

# POLA Energy Recovery Center

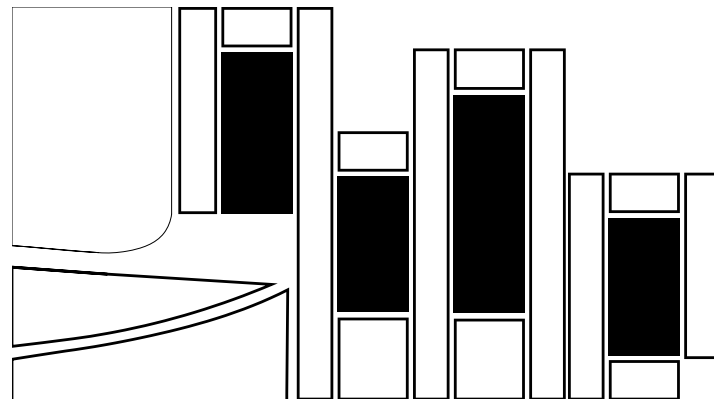
Ziyang Li

Committee Chair:  
**Dr. Ahmed K. Ali**

Committee Member:  
**Prof. Alejandro Borges**

Committee Member:  
**Dr. Astrid Layton**

Studio Instructor:  
**Dr. James Haliburton**





# ACKNOWLEDGEMENTS

This book of my M. ARCH final study is made possible under the help of many people. I owe my sincere appreciation to the following:

**Dr. Ahmed K. Ali**                      Committee Chair

**Prof. Alejandro Borges** Committee Member

**Dr. Astrid Layton**                      Committee Member

**Dr. James Haliburton**              Studio Instructor

Each of them has provided me extensive professional and personal advises and helped me to realize what kind of designer I wanted to be. I would like to thank Dr. Ahmed Ali, my committee chair, for his precise critics for my design; to thank Prof. Alejandro Borges for his suggestions on urbanization; to thank Dr. Astrid Layton for her technical support on Ecological Industrial design; to thank Prof. James Haliburton for his professional advises on details and construction. Words are limited to describing my gratitude to these people.

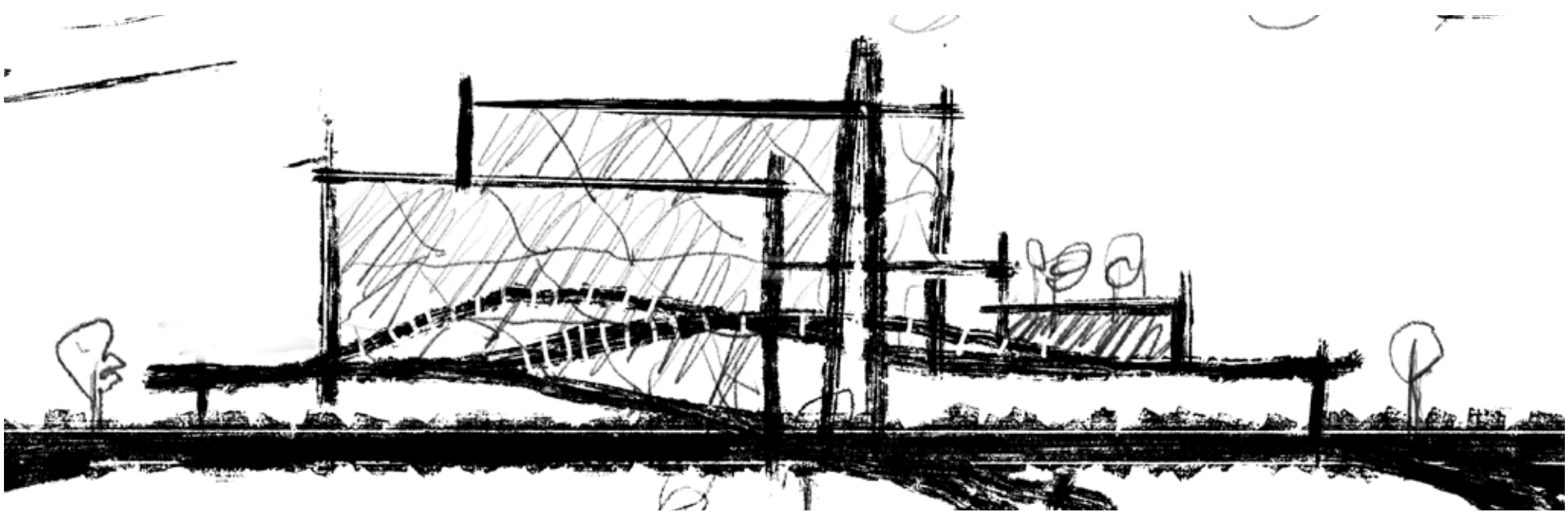
Nobody has been more important to me in my pursuing of my architecture dream than my family. I would like to thank my parents who have been selflessly supporting me and guide me to be who I am.

*"The right to the city is far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city. It is, moreover, a common rather than an individual right since this transformation inevitably depends upon the exercise of a collective power to reshape the processes of urbanization. The freedom to make and remake our cities and ourselves is, I want to argue, one of the most precious yet most neglected of our human rights."*

- David Harvey, *The Right to the City*

# Contents

INTRODUCTION	7
CITY, INDUSTRIAL, AND WASTE ...AND ARCHITECTURE	8 9
INTRODUCTION OF WASTE TO ENERGY FACILITIES	11
ANATOMY OF WTE FACILITY	12
SITE INTRODUCTION	13
PORT OF LOS ANGELES (POLA)	14
SITE ANALYSIS	15
DESIGN CONCEPT	20
SCHEMATIC DESIGN	21
PLANS	22
SECTIONS	25
DIAGRAMS	30
DETAILS	32
REFERENCE	39



# Introduction

This project is a Waste to Energy facility in Wilmington Waterfront, Los Angeles, which integrates municipal waste treatment facilities with outdoor green roofs, indoor exhibition hall, and indoor visitor centers.

Encouraged by the book *The Right to the City* written by David Harvey, this project starts with how we recognize the boundaries between city areas which are referred as urban zones and the areas where support the city area which are the industrial zones. This project focuses on the formation, iteration, and overlapping of the boundaries between the city, the urban zone, and the industrial zone.

This project celebrates the overlapping boundaries of urban space and industrial space in the modern city. This project is about the liminal space that exists in human awareness. The spaces we occupy and the spaces that make the occupation possible - this continuum is recognized and experienced through the liminal spaces.

# City, Industrial, and Waste



Figure 1. Tokyo Urban Street View, Photo by Andre Benz



Figure 2, Industrial Structure, Photo by Daniel Hansen



Figure 3. Garbage Truck on Street , Photo by zibik

When we talk about the city, we usually discuss areas inhabited by people such as homes, commercial districts, and recreation places. However, there are things we ignore that underlay the functionality of the city. Cities are more than homes, businesses, and recreation places. During the daily routine, we walk the sidewalks, we take public transit, we drive or get rides in cars, we use kitchens, and patron restaurants. We see street views between buildings. We stand in crowds on a train, we browse shops, play in recreation facilities or watch them through the window of our car, we smell flavors in our kitchen, we see people sharing life experiences in the restaurant, we hear the exhaust sound from the truck waiting in the line of drive through. Everything is so present except we have not noticed what is supporting our daily life. Where does our electricity come from? Where do our clothes get made? Where is the gasoline in our cars refined? Where does wasted food, excrement, and municipal sewage go? We live in the city and recognize things in the city, but we ig-

nore what is supporting the city; We ignore the essential services, the essential infrastructure. There is division, an intentional separation between served areas - the urban zones, and service areas - industrial zones. This intentional separation was the mark of a first world country, the pinnacle of human industry, but it is disappearing. The world is getting smaller. We have to deal with our own waste, we have to come face to face with the way our fuel is manufactured, we have to become sustainable. No longer can the first world push it's refusal off on the third, if we are going to pull energy from the land, it has to be our land.

It is not our fault we ignore the services and infrastructures because they are normally remote from the main urban areas and they are technically designed not to be seen. There is an invisible boundary between people's daily lives and industrial activities, which is made by distance and urban planning intentions. Yet things are changing gradually in the past decades with the

population rapidly increasing and the city scale rapidly expanding. Meanwhile, the expansion of the city requires more and more materials which are produced by the industrial zone. So, the industrial zone needs to be larger. As a result, the cities' edge begins to meet and overlap with the industrial zone. The boundary made by the distance is gradually disappearing. The increasing population and the expanding space requires more material, as a response the industrial activities will produce more by-product, more waste. Industrial processes will always produce surplus under the rules of capitalism. It is all sent to the city but the surplus becomes waste, and the city can longer send it back. City, industrial, and waste therefore form a triangular relationship. The relationship among city, industrial, and waste gives us the opportunity to rethink the routine of our daily life



## ...and Architecture



Figure 4. Hamburg Philharmonic , Photo by Iwan Baan



Figure 5. Zollverein Power Station , Photo by Ziad Shibab



Figure 6. New York High Line , Photo by Iwan Baan

The internal relationship between city, industrial areas, surplus and waste, and the new boundary forming between urban zones and industrial zones gives the opportunity to have a new perspective on architecture that embraces both industrial and urban elements.

Let us focus on industrial architecture. Traditionally, architectural elements have played a relatively less significant role in the design of industrial elements. Industrial architectures today are more likely to be engineered to the function and operation based on what kind of industrial activities occur inside them, rather than to consider *firmitas*, *utilitas*, and *venustas* as Vitruvius Pollio [1] said.

As the economy went up and down through the 19 century to 20 century, the owners of factories tended to cut their operating budget by moving their factories to remote places to take advantage of cheap labor and lowered safety standards. Design became focused more on the functionality and dura-

bility of the architecture of industrial activity [3]. Most of the architects move their attention away from the architecture of industrial activity. Starting in the 21 century, with the expanding population and urbanization, we witnessed several projects that reconditioned abandoned factories or large-scale infrastructure facilities for public use. We can see an attempt that brought back the beauty of industrial to the public in projects like the Hamburg Philharmonic by Herzog & de Meuron in Germany, the Zollverein Power Station by OMA in Germany, and the High Line by Diller Scofidio +Renfro in the US, when the area used to be industrial now became woven into the urban fabric. These great projects that show the possibility of readopting architecture to industrial facilities and bringing industrial back to public recognition. They also represent not only the popular notion of the readopting new material and technology but also respect and reuse the abandoned waste. However, they are good attempts but not really introducing industrial to the urban zone. This project

takes the lessons of these precedents a step further and integrates the industrial and urban zones. Fortunately, Modern culture is becoming more welcoming to the notion of reusing waste; this transition is rooted in our sustainability movements. Waste-to-Energy (WtE) facilities have become a popular experimental design field for putting architectural spaces into industrial facilities putting architectural design in industrial facilities. Despite the fact that these projects are great examples of informing people of the existence of industrial activities that previously had a stronger connection with urban activity, these projects do not introduce or integrate the contemporary industrial activities into people's routine or daily life. As a Philharmonic theater, an office building, and an unusual public park the revised projects still stayed in a recreation or business urban zone. There are also other projects attempting to catch the idea of bringing industrial to people's life in a relatively opposite way.

# ...and Architecture



Figure 7. Amager Bakke Resource Center, Photo by Rasmus Hjørtshøj



Figure 8. Northeast Coastal Park Waste Plant, Photo by Abalos



Figure 9. Naka Incineration Plant, Photo by Larry Speck

Projects like Amager Bakke Resource Center by BIG in Copenhagen, Denmark, Northeast Coastal Park Waste Plant by Abalos & Herberos in Barcelona, Spain, and Naka Incineration Plant by Yoshio Taniguchi in Hiroshima, Japan have captured public imagination and become new architectural tourism destinations. A variety of architectural elements were added into these projects throughout their design process. We can notice the sign of the architecture of industrial activity is back to the world of architectural design. They are a great start of bringing architecture back to industrial and bringing industrial back to the city. Yet it is not enough. Although these industrial facilities all have some sort of public function in them, they still stay in a remote place like other industrial facilities and the invisible boundary between industrial and urbanity still exists. These facilities only act as a destination to the urban and public. A destination will only provide a temporary but not a consistent relationship to the city. The remote location would make the facility disappear if the public did not go

to the site.

Furthermore, architects are trained to design not only for the present but for the future. As the boundary between industrial and urban becomes closer and closer, the public will witness the industrial coming back to the city. A new typology will emerge that mixes the urban facility and the industrial facility and will play a key role in bringing industrial back to the city.

We have witnessed many great attempts to bring industrial back to the city and to the public in different ways. They would either put new architectural elements in abandoned factories or facilities or integrate public use architecture in new industrial facilities. The first case is the bring-in method. The second case is the take-out method. Both cases are trying to bring architecture back to industrial and showing the machine aesthetic to the city. We can see the potential of combining these two cases together.

The boundary where the industrial zone meets the urban zone would be a suitable place to start an experiment on the new hybrid topology which combines industrial and public facilities to let people understand and realize what is supporting their life and the relationship between served and service areas. The WtE facility would be a reasonable element for the industrial part of the mixed typology, as it catches the notion of reuse and also bonds the city, industrial, waste triangle by reproducing energy and material from the municipal waste.

# Introduction of Waste to Energy Facilities

A Waste-to-Energy Facility (WtE) is a plant that generates electricity and produces heat by burning Municipal Solid Waste (MSW). WtE is an advanced waste management process that was adopted during the early of 20 century and highly developed during the first decade of the 21 century. It has a worldwide influence towards MSW especially in EU and East Asian countries. Currently the EU has the largest percentage of MSW used by WtE facilities in the world. China and Japan also have most of their MSW sent to WtE facilities. As for the United States, although it is one of the largest MSW producing countries, most of the MSW goes to landfill. Policies and trends of public awareness started to promote WtE as an alternative MSW management method in the US. Building WtE facilities has the potential to be a popular solution to manage the problem of lack of landfill in the US.

In order to understand the Waste-to-Energy process. It is important to understand the facilities' physical components. The WtE facil-

ity breaks down into four major departments which consist of numerous components. The major departments are tipping & feeding, incinerating & boiling, Generating, and filtering. Minor service departments include monitoring, operating, and maintaining to help the normal operating of the facility. In the tipping & feeding department, MSW is transported by trucks and the ground weight will calculate the entry fee of the every round of trucks. Waste is dumped into a pit called the bunkers for storage several days until all the organic parts dry out. Tipping & feeding departments need to be fully insulated to avoid odor and hazard gas release to the atmosphere. After the bunkers, waste can be sorted and shredded to be separated into the recyclable categories, or directly fed to the incineration machines. Incinerating & boiling department is where the treated waste burned. Waste is fed to the incinerating machine. The heat from burning boils the water in the heat exchangers, creating steam. Incinerating also produces polluted air and fly ash. Things that cannot be burned will turn to

bottom ash for further treatment. The steam goes to the third department, the Generating department. Steam drives the turbine to generate electricity. Then the leftover steam will be conducted to a heat exchanger to distribute heat for the heat grid. After these, air cooled condensers will cool down the water for reuse. Fly ash and polluted gas will be treated in the filtering department which has a series of filters to separate fly ash and clean the air. Fly ash will be stored until further treatment offsite and filtered air will be release to atmosphere

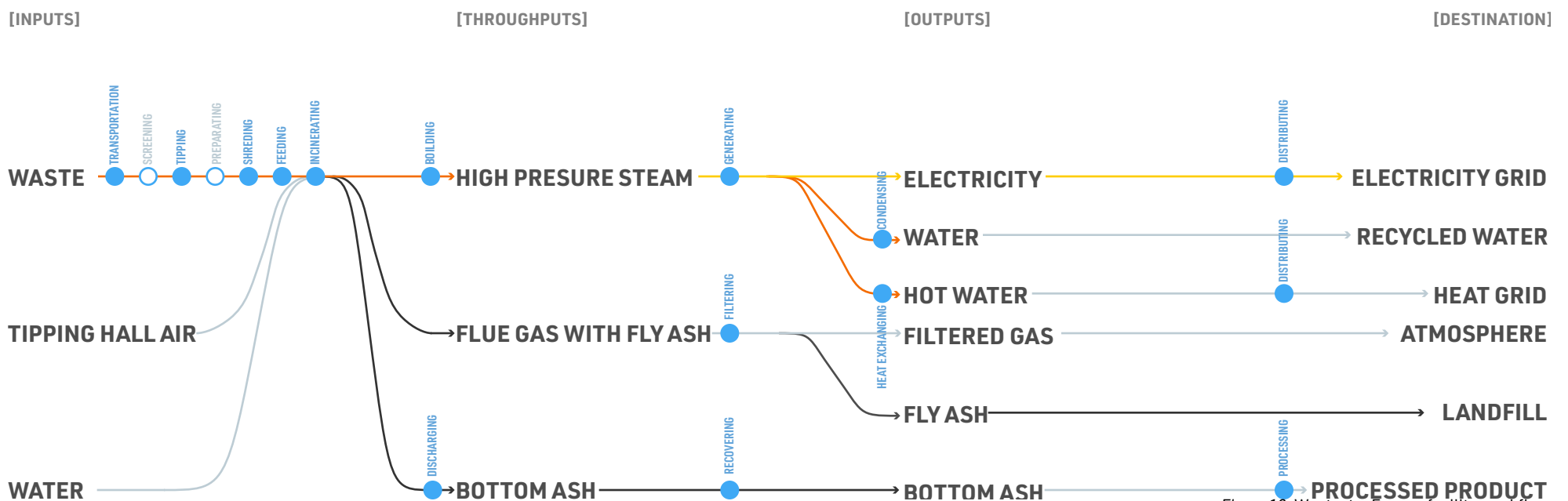


Figure 10. Waste-to-Energy facility workflow

# Anatomy of Waste to Energy Facilities

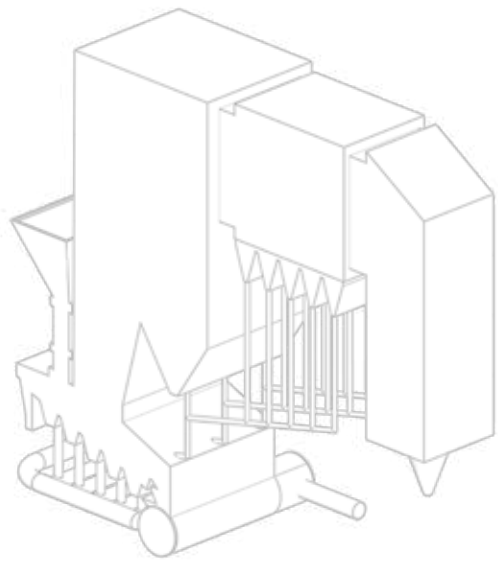


Figure 11. Major machines in incinerating & Boiling Department

**Incinerating & boiling department.** Incinerating & boiling department normally has 3 major components - incinerator, superheater, and economizer. Each 3-components makes up one unit of Incinerating & boiling set. Each set has the capability of digesting around 137,000 tonnes of MSW, generating 55,000 MWh electricity, and producing 348,000 MWh heat per year. The space requirement of each set is a 60" by 140" by 120" space. The number of incinerating & boiling sets depends on both available space and electricity demand.

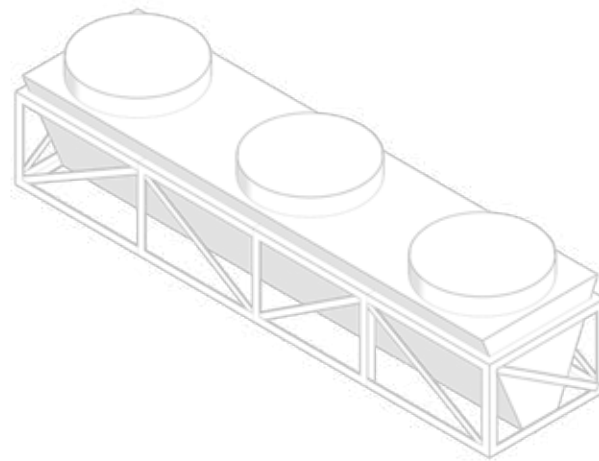


Figure 12. Major machine of Generating Department

**Generating department.** Generating department normally has 4 components - Turbine, Power transfers, feed water tank, air cooled condenser. 4 components make up one generating set. The number of generating sets is the same as the incinerating & boiling set. Each set needs a 60' by 140' by 80' space. In addition, the air cooled condensers need to be outdoors, the water tanks need to be elevated, and the turbines need to be within a sound insulated space.

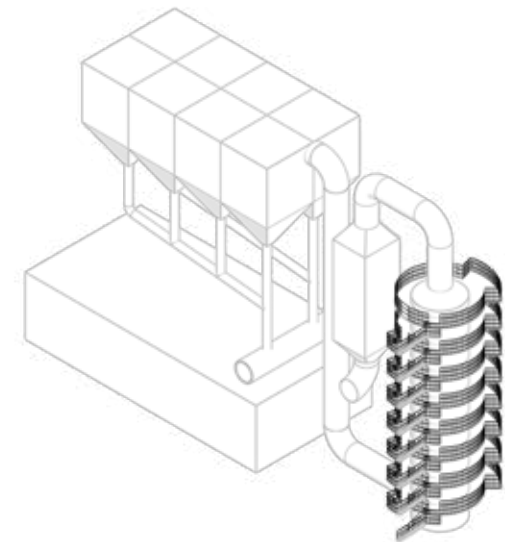


Figure 13. Major machine of Filtering Department

**Filtering department.** Filtering department is one of the departments whose components vary from time to time because of technologies, regulations, and policies. In the US, there need to be baghouse filters, Scrubbers, Selective Catalytic Reduction Filter, and water treatment. Filtering department requires a space larger than 60' by 140' by 100'.

# Site Introduction



The site for the new Waste-to-Energy facility will be at the east edge of the existing Wilmington Waterfront Park, Wilmington, Los Angeles, California. The site is part of the Master Developing Plan for the Port of Los Angeles. In the master plan, the site is half planned to be the promenade of Wilmington Waterfront Park and another half of the site is planned to be industrial zoning.

The site has a roughly 580' by 450' size. The west of the site is Wilmington Waterfront park which is one of the largest parks in Wilmington. The Wilmington Waterfront Park was constructed in 2011 and it made the average public recreation space for the

citizens of Wilmington 5 times. To the east of the site is the Redcar Museum of Port of Los Angeles and the abandoned Redcar track. Redcar Museum displays the old retired Redcars which were once the railtrack train for public transportation at Port of Los Angeles. To the north of the site is the residential subdivision of local citizens. Most of the houses are single family residential units. To the south of the site is the north edge of the Port of Los Angeles. The Port of Los Angeles is one of the most busy ports in the US. It has accessory industrial infrastructure wrapping around it such as generating plants, oil tanks, and exposed train tracks. The Port of Los Angeles blocks most of the view from the

south to the site by the stacked containers and raised highways. The highway and railroad for the Port of Los Angeles also block the accessibility for citizens to the shore.

# Port of Los Angeles (POLA)

The waterfront of Los Angeles consists of the Port of Los Angeles, Wilmington Waterfront, and San Pedro waterfront. The city edge is defined by the infrastructure fabric for the heavily industrialized Port of Los Angeles.

The Port of Los Angeles was founded in 1542. Colonizers at that time found it was a good fit as a port. After centuries developing, the Port of Los Angeles became one of the biggest ports in the US. The Port area is heavily industrialized and used to be away from the urban area. The urban area expanded dramatically in the last century and it now meets the edge of the Port of Los Angeles.

The city started to make some changes to help the city edge look and function nicer and released a multiple stage master plan in 2009. Some of the renovations of the waterfront project are finished, such as the Wilmington Waterfront park finished in 2011. The park provides 5 times the public leisure space for the local people once it was open to the public, which means the public leisure facility is relatively poor so that it can be boosted so dramatically.

It is an interesting thing to see the boundaries of the city forming when the planning program goes on. Instead of monochromatic kinds of boundaries such as highways and railroads. The master plan program gives the city boundary a more vivid spectrum. The future of Port of Los Angeles gives it a great chance to explore mixed architectural typologies.

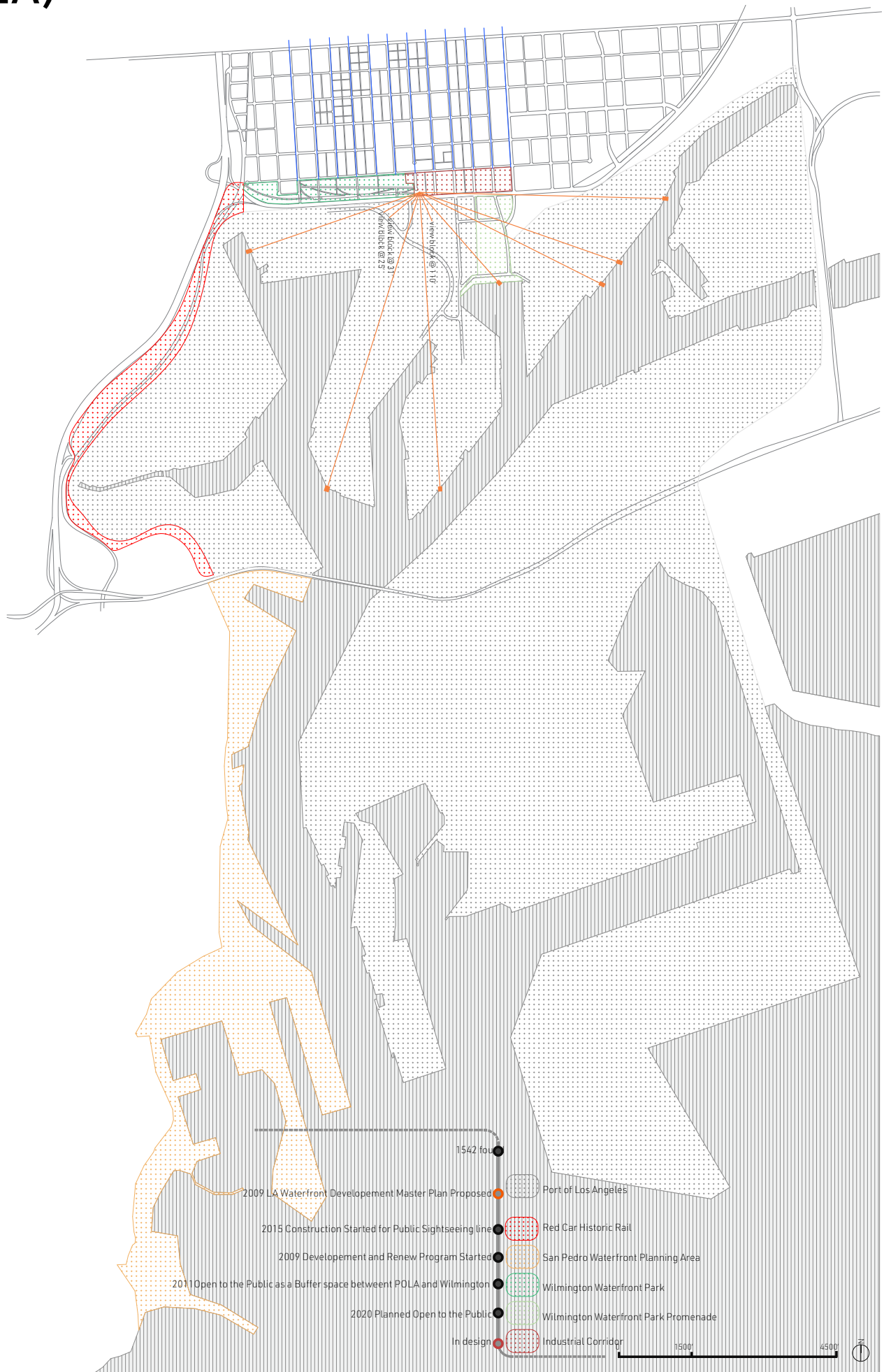


Figure 16. Port of Los Angeles Time line & Planning

# Site Analysis

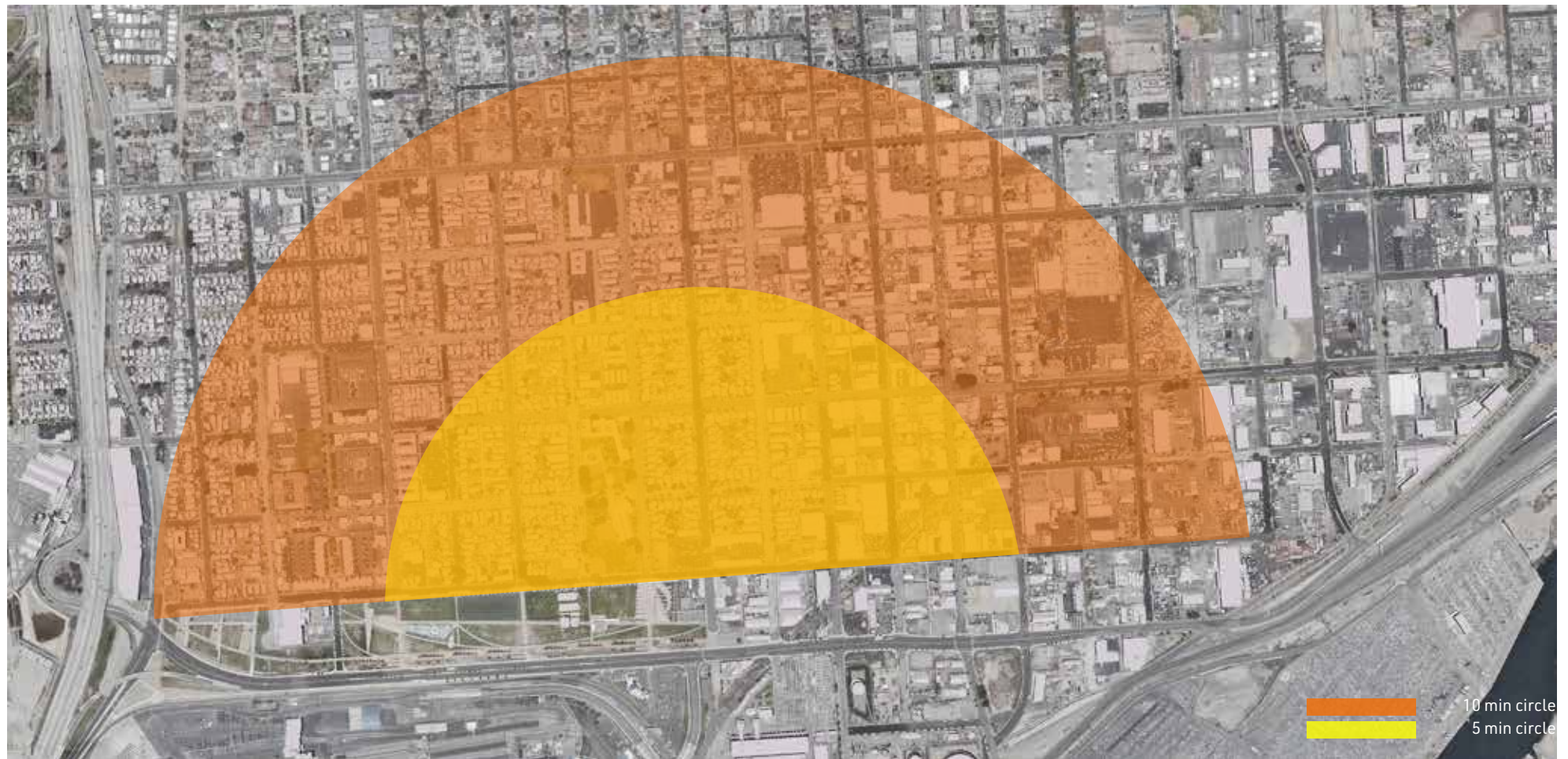


Figure 17. walking time circle

To better estimate the scale of the WtE facility, we need to decide what the demand could be for the local citizens around.

The red circle is a 1 mile circle for 10 min walking in this district. The yellow color is 1/2 mile circle for 5 min walking in this district. The goal is to collect MSW from the residents in walking distance to the WtE facility, so that people can have a straight concept of the relationship between served and service areas. However, the municipal waste collection area is much bigger than the power supply circle. The MSW transportation mechanism is not transferring directly from households to the WtE facility. The waste is

collected by the local waste management department by zip code then distributed to different destinations.. So technically, the waste burnt in the WtE facility is only part of the MSW collected from the nearby residents. So the scale of the WtE facility should be determined by the output of WtE facility.

The population of Wilmington is around 52,286. The orange area in figure 17 is about 1/10 of Wilmington's residential area, so roughly, the population is about 5,200. The capability of one set of incinerating machines is about 10,000 persons. So, one set of the incinerating system is adequate for the local demand/usage.

In this way people could have a better understanding of served and service areas between urban activities and industrial activities.

# Site Analysis

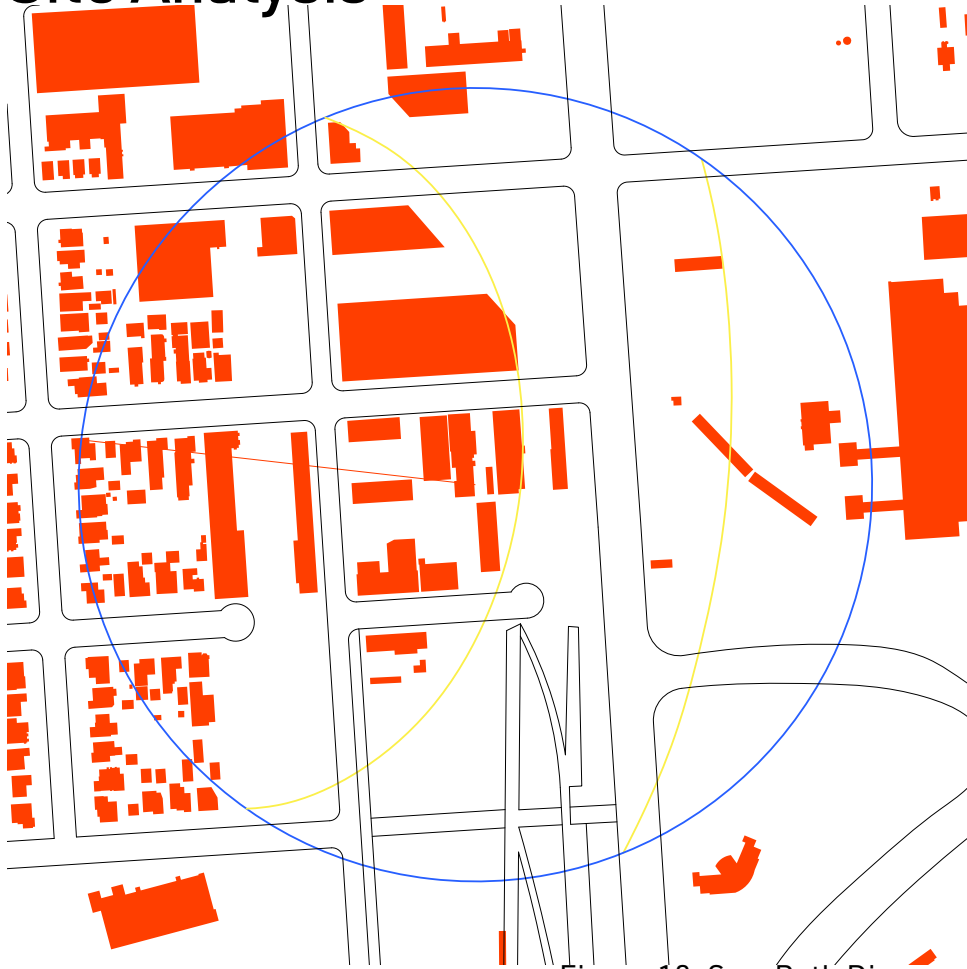


Figure 18. Sun Path Diagram

This is the sun path diagram. When using sunlight as a separation tool for boundaries, we can easily find that the boundaries occur in the buildings. Outside the building there is sunlight and inside the building there isn't sunlight. Yet there is shadow outside the building and windows let some light into the buildings. The boundaries are solid in most cases but not clear at some point.



Figure 19. Walking Connectivity Diagram

This is the walking connectivity diagram. When using this as a separation tool, we can find the boundaries are the road beds. Also there is no boundary in the park.



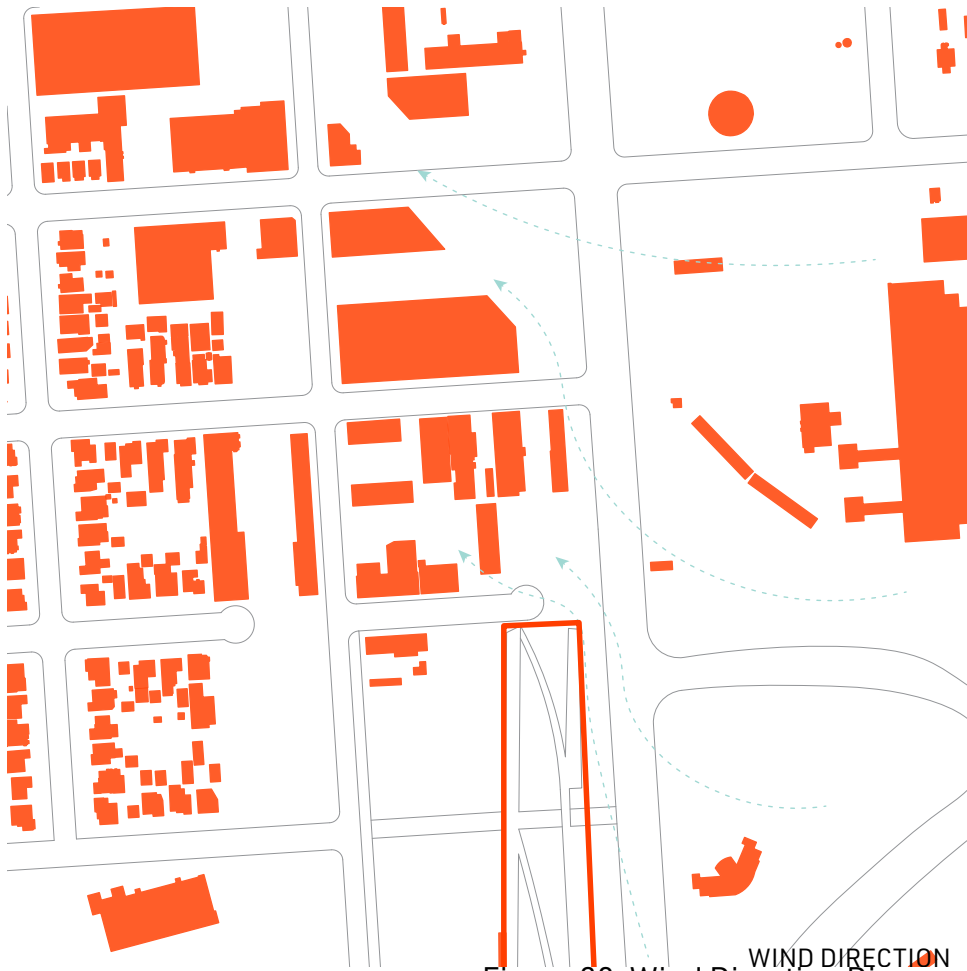


Figure 20. Wind Direction Diagram

This is the wind path diagram. When using wind as a separation tool for boundaries, we can easily find that the boundaries occur when wind meet structures. The Wind majority comes from the southeast side from the side. This boundary can be used for preventing the odor from MSW spreading.



Figure 21. Visual Connectivity Diagram

This is the visual connectivity diagram. When using this as a separation tool, the large structure becomes the boundary. This boundary can help decide the important viewpoint for the project



Figure 22. Sea Level Rising Diagram

This is the sea level rising diagram. When using the tide line in 80 years as a separation tool for boundaries, we can easily find that the boundaries occur on the tide line. The boundary can be used as a construction border to protect the structure from flood.

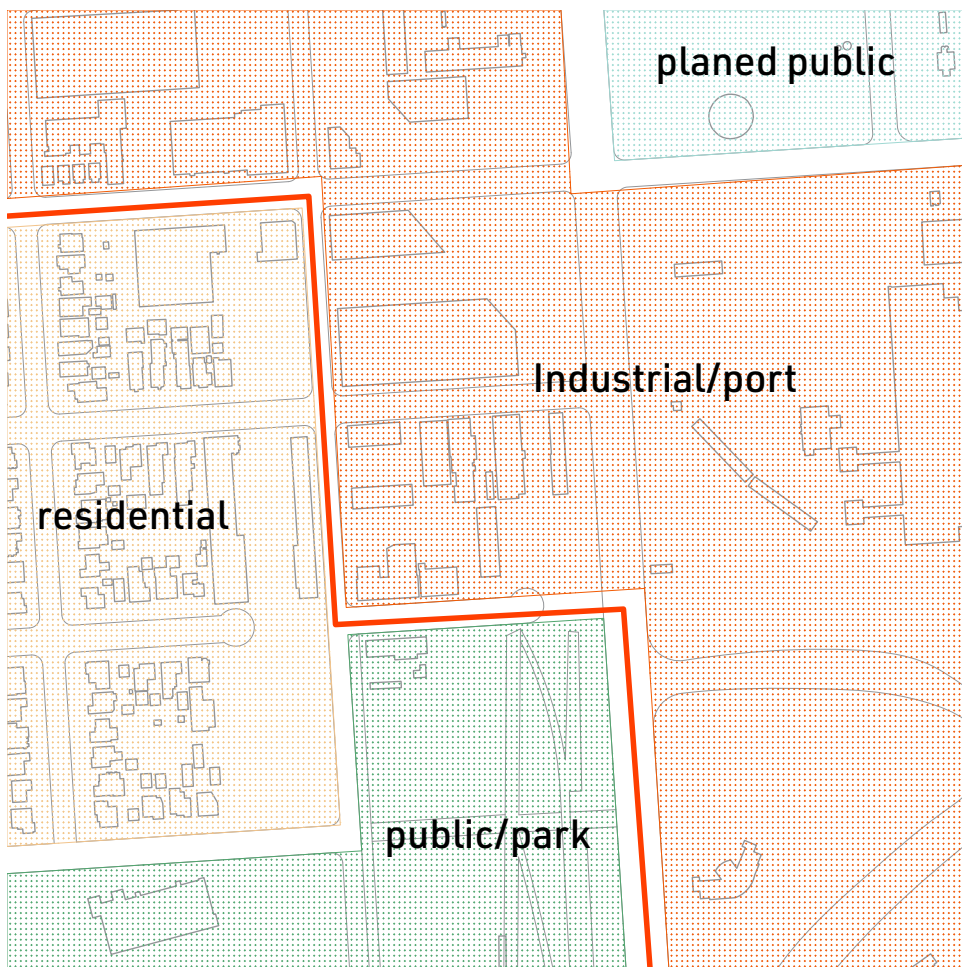


Figure 23. Zoning Diagram

This is the zoning diagram. The boundaries are the edge of different zones. This can help determine the different approaches for helping people understand the boundaries.



Figure 24. Vehicle Connectivity Diagram

This is the vehicle connectivity diagram. When using vehicle accessibility as a separation tool for boundaries, we can find that the park becomes the boundary. This boundary can be used as a tool for managing transportation.

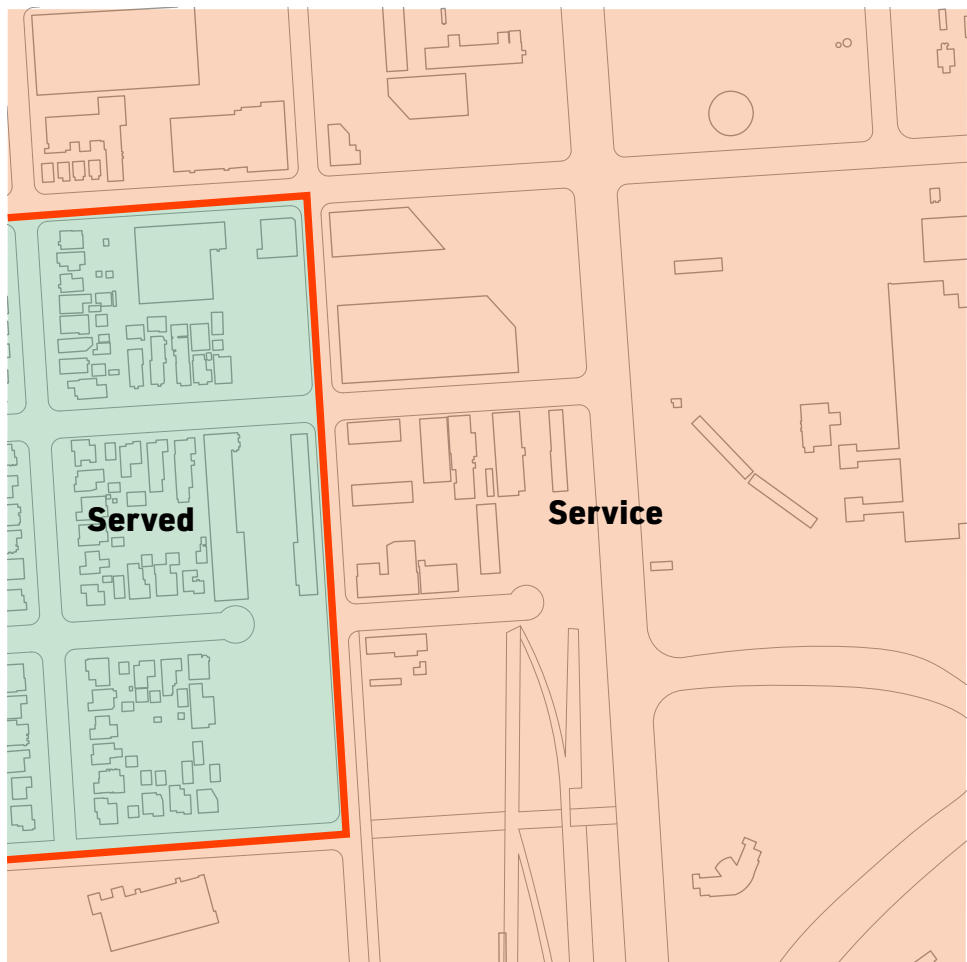
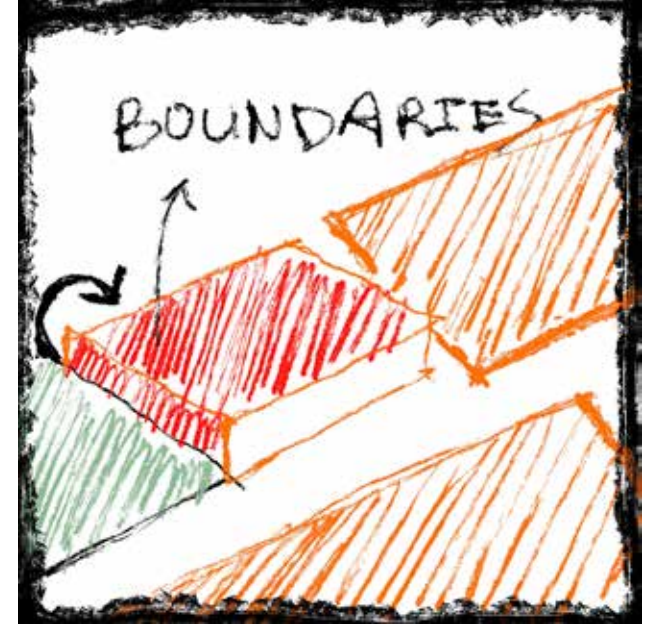
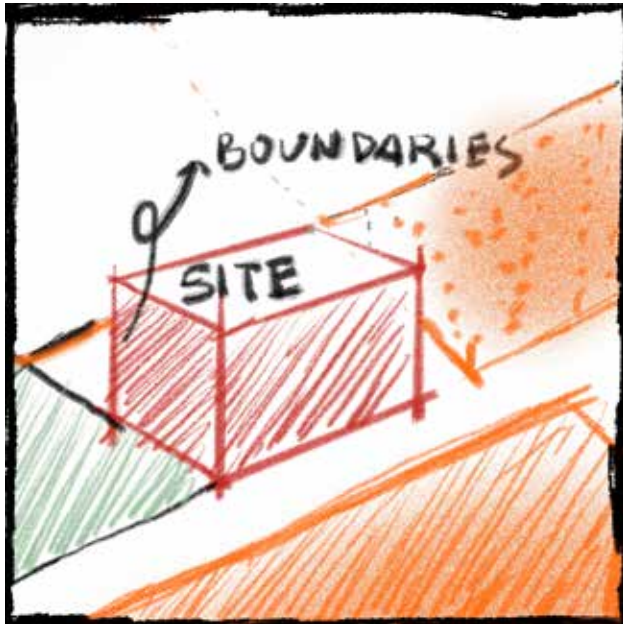


Figure 25. Service & Served Diagram

This is the served and served area diagram. The boundaries lay in between the area. This can help determine the different approaches for helping people understand the served and service areas in the city.

# Design Concept



The general concept of this project is to re-discover the relationships and boundaries between service area and served area of the city through a hybrid facility which is both industrial and public. To achieve this architecturally, I adopted the idea of creating and designing different boundaries between service and served areas at different scales.

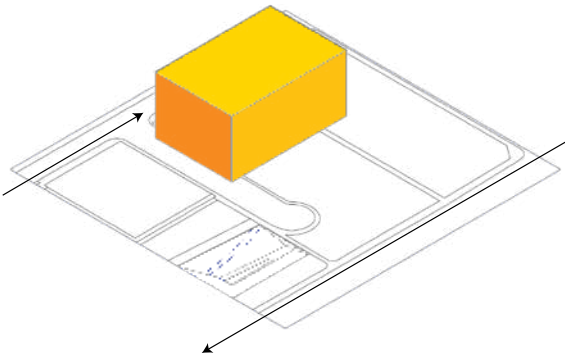
The first scale is an urbanistic scale which considers the context around the project's site. At this scale, it is essential to notice that the project is on the edge of the urban area and industrial area. In addition, in the urban area side, the site is next to both a residential zone and a park. The park, which is Wilmington Waterfront Park, is considered as a "buffer" to alleviate the strong industrial impact from the Port of Los Angeles. Therefore, the Wilmington Waterfront Park can be considered as a boundary that has already existed. In this condition, this project can be the extension of the Wilmington Waterfront Park, which combines a public park and a WtE facility. Moreover, the WtE facility demands

ground access. To avoid the intersection of industrial and public circulation, this project needs to divide the public section and industrial section in different levels. As a result, the industrial section is located at the ground level and the public section is located on the roof level as a rooftop park. Boundaries are formed between the rooftop park and the ground floor WtE facility. At this moment, the boundaries between public and industrial are explored from an urbanistic scale to the second scale --- architectural scale. Moreover, the boundaries are transformed from planes only perpendicular with the ground to planes that also parallel to the ground. In architectural scale, to form the boundary one more step, an interlocking shape is formed to increase the opportunity for people to interact with both public and industrial. Four major departments are distributed into different volumes and then wrapped by rooftop park. The shape of the rooftop park is turned into a wavy shape in order to create different experiences to the boundary. In addition, Four volumes of public spaces are inserted

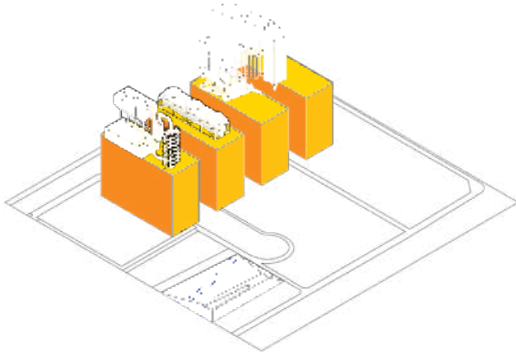
into the ground floor with vertical circulation. Therefore, the boundaries between service areas and served areas have a large variety and can be all experienced by visitors. The third scale is the detail scale. In this project, boundaries are formed by the architectural elements --- Walls, roofs, windows, doors, and etc. The four major departments are designed with the concept of display box which can display the industrial activities inside the box. The Rooftop park wrapping around the box meets the box with different ways of detail design.

# Schematic design

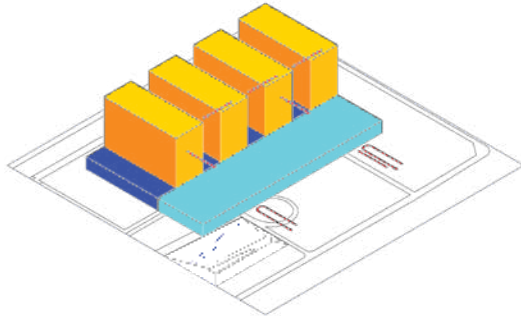
form generation-major volume locate



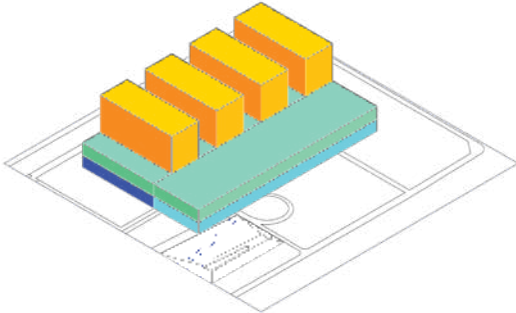
form generation-function separation



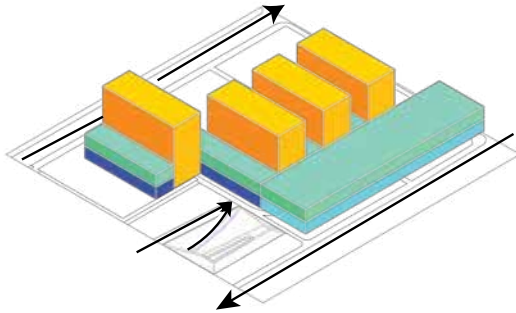
form generation-service& served



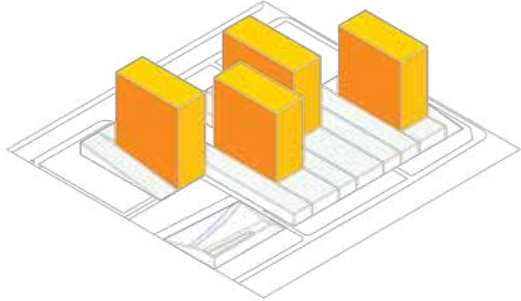
form generation-service&served&public



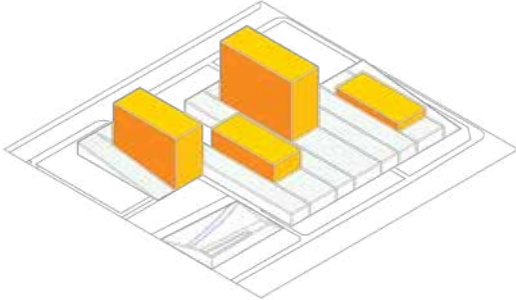
form generation-context adapt



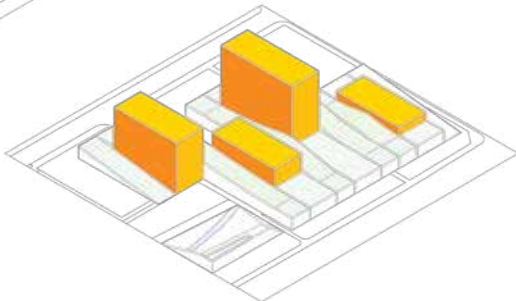
form generation-roof accessible and volume shifting



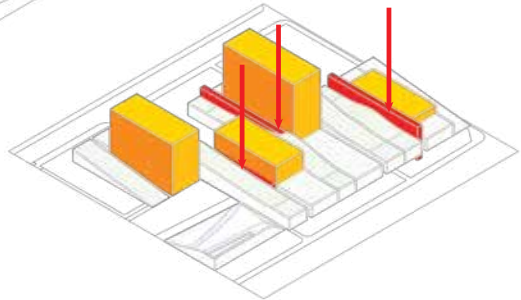
form generation-volume height adjustment



form generation-roof shape waving



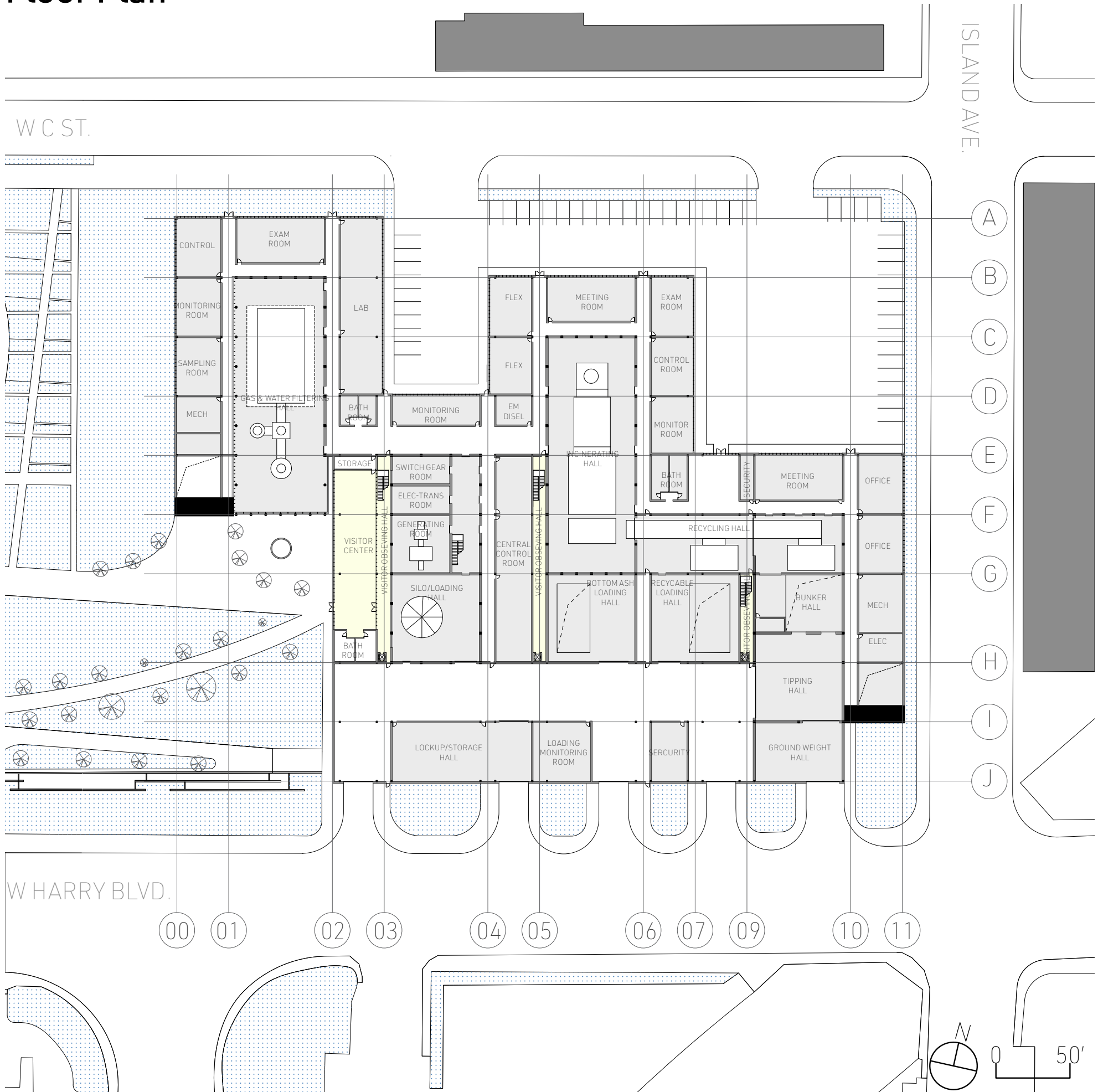
form generation-boundary adding



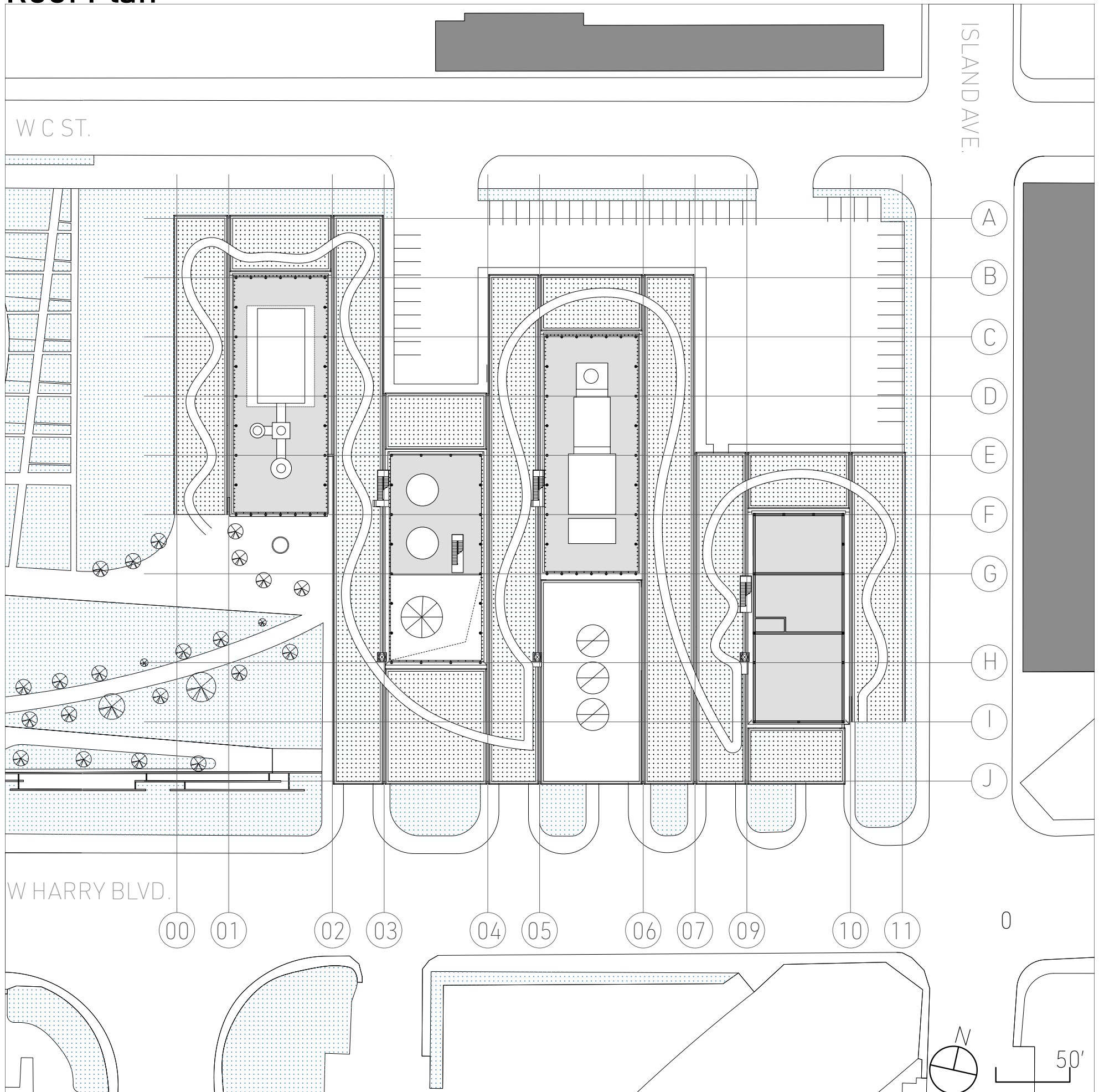
Site plan



# Floor Plan

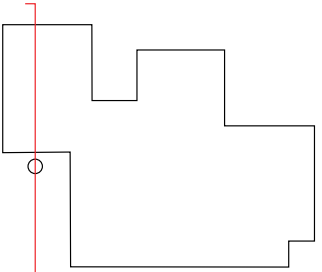
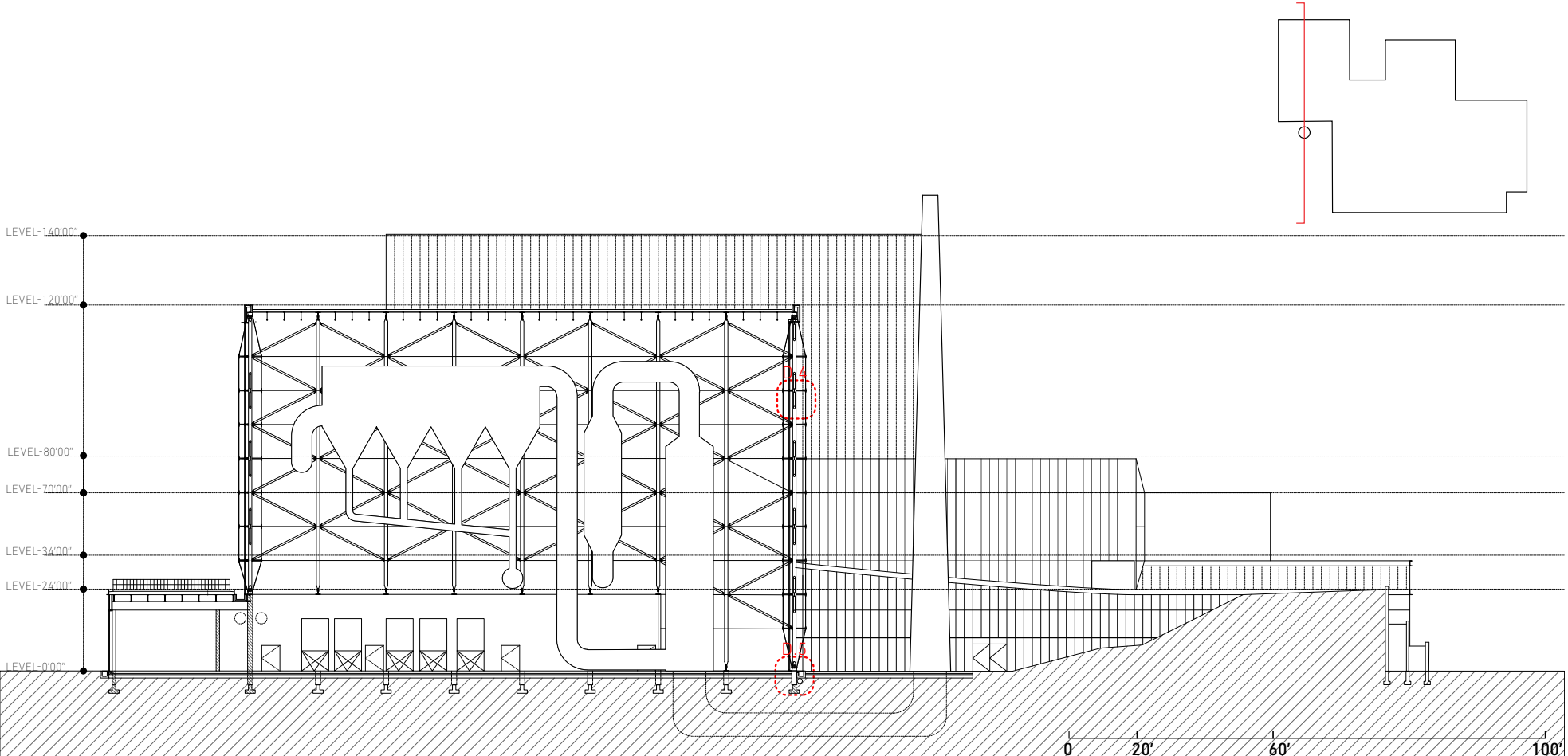
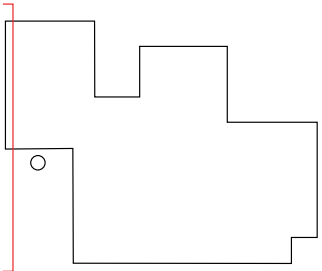
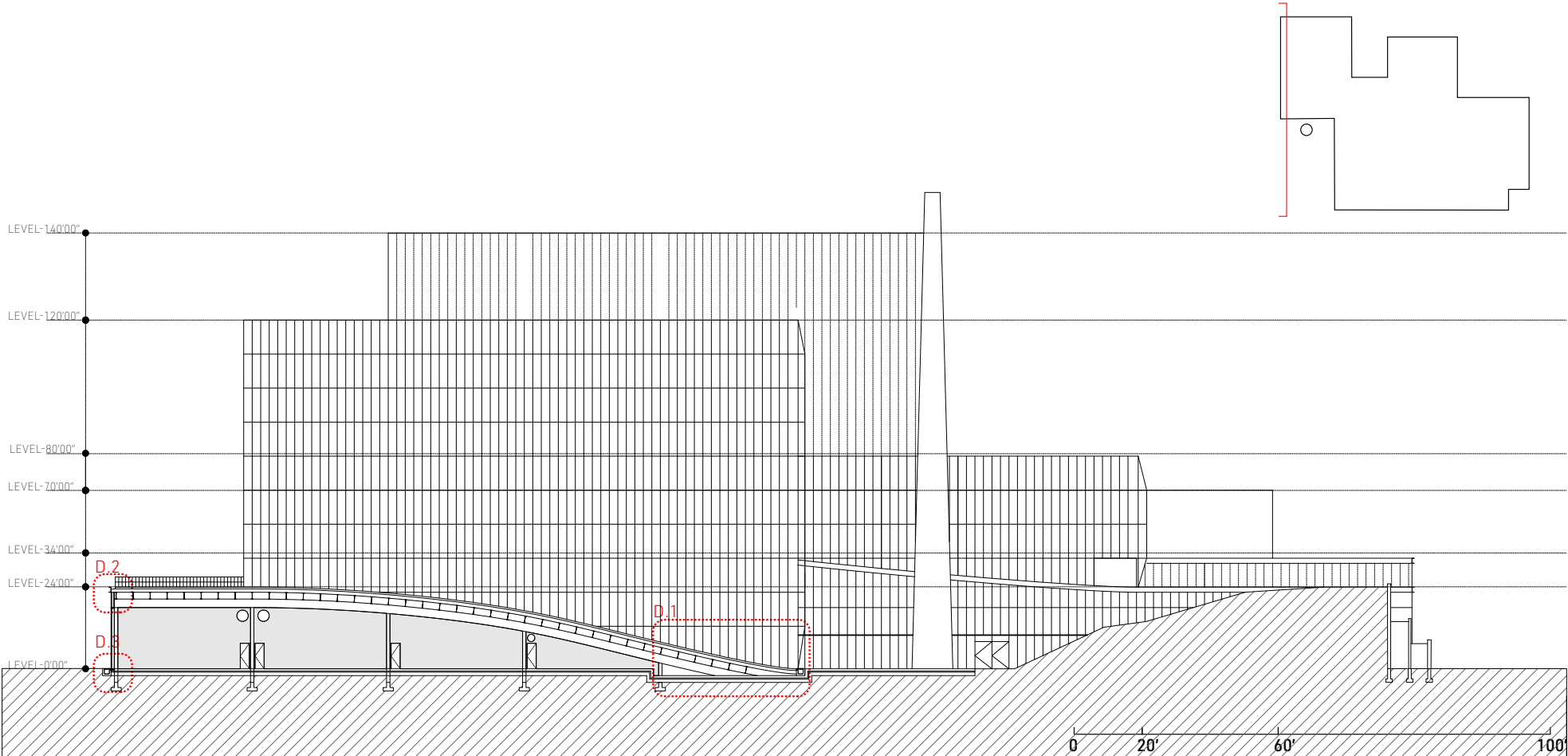


# Roof Plan

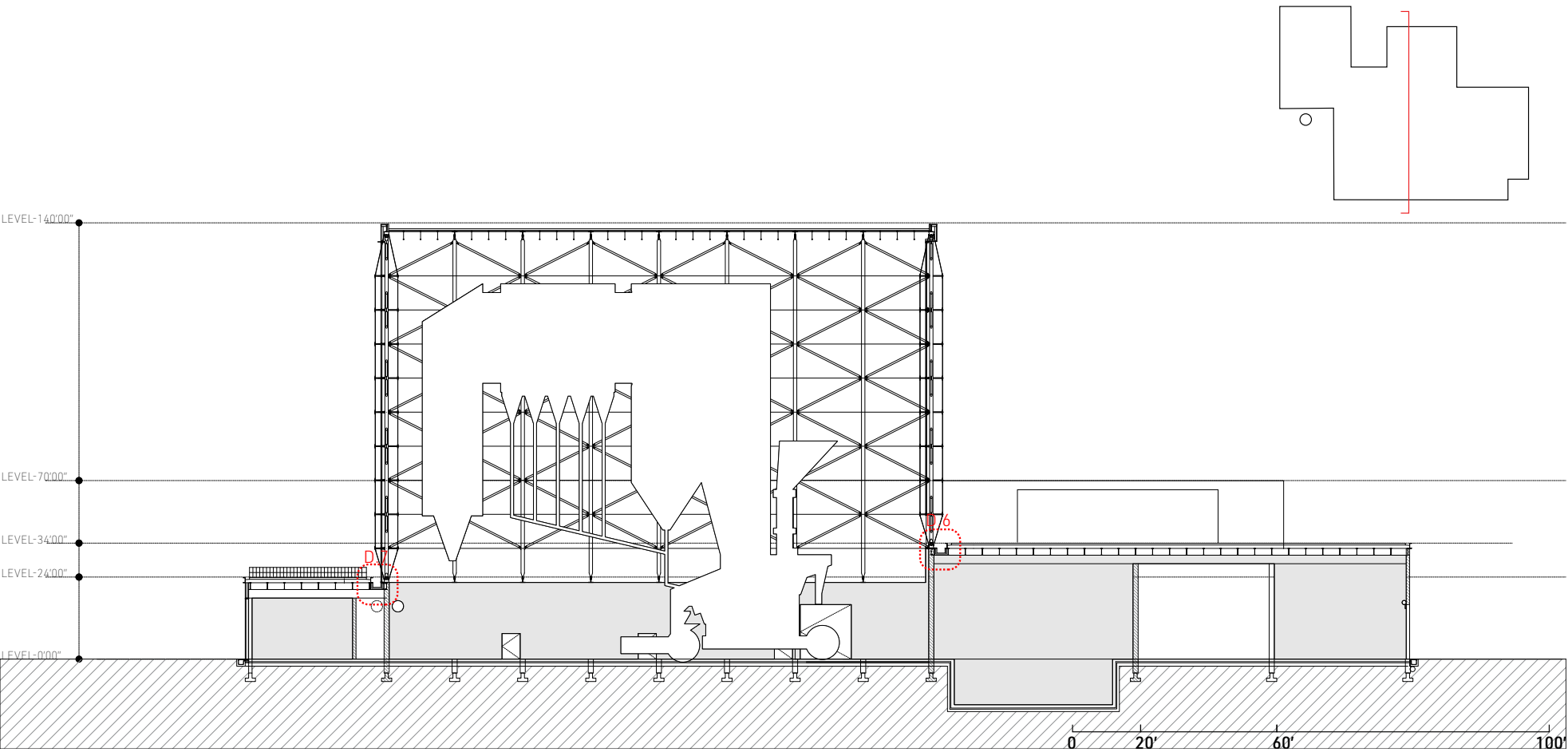
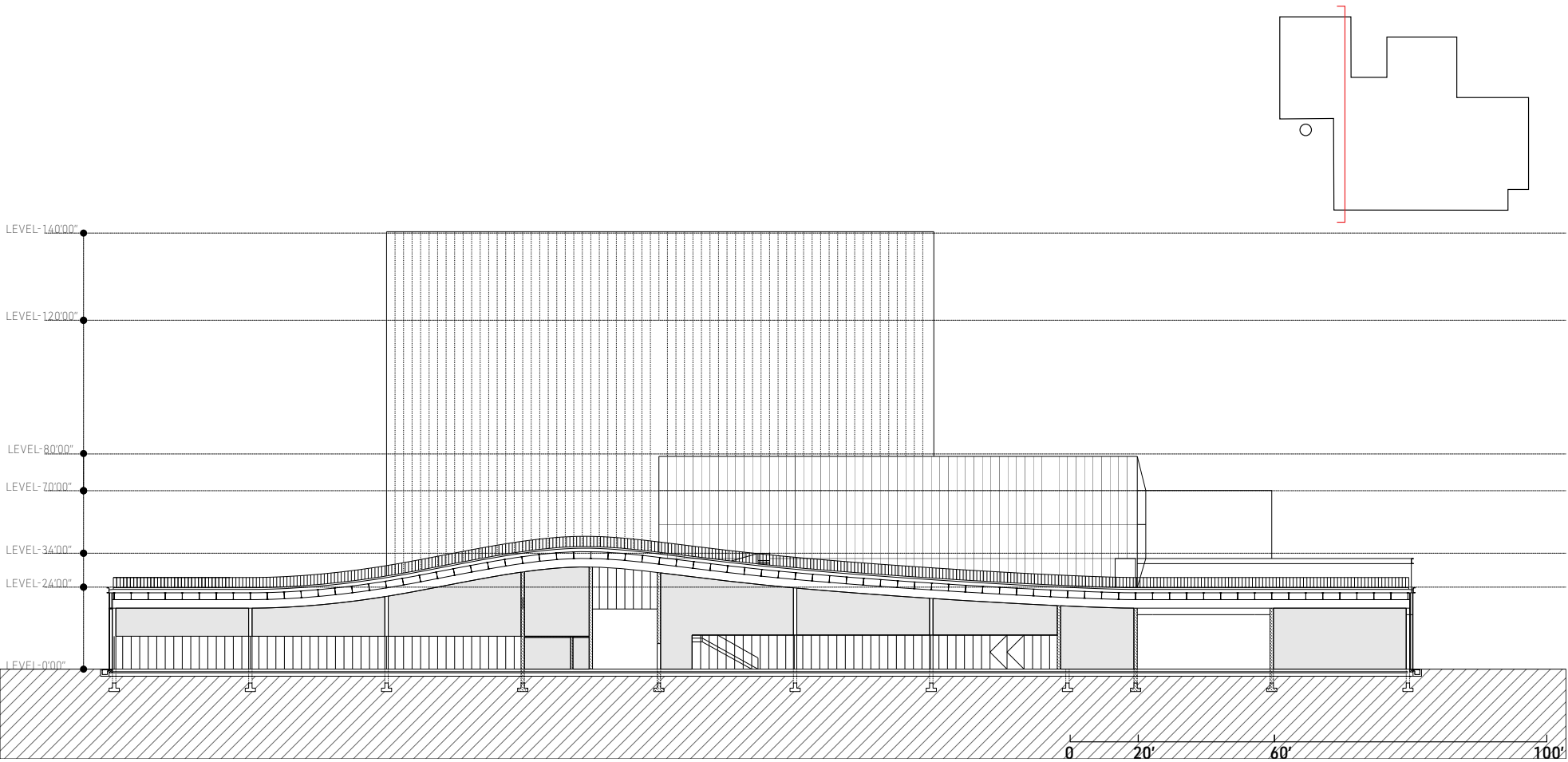




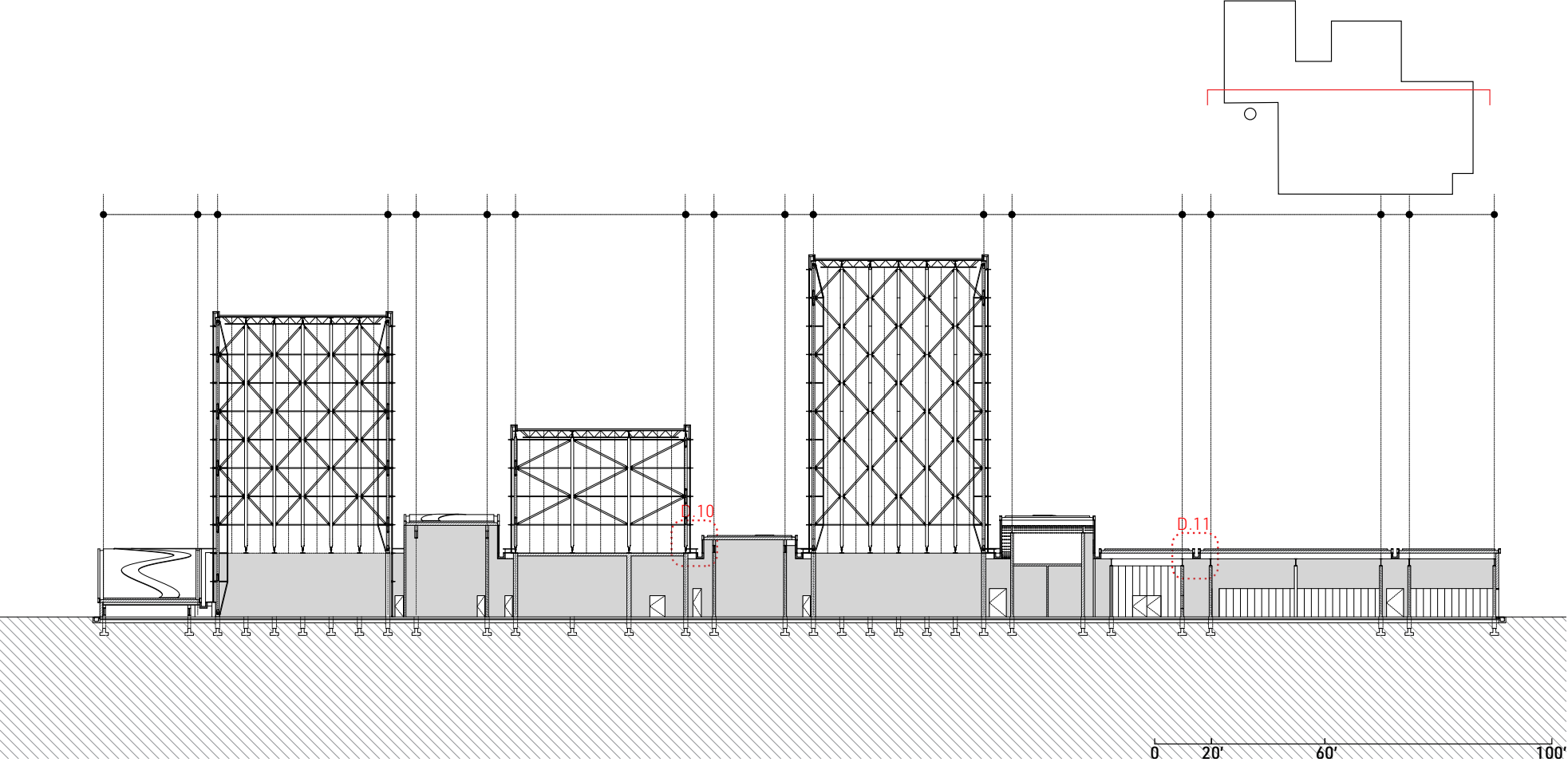
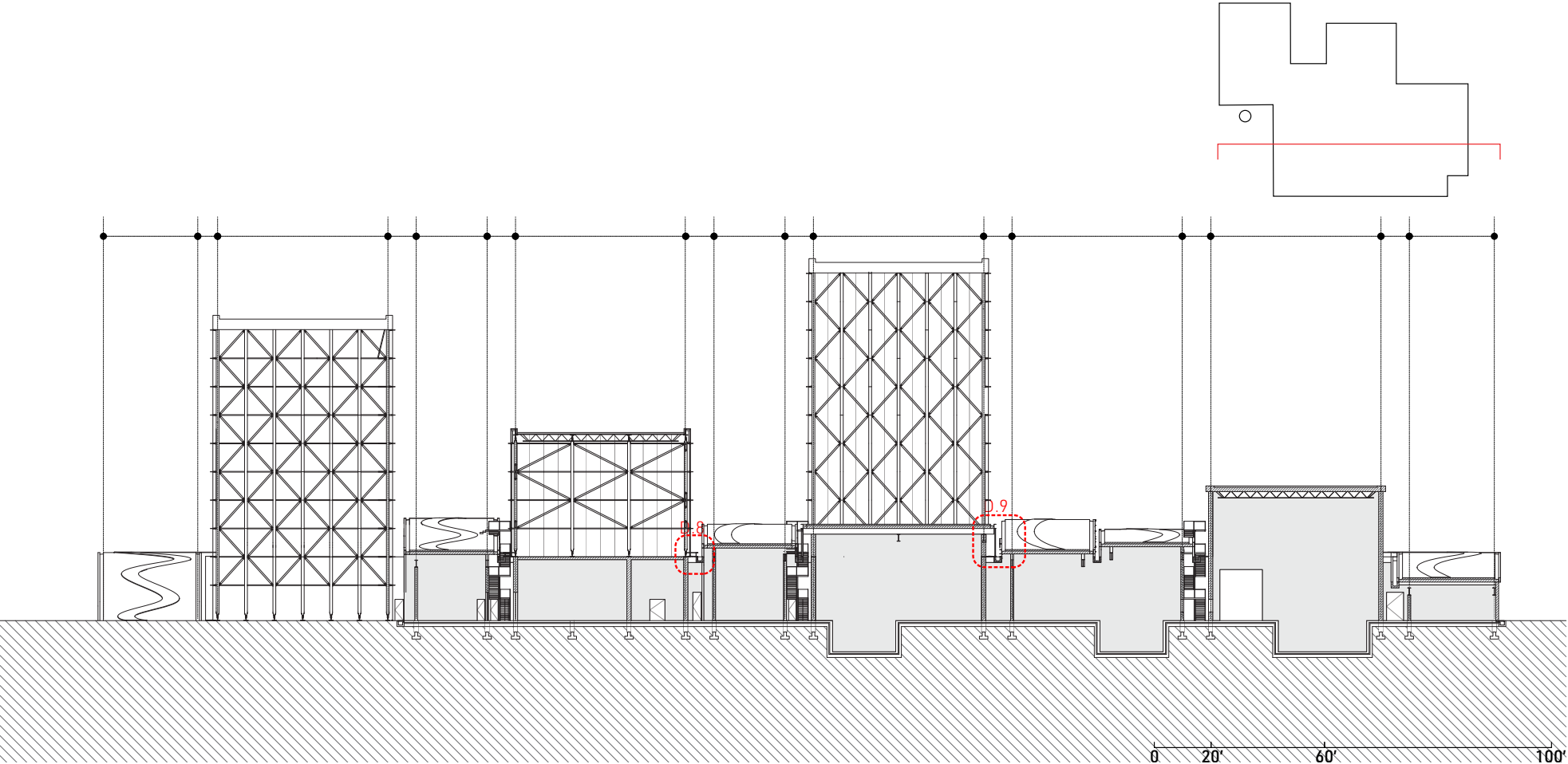
# Section



# Sections



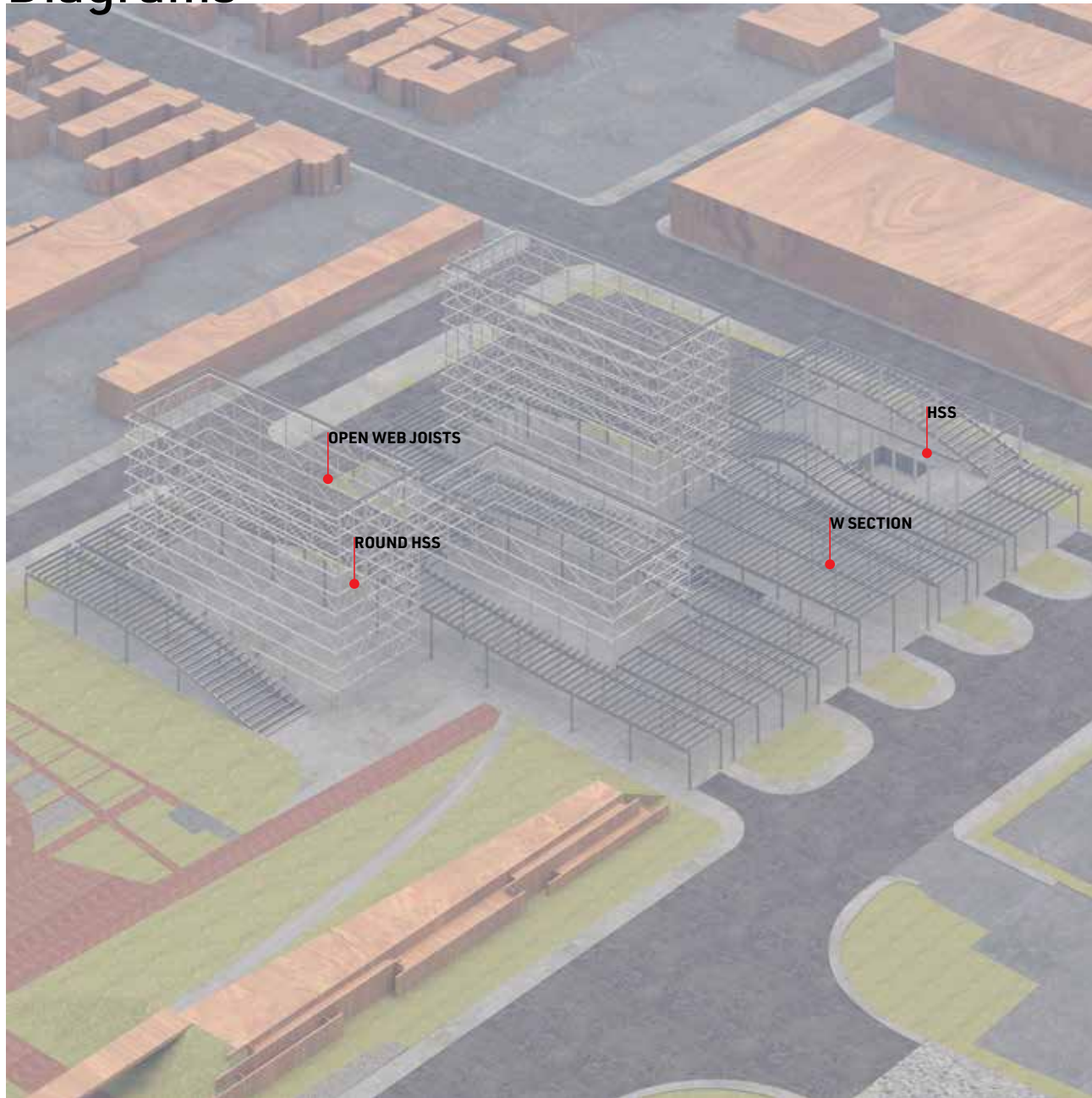
# Section







# Diagrams

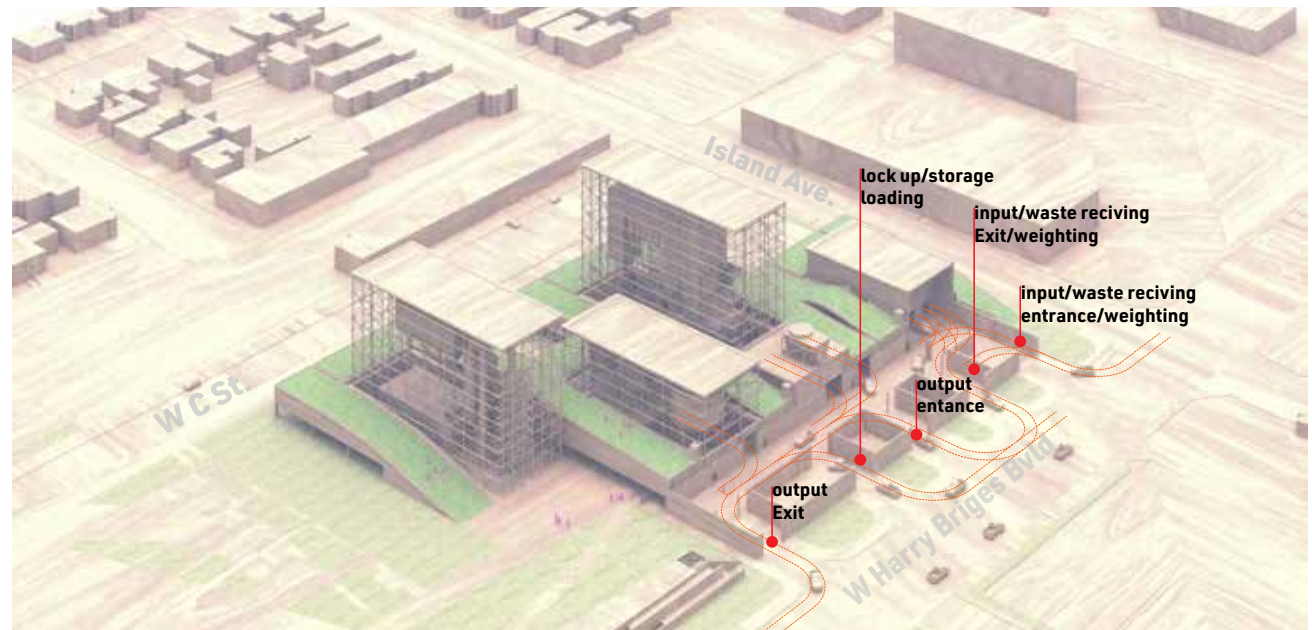


The primary structure of this project will be constructed by steel frame. The major departments' frames are constructed by HSS to provide a highrise and transparency view from the exterior. The service departments in the first floor are constructed by W-sections to provide an organic shape for the roof. Structures between served departments and service departments are separated for the purpose of circulation arrangement and seismic stability. There are 10-foot gaps between the structure of served departments and service departments. This also gives the project opportunities of creating different boundaries between served area and service area.

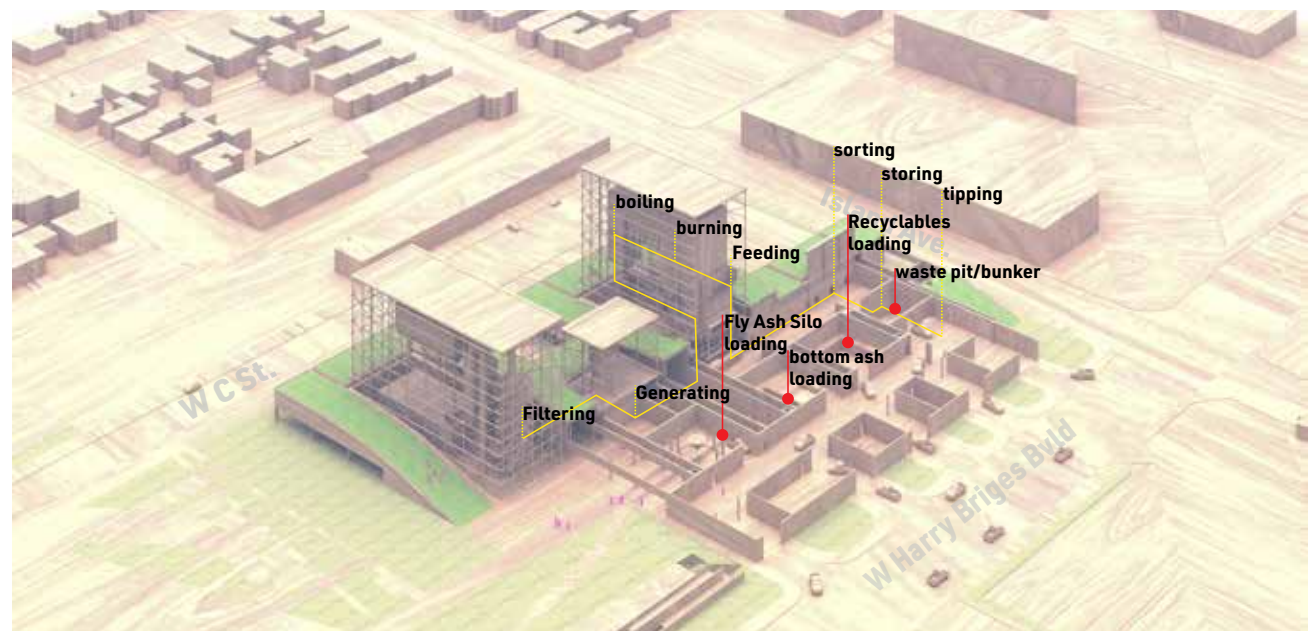


Four major departments of the WtE facility are considered served areas of the industrial facility. When they stand out from the ground floor, they are considered as service areas for visitors on the rooftop park to observe and interact. They are designed as display boxes by HSS steel tube to create a transparent and an industrial look from the exterior.

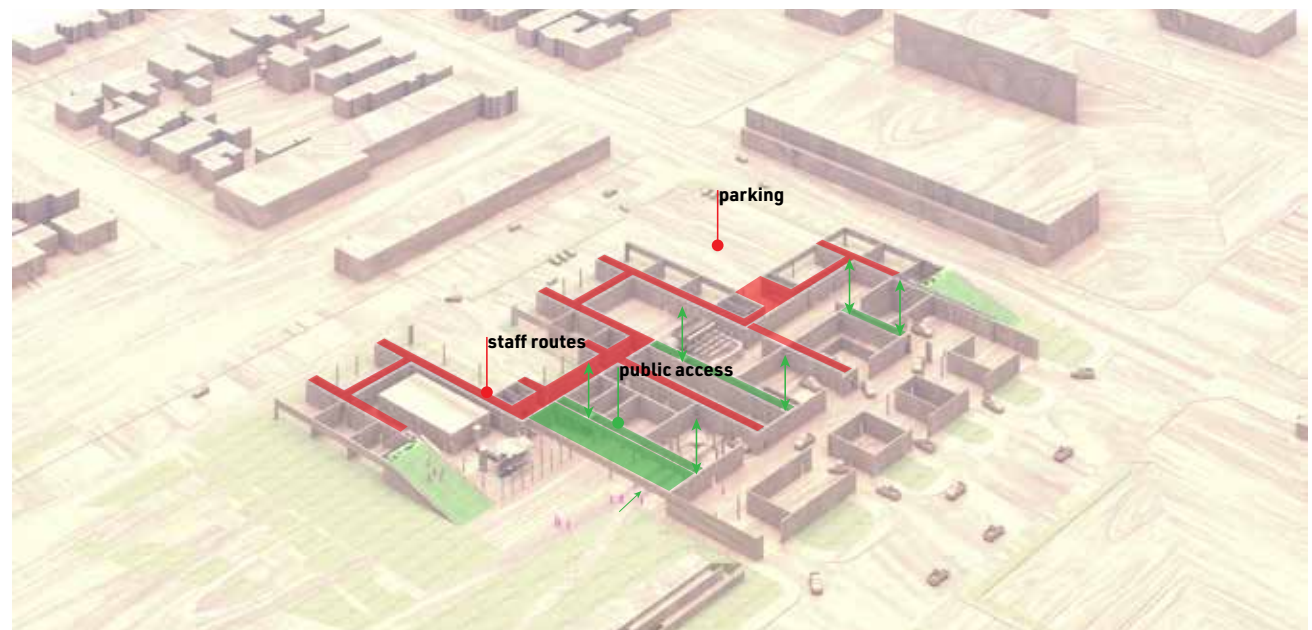
The transportation center is located on the south side of this project. By the consideration of context, the transportation center is beside the major road at the edge of the Port of Los Angeles, which provide the convenience for transportation and avoid bothering the residential area and public area from the transportation activities. The Routes are divided by input, output, and throughput purposes. The divided routes will provide a clear circulation for vehicles and efficiency for transportation activities.



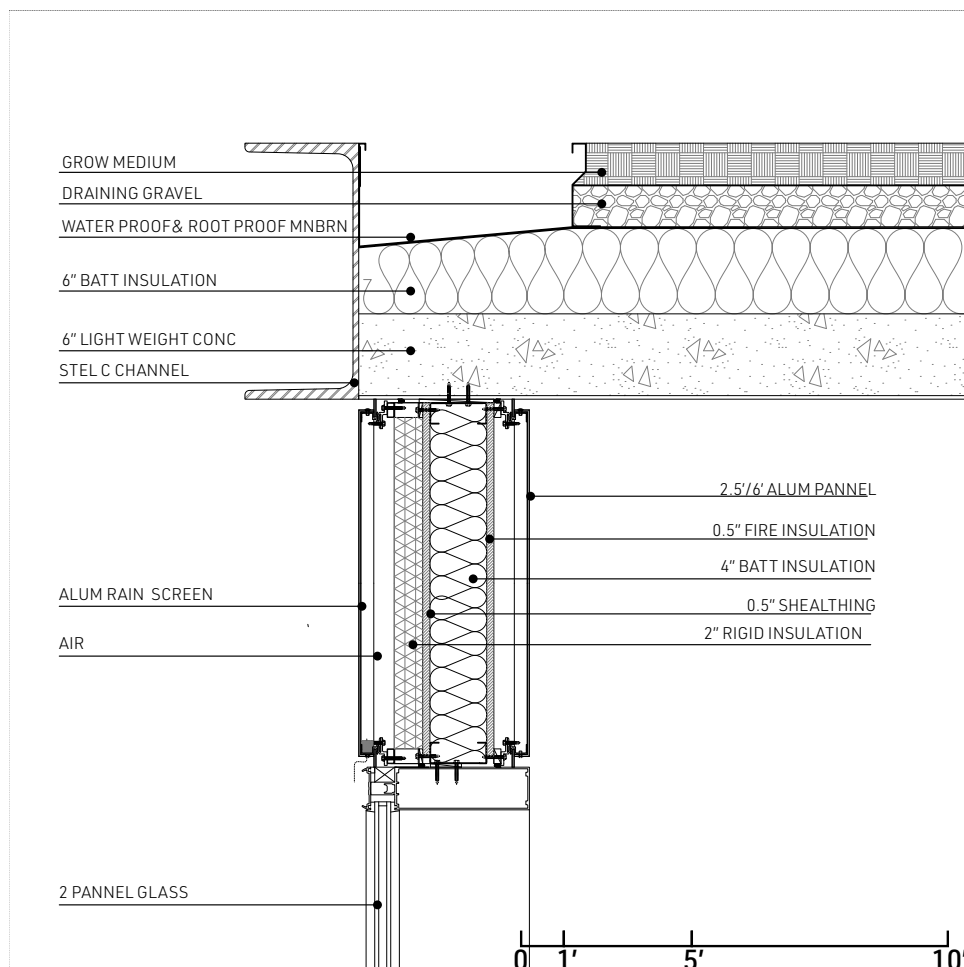
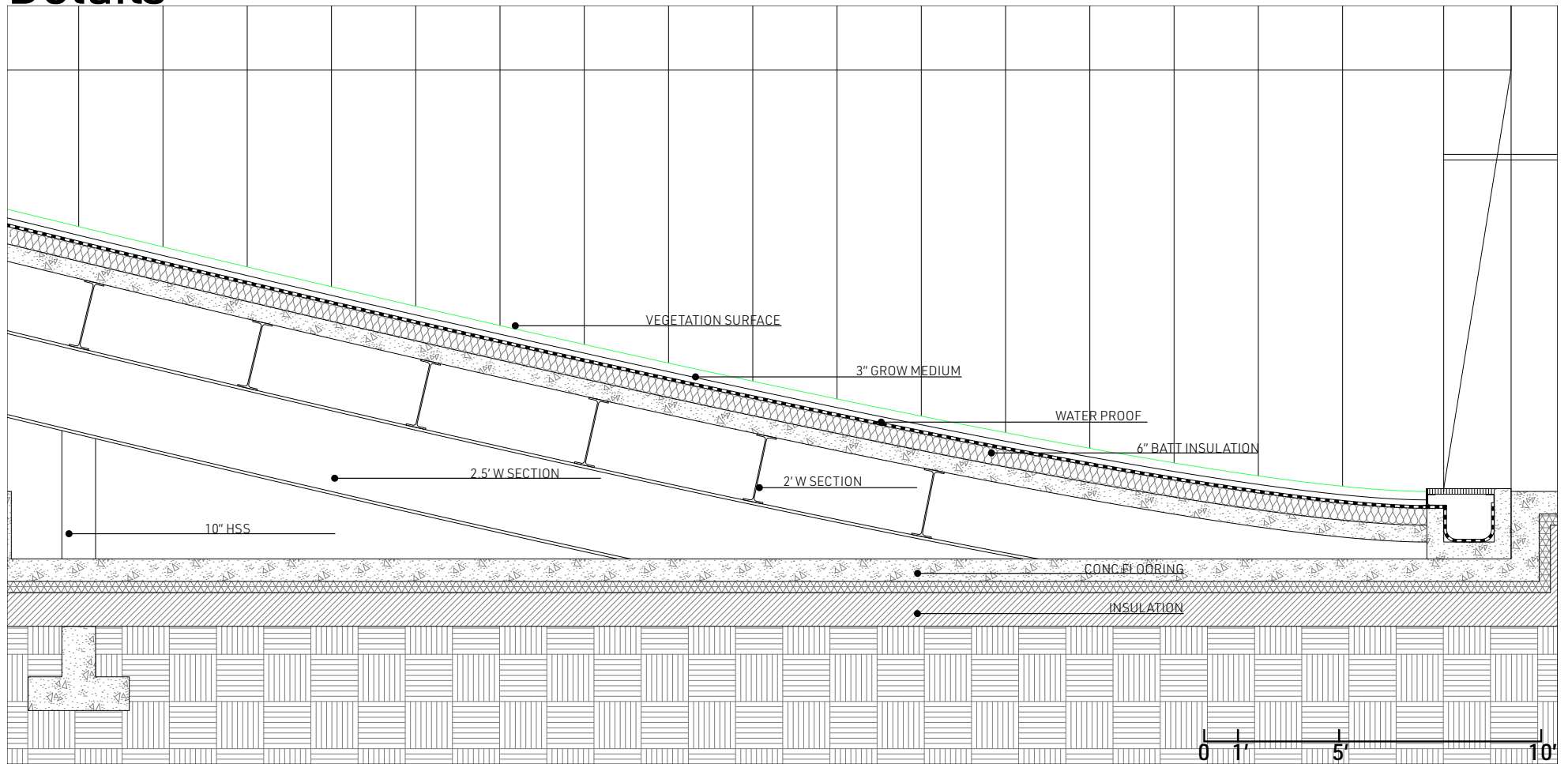
The WtE facility is designed to be highly efficient, which divides the major departments into four spaces with service departments wrapping around them on the ground floor. The workflow of WtE is a linear process and the design for the circulation for the industrial activities is also linear to match the WtE work flow. In addition materials are transported by tubes and convey belts inside the facility to avoid interrupt the human activities in the ground floor.



The circulations for people are clearly separated. In the right figure, the green stands for public circulation and the red color stands for industrial circulation. Industrial circulation circling between served departments and service departments in the WtE facility to provide efficient operation for the industrial activities. Distributed public circulation on the ground floor with vertical circulation provides the opportunities of close interaction and observation for visitors from the park.



# Details

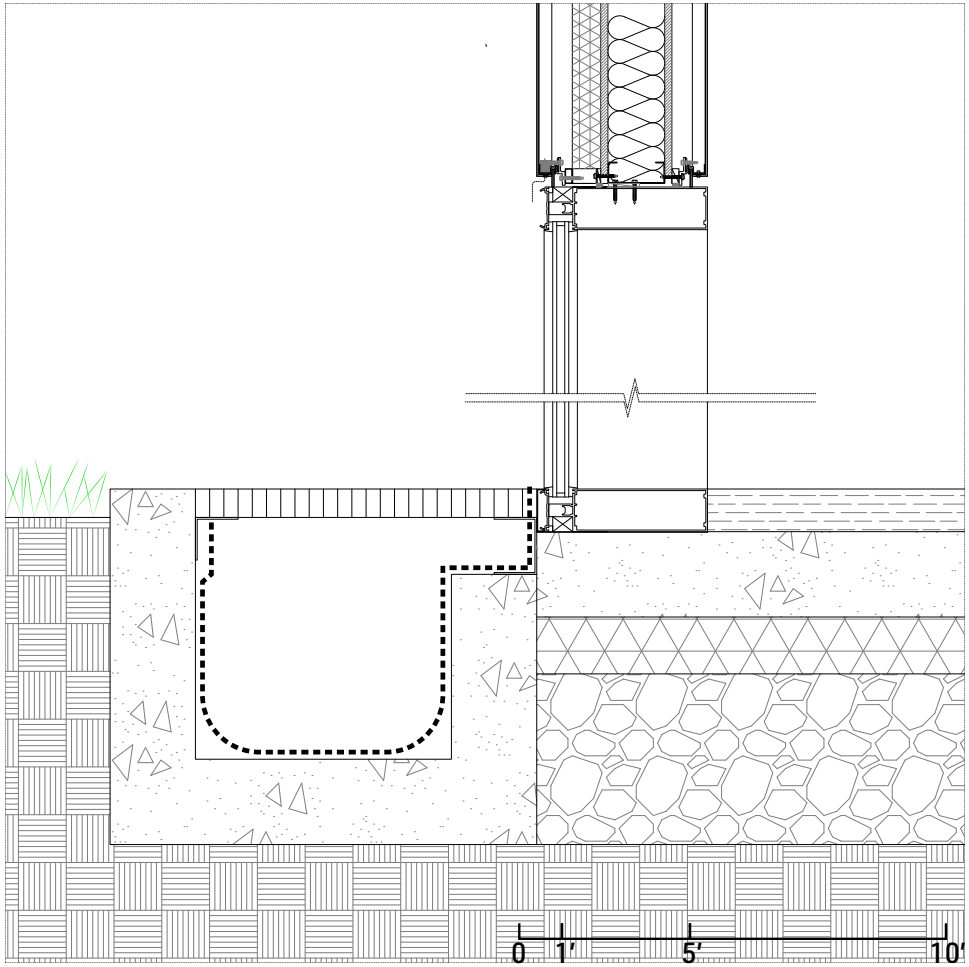


The rooftop park is covered by grass for the nature of parks. These are the details showing the assembly of the green roof and how it touches the ground. Where the green roof touches the ground is where the boundary formed between the Wilmington waterfront park and the hybrate project. To create an inviting boundary, the green roof is designed to flush into the ground without significant height change.

The grass does not touch the edge of the roof for safety and drainage purposes. The gutter is guarded by the C channel steels which will give the edge of the roof an industrial look.

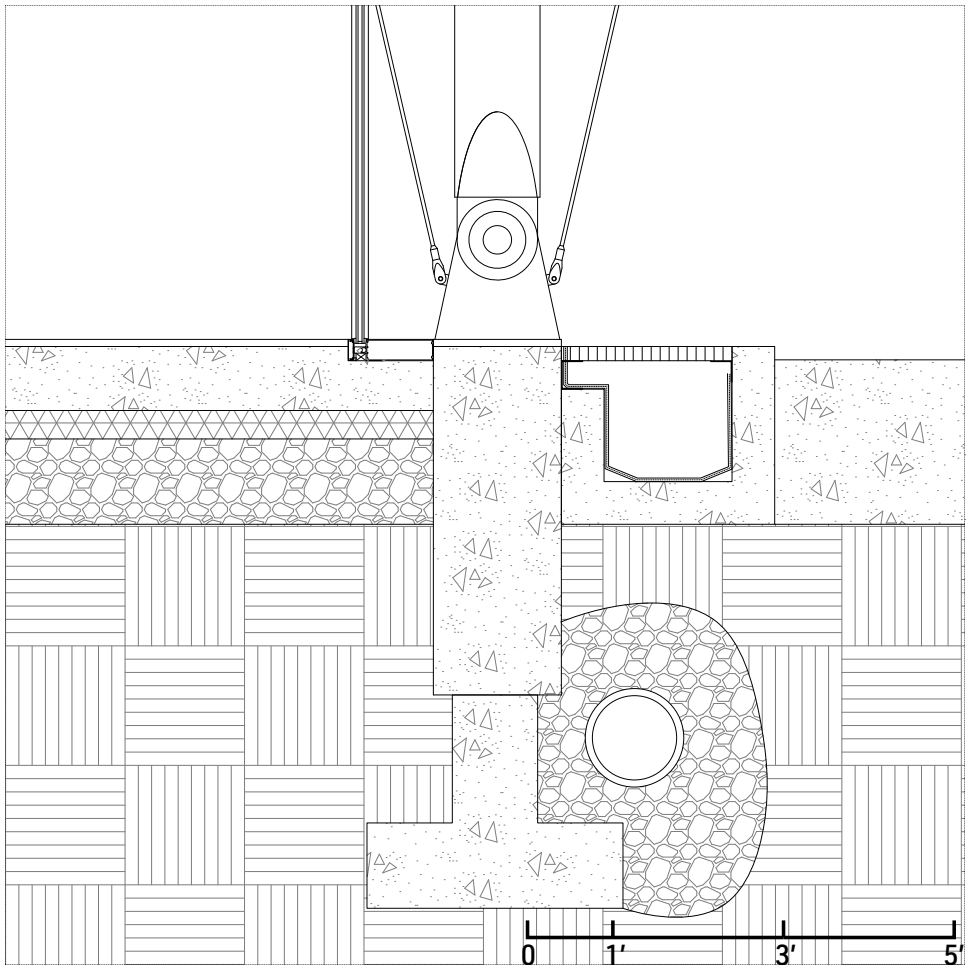


# Details



There are the details showing how this building touched the ground. For the service department, the exterior wall is formed by aluminium panels and glass windows. All the windows started from the base. Grass from the exterior alleviates the visual effect from the drainage grill, which makes the glass windows appear like growing from the ground.

For the Major department, to give an industrial appearance to the visitors, the facade of the "display box" is designed to have multiple layers which expose the structure and all the service elements for the structure.

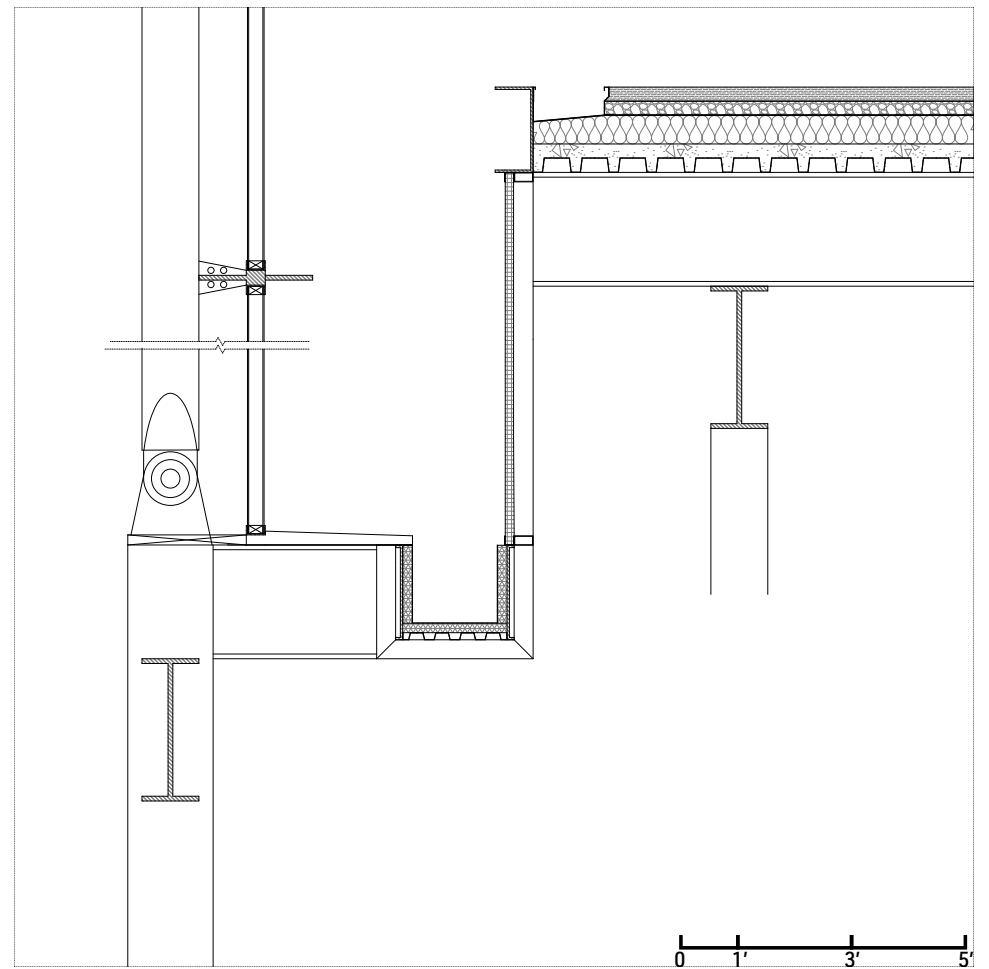
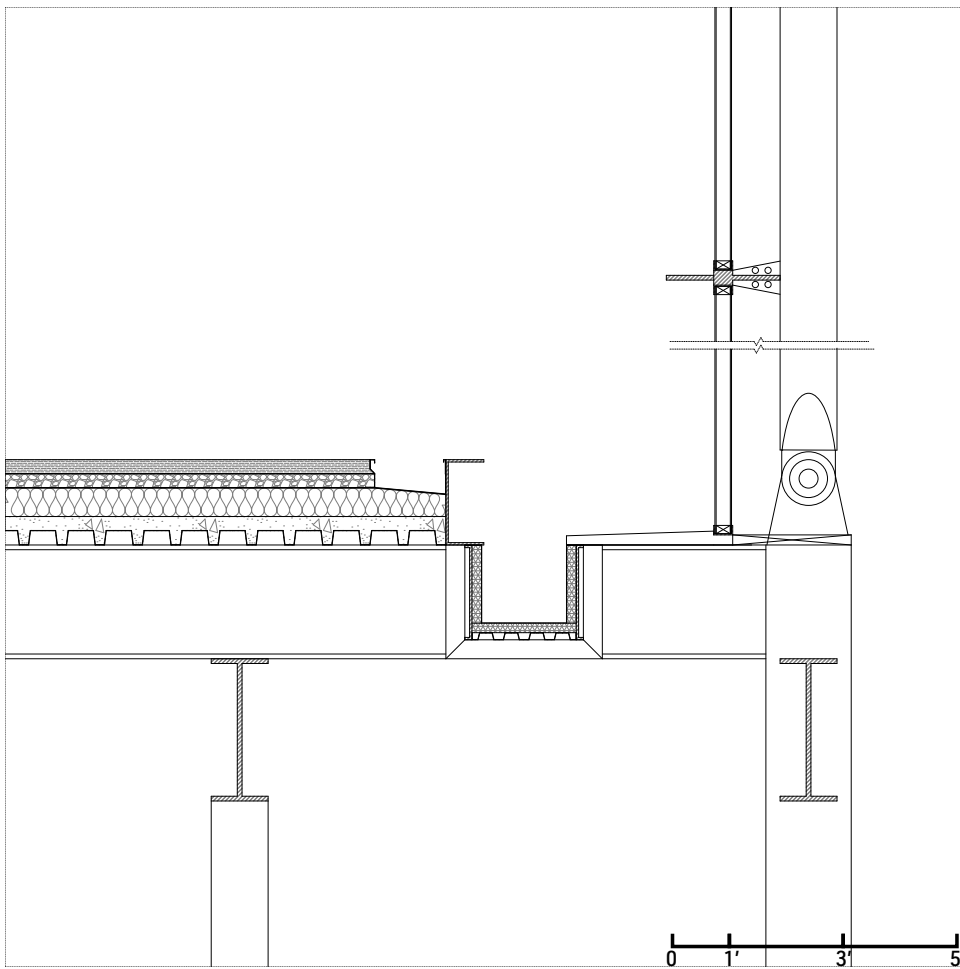
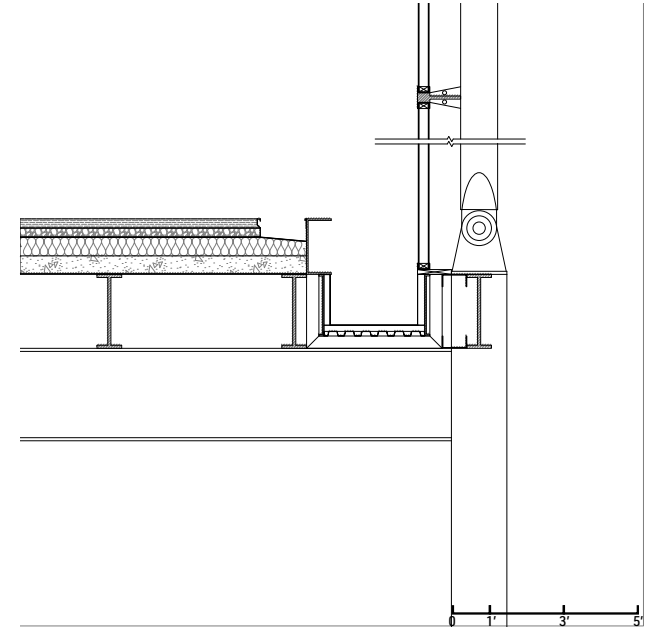
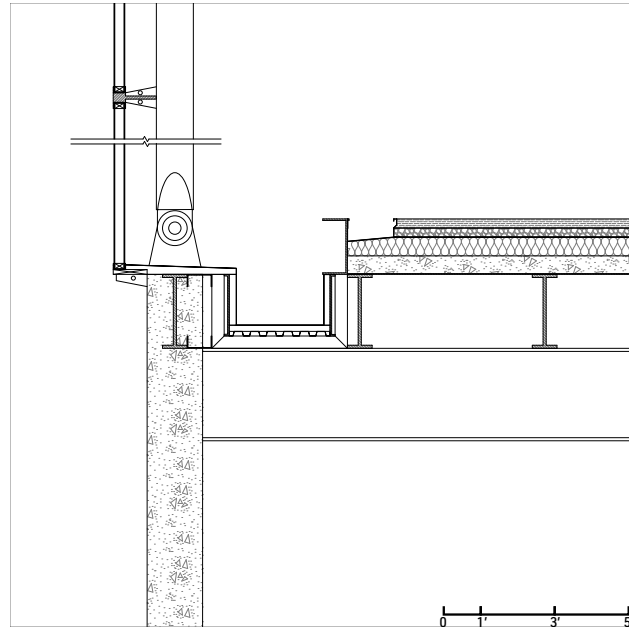
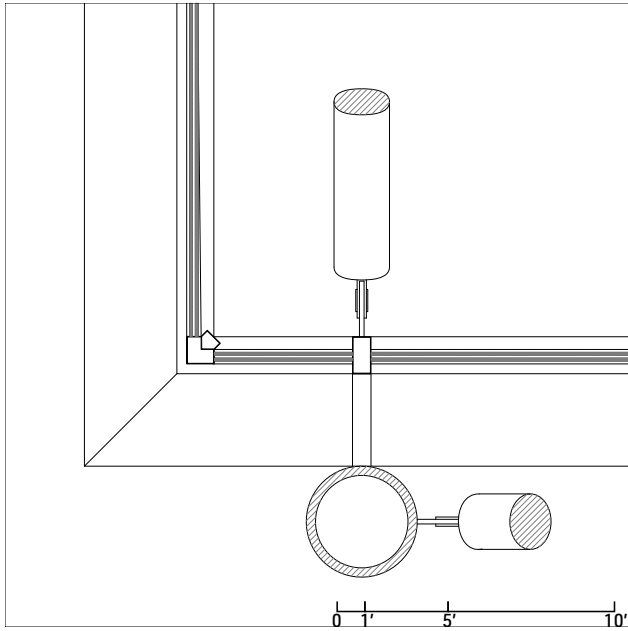


# Details

To create facades that also act as boundaries, the facades need to respond to the context. For the "display box", in order to better reflect the context situation, different facades facing different directions have different layering strategies. For the facades towards south, east, and west, the glazing

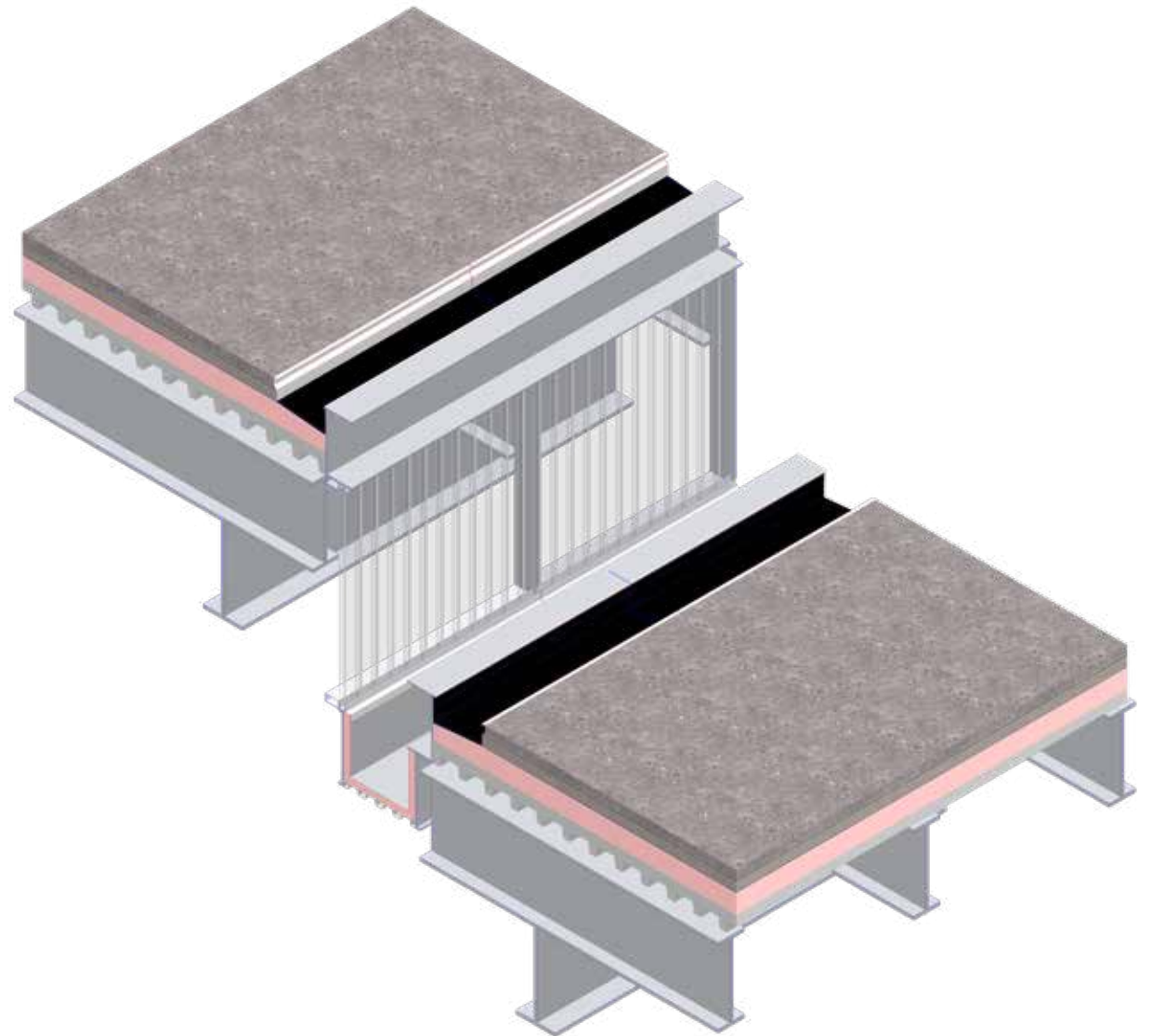
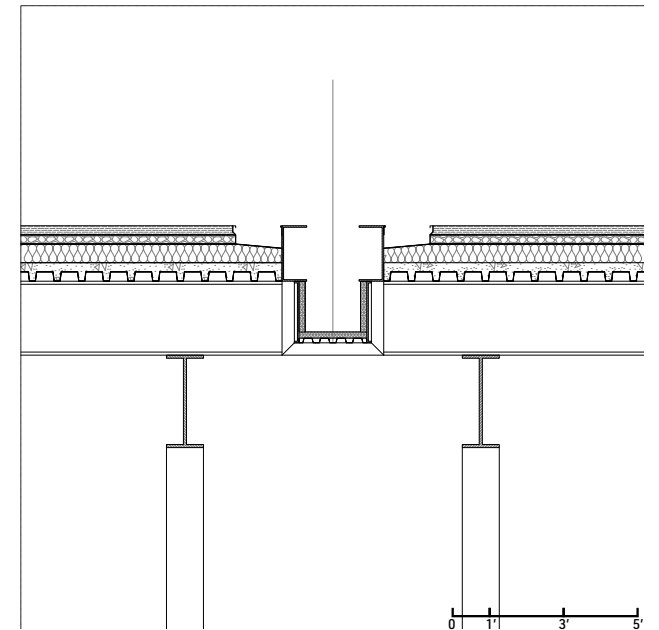
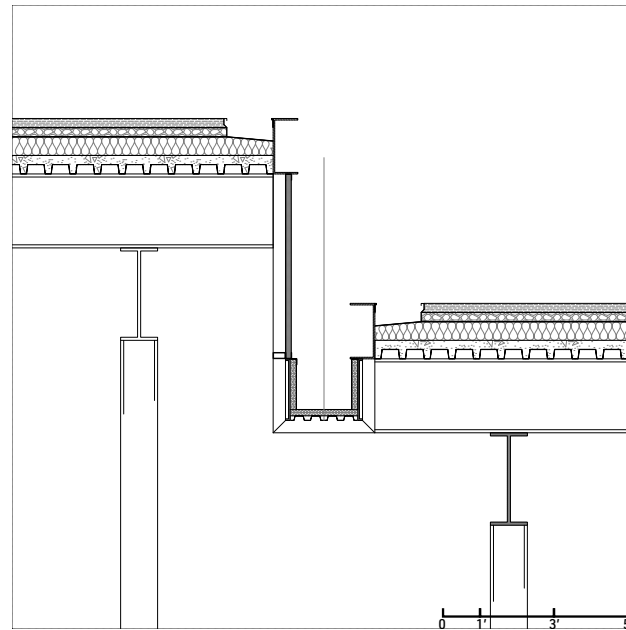
of the facade is outside the structure frame to diminish the impact of the industrial elements for viewers. For the facade toward the south, since this side is where the facility connects to the residential area, the glazing is behind the structure frame to stress the industrial aesthetics for the public. To make

the glasses go inside and outside properly, the glasses change the location on the curtain wall assembly at the corner.



## Details

The separated structure gives the opportunity to design the elements in between the waving shape roof. To create some scattered boundaries between public and industrial. The dividing structures in between the roofs are utilized to be windows for visitors to observe the industrial activities inside the ground floor. The height differences between the waving floors will make the dividing structure in different shapes and heights. The boundaries become even more dynamic for the visitors.









# References

Pollio, V. (1914). *Vitruvius: The Ten Books on Architecture*. Harvard university press.

Curtis, W. J., & Curtis, W. J. (1996). *Modern architecture since 1900*.

Kara, H., Asensio, V. L., Georgoulas, A., & Harvard University. (2017). *Architecture and waste: A (re)planned obsolescence*.

Harvey, D. (2008). The right to the city. *The City Reader*, 6(1), 23-40.

