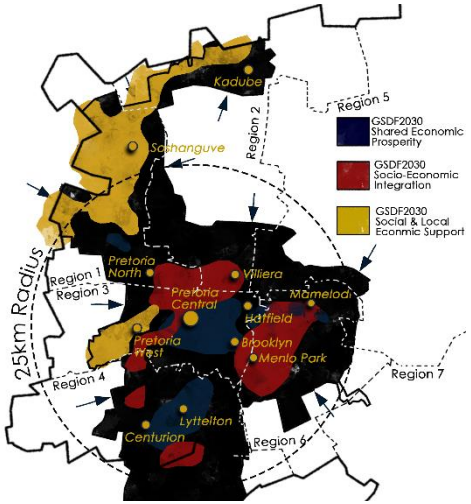


Figure 3: Densification and Social, Economic and Local Integration Framework towards the CBD.
Adapted from City of Tshwane Integrated Development Plan Approved (2020-2021)

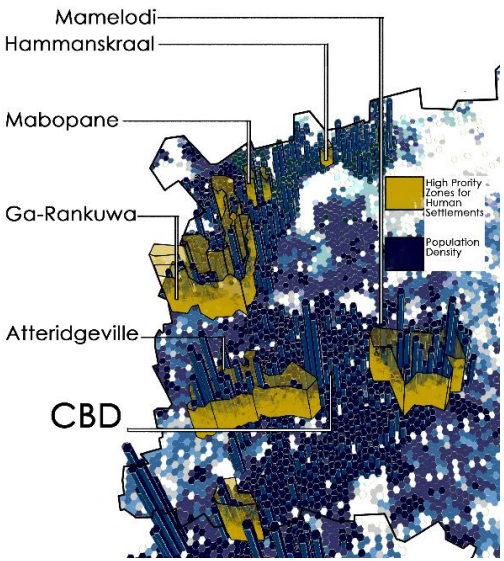


Figure 4: Priority Zones for Human Settlements vs Population Density. Showing Pretoria CBD without designated zoning
Adapted From Review of Gauteng Spatial Framework (2023)

Pretoria Central Mapping

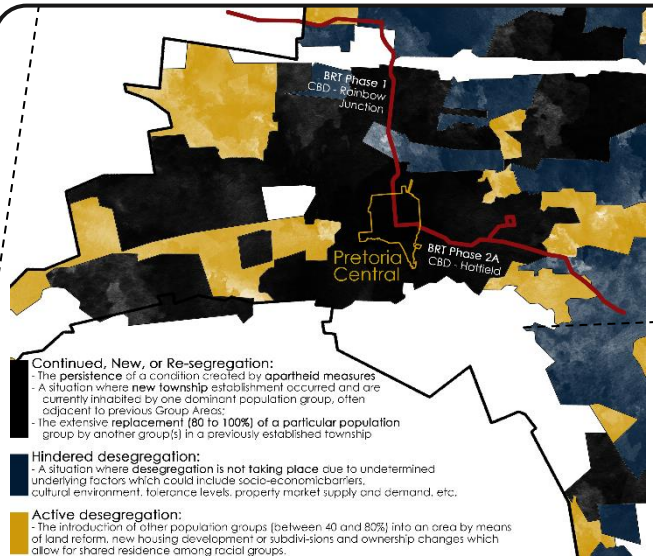


Figure 6: Continued, Hindered, and Active Desegregation Zones in Region 3
Adapted from Hamann & Horn (2011)

Figure 5: CBD Migration into Outer Urban Area's

Gauteng Movement Mapping

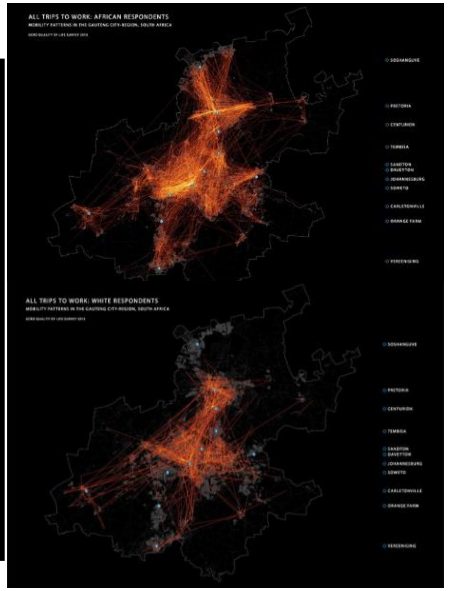


Figure 1: Trips to Work - Black Respondents (top), and White Respondents (Bottom). By Fatti C.C (2015)

Chapter 1 – PROLOGUE & PAPER (DIT 801)

The following section will outline the contextual issue to which the design project responds. The information gathered for the research module, DIT 801, pertaining to PLACE, underscores the contextual framework for the design investigation.

The sub-chapter, PEOPLE challenge the contextual framework's macro-scale solution with a micro-scale consequence that will be outlined.

Place: Centralised Social Housing and Desegregation Densification

In South Africa, the housing crisis is dire, with a 2.4 million housing backlog and an estimated 23% of households lacking adequate shelter (Mahachi, 2019:3; Olojede et al., 2019:165-166). The Social Housing Regulatory Authority (SHRA) aimed to construct 30 000 houses by the end of 2024, and the Department of Human Settlements (DHS) is assisting the delivery of over 180 000 subsidised housing units and 25 000 rental units (Department of Government Communications and Information System, 2021; Department of Human Settlements, 2019). Figure 4 shows that areas designated as high priority zones for human settlements are allocated in high population density zones, supported by the concerted effort towards densification within a 25km radius (Figure 3). However, outer zones prioritised for human settlements, like Soshanguve and Mamelodi, were established by pre-apartheid segregation policies, and do not represent the needs of underprivileged citizens. Users receiving housing on the outskirts of city centres are widely disappointed with the location of subsidised housing (Moolla et al., 2011: 143; Botha, 2022:255). Figure 4 reveals that the Pretoria CBD has the highest population density in Pretoria, without any official designation to fulfil the desperate need for human settlements. This forces black South Africans, who predominantly live on the outskirts of urban settlements (Figure 2), to commit to extraordinary long commutes to work compared to white South Africans (Figure 1)

The rate of urbanisation is expected to double by 2030 – from 5.6 to 11.5 million in Johannesburg (United Nations, 2016:4), and Pretoria is likely to experience similar rates of urbanisation due to push and pull Factors (Figure 7)(Wilhelm-Solomon, 2022).

Figure 8: Pretoria CBD Zoning, 2024.

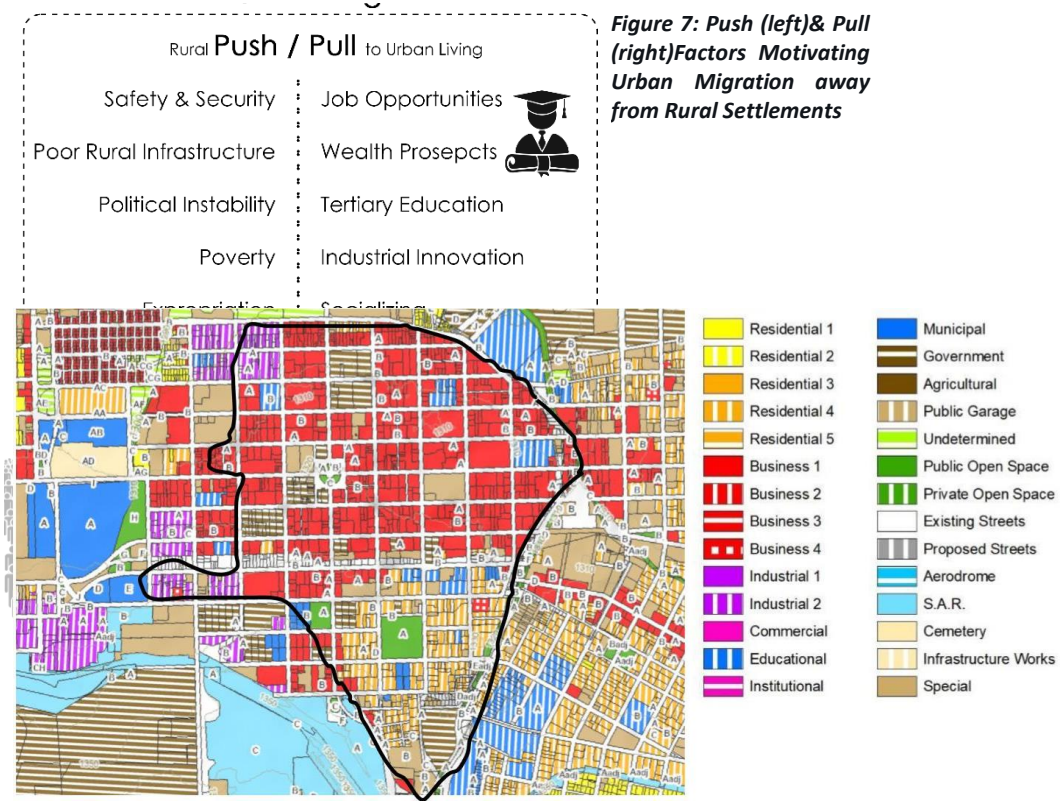


Figure 7: Push (left)& Pull (right)Factors Motivating Urban Migration away from Rural Settlements

Figure 3, revealing planned socio-economic support and integration in the CBD, and Figure 6, revealing the CBD as a continued or re-segregated area show apposing narratives. This was highlighted at the ANC Land Summit, 2018, in Johannesburg, when critics highlighted that perpetuating apartheid planning undermines integration-based wealth creation through land and property assets (Botha, 2022:249-250). A strategy workshop in Centurion in 2021 saw Deputy Director General Leshabane suggest a shift from purchasing land on urban outskirts towards acquiring existing buildings in the inner city of Pretoria for human settlements, promoting densification (Botha, 2022: 249).

It is, therefore, crucial to incorporate housing into city revitalisation efforts. Catalytic projects initiated in 2009 aim to integrate mixed-use developments that promote racial and economic inclusion and shared-prosperity, through

subsidised human settlements (Human Settlements, 2015/16:262-267). By providing centralised social housing, the state can facilitate access to essential amenities and job opportunities, thereby enhancing the quality of life for residents and fostering responsible inner-city renewal.

The 1990s saw a migration of private and public offices away from the CBD, following the repeal of the Groups Areas Act in 1991 (Bremner, 2000:185-186), causing the white and wealthy to develop alternative areas for office use (**Figure 5**)(Clarke & Corten, 2011:881; Botha, 2022), abandoning the city's buildings to urban scavengery, grime, and decay (Turok, Seeliger, & Visagie 2021:20).

The existing zoning laws continue to favour office space (**Figure 9**), resulting in obsolete office structures within the inner city (Langston et al., 2008:1710-1711). As such, an opportunity exists to adapt offices into mixed-use catalytic developments that integrate subsidised residential units and vibrant commercial activities (Mahlatsi, 2022:486).

Material

Mass timber (MT) is a promising material for social housing in adaptive reuse projects due to its numerous advantages. First, it significantly enhances the sustainability of building projects by acting as a carbon sink, reducing the overall environmental impact (Azar, 2024). MT, consisting of cross-laminated timber (CLT) and glue-laminated timber (GLT), offers strength comparable to reinforced concrete, while maintaining the lightweight properties of steel, which is advantageous for inner-city adaptive reuse projects (Azar, 2024).

In the context of adaptive reuse, MT provides the potential for rapid construction, addressing the need for cost-effective housing with limited disruption to dense urban areas. The use of MT accelerates the construction process due to prefabrication capabilities, which minimize on-site disruptions and reduce the impact on the surrounding community (Azar, 2024). This is particularly important in densely populated areas like the Pretoria CBD, where vacant buildings can be repurposed quickly to meet the housing demand. In addition, studies suggest that with the us of MT, tenants can continue in a building during adaptive construction, due to limited construction disruptions and quick construction timelines. This allows adaption within building projects while maintaining rentable income.

MT also contributes to cost savings by reducing foundation requirements and construction timelines, which ultimately lowers the overall construction costs (Azar, 2024). Additionally, its ability to facilitate vertical extensions of multi-story buildings without overloading existing structures allows for higher density in urban centers, a crucial aspect of addressing housing shortages in city areas (Azar, 2024).

Thus, mass timber is a key material for adaptive reuse projects aimed at providing affordable social housing. Its environmental benefits, construction speed, and structural flexibility make it a viable solution for urban renewal, especially in the context of reusing existing office buildings for residential purposes.

People: Multi-story Living and Well-being.

Multi-story buildings, however, can demonstrate negative side effects for adults and children. Israeli studies found that parents prevent children from playing outside, due to lack of supervision (Broyer, 2002; Landau, 1999). Research in Japan found that infants raised above the fifth-floor experienced delayed development, including difficulties dressing, helping, and appropriate urination (Oda, Taniguchi, Wen, & Higurashi, 1989). A study in India concluded that multi-story buildings compromise urban children's spontaneous play. Finaly, "Children living in high-rises depict more behavioural problems than children who don't" (Ahmad, Aibinu, Thaheem, 2017:1701). These studies reveal the consequences of multi-story residential units on childhood development.

"Living in high-rise (buildings) results in a large number of people disengaged from nature and the isolation through psychological state and behaviour problems results in health and productivity loss" (Ahmad, Aibinu, Thaheem, 2017:1700). Additionally, high rises can block natural breezes and sunlight, exacerbating heat island effects, especially when outside spaces are absent – "such residential projects are particularly unsuitable for families" (Ahmad, Aibinu, Thaheem, 2017: 1701). In addition to childhood development, adverse effects are felt in all ages when living in multi-story buildings.

In addition to the spatial problems with multi-story buildings, their surrounding traffic noise poses significant health risks, particularly in city environments. The health effects range from hearing loss, hypertension, cardiovascular issues, to sleep disturbances, and impaired cognitive function (Bodin, et al., 2009; Bluhm et al., 2017). Children in lower-level apartments which were exposed to higher sound levels from traffic, had trouble differentiating sounds and had decreased reading ability than children who lived in higher floors (Cohen, Glass & Singer, 1973) Noise readings from Nana Sita St, in the Pretoria CBD, averaged 72.2 dB. Exposure to noise levels of 70 dB or higher can lead to hearing impairment over time (Bergiland et al., 1999, p. 39).

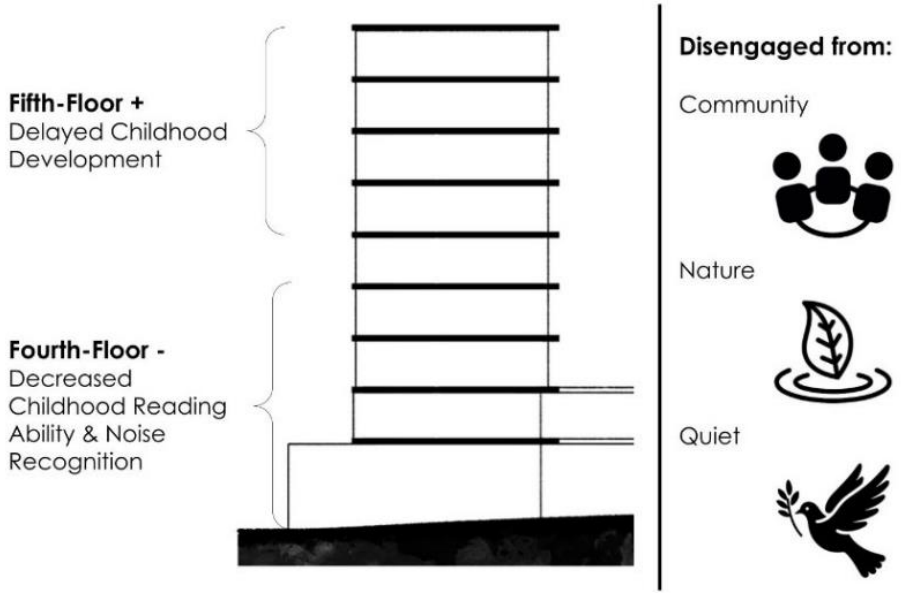


Figure 9: Concluding Diagram to the Adverse Consequences of Multi-Story Residential Living

It is the aim of this paper, therefor, to find solutions to the negative consequences of the phenomenological experience found in multi-story residential buildings, and provide a proposal that promotes acoustic serenity, nature inspired environments, community engagement, and spaces that are protected for play to promote healthy childhood development.

Chapter 2: PLACE

The chosen building sits in the centre of the CBD, between the two zones designated as Residential (south) and Business (north) (Figure 9: Pretoria CBD Zoning, 2024.Figure 9). The existing multi-story building (Figure 11), owned by the City of Tshwane, has been abandoned for five years and has been overcome with decay, grime, and has humbly given refuge to the homeless (Figure 12).

Figure 11: Revit Model Perspective of North and East Facade of the HB Philips Building (Top). Google Maps view of the North and East Facade of the HB Philips Building (Bottom)

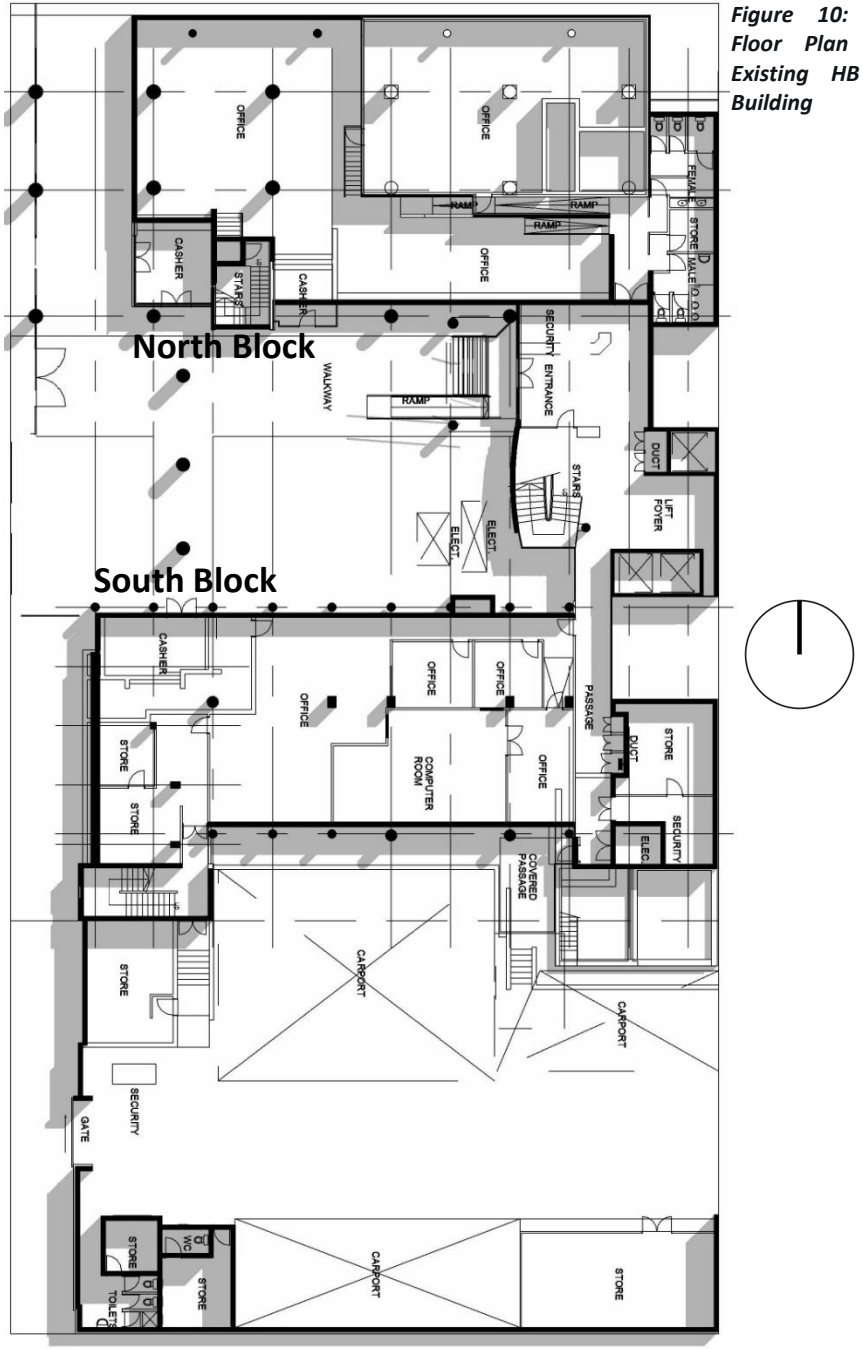
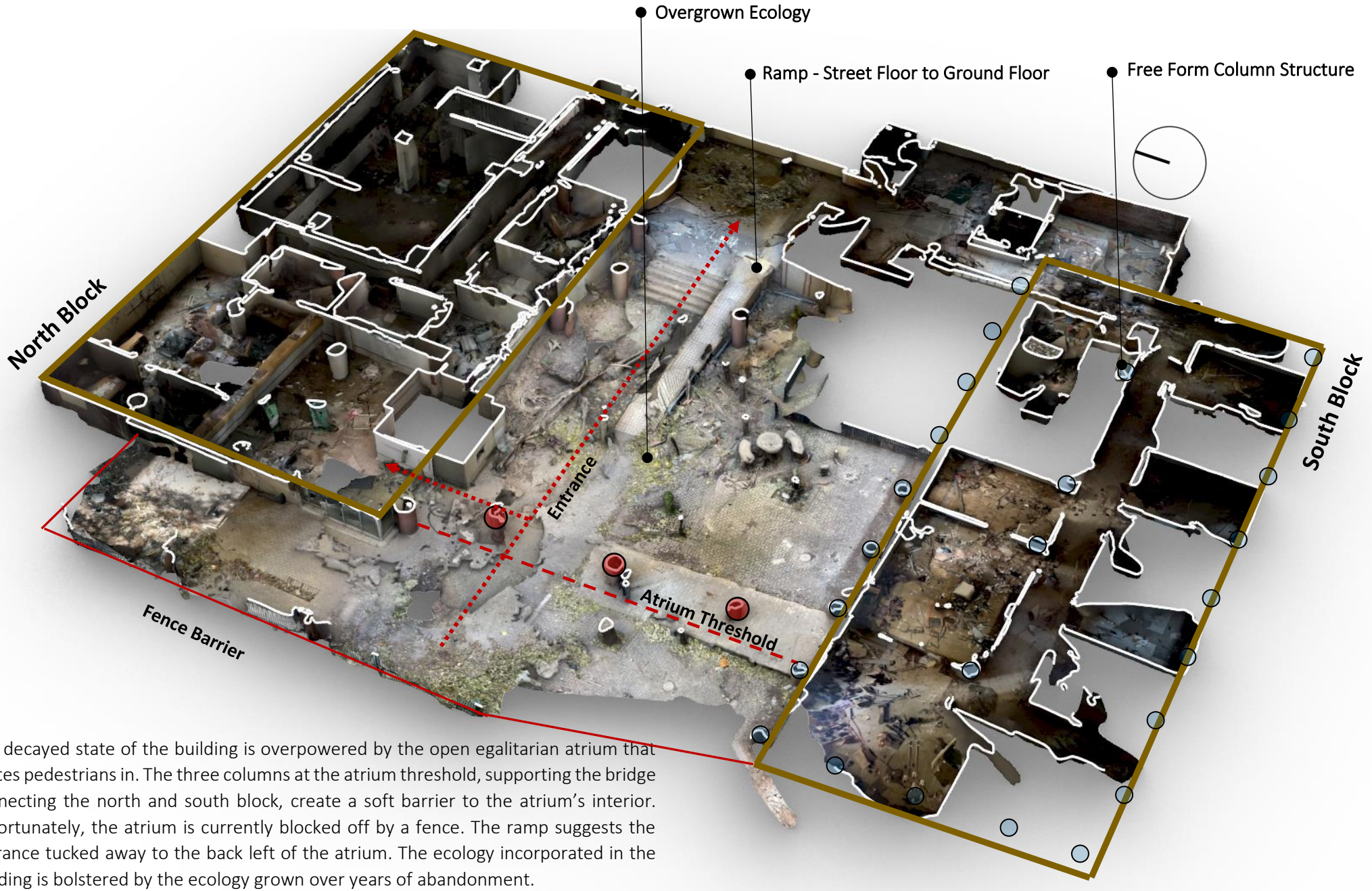


Figure 10: Ground Floor Plan of the Existing HB Philips Building

Figure 12: HB Philips Building Ground Floor Existing State of Decay. Lidar Scan.



The decayed state of the building is overpowered by the open egalitarian atrium that invites pedestrians in. The three columns at the atrium threshold, supporting the bridge connecting the north and south block, create a soft barrier to the atrium's interior. Unfortunately, the atrium is currently blocked off by a fence. The ramp suggests the entrance tucked away to the back left of the atrium. The ecology incorporated in the building is bolstered by the ecology grown over years of abandonment.

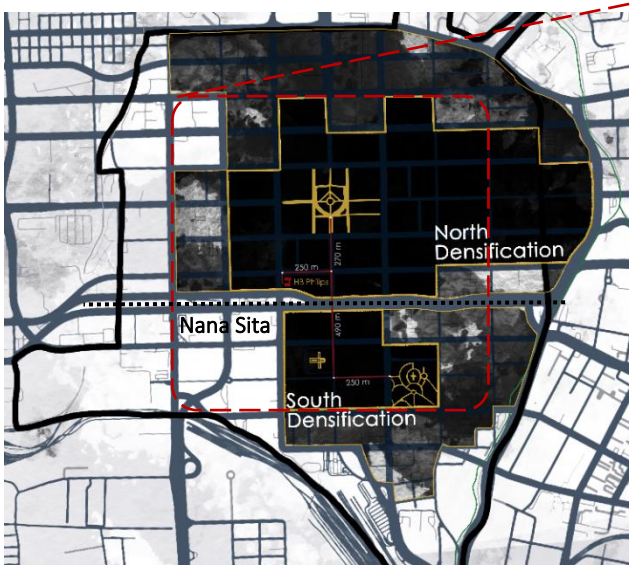


Figure 14: North and South Densified zones of the CBD. Burgers Park and Church square (gold) and their distance to site (red).

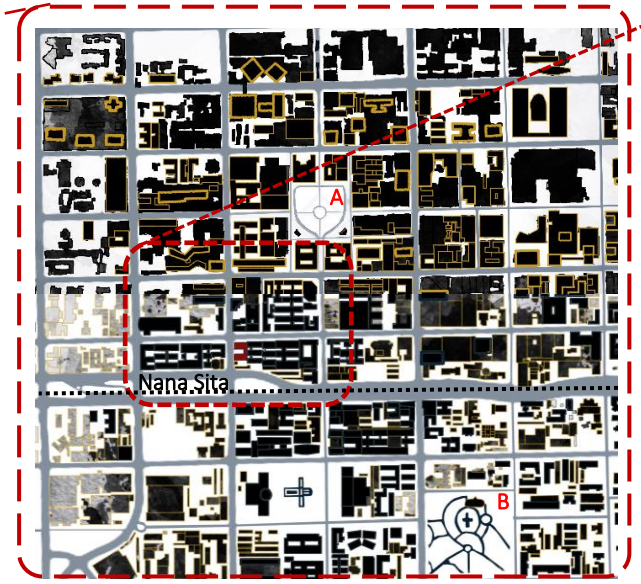


Figure 13: Noli Map Showing City Verticality represented by thickness of gold lines (thickest lines are tallest buildings). Site shown in red.

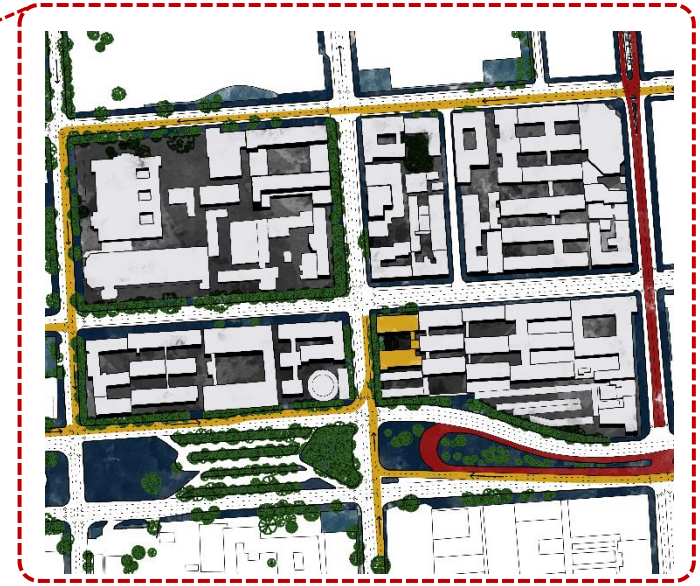


Figure 15: Site Analysis of HB Philips Neighbourhood Block. Ecological Mapping (Green); HB Philips Road Access (Yellow Line); HB Philips (Yellow); Pedestrian Walking Routes (blue); BRT Route (red)

Figure 14 shows the site on the south side of the north zone of Pretoria central. Nana Sita str, a 9-lane main road, visually and physically disconnects the infrastructure, greenery, and pedestrian access from the north and south city zones. The HB Phillips building sits 520m from Church Square, and 990m from Burgers Park, the two priority nodes that provide greenery, cultural development, historical character, and tourism to the North and South zones. This creates an opportune site to connect the two zones and nodes, desegregating the disconnection felt from Nana Sita str.

Informant: The project aims to renew Pretoria's central character by connecting the two zones by creating a Central Improvement District (CID) that manages the social, infrastructural, and cultural connection between the North and South zones

Figure 13 reveals the heights of the on-floor plan. This shows the concentration of high-rise multi-story buildings around Church Square (A) and Burgers Park (B). The buildings bordering Nana Sita reveal low infrastructural density.

Informant: The future effects of densification are important to consider when analysing existing building footprint. To accommodate future urban migration, vertical building extensions must be considered. Therefore, during building adaption, lightweight materials are a strategic approach to provide accessibility to increased city densification and desegregated city planning. Adaptive reuse approaches must be made affordable and profitable over demolition and new build.

Figure 15 reveals the quantitative analysis of the neighbourhood surrounding the HB Phillips building. It provides insight into the character of Nana Sita. While it separates the two city zones, it suggests opportunity for nodal connection in the small public space between the two main lanes. Figure 15 shows the junction of the north BRT route to the east, making it an important transportation node within the CBD. While the north side of the site (Gold) is a densified street edge, the south holds potential for permeability and softer building edges.

Informant: The HB Phillips building is an important site that holds important transport, ecological, and connecting nodes within the city. The renewal of the building can result in positive impacts to reconnect and densify the separated node of the city.

Figure 16: Neighbourhood Zoning with HB Philips in Black

Figure 17: Neighbourhood Pedestrian Friendly zones (Dark Blue) and fenced off zones (light blue), and HB Philips (Gold)

Figure 18: Neighbourhood Ecological Footprint

Figure 16 reveals the reliance on business one and governmental office zoning by city municipalities, despite the lack of demand. A residential zoned unit (yellow) is found two buildings to the west of the HB Philips building. This residential block is the only one in the north zone but highlights the potential for the adaption of the HB Philips building, which is designated as business one, to be rezoned into residential.

Informant: The HB Philips building holds potential for rezoning, and its proximity to a high ecology node motivates this position.

Figure 17 reveals the pedestrian access available to residents of the city (dark blue), while the light blue shows fenced off areas that prevent public access.

Informant: It is noted that the HB Philips Building hosts a fenced off area, denying citizens its egalitarian atrium space. If security is improved and crime is lessened by a CID, these areas would provide needed social spaces for city residents.

Figure 18 Highlights the level of ecology on the city footprint. It's clear that the HB Philips building hosts an inner-city green node feeding from the public space in the centre of Nana Sita.

Informant: The HB Philips building is, therefore, an important green node, which can be bolstered if greenery is nurtured and promoted. Further aspects of Biophilia can be further integrated, maintaining the growing ecological momentum.

Site Study

- **4 Lane Road on all building edges**
- **Ecological Surrounding**
- **HB Philips Building**
- **Atrium**
- **Building Designated Parking**
- **One Way Road Access**
- **BRT Route**

Design Problems:

Services (Figure 19): Relocation of ablutions from the buildings back corner to internal intervals that accommodate each apartment.

Circulation (Figure 21): Socially inviting circulation to be incorporated throughout the building to serve as spaces for communal development.

Public Space (Figure 19): Public spaces that are closed-off to be opened and redesigned for incentivized community engagement.

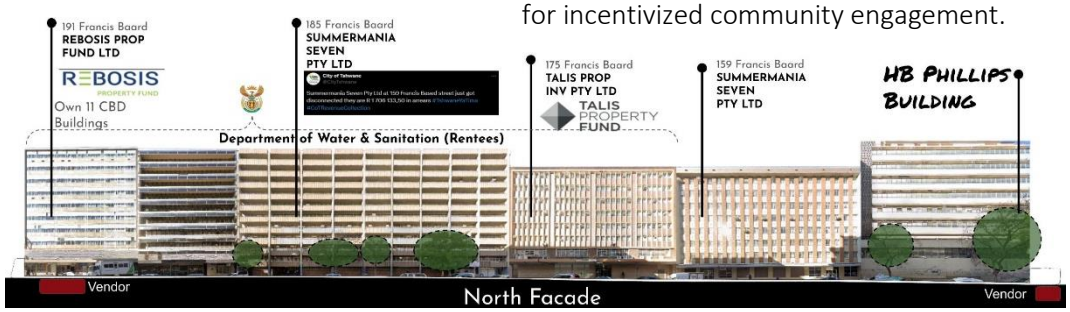


Figure 20: North Facade Street View Showing Building Ownership and Main Street Edge

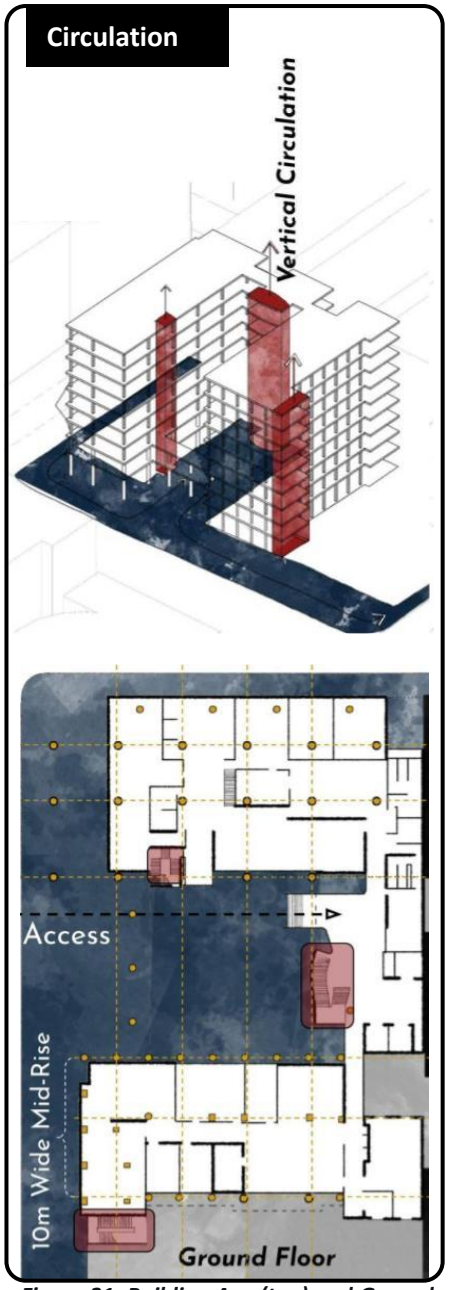


Figure 21: Building Axo (top) and Ground Floor Plan (bottom) showing Vertical Circulation (red) and 5m structural grid

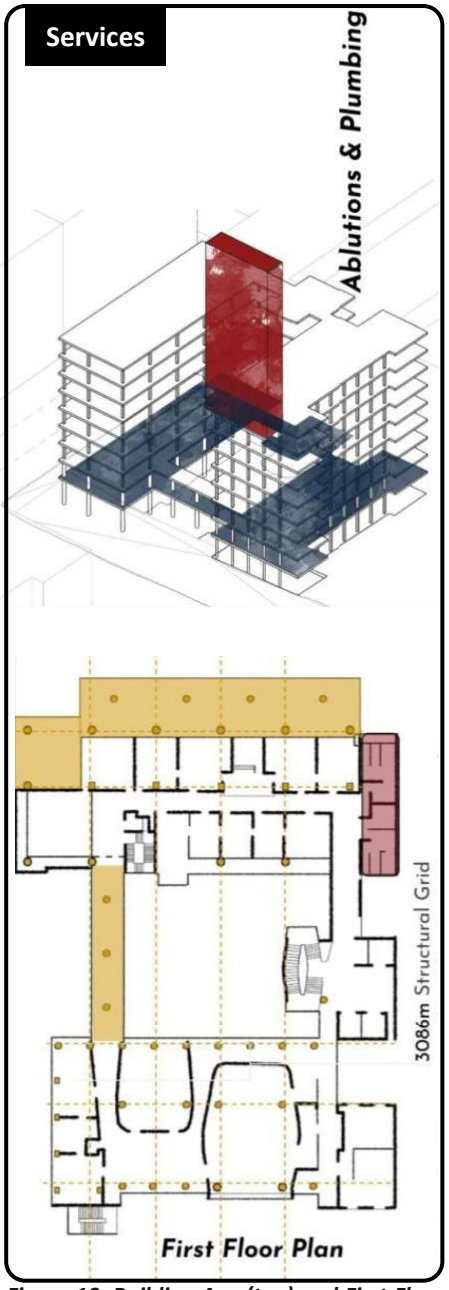


Figure 19: Building Axo (top) and First Floor Plan (bottom) showing Ablutions Block (red) and closed off public space (yellow)

Chapter 3 –PRINCIPLES

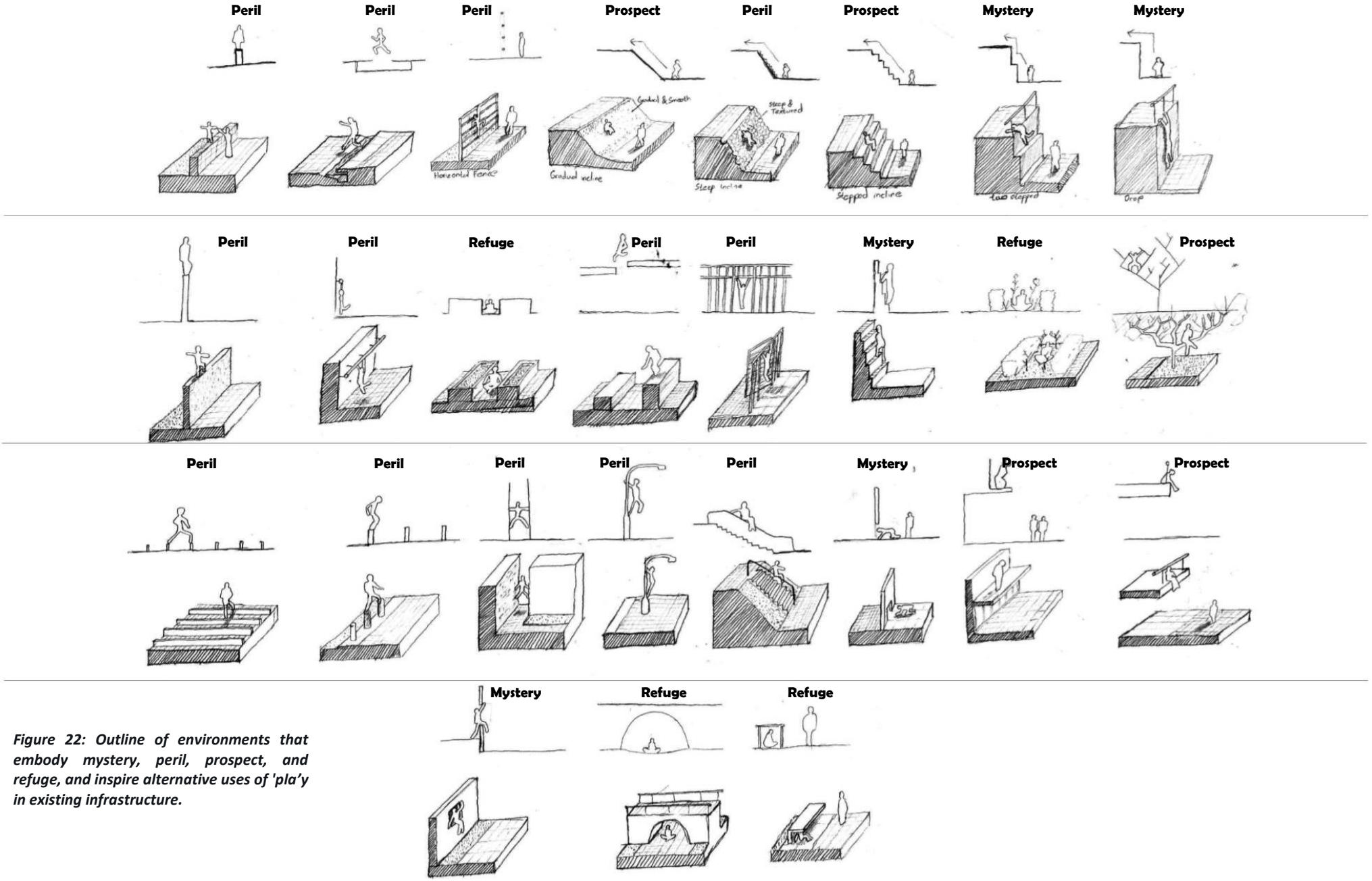


Figure 22: Outline of environments that embody mystery, peril, prospect, and refuge, and inspire alternative uses of 'pla'y in existing infrastructure.

Chapter two discusses the design principles and frameworks used to provide solutions to phenomenological problems associated multi-story building design. This includes three principles of Play, Biophilia, and Passive Security.

Play: Inner City Physical Expression.

The principle of play (Figure 22) was derived through visual study of Pretoria cityscapes, synthesized from the Biophilic principles of 'Nature of Space': prospect, refuge, mystery, and peril (Figure 23).

Urban environments in the Pretoria CBD were discovered that captured these principles. These environments, due to their nature of space, could inspire alternative uses due to their evocation of mystery, peril, prospect, or refuge, and inspire a sense of play in passerby's.

These elements will be incorporated and experimented with in the design. The outcome is to inspire a sense of play in areas that may not be officially designated as play areas. This will be a strategic design framework in multi-story, urban buildings where children and adults have little autonomy of creative spatial usability.

Pastoral: Inner City Biophilia

Multi-story urban environments cause disconnection and anxiety to inner city residents. It is the aim of the project to reconnect people to nature through a designated framework of Biophilia. Strauss Brink, the Architect who designed the HB Philips building postulated that more buildings in South Africa should be designed with 'absent centres'. "Secluded and peaceful courtyards would provide spaces where one's spirit may be re-invigorated' (Brink, 2011:16). The adaption project will bolster the principle of 'one spirit' in the atrium with biophilic principles.

The principle of Biophilia, often mistaken with the incorporation of a few green elements, is a designing philosophy spanning from macro, micro, physical, and ethereal. The philosophy is centred around the phenomenological experience, defining why and how users experience *philia* – love or fondness in a natural environment.

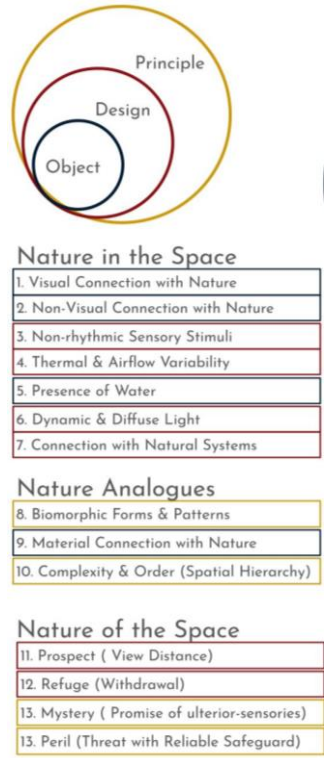


Figure 23: Principles of Biophilia Categorised into Design Considerations

These principles of Biophilia will be incorporated in the design to provide a layered sense of nature in overly urban environments, reconnecting users to positive identity and place.

Figure 23 outlines the 14 principles of biophilia that are discussed by Browning et al (2014). These sections have been designated into three additional scales of design, objects of a space (micro), design of a space (meso), and principles of the space (macro).

Nature in the Space: The direct, physical, and ephemeral presence of nature in a space.

Nature Analogues: The evocations of nature in a space, whether it's a feeling, memory, or image of the unconscious mind.

Nature of the Space: Addresses spatial configurations in nature that are metaphysical and psychologically impacting to promote joy and positivity.

Passive Security

Crime, and the fear of crime is higher in multi-story buildings. Pretoria has one of the highest crime rates of common robber (6th), theft out of a motor vehicle (5th) or shoplifting (6th) in South Africa (Crime Registrar Head Office, 2023). Therefore, passive Security is a vital consideration for a multi-story building in the Pretoria CBD.

A checklist was developed by Violence and Protection through Urban Upgrading (VPUU) to assist designers to create safe urban environments. The headings of the checklist include Surveillance and Visibility; Owned Spaces (territoriality); Defined Access and Safe Movement; Image and Aesthetics; Maintenance and Management; and Physical Barriers (target hardening). The design will be assessed by this checklist and iterated to create protective spaces.

Chapter 3 – PROGRAM

1) Pretoria Central Improvement District Offices (CID)

Project Role: Owner & Investor.
Building Location: Second Floor North Block.
Aim: Five-year privatised urban management system to cut crime, grime in a designated zone of the Pretoria CBD, and to develop economic, social, infrastructural, and cultural prosperity.
Services: Building management; round-the-clock street security patrol & security development; daily litter collection; infrastructure improvement; neighbourhood maintenance; community liason; economic development through fromalisation and entreuprenerial upliftment; cultural development; and tourism development.

2) Gym & Fitness Centre

Project Role: Primary Tenant & Donor.
Building Location: Ground Floor & First Floor, North & Sound Block.
Aim: To provide facilities for well-being & cultural development. This includes physical fitness, muscle building, cardio, and other physical outlets like dancing, spinning, stretching and other.
Services: Fitness and cardio studio; free weight building; resistance-based weight building; spinning studio; mind & body studio; dance studio; personal training; Fight-with-Insight contributor.

3) Fight with Insight – Childhood Development

Project Role: Non-profit Organisation
Building Location: First Floor North Block.
Aim: Create a safe place for inner-city children, using boxing to teach life skills and to assist in taking responsibility. To assist in the development of impoverished youth through mentorship programs and life-skills training.
Services: Boxing training; childhood rehabilitation; childhood development; fitness gym; self-defence training; childhood mentor; life skills training.

4) Human Settlements & Social Housing

Project Role: Multiple Residential Tenants
Building Location: Fourth Floor to Ninth Floor, North & South Block.
Aim: To provide sustainable housing for families, students, professionals, and homeless inner-city residents that host communal spaces and play spaces.
Service: Affordable one-, two-, three-, and four-bedroom units. One Bedroom subsidised housing units.

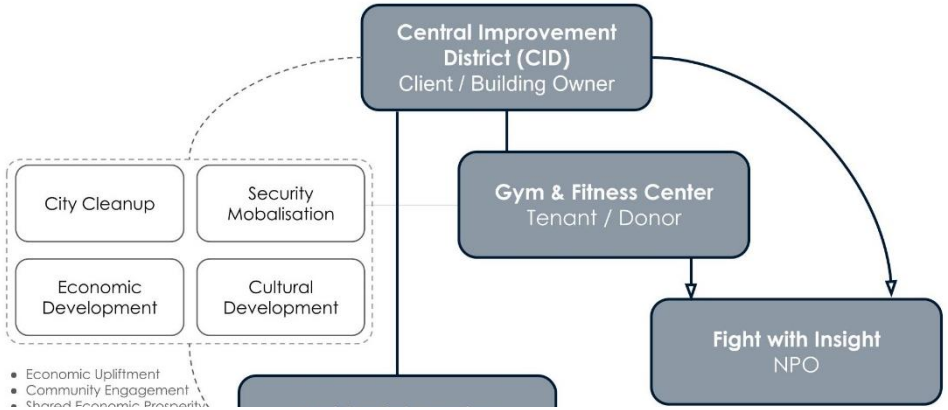


Figure 25: Program Relationships

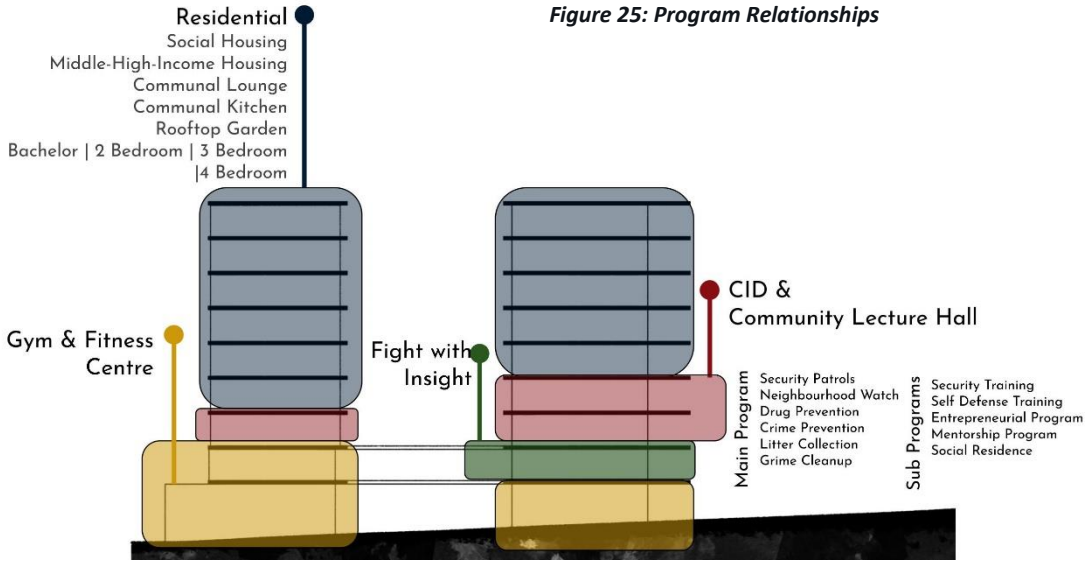


Figure 24: Program Location in Project

Chapter 4 – PROJECT ITERATION

Apartment Layout

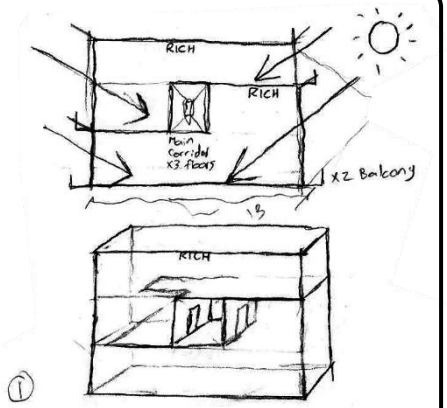


Figure 28: L Shaped Apartment Layout

L Shape Sectional Layout Attributes:

- Apartment footprints lay across building sectional footprint, which provides lighting from both north and south sides without circulation routes or services blocking daylight.
- Limit non-rentable floor area by reducing public circulation to apartments to every third floor. This allows small apartment sizes, due to small structural grid, to maximise apartment square meterage.

Apartment Configuration

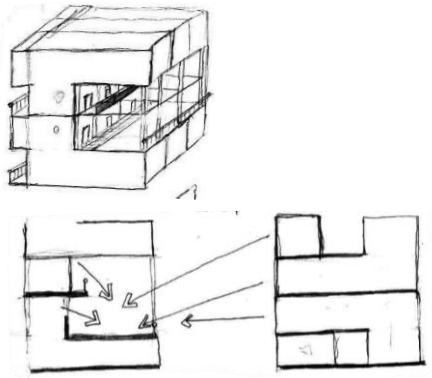
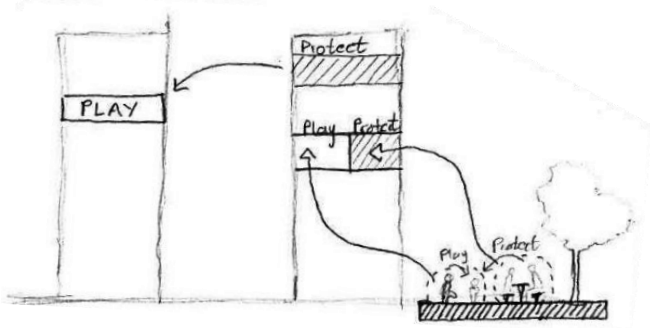


Figure 26: L Shaped Apartment Layout creating Play Area, and Maximising Rentable Space.

Apartment Configuration Attributes:

- Apartment L sectional shape, configures to create voids in the building that allow for communal areas or spaces for play.
- Passive surveillance is promoted around void spaces, maximising passive surveillance, and creating ownership of public spaces.



Building Envelope

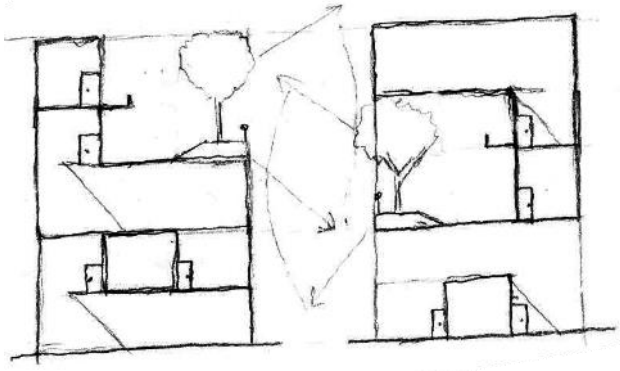
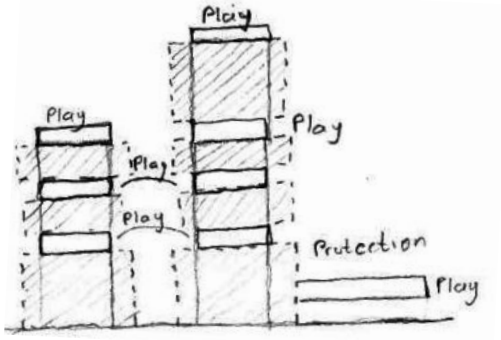


Figure 27: Apartment Configuration and Layout Effect on Building Envelope

Building Envelope Attributes:

- Building Envelope is adaptable with L shape apartment design configurations create double story voids that promote passive surveillance, play, and provide opportunity for Biophilia through 'Nature in the Space'.
- Reducing public circulation motivates the increase in public nodes for gathering.



Design Elements:

Promenade: A secondary vertical circulation route inspired by the existing atrium ramp, connects the program, the people, and the place and invites the public into the egalitarian nodes of the building. This ribbon ties together elements of play and passive security. All building users witness entering inhabitants elevate, providing both protection and play to those who use it and those around. While accessible to the public, levels of screening occur as users ascend to the finale on the apartment floor (4th floor). The two-meter-wide promenade doubles as a running track for the gym, wide enough to not disrupt walking pedestrians, and acts as multiple nodal gathering points for the building residents.

First Floor Amphitheatre: A space is provided above the parking and busy city streets where children can play, and adults can gather. This area doubles as a green park with a grassy floor slab for building users. While mostly open to the public, the promenade will close off access to the amphitheatre after certain hours. The amphitheatre doubles as a mini-sports pitch, allowing organised sports activities to occur and socio-cultural activities to develop.

Activated Bridge and Atrium: Activating the bridge allows first floor circulation across the north and south building block. This second and third floor viewing bridge improves passive security and creates a passive performance space in the atrium, allowing buskers, dancers, choirs, or small theatres to activate the atrium informally. This develops cultural activities and activates a sense of place.

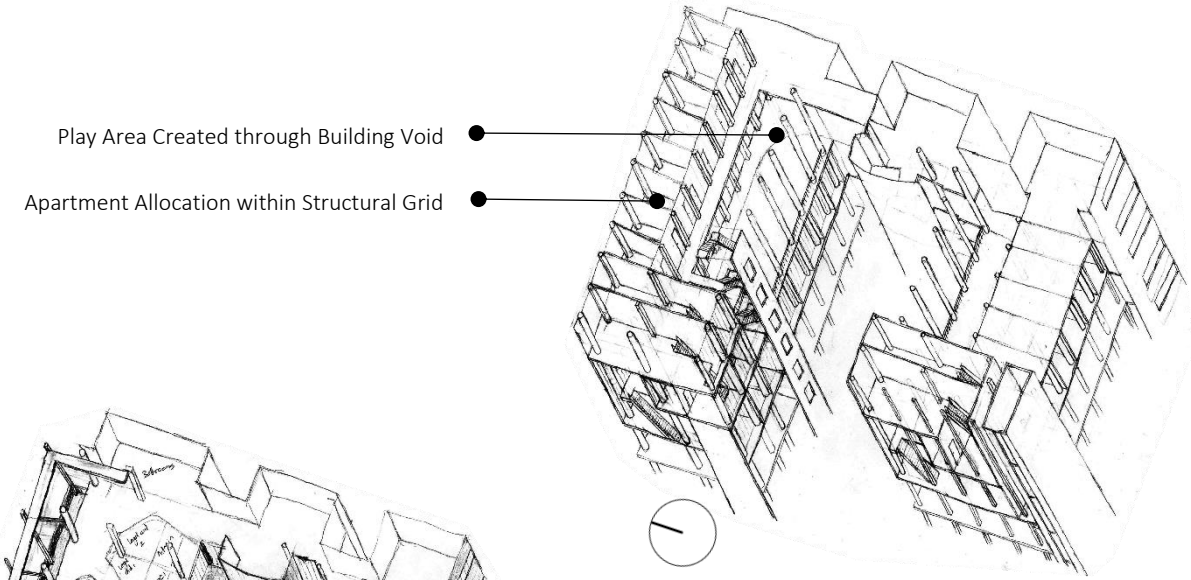


Figure 30: Iteration 1 Fourth and Fifth Floor Plan

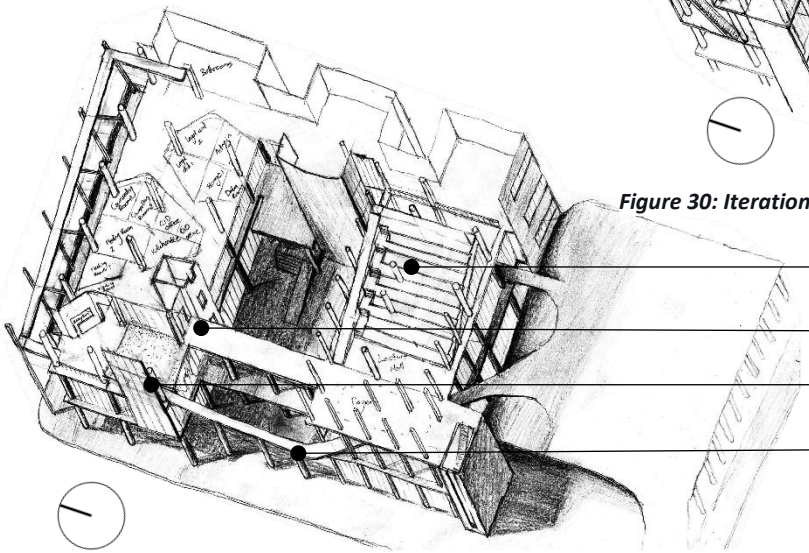


Figure 29: Iteration 1 Second Floor Plan

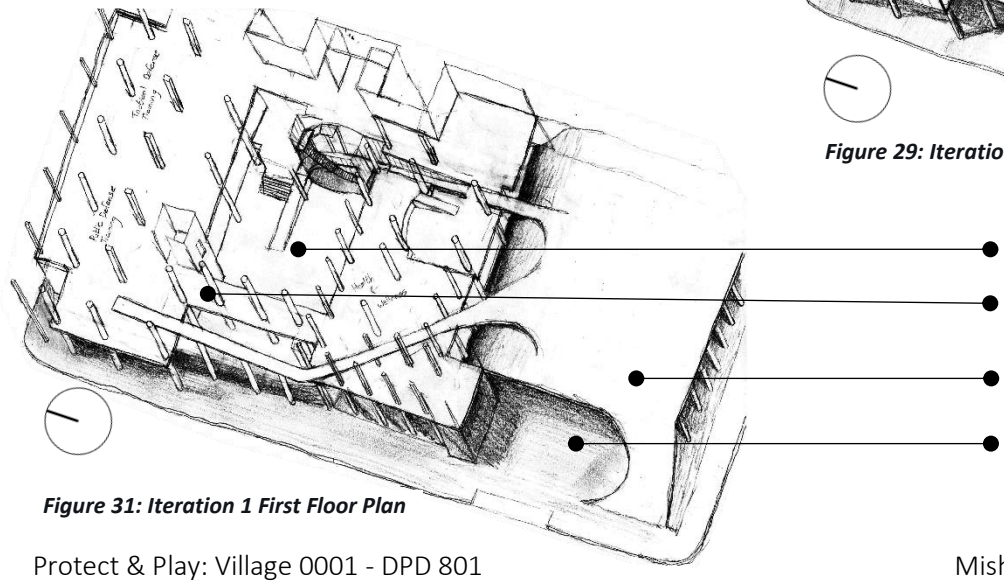
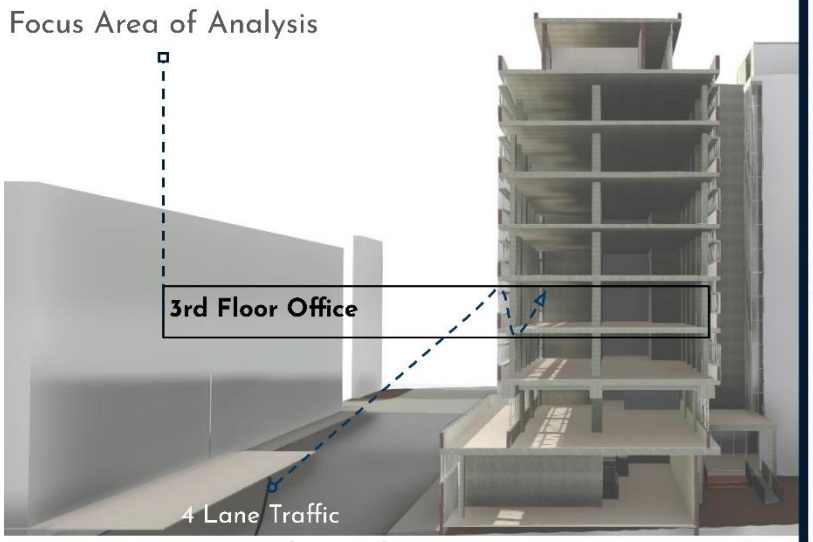


Figure 31: Iteration 1 First Floor Plan

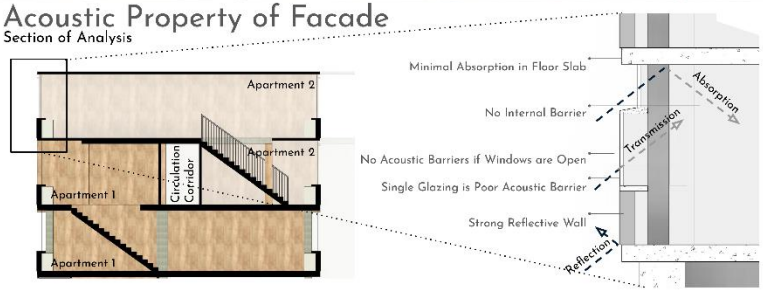
Chapter 5 – PERFORMANCE – Façade System Acoustics

Focus Area of Analysis



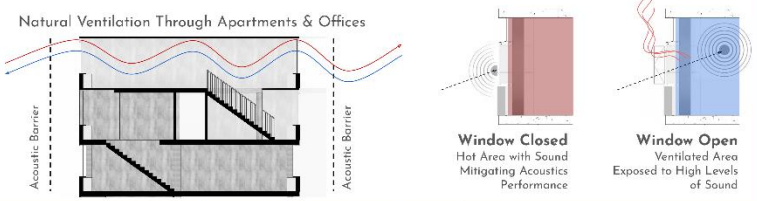
Acoustic Property of Facade

Section of Analysis



Acoustic Performance vs Ventilation

Natural Ventilation Through Apartments & Offices



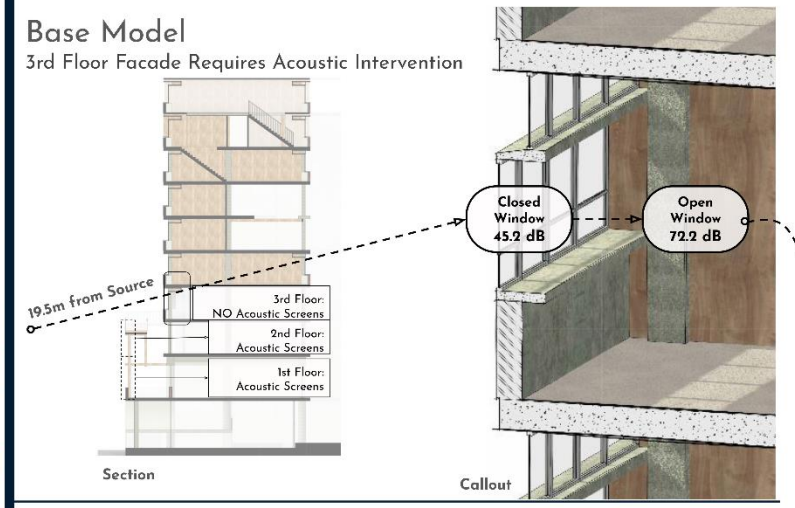
Window Closed
Hot Area with Sound Mitigating Acoustics Performance

Window Open
Ventilated Area Exposed to High Levels of Sound

Traffic Noise Analysis

Base Model

3rd Floor Facade Requires Acoustic Intervention



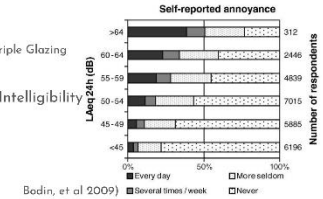
Existing Noise

Interior Acoustic Readings in Second Floor Office

	Main	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
LP Start	72.2	54.1	64.6	62.0	66.1	58.6	66.6
AI Glazing RT	30	20	24	28	32	36	40
LP Interior Window Closed	45.2	34.1	40.6	34.0	34.1	22.6	26.6
LP Interior Window Open	**72.2**	**54.1**	**64.6**	**62.0**	**66.1**	**58.6**	**66.6**

45 - 65 dB leads to Hypertension
Especially in Bedroom Window Facing the street, and not having Triple Glazing (Bluhm, et al, 2007)

35 dB - (Indoor Areas) Sleep Disturbance / Speech Intelligibility
45 dB - Moderate Annoyance
55 dB - Serious Annoyance
65 dB - Speech Requires More Vocal Effort
70 dB - Long Exposure causes Hearing Impairment
(Bergland et al., 1999)



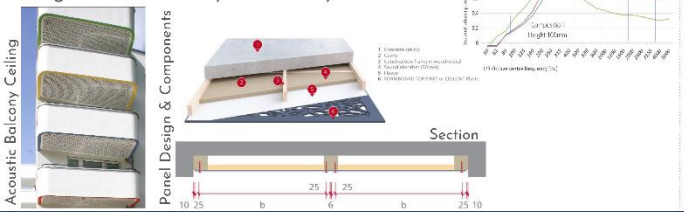
Bodin, et al 2009)

Performance Benchmark: Internal Noise >30 dB
According to Sans 10103 Code 4 - Guidelines 4.1 - Ambient Noise Indoors, Table 1.

Acoustic Design Considerations

Technology

Bruag Acoustic Balcony Acoustic System



Insulation Materials

Knauf Acoustic Insulation

Made from 80% recycled materials, providing an eco-friendly option that enhances building comfort.

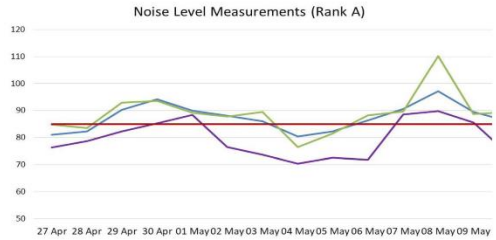
Sound Insulation - 0.89e noise Coefficient

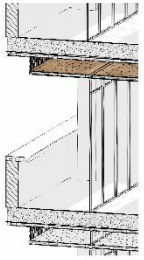
SANS 10103 Standards

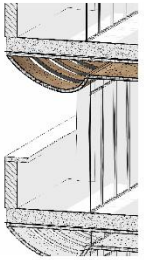
Types of Occupancy or Activity	Design Equivalent Continuous Rating Level for Ambient Noise dBA	Maxim Equivalent Continuous Rating Level for Ambient Noise dBA
General Office areas	40	45
Private Offices	35	40
Living Rooms	35	45
Kitchen	45	55
Bedrooms	**30**	**40**

Sound Levels

Sound Levels were taken at 9:00, after traffic. Noise levels taken at a taxi rank indicate noise levels frequently fall into the 90 dB range. Therefore, traffic noise can be assumed to reach higher than the recorded 72.2 dB.

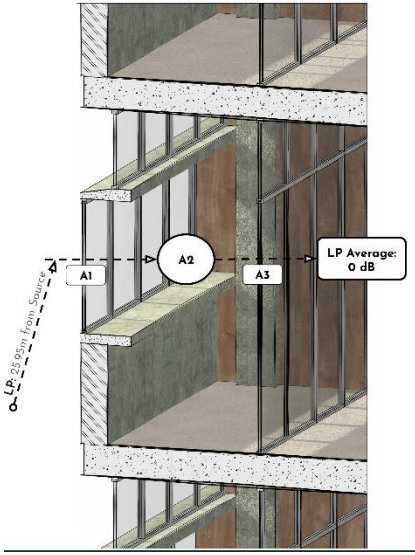






A

Improving Glazing

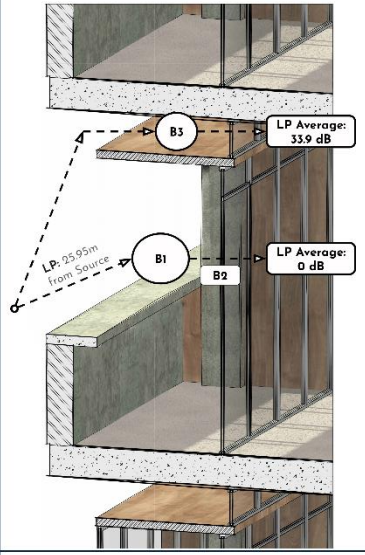


A1
6mm Double Glazing

	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
LP Start	54.1	64.6	62.0	66.1	58.6	66.6
A1 Window Closed						
A1 Glazing Transmission	-35	-39	-43	-47	-51	-55
LP Resultant 1	19.1	25.6	19.0	19.1	7.6	11.6
A2 Room Absorption	-23.7	-25.0	-28.1	-32.7	-36.1	-40.4
LP Resultant 2	0.0	0.0	0.0	0.0	0.0	0.0
∴ No need to calculate A3 Glazing Transmission as LP is zero						
A1 Window Opened						
A2 Room Absorption	23.6	24.9	28.0	32.5	35.8	40.2
LP Resultant 3	30.6	39.8	34.1	33.6	22.8	26.4
A3 Glazing Transmission	-35.0	-39.0	-43.0	-47.0	-51.0	-55.0
LP Resultant 4	0	0.8	0	0	0	0

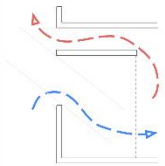
B

Incorporating an Ventilation Shelf

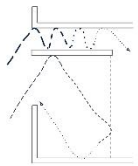


B1
Acoustic Shelf

	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
LP Start	54.1	64.6	62.0	66.1	58.6	66.6
B1 Bottom Window						
B1 Room Absorption	24.4	26.0	28.8	33.0	36.9	41.2
LP Resultant 1	29.7	38.6	33.2	33.2	21.7	25.5
B2 Glazing Transmission	-35	-39	-43	-47	-51	-55
LP Resultant 2	0	0	0	0	0	0
B3 Top Window Open						
B3 Absorption	-20.2	-24.2	-27.1	-31.3	-35.4	-39.5
LP Resultant 3	34.0	40.4	34.9	34.8	23.2	27.1



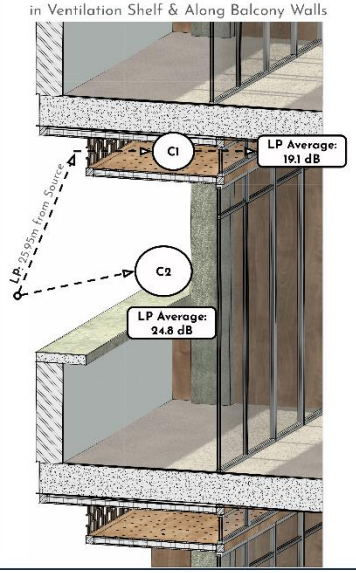
Ventilation



Acoustics

C

Inclusion of Bruag Acoustic Absorption Panels in Ventilation Shelf & Along Balcony Walls



C1
Acoustic Materials

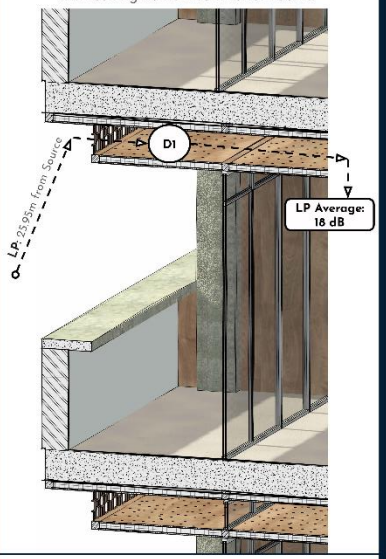
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
LP Start	54.1	64.6	62.0	66.1	58.6	66.6
C1 Top Window						
C1 Absorption	-28.6	-36.6	-42.6	-46.2	-49.7	-53.5
LP Resultant 1	25.5	28.1	19.5	19.9	8.9	13.1
C2 Balcony						
C2 Absorption	-27.2	-32.4	-37.9	-41.7	-45.2	-49.1
LP Resultant 2	26.9	32.2	24.2	34.4	13.4	17.5

Bruag Acoustic Balcony Acoustic System

1	MDF Design	4	Ventilation System
2	Felt	6	MDF Design
3	Sound Insulation	7	Sub-Frame

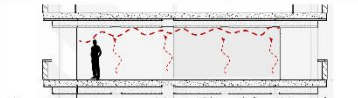
D

Extend the Acoustic/Ventilation Shelf with ceiling vents into interior rooms

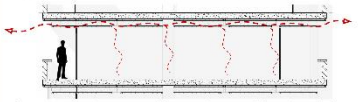


D1
Acoustic Shelf Extension

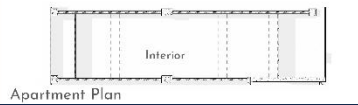
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
LP Start	54.1	64.6	62.0	66.1	58.6	66.6
D Top Window						
D1 Absorption	-35	-39	-43	-47	-51	-55
LP Resultant 1	23.5	26.9	18.6	19.0	8.0	12.2



Apartment Section - Vents Closed for Warmth



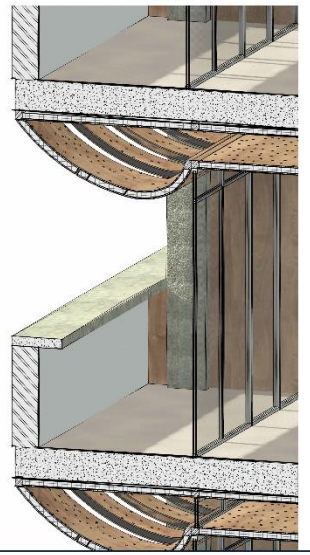
Apartment Section - Vents Opened for Fresh Air



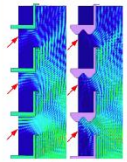
Apartment Plan

E

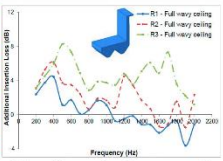
Wavy Reflection & Absorption Treatment



Undulating Balcony Ceiling with Helmholtz Resonators



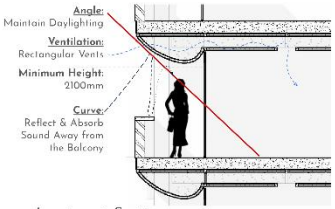
Acoustic Pressure Contours around the Balcony for Both Uniform Ledge (Left) and Full Wavy Ceiling (right) Designs (Ian & Ang, 2004)



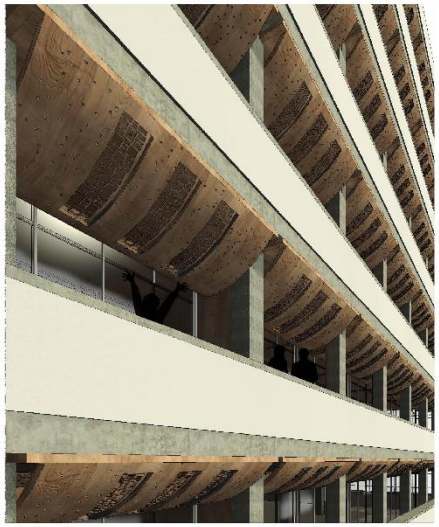
Additional Insertion Loss Characteristics of the Balcony with a Wavy Ceiling (Ian & Ang, 2004)

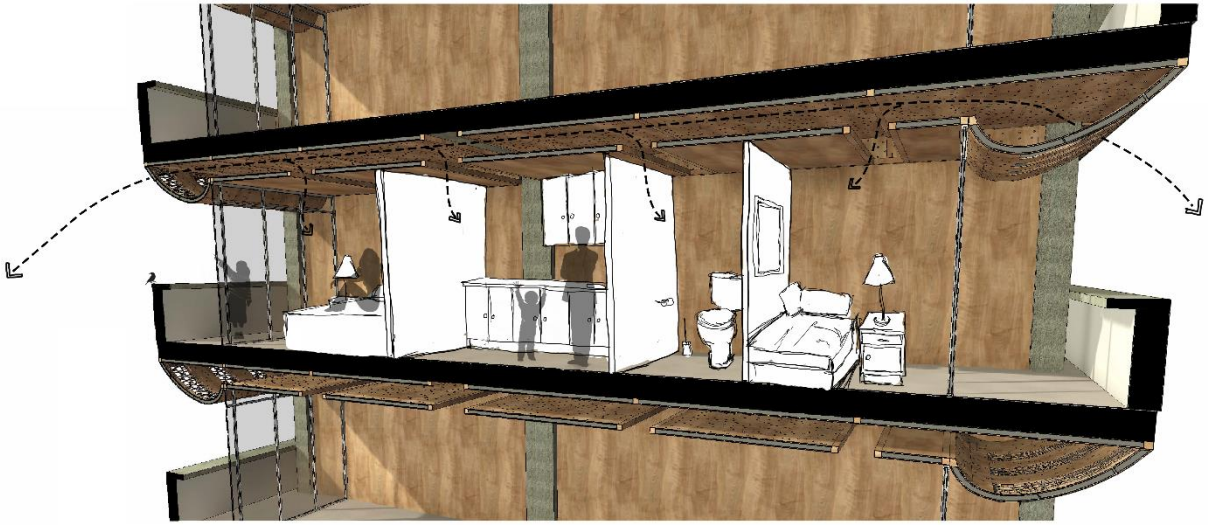
Average LP Loss = -4 dBA

Design Informants



Apartment Section





Traffic Noise:
74 dBA

Facade System:
-56 dBA

3rd Flr Ambient Noise:
18 dBA

High Traffic Noise:
90 dBA

Facade System:
-56 dBA

3rd Flr Ambient Noise:
34 dBA

Atrium Noise:
78 dBA
(Ochiabuto et al., 2020)

Facade System:
-56 dBA

3rd Flr Ambient Noise:
22 dBA

Amphitheatre Noise
55 dBA
(Ochiabuto et al., 2020)

Facade System:
-56 dBA

3rd Flr Ambient Noise:
0 dBA

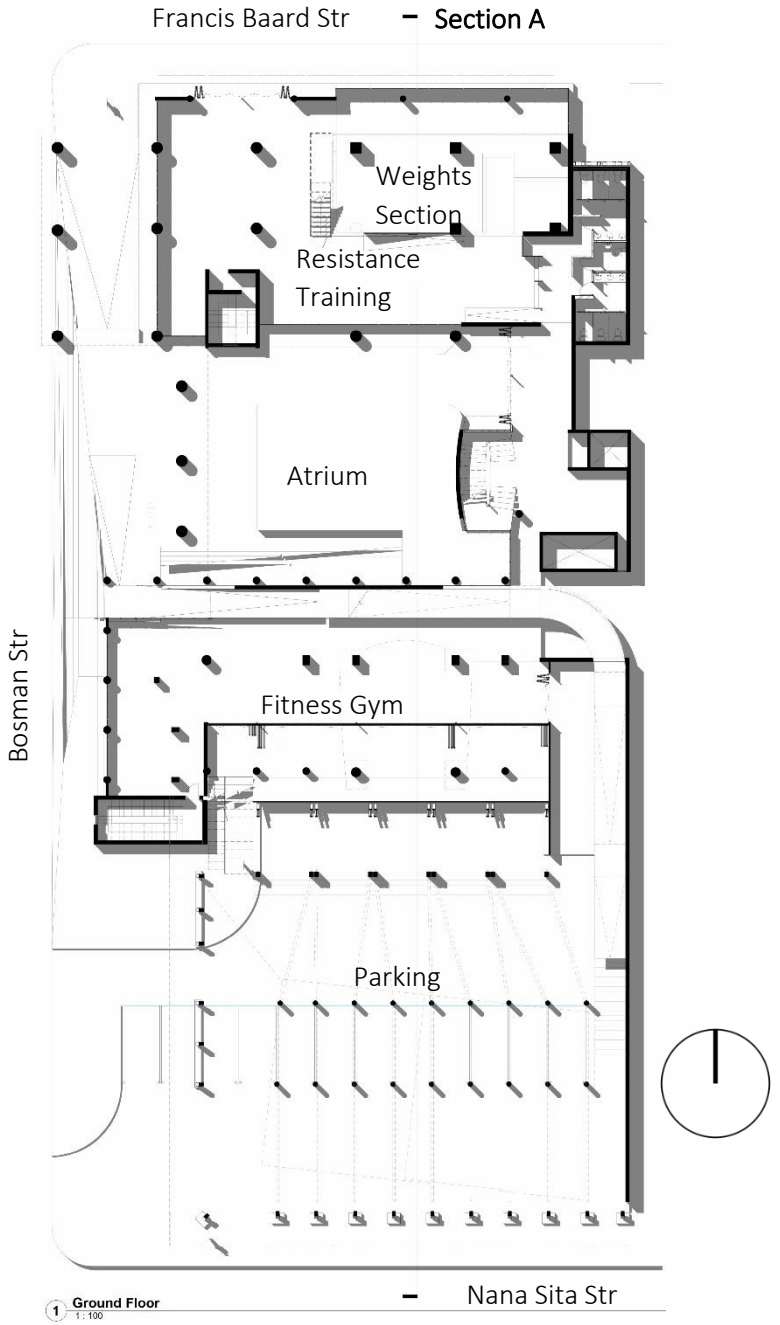
Chapter 6 – PROPOSITION – Current Iteration

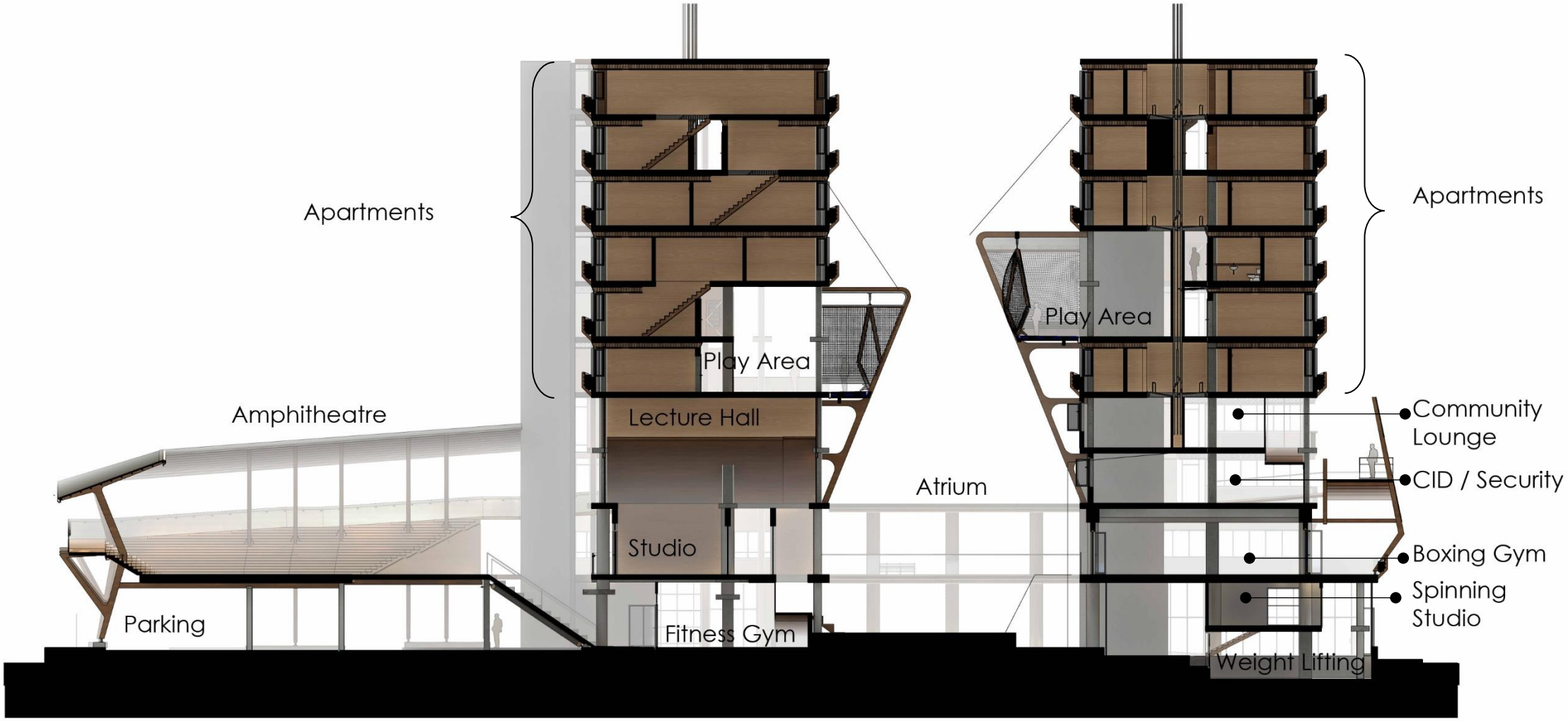
The final design iterates the promenade, acoustic ceilings, amphitheatre, apartment configuration, service articulation, and façade edge. The promenade invites the public off the atrium, to the amphitheatre on the first floor. The atrium is public at all hours of the day, while the amphitheatre is closed in the evenings to provide secure access for the residents.

The atrium design is purposely iterated to suggest a performance space. The GLT structure supports the play area floor slab extensions on both blocks. The loud programs in the centre of the project are protected using the acoustic panels, and play area floor slabs, reducing the sound on the façade edge.

The design incorporates various sound barriers on the North and South edge to prevent sound from entering the building. Polycarbonate panels are used to allow light in, provide visual privacy and acts as a sound reflector.

The promenade was designed as the medium of passive security. Effectively screening off any residents who don't below through long walkways. It also conveys the narrative of biophilia, creating interesting spaces that create curiosity and inspire play through prospect, refuge, peril, and mystery.



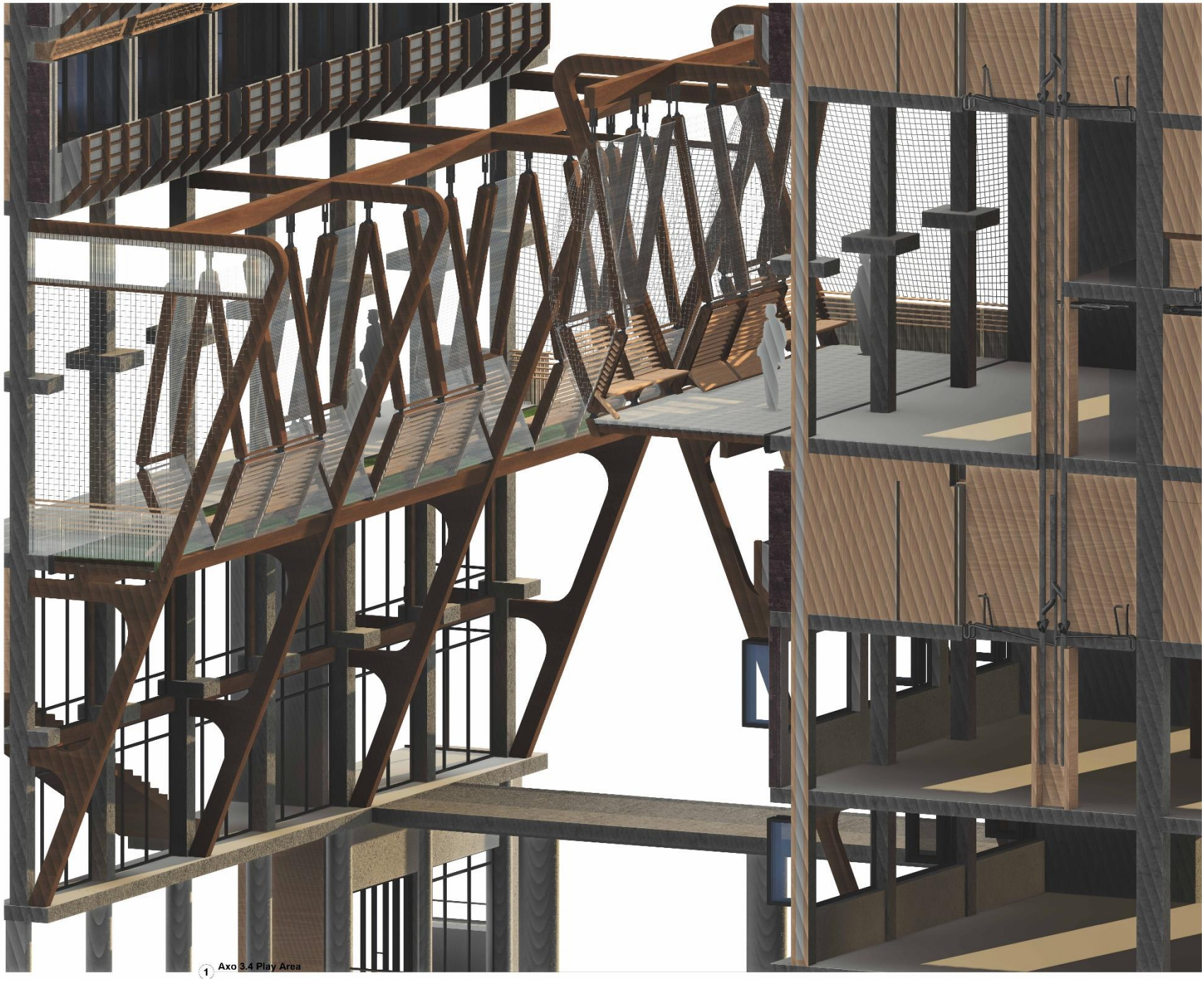


Section A: 1:300

The Play Area

The play area is an open area for children to play, run, climb, and hide. This 5th and 6th floor void in the building provides space for children to be inspired. Incorporating changeable elements on the building's boundary, and permeable, climbable facades, the children's curiosity can be explored. The design iterations explored the creation of spaces that are functionally safe, as well as inspire protection, allowing parents piece of mind if children are not supervised. The open area incorporates soft materials, changeable seating, and durable materials to endure hard impacts from balls, sticks or other materials children find in the city.

The play area is mostly open, inviting wind and rain into the building. Water and drainage have been carefully considered.



The Amphitheatre 1

The amphitheatre is accessible via the fitness gym's embankment and promenade. The soft rubber embankment inspires both children and adults to physically express themselves. It serves as a fitness tool for the gym members, allowing them alternative terrain not normally found in cityscapes, to assess their fitness and physical capabilities. This embankment extends its use out into the amphitheatre, creating the foundations for a obstacle course. The embankment also doubles as a playground accessory for the children. Running up, rolling down or pulling on rope, the embankment is accessible for all who are allowed in the amphitheatre, even after the gym closes. The base of the embankment is appropriately water treated, and enough space is given for a 'run up' and to slow down before the users reach the façade.

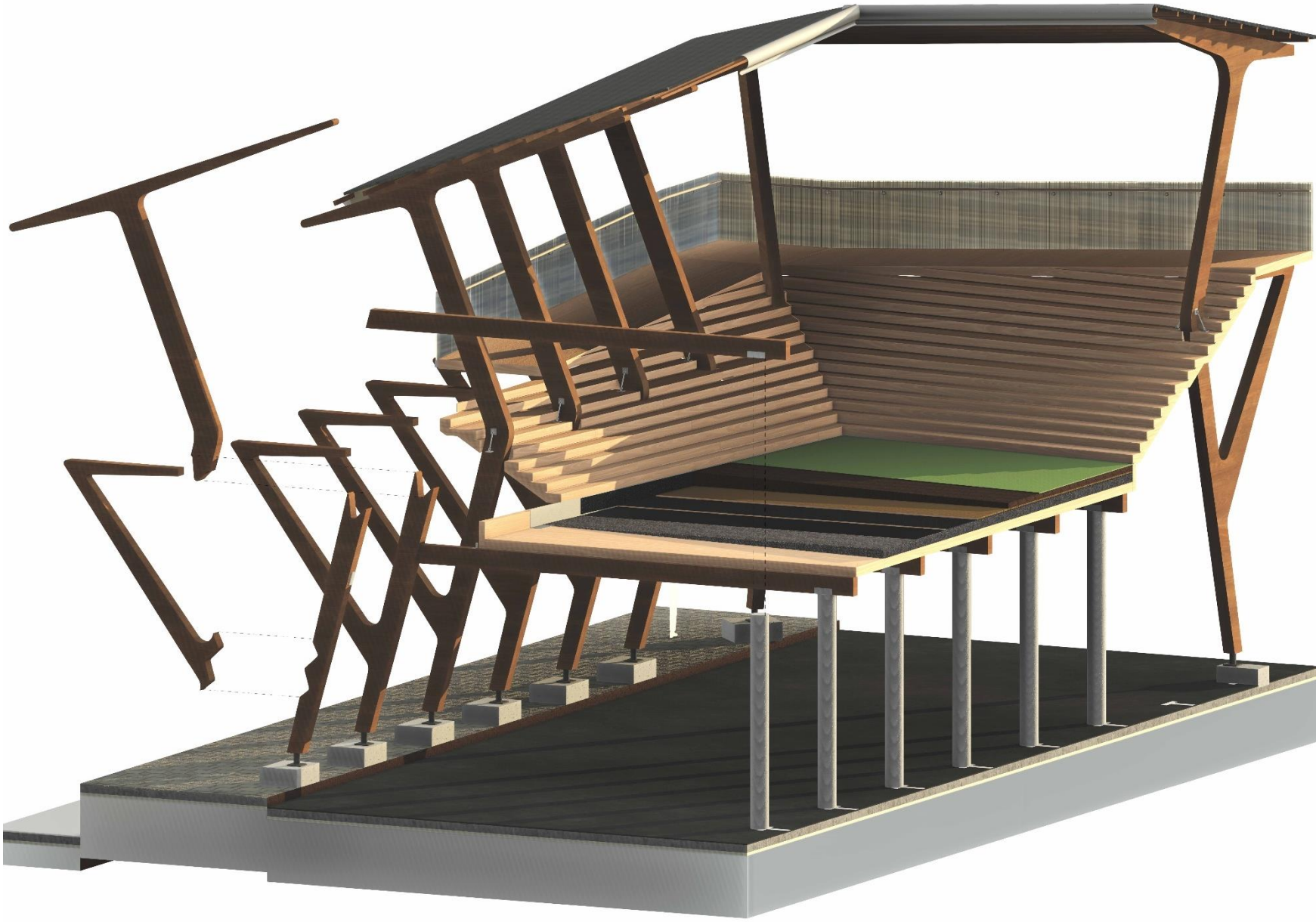
2 Axo 3.1 Embankment

The Amphitheatre 2

A hard boundary is given to the street edge of the amphitheatre. The grandstand, floor and promenade are made of lightweight CLT and GLT structural members, lifted off the street edge by concrete columns and GLT columns.

These columns give back to the street by providing seating at their bases, allowing the design to further develop natural foliage to further give to the street edge users.

The barrier of the amphitheatres edge reduces the loud noise from Nana Sita, provides serenity to the building. The promenade, therefore, acts as the barrier, while providing framed views into the city. The sports field in the centre of the amphitheatre acts as a performance space, allowing for play. The promenade and grandstands allow for supervision, as well as audience members to embrace a sense of community and Identity.



Chapter 7 – POSTLUDE – Conclusion

The Design Process & Outcome

An adaptive reuse design process is vastly different from a traditional new build. The aspects of the existing building become the site and context analysis, and therefor, must be respected. Deciding whether to remove or maintain existing components of the building brings the buildings character, gestalt, and functionality into question. Before creating anything new, the author was tasked with carefully removing parts of the building that weren't serving the new programs purpose or greater community. Additionally, parts of the building that served the program, design concepts, or community were bolstered, enhancing the concentration of the buildings design. This careful collaboration with the architect, Strauss Brink, outside of time, was one of shared views and excitement. Working with an esteemed, seasoned, architect, and assisting with bringing his voice to the new century was an honour and provided the author with tremendous growth.

Strauss Brink looked to create places of harmony and healing for inner-city inhabitants. Inspired by this design outcome, the new adaption of the HB Philips building bolsters these principles idea by creating places of play and performance at different scales. Public spaces allow the building to embrace the cities inhabitants and welcome them to participate in space making and identity creation. The atrium and amphitheatre work together as a public and semi-public space, providing spaces of interaction and protection for the city and the buildings residents.

The promenade facilitates the transitions from public to private, allowing a seamless entry into the building through various thresholds, narrating a journey of discovery for the public and protection for the inhabitants.

The play spaces and communal areas at the base of the apartments serve to break the isolation between city residents, creating functional spaces where communities can engage and develop.

Project Value

The unfortunate consequences of city living have extremely negative effects on children and adults. Few strategies and solutions have been developed to incorporate social spaces that invite the autonomous nature of children, provide passive security, and create a sense of layered nature within a city context.

Linking these concepts creates a unique opportunity to create an alternative view of inner-city living, with differing infrastructural outcomes. This challenges traditional ideas of inner-city living, and seemingly works against traditional means of security, protection, and play. By seamlessly connecting these concepts of openness, passive surveillance, extended views, and performance spaces, design can feel safe and secure while maintaining adaptability and openness. Challenging how buildings relate to the street edge and how safe, secure, and at peace inhabitants can feel within a bustling city.

As cities functionality change, the infrastructural outcomes must adapt to serve the new purpose. The Pretoria CBD has historically rich infrastructural value, it is vital to feed into this functional system and adapt it to suite the needs of the inhabitants desperate to create a sense of home.

Critical Reflection

Communities have complex social paradigms and networks that cannot be solely influenced by architecture. However, South Africa has not been given the chance to develop purposefully. If concerted effort were given to political and infrastructural development, to empower cultural and social programs, they would see greater effects. The people of South Africa could develop into a proud and bustling culture, full of song, dance, and play. This cultural revolution can define deeply personal questions of identity and value.

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