

## ABSTRACT

Title of Document: GATEWAY TO THE CITY: RECONNECTING  
CENTER CITY PHILADELPHIA TO THE  
DELAWARE RIVER WATERFRONT

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This thesis proposes to examine the relationship between the dense city core of Philadelphia and the Delaware River waterfront. The thesis will consider the possibility of reestablishing connectivity between the city and waterfront that existed prior to the construction of I-95.

The site in Center City Philadelphia is located along I-95 and bounded by Market Street, the Delaware River, and Walnut Street. The space over I-95 will be considered as potential buildable area and underdeveloped areas along the Delaware River waterfront will be investigated to promote greater utilization and active daily use.

The thesis will study how appropriate programming of underutilized city land can activate the river's edge and establish links between neighborhoods immediately adjacent to the site. The thesis will also examine how park systems might provide an extension of comfortable open space prevalent throughout the eastern areas of Center City.



GATEWAY TO THE CITY: RECONNECTING CENTER CITY PHILADELPHIA  
TO THE DELAWARE RIVER WATERFRONT

By

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Thesis submitted to the Faculty of the Graduate School of the  
University of Maryland, College Park, in partial fulfillment  
of the requirements for the degree of  
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## Dedication

To all my family and friends who have shown me tireless support throughout my architectural education.

## Acknowledgements

I would like to thank the following people who helped me to pin up my final presentation prior to my thesis defense:

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## Background

This thesis seeks to challenge the presence of large-scale infrastructure in urban settings. Cities are planned with movement and connectivity as important design principles. In order for a city to thrive, it must be able to effectively move people and goods within its borders, so that all areas are vibrant and well maintained. The local movement systems of inner city cores can take many forms, such as rectilinear grids, linear paths, or series of nodes. The advent of regional infrastructure – canals, railroads, and later, highways – also bolstered the movement of people and goods into and out of cities. However, bringing these new regional movement systems into cities often destroyed the local neighborhood connectivity within the inner city core.

In the United States, the Interstate Highway system perhaps the most notorious for fragmenting established city cores. This thesis will explore the impact that I-95 has had on the relationship between Center City Philadelphia and the Delaware River Waterfront. The primary focus of the site will be the Penn's Landing site on the Delaware River and the I-95 corridor between Market Street and Walnut Street. This area confronts an issue common to other cities in the United States, which is a city center that has been disconnected from a vital waterfront by highway infrastructure. The goal of the project is to reconnect the city with the waterfront from a number of viewpoints. Connectivity can be reestablished by densifying both sides of the highway barrier to enforce a visual connection. A network of open space with a link passing over I-95 can connect the historic center of Philadelphia with the waterfront. Connection in programming the site and maintaining iconic views into

and out of the site will also contribute to minimizing the segregating effect of I-95 and reuniting the waterfront to the rest of Center City. In order to comprehensively reunite Center City to the Delaware Waterfront, all of the aforementioned strategies must work together to create a holistic urban scheme.

The scope of the thesis will explore design at the urban scale. Focus of the urban design will be to integrate high density building mass and public open space on the waterfront side of I-95. The massing and open space will also seek to relate to the stable urban context to the west of I-95.

Programmed functions for the thesis are to include a variety of active uses centered around grand public gathering spaces. The building programs will be a mix of retail, residential and civic uses that will promote an active environment along the waterfront and throughout the new urban scheme during all times of the year. The variety of uses will help to draw urban activity from the vibrant neighborhoods on the other side of I-95.

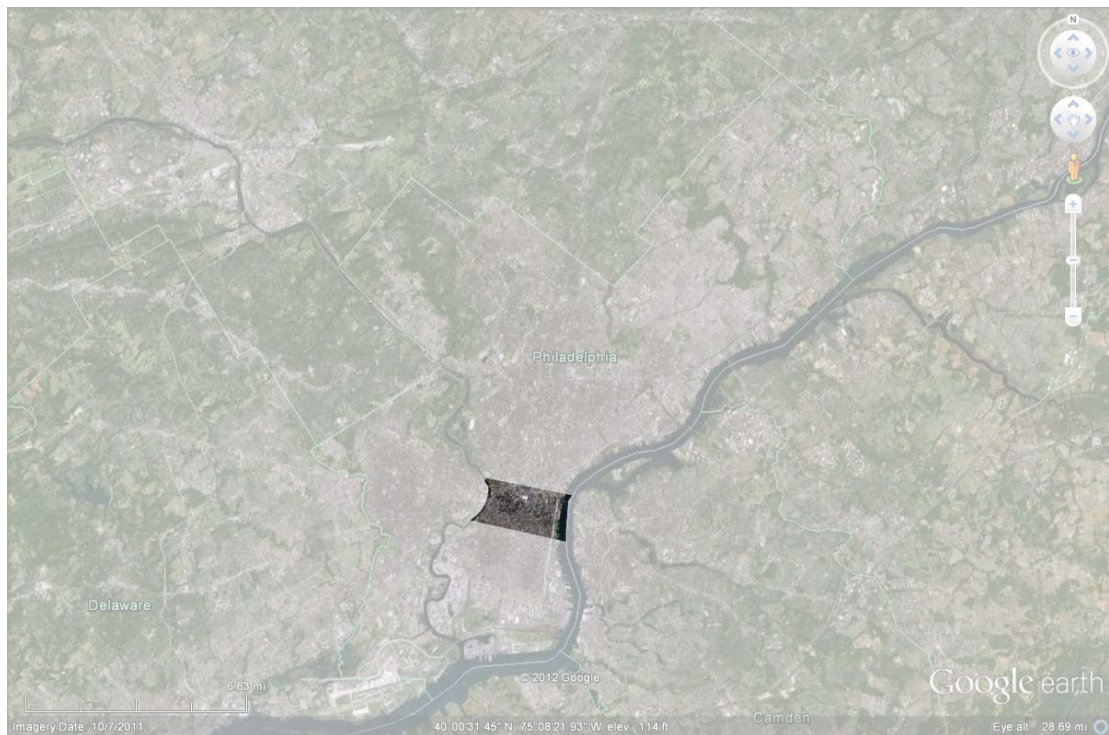
This thesis will demonstrate that the presence of large-scale infrastructure does not have to be a barrier between areas of cities. Rather, this infrastructure and the areas around it simply pose a different set of design challenges for development in cities. With land in cities becoming scarcer, urban infrastructure can provide new opportunities for high density development, and in doing so, cities can be reunited over the highways that once divided them.

## Site Description

The thesis site is located on the eastern edge of Center City Philadelphia along the Delaware River. It is bounded by Market Street to the north, Walnut Street to the south, the Delaware River to the east and Front Street to the West. In total, the site is comprised of 25.6 acres along the waterfront. Much of the eastern portion of the site consists of Penn's Landing, the current development on the site. It consists of surface parking, a shallow amphitheater structure, the Independence Seaport Museum, a 1300 foot wharf, and two museum ships. Perhaps the most prominent existing site condition is I-95, which runs as a depressed highway along the western edge of the site. Christopher Columbus Boulevard parallels the highway at grade and is continuous along the north-south edge of the site. The highway also creates a significant grade change between the city along the western boundary and the waterfront, with variations up to 25 feet. Another reason for this significant grade change is that a large eastern portion of the site is actually fill that has been built out into the Delaware River. The current built out edge at the river is about 750 feet east of the original river bank. Also, the old city fabric is built on a bluff at the top of the river embankment, and so these two factors are what create the change in elevation.

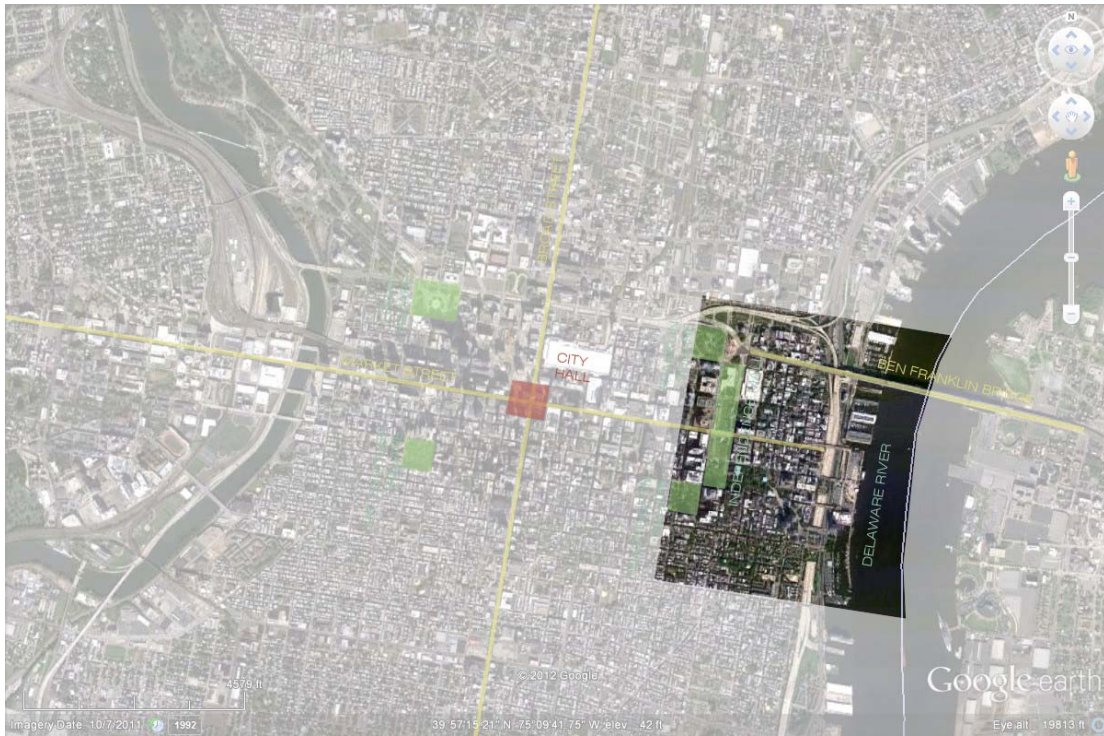


**Figure 1 - The City of Philadelphia and the surrounding region (source: Google Earth)**

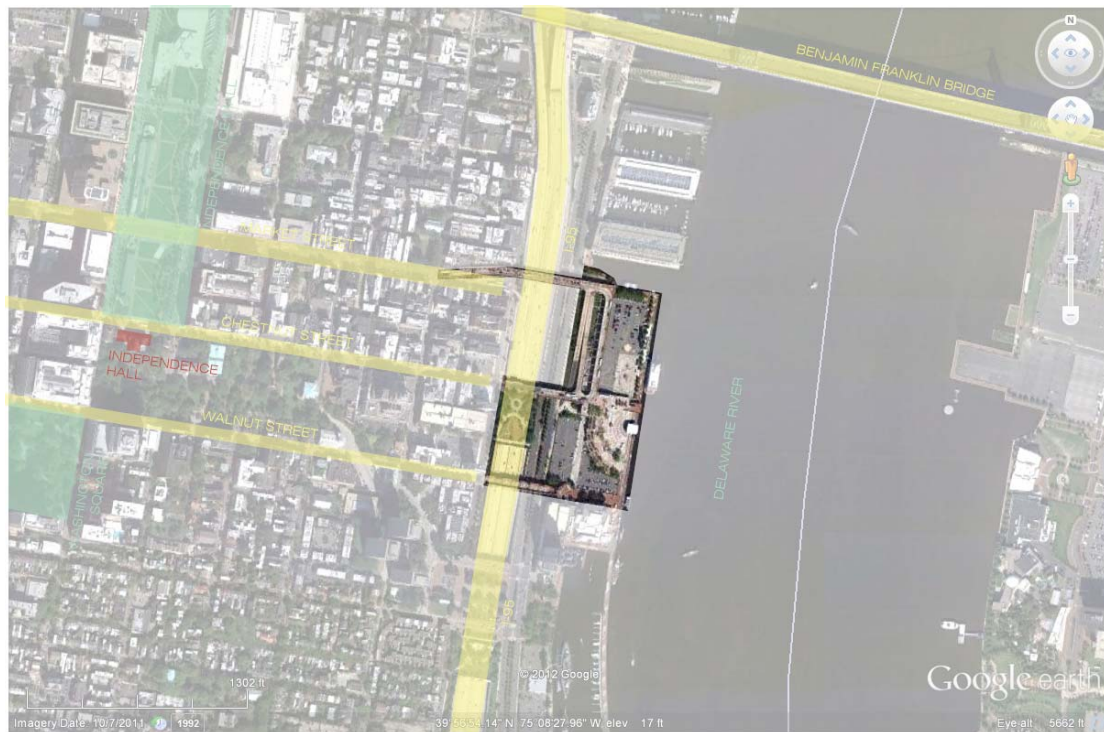


**Figure 2 - Center City Philadelphia within the city limits (source: Google Earth)**





**Figure 3 - Eastern Center City Philadelphia including Independence Mall, Benjamin Franklin Bridge, I-95 and Delaware River (source: Google Earth, author's overlay)**



**Figure 4 - Proposed Thesis Site (source: Google Earth, author's overlay)**





**Figure 5: Thesis site with existing structures and local landmarks (source: Google, author's overlay)**

Beginning at the northern extents of the site, both Market Street and Chestnut Street extend across I-95 and terminate in a scissor ramp that allows car traffic down to the parking lots currently occupying the northern half of Penn's Landing. South of Chestnut Street, I-95 is decked for approximately half a block on top of which a park and the Irish Memorial are located. At the Penn's Landing development, a hardscaped amphitheater called the Great Plaza is sited at the river's edge. This space is used several times a year for concerts, festivals and fireworks shows.



**Figure 6 - Scissor Ramps (source: Author)**

**Figure 7 - Great Plaza (source: Author)**

There is a pedestrian bridge at Walnut Street that leads to the Independence Seaport Museum along the waterfront. A Hyatt Regency hotel occupies part of the site along Columbus Boulevard between Walnut Street and Dock Street. Further south, I-95 is again decked over with a 700 foot long park, stretching from Dock Street to Delancey Street. Dock Street and Spruce Street also continue across to allow vehicular access to Columbus Boulevard.



**Figure 8 – Hyatt Regency and Independence Seaport Museum (source: Author)**

**Figure 9 - Terminus of Dock Street and Spruce Street (source: Author)**

On the eastern half of the site, there is more surface parking as well as two docked museum ships, the *USS Olympia* and the *USS Becuna*, and a restaurant ship, the *Moshulu*. There is one final pier on the southern edge of the site, which is mostly

covered with surface parking. There is also a pedestrian bridge over I-95 at South Street, and even more surface parking between the highway and Columbus Boulevard, which now begins to follow the river's edge. Almost the entirety of the site is impervious surface, the only exceptions being planters for trees and strips of grass at the edges of Columbus Boulevard and parking lots.



**Figure 10 - USS Becuna and USS Olympia (source: Author)**

**Figure 11 - Moshulu (source: Author)**

At Front Street opposite the site boundary, there is a defined street wall. This edge of buildings also acts as the edge of Center City as well, due to the lack of any structured development from I-95 and eastward to the river. Along this street wall, there are a variety of building styles and typologies. Between Market and Walnut Streets, the street characteristics are largely defined by mid to late nineteenth century four to six story brick buildings. These buildings all have ground floor retail and apartment or office space above. In the past few years, mid-rise condominiums have been constructed amongst the old nineteenth century structures. There is also an above grade parking structure and a surface parking lot, which is one of the few locations where the street wall is discontinuous. The building typology shifts between Walnut and Dock Streets, as a complex of 1970's low rise apartment





converted into condominiums. Pier 9 is currently being used as a parking facility, and the Race Street Pier Park has recently been completed as of May 2011.<sup>1</sup>



**Figure 13 - I-95 north of Market Street with Benjamin Franklin Bridge in background (source: Author)**

**Figure 14 - Pier 3 condominiums (source: Author)**

The area to the south of the site boundary is largely a transitional space for the major thoroughfares that run through the site. There is a large ramp structure that connects I-95 and Columbus Boulevard two blocks south of South Street. Also, as is the case to the north of the site, I-95 rises from being a depressed highway to being an elevated highway as it extends south. The surface parking that is located in between I-95 and Columbus Boulevard on the site also extends beyond the site boundaries to the south. Also visible on the pier to the south is the Residences at Dockside, which is a modern high rise condominium.

To the east of the site are extensive views of the Delaware River and Camden, New Jersey. Since the site is located at a bend in the river, there are also view corridors both up and down the Delaware River. Some of the significant views from Penn's Landing are the Benjamin Franklin Bridge to the north, Campbell's Field, a

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<sup>1</sup> Harry Kyriakodis, *Philadelphia's Lost Waterfront* (Charleston: The History Press, 2011), 71.

baseball park in Camden, the Adventure Aquarium, downtown Camden to the east across the river, and the battleship *USS New Jersey* to the southeast.



**Figure 15 - Benjamin Franklin Bridge (source: Author)**

**Figure 16 - *USS New Jersey* (source: Author)**

## Site History



**Figure 17 - William Penn's 1682 plan for Philadelphia (source: David Rumsey Map Collection)**

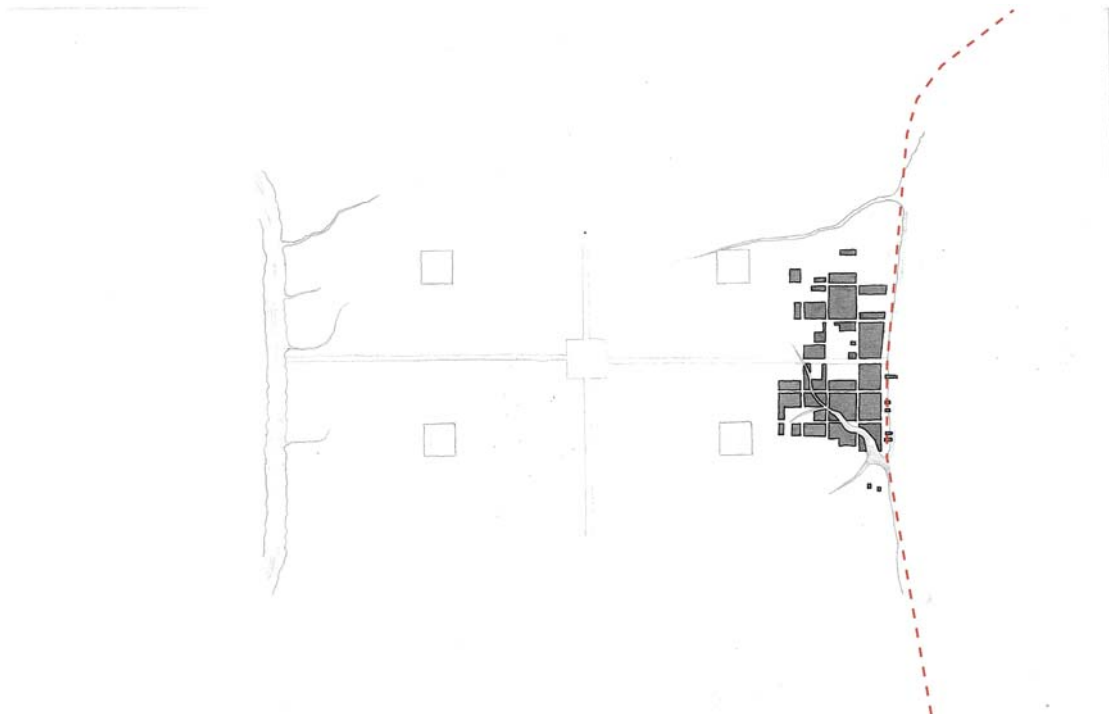
Philadelphia was founded in 1682 by William Penn. In his original master plan for the city, streets were laid out in a grid between the Delaware and Schuylkill Rivers. Although Penn had planned for development to follow this network of streets, growth in Philadelphia's early history instead spread along the Delaware River waterfront.<sup>2</sup> The primary cause for this development pattern was the ability of the Delaware River to be used as a shipping port.<sup>3</sup> Therefore, as docks and wharves spread along the Delaware, so did the rest of the city. The growth of Philadelphia

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<sup>2</sup> Sexton, Sharon, ed., *The Plan for Center City*, Philadelphia: Consolidated/Drake Press, 1988, 62.

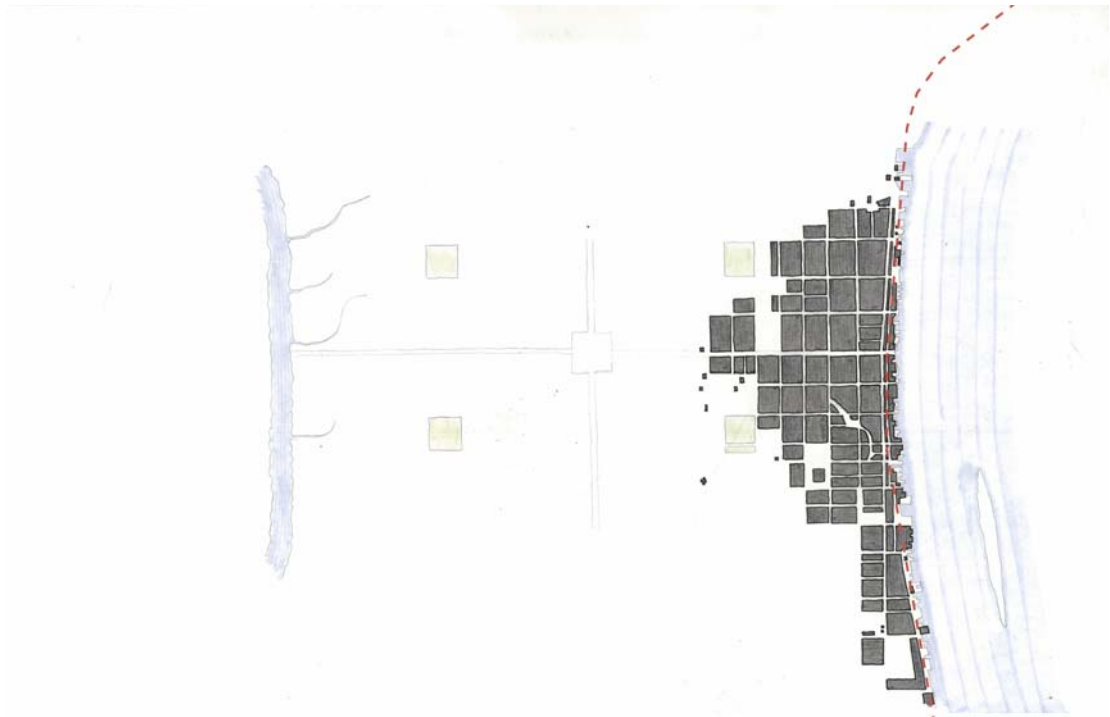
<sup>3</sup> Brown, Peter Hendee, *America's Waterfront Revival*, Philadelphia: University of Pennsylvania Press, 2009, 78-79.

was so concentrated along the river that it was not until the 1830's that the city expanded to Penn's central square, and not until the 1860's that city development reached the Schuylkill River, finally filling out Penn's original plan.

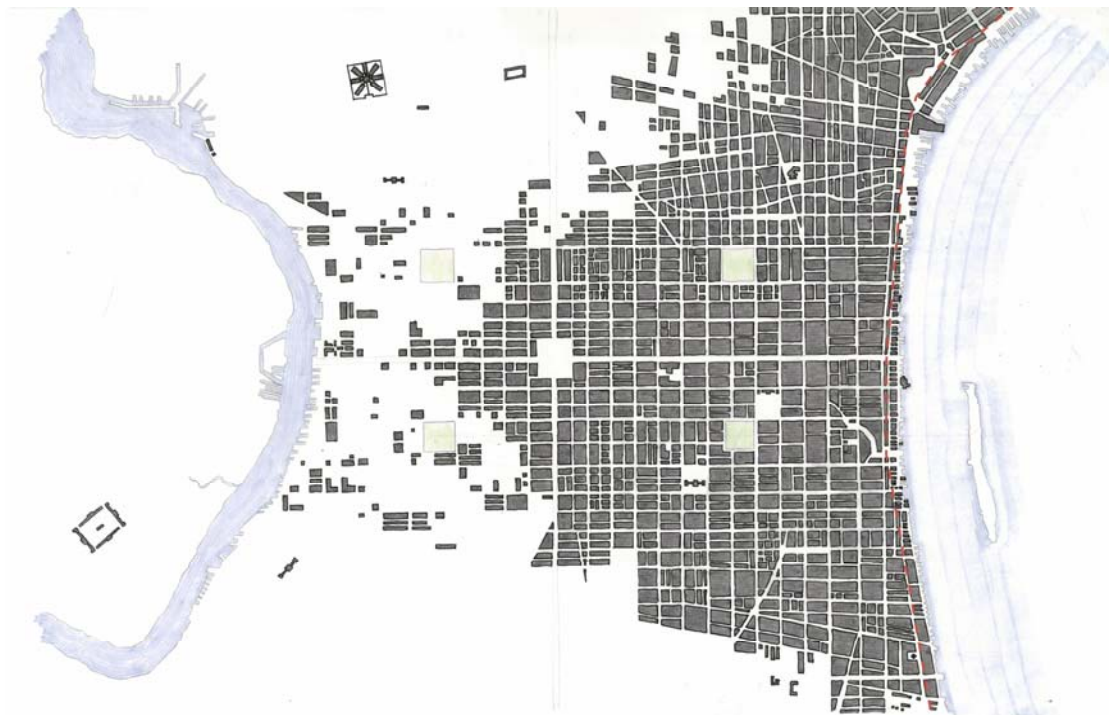


**Figure 18 - Figure-Ground of Philadelphia, 1684 (source: Author)**





**Figure 19 - Figure-Ground of Philadelphia, 1775 (source: Author)**



**Figure 20 - Figure-Ground of Philadelphia, 1838 (source: Author)**



Figure 21 - Figure-Ground of Philadelphia, 1903 (source: Author)



Figure 22 - Figure-Ground of Philadelphia, 2011 (source: Author)

When Philadelphia was founded by William Penn, he arrived by ship and came ashore at Dock Creek. This location is where the first settlements of the city were established, as well as the city's first port. Soon after, however, Dock Creek became too small for the amount of trade that was occurring in the young city, so shipping began to move out onto the Delaware River and Dock Creek was filled in.<sup>4</sup> Dock Creek now exists as Dock Street, which is the only street to break Penn's original street grid. Dock Street serves as an important path into the thesis site.



**Figure 23 - City of Philadelphia, 1776 (source: David Rumsey Map Collection)**

As trade along the Delaware River increased, there was a need for larger and larger piers and docks to accommodate larger ships and greater volumes of goods.

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<sup>4</sup> Tatum, George B., *Penn's Great Town*, Philadelphia: University of Pennsylvania Press, 1961, 16-20.

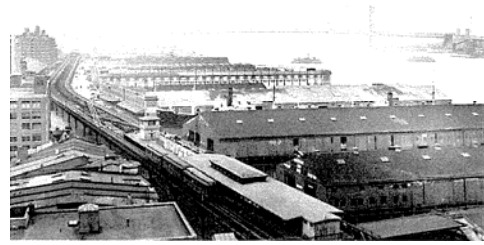
Therefore, the old piers were filled in and larger ones built in their place. Over time, so much new land was added that two new streets, Water Street and Delaware Avenue, were mapped to the east of the original eastern edge of the city, which was Front Street. The relationship between the original river bank and city expansion into the river can be seen with the dashed red line in Figures 18-22. Eventually federal regulation limited the distance that the city could extend into a shipping channel to ensure safe navigation. Today the maximum distance a pier can be built into a shipping channel is 550 feet, and that distance marks the end of zoning overlays for the city of Philadelphia.<sup>5</sup>

The site along the Delaware waterfront between Market and South Streets was used actively for various shipping purposes. By the mid-1800's, many of the docks and wharves, as well as the warehouses along Water Street, were owned by the railroads serving Philadelphia, including the Pennsylvania Railroad, Reading Railroad and B & O Railroad. There was also a cross-river ferry service located at the end of Market Street. These waterfront properties remained in service into the 1960's, and as the railroads began to go out of business, the city assumed ownership of many of these sites.<sup>6</sup>

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<sup>5</sup> Harry Kyriakodis, *Philadelphia's Lost Waterfront* (Charleston: The History Press, 2011), 73.

<sup>6</sup> Brown, Peter Hendee, *America's Waterfront Revival*, Philadelphia: University of Pennsylvania Press, 2009, 81-83.



**Figure 24 - Delaware Ave., 1898 (source: Kyriakodis, *Philadelphia's Lost Waterfront*)**

**Figure 25 - Delaware Ave. elevated train, 1930 (source: Kyriakodis, *Philadelphia's Lost Waterfront*)**

Proposals for a freeway running through the site began in 1937, when there were plans to create an Industrial Highway linking Northeast Philadelphia, Center City and the Port of Philadelphia. In the 1940's and 1950's, the Industrial Highway plan was incorporated into preliminary Interstate highway studies. When the Interstate Highway system was signed into law, the highway along the Center City waterfront officially became part of I-95.<sup>7</sup> In 1972, construction began on the Center City section of the highway. It was to be located between Front Street and Christopher Columbus Boulevard, and by doing so, Water Street was demapped and the old warehouses along Water Street and Columbus Boulevard were demolished. The combination of dilapidated, obsolete warehouse structure and unused railroad right-of-way created a path of least resistance through which the new highway could travel. Coinciding with the construction of the Interstate were the construction of two decked parks and the development of the Penn's Landing waterfront area, which

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<sup>7</sup> The Roads of Metro Philadelphia, "Delaware Expressway: Historic Overview," [phillyroads.com](http://www.phillyroads.com/roads/delaware/), <http://www.phillyroads.com/roads/delaware/> (accessed October 23, 2011).

includes The Great Plaza stage area and the Independence Seaport Museum and is the current state of the site today.

## Site Selection

The selection of the thesis site of the Delaware River waterfront and I-95 in Center City Philadelphia is important because this site has the ability to address many of the issues that are present in countless American cities. First of all, the site represents an area that was once deeply connected to the core of the city, only to become cut off from the rest of the city by the Interstate highway system. The waterfront was once connected to the city with a network of streets and buildings that promoted the easy movement of people and goods to, from and around the site. Now with the highway running through the city, that once seamless connectivity is now very much restricted.

Secondly, the site is an example of a location that was once vital to the existence of the city, and over time became overlooked, neglected and abandoned during the middle of the twentieth century. There are several reasons for the decline during this time, including changing industry and economy, the desire of people to move to open areas away from the city center, and pollution. What was once a dense urban core full of business and activity and an asset to the city, is now mostly empty and no longer serves citizens the way it once did.

Finally, a growing problem in many cities is that they are running out of greenfield sites. Finding new and unconventional development sites is going to be an important part of future central city growth as traditional lot parcels become less and less available. The selected thesis site has the ability to foster new urban development on both waterfronts as well as along and above highways.

The I-95 corridor along the Delaware River in Center City, Philadelphia exhibits problems that are common to many American cities. This thesis seeks to address how urban design can minimize the negative impact of large-scale urban infrastructure present in urban centers. The implementation of intelligent urban design can minimize or eliminate the highway barrier and make the waterfront a connected part of Center City Philadelphia again. Development of the site will allow the waterfront area to become an asset to the city as it once was earlier in its history. New and varied programs at the site will make it an active area for citizens of Philadelphia at all times throughout the year. Due to the rebirth and increasing desirability of cities, selecting this site will also show how cities can reclaim land from infrastructure and use it to create new opportunities for growth within the city center as land continues to sell at a premium. The Delaware River waterfront can show the importance and potential of all land within a city.



## Site Planning

### **PennDOT Delaware Expressway Cover**



**Figure 26 - PennDOT Delaware Expressway Cover Master Plan (source: phillyroads.com)**

The original I-95 plans that were released in 1963 proposed an elevated highway that went through Penn's Landing in Center City. However, there was widespread objection, including from architect Frank Weise. He claimed that an elevated highway would destroy the city's connection to the waterfront. Therefore, alternative designs were explored, beginning with the highway being depressed into the earth, rather than elevated. The final 1965 plan involved a six block long cover of I-95 spanning from Pine Street to Arch Street. This cover was to include 15 acres of parkland as well as buildings over the highway, as seen in Figure 26. The Penn's Landing development is also shown with higher density development at the waterfront. Development also extends north to Race Street, making this Penn's

Landing plan about twice the area of what was actually built.<sup>8</sup> Due to federal concerns about the cost of covering the whole six blocks over I-95, the plan was scaled back to only include the two park covers that exist today.

### **Master Plan for the Central Delaware: Transforming Philadelphia's Waterfront**



**Figure 27 - Master Plan for the Central Delaware, Penn's Landing Waterfront Plan (source: Delaware River Waterfront Corporation)**

Released on October 28, 2011, the Master Plan for the Central Delaware strives to, “transform a six-mile length of Philadelphia’s Central Delaware River waterfront into an authentic extension of the thriving city and vibrant neighborhoods immediately to its west.”<sup>9</sup> Included in this master plan are recommendations for the

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<sup>8</sup> The Roads of Metro Philadelphia, “Delaware Expressway: Historic Overview,” [phillyroads.com](http://www.phillyroads.com/roads/delaware/), <http://www.phillyroads.com/roads/delaware/> (accessed October 23, 2011).

<sup>9</sup> Delaware River Waterfront Corporation, “Master Plan for the Central Delaware: Transforming Philadelphia’s Waterfront.” (Master plan presented to the Philadelphia City Planning Commission, Philadelphia, PA, October 28, 2011), 46.

Penn's Landing site. It seeks to maintain the civic nature of the site by providing open areas for public gathering, while also introducing residential and mixed use development to promote year-round use. The Market and Chestnut Street infrastructure would be removed to make room for large mixed use development containing hotel and conference space, residential units and public-oriented retail. The highway cover between Chestnut and Sansom Streets would be extended to Walnut Street as well as over Columbus Boulevard to link with a sloped lawn on the waterfront side that would function as a large civic gathering space. Medium density residential mixed use buildings would be located on Columbus Boulevard along the waterfront from Spruce Street to South Street to promote continuous activity along the north-south axis of the site.<sup>10</sup>

The Master Plan for the Central Delaware will be a valuable tool in developing different aspects of this thesis. A critical analysis of the plan will help to draw out the connectivity issues between the city and the waterfront, as well as provide insight on ways to reconnect the city elements. Analysis of the Master Plan will investigate pedestrian access, open space, building mass and typology to inform the thesis of potential strategies to minimize the highway barrier and reconnect the city to the waterfront.

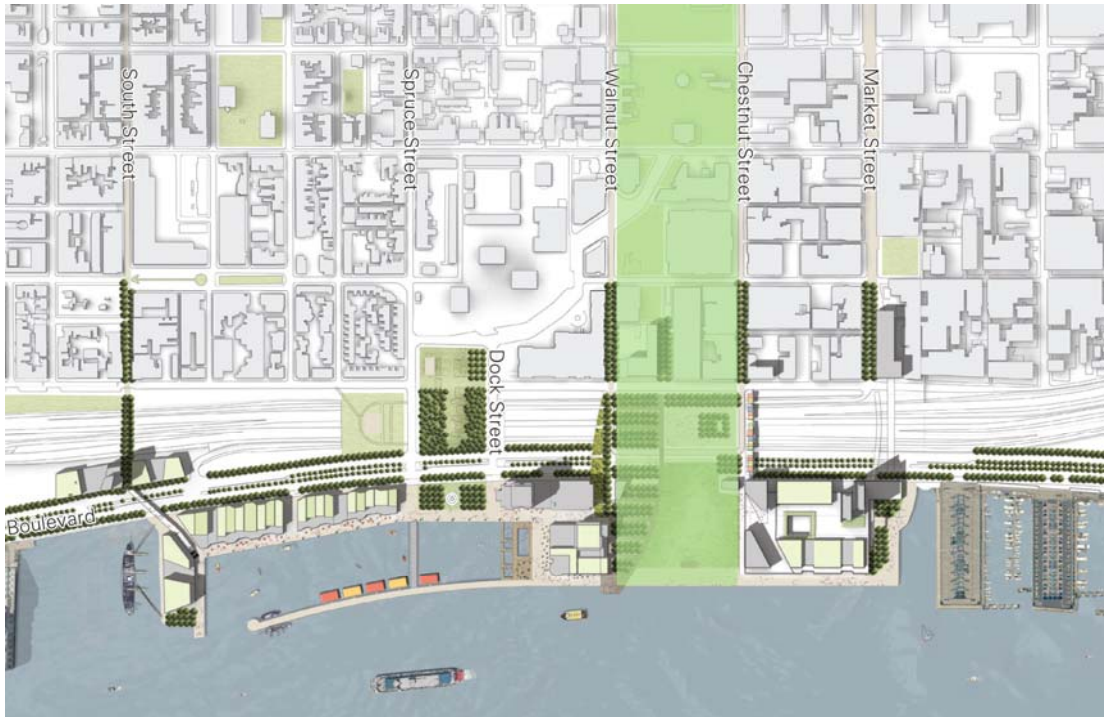
This thesis will primarily focus on the Master Plan area located at the Penn's Landing site, with Walnut Street as the southern boundary and Market Street as the northern boundary. This area presents the greatest potential critical analysis of the Master Plan as it relates to the thesis, specifically how the park network relates back

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<sup>10</sup> Delaware River Waterfront Corporation, "Master Plan for the Central Delaware: Transforming Philadelphia's Waterfront." (Master plan presented to the Philadelphia City Planning Commission, Philadelphia, PA, October 28, 2011), 49-51.

to the city, and how the densification of the northern block between Chestnut Street and Market Street can act as a catalyst to activate the Penn's Landing site. The area south of Walnut Street in The Central Delaware Master Plan shall be deemed appropriate for future development for that area, as the medium density retail and residential development proposed is consistent with the adjacent neighborhoods.

This thesis will first analyze the public open green space for The Master Plan for the Central Delaware. The Master Plan states that a diverse open space is needed in this area to maintain the large-scale civic functions that the existing Penn's Landing site is used for, such as public concerts and fireworks displays. The Master Plan also claims that the open space needs to support smaller scale activities, such as personal recreation, art displays and open air markets. Successful inclusion of these varied park programs will be essential to establishing connectivity across I-95 and promoting daily activity on the waterfront site. The open park space should be viewed as a continuation of the green open space network that is located between Chestnut Street and Walnut Street. This open space network begins at Independence Hall and continues to the east. This green corridor includes a number of historic structures dating to the early 18<sup>th</sup> century. These historic structures can be viewed as object buildings or follies that are located within this green corridor. Inclusion of a public park in the thesis site will bring clarity to the eastern end of the open space diagram and will provide a continuous link from Independence Hall to the Delaware River.



**Figure 28 - Green corridor diagram extending to Master Plan for the Central Delaware Penn's Landing scheme (source: Delaware River Waterfront Corporation, author's overlay)**

The public park presented by the Master Plan for the Central Delaware can be viewed much the same as another Philadelphia park – Rittenhouse Square. Both are the same size – eight acres – and the Master Plan waterfront park intends to be of the same great civic importance as Rittenhouse Square. However, a closer comparison of the two park spaces reveals many problems with the Master Plan park.

One of the primary reasons that Rittenhouse Square is regarded as a successful urban space is the diverse and active uses that line the park on all four sides. The continuous street facades and dense retail and residential functions allow the park to be a center for activity. The Master Plan park does not possess the same surrounding urban density to populate the park. The park is instead exposed and open along most

of its perimeter. Another aspect of Rittenhouse Square that makes it such an active space is how the park is properly scaled for pedestrian use.



**Figure 29 - Master Plan for the Central Delaware compared to Rittenhouse Square (source: Delaware River Waterfront Corporation, Google Earth, author's overlay)**

The square is divided up by paving and plantings that create a series of rooms within the park that allow it to be used for several uses at once, including walking, playing sports, picnicking and performing. Ample shade is also provided by deciduous trees so that the park remains a comfortable temperature during the summer months and sunny during the winter months.



**Figure 30 – Public art displays in Rittenhouse Square (source: Google Earth)**  
**Figure 31 – Daily activity in Rittenhouse Square (source: Google Earth)**

The design of the public park in the Master Plan for the Central Delaware does not take many of the design sensibilities of Rittenhouse Square into consideration. Instead, the park consists primarily of one large open space that extends for hundreds of feet. This space would be both uncomfortably hot in the summer and unbearably cold in the winter. It would also fail to provide the many intimate spaces that Rittenhouse Square provides. Even as a civic function, the park's open space greatly exceeds that of the Great Plaza which serves the same function on the existing site.



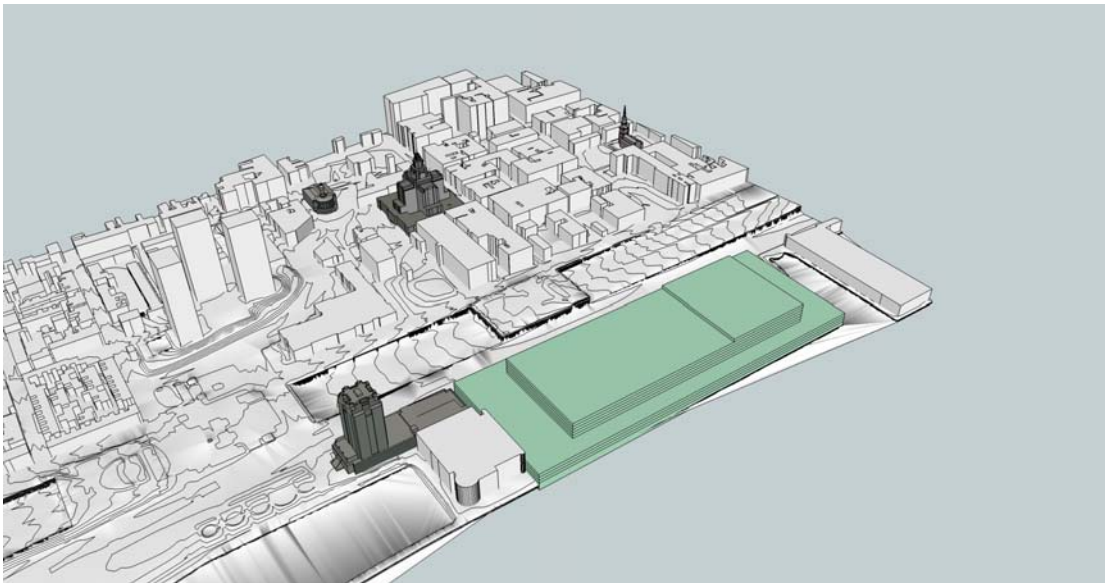
**Figure 32 – Master Plan for the Central Delaware compared to existing Great Plaza amphitheater (source: Delaware River Waterfront Corporation, Google Earth, author's overlay)**

Analysis of the Master Plan for the Central Delaware's public park as well as analysis of Rittenhouse Square will provide the thesis with a proper direction for a successful open space network that will continue the green corridor from Independence Hall to the Delaware River and provide comfortable outdoor space for daily active use.

This thesis also must provide a critical analysis of the building programming of the Penn's Landing site of the Master Plan for the Central Delaware. In the Master



Plan, all of the building massing is located on the northern half of the site, between Chestnut Street and Market Street. Concentrating the building massing in this location of the site is appropriate, as Market Street is a densely programmed street and that activity should be continued across to the waterfront. A diverse range of building programming is also recommended for the development site, including residential, retail, hotel and conferencing spaces.<sup>11</sup> The Master Plan also seeks to mimic the high density atmosphere of Center City Philadelphia. However, further analysis of the Master Plan building massing through 3D modeling shows that the Master Plan leaves the Penn's Landing site severely underdeveloped. According to the Philadelphia Zoning Code, the entire Market Street corridor is zoned as C-4, which is used for high density mixed use development. Under this zoning, the allowable building square footage for the Penn's Landing site is 2,600,000 square feet.



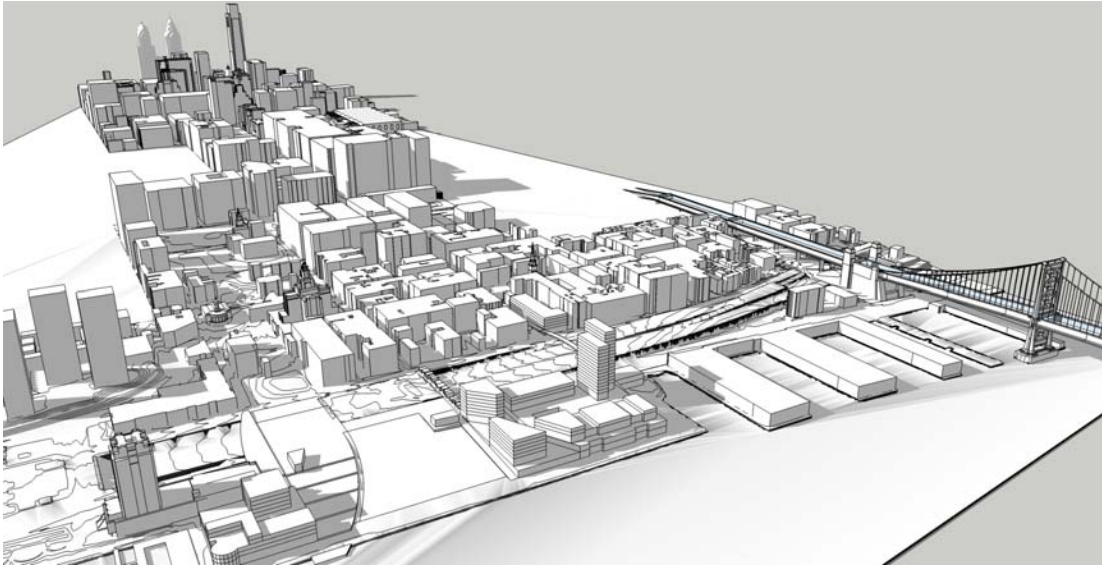
**Figure 33 - FAR Massing study of Penn's Landing site (source: Author)**

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<sup>11</sup> Delaware River Waterfront Corporation, "Master Plan for the Central Delaware: Transforming Philadelphia's Waterfront," 51.

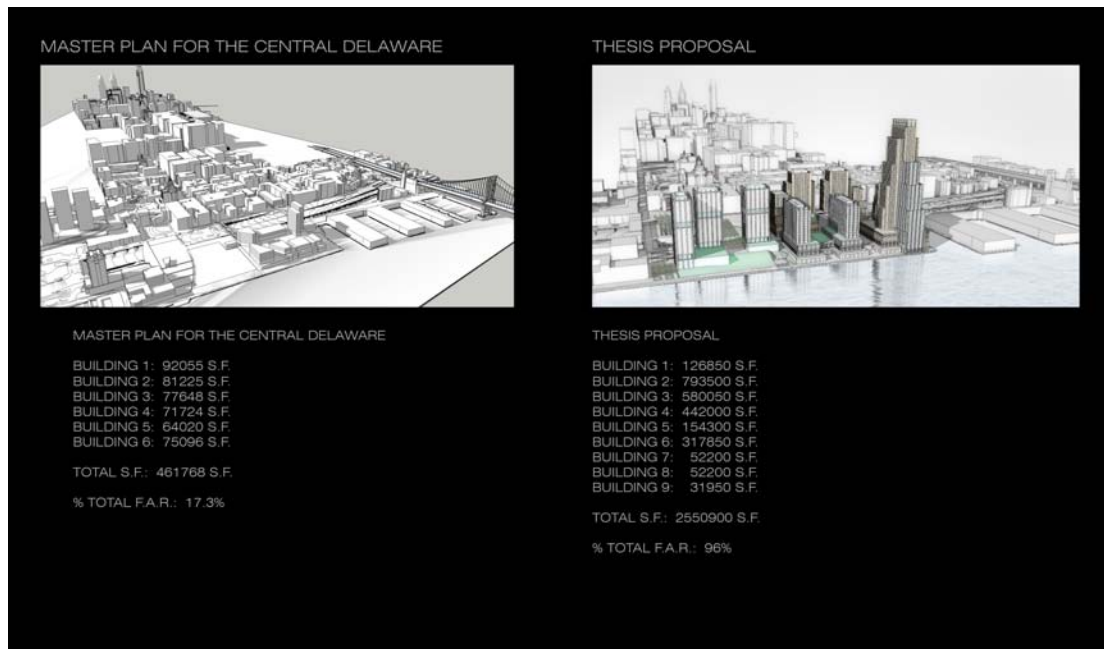


However, according to 3D modeling analysis, the Master Plan only shows 460,000 square feet of building mass in their renderings – only 17% of the total allowable building area.



**Figure 34 - 3D model of the Master Plan for the Central Delaware (source: Author)**

Therefore, it should be a primary focus of the thesis to challenge this representation of building mass and build up the Penn's Landing site to its full potential. It is important to fully develop the site because a critical density with a variety of programs is required to both make the site self sustaining and a destination to draw people from Center City and across the highway.



**Figure 35 - Master Plan square footage compared to thesis proposal square footage (source: Author)**

Additionally, this thesis seeks to critically analyze transportation connections into the site. The Master Plan for the Central Delaware proposes primarily pedestrian connections into the site. However, a site with the amount of proposed building program needs to be serviced by a range of transportation systems, including vehicular traffic and mass transit. Full access to the site is crucial for both populating the site as well as bringing goods and services to and from the site. Therefore, planned development must exceed the pedestrian connection of the Master Plan and include a full road network on all levels of the thesis site.

The Master Plan can also be used to inform the thesis of appropriate site programming. The retention of civic and open space functions is important in order to keep the site a destination for major city festivals and events. Introducing high-density mixed use around these public spaces will also promote daily active use by

drawing people from the city center, across the urban highway, and to the waterfront.

Thus, the thesis should utilize the Master Plan for the Central Delaware as a valuable tool; however it should be a tool that is analyzed critically.

## Site Survey



**Figure 36 - Site Survey showing site boundary, building footprints and topography (source: Author)**

Figure 14 indicates the boundaries of the site in a dashed red line. Existing building footprints are shown on the site, as well as in the surrounding context of the city. Topographic contours are also present in Figure 36 in green, with each contour representing two feet. The I-95 right-of-way occupies most of the western half of the

site.

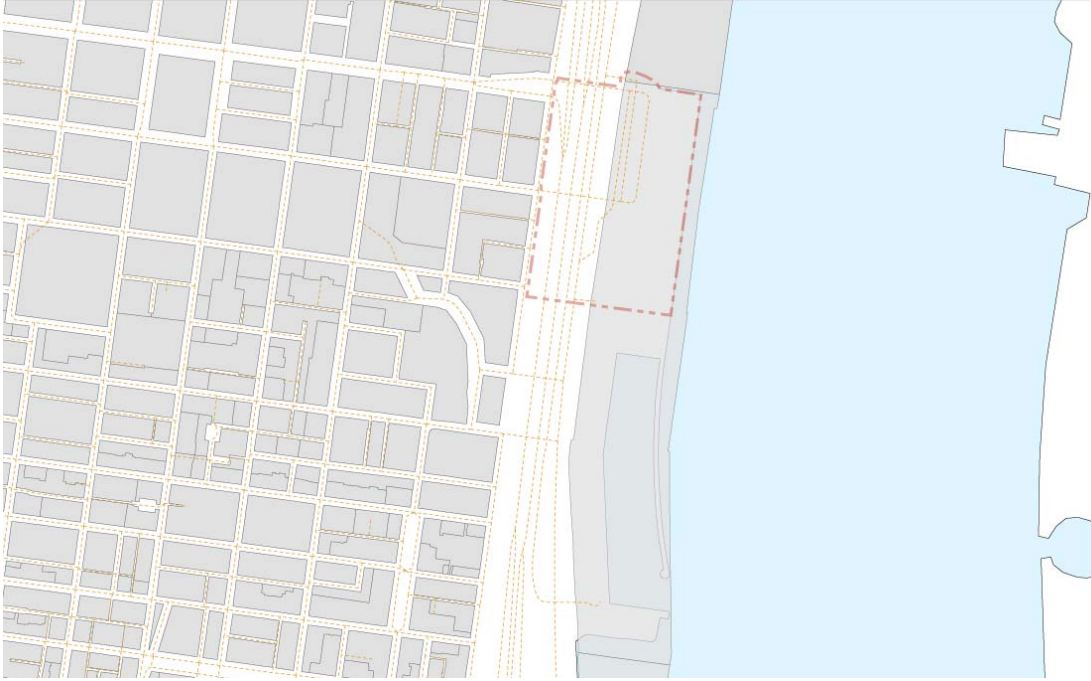


**Figure 37 - Site with major roads and land features (source: Google Earth with edits by author)**

Figure 15 highlights major features both on and around the site. Market Street and Walnut Street are not only site boundaries, but they are also means of access into the site. Chestnut Street and Dock Street are also important corridors leading to the site. In Figure 15, Penn's Landing can be seen with the existing development. Also, Independence Hall is located five blocks to the west of the site.

## Site Analysis

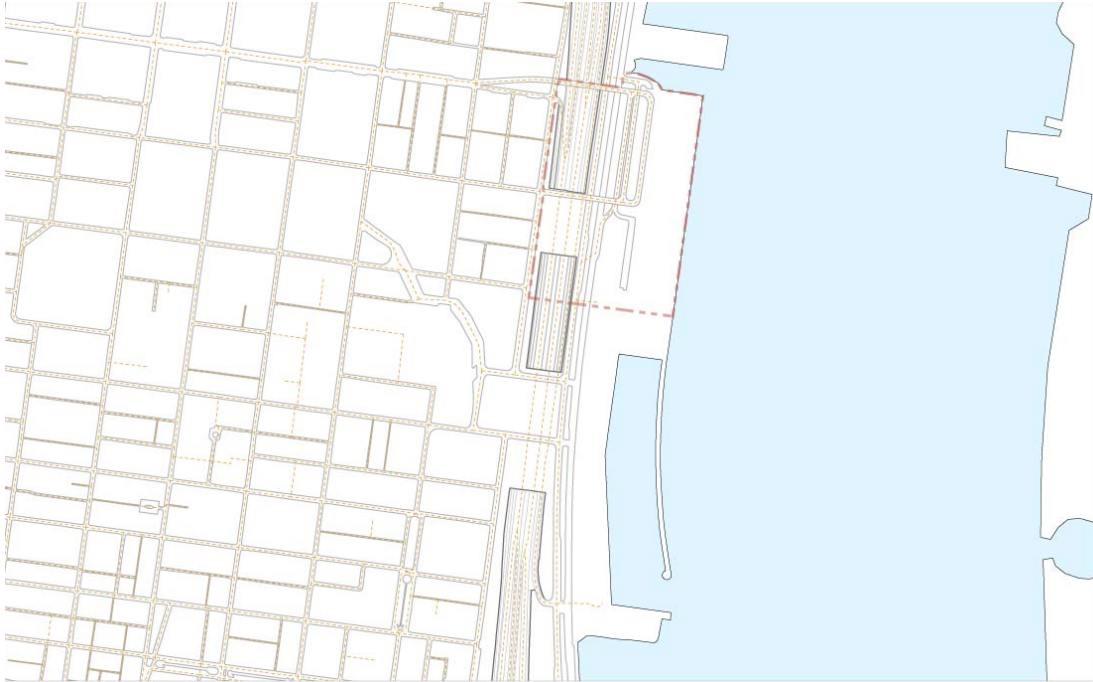
### Site Boundaries, Setbacks, Rights of Way



**Figure 38 - Street Rights of Way (source: Author)**

Figure 16 shows the contrast between the buildable plats (represented as gray fill) and street rights-of-way. Street centerlines are also visible in light dashed lines. The I-95 and Christopher Columbus Boulevard rights-of-way occupy approximately half of the site, which is evident within the dashed red site boundary. However, the air rights over I-95 should still be considered in development of the thesis.





**Figure 39 - Street Curb Cuts (source: Author)**

In Figure 17, streets are instead shown from curb to curb, as opposed to the right-of-way. Showing curb cuts reveal the makeup of the street networks on the site, such as medians and lane dividers. The existing decks that span I-95 can also be seen.

## Contour / Slope



**Figure 40 – Topography (source: Author)**

Figure 40 illustrates site topography and displays two foot contours. The slope and contour of the site is largely the result of human intervention. The waterfront side of the site is relatively flat due to the ground consisting of fill and pier structures. The highway is depressed down below grade, which results in the steep slopes and retaining walls on either side of the depression.





**Figure 41 – Historic street sections of Center City Philadelphia (source: David Rumsey Map Collection)**

Figure 41 is a study of street sections in historic Philadelphia. This study is critical to understanding the site slope because it reveals that the banks of the Delaware River rose up sharply to form a bluff. Much of the city was built upon this bluff. As a consequence of the city's location, east-west connections are negotiated in relation to significant transition in grade.

## Site Inventory

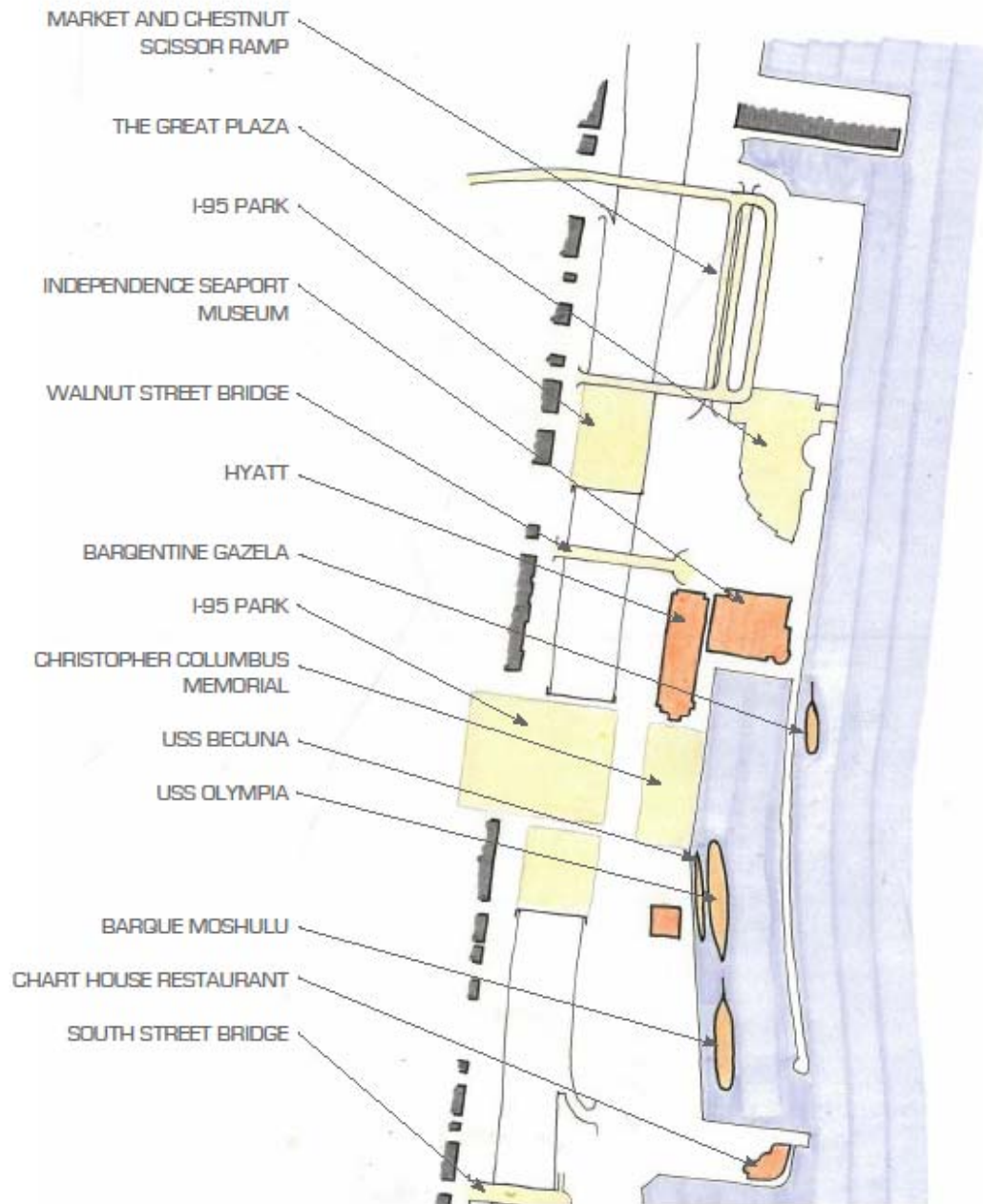


Figure 42 - Existing structures, infrastructure and vessels located on site (source: Author)

Figure 42 documents structures and ships that are currently located on the thesis site. The Market Street and Chestnut scissor ramp is an infrastructure that is currently used for pedestrian and vehicular traffic as an overpass of I-95 and then as a ramp to descend down to the level of Penn's Landing.

The Great Plaza is a 3.4 acre terraced park located along the Delaware waterfront. The Plaza is mostly constructed hardscape of brick and granite.<sup>12</sup> It acts as a stairway from the end of Chestnut Street down to the water's edge. It is currently used several times a year for large public gatherings such as concerts and fireworks displays.

The two I-95 parks are the only portions of the PennDOT Delaware Expressway Cover Plan. The northern park is bounded by Chestnut Street and Sansom Street. Its eastern edge is approximately twenty feet above Columbus Boulevard, giving this park no physical connection to the water. The southern park is bounded by Dock Street and Delancey Street. This park is larger and successfully links Society Hill with the water's edge. This location is currently the only area of the site that establishes a strong connection between the city and the water.

The Walnut Street Bridge and the South Street Bridge are both pedestrian only links across I-95. The Walnut Street Bridge also spans Columbus Boulevard and terminates in a stair that descends to Penn's Landing, whereas the South Street Bridge terminates short of Columbus Boulevard.

The four ships currently docked at the site serve a variety of functions. The *USS Becuna* and *USS Olympia* serve as museum ships belonging to the Independence Seaport Museum. However, the museum can no longer fund them and they are set to

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<sup>12</sup> Sexton, Sharon, ed., *The Plan for Center City*, Philadelphia: Consolidated/Drake Press, 1988, 134.

be moved to a different location by private interests.<sup>13</sup> The barque *Moshulu* is a restaurant ship and the barquentine *Gazela* is moored at Penn's Landing and operated by the Philadelphia Ship Preservation Guild.<sup>14</sup>

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<sup>13</sup> Delaware River Waterfront Corporation, "Master Plan for the Central Delaware: Transforming Philadelphia's Waterfront." (Master plan presented to the Philadelphia City Planning Commission, Philadelphia, PA, October 28, 2011), 49.

<sup>14</sup> McDevitt, John, "Tall Ship 'Gazela' Hosting Weeklong Art & Music Fest at Penn's Landing," CBS Philly, <http://philadelphia.cbslocal.com/2011/07/27/tall-ship-gazela-hosting-4-day-art-music-fest-at-penns-landing/> (accessed December 13, 2011).

## Buildable Areas / Non-Buildable Areas

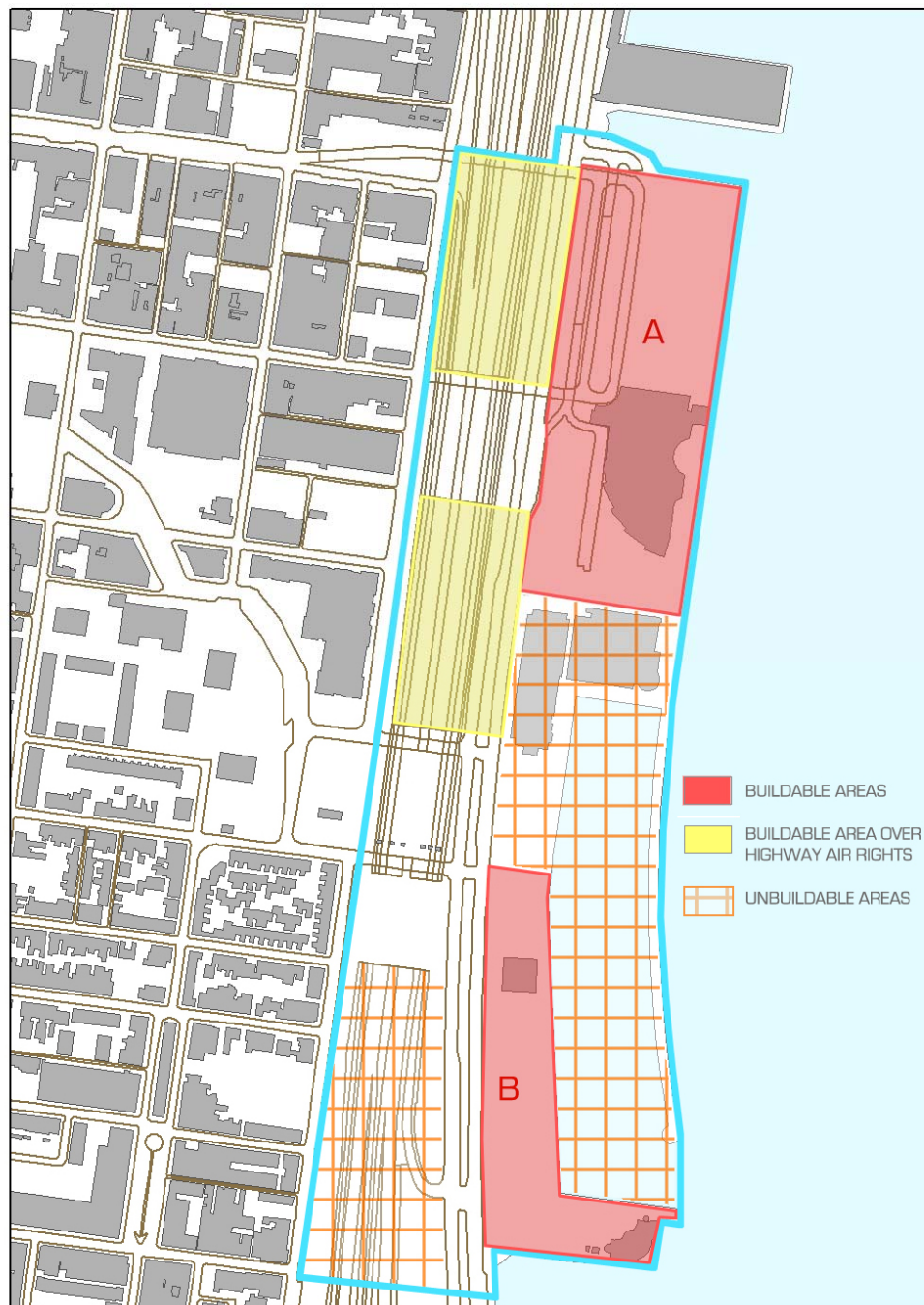


Figure 43 -Buildable and unbuildable areas (source: Author)

Buildable areas on the site are focused mainly on the eastern half of the site on the waterfront at Penn's Landing. These buildable areas are divided into two sections. The buildable area labeled, "A," begins at Market Street and ends at Walnut Street. Included in this buildable area are the scissors ramps of Market Street and Chestnut Street. This infrastructure will need to be reexamined and redesigned in accordance with development on the waterfront. Also included within the buildable area is the Great Plaza. Its form is not essential to the identity of the site, although its program as a civic venue should be considered in the program for the site.

The southern half of the buildable area, labeled "B," is on the waterfront between Spruce Street and South Street. The surface parking lots and two small restaurant buildings will be replaced with higher density development.

The air rights over I-95 should also be explored as options for buildable area, particularly the area between Market and Chestnut Streets and the undecked area between the two I-95 parks. A range of options should be studied, from remaining uncovered, to decked parks, to full building massing.

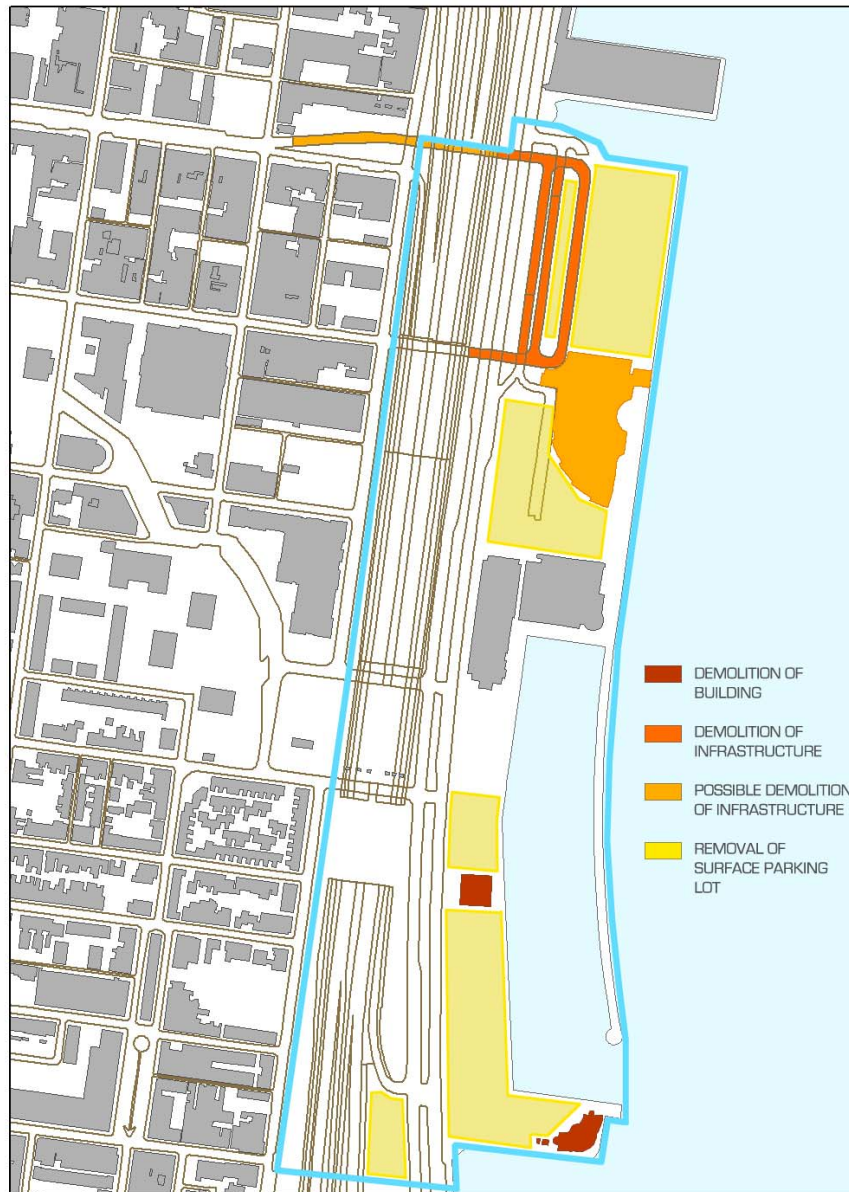
There are also several locations on the site that should be left untouched. These include the Independence Seaport Museum lot, The Hyatt Regency parcel, the Christopher Columbus memorial at the terminus of Dock Street, the southern areas of I-95 and the wharf area.

This thesis will explore development in buildable area "A," as well as the air rights over I-95 between Chestnut Street and Walnut Street. These areas present the greatest potential for reconnecting the Penn's Landing waterfront area with the fabric of Center City Philadelphia through the implementation of extensive site

programming and incorporation of open space and transportation networks.

Buildable area “B” will assume the programming suggested by the Master Plan for the Central Delaware, which is medium density residential and retail.

## Demolition Plan



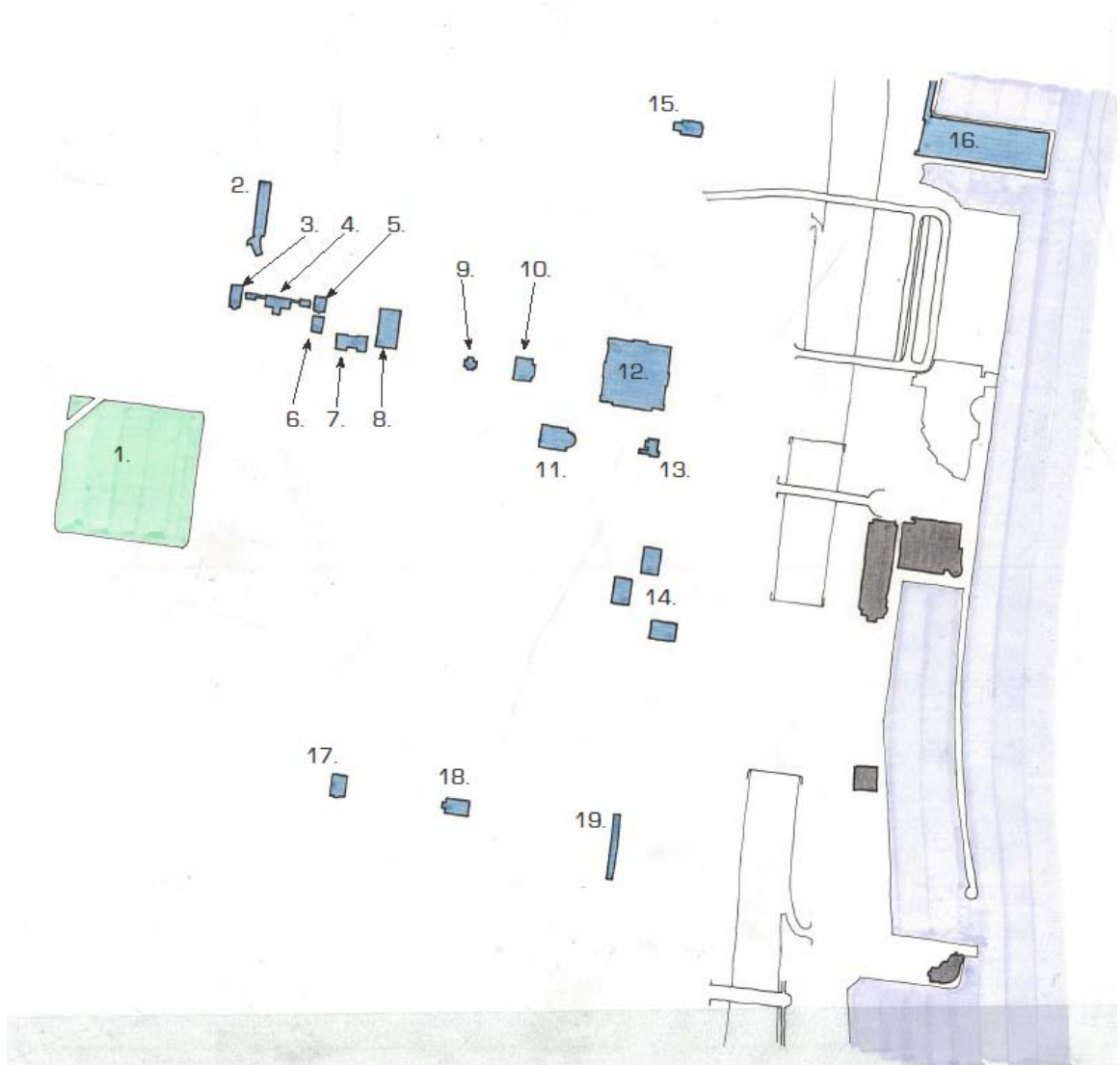
**Figure 44 - Diagram indicating proposed demolition of existing site elements (source: Author)**

There are several different existing components located on the site that could be removed in order to create development sites. The existing one and two story



buildings on the southernmost pier and across from Spruce Street would have to be demolished in order to facilitate higher density development in those areas as recommended by the Master Plan for the Central Delaware. The Great Plaza amphitheater structure would also be removed although its purpose as a civic gathering space should be retained in the thesis. While the scissors ramps at the ends of Market and Chestnut Streets provide vehicular and pedestrian access to the site, they should be removed in order to allow for more buildable area on the waterfront side of the site, with accommodations for continued traffic and mass transit requirements absorbed by the thesis program. Finally, all surface parking lots will be removed to be incorporated into higher density mixed use development that can support integrated structured parking.

## Historical Structures / Artifacts



**Figure 45 - Historic Structures in the vicinity of the I-95 corridor (source: Author)**

There is a concentrated grouping of historic structures to the west of the thesis site. This grouping forms a historic corridor from Sixth Street to the western edge of the site at Front Street, as well as from Chestnut Street to Dock Street. The buildings along this corridor are primarily eighteenth century buildings that have significant

impact on the development of the United States. This corridor includes items labeled in Figure 45:

1. Washington Square – one of the five public squares as laid out by William Penn in his original plan for the city.
2. Liberty Bell Center – pavilion opened in 2003 and houses the Liberty Bell.
3. Congress Hall – Congress Hall was constructed in 1789 as the county courthouse but a year later it began service as the first meeting place of the United States Congress. It is located just to the west of Independence Hall.
4. Independence Hall
5. Supreme Court Building – The building was completed in 1791 as Philadelphia City Hall, but when Philadelphia became the nation's capital, it was offered as the seat of the Supreme Court. It resumed its role as city hall after the Federal Government moved to Washington, D.C. in 1800. When the city government moved to the current location, this building became a museum.
6. Philosophical Hall – The building was completed in 1789 as the home for the American Philosophical Society and is still owned by the Society today.
7. Library Hall
8. The Second Bank of the United States – Greek Revival building completed in 1824.
9. Carpenter's Hall – The Hall was completed in 1771 and is home to the oldest builders' organization in the United States.
10. First Bank of the United States – The Bank was the first true commercial bank in the United States. The building was completed in 1797.<sup>15</sup>
11. Merchant Exchange
12. U.S. Customs Building
13. City Tavern

The Society Hill Towers (14.) are a modern apartment complex by I.M. Pei.

They provide a terminus for the axis that passes through the I-95 park and through to the Christopher Columbus Memorial.

Christ Church, St. Peter's and St. Paul's (15, 17 and 18, respectively), are three historic churches dating to the eighteenth century within a five minute walking distance from the site.

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<sup>15</sup> Riley, Edward M., et al, *Historic Philadelphia*, Edited by Luther P. Eisenhart, Philadelphia: American Philosophical Society, 1965, 27-147.

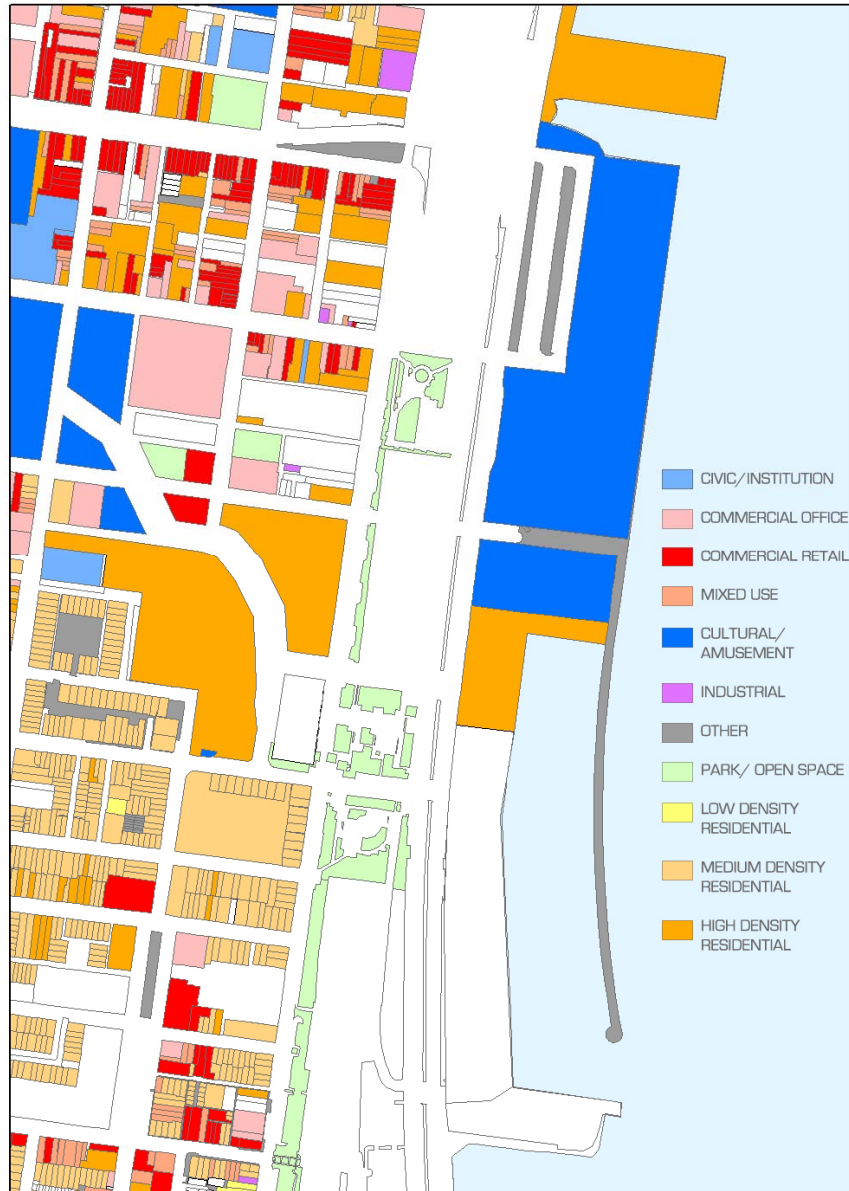
Pier 3 and Pier 5 (key 16), are two converted Art Deco warehouses from the 1930's located just to the north of the site that now serve as condominiums.<sup>16</sup>

The thesis site is surrounded by a number of historic structures that draw a great amount of pedestrian traffic. In order for the thesis to reestablish connectivity to the I-95 site, connections should be made to the history of the city.

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<sup>16</sup> Harry Kyriakodis, *Philadelphia's Lost Waterfront* (Charleston: The History Press, 2011), 73.

## Urban Context



**Figure 46 -Urban context and land use (source: Author)**

All of the city development and urban fabric is located to the west of the site on the other side of the I-95 trench. The urban context along this city edge gradually

changes as one moves from north to south along Front Street. Building uses along the Market Street corridor are largely commercial retail and consumer based functions. Chestnut and Walnut Streets have a larger diversity of building uses, with an equal distribution of large scale mixed use and commercial office buildings. There is also a defined path of cultural use buildings leading westward towards Independence Mall. The city fabric between Walnut and Spruce Street is comprised of high density residential towers and apartment blocks. Density lowers moving south towards South Street, and medium to low density residential becomes prevalent, with row houses being the dominant building type. Finally, South Street is another corridor made up of in-line retail.



**Figure 47 - Site Figure-Ground (source: Author)**

The urban street and block structure is easily identifiable west of I-95, while this type of order is largely nonexistent in the primary site area. The streets and

blocks can be seen as a clear edge by the wall of building facades along Front Street.

This city grid then continues uninterrupted westward to the Schuylkill River.

## Zoning/FAR



**Figure 48 - Zoning Map (source: Author)**

The eastern half of the site, Penn's Landing, is zoned C-4, which has no setback requirements, provided development is greater than four stories or is not

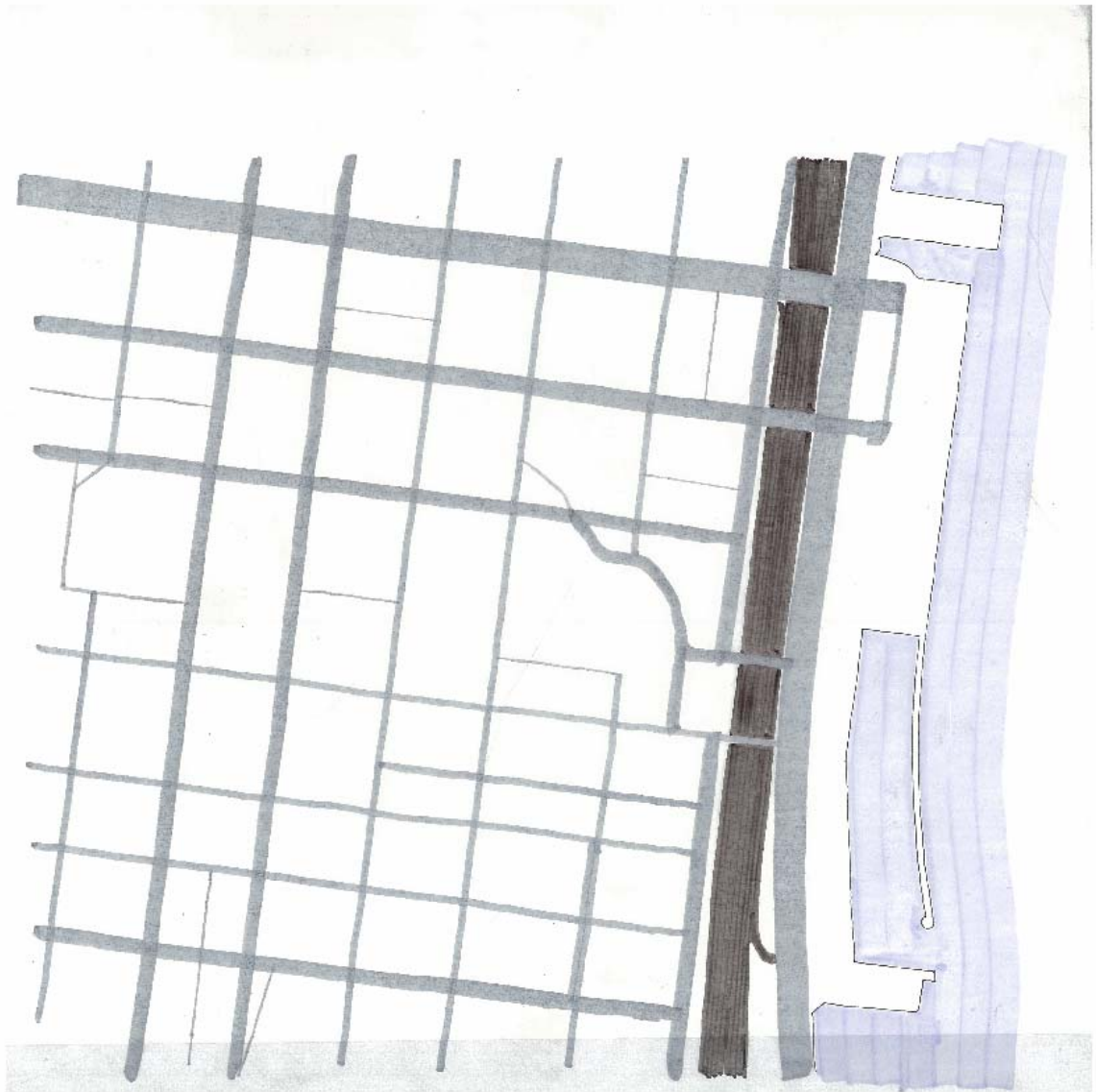


single family residences.<sup>17</sup> The C-4 zone is described as the type of use that should be found in a high-density business core. The zoning code also states that development in this zone should promote atmospheres of active sidewalks and lively public spaces. The Floor Area Ratio in the C-4 zone is 5.0 for the base zoning; however if all bonuses are awarded, the FAR can be increased to 8.0. Complete regulations regarding the C-4 zone can be seen in Appendix 1. The thesis site is comprised of 12 acres within this zone; therefore, a total of 2,600,000 square feet of floor area is allowed on the site according to the C-4 zone.

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<sup>17</sup> Frederic D. Garman et al., "Title 14. Zoning and Planning," in *The Philadelphia Code*, (Cincinnati: American Legal Publishing Corp., 2011), 305.

## Street Hierarchy



**Figure 49 - Grid network of streets and street hierarchy (source: Author)**

Figure 49 illustrates the hierarchy of streets in Center City Philadelphia. I-95 dominates the diagram as a north-south corridor, with Christopher Columbus Boulevard acting as another prominent corridor just to the east of the highway.

Market Street is one of the two main streets from William Penn's 1682 plan, and is therefore a primary corridor running east-west.

## Site Access



**Figure 50 - Pedestrian Site Access (source: Author)**

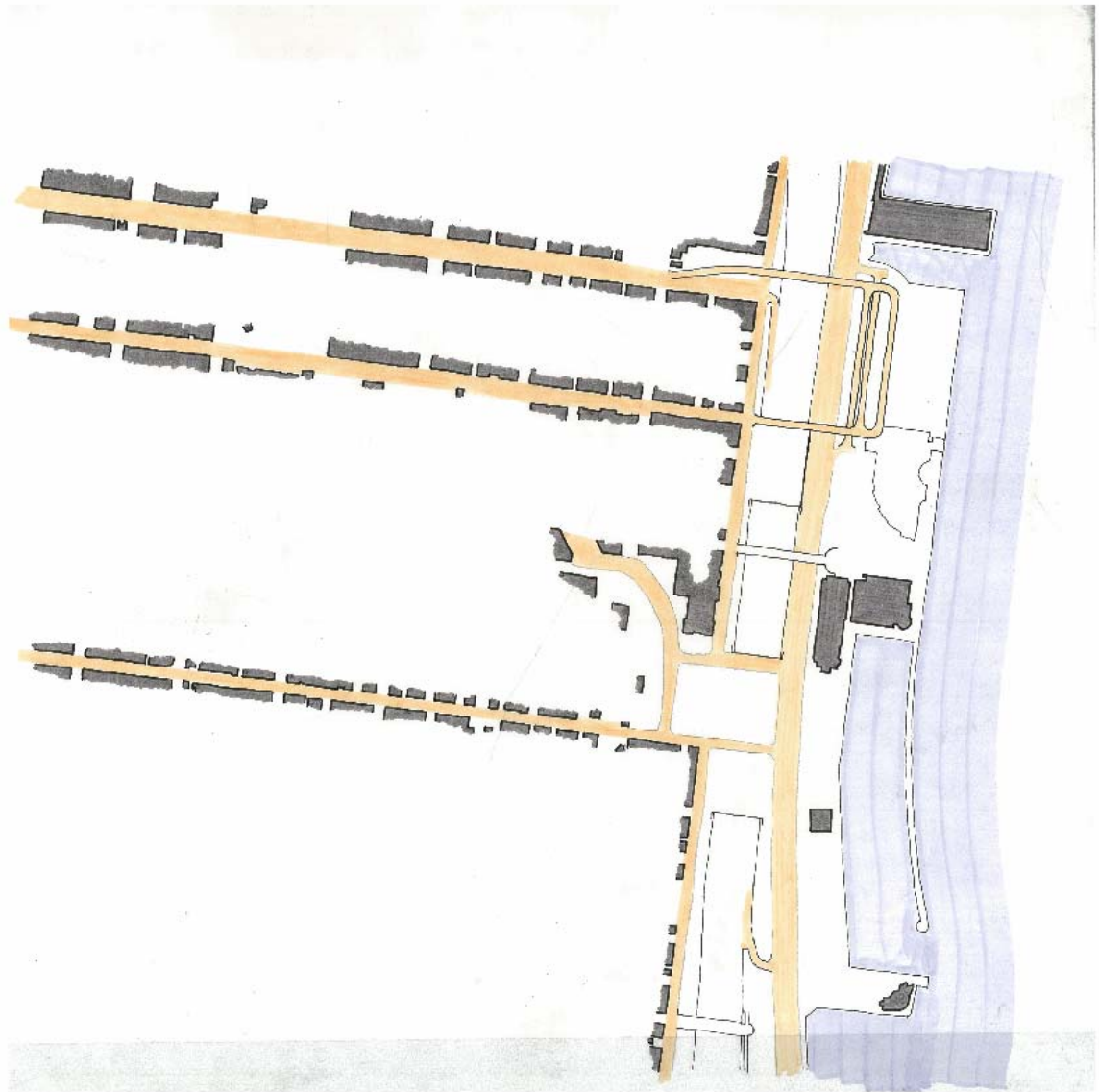
The continuation of many east-west streets provides pedestrian access to the site. Although I-95 interrupts the city grid, a number of pedestrian bridges allow pedestrian flow to continue over to Penn's Landing. The scissor ramp at Market and Chestnut Streets allows both pedestrian and vehicular access to the site, although the

ramp's effectiveness as a connection between the city and the river is limited, as there is nothing to engage pedestrians as they cross the expansive highway below.

Walnut Street also provides pedestrian access to the site. A pedestrian bridge crosses over I-95 and Columbus Boulevard and then leads to a stair that brings one down to the waterfront level by the Independence Seaport Museum.

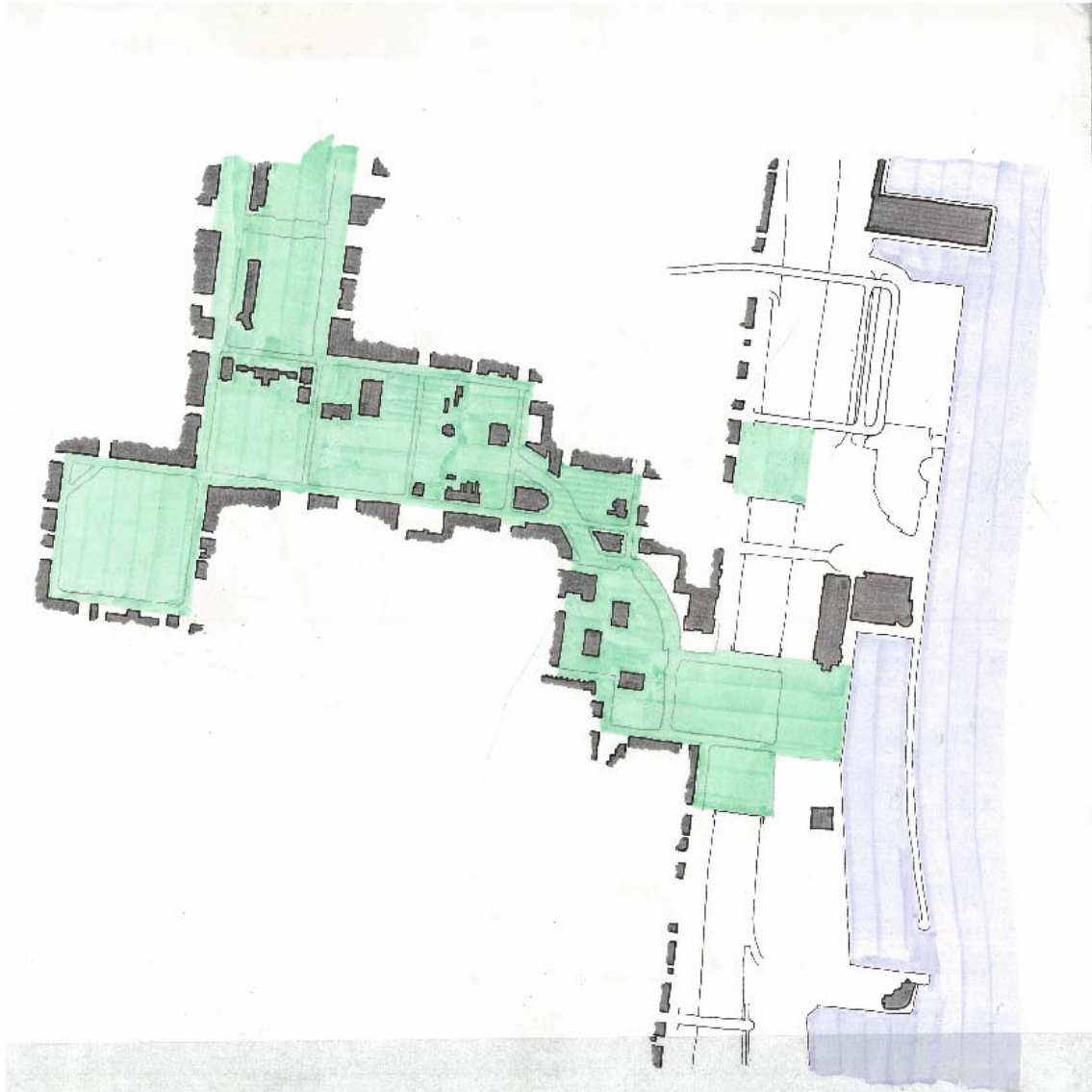
The pedestrian access at Dock Street and Spruce Street is unique among all other pedestrian connections, as pedestrian movement from the city to the waterfront occurs at the waterfront grade. The procession begins at Society Hill Towers, over a depressed section of I-95 at the decked park, across Columbus Boulevard and to the waterfront.

Overall, the diagram shows that pedestrian access to the site is much stronger on the northern half of the site.



**Figure 51 - Vehicular Site Access (source: Author)**

When compared to pedestrian site access, vehicular access to the site is even more restricted. Again, the scissor ramp infrastructure provides access from the city down to the waterfront at Market and Chestnut. Spruce Street also serves as an access corridor to the site. Columbus Boulevard serves as the major north-south route for traffic to and from the site.

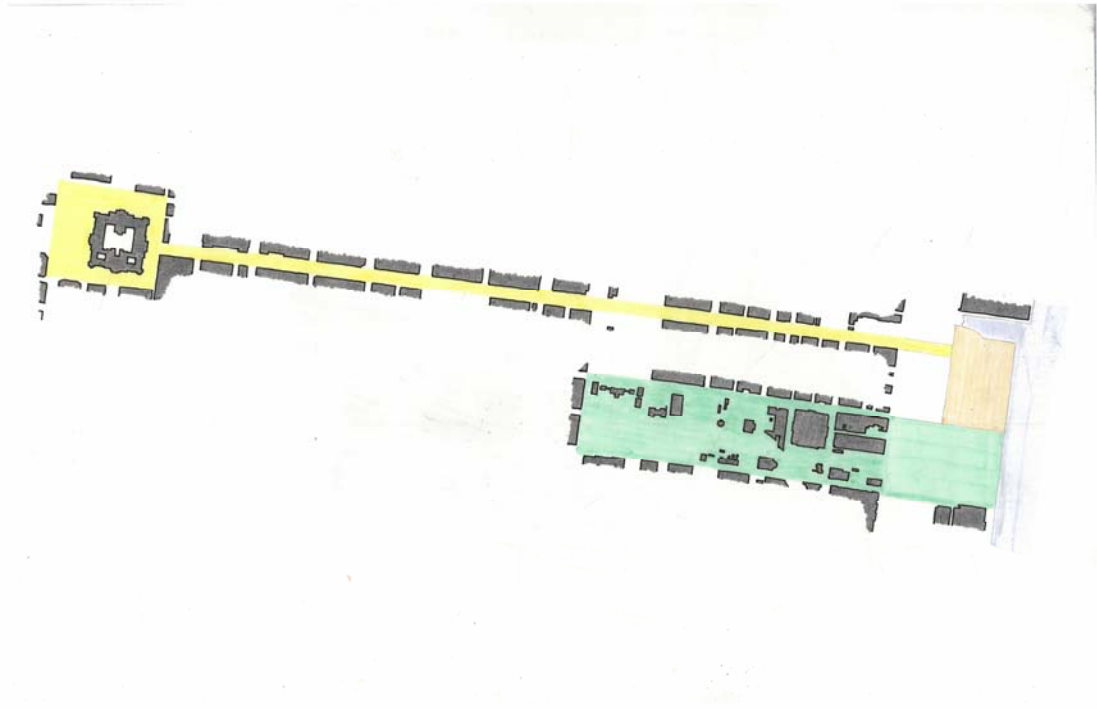


**Figure 52 - Open Space Network (source: Author)**

Figure 52 shows the open space network that exists near the site. The thesis should seek to strengthen this network of open space and comprehensibly bring that connection to the waterfront. An east-west corridor of open space can provide a strong pedestrian connection from Independence Mall all the way down to the waterfront at Penn's Landing.

## Conceptual Analysis

### Connection Diagram



**Figure 53 - Diagram expressing extension of Market Street corridor and open space historic corridor to the waterfront (source: Author)**

The diagram in Figure 53 is designed to bring focus and clarity to the previous access diagrams in Figures 50-52. The first means of connection that will be reestablished between the waterfront and the city is at Market Street. Market Street is one of the two main streets in Philadelphia and the primary east-west axis of the city. Currently the eastern end of Market Street ends unceremoniously by splitting into an onramp to I-95 and offsetting to the north to become the viaduct to Penn's Landing. The thesis intends to extend Market Street to the waterfront and terminate with

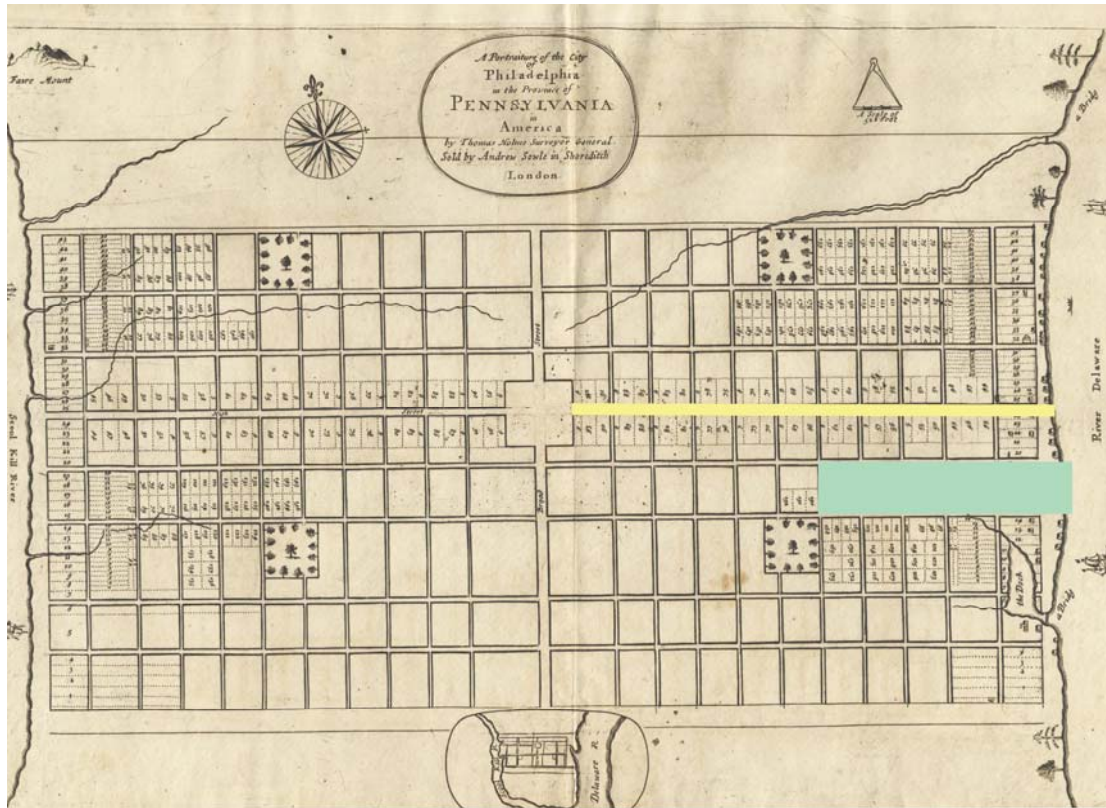


purpose at the waterfront development site, thus marking the edge of the city and giving the eastern terminus of Market Street purpose.

The second major connection that the diagram proposes is a continuous green network that extends from Independence Hall to the waterfront. The current network of green spaces begins at Independence Hall but it staggers down to Society Hill. The thesis will refocus this green network as a corridor that runs continuously from Independence Hall to the river's edge in a one block wide area between Chestnut Street and Walnut Street. The thesis site at Penn's Landing will reinforce this concept by the presence of a public park that will span I-95 and directly connect Old City Philadelphia to the river's edge. This green corridor will also serve as a historic network, as many historic structures dating to the 18<sup>th</sup> century will be preserved as object buildings within this green network.

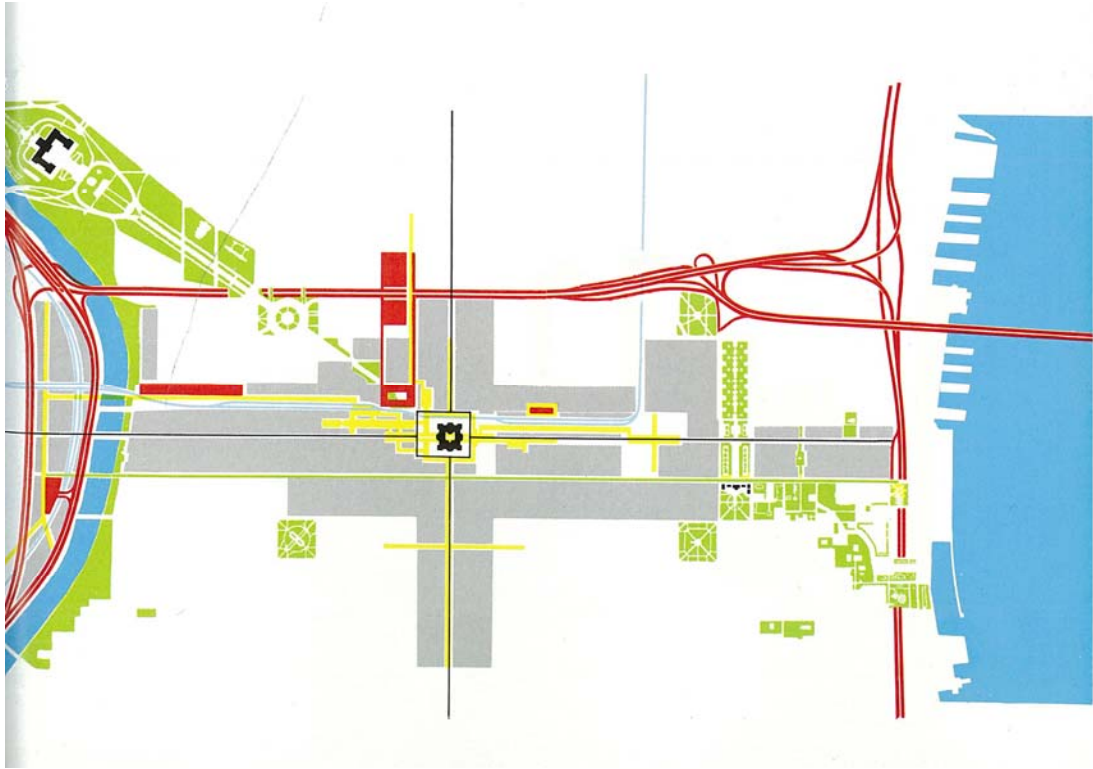
Refocusing these two corridors will command a strong presence within Center City Philadelphia and they will act as armatures that will reconnect the city to the waterfront.

The diagram can also be applied to several historic plans of the City of Philadelphia. First, the Market Street corridor fits into William Penn's 1682 plan of Philadelphia as one of the two main axes of the city. The green corridor is also able to fit within the gridded network of streets as seen in Figure 54.

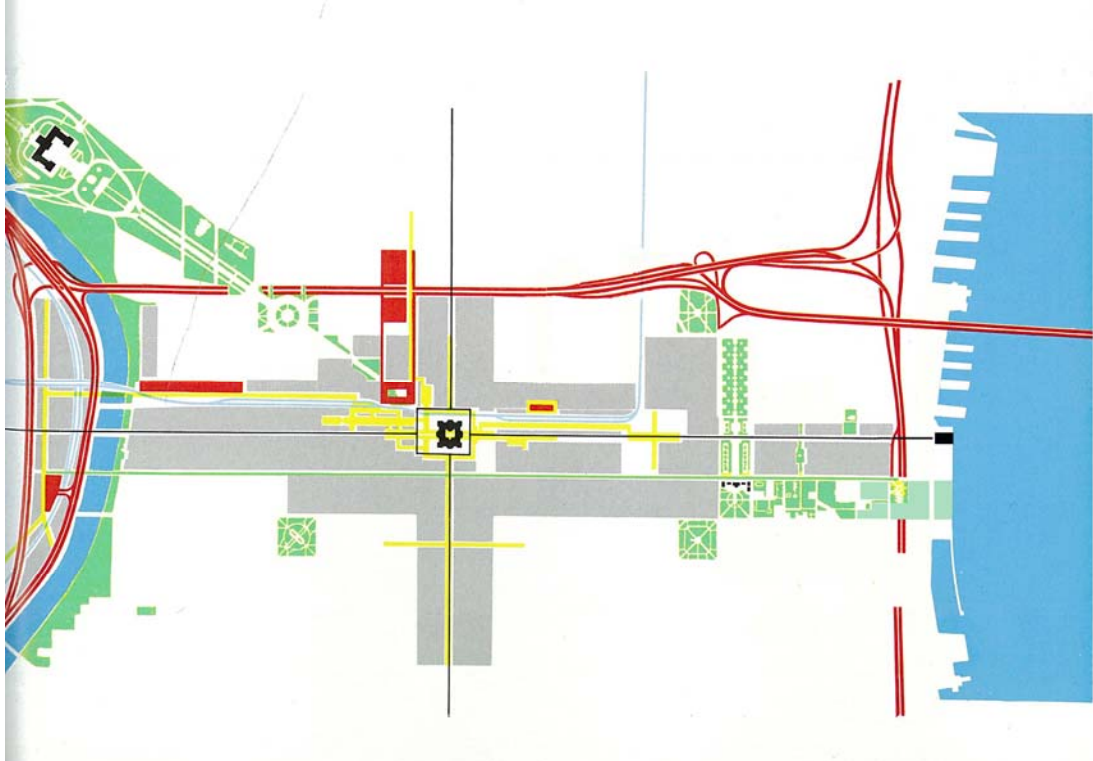


**Figure 54 - 1682 plan of Philadelphia overlaid with corridor diagram (source: David Rumsey Map Collection, author's overlay)**

The diagram can also be adapted into Edmund Bacon's plan for Center City Philadelphia. As seen in Figure 55, Bacon proposes a network of parks and green spaces around Independence Hall and other historic structures. However, these spaces are not able to continue this open space to the waterfront. In Figure 56, the thesis is accommodated in Bacon's city plan by establishing a clear and direct connection to the river.



**Figure 55 - Edmund Bacon diagram of Center City Philadelphia (source: Edmund Bacon, *Design of Cities*)**



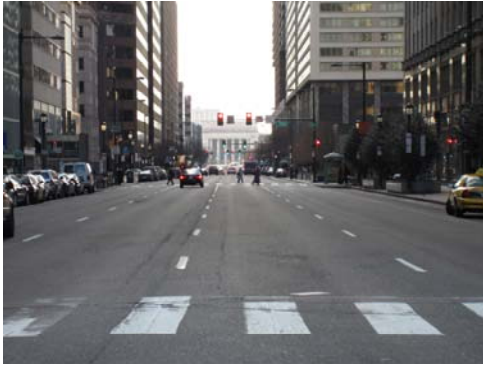
**Figure 56 - Edmund Bacon diagram of Center City with thesis design principles incorporated (source: Edmund Bacon, *Design of Cities*, edits by author)**

## Visual Axes

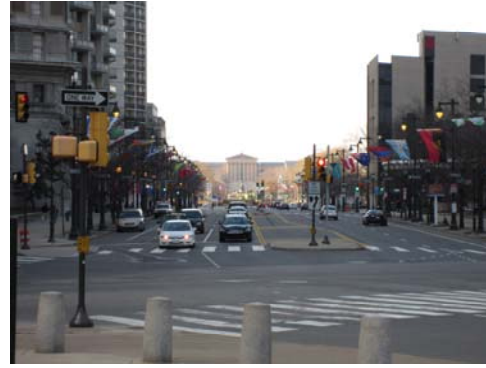


**Figure 57 - major axial streets of Center City Philadelphia and terminal landmark structures**  
(source: Author)

Center City Philadelphia contains a number of streets radiating from its center – City Hall – that terminate in landmark structures. These streets act as axes that transfer activity from the center of the city to the edge and vice versa. The landmark structures at the ends of these streets serve as markers for the edge of the city. Two structures that currently serve this function are 30<sup>th</sup> Street Station, located at the end of John F. Kennedy Boulevard, and the Philadelphia Museum of Art, located at the end of Benjamin Franklin Parkway, seen in Figures 58 and 59.

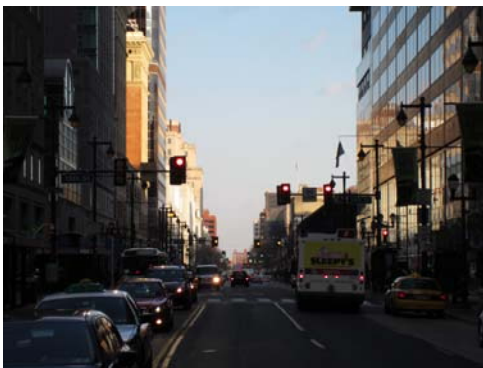


**Figure 58 - 30<sup>th</sup> Street Station (source: Author)**



**Figure 59 - Philadelphia Museum of Art (source: Author)**

The thesis site presents an opportunity to build upon the diagram of axial streets with a terminus marking the edge of the city. Currently, the view corridor of Market Street extends beyond the city, over the Delaware River and into Camden, New Jersey. The thesis can clarify the edge of the city by proposing a landmark building that is placed on axis with the end of Market Street. The purpose will be twofold: The thesis site will clearly define the city limits and its strong presence at the end of the Market Street corridor will help to visually draw activity down to the waterfront.



**Figure 60 - Existing Market Street condition - amorphous termination (source: Author)**



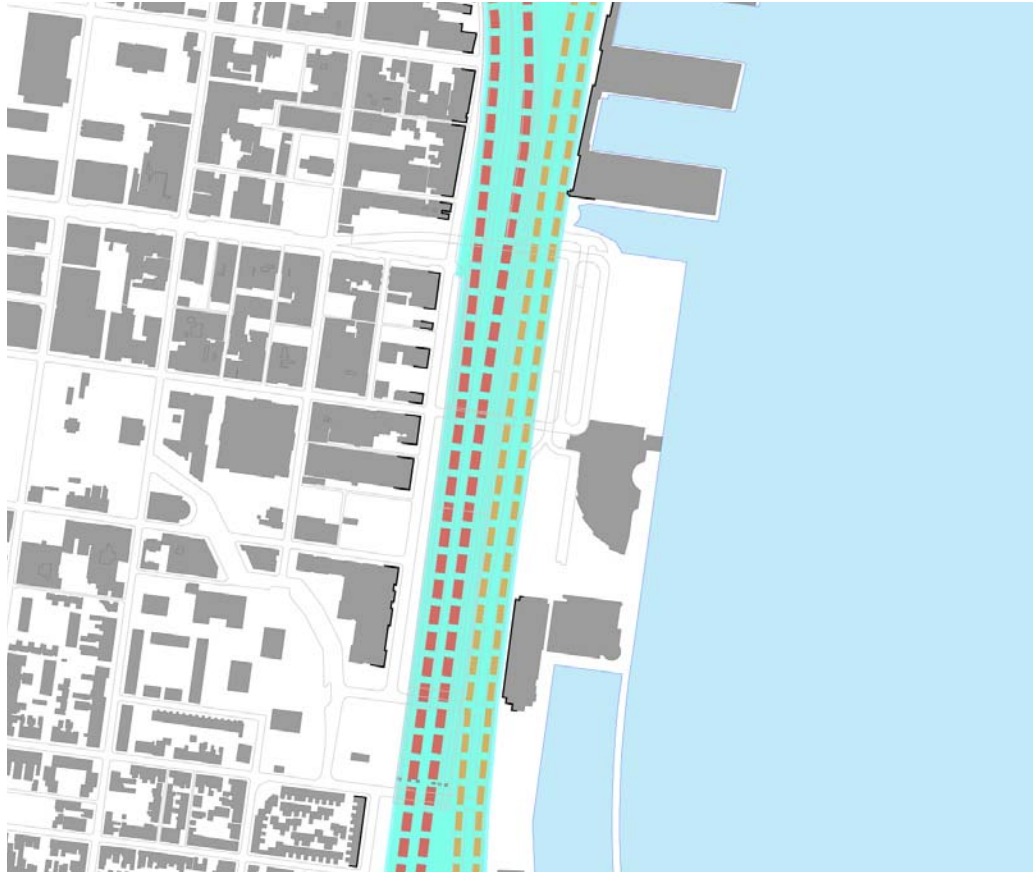
**Figure 61 - Market Street with thesis intervention - defined terminus (source: Author)**





**Figure 62 - Visual corridors including thesis intervention at eastern terminus of Market Street**  
(source: Author)

## River of Cars



**Figure 63 - I-95 corridor and isolation of Penn's Landing (source: Author)**

As previously mentioned, throughout the history of Philadelphia, the edge of the Delaware River has encroached outward towards the center of the river until it reached its current location about 700 feet farther east from the original river bank. The Delaware Riverfront was historically an active shipping area and contained extensive networks of warehouses and transportation systems. As these systems became obsolete and shipping facilities moved to larger and more modern locations in South Philadelphia, much of the waterfront became derelict. The I-95 corridor utilized these abandoned zones as a path of least resistance to run through the city, and in doing so, severed the outermost areas of the waterfront from the city.

Ironically, the western edge of the I-95 corridor actually occupies the same edge as the original river bank of the city. Now, a river of cars runs along the edge of the city and the Penn's Landing thesis site is like an island, with the Delaware River to the east and a river of cars to the west. With the 19<sup>th</sup> century connections back to the city destroyed, the Penn's Landing site should be treated as an island, containing its own identity as a city within a city. New strategic connections should be made back to the city, creating bridges which carry across corridors of people and activity. Application of the Market Street and green corridor diagram will achieve this necessary relinking.



## Precedent Analysis

### **Olympic Sculpture Park**

Location – Seattle, Washington

Architects – Weiss/Manfredi

Program – Sculpture Park, walking trail, structured parking, arts, performance and educational pavilion, outdoor amphitheater

Size – 8.5 acres

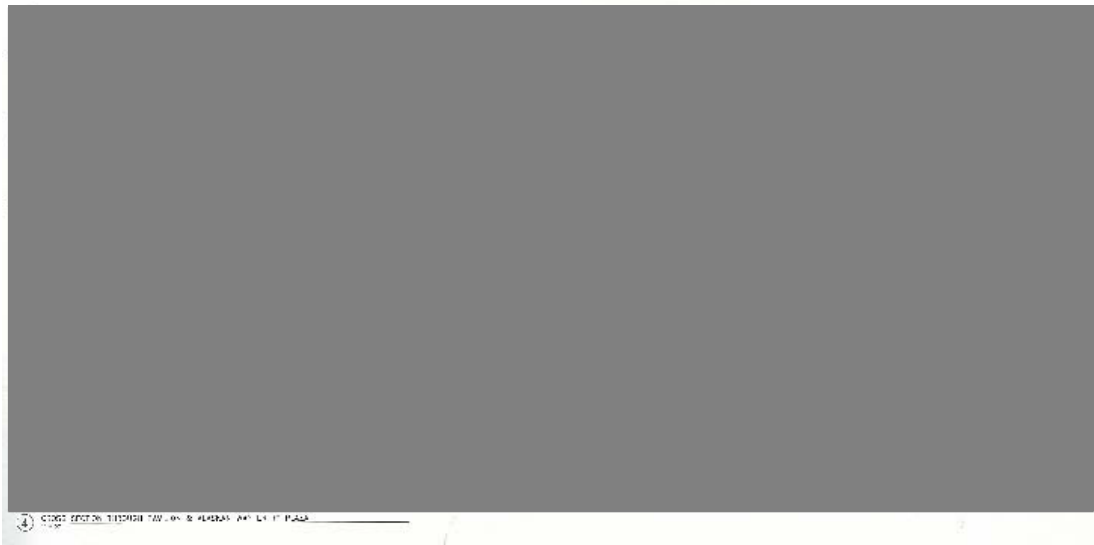
Completed – 2007

Seattle, like many post-industrial cities, has been separated from its waterfront by transportation infrastructure. Olympic Sculpture Park is a project that reestablishes the connection between downtown Seattle and the Ellicott Bay waterfront. Prior to construction, the site was an abandoned industrial site that was divided into three disjointed segments by a four lane roadway and freight railroad tracks. Another design challenge was a forty foot grade change from the city level down to the water's edge.



**Figure 64 - Aerial view of Olympic Sculpture Park (source: Manfredi and Weiss, 2008, 21)**

Weiss/Manfredi was able to solve the problems of existing infrastructure and significant grade change by introducing a landscape with a series of switchbacks.



**Figure 65 - Site Sections (source: Manfredi and Weiss, 2008, 21)**

These switchbacks are able to link the three segments of the site with two landscaped bridge structures that span the road and the train tracks. The grade change is accommodated in the switchbacks, which act as a series of ramps, thus allowing for continuous connectivity from the city down to the waterfront.<sup>18</sup>

The Olympic Sculpture Park provides a strong example of how landscape and capturing of views can give clear connection to a once disconnected urban waterfront. Another noteworthy aspect of the design is how it treats the forty foot grade change as an amenity, not a liability. The upper levels of the park are able to conceal structured parking requirements. Low level roadways and upper walkways are joined by sloped lawns that function as public amphitheaters. Finally, the project places strong emphasis on views. Each leg of the path was carefully directed to highlight an iconic view of Seattle and the surrounding area.

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<sup>18</sup> Manfredi, Michael A., and Marion Weiss, *Weiss/Manfredi: Surface/Subsurface*, New York: Princeton Architectural Press, 2008, 20-21.

### **Special South Street Seaport District**

Location – New York, New York

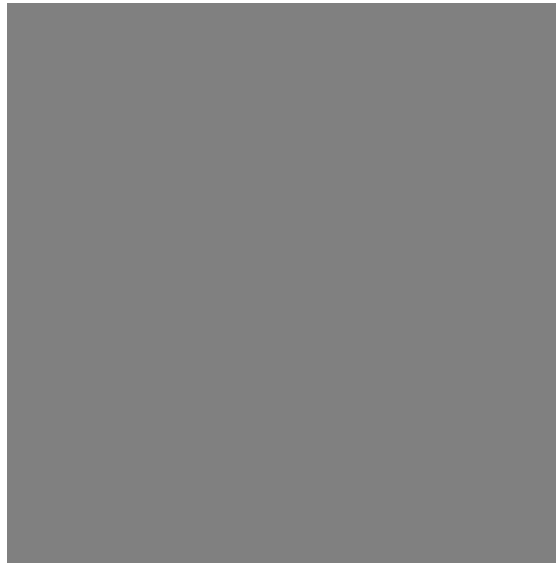
Architects – multiple

Program – museum, retail

Size – 3.5 acres

Completed – varies

The South Street Seaport District is bounded by John Street to the south, Peck Slip to the north, Water Street to the west and the East River. Within the bounds of the site are several blocks of preserved nineteenth century warehouses and shops. The docks along the East River house the Fulton Fish Market, the Seaport Mall, and the Seaport Museum, including several museum ships docked there. The old buildings and warehouses in the district used to be heavily dependent on the docks on the East River; however, construction of the elevated East River Drive caused the docks to be isolated from the city.<sup>19</sup>



**Figure 66 - South Street Seaport (source: Rosebrock, 1977, 25)**

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<sup>19</sup> Rosebrock, Ellen Fletcher, *South Street: A Photographic Guide to New York City's Historic Seaport*, Toronto: General Publishing Company, Ltd., 1977, 24.

In order to restore activity to the South Street Seaport, plans were developed in the 1960's to make the area a "living museum." These plans included renovating many of the old buildings to serve as shops that could demonstrate various trades as they were practiced in the nineteenth century. The construction of the Seaport Museum on one of the piers also began to reintroduce activity on the other side of East River Drive. Local businesses, such as the Fulton Fish Market, also generated movement along the river. Finally, in the 1980's, new plans introduced a pedestrian walkway along Fulton Street and a shopping pavilion on Pier 17.<sup>20</sup> These developments along the docks have generated active use of the South Street Seaport for locals and tourists alike. So, even though East River Drive still exists as a physical presence in the district, it is no longer a barrier. The South Street Seaport District is now unified due to planning that unified both sides of the highway programmatically and injecting pedestrian-friendly promenades and retail corridors into the area.

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<sup>20</sup> Skowron, Shane, "Restoration: 1960 to Present," Fordham University: The Jesuit University of New York, [http://www.fordham.edu/academics/colleges\\_\\_graduate\\_s/undergraduate\\_colleg/fordham\\_college\\_at\\_1/special\\_programs/honors\\_program/seaportproject/rest/index.html#plan](http://www.fordham.edu/academics/colleges__graduate_s/undergraduate_colleg/fordham_college_at_1/special_programs/honors_program/seaportproject/rest/index.html#plan) (accessed December 5, 2011).

## **Yokohama International Passenger Terminal**

Location – Yokohama, Japan

Architects – Foreign Office Architects

Program – ship terminal, customs and immigration offices, retail, conference areas, parking

Size – 13.5 acres



**Figure 67 - Passenger Terminal Observation Deck (Arcspace)**

The Yokohama International Passenger Terminal is the newest facility built on a site that has accommodated passenger travel for more than 150 years. It is designed to handle traffic from the largest passenger ships in the world and it acts as a gateway to the city of Yokohama to thousands of people a day. However, the Port of Yokohama did not want the new terminal to be solely for tourists. They wanted the terminal to supply a variety of civic and public uses for the locals to take advantage of

as well.<sup>21</sup> The design of the passenger terminal is able to welcome both locals and foreigners. Passenger ships are able to dock alongside the structure, which rises two stories at the water's edge so that visitors can be immediately met with open, conditioned space. As locals approach the terminal, they are greeted with a series of undulating plazas and lawns that take them from the street level, up onto the roof level observation deck and then back down again into the shopping level of the terminal. The project has been described as "the best place in Yokohama for walking."<sup>22</sup> The large ships that are constantly embarking and disembarking also draw interest from many locals. Thus, the constant mingling of visitors and locals at the terminal make the waterfront site full of activity.

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<sup>21</sup> ArcSpace, "Foreign Office Architects: Yokohama International Port Terminal," ArcSpace.com, [http://www.arcspace.com/architects/foreign\\_office/yokohama/yokohama\\_index.html](http://www.arcspace.com/architects/foreign_office/yokohama/yokohama_index.html) (accessed December 14, 2011).

<sup>22</sup> Arita, Eriko, "City's New Gateway to Worlds Apart," *The Japan Times*, May 24, 2009, Life in Japan section.

## Rockefeller Center

Location – New York, New York

Architect – Raymond Hood

Program – retail, office, residential, performing arts center, civic plaza

Size – 22 acres



**Figure 68 - Site plan of Rockefeller Center (source: Rem Koolhaas, *Delirious New York*)**

Rockefeller Center can be seen as the first “city within the city.” It is a unified assemblage of mixed use buildings that act together as one cohesive manifestation. The overall complex is able to act as a series of layers that allow for



active use on a number of different levels. Rockefeller Center is able to introduce light, air and views into the site through strategic placement of building mass.<sup>23</sup> Another quality that makes Rockefeller Center such a hub of activity is the concept of hybrid buildings. Many of the individual buildings seamlessly encompass a number of programs, thus allowing them to stay active at all times. Additionally, Rockefeller Center makes use of many levels of roof gardens to provide elevated areas for recreation and viewing the city, as well as to unify the assembly of buildings.<sup>24</sup> The thesis should embody the dynamic spaces of Rockefeller Center in its programmed space. The use of hybrid buildings would allow for a variety of mixed uses within a limited space. A scale comparison in Figure 69 between Rockefeller Center and the Master Plan for the Central Delaware serves to realize the full buildout potential of the thesis site.



**Figure 69 - Master Plan for the Central Delaware building massing compared to Rockefeller Center (source: Delaware River Riverfront Corporation, Google Earth)**

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<sup>23</sup> Koolhaas, Rem, *Delirious New York*, New York: The Montacelli Press, 1994, 204.

<sup>24</sup> Koolhaas, Rem, *Delirious New York*, New York: The Montacelli Press, 1994, 204-205.

## Design Conclusions

This thesis reveals how it is possible to reconnect a waterfront that has been isolated by major regional infrastructure back to an urban environment. The thesis is able to reestablish this connection between city and waterfront through the implementation of three main design concepts. First, application of the Market Street corridor and the green space network to the thesis design is critical to creating a clear concept for the location of park space and building massing. Also, making the thesis design a terminus for Market Street will establish the waterfront as the edge of the city and provide a landmark to which activity will be drawn. Finally, recognizing the Penn's Landing site as an island located between the Delaware River and the river of cars, I-95, gives the thesis its own unique identity within the city and ensures that the thesis relates to both the water and the city.

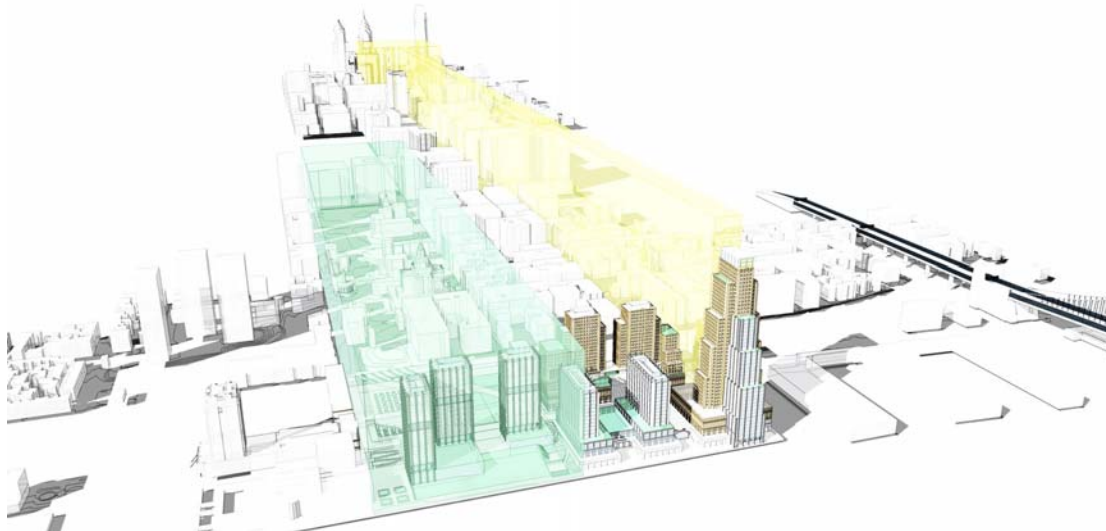


**Figure 70 - Area Plan (source: Google Earth, author's overlay)**

The area plan, shown in Figure 70 above, begins to explain the incorporation of the Market Street corridor and green corridor diagram into the thesis design. Market Street is extended to the east into the thesis via a vehicular and pedestrian bridge that is placed on axis with the street. This allows for a direct path into the thesis site. Market Street is then terminated by a public plaza and a 500 foot tall landmark building that acts as the ceremonial terminus to Market Street as well as a beacon from the Delaware River. The end of Market Street now acts as a true

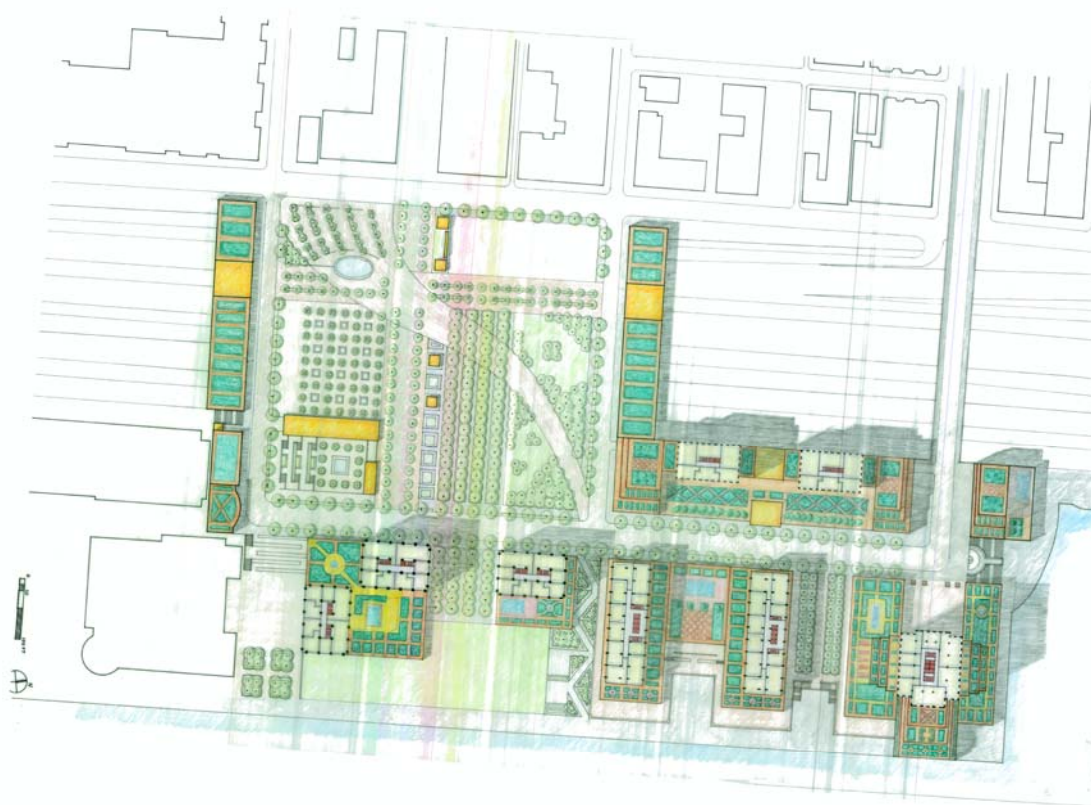
terminus to the city and acts as a gateway to the waterfront, thus reinforcing the diagram of visual axes radiating from City Hall.

At the southern half of the site, an eight acre public park completes the diagram of the green corridor and finalizes the connection from Independence Hall to the Delaware Riverfront. The edges of the park are reinforced to the north and south with liner buildings that also span I-95. These liner buildings will aid in the daily activity of the park by providing street level retail and café spaces. As the park approaches the river, a series of point tower apartments serve to separate the primary park space from the sloped lawn that cascades down to the river. This sloped lawn will assume the program of civic events such as concerts and fireworks displays. The point towers themselves fit into the green corridor diagram by acting as object buildings within the green space, much as the historic 18<sup>th</sup> century buildings do in the city.



**Figure 71 - Application of network diagram to thesis design (source: Author)**

Image 72, below, reveals the thesis site plan in greater detail. Still looking at the eight acre public park, the results of the comparison between Rittenhouse Square and the Master Plan for the Central Delaware can be seen. First of all, ample shade has been provided by various groupings of trees. This will help to keep the park a comfortable temperature during the summer months so that it can be enjoyably used throughout the year. The groupings of trees and variations in paving also help to program the park space for various uses, such as sports areas, picnic areas, market areas and performance areas. The placement of various folly structures throughout the park will also encourage these events. The liner buildings to the north and south of the park will also ensure that the entire perimeter of the park contains active use.

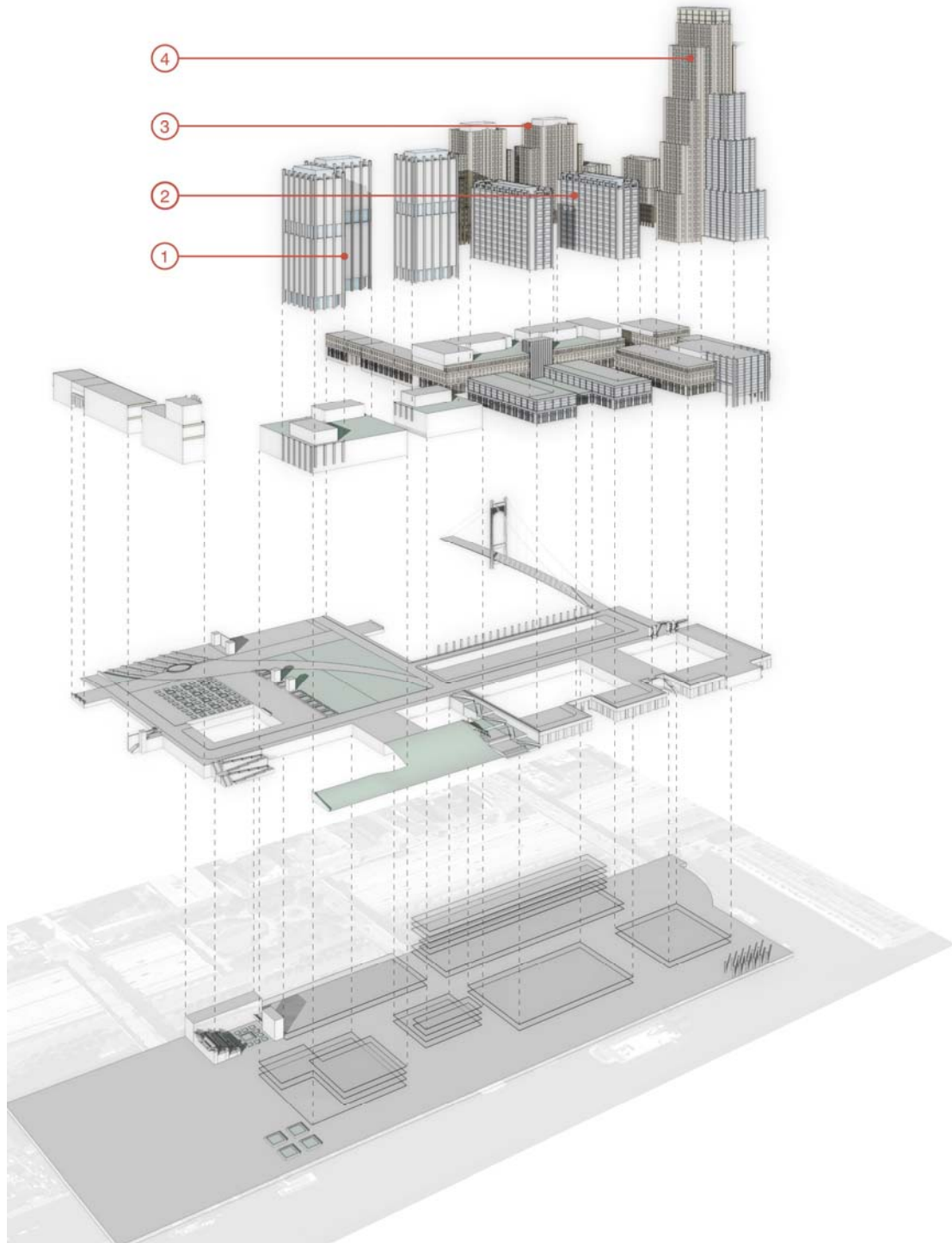


**Figure 72 - Site Plan (source: Author)**

Also integral to the site plan is the network of roads. Market Street, Chestnut Street and Walnut Street are all continued over to the thesis site in order to allow for an unimpeded flow of traffic and mass transit to and from the site. Vehicular connections are essential to support the functions of the varied programs of the buildings that are a part of the thesis design.

One of the major ideas that was involved throughout the design process of the thesis was the idea of layering. The thesis site must have the ability to accommodate many different movement networks and many different programs. These different, often contradictory networks must be able to coexist within a relatively small area. Thus, it is essential to layer the site and the building massing in order to create harmony between functions of the thesis.





**Figure 73 - Exploded site axonometric (source: Author)**

The lowest layer of the site, located at river elevation, is reserved for regional movement networks. This includes I-95, Christopher Columbus Boulevard and the

riverside pedestrian promenade, which is meant to serve as part of a six mile long riverwalk along the Delaware River. The high speed movement of the highway and the calm movement of the pedestrian walk are separated by the enclosed parking structures of the various buildings. The second layer is designed to accommodate the local movement networks. This layer occurs twenty-four feet above the lowest level, and is at the same level as Center City. The extensions of Market Street, Chestnut Street and Walnut Street allow for local vehicular movement and mass transit. The three streets are connected by a central north-south street that provides the main connection through the thesis site. All of the major park spaces are also part of this layer, as they allow for pedestrian movement throughout the site. The final two layers both consist of the building massing. The lowest sixty feet of the building masses serve to activate the street level, providing constant activity throughout the thesis site. The upper layer of all the building masses are for the private realm, such as residential, office and hotel spaces. This layer helps to populate the thesis site and this layer helps to provide the critical mass that keeps activity on the street level. Figures 74-77 provide a more detailed breakdown of building programs.



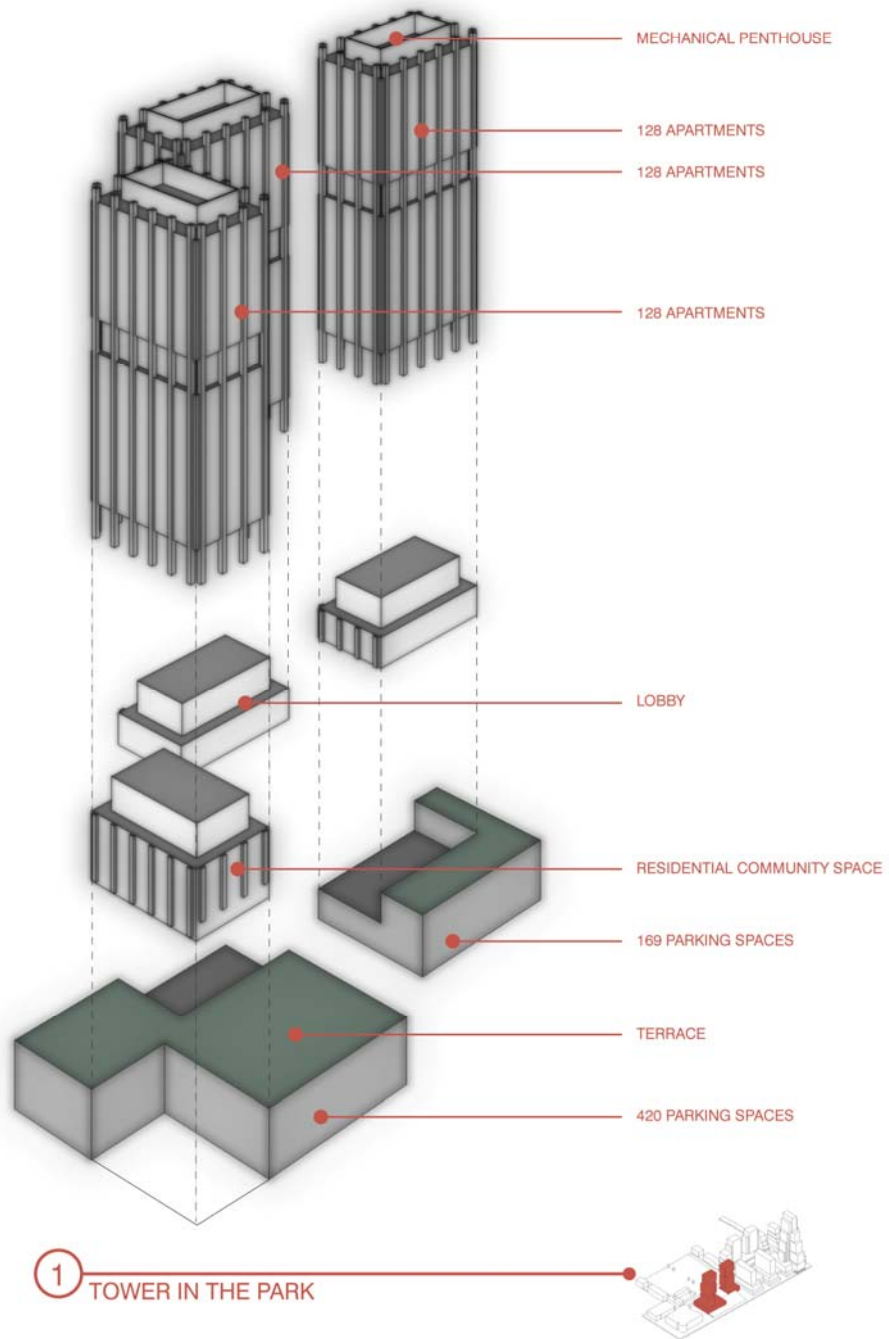
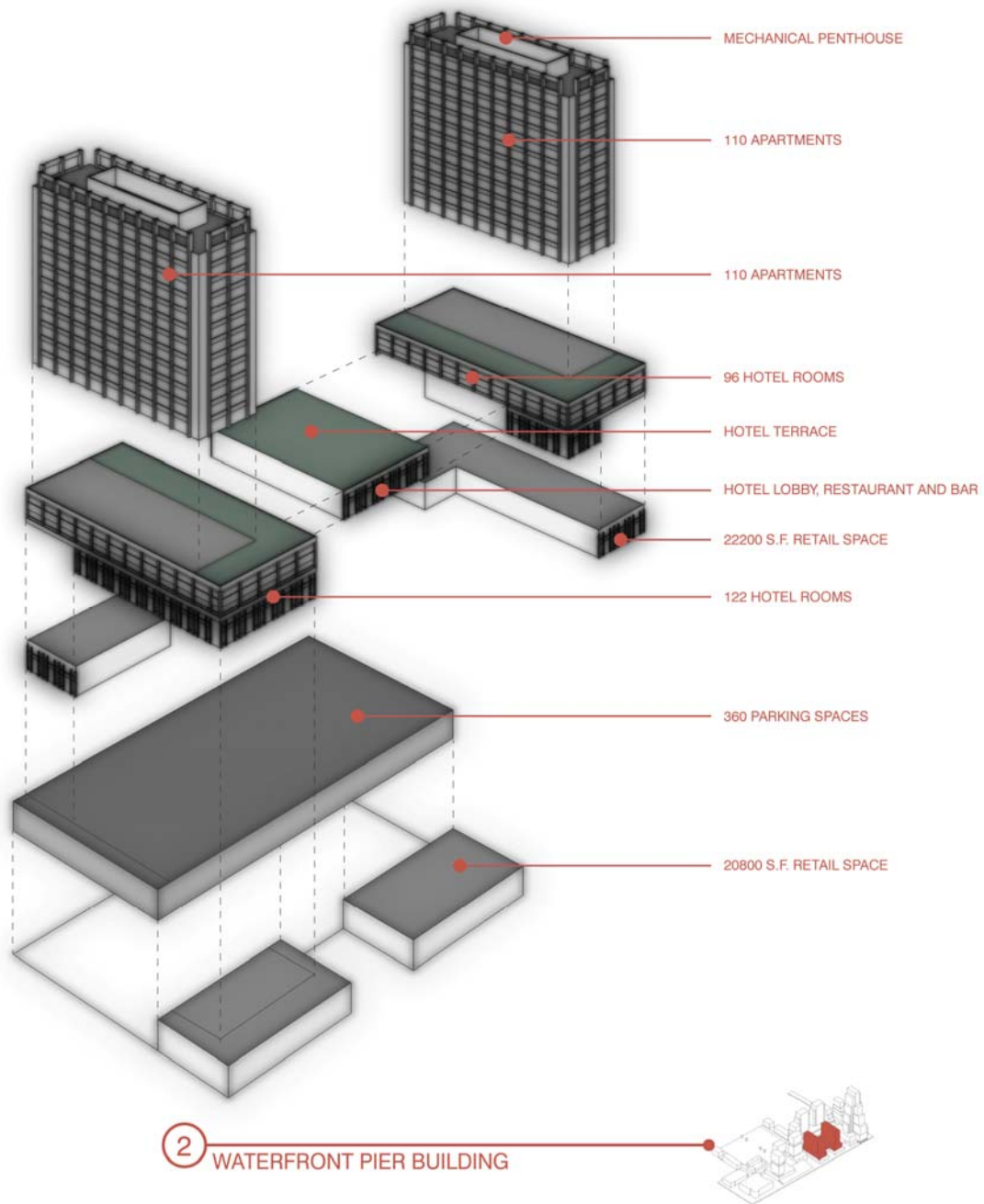
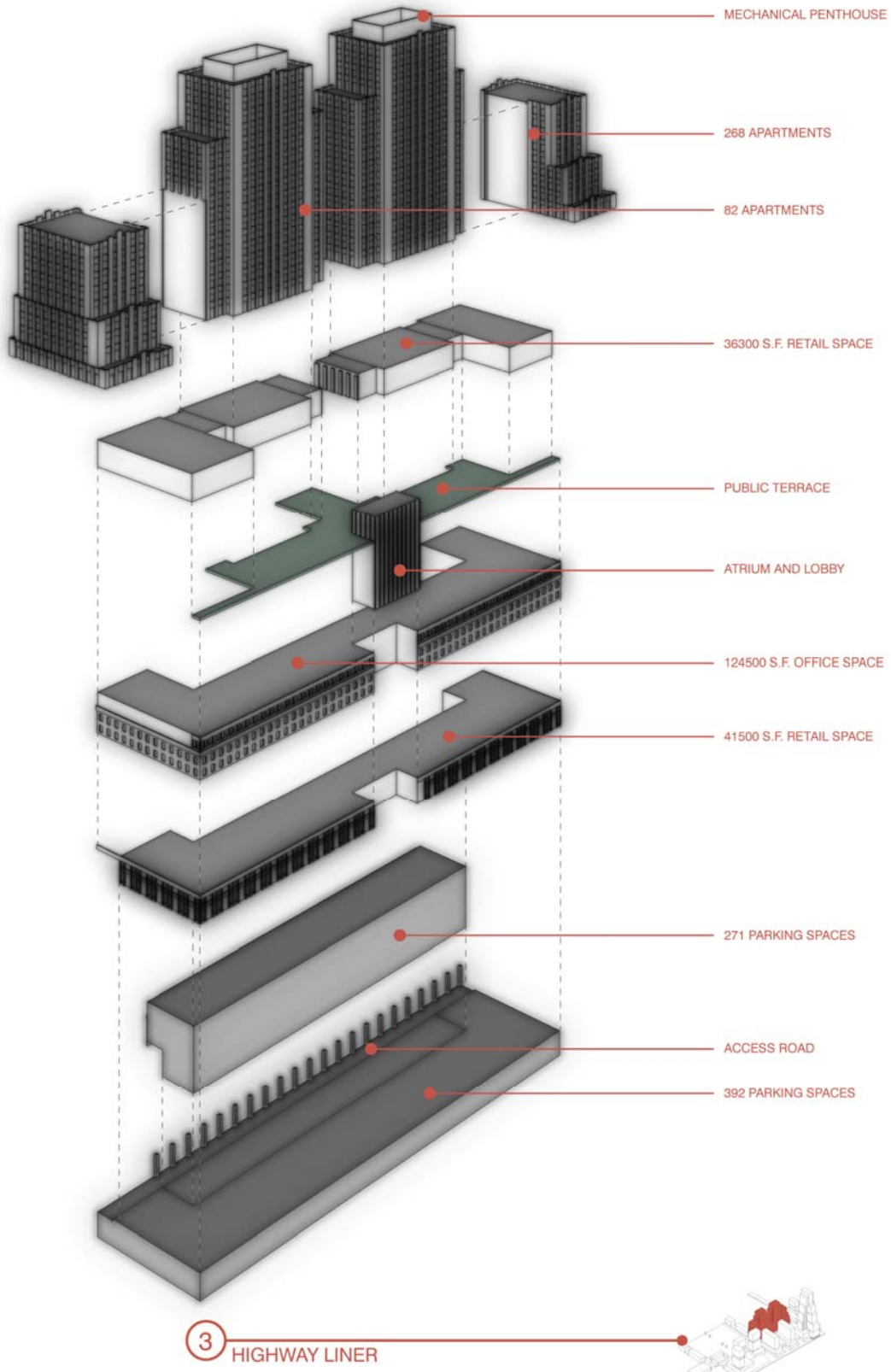


Figure 74 - Park Tower Building programming (source: Author)



**Figure 75 - Pier Building programming (source: Author)**



**Figure 76 - Highway Liner Building programming (source: Author)**

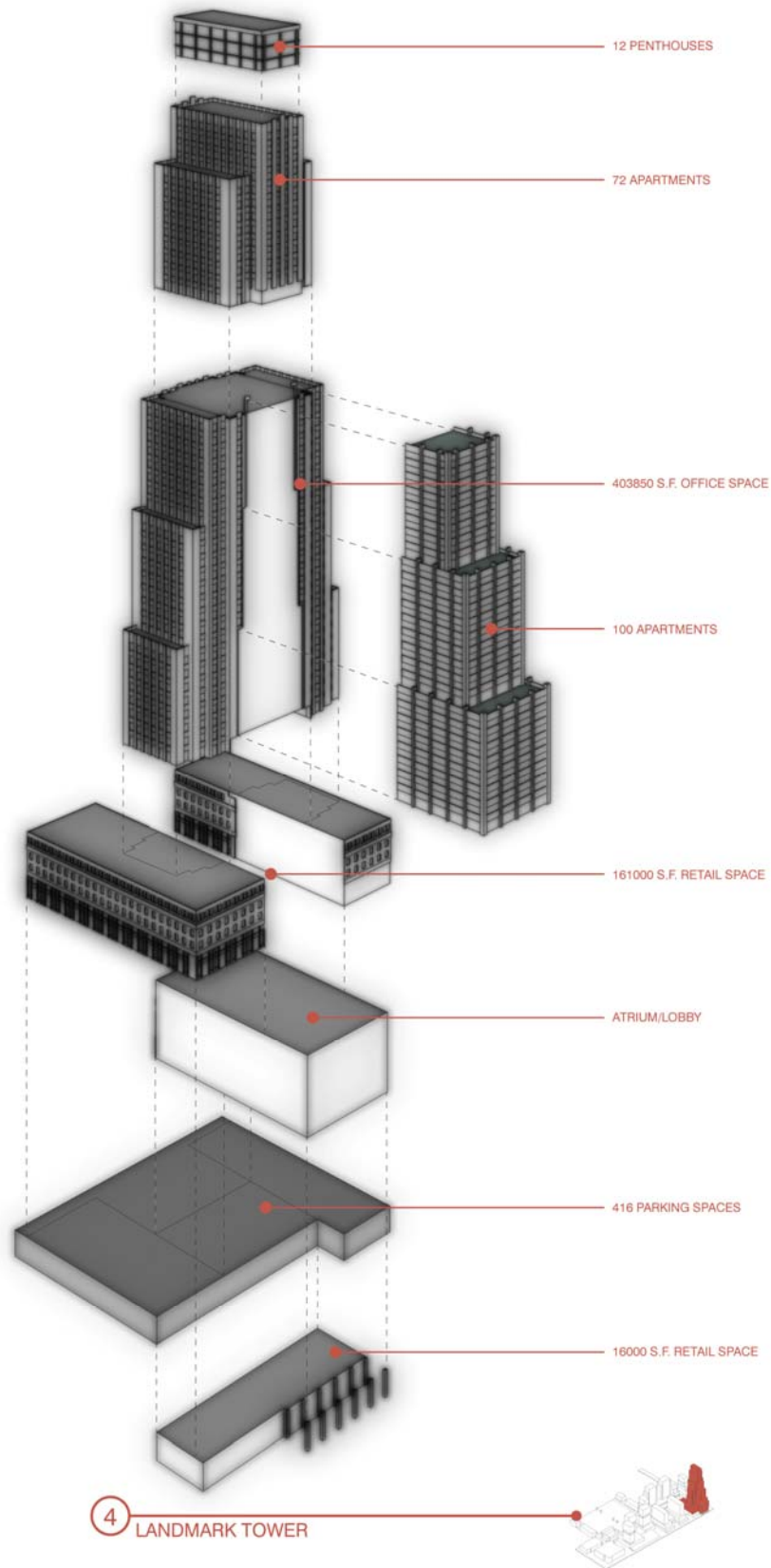
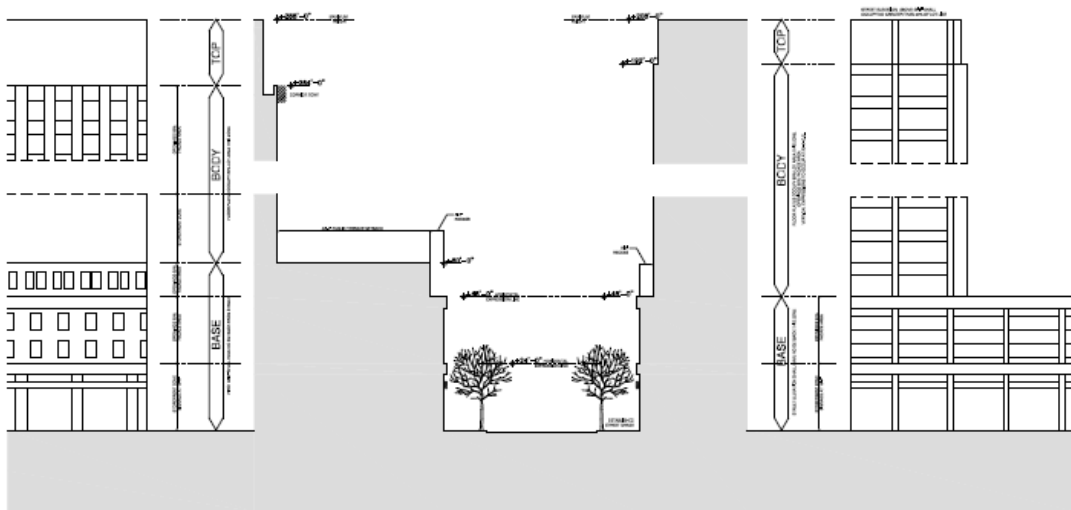


Figure 77 - Landmark Tower programming (source: Author)

Finally, the thesis is a design with two distinct sides. One side faces the city while the other faces the river. The two sides must be treated differently in order to relate to each unique condition. The North-South street acts as the divider in the thesis design. First, the building massing on the waterfront side of the thesis should develop a rhythm of solid and void, so that views out to the river from the street level can be preserved. Conversely, the building massing along the highway side of the thesis design should be continuous along the street, so that the noise of the highway is shielded by the building, preventing it from reaching the pedestrian friendly streets. The thesis also establishes design principles for the facades of the building masses. Buildings located on the waterfront side of the site should have a higher percentage of transparent surface to allow views from deeper in the site to permeate through to maximize views of the river. Buildings on the city side of the site should have more opaque surface in order to deflect noise from the highway and to relate to the solid masonry aesthetic that is prevalent among the adjacent buildings in Center City. The form based design principles for each street are presented in Figures 78-81 below.



**Figure 78 - design principles at north-south street (source: Author)**

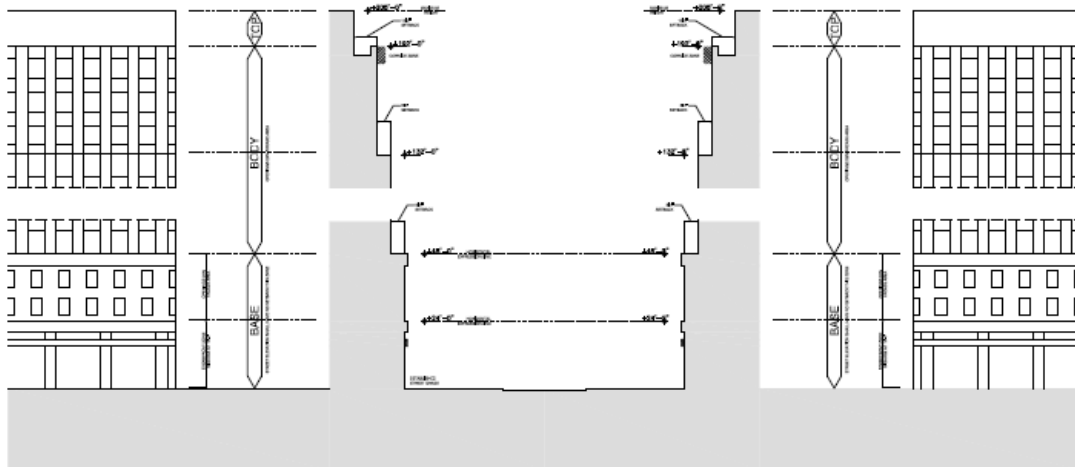


Figure 79 - design principles at Market Street (source: Author)

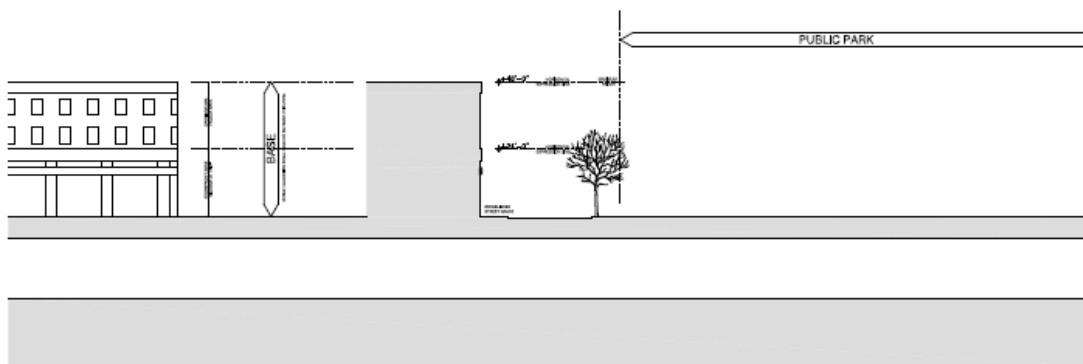


Figure 80 - design principles at Chestnut Street (source: Author)

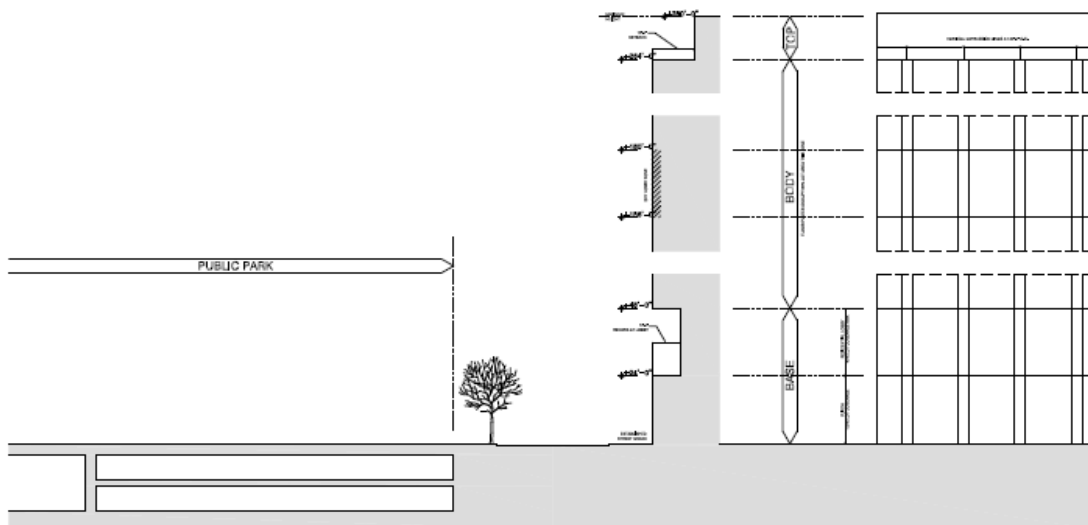


Figure 81 - design principles at Park Towers (source: Author)





**Figure 82 - Street atmosphere at north-south street (source: Author)**



**Figure 83 - street atmosphere at Market Street (source: Author)**



**Figure 84 - street atmosphere at Chestnut Street (source: Author)**



**Figure 85 - street atmosphere at Park Towers (source: Author)**





**Figure 86 - Site aerial perspective from Center City (source: Author)**



**Figure 87 - Site aerial perspective from Delaware River (source: Author)**



**Figure 88 - Night Perspective (source: Author)**

This thesis design sought to find solutions to the design challenge created when large scale regional infrastructure separates a city from its waterfront. Design challenges were overcome by understanding the site conditions of the waterfront. It was essential to combine movement systems from within the city and focus them so that they could become armatures to the waterfront, thus creating new local movement networks that follow a clear concept. This design shows that the challenge of highways in urban settings can be overcome and that cities can be reconnected.

## Appendix 1

### 1. C-4 Commercial Zoning language

(.2) Buildings in excess of the basic allowable gross floor area, as provided herein, (on lots designated class "C-4" Commercial, exceeding a F.A.R. of five hundred percent (500%) and on lots designated class "C-5" Commercial, exceeding a F.A.R. of one thousand two hundred percent (1,200%) and which are over three hundred feet in height above the average ground level:

(.a) From ground level to a point sixty-five feet above the average ground level of the lot, buildings may occupy one hundred percent (100%) of the lot;

(.b) From a point sixty-five feet above the average ground level of the lot, buildings, including mechanical space, shall occupy no more than seventy-five percent (75%) of the lot up to a point three hundred feet in height above the average ground level;

(.c) From three hundred feet above the average ground level of the lot, buildings, including mechanical space, shall occupy no more than fifty percent (50%) of the lot up to a point five hundred feet in height above the average ground level, or buildings, including mechanical space, over three hundred feet but less than five hundred feet in height above the average ground level may be constructed so that the average lot coverage of the building above a point sixty-five feet above the average ground level of the lot, shall not exceed sixty percent (60%) of the lot;

(.d) From five hundred feet above the average ground level of the lot, buildings, including mechanical space, shall occupy no more than forty percent (40%) of the lot up to a point seven hundred feet in height above the average ground level, or buildings, including mechanical space, over five hundred feet but less than seven hundred feet in height above the average ground level may be constructed so that the average lot coverage of the building above a point sixty-five feet above the average ground level of the lot, shall not exceed fifty percent (50%) of the lot;

(.e) From seven hundred feet above the average ground level of the lot, buildings, including mechanical space, shall occupy no more than thirty percent (30%) of the lot, or buildings, including mechanical space, over seven hundred feet in height above the average ground level may be constructed so that the average lot coverage of the building above a point sixty-five feet above the average ground level of the lot, shall not exceed forty percent (40%) of the lot, provided, that in the area bounded by Arch Street, 18th Street, Cuthbert Street,

and 19th Street, buildings, including mechanical space, over seven hundred feet in height above the average ground level may be constructed so that the average lot coverage of the building above a point sixty-five feet above the average ground level of the lot shall occupy no more than forty-eight and one-half percent (48.5%) of the lot. [198](#)

(d) *Building Set-back, Front Yards and Rear Yards.* In these districts, building set-backs, front yards and rear yards shall not be required, subject to other requirements contained herein, for legally required windows, set-backs to ensure the penetration of sunlight, set-backs to ensure continuity of development, for the adequate spacing of buildings, and/or for public space, provided, that when lots are located in areas which are subject to other more restrictive set-back or yard controls set forth in other Sections of this Title, the most restrictive regulations shall apply.<sup>25</sup>

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<sup>25</sup> Frederic D. Garman et al., “Title 14. Zoning and Planning,” in *The Philadelphia Code*, 305.



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