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Title

NEW BREATH FOR JOHANNESBURG: Adaptive Reuse of Ponte Tower and the Imagining of Witpoortjie Tower as Catalysts that Foster Urban and Social Growth

By

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New Breath for Johannesburg

Adaptive Reuse of Ponte Tower and the Imagining of Witpoortjie Tower as Catalysts that Foster Urban and Social Growth

A Thesis
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ABSTRACT

Adaptive reuse is the architecture of the future. In every single metropolis, city, town or village there are buildings that are decrepit, dysfunctional, or disused. In the future, adaptive reuse will encompass a huge percentage of architecture projects. In many areas giving new life to one of these buildings can act as a starting point for the surrounding area to come back to life, as they are usually not the only part of a neighborhood that needs help. This thesis explored how using architecture and adaptive reuse as a catalyst for urban revitalization can bring new life to a downtown area.

ACKNOWLEDGMENTS

I would like to thank Regin Schwaen for guiding and supporting this project through two semesters as my thesis advisor. This project would not have been what it was without his insights.

I would like to thank my parents, Paul and Carrie Seelhammer, for supporting me and giving ideas throughout this process. Paul acted as my proxy for site visits, taking pictures and collecting information for me in Johannesburg.

I would like to thank Ali Visage for speaking to me in an interview. Her unique insight as someone who lived near the site during its heyday was instrumental in my decisions on what to include in the project.

DEDICATION

I dedicate my thesis to my grandparents, Bill and Mary Seelhammer. Throughout my five years of school, they have supported me with check-in phone calls, attending presentations, proof reading, and grocery store trips. I would not have succeeded at NDSU without their constant love and support.

TABLE OF CONTENTS

LIST OF FIGURES

Thesis Proposal

1.1 Introduction

Dirty, dangerous, crime infested. These are all words I regularly hear people use when describing downtown Johannesburg. I lived in Johannesburg with my parents and four siblings from 2012 to 2019. During those years I never once visited the inner city, being warned away by every friend and local. I was always curious about what caused the largest city in the country to become so unsafe; was it the aftermath of Apartheid? Negligence of the governing bodies? Lack of funding? Later, I started to realize that it may have been all the above. It got me interested in how someone could help to revitalize the inner city, to build toward a new future of community and progress.

Downtowns are the key to successful cities. They foster a sense of community, showcase local culture, and provide a place for entertainment. They are immensely important for a successful city; this thesis intends to explore how using architecture as a catalyst for urban revitalization can bring new life to a downtown area.

Figure 1 Masweneng, S. City Buildings with View of the Ponte City Apartments. [Photo]

Ponte Tower is a 54-story tower in the midst of downtown. It was built in 1975 at the height of Apartheid, which was the complete segregation throughout the whole country which started in 1948 and lasted until 1994 when Nelson Mandela became the first president of the new Democratic government. It is the tallest residential building in Africa at 567 feet, and for the first years of its life the penthouses had saunas and hot tubs, modern art, and in pure 70s fashion had orange carpet on their walls (Henderson, 2023). It was viewed as an extremely desirable place to live due to its location with amazing views of the city, until the mid-80's and 90's when gangs and crime started to engulf the structure, causing a shift from a symbol of lavishness and pride into a symbol of everything that was wrong with downtown. Trash thrown out of windows into the center piled up 14 stories high, informal brothels and drug dealing operations were common, and over 50% of the apartments were unlivable (Henderson, 2023). Starting in 2001, a developer and investors put some money into Ponte and its apartments were transformed to be at least slightly livable while people started to move in. The current condition of the building is far from ideal, with numerous spaces remaining dirty, gloomy, and unfinished as the developers' huge plans and dreams fell short of funding needed for complete renovation. As of 2017, apartments were largely cleaned up and made livable, but community spaces and infrastructure such as the creaky elevators, or fundamental problems such as lack of safe evacuation routes, have not been addressed (*Ponte*, 2009).

The tragic descent into an urban slum prompts this thesis to create a plan for revitalization and modernization of the tower, as well as connecting the tower with new elements in the surrounding urban fabric. As you observe the surroundings, you discover the treasures and value of the location. Three universities are within walking distance, Johannesburg Stadium and Ellis Park Stadium are across the street. There is opportunity for urban green space and walking paths intertwined throughout the area. All in all, this thesis will put forward a captivating and new future for downtown Johannesburg, using Witpoortjie Tower and Ponte Tower as the driving force. This is a catalyst. This is a rebirth. This is a future. This is for the people.

1.2 Problem Statement

New Breath for Johannesburg will involve invigorating a section of downtown Johannesburg through designing a new tower, positioned right across the road from Ponte and connected to it by an elevated walkway. It will also involve the adaptive reuse of Ponte Tower, adding various spaces such as student housing, apartments, retail opportunities, greenhouse floors, and community gathering spots.. This new tower will be a commercial and economic powerhouse to bring jobs, money, and activity back to downtown. Prioritizing sustainability and safety, the focus lies on revitalization and community engagement. The towers will be a catalyst for urban renewal and will invigorate the surrounding urban fabric to better support the communities of Johannesburg.

Figure 2 Blais, C. (2023). View from Inside Ponte Tower Looking up to the Sky. [Photo]

1.3 Literature Review

Shenzhen Women's and Children Center

Designed by MVRDV Architects in Shenzhen, China

"The MVRDV-designed Shenzhen Women & Children's Centre transforms an old mixed-use tower built in 1994 into a vibrant and colourful skyscraper hosting a hotel and a wide range of facilities for the welfare of women and children: a library, an auditorium, a children's theatre and "discovery hall", as well as therapy rooms and offices for staff." (*Shenzhen Women & Children's Center / MVRDV*, 2023). A wonderful example of adaptive reuse, the new tower serves the community as a new hub of activity and happiness. The Shenzhen project's emphasis on community involvement and urban revitalization draws a parallel to this thesis's objectives. By actively engaging communities and reinvigorating neglected buildings, both the Shenzhen project and this thesis aim to address the critical issue of underutilized urban spaces, fostering an environment where people are encouraged to actively participate and thrive within their city centers.

Figure 2 Zhi, X. (2023). View from street. [Picture]

CasaNova and The Muse Towers

Designed by Barcode Architects in Rotterdam, The Netherlands

The CasaNova is a tower designed in tandem with the existing Muse Tower. The two towers share a plinth and mutual community spaces such as a rooftop garden and kitchen, fitness area, meetings rooms, and parcel room. The fluid circulation and casual encounters of residents from each tower is essential to allow residents to form a sense of community and social cohesion. The plinth of the buildings include commercial, retail and entertainment opportunities available to all the residents of the city (*CasaNova Building / Barcode Architects*, 2023). The relevance of these towers to this thesis lies in fostering community connections and the symbiotic use of shared spaces. The project's vision involves establishing a new tower in proximity to Ponte Tower, connected by an elevated walkway. This walkway aims to link community spaces reminiscent of the gathering spaces and lush greenery seen on the plinth of the CasaNova and Muse Towers.

Figure 3 Wilschut, H. (2023). View of Towers. (Right tower is CasaNova, left is The Muse). [Photo]

Quay Quarter Tower

Designed by 3XN Architects in Sydney, Australia

The Quay Quarter Tower is one of the largest adaptive reuse projects in the world, being formed around an old mixed-use tower, the AMP Center. Built in 1976, the tower was reaching the end of its life cycle and was in need of a solution to revive it. By reusing 65% of the original structure and 95% of the original core the project was able to attain a embodied carbon saving of 7.3 million kilograms (*Quay Quarter Tower / 3XN*, 2023). This project is a prime example of large-scale adaptive reuse and the benefit it has on the environment. Its relation to this thesis is the embodied carbon savings. By saving the concrete structure and core it allows for the same type of embodied carbon savings as Quay Quarter Tower. Although Ponte won't involve a full re-design like this tower, it will still be a fresh addition to the Johannesburg skyline.

Figure 4 Mørk, A. (2022). Tower in the Fog. [Picture]

1.4 Intended Audience

The intended audience is the entire Johannesburg population, as it intends to be the catalyst for revitalizing downtown and bringing activity back to the area. A more focused audience will be families with kids, residents from a full range of incomes, students from the three universities, businesses looking for retail space, and tourists visiting the city. Downtown Johannesburg is not the only place in the city that could benefit from the same upgrades and redesign that this thesis is proposing. There are many suburbs and districts that have their own downtown areas that suffer from similar, if less extreme, problems. This thesis aims to offer examples that any commercial or downtown district can use to begin renewal.

1.5 Goals and Methods

The goal of this project is to turn Ponte Tower into a nucleus of activity, as well as bring new people and jobs into downtown Johannesburg by constructing the Witpoortjie Tower as a commercial hub. Research will focus on adaptive reuse strategies, the intricacies of tower design, sustainable and green technology, urban green space, community and culture, the economic and social impact of the project, and safety and security in a downtown area.

1.6 Schedule

Oct. – Thesis proposal development.

Nov. – Finish proposal.

Dec. – Finish research.

Jan. – Develop floor plans through bubble diagrams, create program, develop bridge spaces.

Feb. – Refine plans, form, and bridge spaces.

Mar. – Production of renders, final diagrams etc.

Apr. – Finish other miscellaneous renders and diagrams.

1.7 Ali Visage Interview

Ali Visage is a close family friend and someone who has personal connections to Ponte and the Hillbrow area. Her first experiences with the area were in 1988 and 1989 when she visited her brother who was living in the area at the time. This was during the time when Apartheid was coming to an end and the restrictions on people of color were starting to relax. Hillbrow was a safe and vibrant area of shops,

restaurants and places for young people to gather and socialize while living and working close by. Ali experienced the area right before the madness and crime took over the area. She said that the nickname for Ponte was 'Suicide City' because many people would choose to end their lives in the core of Ponte. Rumors about murder and other crime ran rampant and contributed to the notoriety of the building and neighborhood. Ali told me that Hillbrow needs something to come in and bring the life and vibrance back, as her memories of the area are happy and joyful ones of friends and a beautiful culture. This is what I am aiming to achieve with this thesis; a revival of the safe and amazing history of Hillbrow and Ponte.

1.8 Personal Investment

I am personally invested in this topic because of my experiences growing up in Johannesburg and the issues I noticed while there: societal issues such as homelessness and out of control crime, economic issues such as inflation and unemployment, and the general lack of governmental impact on these issues. I want to create an architectural solution that addresses these issues and proposes a way for the built environment to support a new life for downtown so that the people and communities of Johannesburg can come together to solve these issues in the future.

Although most of the information given so far in this thesis is about negative events, they are not the whole story of Johannesburg. The reason I am striving to unravel these issues is because of the good experiences the city and South Africa have given me. I didn't fully appreciate these experiences until after I left and started to reflect on the people I encountered, the food I experienced, the moments spent with friends and family, and the vibrant culture and life. I want to research topics that will allow me to create a design solution that will be a fresh breath of life for the communities of Johannesburg, as well as celebrate the aspects that make South Africa unique.

2.0 Background

2.1 Project Type

The typology of the project is adaptive reuse of an existing skyscraper, utilizing the building to support its residents in new ways. The project also includes construction of a new skyscraper connected to Ponte by 300 ft long pedestrian bridges. This typology is unique and has never been done before, but located nearby is Braamfontein Gate, a large-scale adaptive reuse project by Johannesburg firm Local Studio. The skyscraper was originally the headquarters of Total Oil Company. Local Studio transformed it into residential units on a similar scale to Ponte Tower. They also propositioned the city to allow them to construct the Rissik Str. Promenade adjacent to the tower, which is somewhat similar to the way this thesis is designing the new tower (*Braamfontein Gate – Local Studio*, n.d.). Braamfontein Gate acts as a sort of proof of concept for this thesis, as it was completed under similar circumstances and location.

2.2 Project Issues

This thesis is trying to solve issues of urban decay, dangerous urban conditions, and lack of community involvement and engagement. Hillbrow is notoriously dangerous, so everyone who lives in surrounding neighborhoods and in the Greater Johannesburg area mostly try to avoid it.

It also aims to propose a possible way to grow the economy of Hillbrow by bringing in new jobs and opportunities with the new tower. The influx of money into the area would help with supporting people who need help with housing, food, or clothes. This would then feed into helping these same people attend universities or get jobs to support their families.

3.0 Methodology

3.1 Project Location (Larger Scale)

The proposed project location is in Berea, a district of downtown Johannesburg, South Africa. The tower is positioned at 1 Lily Ave, Berea and is set on the cusp of a ridge that overlooks the University of Johannesburg with two stadiums and the rest of downtown in the background. Johannesburg is a subtropical highland climate with dry, nearly rain-free winters and mildly hot summers, perfect conditions for solar panels and passive heating during the cloudless winter. The city sits on the Highveld which is South Africa's central plateau and runs along a set of jagged rocky hills called the Witwatersrand (*Johannesburg*, n.d.). A veld is a large open area of plains and highlands covered with dry grasses, red

dirt, and minimal vegetation and is categorized by elevation into high, middle, or lowveld. A rand describes faults that run along the rocky ridges crisscrossing South Africa's highlands which contained gold, and also separate large districts of Johannesburg such as the Midrand or Westrand (*Johannesburg*, n.d.). These gold deposits started the largest international gold rush in history. The sheer wealth of the region grew Johannesburg out of nothing to become an international economic powerhouse.

Figure 5 Getty Images. (Taken some time in the mid-1900s.) Eloff Street in Johannesburg Central Business District [Photo]

Downtown grew out of this wealth and buildings like Ponte Tower were constructed through the prosperous, yet turmoil-filled, period of Apartheid. Towards the end of Apartheid and after the Soweto Uprising, the explosion of crime and gangs took over Ponte and many other buildings and areas; hundreds of buildings were hijacked and destroyed during this time. The hijacking of a building involves a group of criminals taking over a building, removing lawful owners, and forcing residents to pay them instead, often under threats of physical harm (Henderson, 2023). The Inner City Property Scheme estimates that 400 buildings in the inner city are hijacked (Reporter, 2015). This growth of crime has led to the current state of downtown Johannesburg as a dangerous and poorly upkept area. Over time this

caused the overall degradation and decay of the Tower, which, as stated earlier, is the problem this thesis is addressing. The overall economic and government decay of South Africa has continued into current times and has even gotten worse.

3.2 Project Location (Smaller Scale)

Hillbrow is a neighborhood that is imbued in history. During the segregation of Apartheid, the area became a 'grey-area,' a neighborhood that had people of different races living together. Hillbrow became known as the place to go for acceptance and safety. It is a densely packed urban area of many run-down buildings. On the cusp of the ridge overlooking the neighborhood stands Ponte Tower.

3.3 Specific Site

The site is 1 Lily Ave, which is the site of Ponte Tower. The site also includes the open lot across the road from Ponte, that I have named 2 Lily Ave. The terrain of 2 Lily Ave is rocky and at a steep elevation. It is covered by Indigenous plant life and grasses, making it feel like you are not in the middle of a metropolis.

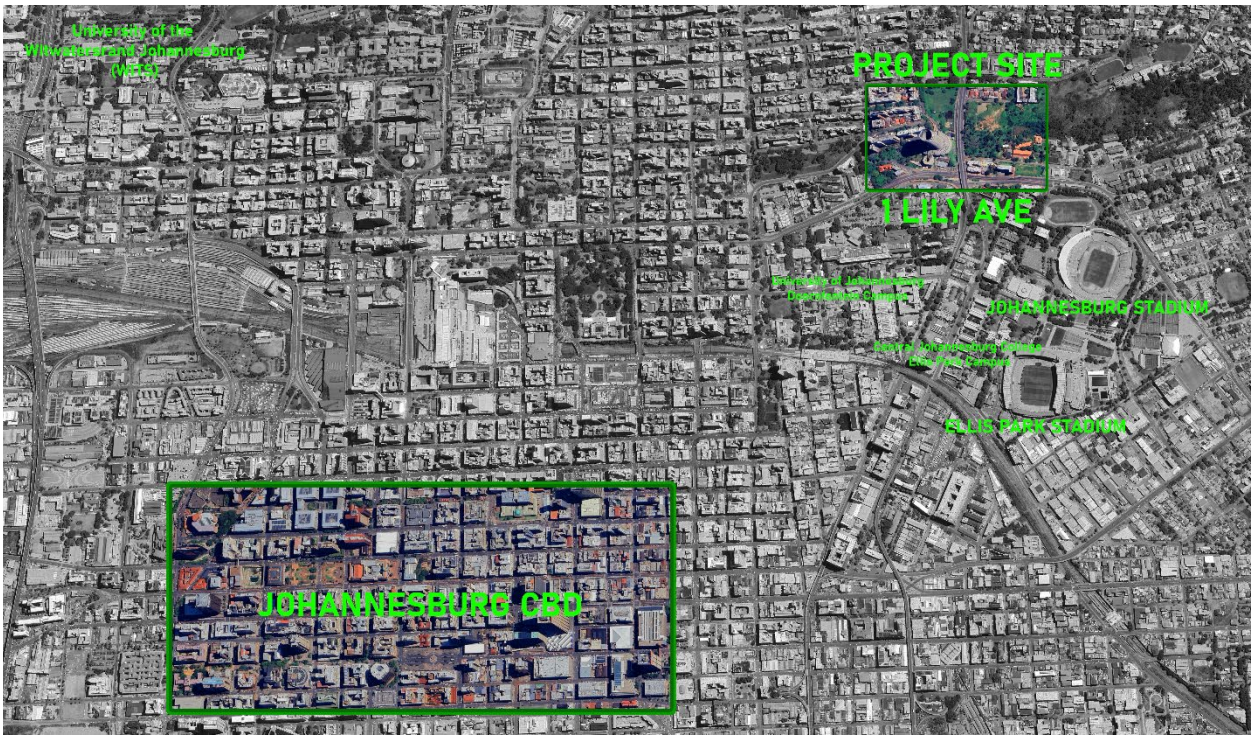

Figure 5 Google Earth. [2024]. Site Overview.

3.4 Research

This section includes research done to support the thesis project. It scales every aspect of the thesis and provides examples, information, and inspiration for future design. It also acts as a resource for future students or professionals that are attempting similar projects.

Adaptive Reuse

Adaptive reuse is the process of taking an old, unused, decaying building and bringing it back to life as a new building typology. Think of a rundown factory becoming a school building, or an old warehouse being turned into lofts and apartments. Beautifully preserving the history of old buildings is an art form, and every aspect of the building, from the foundation to its structure, to the details of its skin and windows must be brought into the equation when designing.

Benefits of Adaptive Reuse

One of the most attractive reasons to pursue adaptive reuse is the embodied carbon savings of projects. Embodied carbon describes the amount of carbon emitted to harvest raw materials, manufacture building materials, and the installation of these materials (*Embodied Carbon*, n.d.). Essentially, it is the environmental cost of constructing a building. Think about how much concrete, steel, and other building materials go into a new skyscraper. NewStudio Architecture writes in a forum that, “The building sector makes up a whopping 40% of annual global carbon emissions (*Adaptive Reuse*, 2023). The global Architecture 2030 initiative states that, “cement manufacturing alone accounts for 11% of global CO2 emissions” (*Adaptive Reuse*, 2023). These numbers are devastating and show the need to adapt and figure out new ways to improve the built environment for the future. Adaptive reuse has been gaining momentum for decades as the new way to solve the emission crisis of the construction and building industry. A famous saying by architect and sustainability expert Carl Elefante states that, “The greenest building is the one that is already built” (*How Adaptive Reuse Gives Defunct Buildings New Leases on Life*, 2022). Using an old building as a ‘host’ for new urban life saves money and construction time, which plays into creating a sustainable and healthy future. It extends the lives of buildings that have outlived their original purpose or buildings that have fallen into disrepair. Collectively, the architecture world predicts that 90% of real-estate development for the next decade will be centered around adaptive reuse. (*How Adaptive Reuse Gives Defunct Buildings New Leases on Life*, 2022).

Unique Design Opportunities

Adaptive reuse offers new and unique design opportunities such as preserving historic buildings' history and aesthetics, reusing materials that may be aged or rough and have character, and revealing new spaces and environments within the building envelope. Around the world there are buildings in every architectural style that are nearing the end of their life and becoming run-down, unsafe, and abandoned. Taking care of this history not only affects the built environment but allows a unique sense of place to be created and new communities to be formed. Instead of demolishing an old building because it is not up to code or is not energy efficient, we can retrofit these buildings with green technology or design a way to bring it back up to code.

Sustainable and Green Technology

Sustainability is a major part of this thesis, and it will extend beyond the conventional environmental focus to encompass a holistic approach that considers social, economic, and cultural dimensions. The goal is to explore solutions and strategies that not only mitigate environmental impacts but also contribute to the well-being of the new communities formed, as well as emphasize the importance of a sustainable future for both current and future generations.

Solar and Rain Collection

Johannesburg's solar energy potential is nearly unlimited. The sun shines for an average 72.6% of daylight hours throughout the whole year, a notable contrast to roughly 55% sunny hours in Fargo, North Dakota. Furthermore, during winter from May to August there is hardly a cloud in the sky, adding to the solar potential (*Sunshine & Daylight Hours in Johannesburg, South Africa Sunlight, Cloud & Day Length*, n.d.). The circular design of Ponte Tower offers a distinct advantage for solar integration. By strategically placing solar arrays on the northern half of the building, complete coverage from sunrise to sunset can be achieved. This arrangement ensures that the panels are constantly facing the sun as it moves across the sky. The world of solar integration in solar panels is expanding every year, with new design and technology solutions being created to solve energy and sustainability issues around the world.

Technology

The most promising innovations in relation to this thesis are Building-Integrated Photovoltaics and photovoltaic glass. Building-Integrated Photovoltaics are simply incorporating solar panels into the façade

and envelope of a building, allowing the panels to become a part of the architecture while also providing a large amount of sustainable power (*Redefining Skyscraper Power Harnessing Solar Energy from Above*, n.d.). Photovoltaic glass is the product of embedding photovoltaic cells into glass that absorb light and generate electricity from the sun passing through. There are many different technologies within the realm of photovoltaic glass, but the most promising for building applications are Tandem Semi-Transparent Perovskite solar cells. This is a long name of confusing words, but it combines the mineral perovskite with the more traditional silicon of a solar cell to increase efficiency as well as making the cells semi-transparent for use in windows. The part that makes this promising is that this technology has a 12.7% efficiency for converting light to electricity as well as a 77% transparency, ensuring proper visibility for use in buildings (smartglassworld, 2022).

Rain collection will be an integral part of sustainability for this thesis. During the dry winter, there is almost no precipitation which has caused major droughts in the past. Storing rain during the summer and using it for anything from drinking water to watering plants and flushing toilets will go a long way in reducing the impact of future droughts. This project could also offer the collected water to surrounding buildings and people, dependent on the amount of water able to be collected.

The collection systems for rainwater could vary from green roofs that drain excess water into storage, 'blue' roofs that are a more active solution and involve collection trays, pipes, valves, etc., or collection points placed on the sides of the buildings to catch rain that hits the side of the building and runs down to ground level. Blue roofs are an interesting way to handle large amounts of rainwater and easily capture it (Daniel, 2017). Although average yearly rainfall is not particularly large, Johannesburg regularly receives extreme precipitation. The storm intensity and amount of rain that falls within that short period of time show a need for a roof system capable of handling this precipitation to prevent water from running off the roof.

Blue roofs most commonly involve a collection basin of less than 1 foot (0.3m) deep, although the exact specifications are designed based on the climate of the site. The New York Department of Environmental Protection was among the first to start implementing automated systems that require minimal human interaction to function, which dropped the cost of operation drastically. A green roof can cost up to $20/sf for installation, while a blue roof can cost as little as $1/sf. Buildings such as the Solaire

in NYC utilize blue roof technology to catch rainwater for uses such as flushing toilets or irrigation (Daniel, 2017).

Biophilic Design

Biophilic design is essentially bringing the outdoors inside, although that is a simplification of the topic. Connection to nature is a base need of humans and contributes to increased health, happiness and productivity ("What Is and Is Not Biophilic Design," n.d.). Stephen R. Kellert says in his article, 'What is and Is not Biophilic Design?' that "Since today's "natural habitat" is largely the built environment, where we now spend 90% of our time, biophilic design seeks to satisfy our innate need to affiliate with nature in modern buildings and cities."

Biophilic design focuses on a whole ecosystem, rather than one single isolated occurrence of nature. All plants, trees, algae, and organisms out in the world are intertwined to form an ecosystem, so making sure the habitat is functioning at the same level it would out in the wild is important to ensure healthy and successful green integration. Biophilic design also relies on continuously contacting the occupants with nature to further enforce the complete integration of an ecosystem into the building ("What Is and Is Not Biophilic Design," n.d.).

Figure 6 Lam, C. (2022). Singapore Airport Water Feature. [Picture]

The Fynbos

Cape Town, South Africa has produced the first biophilic building in Africa, the Fynbos. It is a mixed-use building that integrates plant life through an exterior vertical garden and interior plant life. Because Cape Town has a Mediterranean climate, the summers are almost completely free of rain. This is a contrast to Johannesburg where the winter is precipitation free, but they both have the same problem. The Fynbos solves this problem with highly engineered systems for water collection, drainage control, and reusing every bit of water possible. Solar panels integrated onto the balconies and exterior faces provide part of the energy consumption (“Fynbos,” n.d.). The same strategies used in the Fynbos can be used in Johannesburg, as both sites have the same advantages and disadvantages but during opposite seasons.

Figure 7 TwentyEightZeroTwo Architects. (2021). Exterior View of the Fynbos. [Render]

Passive Heating and Cooling

In moderate climates such as Johannesburg, passive heating and cooling are easily achieved as it never reaches very low temperatures in the winter and has mild summers. Thermal design can save money while still regulating temperatures indoors. Traditionally not many homes or apartments are heated and cooled in South Africa. The biophilic design researched in the previous section can help with passively controlling temperatures as well. Creating an environment inside that simulates an outdoor ecosystem's humidity, airflow, and including natural materials such as stone and wood that are better at regulating temperatures go a long way in reducing strain on mechanical systems (Goeres, 2020).

Passive techniques are methods used to eliminate mechanical systems that cost energy, money, and resources or produce emissions that may harm the environment. Methods such as natural ventilation, orienting the building to use sun for heating, heat-sink walls using materials that absorb heat throughout the day and then release it slowly at night, using vegetation for natural shade, and water features that help regulate temperatures in lobbies and community spaces.

Implementing these strategies in Ponte tower will be different than in Witpoortjie Tower. Working with an adaptive reuse project will prove difficult as you are limited to the spaces and materials that are already in place unless you heavily modify the building. The design will cut out sections of Ponte and mold the building to hold green technology while Witpoortjie Tower will be intentionally formed and designed around biophilic and passive design.

Inspiration from Art and Nature

Taking inspiration from artists and the prominent natural features of a site when designing architecture is important. It allows the creation of a unique sense of place as well as utilizing local materiality and natural elements. Art is a close cousin to architecture, and many artists have also been architects or used buildings as canvases for their paintings or installations. This thesis will draw inspiration from some of these artists for the design and aesthetics of the buildings.

Gordon Matta-Clark

Gordon Mata-Clark was an American artist most famous for his works of large-scale interventions into architecture. Although he was a prominent artist, he had previously studied architecture at Cornell University. This education inspired him to create artwork that cut into existing architecture, such as 'Conical Intercept,' for which he cut holes into two 17th-century townhomes to expose the inner workings (*Gordon Matta-Clark*, n.d.). Matta-Clark used architecture to explore his artistic feelings and ideas. His work with derelict buildings stands out as an unconventional but interesting way to think about adaptive reuse and how this thesis might apply unique methods of reuse. In a way, he is adapting the buildings for art instead of a new architectural use.

Walter Sisulu Botanical Gardens

One of the most beautiful places in Johannesburg, Walter Sisulu Botanical gardens is full of indigenous plant life, craggy rock formations, sculptures by local artists, and crisscrossed by walking paths, all with the amazing Witpoortjie Falls as a backdrop. The Gardens were formally founded in 1982, although the area has been popular for hikes and picnics since the 1800's. In the 1990's the major buildings were constructed, and since then various features have been added such as a succulent garden, bird and butterfly section, water garden, and a geological garden (*History - SANBI*, 2018).

The Gardens' landscapes, gathering areas, and plant life will inspire the green life integration such as green roofs and community spaces of both Ponte and Witpoortjie Tower The waterfall and craggy rock formations will inspire water collection strategies, as well as the aesthetic choices of the skin. Growing up within 45 minutes of the Gardens was a joy. Our family regularly hiked the trail to the top of the waterfall and went up into the hills where you can find one of the best views in Johannesburg. This area held the most impactful natural scenes and memories for me during my time in the city.

Figure 8 Tourism Media. (Unknown Date). Succulent and rock garden at the Botanical Gardens. [Picture]

Figure 9 Firelight Tours. (2022). Witpootjie Falls. [Picture]

Economic and Social Impact

Exploring how a tower affects every aspect of a society and how it can improve its surroundings and help the community is immensely important for this thesis. It is the main factor that would prove the thesis viable in the real world.

Economic, Social, and Infrastructure Problems

The main problems facing South Africa and this thesis are economic, social, and infrastructural. As of 2023, the unemployment rate in South Africa is 32.1% (*Pressure Mounts on South Africa's Ruling Party as Unemployment Rises Again Ahead of Election*, 2024). This is the worst unemployment rate in the entire world and is the most obvious sign that something needs to change. Central Downtown Johannesburg has the highest number of contact crimes in South Africa. These crimes include murder, assault, and sexual offenses (*South Africa*, n.d.-a). On top of these issues, homelessness is a massive issue in Johannesburg. The Johannesburg Inner City Partnership and its Johannesburg Homelessness Network (JHN) estimate that there are between 8,000 and 20,000 people living homeless in Johannesburg. Although they also state that there has not been an actual study done to count or measure the number of homeless in the city, so the number could be much higher ("Johannesburg Homelessness Network (JHN)," n.d.). I can say from my experience living in Johannesburg that the real number is almost certainly thousands higher than the estimation.

How New Towers Impact an Economy

Building a new skyscraper has immense impact on a neighborhood or city. It might bring new jobs, retail opportunities, housing, or even advertising space. One of the most striking examples of this is that Vodacom's neon advertisement on top of Ponte Tower generates R500,000 per month for the owners which equates to $27,013 (*Chapter 8*, n.d., p. 8). According to Ponte's rental website, a two-bedroom unit will cost its occupant R3,700 per month (*Ponte' City Apartments | 2 Bedroom Apartment | Ponte City Apartments*, n.d.). With the tower housing almost 500 units, it can be estimated that the advertisement matches nearly 1/3 of the Tower's monthly income from rent. As such, this thesis proposes to keep the sign as part of the final design, in order to allow the owners to maintain the income stream.

This thesis also proposes to reserve as many jobs as possible for homeless or in need people, although it is known that the office jobs created by Witpoortjie Tower will not be accessible by many

homeless people as they have not had the opportunity to acquire the qualifications or degrees needed for them. As such, Witpoortjie Tower will be designed with several floors in the base that contain resources such as community centers with space for tutoring and resources for these in need people to get help towards achieving those qualifications and degrees. It also hopes that the Tower will create an economic status in the neighborhood that will help these people attend universities and get help with housing, food and medicine.

Impact on Larger Johannesburg

The hope is that this thesis will show Johannesburg how it could start to help its in need communities and neighborhoods. Constructing Witpoortjie Tower in Hillbrow could have massive impact on how South Africans experience the inner city. Allowing the Tower to act as a new hub of economic growth, retail expansion, job creation, tourist attraction as well as tourist housing in the hotel could start the spread of growth, communal contentedness, and joy throughout the whole Johannesburg metropolitan area. I can only imagine how my experience growing up in Johannesburg could have been different if downtown was safe and inviting.

Safety and Security

The main catalyst of danger and crime in South Africa can be attributed to Apartheid. While growing up I took Afrikaans lessons from a tutor, and she would tell me stories of what the country was like before Apartheid. Public trains with real silverware and 5 course meals, incredibly low crime, and an honest government were some of her highlights. Apartheid created tension and stress between people and races and caused more violence and crime as a side effect.

Normal Security Measures

Currently Ponte Tower requires fingerprint access to the building and has 24-hour security guards. It also requires every guest to sign in on a sheet so that they know who is in the building at all times (Smith, 2015). In general, South Africa has adopted a standard of security throughout every province and city. Nearly every home, business or building has a tall, metal fence with spikes on top. Most homes will add a short electric fence on top of this spiked fence to add another layer of security.

These security measures are in response to the incredibly high number of break-ins every year in the country. South African residents reported 1.4 million break-ins in 2023, although only 42% of

households affected by a burglary reported it to the police (*South Africa*, n.d.-b). In comparison, residents in the USA reported 1.1 million burglaries in 2019 (*Burglary*, n.d.). With the USA having roughly six-times the population of South Africa, this shows how bad the situation is in relation to home burglaries. The data in this section prompts this thesis to consider implementing appropriate security measures to keep its users as safe as possible. Fences, security cameras, and visible security guards are instrumental in this goal.

4.0 Results and Conclusions

This section includes a description of the project outcomes and documentation of the design process from sketches to the final solution.

4.1 Final Project Description

The final project includes the adaptive reuse of Ponte Tower and the design of Witpoortjie Tower. The project is a high-rise design that incorporates two towers into one ecosystem. Ponte Tower was adapted and changed by knocking out floors to create three double-height green floors that Ponte residents will use for recreation such as picnics, parties, etc. The apartments within were updated to hold new technology and elements that help the tower achieve LEED status. Witpoortjie Tower was designed to hold offices, a hotel, and community resources. It uses a steel structure focused around a double concrete core system. The façade is inspired by Witpoortjie Falls, located in the Walter Sisulu Botanical Gardens. Two 300 ft. long pedestrian bridges were designed to be connections between Ponte and Witpoortjie, allowing residents to access the full amenities of Witpoortjie as well as walk to work in the office blocks.

4.2 Project Objectives

The project succeeded in achieving its goal of proposing a way to solve issues of urban decay, dangerous urban conditions, and lack of community involvement and engagement. By designing a publicly accessible building, it intends to draw in people that need support. It implements multiple security systems in order to keep the peaceful users safe from any persons who contribute to the dangerous conditions in Hillbrow.

It also succeedes in providing roughly 1,800 office jobs and 100 jobs in the hotel to help the community to grow the economy of Hillbrow.

4.3 Project Design and Documentation

This section includes the process of design and the final outcomes of the project.

Figure 11 Exploration of nature.

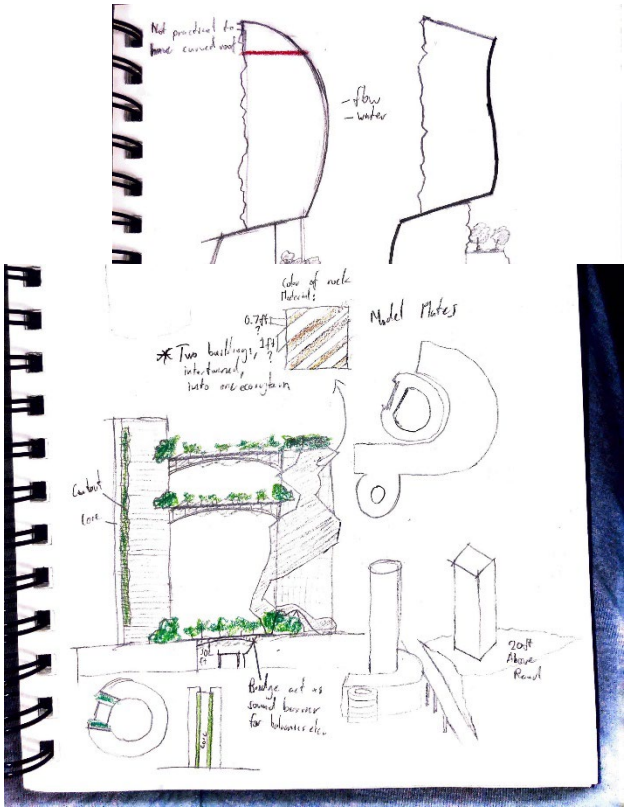

Figure 10 Exploration of building connection.

Conceptual Design

The sketches from the previous section influenced me to explore how the nature I experienced in Johannesburg could inform the design of the project. The most influential natural area for me is the Walter Sisulu Botanical Gardens, which were listed in a previous section as well. The Witpoortjie Waterfall is the focal point of the gardens, and that is the starting point I chose for my design parti.

Water cuts stone, water pushes stone. Water informs the design of the rock faces of the waterfall. I chose to use that idea of water pushing and cutting stone as my rough parti. In the image on the next page, you can see the lines I drew over the waterfall, following the cuts and slices of rock that water movement formed over time.

Figure 13 Firelight Tours. (2022). Witpootjie Falls. [Picture] Edited to include red lines by author.

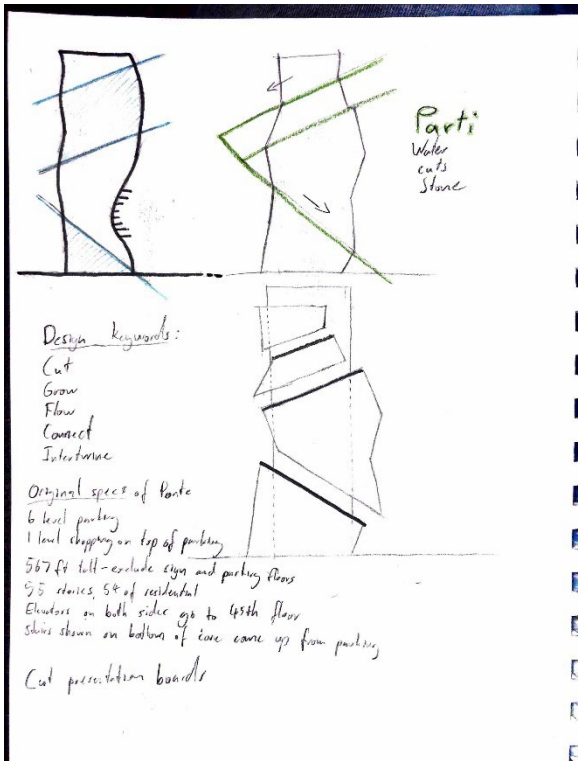

Figure 12 Parti Evolution

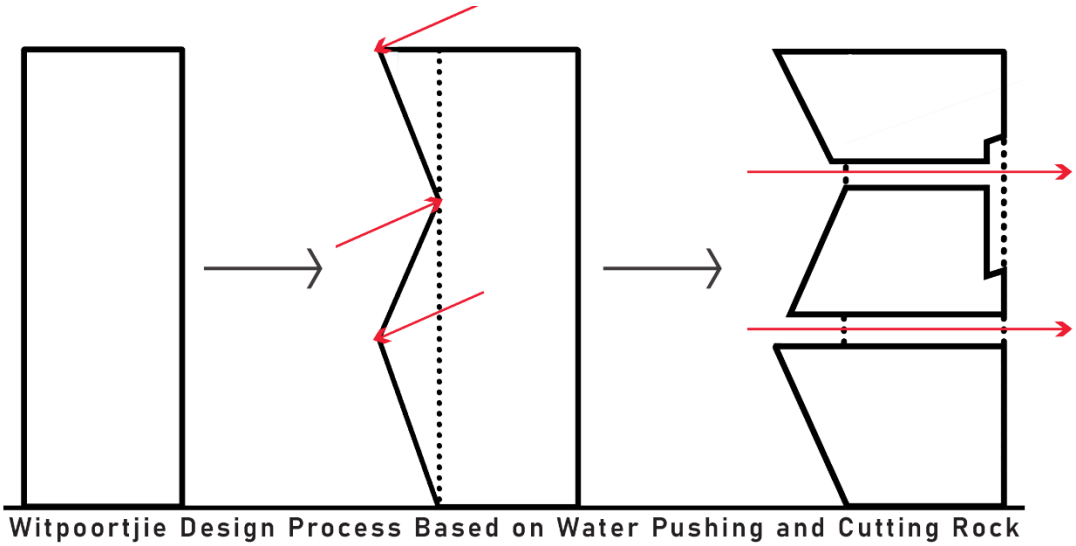

Figure 14 Final Parti.

This parti takes the idea of water pushing and pulling and applies it to a normal, boring rectangle skyscraper form. By pushing and cutting the façade, the form echoes the natural patterns of water flowing through a waterfall and moving the rock. This idea is reflected through every elevation as well as the section shown below. Water cuts. Water pushes. Water is free. Water is powerful.

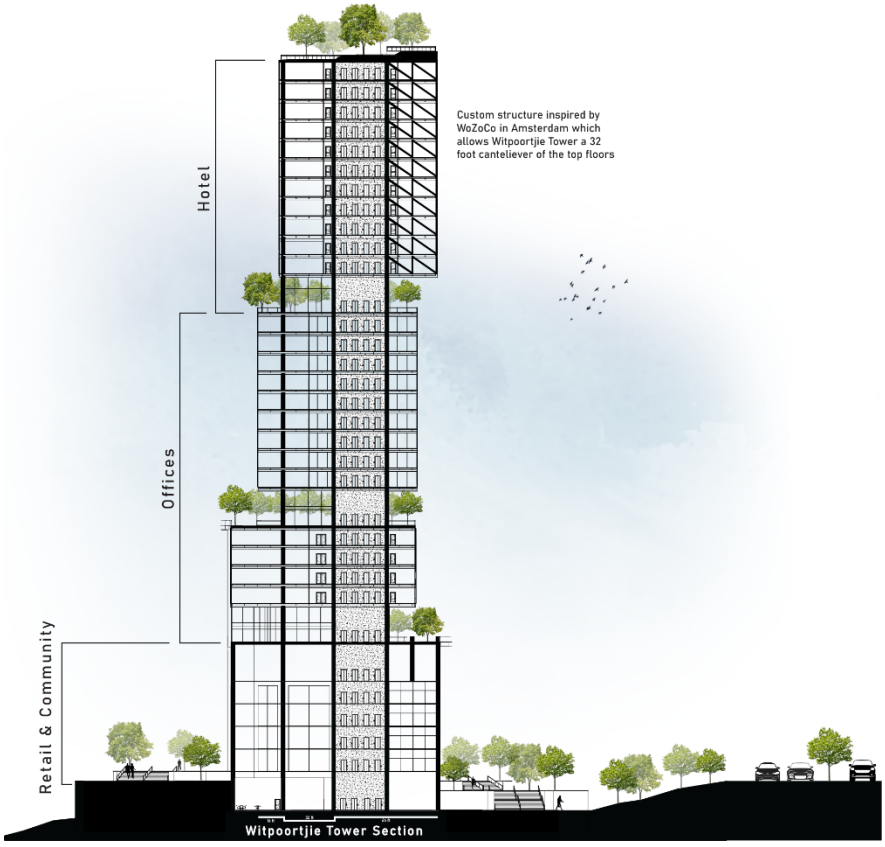

Figure 15 Section Cut

Final Design

This section documents the final visuals, renders, and plans that make up the thesis design.

Figure 16 Main Render

Figure 17 Witpoortjie Ground Floor Plan

This plan shows the ground level amenities and the stepping stones community area. The two renders following this text are taken in relation to this ground floor.

Figure 18 Stepping Stones Community Area

Figure 19 Ground Floor Atrium Entrance

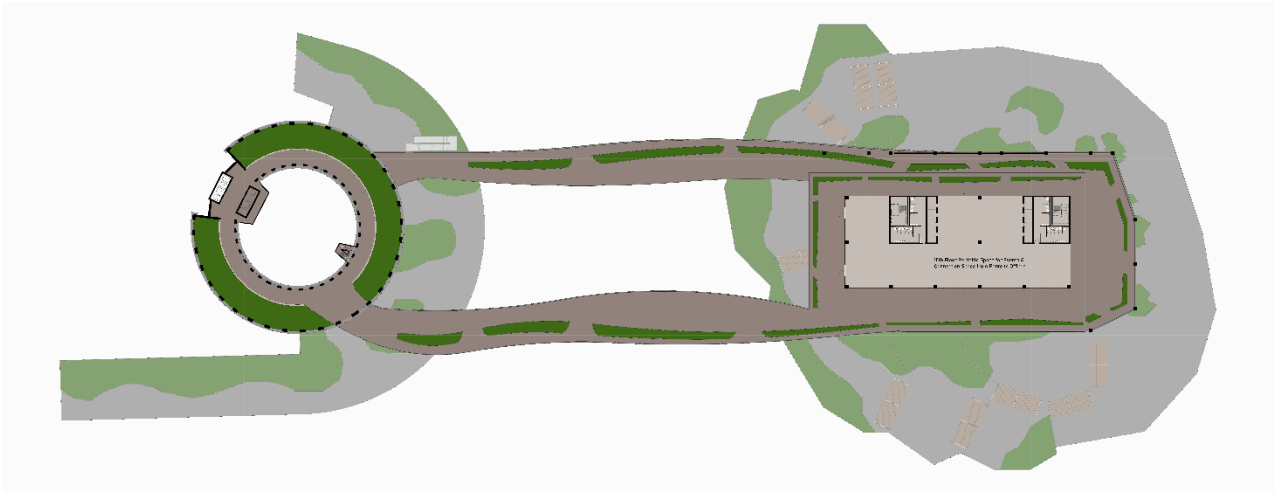

Figure 21 Plan showing bridge connections

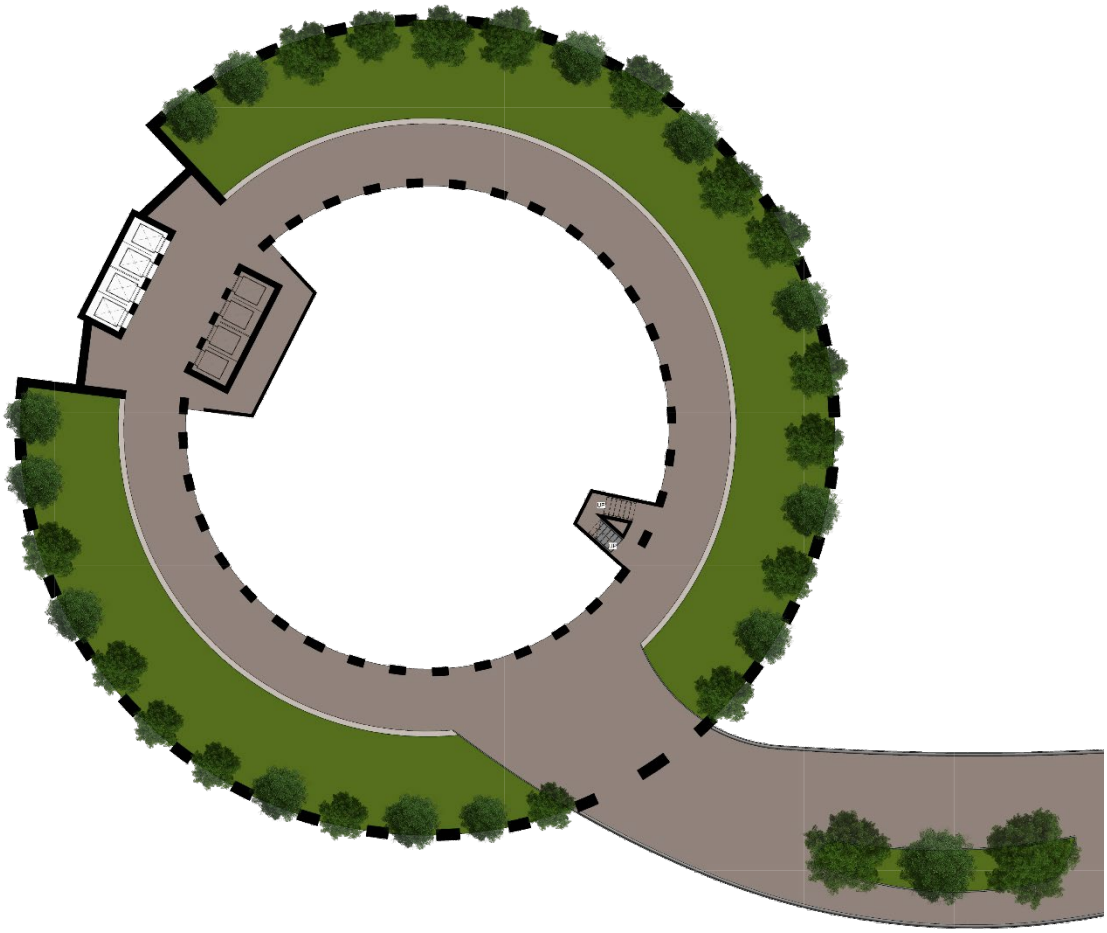

Figure 20 Ponte Tower Green Floor

Figure 22 Ponte Tower Green Floor

Figure 23 Witpoortjie Tower Green Roof

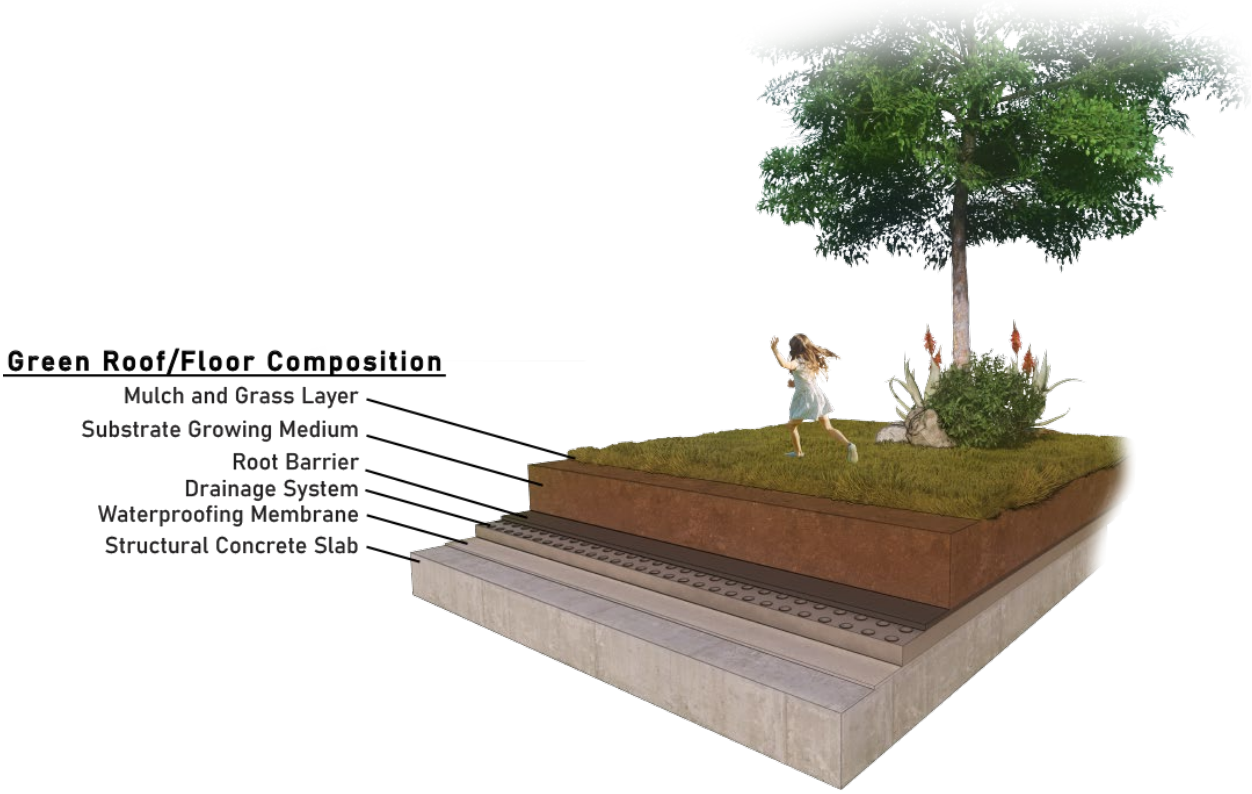

Figure 24 Green Roof/Floor Section

This section shows the custom green roof construction used in both towers. The concrete structure slab is reinforced in order to support the extra growing medium depth needed to grow the larger trees seen throughout the project.

Figure 25 Rendered Elevation

This elevation shows the bridge connections as well as the road passing underneath the bridges. The lower bridge is meant to connect Ponte residents to the community support services in the base of Witpoortjie Tower. The upper bridge connects Ponte residents to the office blocks so they can walk to work easily.

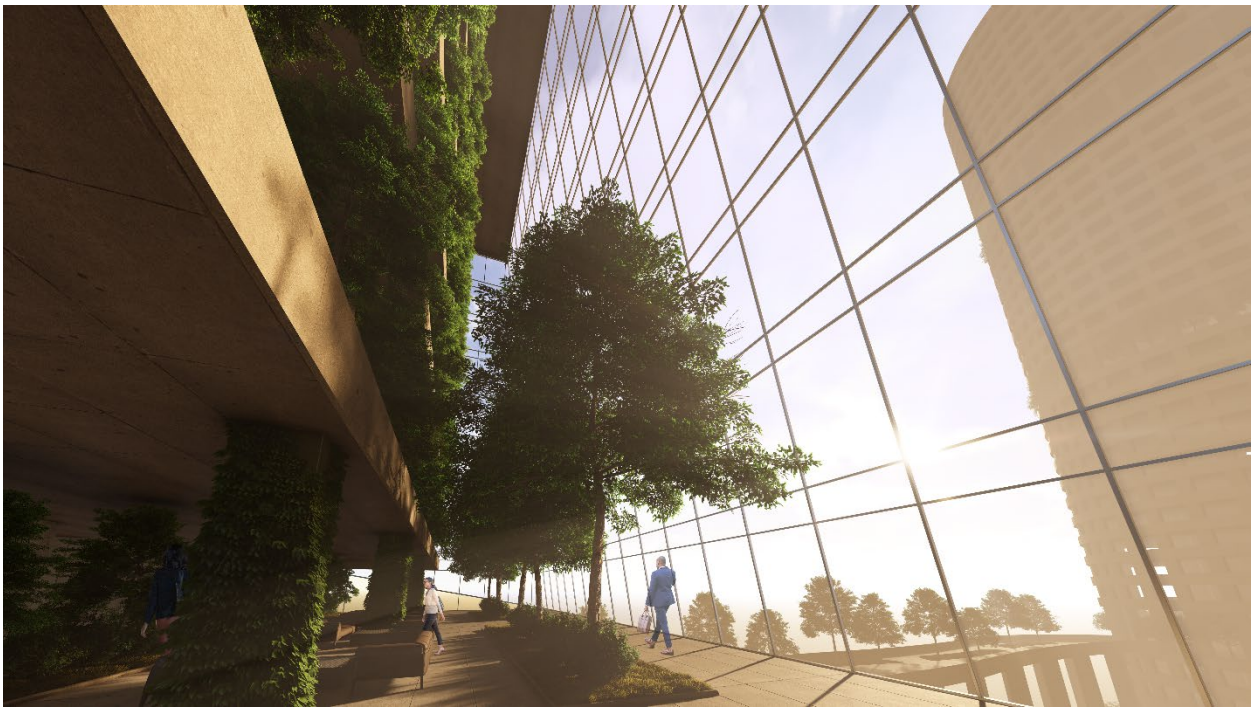

Figure 26 Witpoortjie 12th Floor Atrium

This render shows the gathering space designed within Witpoortjie that acts as circulation and recreation space for the office and hotel workers.

4.3 Conclusions

This project was extremely successful, but there are some issues that would be part of the future development of this project. The main issue not addressed completely was connecting the project to the greenspace surrounding the project. I would have liked to create a network of paths and parks in the area adjacent to Witpoortjie Tower. Currently there are some walking paths but the area is large and not utilized to its highest potential. Walking paths, boardwalks, and gardens could be implemented in the future. This thesis also needs further development on issues of reuse with not just the main tower of Ponte but also the base of Ponte that includes empty retail spaces and rooms that did not make it into the final design. Because of the scale of the project these spaces were skipped over in order to develop the main parts of the project first. In the future these spaces could be utilized by the residents or owner of Ponte to create another layer of community involvement and growth. Overall, the project succeeded as a proof of concept, as proof that adaptive reuse is the future of architecture, and as proof that this neighborhood needs a catalyst to transform it.

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Architecture Studio Experience Appendix

2nd year: 2020 – 2021

Fall Studio: Charlotte Greub

Land Artist Studio

Minneapolis Boathouse Project

Spring Studio: Emily Guo

Marfa Texas Dwelling

Mixed-Use Group Project – The Twist Hotel

3rd year: 2021 – 2022

Fall Studio: Regin Schwaen

Pella Windows Design Competition – Pella Plains Showroom

Oscar Zero Visitor Center – Tensio Hominum

Cabin Development – See-Through Cabins

Spring Studio: Jennifer Brandel

NDSU Native American Student Center – Arrowhead Student Center

4th year: 2022 – 2023

Fall Studio: Roland Sharpe-Flores

Washington D.C. Capstone Project – Contra Conceptum

Spring Studio: Paul Gleye

Marvin Windows Design Competition – Flatlands House

West Fargo Downtown Urban Design Project

5th year: 2023 – 2024

Thesis Advisor: Regin Schwaen

Legendary Highway 14 Tower Design Competition – The Perch

Thesis Project – New Breath for Johannesburg