

ABSTRACT

Title of Thesis: [STAY]DIUM: CREATING A COMMUNITY
IN AN ABANDONED STADIUM THROUGH
ADAPTIVE REUSE

Enzo R. Montecinos, Master of Architecture,
2020

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Brazil's love for soccer, their beautiful stadiums and the nation's famous hospitality made the 2014 World Cup unforgettable for every tourist that visited. However, six years later the Brazilian taxpayers are not even close to paying off the most expensive tournament in Brazilian history. From the twelve stadiums constructed, all but four are unused, fraught with corruption allegations or serious structural problems. The stadiums have been abandoned due to loss of interest and high cost of construction and maintenance. This thesis project focuses on an abandoned stadium and re-purposing the structure with a mixed-use program, using sustainable strategies to bring forth a positive impact on the community.

[STAY]DIUM: CREATING A COMMUNITY FROM AN ABANDONDED
STADIUM THROUGH ADAPTIVE REUSE

by

Enzo R. Montecinos

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Chapter 1: HISTORY OF THE WORLD CUP

“Football is one of the world’s best means of communication. It is impartial, apolitical and universal. Football unites people around the world every day. Young or old, players or fans, rich or poor, the game makes everyone equal, stirs the imagination, makes people happy and makes them sad.” –Franz Beckenbauer, German Football Coach. Manager, and former Player.¹

Background

Beginnings

The first FIFA World Cup opened at the brand-new Estadio Centenario in Montevideo on 18 July, 1930. It was the beginning of a new era in world football and the inaugural event proved a remarkable success, both in a sporting and a financial sense. Of course, the organizers were disappointed that only four European sides had participated.

Tournaments

The twenty one World Cup tournaments have been won by eight national teams. Brazil have won five times, and they are the only team to have played in every tournament. The other World Cup winners are Germany and Italy, with four titles each; Argentina, France and inaugural winner Uruguay, with two titles each; and England and Spain with one title each.

¹ "Why Soccer Unites the World? by Sophief." Infogram

The World Cup is the most prestigious association football tournament in the world, as well as the most widely viewed and followed sporting event in the world, exceeding even the Olympic Games; the cumulative viewership of all matches of the 2006 World Cup was estimated to be 26.29 billion with an estimated 715.1 million individuals watching the final match.

Religion of Soccer

The only means of explaining the phenomenon of the World Cup is through categories and concepts that we usually reserve for the religious and the sacred. In a strange way, the World Cup is about none of the forces that overshadow the day-to-day concerns of human life.² The Cup is a very elaborate ritual, played out on the largest global scale possible. It transcends politics, economics, and religion by incorporating all of them. It does so by juxtaposing people, groups, national identities, particular belief systems.

Impact

Viewers

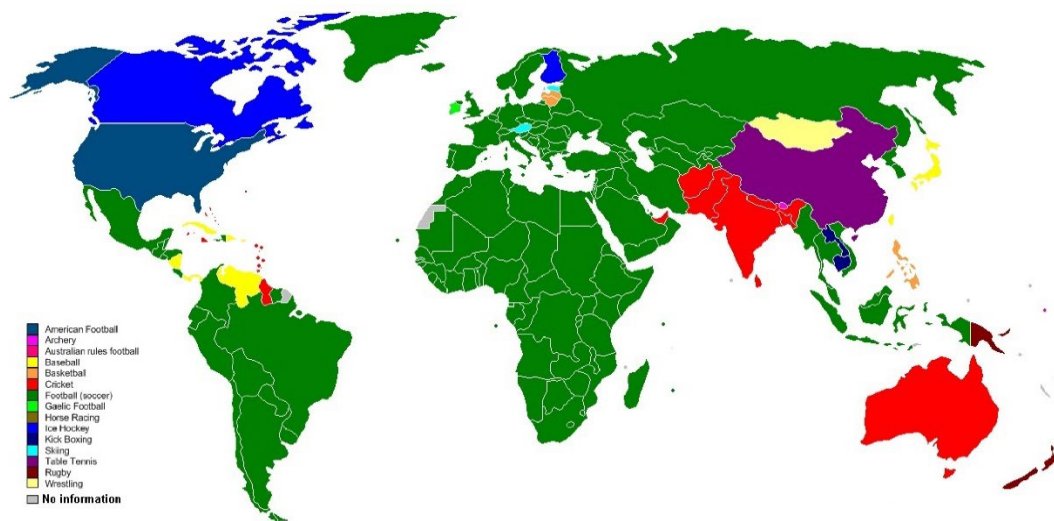
About 3.2 billion people watched the World Cup in 2014. But, after taking a look at this map of the most popular sports around the world, that shouldn't surprise anyone.³ Soccer dominates the global sports scene. Soccer is the sport played most consistently around the world. It's not sectioned off or dominated by one country.⁴ According to

² Onishi, Bradley B., and Bradley B. Onishi. "Love and Devotion: The World Cup and the 'Religion' of Soccer."

³ Beauchamp, Zack. "MAP: The Most Popular Sport in Every Country."

⁴ Ibid.

FIFA's most recent Big Count survey, there are 265 million players actively involved in soccer around the world, roughly about four percent of the world's population.⁵ Sports like American football, on the other hand, are mainly played and watched in only one country.



World Domination

Brazil Hosting the World Cup

When the World Cup was awarded to Brazil in 2007 - part of a remarkable parlay that included the award of the 2016 Summer Olympics as well - the country's economy was starting to boom. The event was political from the onset, its significance potentially going well beyond the results on the playing fields where Brazil has won the world championship a record five times.

⁵ "Why Soccer Unites the World? by Sophief."

Brazil experienced doubts over whether it can pull off the event and second thoughts about the upsurge of influence on the international scene it was supposed to symbolize. The fervid devotion of Brazilians to soccer has made this country the Land of Football. But Brazil today is not just a land of football, it is also a land of public protests against corruption, heavy taxes, and deplorable public education and health services, cities with chaotic urban transport, markets with inflated consumer prices, and a dysfunctional political system that is manipulated by an elite for personal benefit.⁶

The problem with such grand visions is that Brazil's political imagination is always strong on dreams but short on ways and means. Despite one of the heaviest tax burdens in developing economies (more than thirty-seven percent of GNP), public sector finances and management have proven inadequate to maintain reasonable levels of public education and universal health care. This leaves Brazil's lower-income majority in need of basic education and health facilities while the wealthier thirty percent pay for access to private schools and clinics.⁷

The World Cup and the Olympic Games were supposed to provide a cure for this bad news. But instead they have become part of the disease. The twelve stadiums Brazil promised would meet FIFA standards have encountered long delays. Sepp Blatter, president of FIFA, said that in his experience with World Cups he had never seen so

⁶ Polimédio, Chayenne. "How Corruption Has Dampened Brazilian Affection for the World Cup."

⁷ De Onis, Juan. "BRAZIL'S TROUBLES: World Cup Runneth Over."

much uncertainty in meeting deadlines. The new or remodeled stadiums would all be ready at the last minute in June.

Chapter 2: STADIUMS ACROSS BRAZIL

Section 1

South America

South America is bordered on the west by the Pacific Ocean and on the north and east by the Atlantic Ocean; North America and the Caribbean Sea lie to the northwest. It includes twelve states Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela. Most of the population lives near the continent's western or eastern coasts while the interior and the far south are sparsely populated.

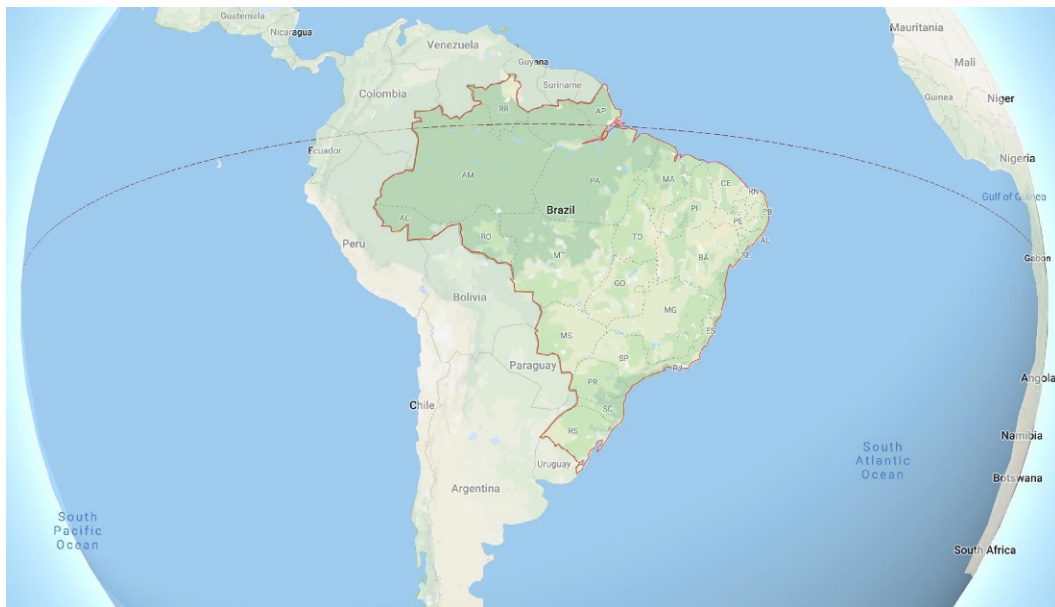


Illustration 2: Map of South America (source: Google Earth, Author's overlay)

Geography

The geography of western South America is dominated by the Andes mountains; in contrast, the eastern part contains both highland regions and vast lowlands where rivers such as the Amazon. Most of the continent lies in the tropics.

Resources

South America's major mineral resources are gold, silver, copper, iron ore, tin, and petroleum. These resources found in South America have brought high income to its countries especially in times of war or of rapid economic growth by industrialized countries elsewhere.

Locations across Brazil

From the twelve stadiums the Brazilian government built/re-purposed Manaus is the only city separate from the cluster of cities among the shore line. Surprisingly the “City of the Forest” is the seventh most populous city in the country with a population of 2,145,444 people in 2018.⁸

⁸ Kanai, Juan Miguel. "Capital of the Amazon Rainforest: Constructing a Global City-region for Entrepreneurial Manaus."



Illustration 3: Map of Brazil's Stadiums (source: Author)

Stadiums

Problems arise from the stadiums



Illustration 4: Stadium Diagram (source: Designboom)

- 250,000 people directly/indirectly forcefully removed from their living spaces.
(Brazilian politicians used the games as an excuse)
- Debt for the country; total cost of games \$12 billion
- Police brutality due to protests
- Strengthen industries to use child labor
- Infrastructure problems, only finish 10 out of 56 promised infrastructure projects

Controversies

The long list of controversies before the tournament's start included mass evictions, violent protests, police brutality and construction worker deaths. Thanks to the World Cup, more than 250,000 people were either directly or indirectly forcefully removed from their living spaces. Some experts say Brazilian politicians used the games as an excuse to clear out Brazilian slums and reclaim them. Eleven million Brazilians live in these slums.⁹

The total cost of the games was \$12 billion, a price tag that many are convinced was not worth it, considering the social inequality plaguing the country.¹⁰ Brazil spent billions on twelve stadiums, even though FIFA only requires a minimum of eight built stadiums. In the future, Brazil will struggle to fill the stadiums with enough fans. The projected boom in tourism is not expected to generate enough revenue to make up for the hefty price tag.

Demonstrations against the games' astronomical spending saw rampant police brutality. Citizens protested the government's clearing of the Brazilian slums in order to accommodate the games, as well as lavish spending on the games when there is already such a wealth disparity in the country. Protesters questioned why the country would spend so much on soccer when so many Brazilians don't have access to health care and other basic needs. The Pew Research Center found in June that 61% of

⁹ Polimédio, Chayenne. "How Corruption Has Dampened Brazilian Affection for the World Cup."

¹⁰ Marshall, Euan. "Brazil Soccer Stadiums: From World Cup Arenas to White Elephants."

Brazilians were unhappy with hosting the event because they thought it took money away from other public services.¹¹

According to UNICEF, around 3 million Brazilian children ages 10 to 17 are victims of child labor. UNICEF emphasized the importance of protecting children from child labor during the World Cup, especially domestic workers, boys recruited by the drug trade and indigenous children.¹² While soccer has inspired many poor Brazilian children to follow their dreams, it has also strengthened industries using child labor and brought injustice to poor working families.

An unfinished overpass collapsed in early July, killing two people, and many thought it was because Brazil rushed its infrastructure projects for the World Cup. Brazilian politicians only finished ten out of fifty-six of their promised infrastructure projects in preparation for the games. Brazil rushed the construction of its stadiums, which meant the neglect of proper safety precautions. During the stadium's construction, at least eight construction workers were killed.

Site Selection Matrix

Maracanã

In business terms, renovating the legendary Maracanã was an open goal. Renovating the temple of Brazilian soccer would be expensive, but lucrative in the short to medium term. The initial agreed cost for stadium works was set at \$210 million, but

¹¹ Ibid.

¹² Kaufman, Sarah. "7 Big Problems the World Cup Left Behind in Brazil."

renovating the Maracanã ended up costing an incredible \$360 million to the Rio de Janeiro state government, driving it to the brink of bankruptcy and causing a state of financial disaster. As part of ongoing federal police investigations into corruption within Brazil's biggest construction companies, the firms responsible for the stadium works were charged with having overpriced contracts and rigging the bidding process for the construction contract.

	ARENA DA AMAZÔNIA	ESTÁDIO NACIONAL DE BRASÍLIA MANÉ GARRINCHA	ARENA DAS DUNAS	ARENA PANTANAL
ACCESSABILITY	Yes	Yes	Yes	Yes
ACCESS TO DRAWINGS	Yes	N/A	N/A	N/A
ACTIVE	Light use Christian Concerts	Light use Brasília club draw barely 5,000 people	Light use Children's birthday parties and weddings	Yes High school and bus parking lot
CAPACITY	44,300	72,788	42,000	41,390
CLIMATE				
COST	\$270 million	\$900 million	\$400 million	\$293 million
MATERIALS	Fabric	Fabric	Steel trusses coated with aluminum tiles	Steel trusses
NEW INFRASTRUCTURE	Yes	Yes	Yes	Yes
POPULATION	7 th largest city	3 rd largest city	12 th largest city	35 th largest city
URBAN CONTEXT	Yes (Amazon rain forest)	Yes (Capital of Brazil)	Yes	Yes



Illustration 5: Site Selection Matrix (source: Author)

Costs

Arena dreams tend toward the ridiculous. Promises of economic benefits are as illusory as lost civilizations. FIFA, required that World Cup host nations build at least eight stadiums. Brazil, in a fit of prideful excess, insisted on building 10, at a cost of nearly \$2 billion.

Those stadiums have become aspiring archaeological digs. Brasília spent \$550 million to build its stadium; it doubles as a municipal bus depot. The stadium in Cuiabá cost \$230 million, and homeless men sleep in the locker rooms. Brazil's expenses for the World Cup greatly outran its revenue. Brazil repeated its wasteful act for the Olympics. There are corruption inquiries in a half-dozen states, with construction companies and hapless officials under the magnifying glass.

Struggling Cities

In the end, cities such as Manaus, Cuiabá, Natal and Brasília, places with little to no local soccer culture, were awarded World Cup matches and brand-new stadiums, while proper soccer cities such as Florianópolis, Belém and Goiânia missed out. In Natal, a company bought the stadium, but has made little money renting it out for children's birthday parties and weddings, and the facility is now for sale once again.

The choice of Manaus as one of the host cities was particularly controversial. In an effort to have the tournament spread out across Brazil's five main regions, one of the World Cup venues was to be in the country's north region.¹³ This means it was between Manaus – in the middle of the Amazon Rainforest, with no suitable stadium and zero local soccer culture.

As soon as the World Cup packed up and left, the brand-new arenas in Cuiabá, Manaus, Natal and Brasilia went largely unused. In an effort to recuperate losses, the

¹³ Powell, Michael. "In the Brazilian Rain Forest, 'a White Elephant, a Big One'"

stadium in Cuiabá is now used as a high school, while its car park is used as a garage for the city's buses.¹⁴

Chapter 3: SITE ANALYSIS

Amazon

The Amazonia region encompasses parts of nine countries in South America and includes both the Amazon rainforest and the water-rich Guiana Shield.¹⁵ It is home to 30 million people, including 375 indigenous groups. It contains the largest tropical forest in the world, the richest biodiversity in the planet, almost one-third of the world's tropical forest carbon and one-fifth of the planet's fresh water that flows into the ocean.¹⁶

People rely on the Amazonia's ecosystem for everything from fisheries to food security and climate regulation. Despite these crucial services, ongoing deforestation and climate change impacts threaten to permanently alter this massive system.¹⁷

Destruction of the Amazon

Brazil's President Jair Bolsonaro has vowed to industrialize the Amazon Rainforest and permit even more animal agricultural and mining. Bolsonaro will build a highway

¹⁴ Moseman, Andrew. "This \$900 Million Soccer Stadium Is Now a Parking Lot."

¹⁵ Kanai, Juan Miguel. "Capital of the Amazon Rainforest: Constructing a Global City-region for Entrepreneurial Manaus."

¹⁶ Neugarten, Rachel. "These 7 Maps Shed Light on Most Crucial Areas of Amazon Rainforest..."

¹⁷ "Urgent: Stop Bulldozing of Amazon Rainforest by Brazil President."

that cuts through the heart of the rainforest to increase access for the ranchers, miners and logging companies.¹⁸

The loss of Amazon Rainforest is critical because it cools the planet and it produces more than twenty percent of the world's oxygen.¹⁹ Bolsonaro's plans to destroy the Amazon will accelerate global warming and decrease available land for diverse species of animals, including indigenous peoples, who call the rainforest home.

By combining environmental, social, and economic data using computer models, Conservation International maps are painting a more complete picture regarding the health and threats to these important places.

¹⁸ Ibid.

¹⁹ Neugarten, Rachel. "These 7 Maps Shed Light on Most Crucial Areas of Amazon Rainforest..."

Carbon stock stored in the forests

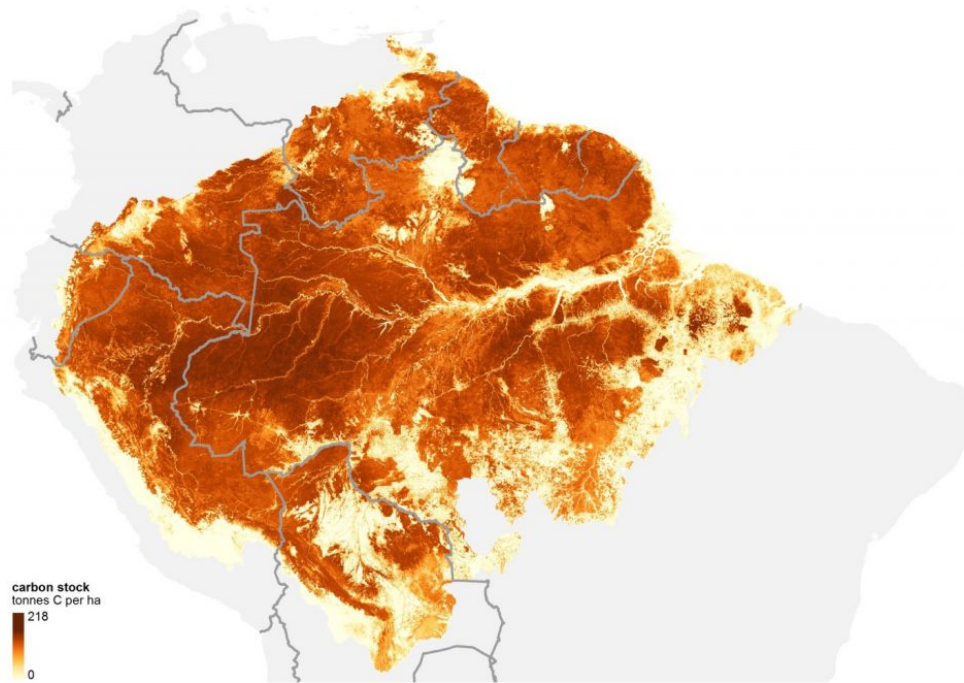


Illustration 6: Carbon Stock Stored in the Forest (source: Conservation International)

This map reveals that the areas with the highest forest carbon stock are located in undisturbed parts of the central Amazon Basin and the remote portions of the northern Amazon Basin and Guiana Shield.²⁰

²⁰ Neugarten, Rachel. "These 7 Maps Shed Light on Most Crucial Areas of Amazon Rainforest..."

Forest cover and forest loss

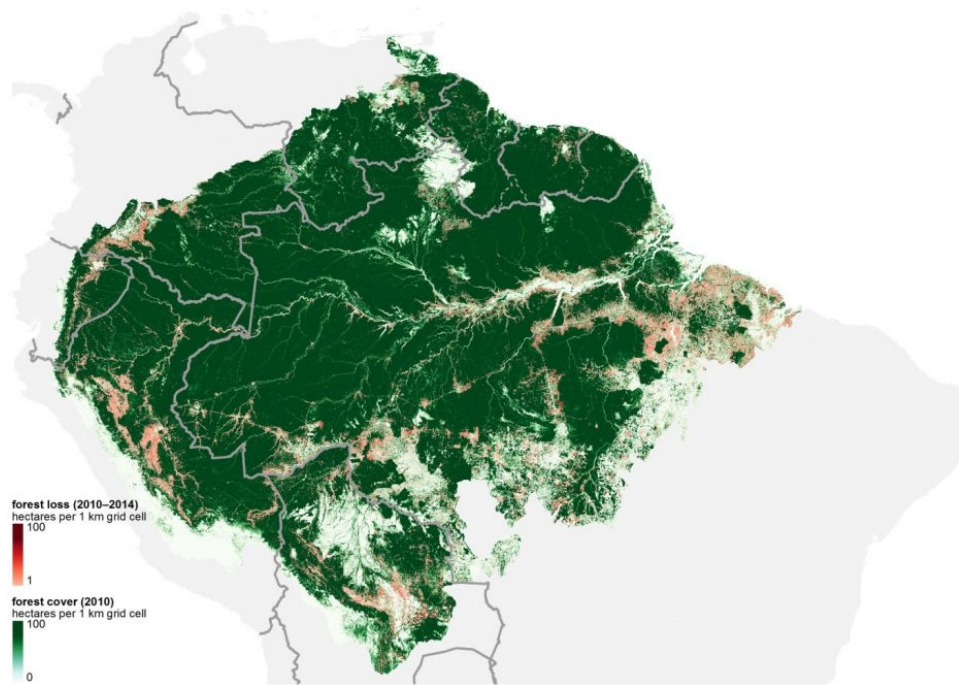


Illustration 7: Forest Cover and Forest Loss (source: Conservation International)

Identifying hotspots of deforestation activity in southern Brazil, parts of Bolivia and along the Andean foothills in Peru. Although causes vary by geography, the expansion of agriculture, especially for soy and cattle and increased human pressures are the primary drivers. From 2010 to 2014, Amazonia lost almost 62,000 square kilometers (almost 24,000 square miles) of forest - equivalent to destroying a forest larger than Massachusetts every year.²¹

²¹ Ibid.

Freshwater service

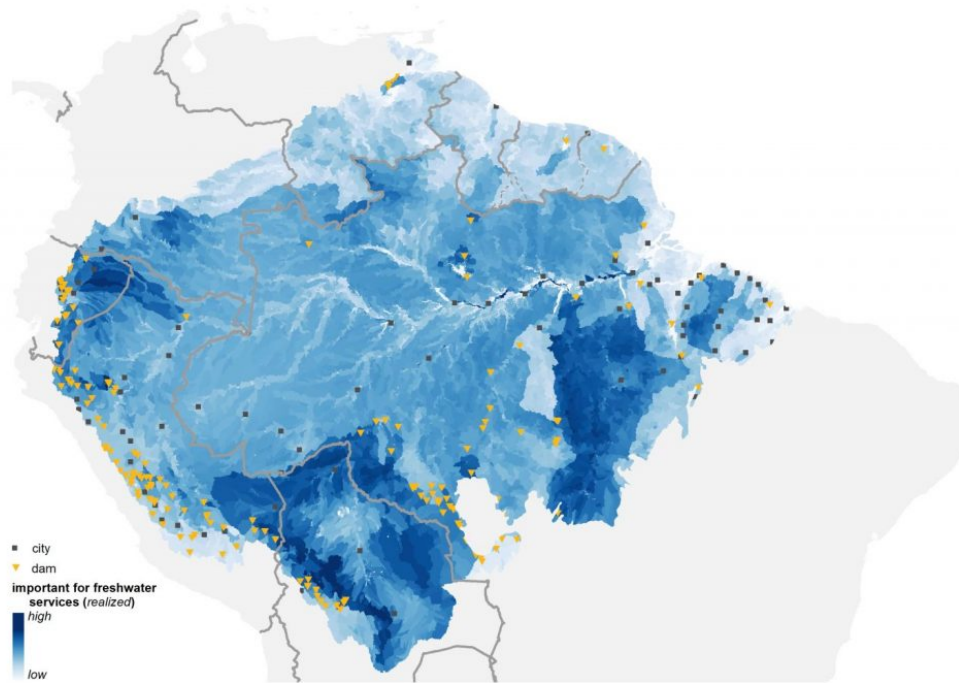


Illustration 8: Freshwater Service (source: Conservation International)

Ecosystems that play a role in the provision of freshwater services, such as forests, floodplains, lakes and river channels that provide flow regulation and water quality maintenance. This map shows areas that are already providing services to people or economic sectors, such as population centers and hydropower facilities.²²

²² Neugarten, Rachel. "These 7 Maps Shed Light on Most Crucial Areas of Amazon Rainforest..."

Areas most vulnerable to climate change

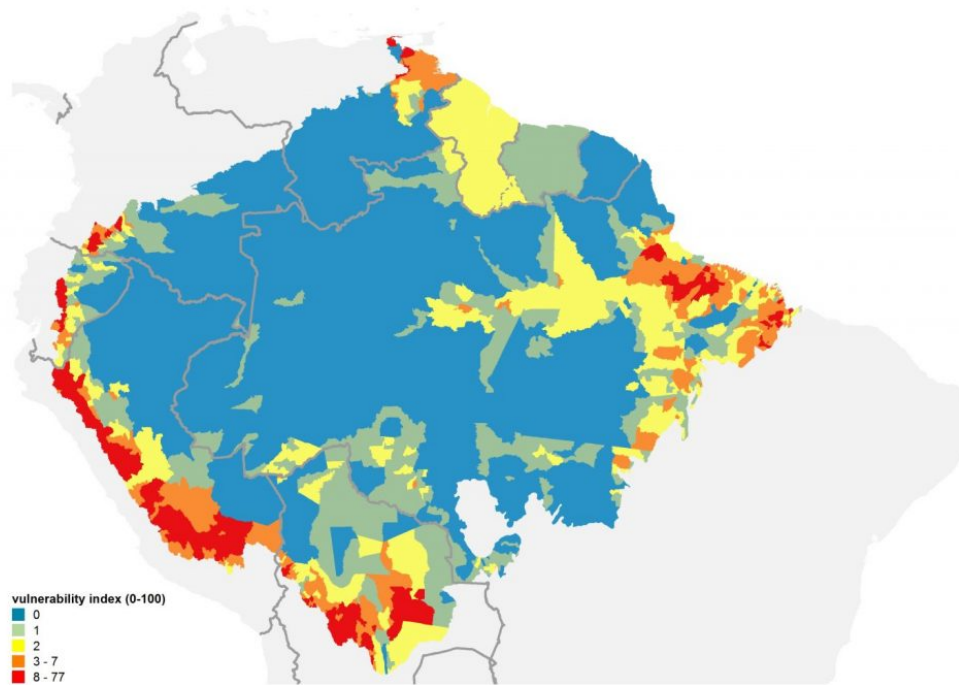


Illustration 9: Areas most vulnerable to Climate Change (source: Conservation International)

The foothills of the Andes are vulnerable, as this area is characterized by steep slopes and is highly prone to an increase in water flow, which can cause flooding.

Northeastern Brazil is also vulnerable due to its high population density, a predicted reduction in water availability in this area, and the relatively low adaptive capacity of its people due to low socioeconomic status.²³

²³ Neugarten, Rachel. "These 7 Maps Shed Light on Most Crucial Areas of Amazon Rainforest..."

Housing needs in Brazil

Housing

People earning less than US\$1,000 per month account for about 90 percent of this deficit. In the cities, there is overcrowding and housing deterioration. It is estimated that more than 50 million Brazilians live in inadequate conditions. 26 million people in urban areas lack access to drinking water, 14 million do not have trash collection services and 83 million are not connected to sewage systems.²⁴

Social & economic factors

Rural areas in the northeast region are currently suffering the worst drought in the past 50 years. Adequate access to water is a privilege that over 21 million people do not have.²⁵ Women and children are forced to walk long distances to fetch water for their homes, often in sources where the water is untreated.²⁶

Objective

Staydium proposes the re-appropriation of the stadiums renovated or built for the 2014 FIFA world cup in Brazil. Within the host country, the housing shortage is estimated to be at 5.2 million homes according to the institute of applied economic research. By analyzing the current structures of the athletic venues, there is possibility for alternative modes of housing and mixed-use spaces. Residents can have sunlit views to the interior and exterior.

²⁴ Kanai, Juan Miguel. "Capital of the Amazon Rainforest: Constructing a Global City-region for Entrepreneurial Manaus."

²⁵ De Onis, Juan. "BRAZIL'S TROUBLES: World Cup Runneth Over." *World Affairs* 177, no. 1 (2014): 51-57.

²⁶ Ibid.

Manaus, Brazil

Site plan



Illustration 10: Location of Manaus (source: Archdaily)

Location

No roads run to Manaus other than dangerous dirt tracks impassable in wet weather.²⁷

Those challenges later turned to red ink. The local soccer teams draw 1,000 fans on the best nights. They could not afford the rent. A few big league teams, those from São Paulo and Rio de Janeiro, sometimes played here, but only if the state containing

²⁷ Powell, Michael. "In the Brazilian Rain Forest, 'a White Elephant, a Big One'." The New York Times.

Manaus provided a subsidy of one sort or another.²⁸ It is a four-hour flight from Rio to this capital of the Amazon.

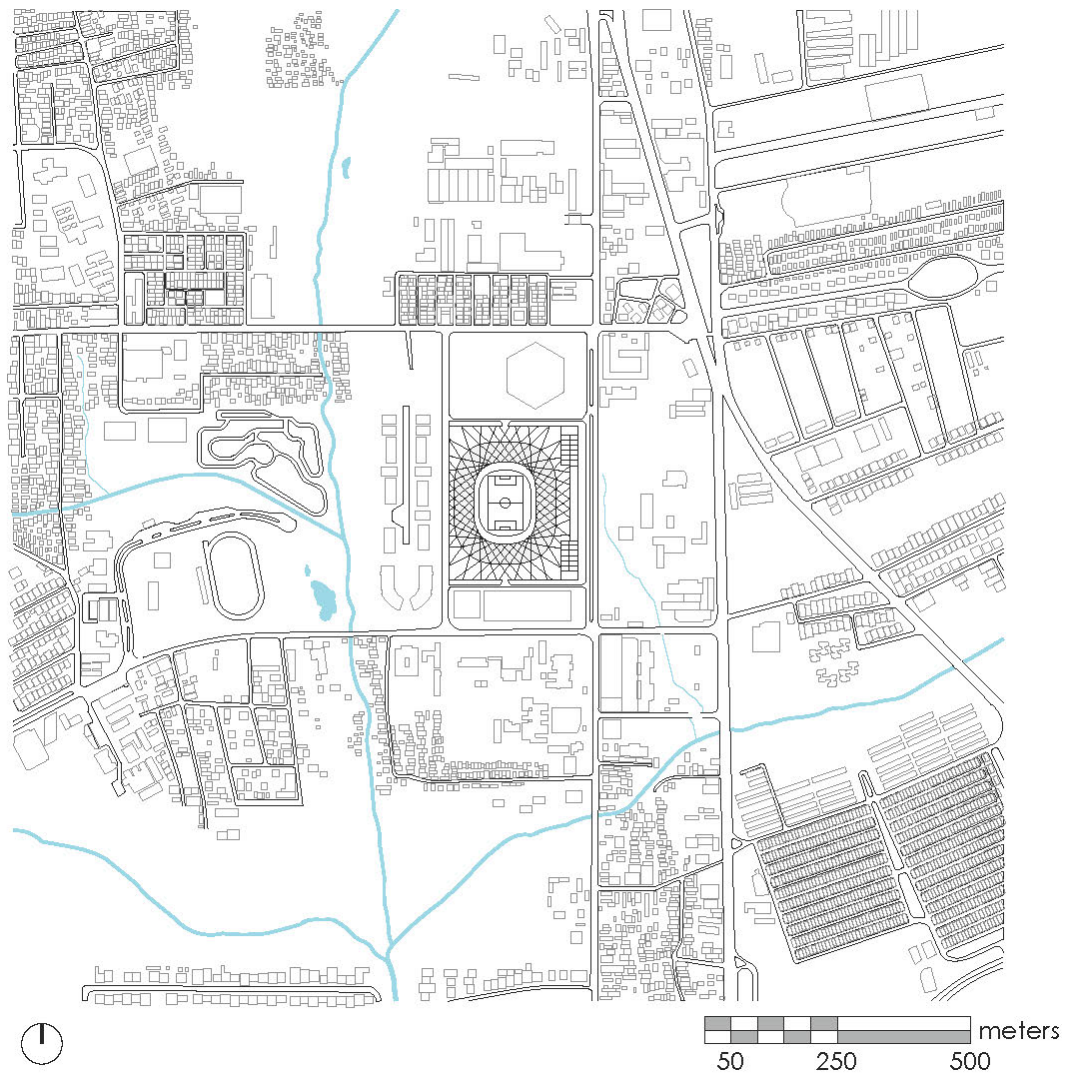


Illustration 11: Site Plan of Manaus (source: Author)

Subsection 3

²⁸ Ibid.

Arena de Amazonia

Site plan

Arena da Amazônia in Manaus, a city whose name comes from a local tribe and means Mother of the Gods. When Brazil embarked on an arena construction for the World Cup in 2014, Manaus city leaders decided to build the grandest arena of all. Years in the making, at a cost of \$220 million, it was crafted to resemble a giant white basket of a type common in the region, atop a four-story concrete plaza. The arena seats 44,351 people.



Illustration 12: Site Image with Dimensions (source: Google Earth, Author's overlay)

Isolation

Save for the rarest of occasions, such as when Olympic women's soccer teams played here recently, this arena sits empty. Manaus is surrounded by a rain forest the size of

France, Spain, Sweden, Greece and Italy combined, and it is reachable only by airplane or boat.²⁹

Debt

The debt has piled high and requires tapping from money intended for schools and hospitals. One-quarter of Manauaran's are extremely poor; many lack running water.

Chapter 4: PRECEDENT RESEARCH

Las Arenas

Las Arenas was a bullfighting arena constructed in the late 1800's. It's been in disuse since 1989 and with a neo-mudéjar style, didn't actually have high architectural value. Being in such an impressive location for more than a century, this site was really in the minds of every citizen, and its symbolic value lead to a suitable preservation. That's why the architectural answer, was orientated towards its maintenance as a second skin of the new building.

Overview

The approach has involved the most advanced architectural and engineering technologies to re-establish the original building as a visually striking landmark for the city.

²⁹ "America." (Manaus, Amazonas, Brazil) - Population Statistics, Charts, Map, Location, Weather and Web Information.

Rogers Stirk Harbour + Partners set out to re-establish Las Arenas as a 21st century landmark for the city. This involved retaining the entire existing façade as well as re-integrating what had become an isolated traffic island into the city fabric. The design includes a new leisure and retail development within this façade, and has also created significant areas of public realm both in the new dome structure – with its 360-degree roof terrace rising above the existing wall – and at the surrounding street level, which will help to revitalize this part of Barcelona.

Concept

The bullring uses advanced architectural and engineering technologies in response to the brief, while respecting and celebrating the fabric of the historical bullring to create a visually striking new landmark for the city.³⁰ The redevelopment re-establishes a new, open public realm around the base of the building providing level access to a wide range of retail facilities and connections with the existing metro station and neighboring Parc Joan Miró. The most spectacular aspect of the intervention however is the inclusion of a 100-meter ‘dish’ with a 76-meter-diameter domed roof, floating over the façade of the bullring.

Design

The design is based on a series of separate and complementary structural systems which allows a variety of activities and user requirements to take place on different

³⁰ Rogers Stirk Harbour. "Las Arenas." Rogers Stirk Harbour Partners.

levels inside the building. Separate structural systems support the existing façade of the historic bullring, providing maintenance, fire escape, services and access gantries.

Levels

Structure

Columns travel down to ground level within the four atria; bridges, lifts, escalators and walkways either pass through these columns or on either side of them. This also allows for an open, column-free space at level four and removes the need for any structural members to pass through the cinema spaces below at levels two and three. These cinema spaces are formed by large steel cantilevered boxes that effectively constitute a separate, self-contained structural system within the building and rest on a concrete base at level two.³¹

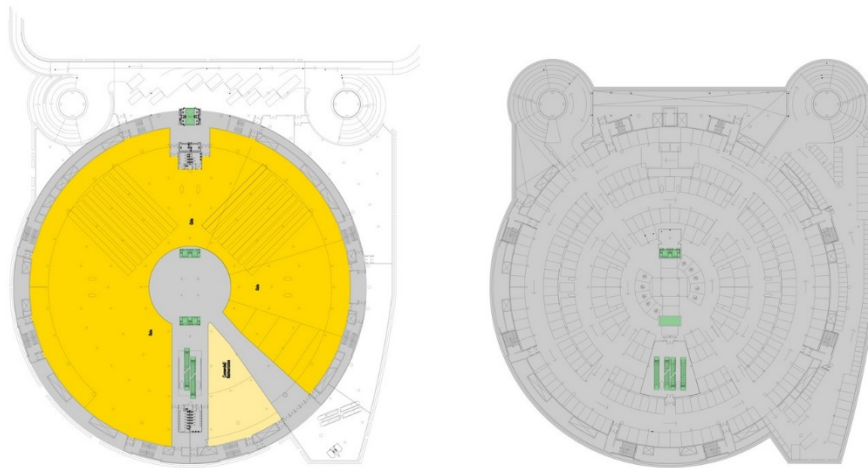


Illustration 13: Floor Plan Level -1 (source: Archdaily)

Illustration 14: Floor Plan Level 0 (source: Archdaily)

³¹ Rogers Stirk Harbour. "Las Arenas." Rogers Stirk Harbour Partners.

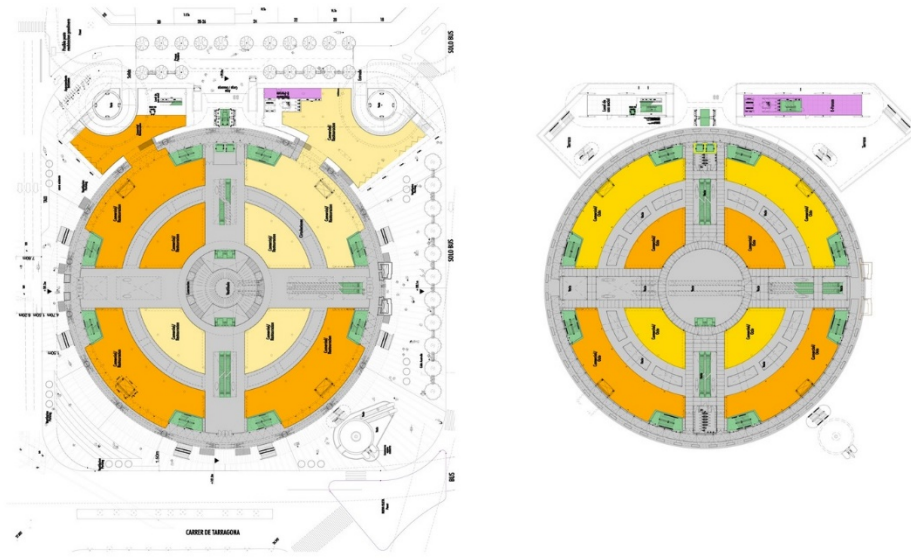


Illustration 15: Floor Plan Level 1 (source: Archdaily)

Illustration 16: Floor Plan Level 2 (source: Archdaily)

From level two downwards, a more conventional concrete column and floor slab construction has been used for the retail areas. The design of the column layout has provided the spaces required by the client for different retail zones; these columns continue into the four levels of car park below.

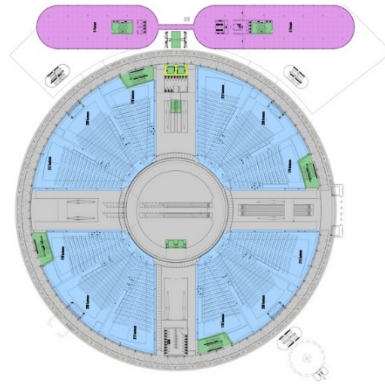
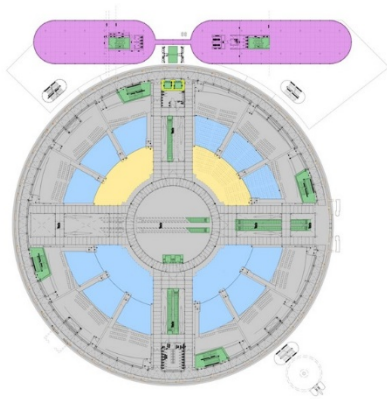


Illustration 17: Floor Plan Level 3 (source: Archdaily)
Illustration 18: Floor Plan Level 4 (source: Archdaily)

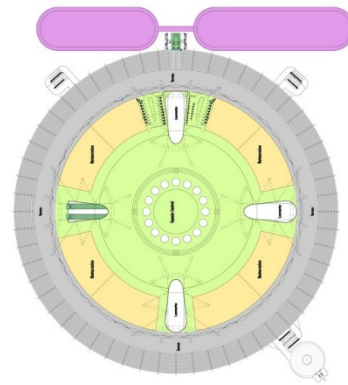
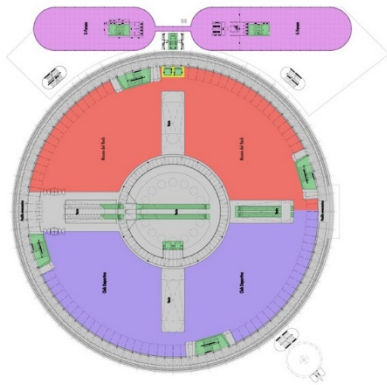


Illustration 19: Floor Plan Level 5 (source: Archdaily)
Illustration 20: Floor Plan Level 6 (source: Archdaily)



Illustration 21: Floor Plan Level 1 (source: Archdaily)

Program

Program spread sheet

Description	Existing Las Arenas	Level
Underground Parking	620,000 sq. ft.	(-5)-(-2)
Commercial/Retail	116,500 sq. ft.	(-1)-(2)
Supermarket	15,000 sq. ft.	-1
Office	42,400 sq. ft.	(0)-(4)
Theater	52,000 sq. ft.	3
Museum	26,000 sq. ft.	4
Gym	26,000 sq. ft.	4
Restaurant	16,000 sq. ft.	5
Track	20,000 sq. ft.	5
Residential	N/A	N/A
Bike Storage/Parking	N/A	N/A
Laundry	N/A	N/A
Soccer Academy	N/A	N/A
Soccer Field	N/A	N/A
Number of Levels	5	

Number of Levels	5	
Circulation	230,076 sq. ft.	46,015/floor
Total Square Feet	933,900 sq. ft.	186,780/floor
Gross Floor Area	1,163,976 sq. ft.	232,800/floor

Illustration 22: Las Arenas Program Spread Sheet (source: Author)

Square footage

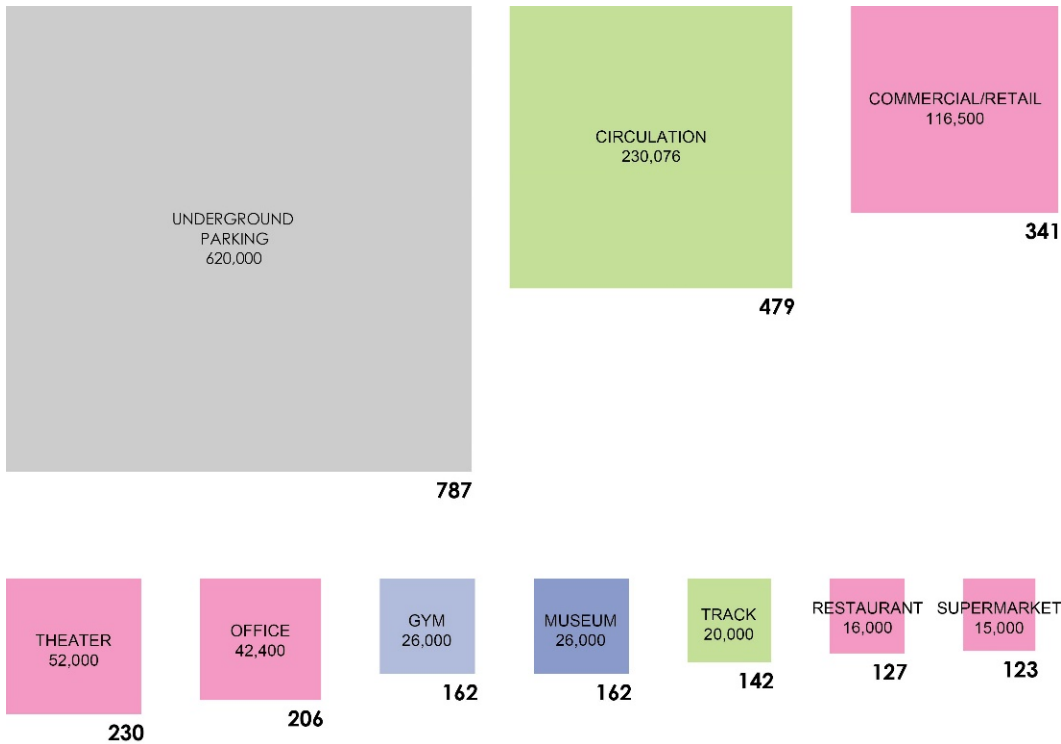


Illustration 23: Las Arenas Square Footage (source: Author)

The three largest programs for Las Arenas include underground parking with 620,000 sq. ft. of space, circulation with 230,076 sq. ft. of space and commercial/retail at 116,500 sq. ft. Other amenities include a gym, theater, museum and a track on the top level.

Construction

Facade

The historic bullring has been retained and restored as the façade to the new building. This involved the excavation of the base of the façade and the insertion of composite arches to support the existing wall and create new spaces.³²



Illustration 24: Aerial View of Construction Progress Showing the Retention of the Original Façade (source: Rogers Stirk Harbour + Partners)

Illustration 25: Aerial View of Construction Progress Showing Internal Structure (source: Rogers Stirk Harbour + Partners)

Roof

Several structural options were researched for the roof with the preferred solution being a lamella structure in which the timber members form a pattern of lozenges creating a grid-shell of timber.³³

Simple, repetitive short lengths of timber glu-lam beams, made of fir join together to form the dome. The primary members of the dome are connected invisibly, so the metal bolts are hidden within the wood and from beneath the dome it appears to be a

³² Castro, Fernanda. "Las Arenas / Richard Rogers Alonso Y Balaguer."

³³ Castro, Fernanda. "Las Arenas / Richard Rogers Alonso Y Balaguer."

continuous timber structure. Laminated beams are topped with two layers of plywood.



Illustration 26: View of Dome during Construction (source: Rogers Stirk Harbour + Partners)

Parking

With the major components changing to a commercial/mixed use there is a need for parking. Five levels below the grade are dedicated to parking and pedestrian circulation. The total amount of square footage available for parking is 533,430 for the four levels of parking.

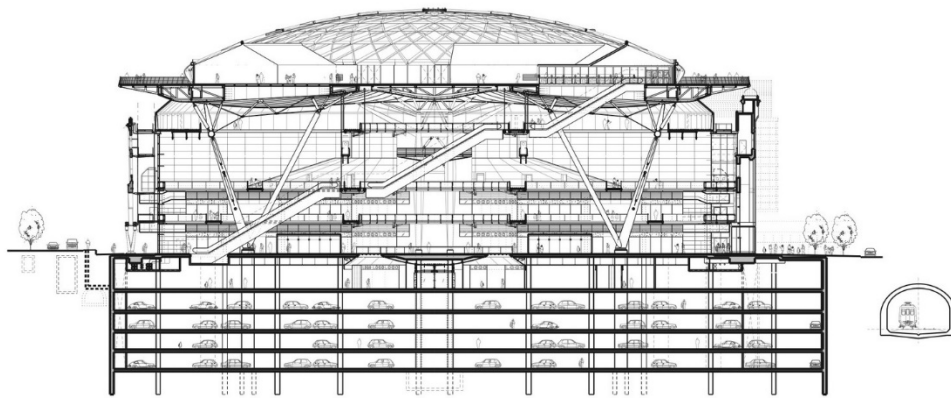


Illustration 27: Section (source: Archdaily)



Illustration 28: Picture of Elevation (source: Archdaily)

Chapter 5: PROGRAM INVESTIGATIONS

Site Analysis

Walking times

A majority of the civic and government buildings are located within a twenty-minute walk from the stadium. The size of the stadium determines the surrounding block sizes to be large. Residential blocks are much smaller and extending to the city fabric.

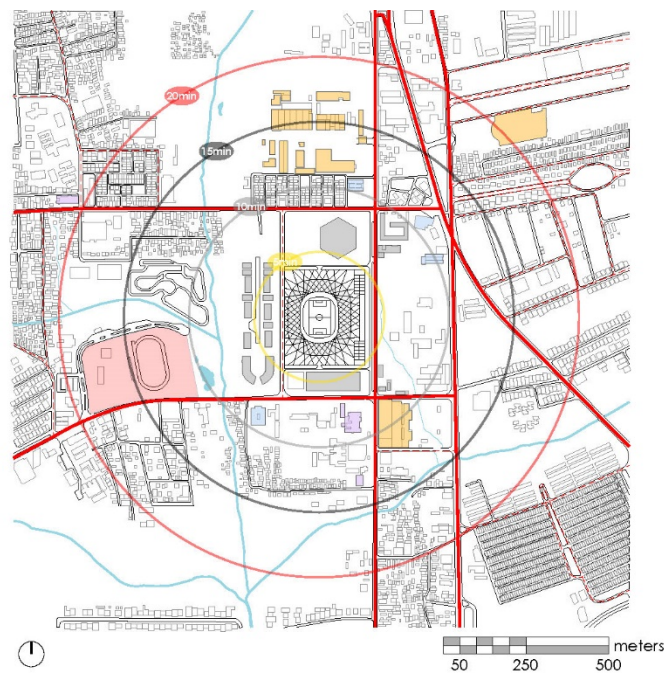


Illustration 29: Site Analysis: Walking Times (source: Author)

Surrounding Context

To the east of the Arena da Amazonia is an Olympic village which was used for the summer Olympic Games. Residence of Manaus use it for recreational activities and leisure. To the north is the building for the government of Amazonas and further north a large brewing company. To the east are government buildings and a couple of

shopping centers. To the south are factories and a convention center. Residential areas are a twenty minute walk.

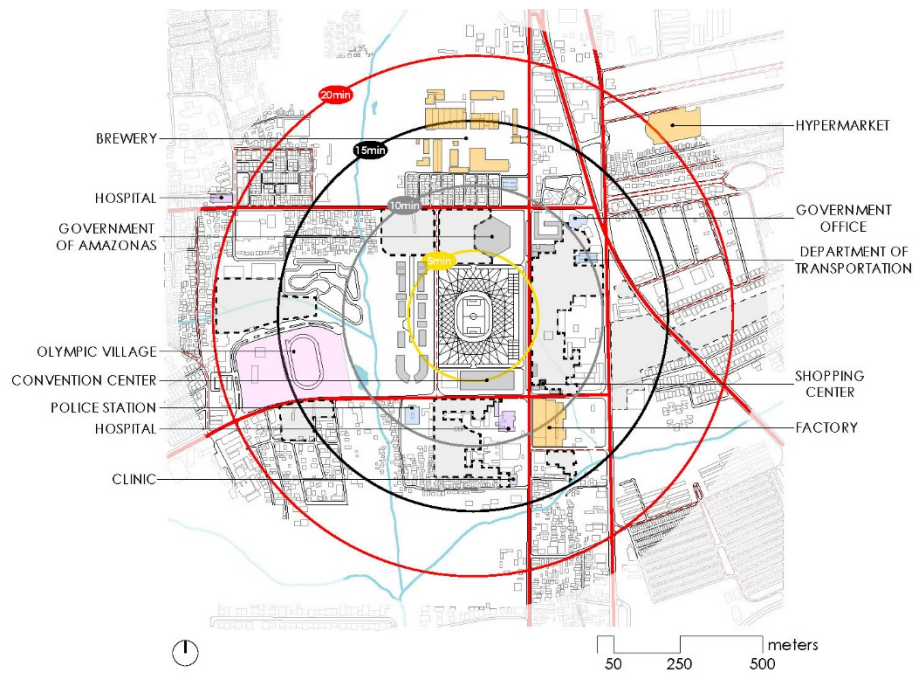


Illustration 30: Site Analysis: Surrounding Context (source: Author)

Overlay

Existing

The stadium is located at the central traffic axis that links the airport with the inner city. The new building was integrated into a sports park with Sambadrome, field and track facilities, multi-purpose halls and an aquatic center. The project was developed in cooperation with the GMP.



Illustration 31: Existing Site Plan 200' Scale (source Google Earth, Author's overlay)

Santiago Bernabeu

The site overlay onto Santiago Bernabeu in Madrid, Spain is slightly smaller than Arena da Amazonia. There is a difference in the number of trees surrounding each site. Madrid is urbanized with block sizes that are adequate while Manaus has large plots of empty space.



Illustration 32: Madrid, Spain Overlay 200' Scale (source Google Earth, Author's overlay)

Emirates Stadium

The site overlay onto Emirates Stadium in London, England which shows major axis of the city and three direct connections from the surrounding neighborhood into the stadium. Arena da Amazonia currently has one major axis and one main entrance into the stadium. A numerous amount of entrances will help alleviate inhabitants.

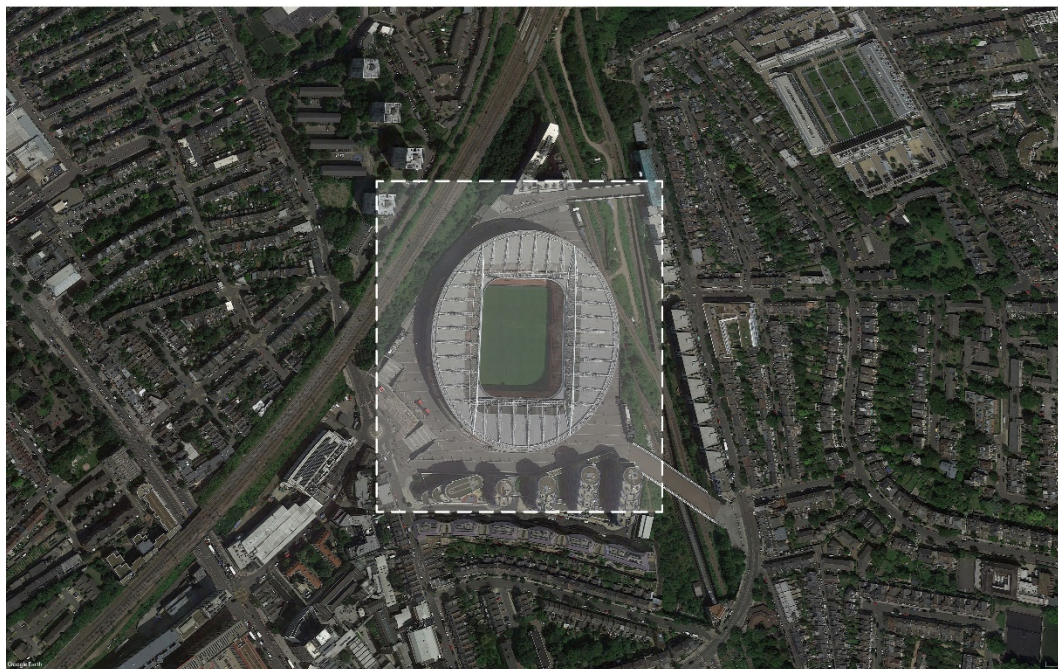


Illustration 33: London, England Overlay 200' Scale (source Google Earth, Author's overlay)

Levels

The stadium has been placed on a base which provides space for VIP access, the media, the players and parking spaces. A ring including spectator boxes, offices and a restaurant - rates the upper tier from the lower tier, which is recessed in the base.

Level 00

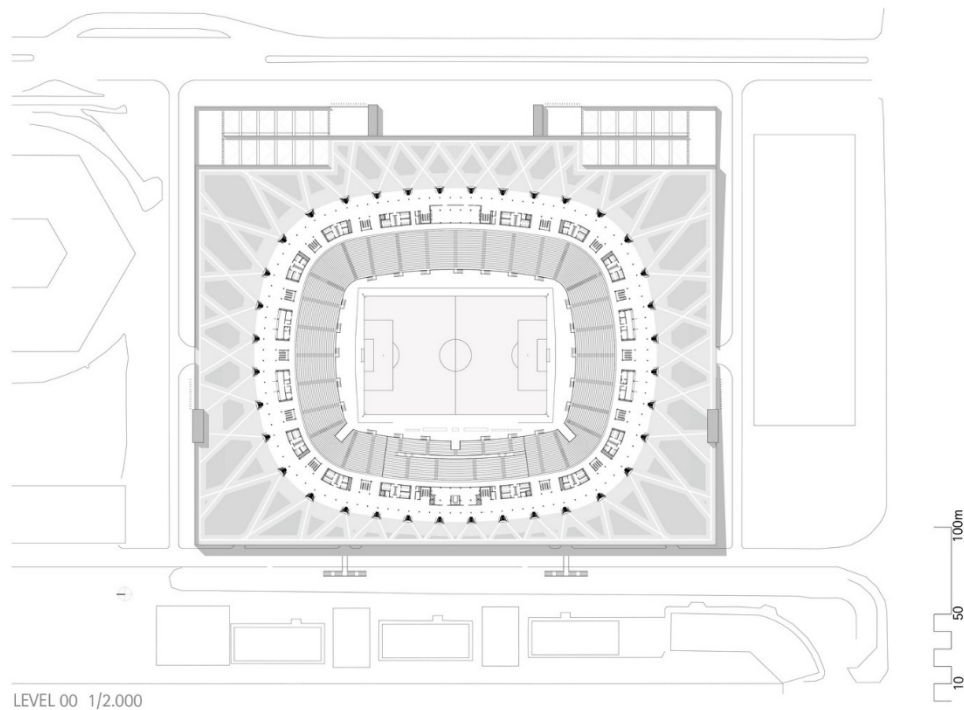
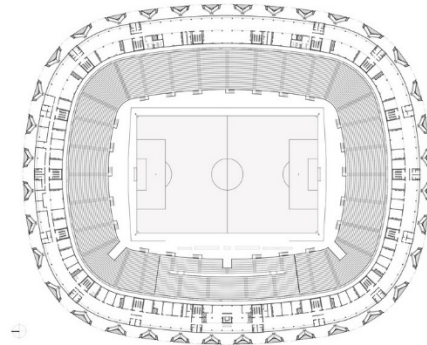


Illustration 34: Level 00 (source: Archdaily)

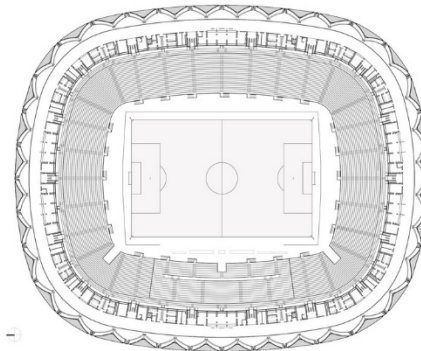
Level 01



LEVEL 01 1/2,000

Illustration 35: Level 01 (source: Archdaily)

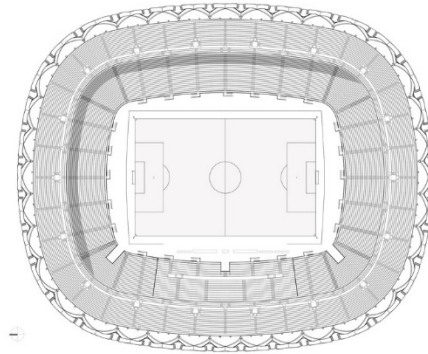
Level 02



LEVEL 02 1/2,000

Illustration 36: Level 02 (source: Archdaily)

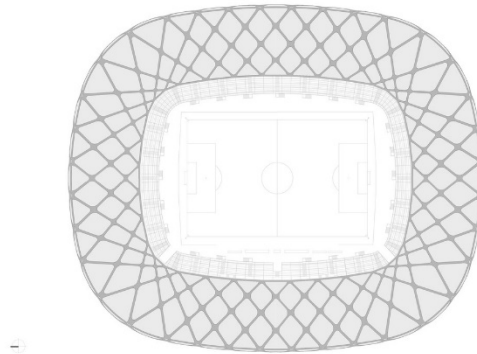
Level 03



LEVEL 03 1/2,000

Illustration 37: Level 03 (source: Archdaily)

Roof



1/2,000

Illustration 38: Roof (source: Archdaily)

Sections

Existing Detail Section

The existing stadium has five major spaces with the first two levels having the highest floor to ceiling dimensions. The middle two being smaller to accommodate for a large stand at the upper levels. The roof structure is composed of mutually bracing

cantilever elements in the form of hollow steel box girders which also serve as large gutters for the discharge of the enormous quantities of water expected during tropical rain events. In view of the hot and humid climate at the Amazon, the roof extends into a facade which provides shade to the spectator balconies and vertical access routes. The roof and facade panels consist of translucent glass fiber fabric.³⁴

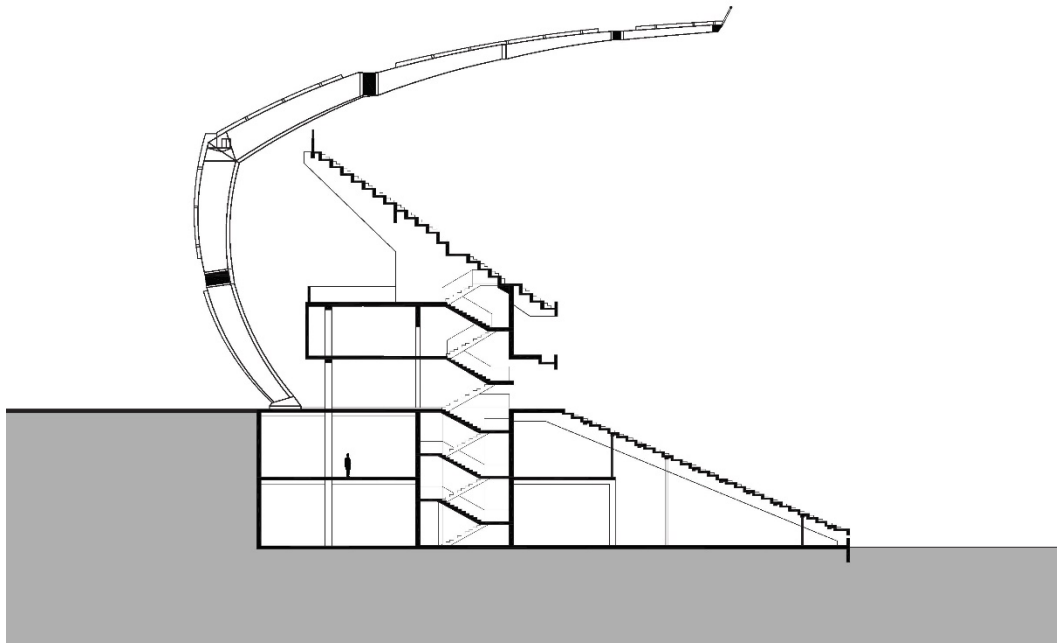


Illustration 39: Existing Detail Section (source: Author)

Existing Transverse Section

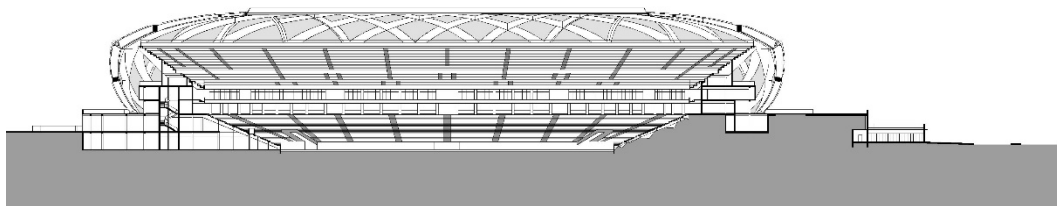


Illustration 40: Existing Transverse Section (source: Author)

³⁴ Rogers Stirk Harbour. "Las Arenas." Rogers Stirk Harbour Partners.

Existing Longitudinal Section

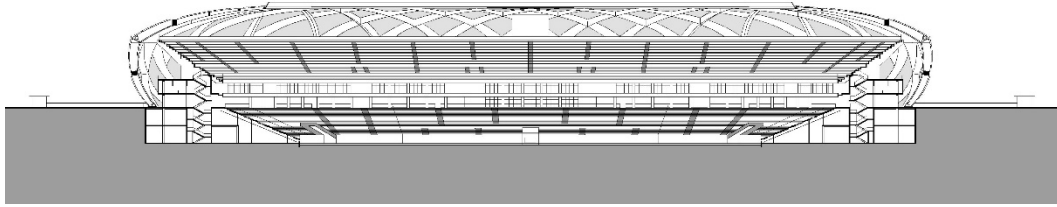


Illustration 41: Existing Longitudinal Section (source: Author)

Views

North View



Illustration 42: North View (source: Google Maps)

South View



Illustration 43: South View (source: Google Maps)

North-East View



Illustration 44: North-East View (source: Google Maps)

Main Entry



Illustration 45: Main Entry View (source: Archdaily)

Interior Panorama



Illustration 46: Interior Panorama View (source: Archdaily)

Chapter 6: DESIGN

Schematic Design: Programmatic Explorations

Scheme 1: Residential Garden Community

The first scheme integrates several sustainable design strategies. To maximize daylight penetration and enable natural ventilation, certain panels of the external façade of the building openings within the roof are removed. A roof garden is ideal for residents looking to grow their own fruits and vegetable within the community. Solar photovoltaic panels are added to the roof to convert sunlight to electricity. Rainwater will be collected on site and stored on site for watering plants and prevent water runoff. The first level is all commercial and the levels above it are for residential units. Parking is available below grade around the perimeter of the base. Half of the soccer field is preserved for the soccer academy to use. The other half will be for a civic place.

Scheme 2: Residential / Commercial

The second scheme features restaurants at the highest level. The middle two levels are residential and mixed use while the first floor is commercial. The soccer field is elevated two levels creating parking inside of the perimeter of the base.

Scheme 3: Residential / Mixed Use

The third scheme removes a portion of the structure creating a strong entrance and promenade. The upper level features mixed use program and amenities/services for

residents. The middle two levels are residential with the first level being commercial. Visual connections between the street and volume are enabled through the opening which serve as a catalyst for the community.

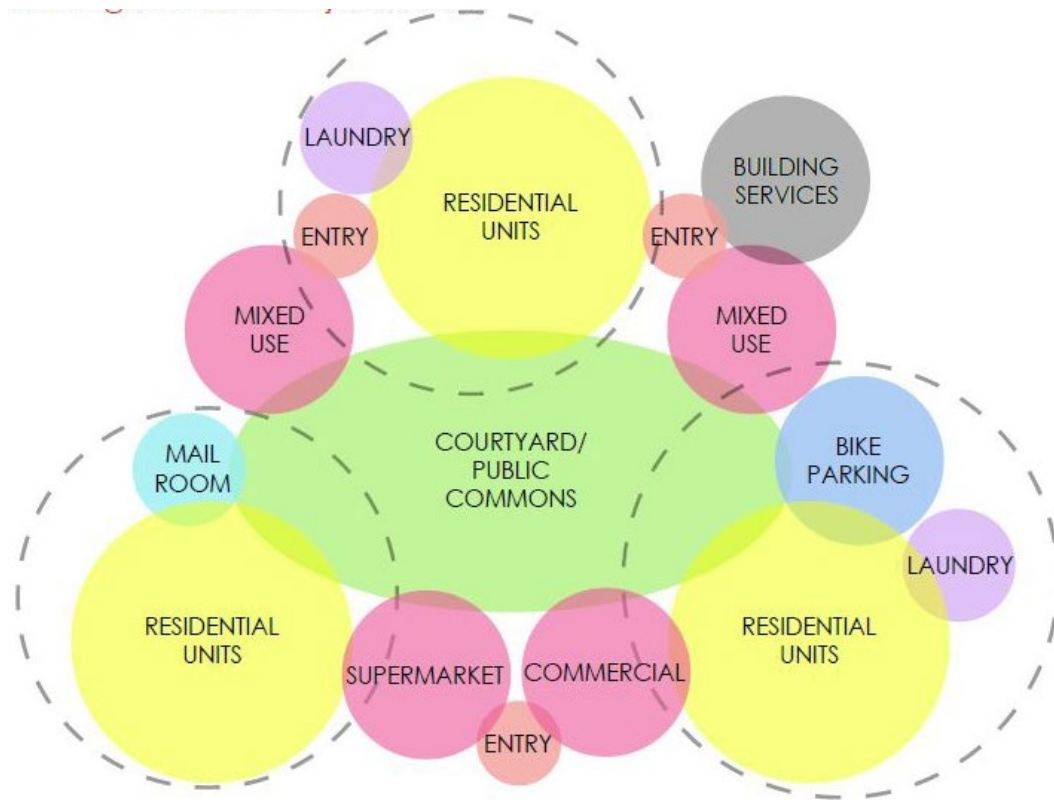


Illustration 47: Proposed Program and Adjacencies (source: Author)

The program is arranged to have circulation on the inner court and public amenities are placed on the lowest levels, while residential units will be on the upper levels. The courtyard will serve as a soccer field and can be easily converted during holidays and special events for residents.

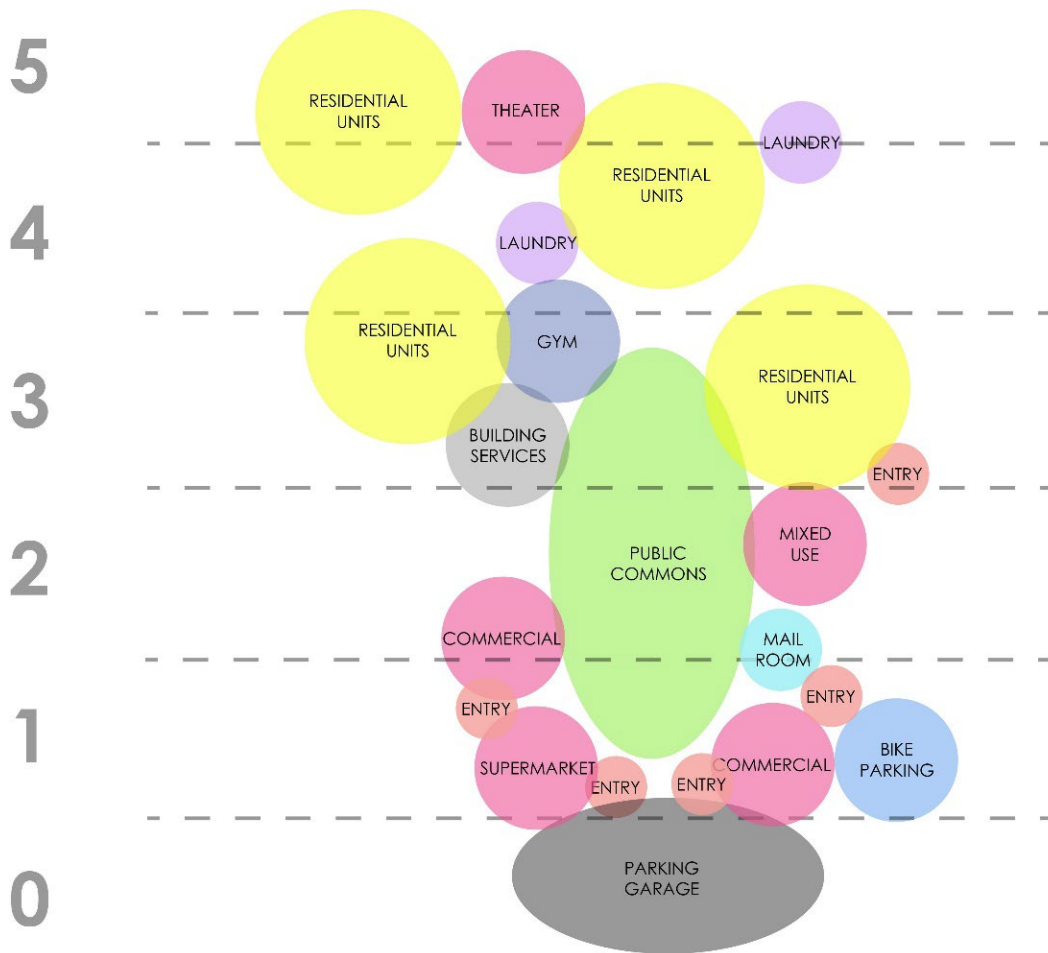


Illustration 48: Proposed Stacking Diagram (source: Author)

The stacking diagram helps us vertically visualize how the program will be arranged according to each level. There will be six levels of residential areas within the 5 existing levels of the stadium.

Combined program spread sheet

Description	Existing Las Arenas	Level	Proposed Stadium	Level
Underground Parking	620,000 sq. ft.	(-5)-(-2)	625,000 sq. ft.	(-2)-(-1)
Commercial/Retail	116,500 sq. ft.	(-1)-(2)	180,000 sq. ft.	(1)-(2)
Supermarket	15,000 sq. ft.	-1	40,000 sq. ft.	1
Office	42,400 sq. ft.	(0)-(4)	96,500 sq. ft.	(1)-(3)
Theater	52,000 sq. ft.	3	30,000 sq. ft.	3
Museum	26,000 sq. ft.	4	N/A	N/A
Gym	26,000 sq. ft.	4	30,000 sq. ft.	4
Restaurant	16,000 sq. ft.	5	20,000 sq. ft.	1 & 6
Track	20,000 sq. ft.	5	25,000 sq. ft.	1
Residential	N/A	N/A	620,000 sq. ft.	(3)-(6)
Bike Storage/Parking	N/A	N/A	5,000 sq. ft.	1
Laundry	N/A	N/A	5,000 sq. ft.	(3)-(6)
Soccer Academy	N/A	N/A	20,000 sq. ft.	(1)-(2)
Soccer Field	N/A	N/A	63,000 sq. ft.	1
Number of Levels	5		6	

Number of Levels	5	6
Circulation	230,076 sq. ft.	310,500 sq. ft.
Total Square Feet	933,900 sq. ft.	1,759,500 sq. ft.
Gross Floor Area	1,163,976 sq. ft.	2,070,000 sq. ft.

Illustration 49: Combined Program Spread Sheet (source: Author)

Square footage

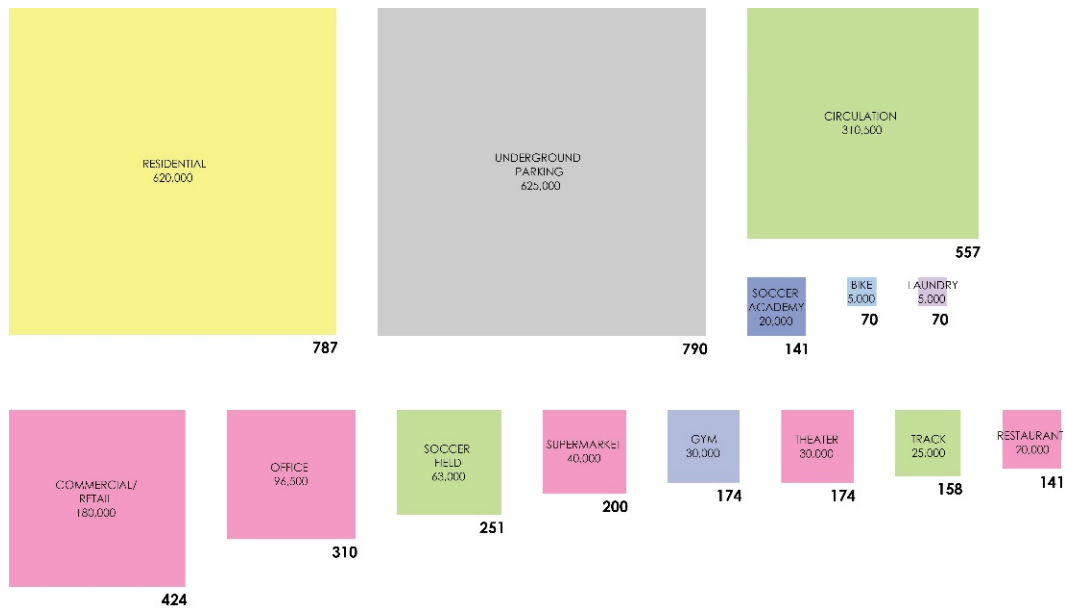


Illustration 50: Square Footage (source: Author)

Building Detail Section

Scheme 1 Section

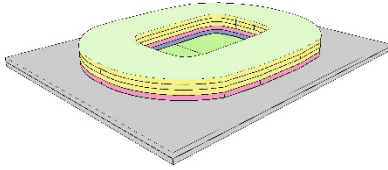


Illustration 51: Building Scheme 1 (source: Author)

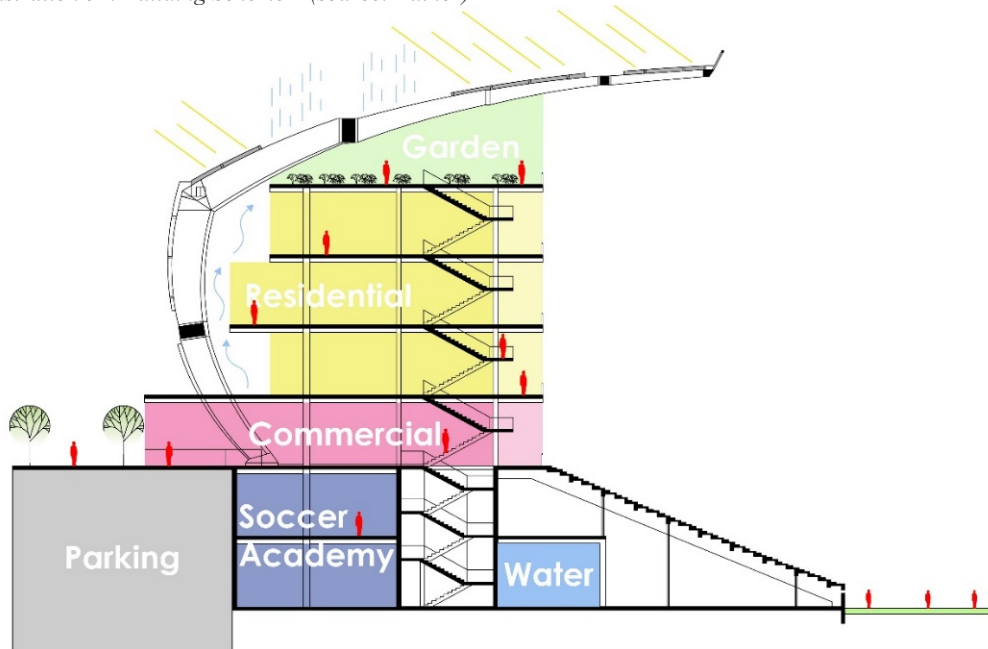


Illustration 52: Building Detail Section Scheme 1 (source: Author)

Scheme 2 Section

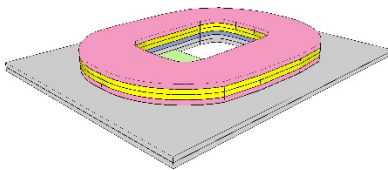


Illustration 53: Building Scheme 2 (source: Author)

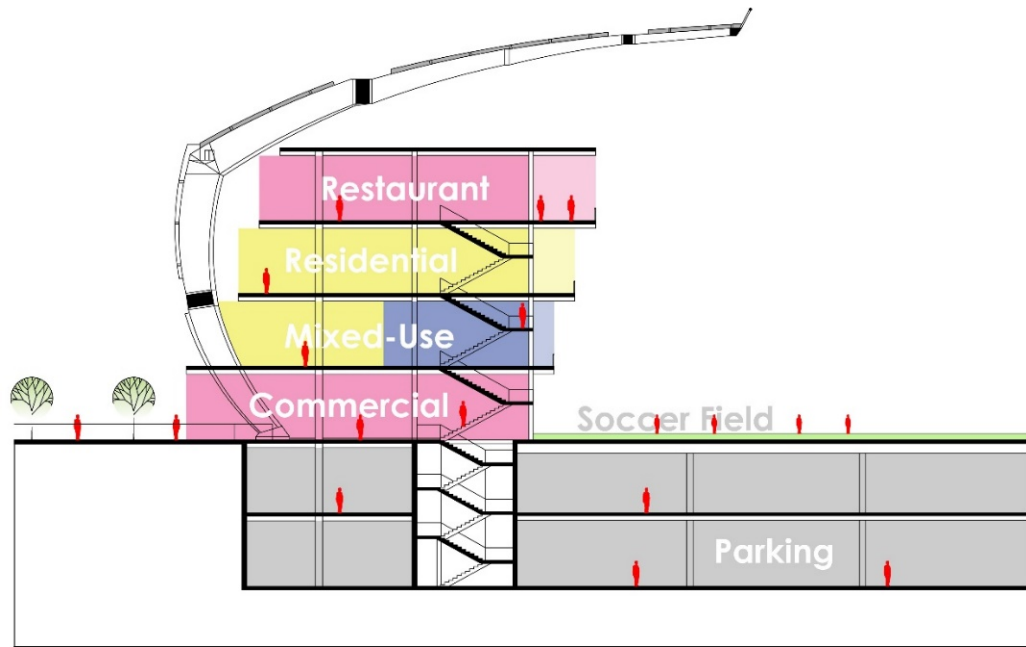


Illustration 54: Building Detail Section Scheme 2 (source: Author)

Scheme 3 Section

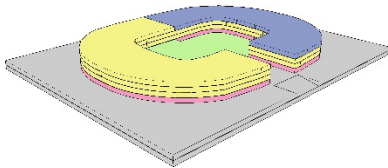


Illustration 55: Building Scheme 3 (source: Author)

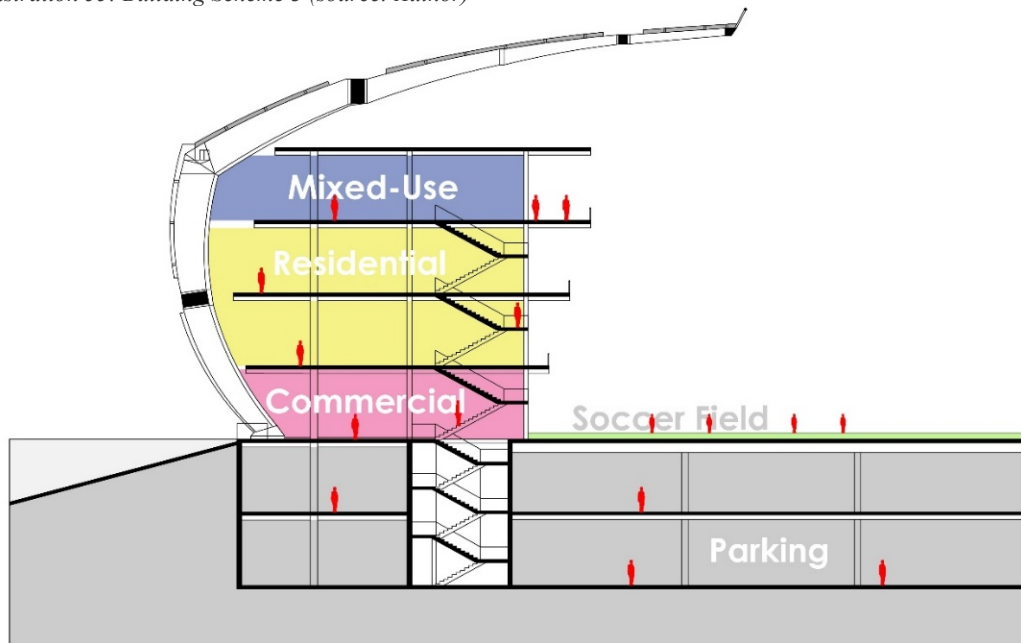


Illustration 56: Building Detail Section Scheme 3 (source: Author)

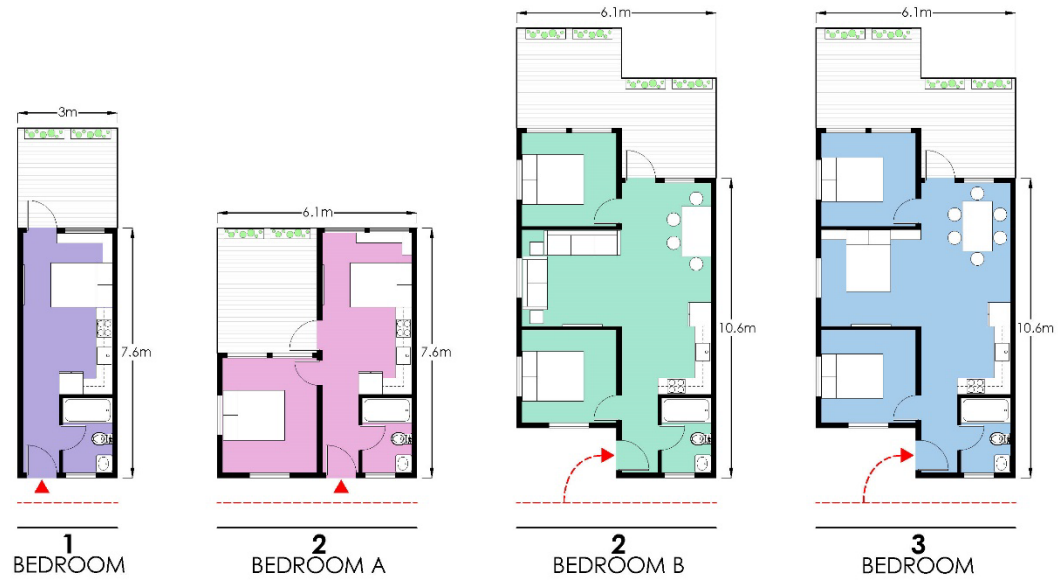


Illustration 57: Unit Typology (source: Author)

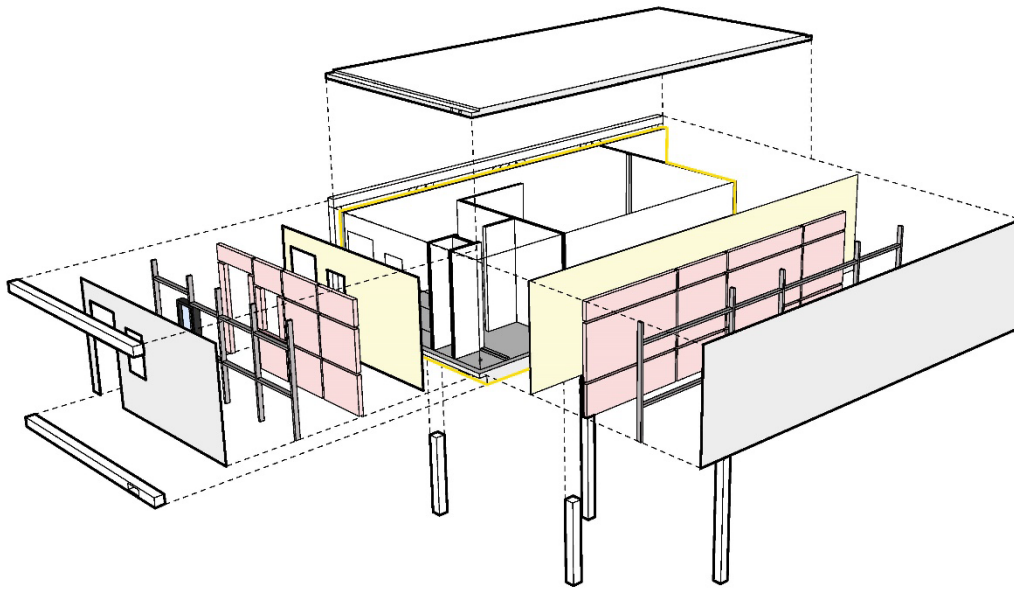


Illustration 58: Exploded Unit (source: Author)

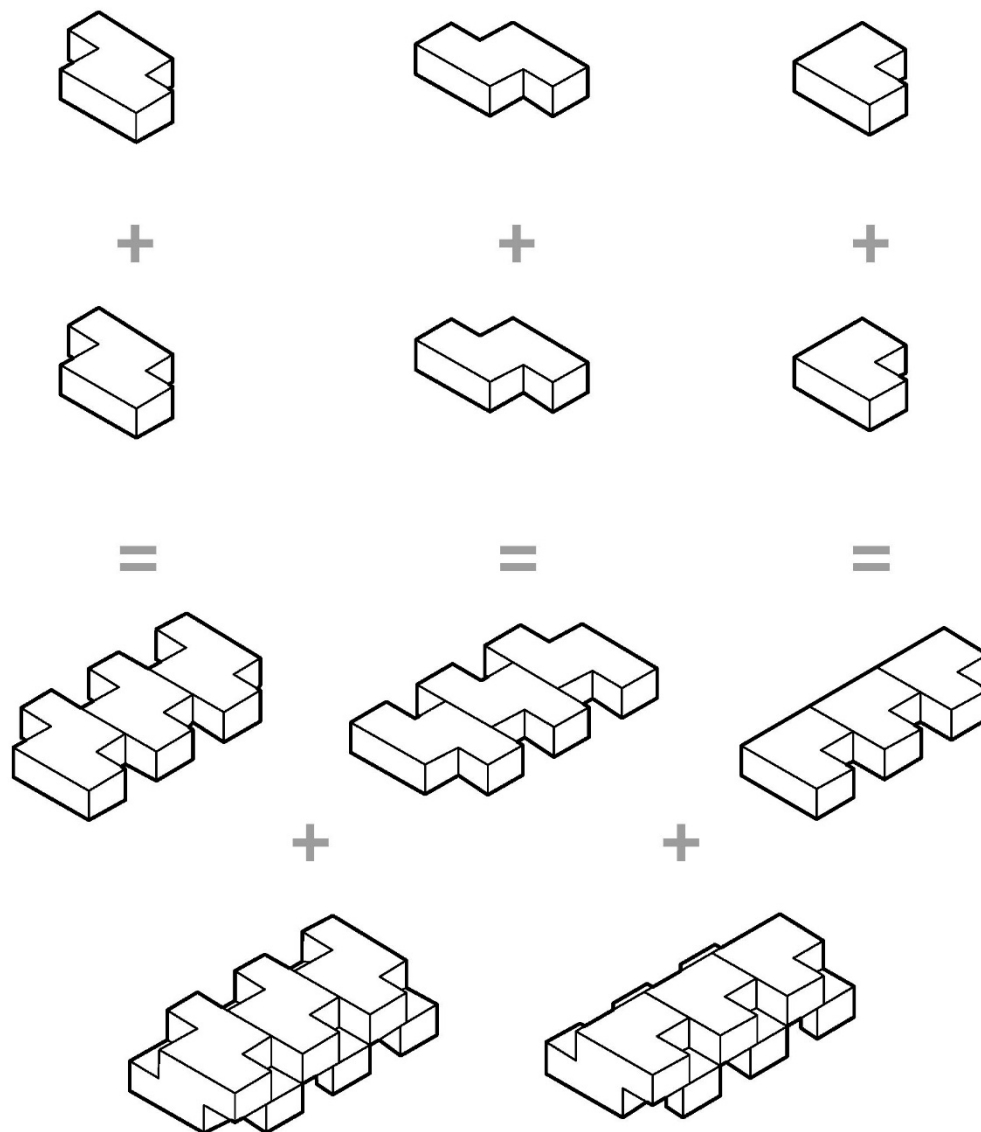


Illustration 59: Unit Aggregation (source: Author)

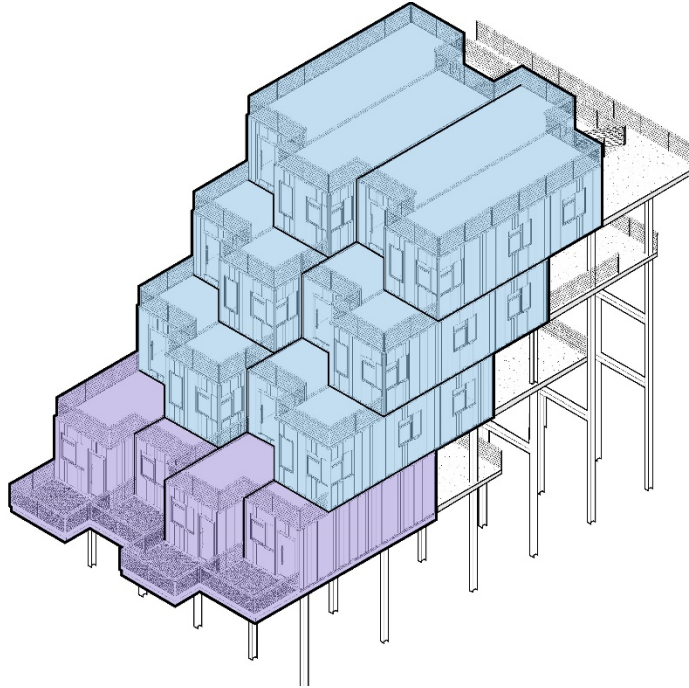


Illustration 60: Bottom Residential Tier 4X4 (source: Author)

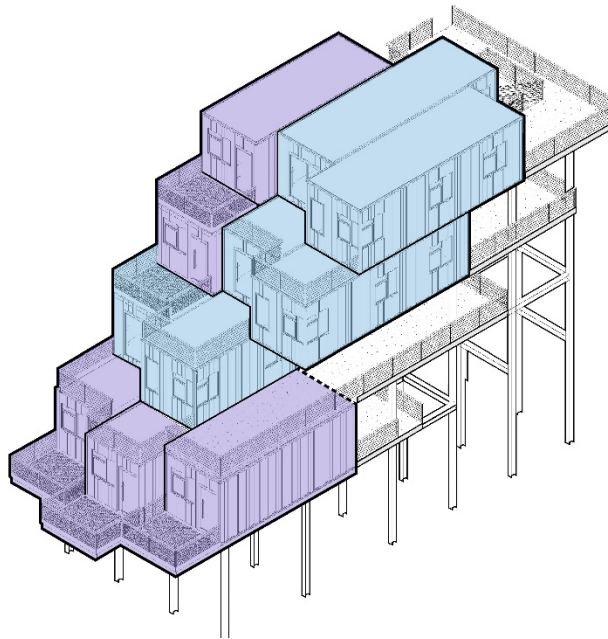


Illustration 61: Bottom Residential Tier 3X4 (source: Author)

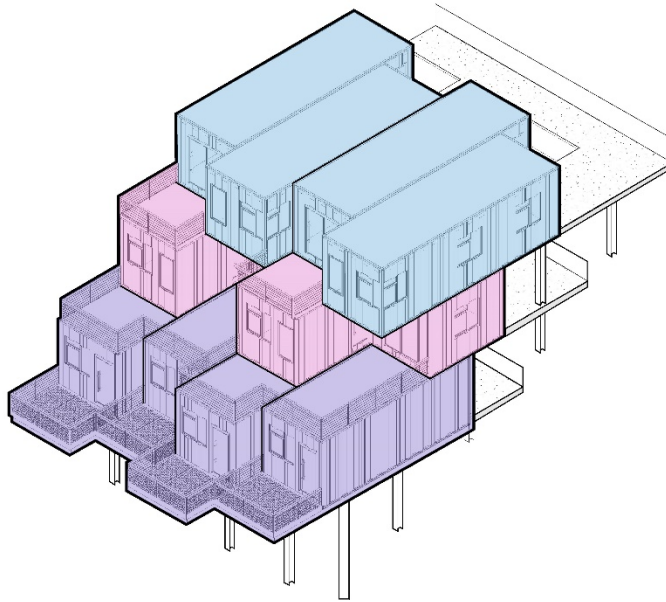
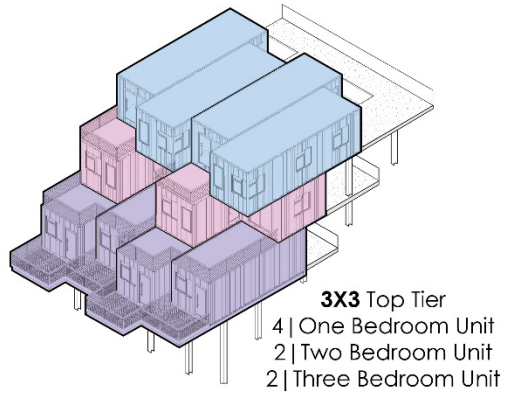
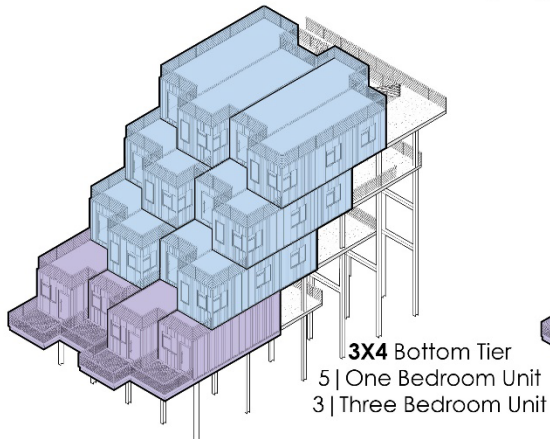


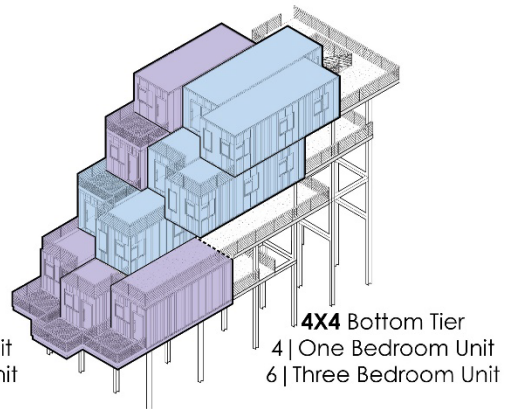
Illustration 62: Top Residential Tier 4X4 (source: Author)



3X3 Top Tier
 4 | One Bedroom Unit
 2 | Two Bedroom Unit
 2 | Three Bedroom Unit



3X4 Bottom Tier
 5 | One Bedroom Unit
 3 | Three Bedroom Unit



4X4 Bottom Tier
 4 | One Bedroom Unit
 6 | Three Bedroom Unit

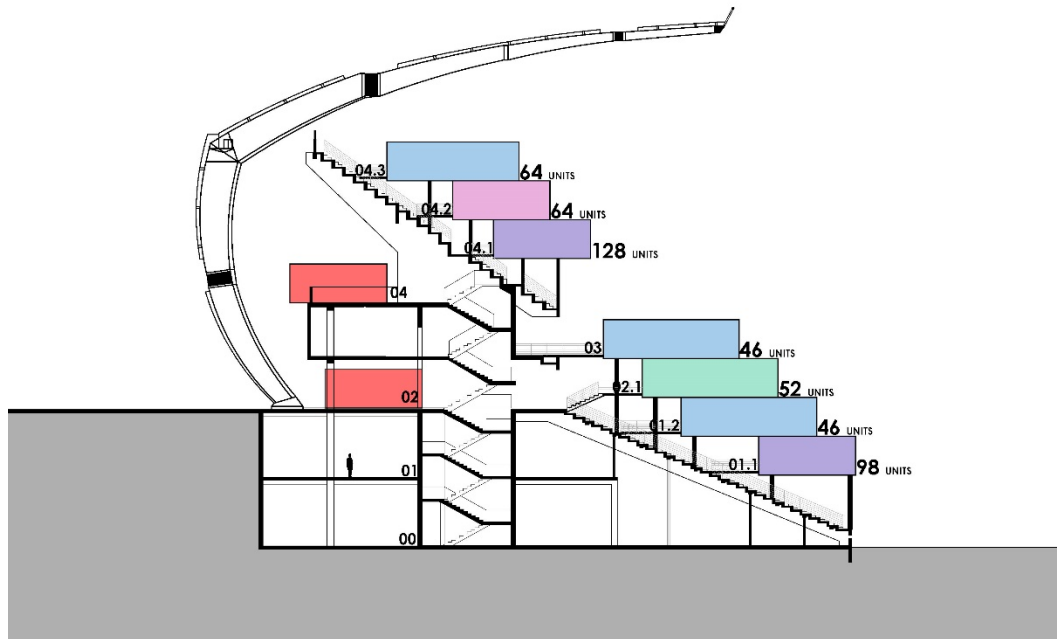


Illustration 64: Unit Typology + Levels (source: Author)

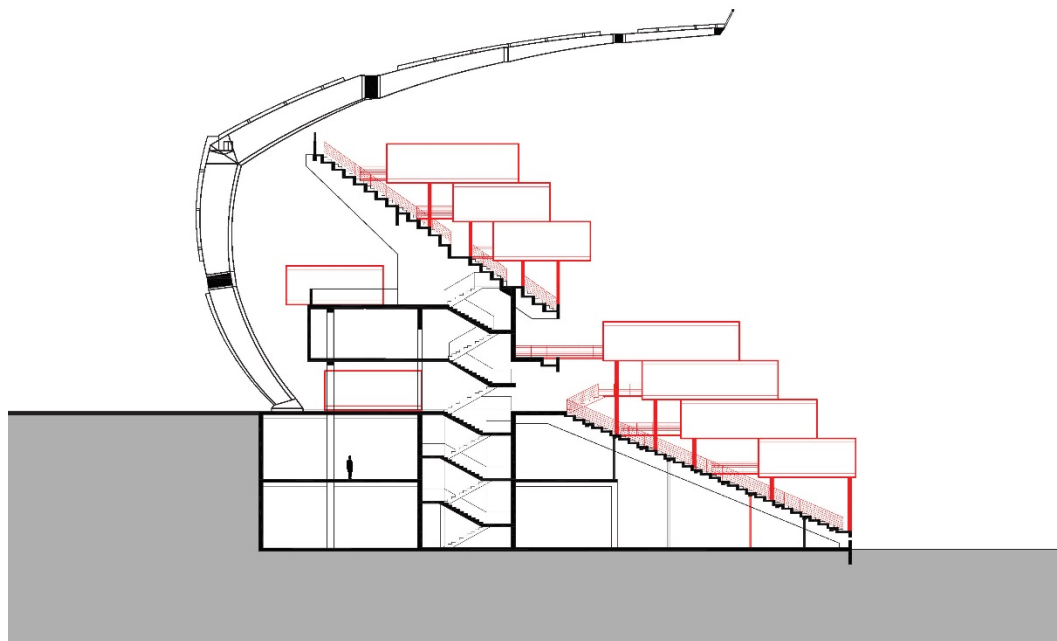


Illustration 65: New Structure (source: Author)

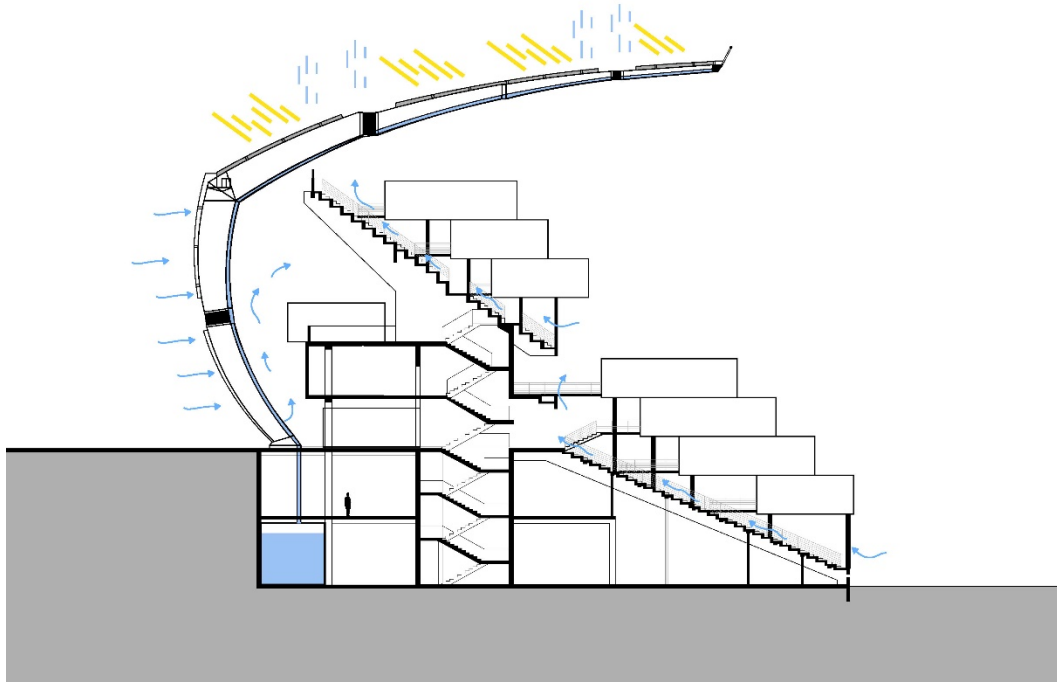


Illustration 66: Sustainability Strategies (source: Author)

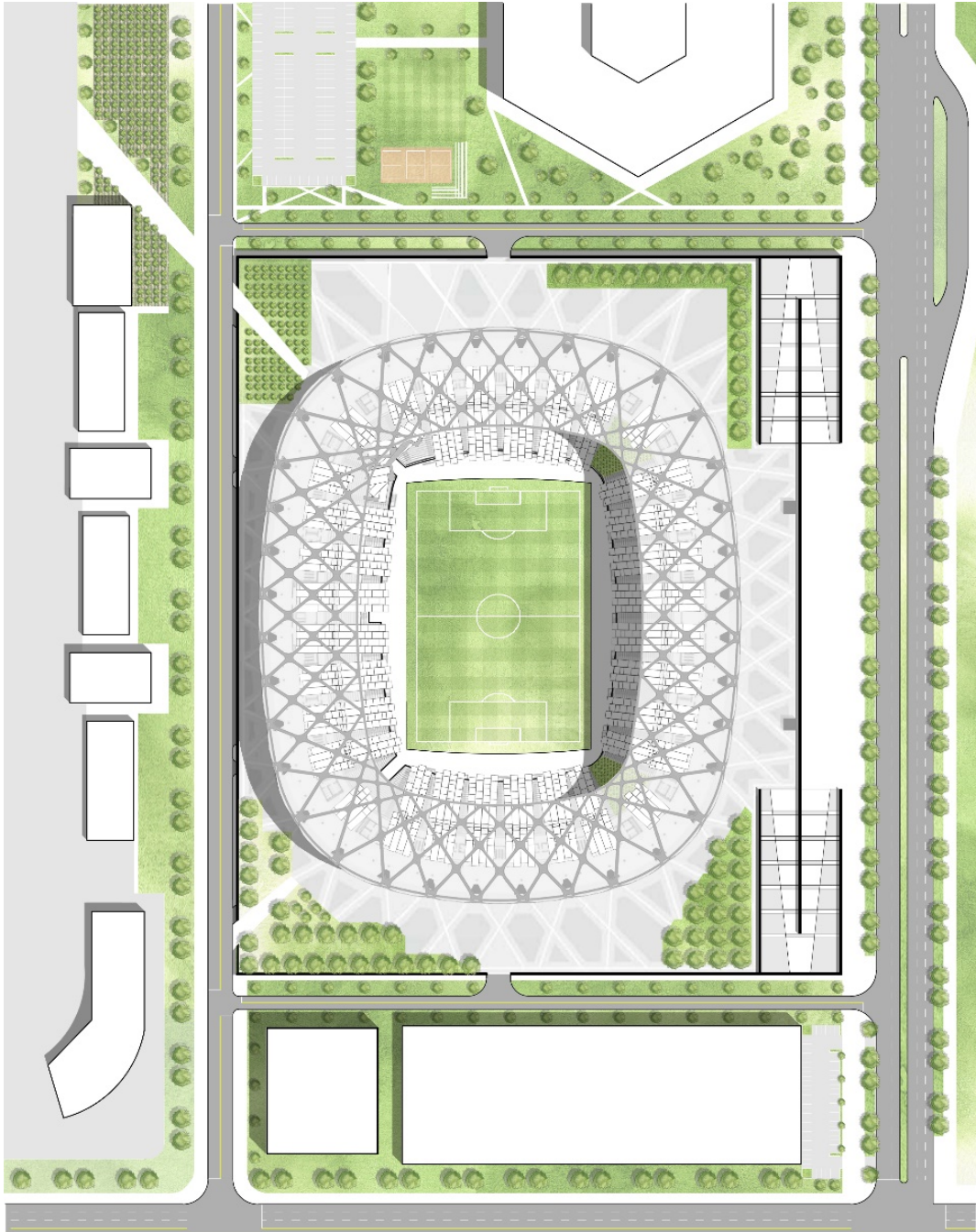


Illustration 67: Proposed Site Plan (source: Author)

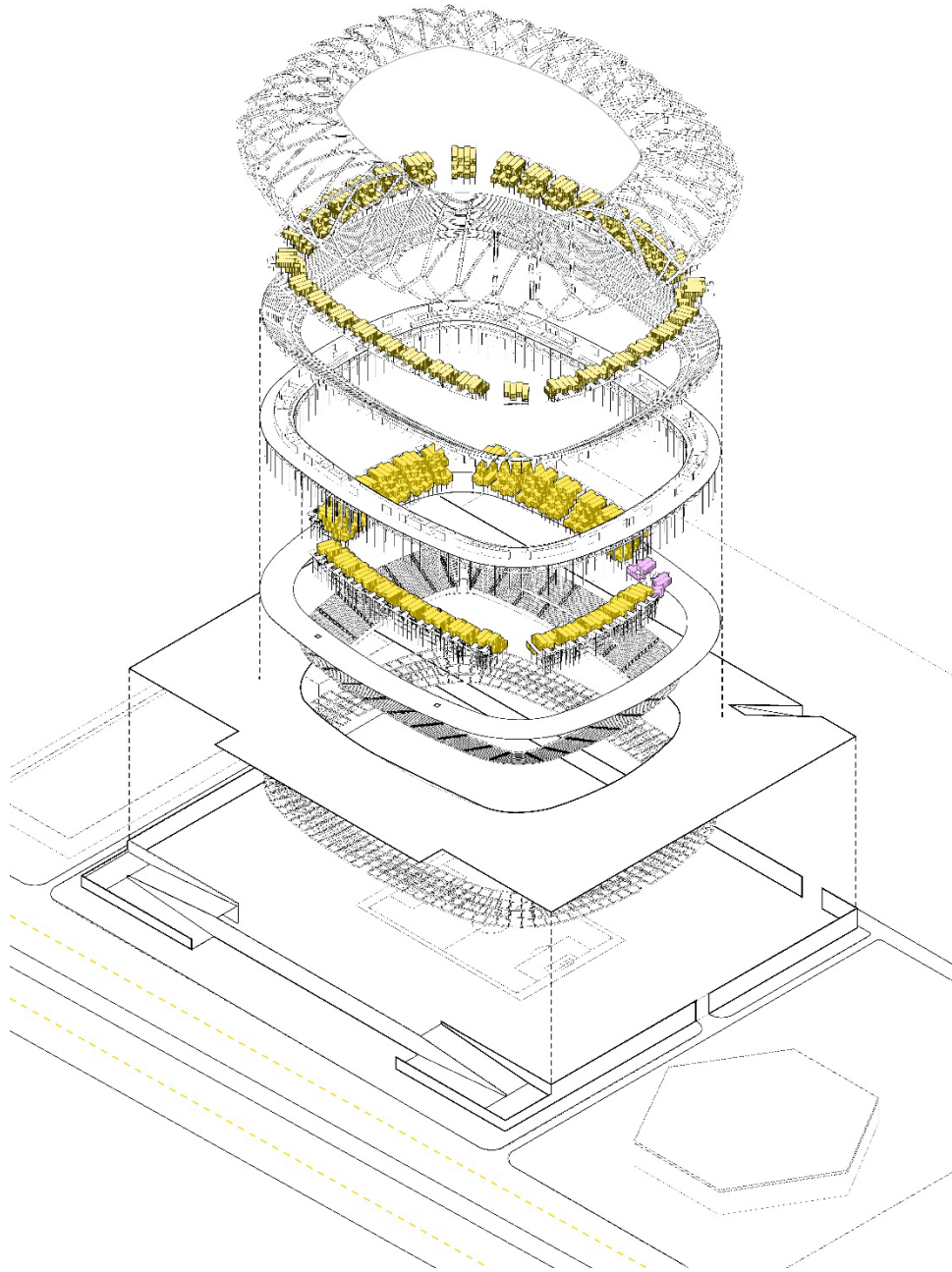


Illustration 68: Lower Residential Tier and School (source: Author)

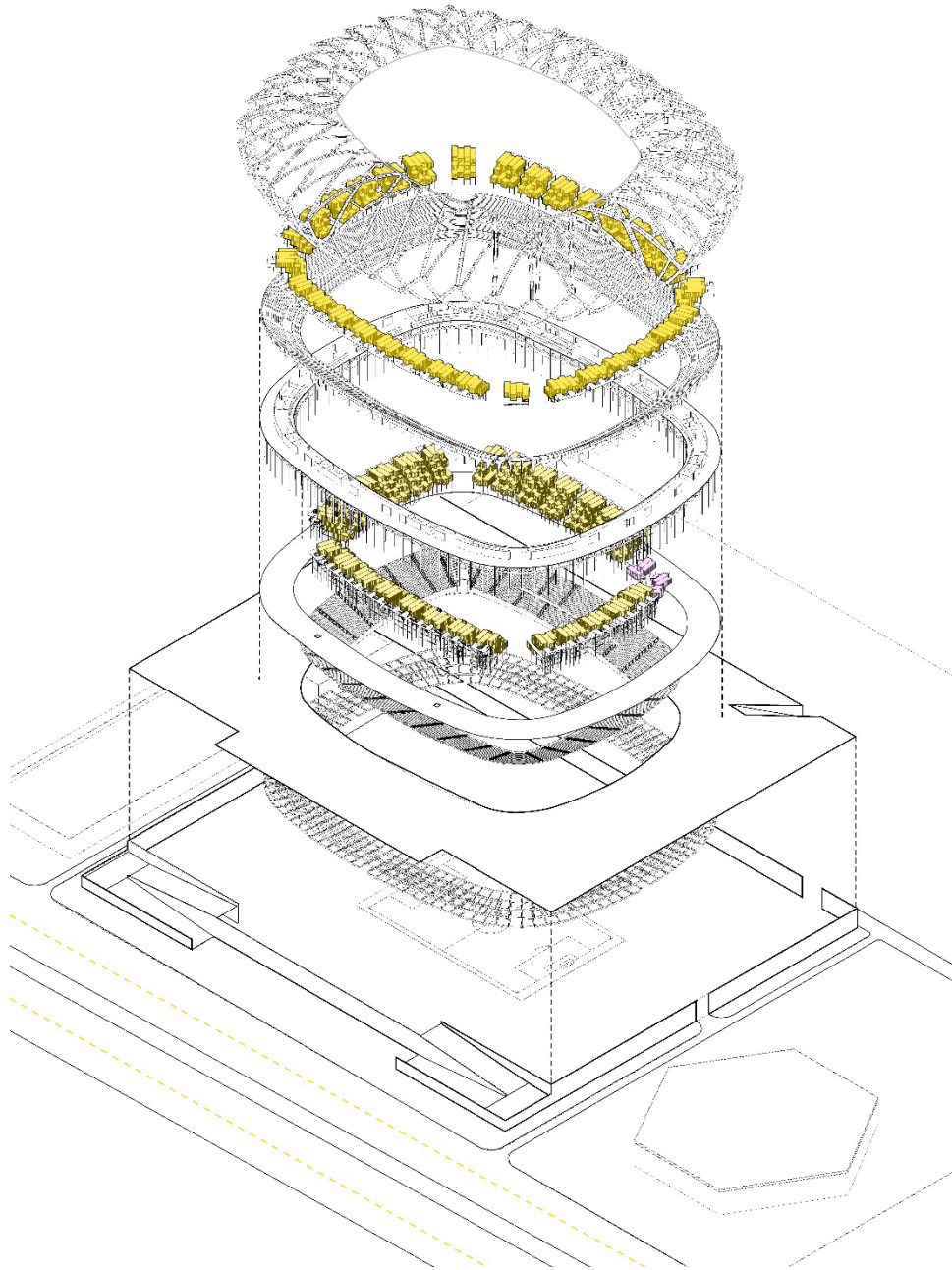


Illustration 69: Upper Residential Tier (source: Author)

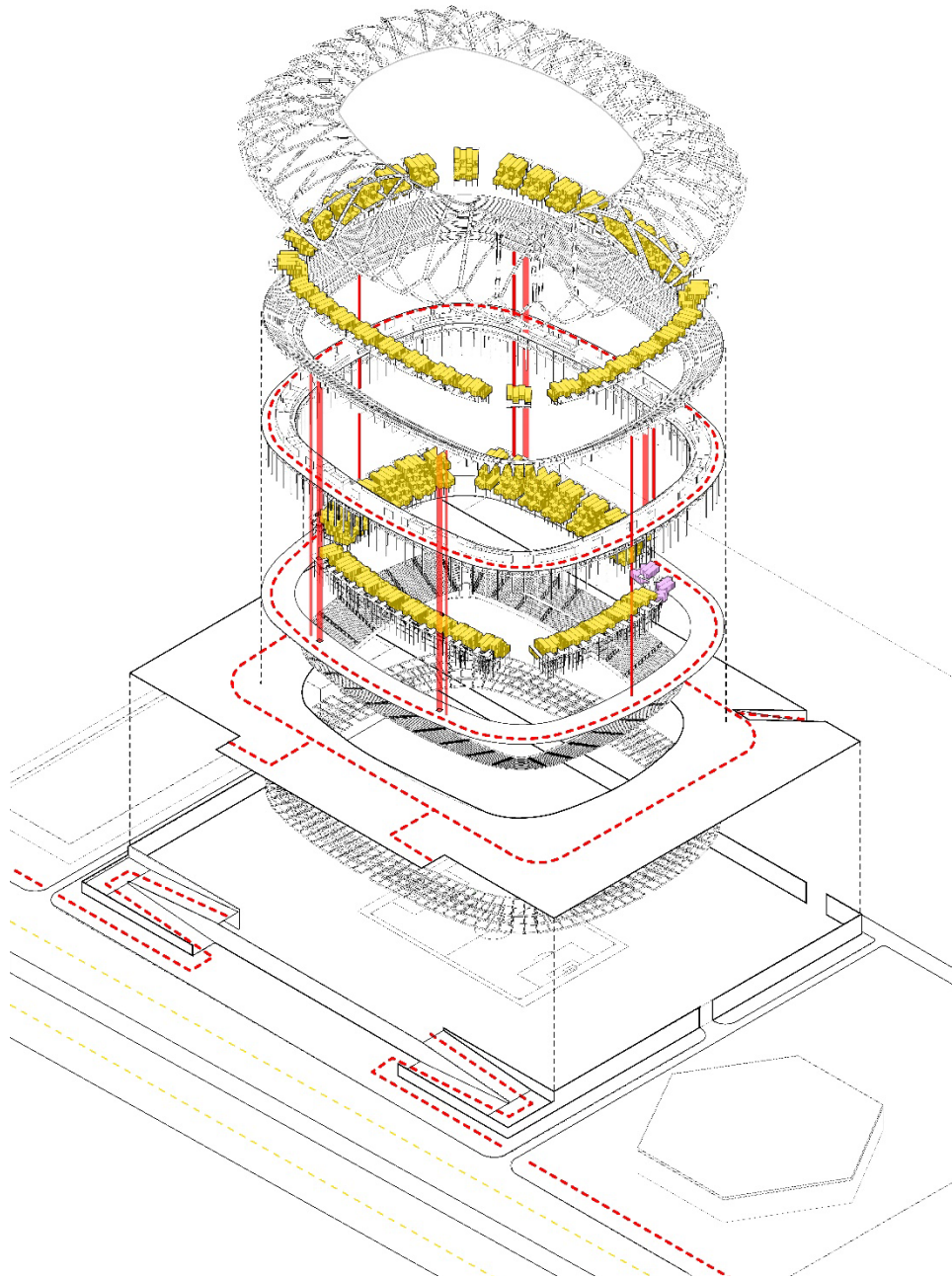


Illustration 70: Circulation (source: Author)

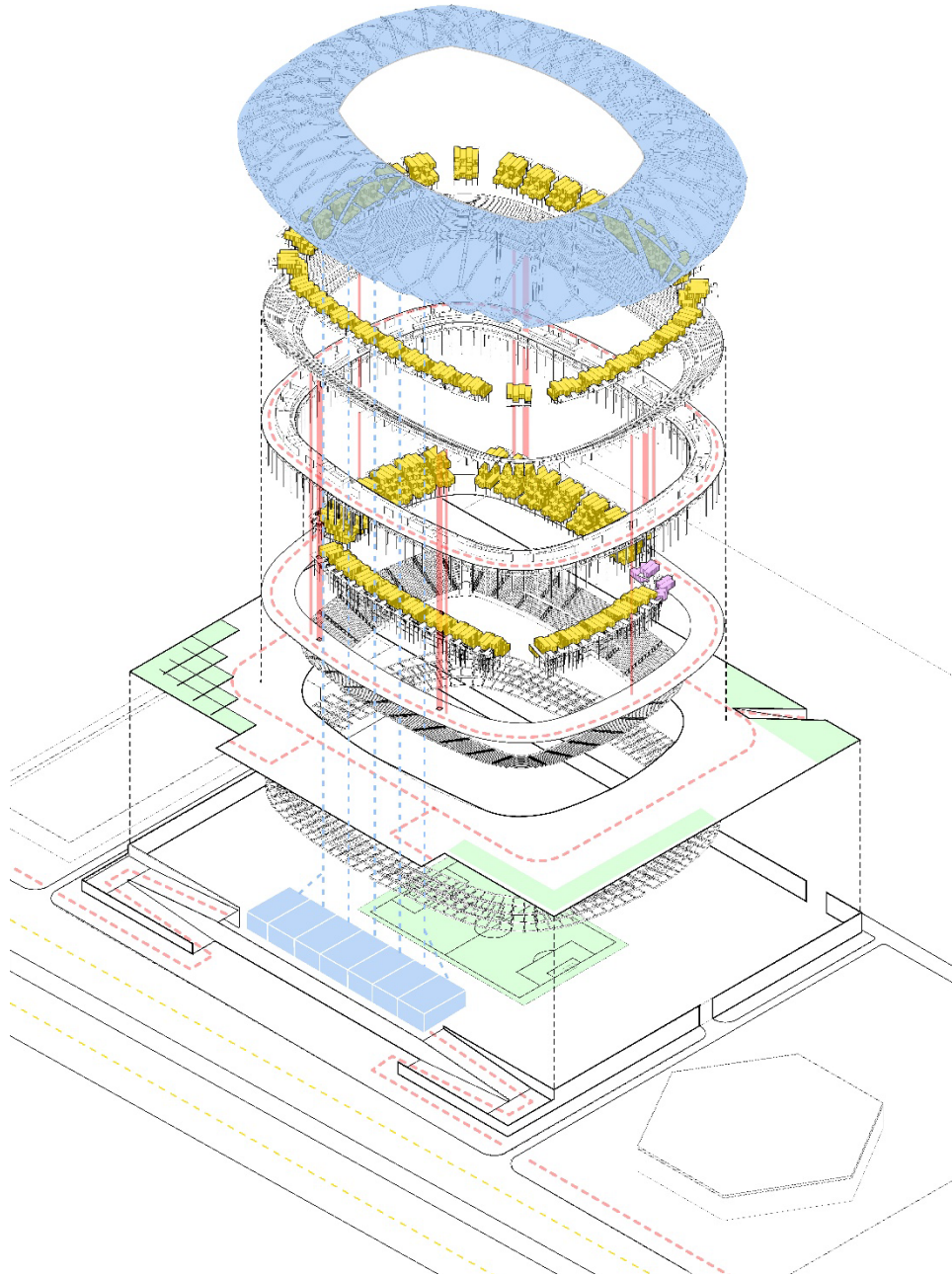


Illustration 71: Rainwater Harvesting System (source: Author)

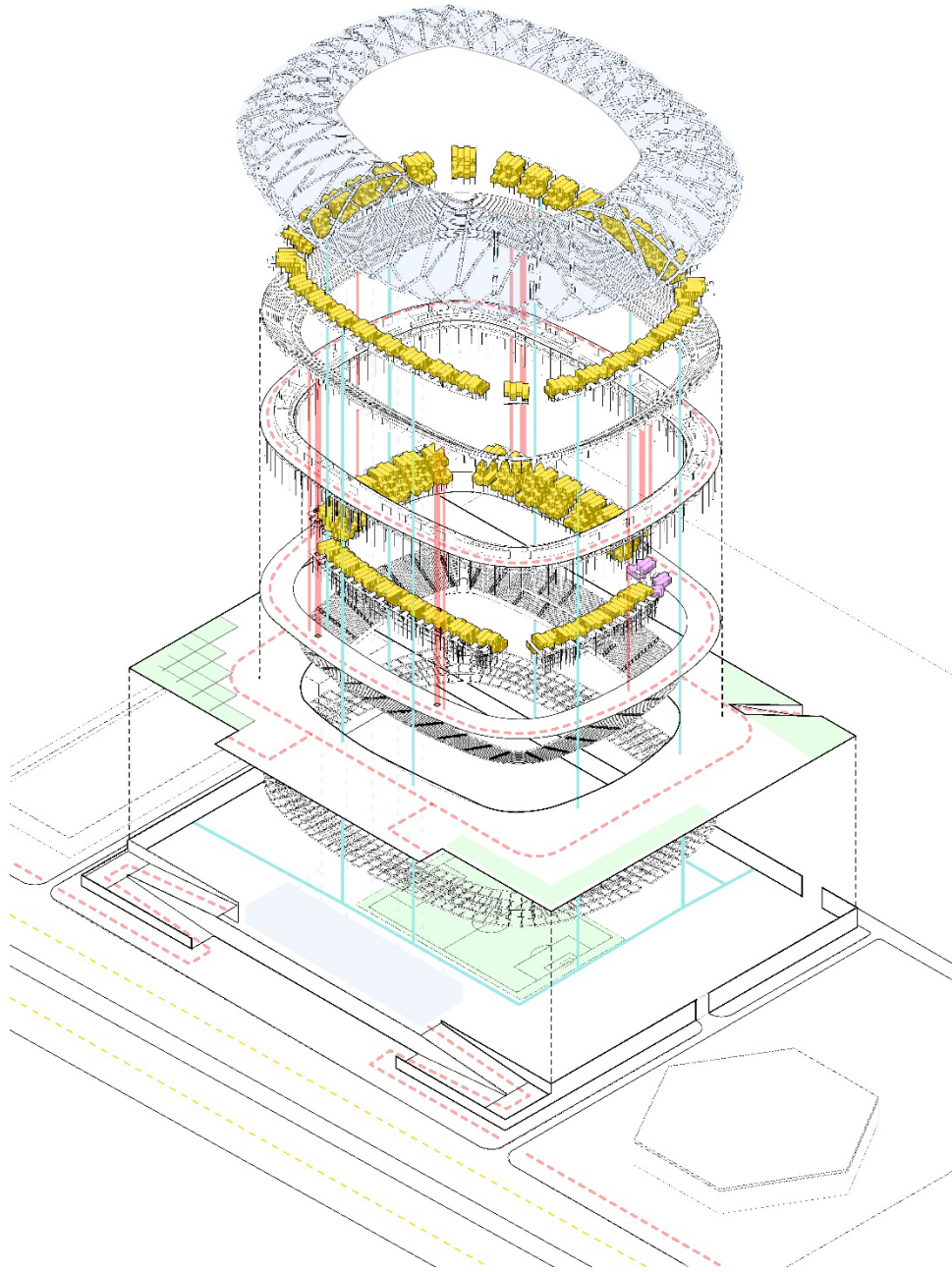


Illustration 72: Potable Water System (source: Author)

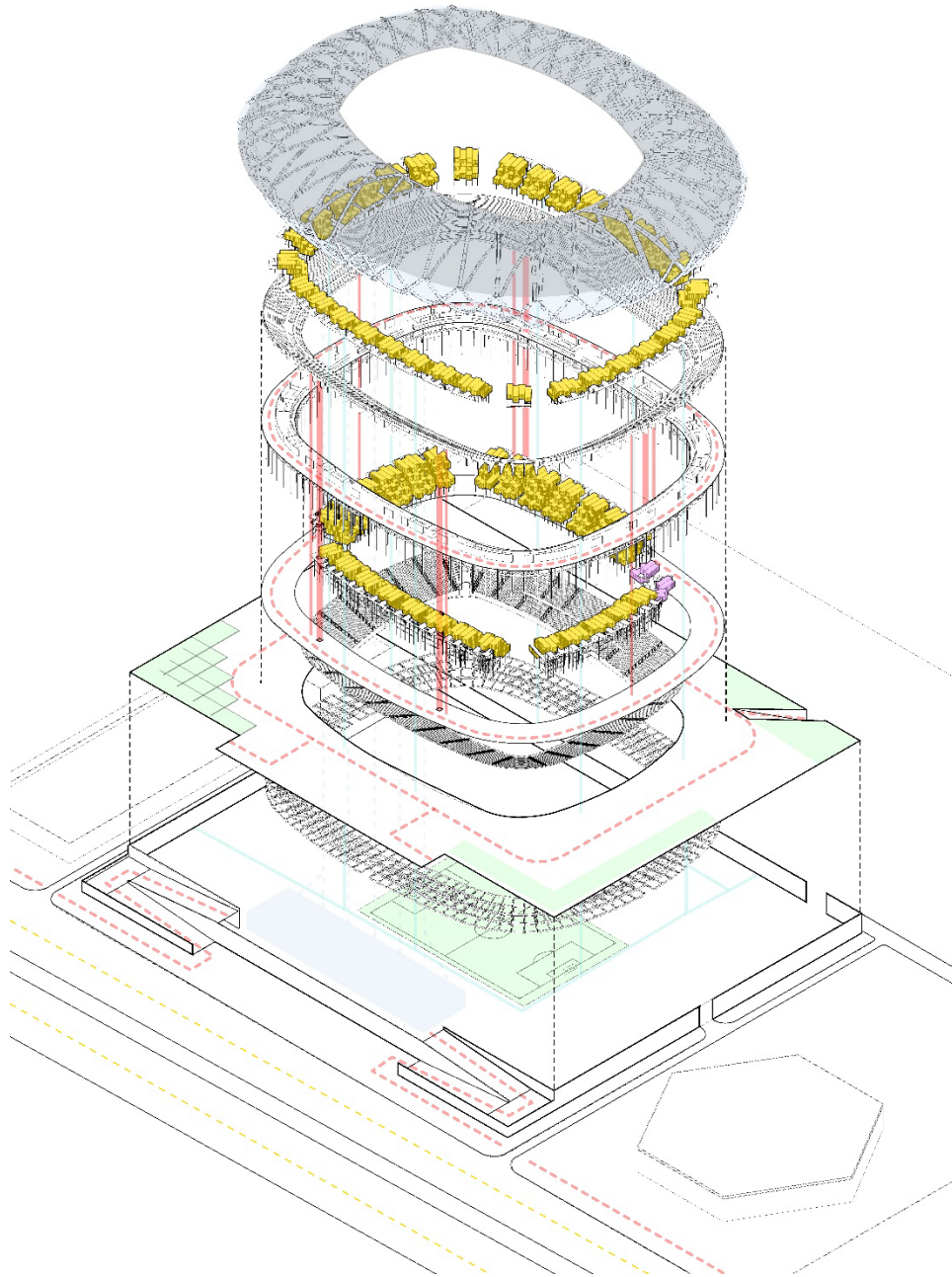


Illustration 73: Photovoltaic System (source: Author)

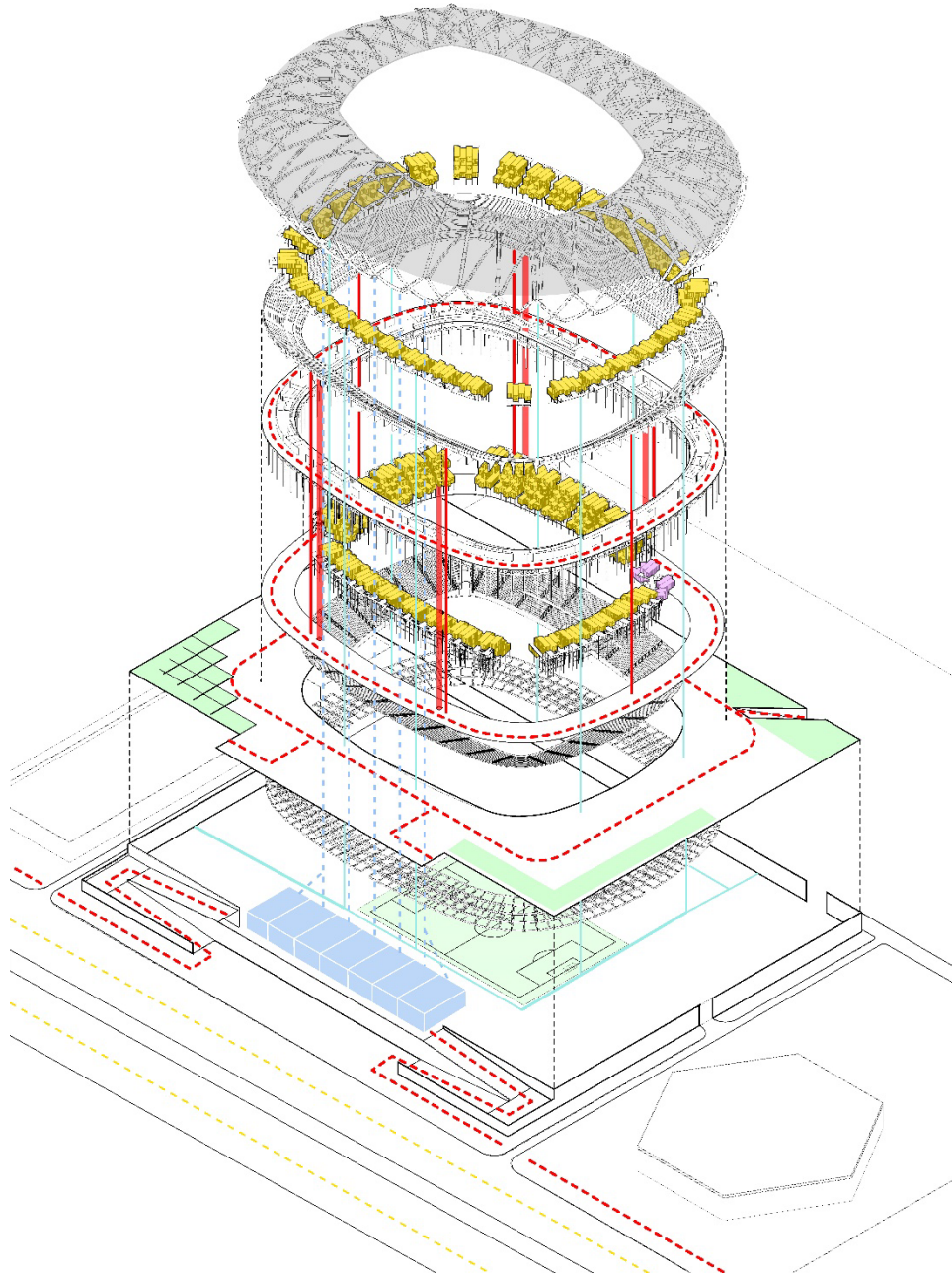


Illustration 74: All Systems (source: Author)



Illustration 75: Residential Threshold (source: Author)



Illustration 76: Concourse (source: Author)



Illustration 77: Soccer Field (source: Author)

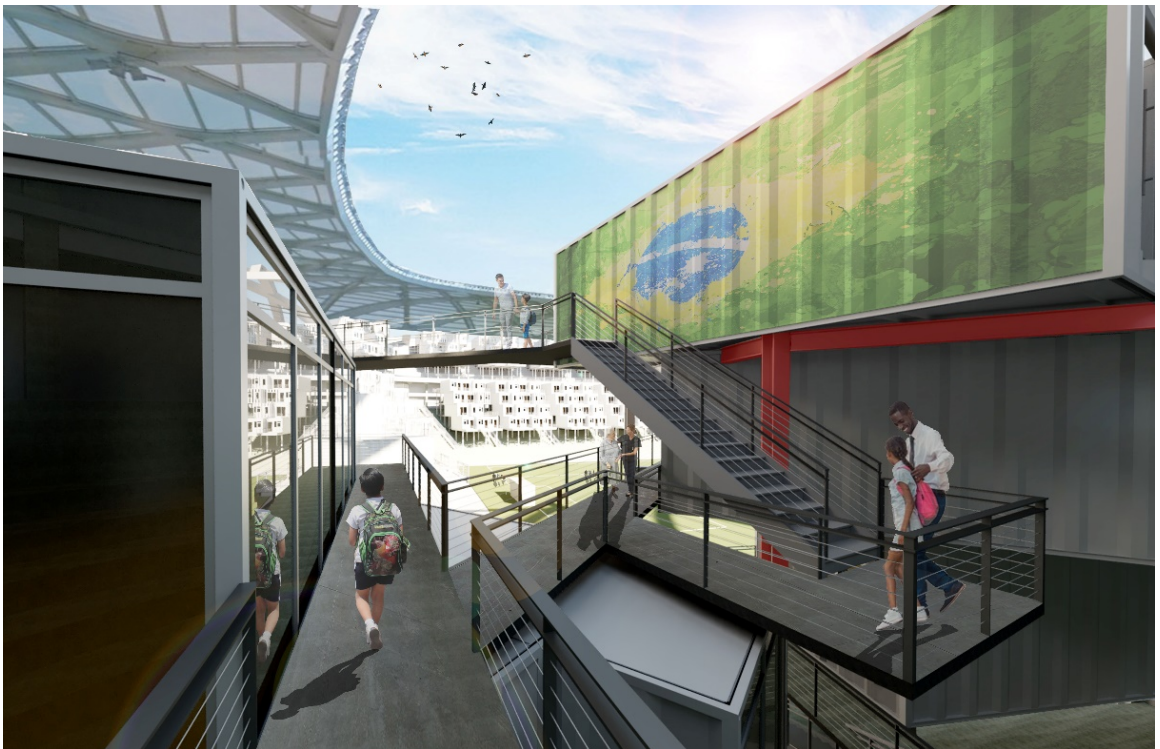


Illustration 78: Entrance to School (source: Author)

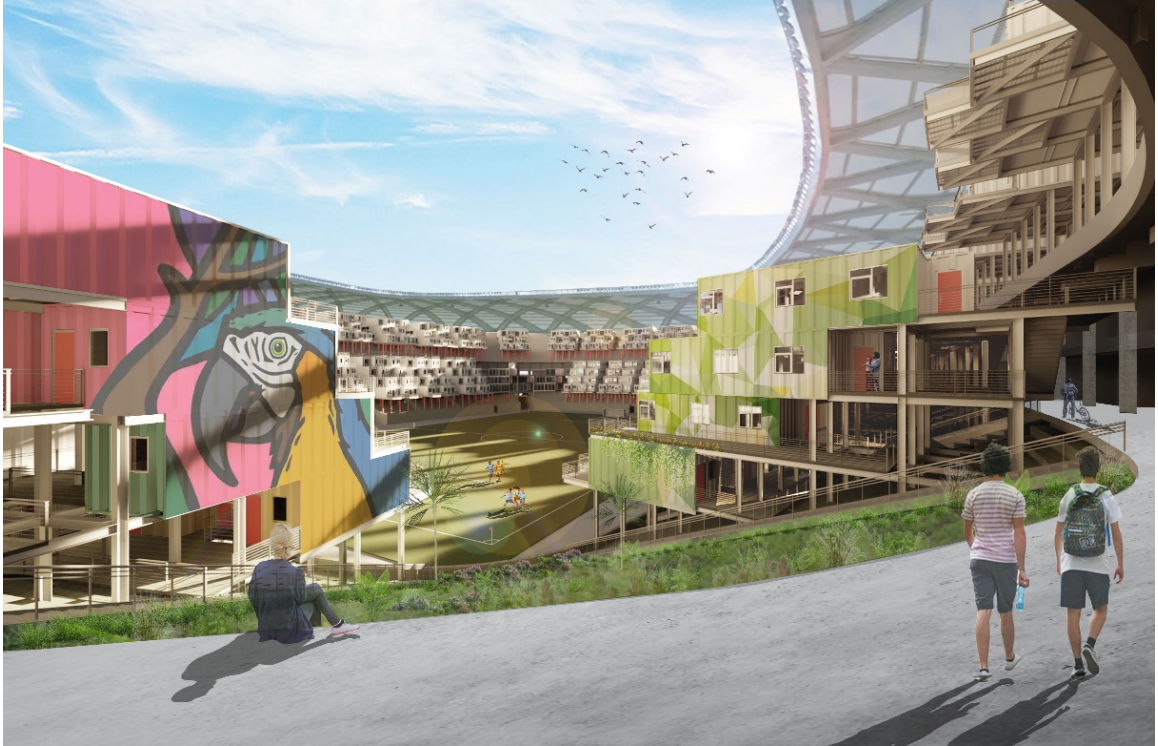


Illustration 79: Bioswale (source: Author)

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