

THE ECONOMIC IMPACT OF THE PRESERVATION AND ADAPTIVE
REUSE OF RAIL TRACKS, THE HIGH LINE IN NEW YORK CITY:
REGIONAL IMPACT ANALYSIS AND PROPERTY VALUE CHANGE
ANALYSIS

A Thesis

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Master of Arts

by

Jiyeon Song

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ABSTRACT

Considered to be one of the most successful recent economic development projects in New York City, the transformation of a recent section of former New York Central Railroad elevated track to the now-famous High Line Park has been the envy of designers and preservationists in cities across the US.

The High Line project has been looked to as a model for a large number of cities with significant tracts of disused industrial infrastructure from the heyday of American railroads. Philadelphia is just one example of a community that has been attempting to replicate the High Line's success. However, the significant capital investment required to adaptively reuse elevated railroad structures is challenging.

A critical examination of the High Line's economic impact, this study attempts to balance the sticker shock of such capital investment with the ongoing development benefit. It considers the number of jobs created by the project, the increase in household income and property values within the neighborhoods adjacent to the line, and subsequent demands on other industries.

The study employs two quantitative methods to arrive at its conclusions: (1) Impact Analysis for Planning (IMPLAN) software for measuring the exact the dollar amount of economic benefits from historic preservation; (2) Geographic Information System (GIS) to present the changes of property values by collecting the data of property values along the High Line. This thesis concludes that there has been a positive economic impact from the High Line Park development.

BIOGRAPHICAL SKETCH

Jiyeon Song studied urban planning and engineering as an undergraduate at Seokyeong University. While there, she developed a deep interest in preserving historic buildings under development pressure. Her research focused on how to preserve and reuse such structures. Her research was condensed in her graduation work, "*The future of the old past*" a plan for the Machine Tools Trade Complex area in Seoul, which had been worn out after its thirty-year contribution to the economic development of Seoul, the Republic of Korea. With the conviction that the unique atmosphere and historic buildings were worth preserving, she suggested a way to revitalize this area. The key plan was to preserve the old buildings through a mixed-use program.

She has continued her research further in her master's program in historic preservation planning at Cornell University. During her graduate years, she interned at the National Railway Historical Society (NRHS). Her interests in railroads grew after she conducted a nation-wide census of historic rail-related properties and participated in creating the NRHS At-Risk List. She has been selected as Martin Weaver Student Scholar from Association for Preservation Technology International. The scholarship will be used for her research about covered bridges in the U.S. state of Georgia. She is currently interning at Lyndhurst, an historic site owned by the National Trust for Historic Preservation.

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INTRODUCTION

The purpose of this study is to raise the public's concern that associated with the historic preservation of urban infrastructure, especially railroads, which seems doomed to demolition. The aim of this study is not only to support preservation activities, but also to demonstrate the positive economic impacts of reusing railroad infrastructure. This study focuses primarily on the transformation of the west side railroad tracks of the New York Central Railroad—abandoned for decades—into a successful economic booster for the City of New York.

Railroad transportation has been used in the United States for over 180 years. Starting with the Baltimore and Ohio Railroad in 1827, railroads quickly became a dynamic force in America's social and economic development.¹ The considerable railroad expansion started in the 1830s. Over 200 railroad companies were developed by January 1837.² The railroads grew in the 1840s and 1850s and played a significant role in westward expansion. By the Civil War, the rail system was widespread in the United States, creating a 30,000-mile network.³ The use of the railroads during the Civil War and World

¹ Robinson, Michael C and Suellen M. Hoy, *History of Public Works in the United States, 1776-1976* (Chicago: American Public Works Association, 1976), 131.

² *Ibid.*, p. 134.

³ *Ibid.*, p. 136-137.

War I was intensive because of the country's enormous wartime transportation needs.⁴

The heyday of the railroad industry was in the 1920s. After World War I ended in 1918, the railroads were under-maintained and under-equipped. Also, Congress addressed this by devising a loan program to support the railroads' recovery. Seventy-seven railroad companies were aided by this program, using a revolving loan fund of \$300 million. The fund allowed the railroads to be the major mode of transportation for the nation during the 1920s; three-quarters of the freight and greater than 25 percent of passengers were transported by rail in the United States.⁵

The Great Depression of the 1930s started the decline of railroad industries.⁶ Although the railroads remained as the primary mode of freight transportation until 1940, the railroad's had dropped to a fraction of total passenger transportation. Many railroad companies had financial difficulties in this period.⁷

When World War II started in 1939, there was the great demand to transport freight to eastern ports for use in Europe. American railroads carried 97 percent of army and navy equipment and supplies during America's

⁴ *Ibid.*, p. 137-138, 144.

⁵ *Ibid.*, p. 144.

⁶ *Ibid.*, p. 147.

⁷ *Ibid.*, p. 149.

involvement in the war. Troop trains carried an average of almost a million servicemen per month.⁸

In spite of the intensive use of the railroads in World War II, and the development of diesel locomotives during the 1950s, railroads steadily lost business to highway transportation in the United States.⁹ By the end of 1960s, with a few exceptions, most railroads went bankrupt or had financial difficulties. The main factors behind the difficulties were various; over-regulation, inability of railroads to control their own prices, the burden of unprofitable passenger service, excess facilities, inept management, men-structures, and airplane travel.¹⁰ However, competition with the over-the-road highway system and air transport were the greatest factors.

The interstate highway system was authorized by the federal government in 1956 and its construction exceeded 20 billion dollars.¹¹ This brought on the ensuing bankruptcies in the railroad businesses in the United States, and since then abandoned railroad properties have appeared throughout the country.¹² Figure 1 represents the total mileage of railway operated in the United States. The statistics for each year were surveyed from three different agencies from 1830 to 2000: the Bureau of Transport Economics and

⁸ *Ibid.*, p. 149.

⁹ *Ibid.*, p. 151.

¹⁰ *Ibid.*, p. 155.

¹¹ Schwieterman, Joseph, *When the railroad leaves town: American communities in the age of rail line abandonment* (Missouri: Truman State University Press, 2011), 19.

¹² Content Manager, Dkeen, *A Short History of U.S. Freight Railroad* (Washington DC: Policy and Economics Department, Association of American Railroads, 2013).

Statistics, Interstate Commerce Commission, and Association of American Railroads. Since the three different agencies gathered their statistics with different criteria, there was an inconsistency of survey extents. However, this chart still represents the rise and fall of railroads in the United States.

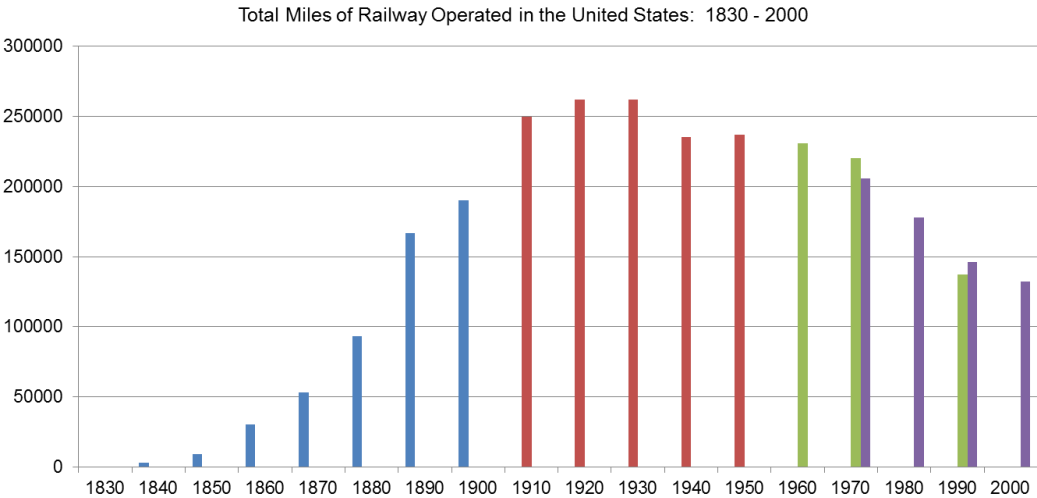


Figure 1 – Total Miles of Railway Operated in the United States: 1830 - 2000

Sources: 1830 - 1900: Association of American Railroads (blue)
 1910 – 1950: The Bureau of Transport Economics and Statistics, Annual report on the statistics of railways in the United States (red)
 1960 – 1990: Interstate Commerce Commission, Annual Report on Transport Statistics in the United States (green)
 1970 – 2000: Association of American Railroads, Washington, DC, Railroad Facts, Statistics of Railroads of Class I, annual, and Analysis of Class I Railroads, annual.(purple)

The High Line used to be a part of New York Central Railroad. In the history of the United States railway system, the New York Central Railroad (NYCRR) is noteworthy. It was one of the largest railroad systems in the United States, operating more than 11,000 miles through eleven American states, with hundreds of trains were scheduled every day. Suffering economic difficulty

during the 1960s, the New York Central Railroad was merged with Pennsylvania Railroad to form Penn Central in 1968.¹³

However, 40 years earlier, when there was considerable demand in the urban areas in the United States to transport freight and passengers, New York, one of the biggest cities in the United States, was wrestling with the conflicts between trains and other forms of transportation in an increasingly crowded downtown. The New York Central Railroads' 1934 West Side Improvement project, the High Line, addressed this. The High Line was built along the line of the Hudson River Railroad, one of the New York Central Railroad's lines.¹⁴

Because railroads are an important in the history of the United States, their preservation and re-use are therefore also important. Other successful cases of railroad re-use show the excellent prospects for the abandoned railroad right-of-way as a remarkable way to boost economic development.

My thesis examines the economic impact of historic preservation and the re-use of rail corridors on the community. The methodology for this thesis consists of two sections: (1) an economic impact analysis using Social Accounting Matrices (SAM) and SAM-based Multiplier Analysis, which is a methodology designed to analyze three criteria (job created, increase in

¹³ Solomon, Brian and Mike Schafer, *New York Central Railroad* (Osceola, WI: MBI Publishing Company, 1999), 11.

¹⁴ *Ibid.*, p. 21.

household income, and demand created on other industries); and (2) a survey of the changes in the property values in the neighborhood of the refurbished railroad track.

The quantitative research of measuring the economic impact was conducted by using computerized techniques. IMPLAN software was used for economic impact analysis, Microsoft Excel was used for collecting all property values and calculating the changes over time, and Geographic Information System (GIS) methods were used for presenting the spatial analysis of property value changes, and the location of the High Line.

Two interviews were conducted for my thesis. The interviewees included Robert Balder, a visiting lecturer of the Department of City and Regional Planning at Cornell University and the former Executive Vice President of Real Estate for the NYC Economic Development Corporation, and Aaron Goldblatt, the boards of director of the Friends of the Rail Park in Philadelphia. I interviewed Mr. Balder in his office in Manhattan on March 19th in 2013. The primary purpose of the interview was to obtain various sources to get data of property values and real estate circumstance of Manhattan. The interview with Mr. Goldblatt was conducted in his office in Philadelphia on April 24th in 2013. The aims when interviewing were (1) to examine the process of reusing the Philadelphia's rail viaduct; (2) to understand how the advocates who

attempt to reuse the abandoned rail tracks think about the High Line in Manhattan; and (3) to investigate the main visions/plan for the project.

The success of the High Line project can serve as a model of adaptive reuse of railroad tracks in the United States. Following the example of the High Line in Manhattan, advocates in Chicago, Queens in NYC, St. Louis, Philadelphia, and Jersey City in New Jersey are now attempting to preserve and reuse both their abandoned, railroad corridors and rail-related structures in a way that mirrors the existing “rails-to-trails program.” The factors contributing to the success of the High Line are various—design, financial supports, public-private collaboration, as well as its location in Manhattan. This is not to suggest that every abandoned railroad corridor should be renovated into an open space or public park, but increased awareness of railroad preservation can be an economic booster and perhaps, provide for adaptive reuse in the future.

Chapter 1 of this thesis provides an overview of the High Line and its surrounding neighborhoods. I examine the history of the elevated rail track and its nearby areas—the Hudson Yards, West Chelsea, and the Meatpacking District—including the recent development of these three areas. Chapter 2 explains the data sources for quantitative measurement of the economic impact of the High Line and methodology. This chapter consists of two sections: Economic Impact Analysis using IMPLAN and Property Value

Change Analysis. Chapter 3 discusses the results of the two quantitative analyses using tables showing the exact numbers and maps showing the property value changes. The conclusion of the thesis contains an analysis of the results as well as suggestions for the success of similar projects elsewhere in the United States.

CHAPTER 1: THE HIGH LINE, PRESERVING AND REUSING THE RAILWAY

What makes the High Line attractive is not only its design, landscape, and cultural programs, but also its history and relationship to the surrounding neighborhoods. While the visitors are walking along the line, they can see the historic tracks and neighboring buildings. Once an important part of infrastructure supporting freight transportation for the West side of Manhattan, the High Line serves as more than the sum of its parts after its reuses, as an elevated park. At that time of the High Line's birth, the area could have been characterized by its industrial, transportation, and temporal uses. The 22 blocks currently comprising the High Line Park are dominated by arts-related industries and residences. To understand the transformation of the area, we will examine the history of the High Line and the nearby neighborhoods. This chapter consists of three sections: the history of the High Line, the history of the neighborhoods along the line, and the recent development of the neighborhood. The neighborhoods discussed in the second section include the Hudson Yards, West Chelsea, and the Meatpacking District.

The History of the High Line

The story of the High Line begins as the first railroad to reach New York City. In 1842, the Hudson River Railroad was chartered to extend its rail line from

New York to the state capital of Albany.¹⁵ The two cities were finally connected in 1851. In 1867, Cornelius Vanderbilt, then the richest man in America, gained control of the Hudson River Railroad as well as the New York Central Railroad.¹⁶ After two years, the Hudson River Railroad and New York Central Railroad were merged. Vanderbilt constructed the Spuyten Duyvil & Port Morris Railroad that linked the Hudson River Railroad with the New York & Harlem Railroad. This let passenger trains of the Hudson River Railroad gain access to the new Grand Central Depot, which was on the New York & Harlem Railroad.¹⁷ The Hudson River Railroad south of Spuyten Duyvil became a freight line later known as the West Side Freight Line.¹⁸ In 1913, the New York Central Railroad and Hudson River Railroads became part of the New York Central System.¹⁹

The High Line was an elevated section of the West Side Freight Line. Authorized by the City of New York in 1846, the West Side Line was a thirteen-mile street-level corridor railroad situated along the shore of the Hudson River on the west side of Manhattan.²⁰ Hudson River passenger terminals such as the Chelsea Piers were crowded by cars, pedestrians, and horse-drawn street cars. A significant amount of freight was shifted by ferry across the Hudson, and floating bridges carried the cargo onto street-level rail

¹⁵ Solomon, Brian and Mike Schafer, *New York Central Railroad* (Osceola, WI: MBI Publishing Company, 1999), 20.

¹⁶ *Ibid.*, p. 21.

¹⁷ *Ibid.*, p. 22.

¹⁸ *Ibid.*

¹⁹ *Ibid.*, p. 39.

²⁰ *Ibid.*, p. 21.

lines. The freight was sent to yards or industrial buildings in New York City, particularly on the west side of Manhattan.²¹ Figure 2, below, shows the two distinct freight lines operated by New York Central.

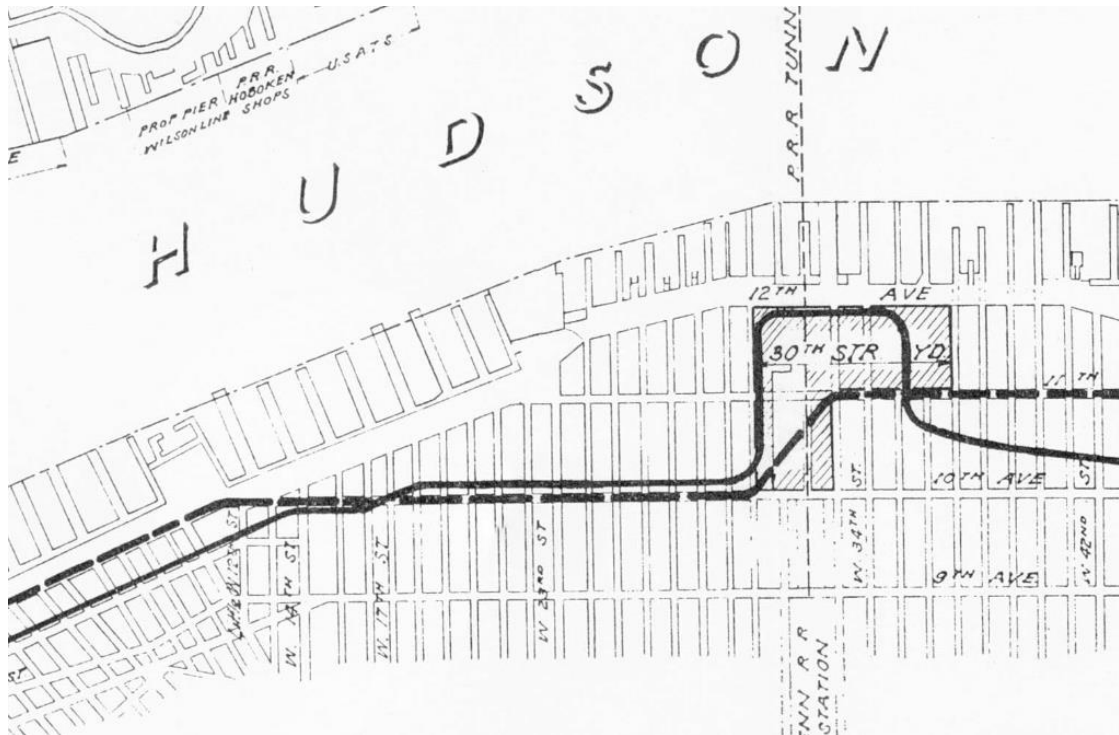


Figure 2 – Map of New York Central’s West Side Line in 1934, the Southern Section of the Line near the Thirtieth Street Yards

Source: New York Central's 1934 West Side Improvement Pamphlet

Concurrent with the city’s growth, traffic on the West Side Freight Line increased steadily. By the mid-1920s the line was congested with nearly 1,700 railroad cars every day.²² It has been called the lifeline of New York because of the significant role it played in transporting essential goods from

²¹ Jones, Casey, *Reclaiming the High Line*, (New York, NY: The Design Trust for Public Space and the Friends of the High Line, 2002), 12.

²² Solomon, Brian and Mike Schafer, *New York Central Railroad* (Osceola, WI: MBI Publishing Company, 1999), 107.

around the country to the city.²³ The southern part of the West Side Line in particular was crowded with traffic. It ran through the Meatpacking District. The area held more than 250 slaughterhouses and meatpacking plants in 1900. Meanwhile, large factories and warehouses were being built to the north of the Meatpacking District, also increasing the demand for freight transportation on the west side of Manhattan.²⁴

With the increased traffic, however, came numerous accidents between the trains and other traffic. To address the situation, the New York Central's Manhattan operations implemented the West Side Cowboys—men on horses who warned pedestrians and motorists of approaching trains.²⁵

²³ La Farge, Annik, *On the High Line: Exploring America's Most Original Urban Park* (New York, NY: Thames & Hudson Inc., 2012), 8.

²⁴ The Friends of the High Line Official Website, Neighborhood Info, <http://www.thehighline.org/about/neighborhood-info>

²⁵ Solomon, Brian and Mike Schafer, *New York Central Railroad* (Osceola, WI: MBI Publishing Company, 1999), 107.

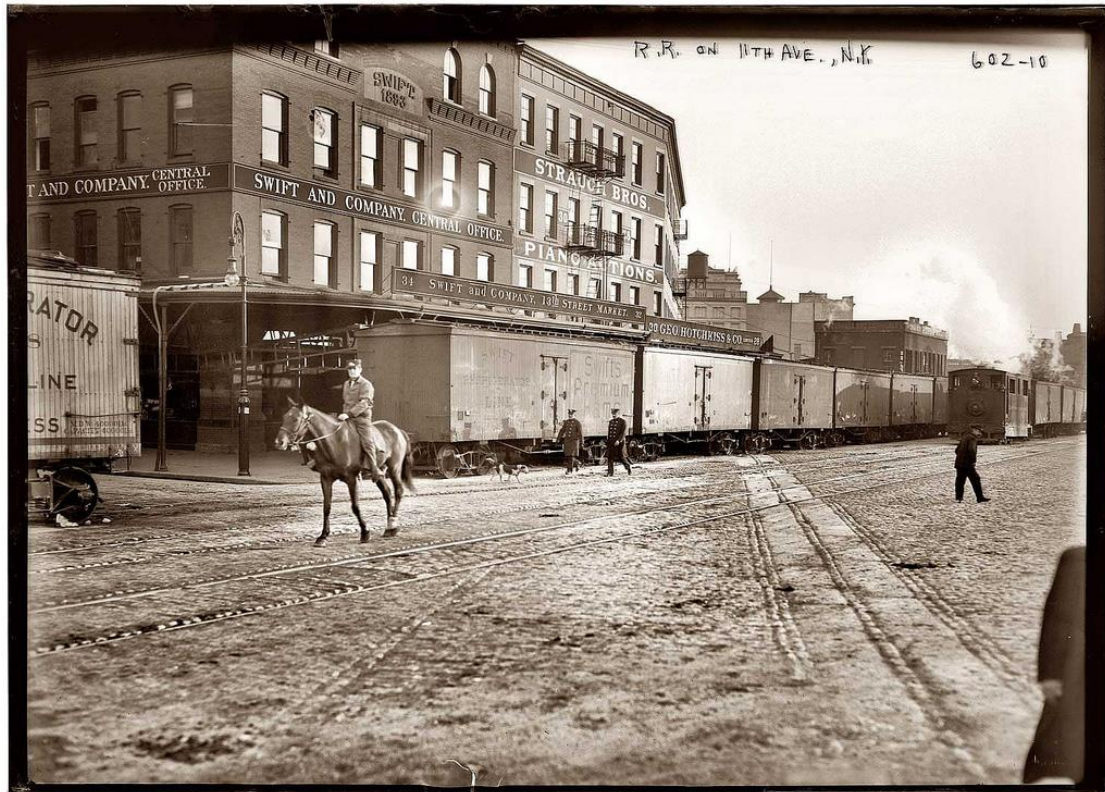


Figure 3 – West Side Cowboy before the New York Central’s 1934 West Side Improvement

Image Source: Friends of the High Line website

The Railroad, and New York City, needed a more effective solution. In the late 1920s, the NYCRR, the government, and the New York State government decided to improve the rail line on Manhattan’s West Side with a project that included elevating the tracks south of 34th Street. This elevated section was named the High Line. It went into operation in 1934.²⁶ The cost of the High Line was \$85 million according to the *New York Times*. The City officials

²⁶ *Ibid.*

regarded it as “One of the greatest public improvements in the history of New York.”²⁷

Traveling South from 34th Street to St. Johns Park (bounded by Laight Street and Ericsson Place between Hudson Street and Varick Street), the freight trains ran a double-track line supported by a steel frame structure with a concrete-reinforced deck, gravel ballast, and metal railings. The efficient and multi-functioned High Line structure provided both economy and connectivity. The High Line was highly functional because it had pathways for ground transportation beneath the elevated structure, and elevated rail sidings that led alongside and through adjoining buildings, enabling both trucks and trains to load & unload at their own convenience.²⁸ For example, the Starrett-Lehigh Building’s elevators carried freight cars up to 19 factory and warehouse floors.²⁹

After World War II, the factories along the High Line had less need for train connections. The growth of interstate trucking companies conveyed freight shipments on the High Line began to decline. Its southern section was

²⁷ Jones, Casey, *Reclaiming the High Line*, (New York, NY: The Design Trust for Public Space and the Friends of the High Line, 2002), 48.

²⁸ Solomon, Brian and Mike Schafer, *New York Central Railroad* (Osceola, WI: MBI Publishing Company, 1999), 107.

²⁹ Jones, Casey, *Reclaiming the High Line*, (New York, NY: The Design Trust for Public Space and the Friends of the High Line, 2002), 12.

demolished in the 1960s and, after 46 years of operation, the last train ran on Thanksgiving Day, 1980.³⁰

Thereafter, the tracks, railbed, switches, and steel superstructure were endangered. A group of people, most of whom owned property along the High Line, insisted upon tearing down the entire length of the structure. Yet, in the 1970s, a Chelsea resident, Peter Obletz, stood up for the preservation of the High Line. As the very first enthusiastic advocate, Obletz called for the reuse of the High Line, citing both its potential commercial and public uses.³¹

After Mr. Obletz's death in 1996, the Friends of the High Line, a non-profit organization, began to put its efforts into preserving and re-using the abandoned elevated track bed as a public open space in 1999. With the support of the City of New York, the first phase of construction on Section 1 (Gansevoort Street to 20th Street) began in April, 2006. The Section 1 opened to the public in June 9th, 2009; subsequently, Section 2 (West 20th Street to West 30th Street) opened in June 8th, 2011. Currently, Section 3 (West 30th Street to West 34th Street) is under construction and is expected to be completed in 2014.³² Figure 4 shows the research boundary and construction

³⁰ *Ibid.*, p. 49-50.

³¹ *High Line History*, The Friends of the High Line Official Website, <http://www.thehighline.org/about/high-line-history>

³² *High Line History*, The Friends of the High Line Official Website <http://www.thehighline.org/about/high-line-history>

phase of the High Line, and the following figures 5, 6, and 7 show the detail of each construction phase and the nearby area.

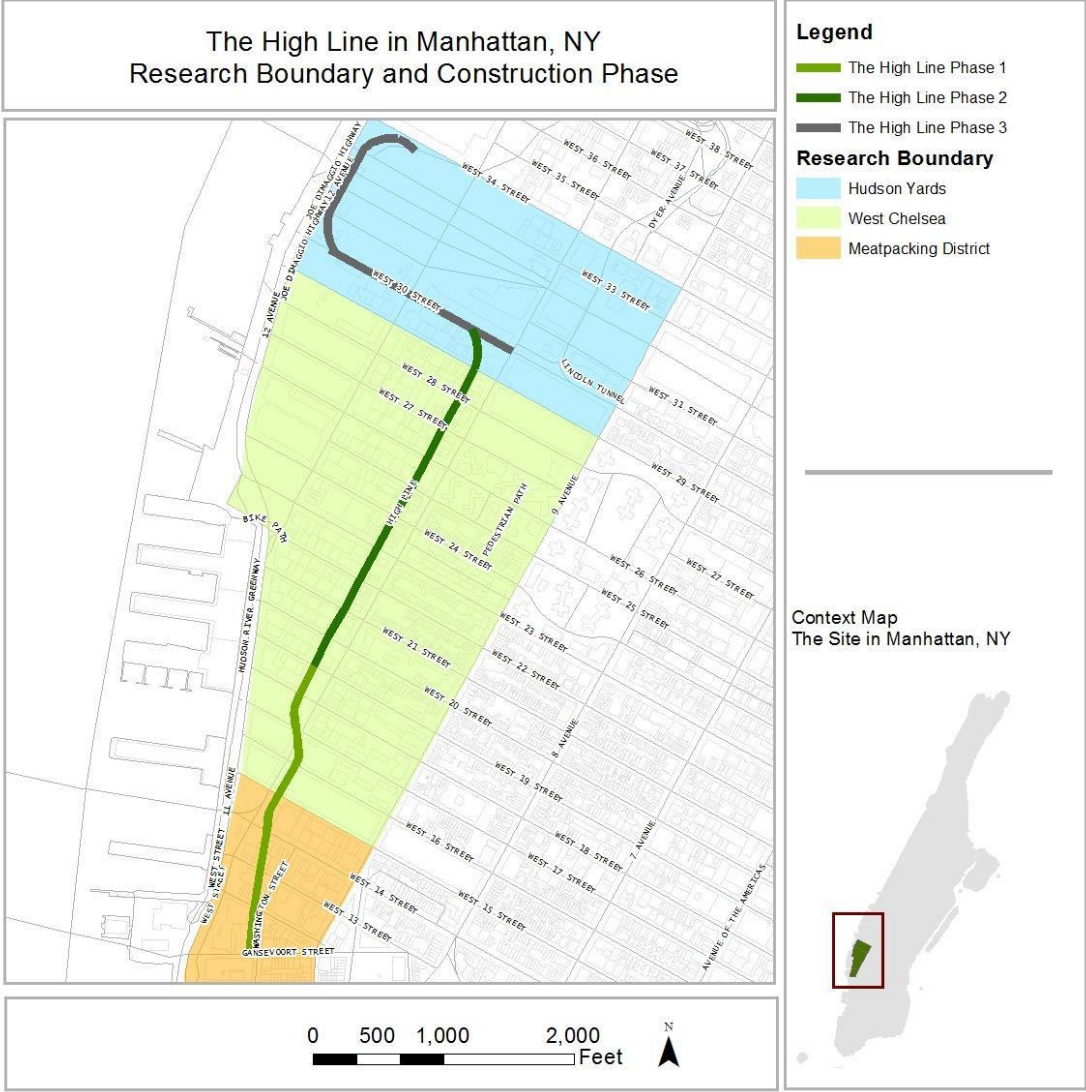


Figure 4 – The Research Boundary and Construction Phase of the High Line

Source: Department of City Planning, City of New York / GIS Map created by Jiyeon Song

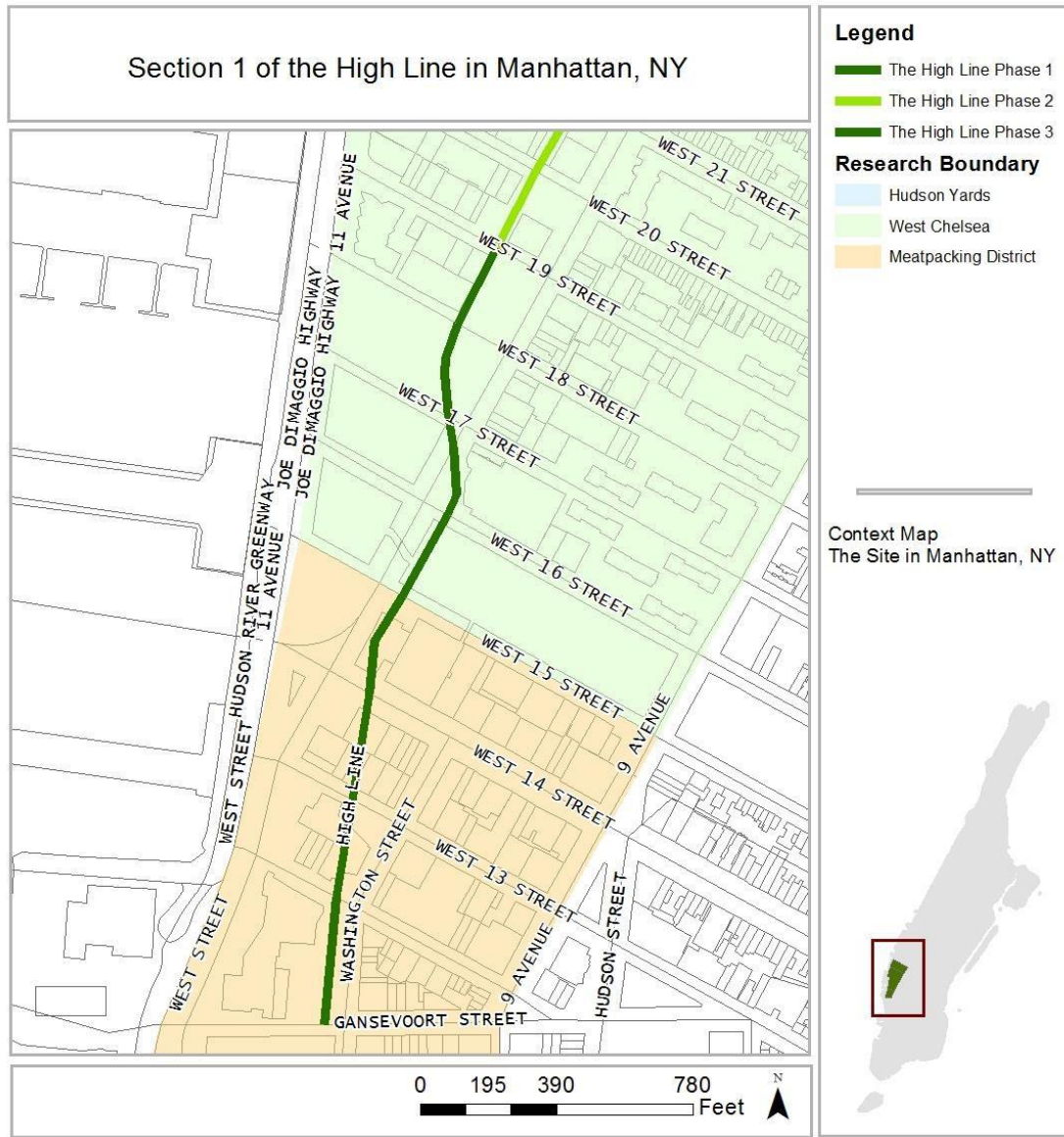


Figure 5 – Section 1 of the High Line

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyeon Song

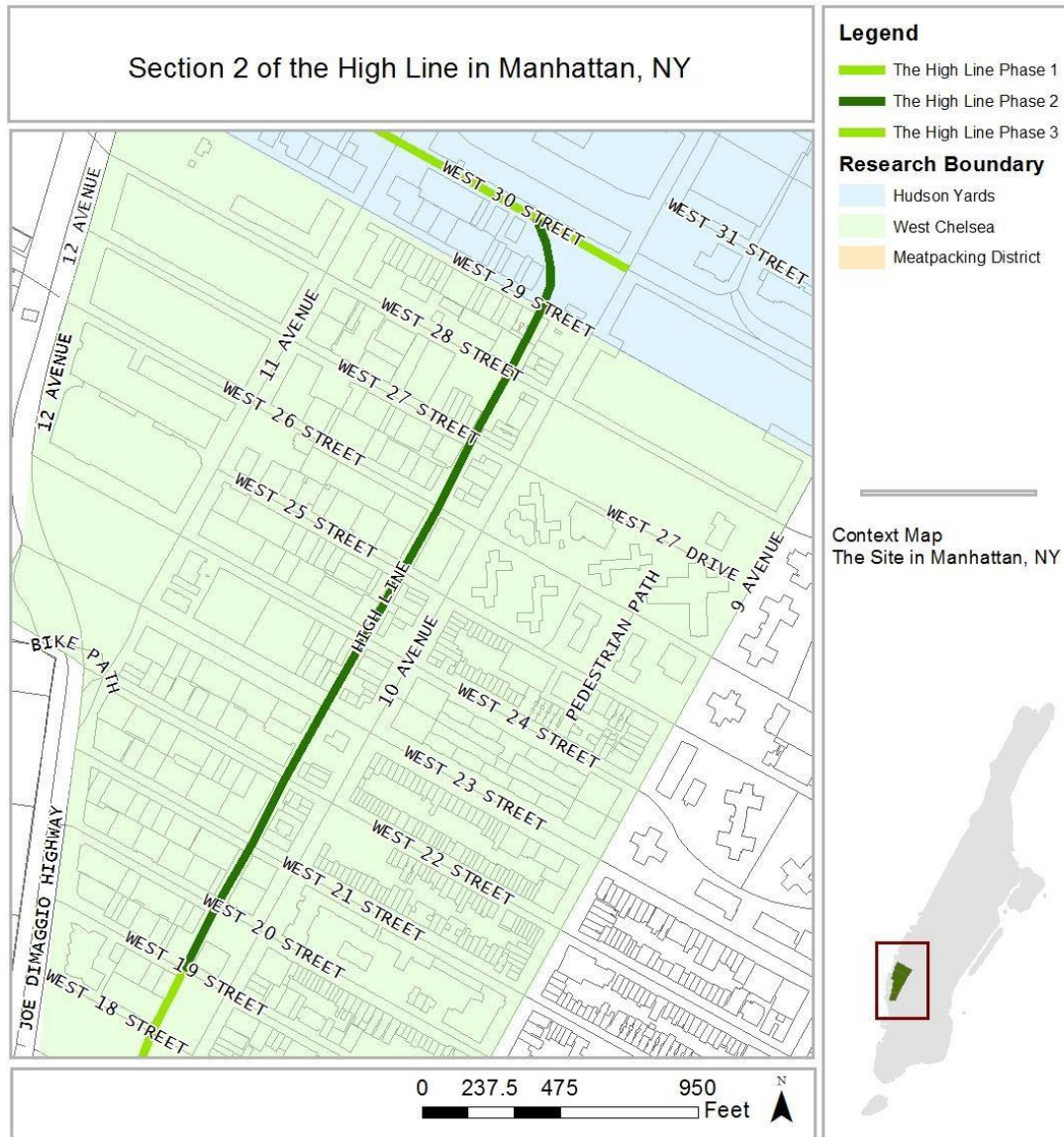


Figure 6 – Section 2 of the High Line

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyoung Song

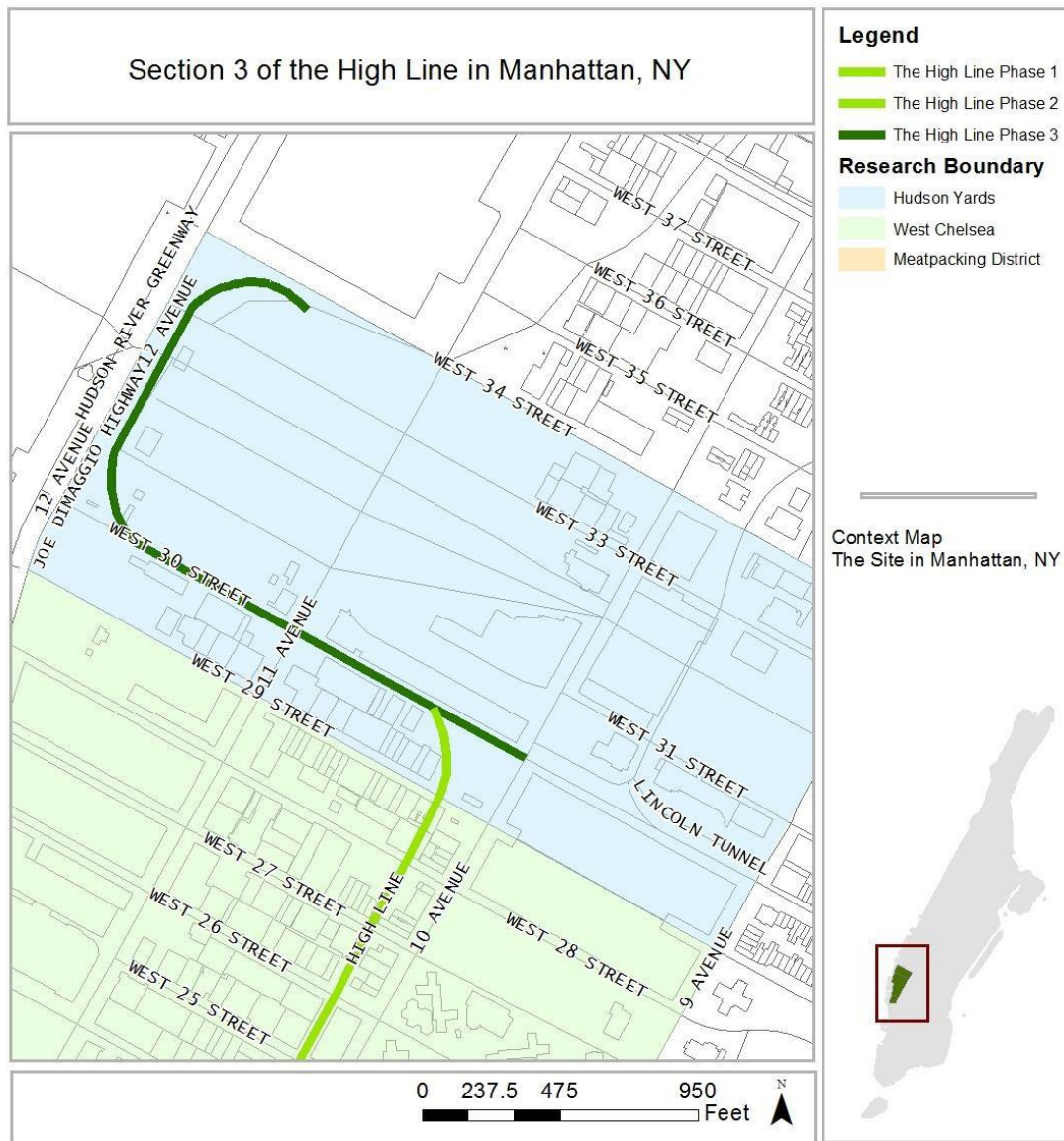


Figure 7 – Section 3 of the High Line

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyoung Song

The History of the Neighborhood

The High Line neighborhood includes the Hudson Yards, West Chelsea, and the Meatpacking District, which are all historic districts in the area. The Hudson Yards are located between West 34th and 29th Streets and runs from 9th Avenue to 12th Avenue. The West Chelsea area is bounded by the 29th and 15th Streets between the 9th and 12th Avenue. The Meatpacking District lies between West 15th and Horatio Streets from 9th Avenue to 11th Avenue. This section explains the history of each neighborhood.

The Hudson Yards Neighborhood

This area has for decades housed the railroad-related uses on Manhattan's west side. The 1890 Sanborn Insurance Map (Figure 8) shows that the New York Central Railroad and the Hudson River Railroad had a depot in a block bounded by West 30th and West 29th Streets, and 9th and 10th Avenues.

Railroad tracks, freight sheds, and warehouses all were located in the Hudson Yards area. The site also housed other properties such as lumber yards, coal yards, and factories.

The success of the West Side Freight Line resulted in the expansion of these yards through the mid-1920s. Figure 9 shows the area western portion of the Hudson Yards in 1911. The rail tracks, freight sheds, and the rail-related properties were spread out within the yard, although there were still other

unrelated businesses in the area such as a soap factory between 29th and 30th Streets. The West Site Improvement Project, authorized by the New York City government in the late 1920s allowed the rail track in the Hudson Yard at 34th Street to be constructed as the beginning point of the elevated railway (which later became the High Line).³³ The yards continued to be used for several decades, but by the late 1970s some of properties had been abandoned because of the reduction in freight on the West Side.³⁴

An underground tunnel was built on the west side in the 1970s for use as a rail car storage space. Amtrak and Metro North began to use this passage in 1991 to facilitate travel to Upstate New York.³⁵

This yard also housed a six-track indoor maintenance shop, used for inspections and light maintenance.³⁶ Although the Hudson Yards did see a small proportion of passenger traffic to Penn Station, its major purpose was freight traffic. Up until after the year 2000, north bound Amtrak trains traveling through the Hudson Yard terminated at Grand Central Terminal, although this has now been changed to Penn Station in the last decade.

³³ Solomon, Brian and Mike Schafer, *New York Central Railroad* (Osceola, WI: MBI Publishing Company, 1999), 107.

³⁴ Brotherhood of Locomotive Engineers and Trainmen Website, http://www.ble-t.org/pr/news/pf_headline.asp?id=13167

³⁵ *Ibid.*

³⁶ *Ibid.*

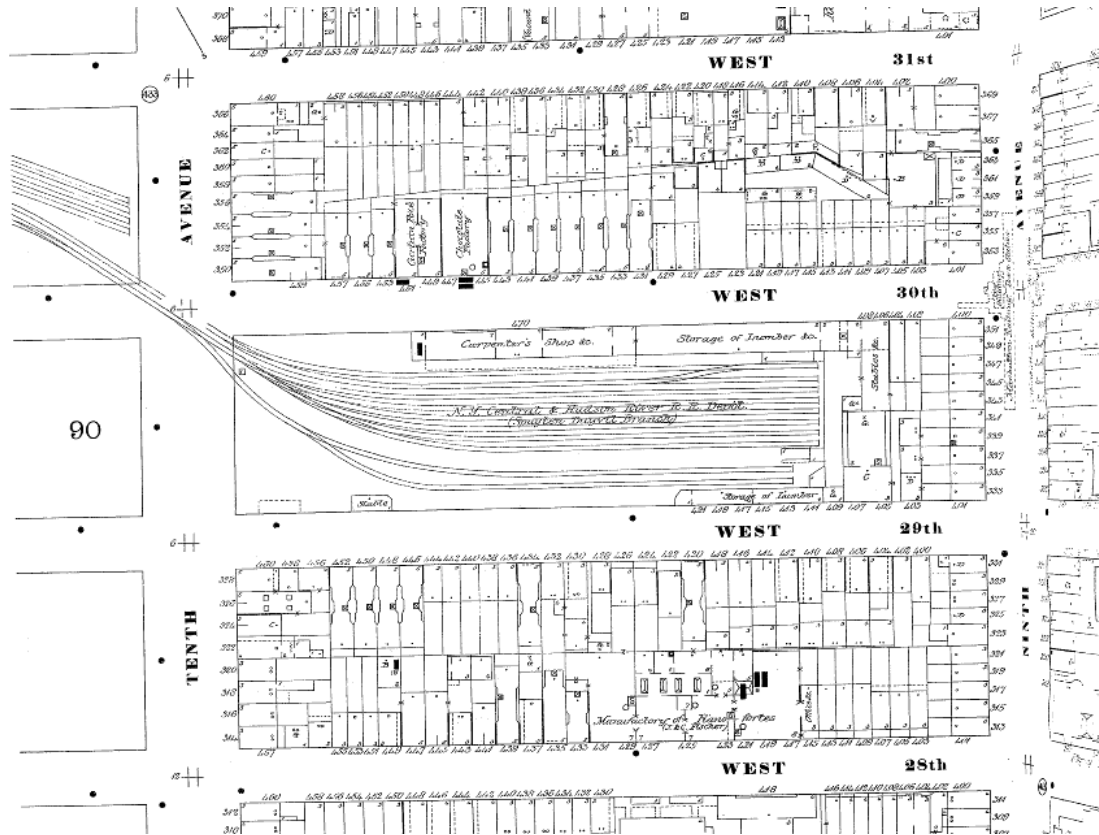


Figure 8 – East of Hudson Yards in 1890

Map Source: the 1890 Sanborn Insurance Map

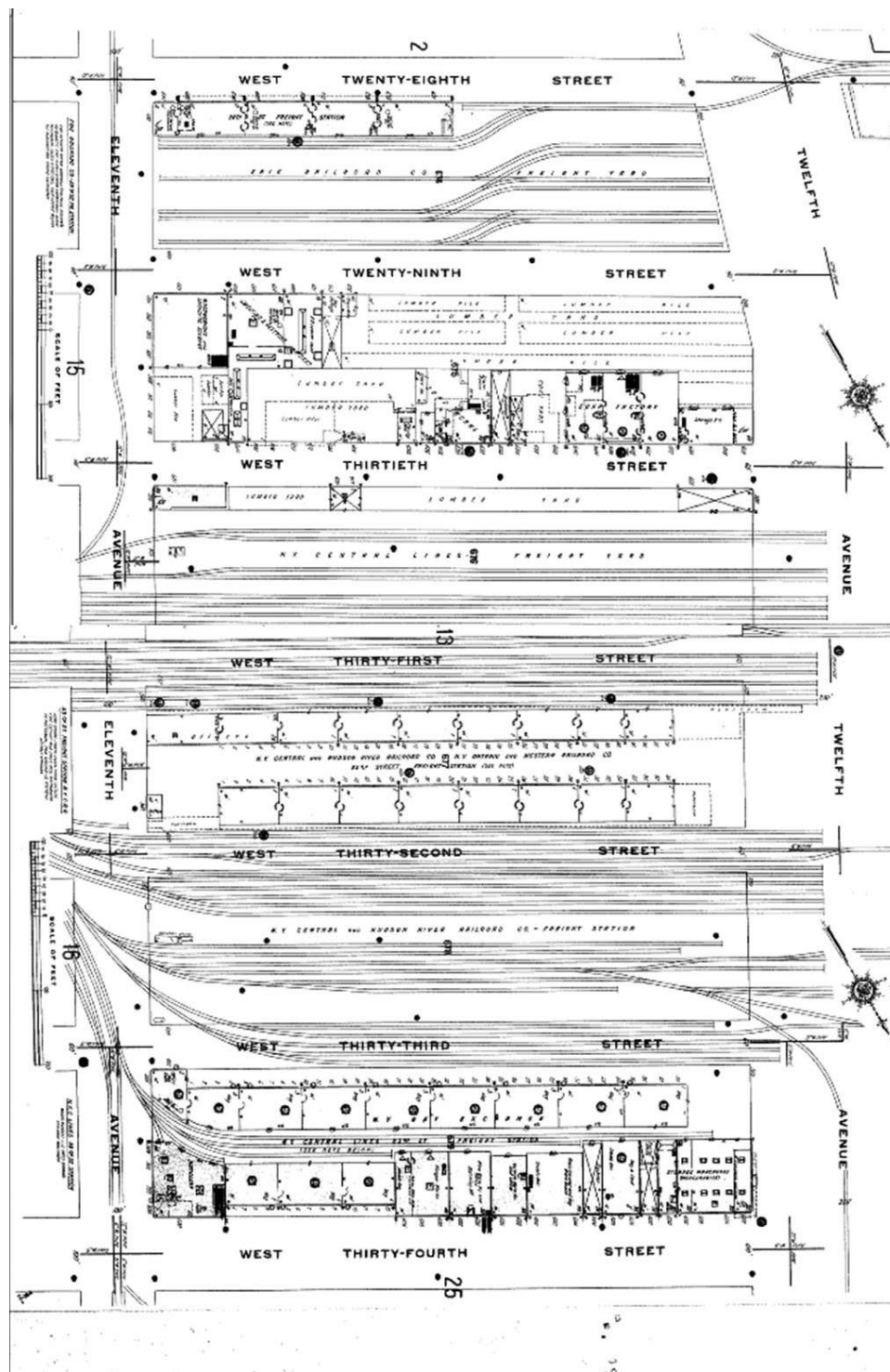


Figure 9 – The West of Hudson Yards in 1911

Map Source: the 1911 Sanborn Insurance Map

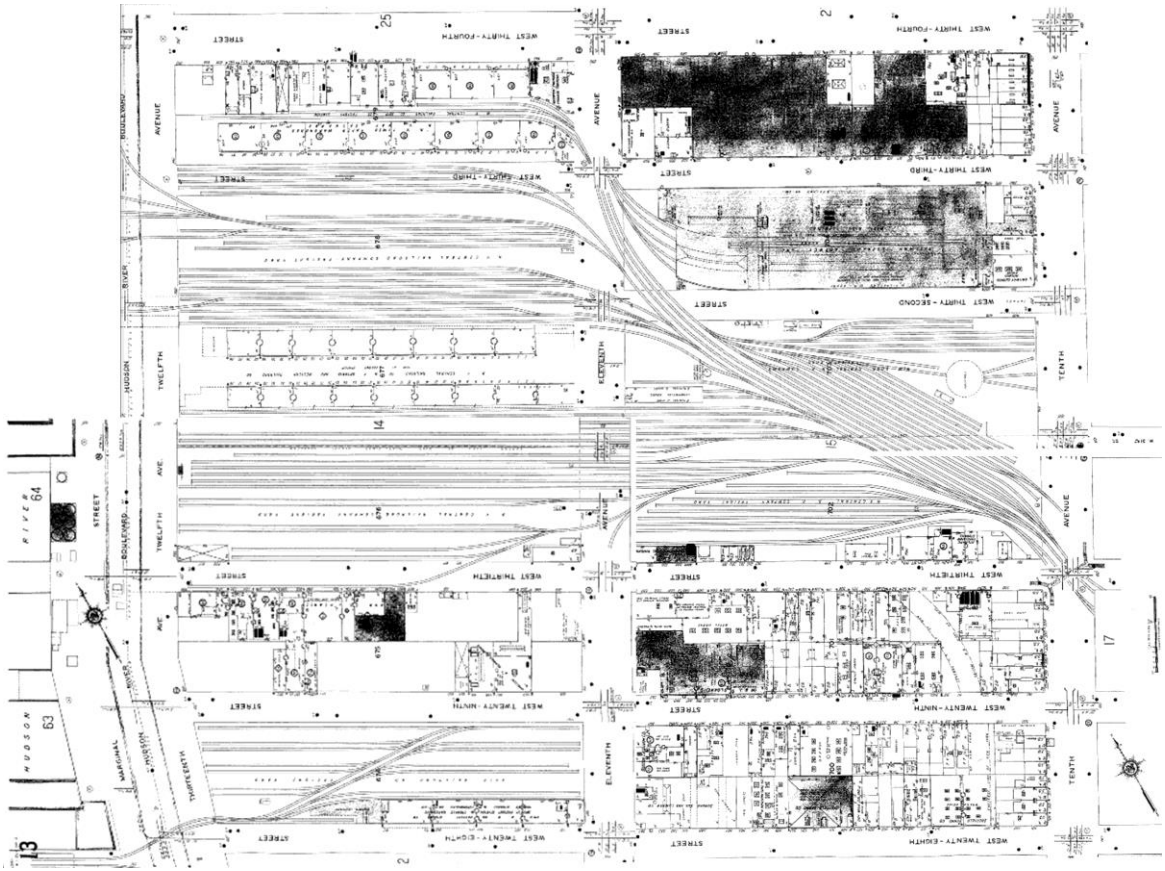


Figure 10 – The Hudson Yards in 1930

Map Source: the 1930 Sanborn Insurance Map

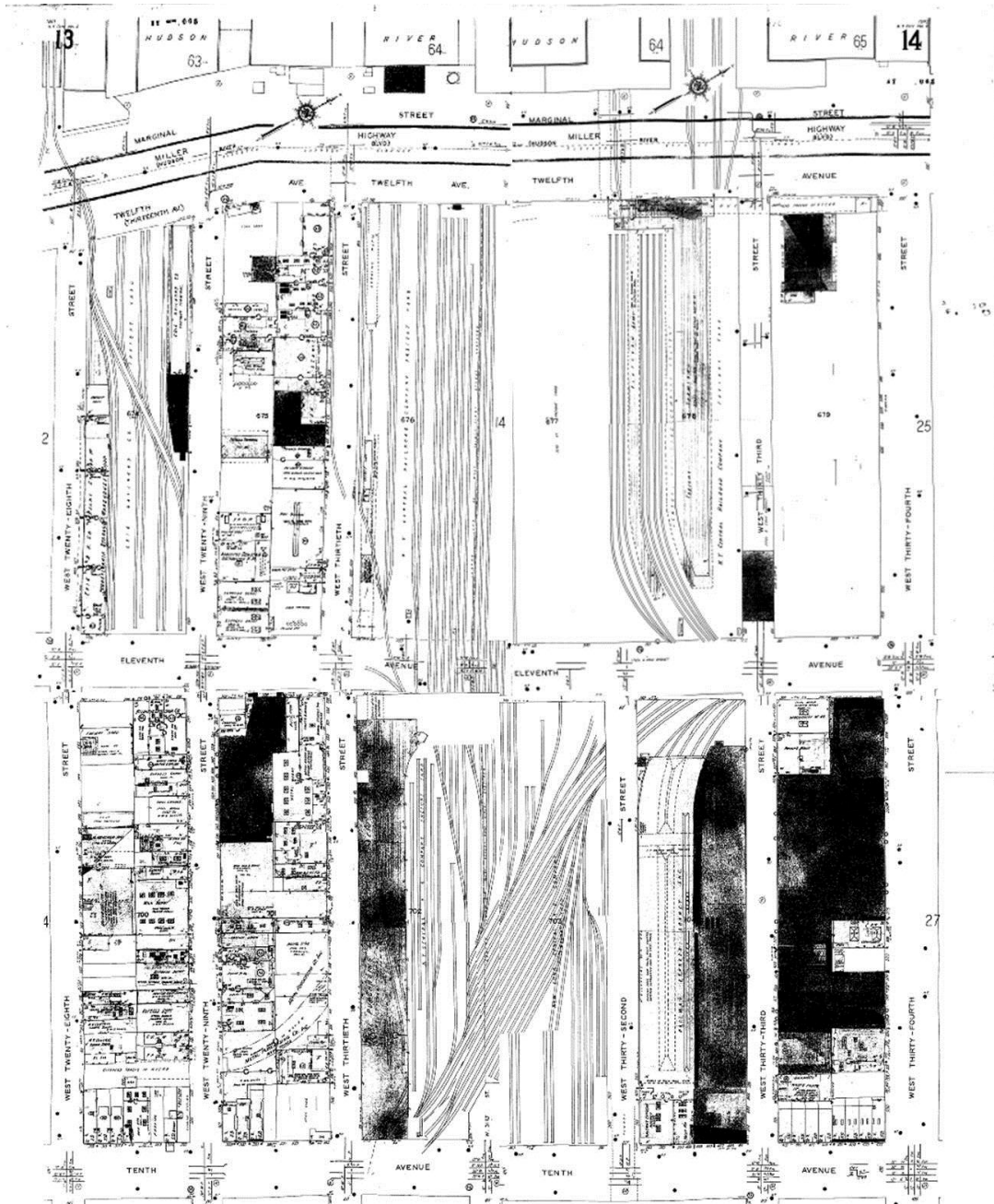


Figure 11 – The Hudson Yards in 1951

Map Source: the 1951 Sanborn Insurance Map

The West Chelsea Neighborhood

This area lies between West 15th and 29th Streets from 9th to 12th Avenue. The Early development of the area began with industrial use during the late 1840s and 1850s. There were two major factors behind this development. The first was the low price of land newly reclaimed from the Hudson River. This spurred many industries from Lower Manhattan to move to West Chelsea.³⁷ The second factor was the availability of convenient transportation provided by the railroad following its completion in 1851.³⁸

The prominent industries in the middle and late nineteenth century were iron and brass works. In 1850, approximately 400 people were employed in metal factories such as the Chelsea Iron Works and the Minnesota Iron and Brass Foundry. By 1860, the J.B. & J.M. Cornell Iron Works, which took over from Chelsea Iron Works, employed more than 1,200 people and occupied several blocks within West Chelsea.³⁹ In addition to the metal works, other industries such as lumber, stone, and coal occupied several yards in the area in 1850s and 1860s. However, the operation of these industries stopped by the end of 19th century.⁴⁰

³⁷ Brazee, Christopher and Jennifer Most. *West Chelsea Historic District Designation Report*. (New York, NY: New York City Landmarks Preservation Commission, 2008), 11.

³⁸ *Ibid.*, p. 12.

³⁹ *Ibid.*

⁴⁰ *Ibid.*, p. 13.

From 1891 to 1950 new development came to the area through the warehousing and printing industries. Large warehouses first came to the area in the late 19th century, culminating in the monumental complex of the Terminal Warehouse Company's Central Stores in 1891, which occupied the block between West 27th and West 28th Streets, and from 11th Avenue to the Hudson River. These large terminal structures and warehouses were constructed after the Lehigh Valley Railroad (LVRR) and Baltimore & Ohio (B&O) Railroad acquired this land along the Hudson River. The B&O acquired property between West 25th and West 26th Streets in 1897, and the LVRR purchased the block to the north of B&O's property in 1900. Many smaller storage facilities were shortly thereafter constructed east of 11th Avenue in the early 20th century.⁴¹

In the beginning of the 20th century, a variety of other industries began to develop in the West Chelsea neighborhood. One of them was the printing industry. The new headquarters of the H. Wolff Book Manufacturing Co. was erected at 518 West 26th Street in 1910. The company continuously expanded their manufacturing space until the 1950s, occupying many buildings within West Chelsea including: the former Cornell Iron Works at 555 West 25th Street; the Terminal Warehouse Company's Central Stores at 261 11th Avenue; and the R.C. William & Co. warehouse at 259 10th Avenue.⁴²

⁴¹ *Ibid.*, p. 14-18.

⁴² *Ibid.*, p. 13-14.

Although the railroad companies, which had their own storage facilities in the area, ceased the operation during the mid-20th century, their storage facilities remained in use. This included the B&O Freight Terminal between West 25th and 26th Streets, and the Starrett-Lehigh building, which continued to function as a rental warehouse, manufacturing, and office space, even after the Lehigh Valley Railroad disassociated itself from the building in 1944. A number of buildings in West Chelsea converted their functions from manufacturing to warehousing throughout the 20th century.⁴³

In the 1960s, several industrial firms started to relocate from Manhattan. The decline of manufacturing in the city impacted the industrial buildings in West Chelsea. A number of industrial buildings were adaptively reused as a result. The former Terminal Warehouse Company's Central Stores building became a night club, called "The Tunnel" in 1987. The Otis Elevator Company building housed "Les Mouches" supper club after the company left in 1974.⁴⁴

A new wave of development appeared in the West Chelsea area in the 1980s. The industrial buildings in the neighborhood began to convert to art galleries and related business. Approximately 40 galleries had opened by 1997. The demand for art gallery space in the area continues today. Currently, more

⁴³ *Ibid.*, p. 24-25.

⁴⁴ *Ibid.*, p. 24.

than 50 percent of the West Chelsea District as a whole is used for art-related business.⁴⁵

The Meatpacking District Neighborhood

This lies between West 15^h and Horatio Streets from 9th to 11th Avenue. The early development between 1840 and 1879 consisted of single-family residences and heavy industries. It was later known as the Gansevoort Market. After the Civil War, the area developed with multiple dwellings and industrial structures, becoming the financial center of the country.⁴⁶

Two major factors resulted in the residential and commercial development of the area in the 1880s: (1) the establishment of two municipal markets, the open-air Farmers' Market (later Gansevoort Market) and the West Washington Market, and (2) the improvement efforts by the Astor Family, who owned many properties in the area. The two markets played an important role in the neighborhood. From the 1880s to World War II, a variety of products such as wholesale produce, fruit, groceries, dairy, eggs, foods, and liquor (until Prohibition) were sold there. In particular, the efforts of the Astor Family were the major contribution to the development of the area, as they owned most of the properties in the Gansevoort Market by inheritance through the 1970s.

⁴⁵ *Ibid.*, p. 25.

⁴⁶ Shockley, Jay. *Gansevoort Market Historic District Designation Report*. (NY, NY: New York City Landmarks Preservation Commission, 2003), 7-8.

Family members used high-quality architecture to maximize the value of their properties.⁴⁷

Between 1928 and 1970 the various transportation and development projects provided easy accessibility between the market and the rest of the metropolitan area. These included: the elevated Miller Highway (built between 1929-1931); the Union Inland Terminal No. 1 (built between 1931-32) occupying the whole block at Ninth Avenue and West 15th Street, the New York Central Railroad's elevated freight railway (built in 1934, later the High Line) passing through around thirty buildings on the route southward to the new St. John's Park Freight Terminal, and the Lincoln Tunnel (built in 1937) connecting the market to New Jersey.⁴⁸

Poultry and meat packing became major industries throughout the district. The old West Washington Market was replaced by the Gansevoort Market Meat Center. By the middle of 20th century, this area became the largest meat and poultry receiving market in the world. Although the major industry in the Gansevoort Market area was meatpacking in the 20th century, there were a variety of other commercial, manufacturing, and industrial functions.⁴⁹

⁴⁷ *Ibid.*, p. 8-11.

⁴⁸ *Ibid.*, p. 17-18.

⁴⁹ *Ibid.*

During the 1960s, the effectiveness of air freight transport resulted in a decrease in demand for use of the Hudson River waterfront. This impacted the meatpacking businesses in the Gansevoort Market area because of these changes in the distribution system of meat and poultry. The appearance of supermarkets and development of both frozen foods and refrigerated trucks also had a significant impact. The Miller Highway was closed in 1974, and demolished in 1980s. The elevated freight line (the High Line) also stopped operation, and subsequently the section south of Gansevoort Street was torn down in the 1980s.⁵⁰

Today, the Meatpacking District, has become famous for its diverse uses, such as retail stores, restaurants, offices, clubs, galleries, and apartments, and it still houses 25-30 meatpacking companies.⁵¹

The New Development in the High Line Neighborhoods

The Meatpacking District, West Chelsea, and the Hudson Yards have been positively affected by the High Line project. A zoning change in 2005 allowed many additional development projects to be proposed, which I will discuss in the next section.

A new branch of the Whitney Museum of American Art is the most significant project currently under construction along the High Line in the Meatpacking

⁵⁰ *Ibid.*, p. 18-20.

⁵¹ *Ibid.*

District. It is expected to be completed in 2014 and open to the public in 2015. Designed by architect Renzo Piano, the museum will include more than 50,000 square feet of indoor galleries as well as 13,000 square feet of outdoor exhibition space.⁵² This museum will certainly have a positive economic impact on this part of New York City.

The newly developed residential properties near the High Line in the West Chelsea neighborhood include: Edison Properties (mixed use; public plaza), 508 West 20th Street; Sherwood Equities, 511 West 21st Street; Equity Residential, 245 10th Avenue; Hampshire Companies (retail-office); L&M Development Partners and Ekstein Development; and Related Companies (mixed use).⁵³

The Hudson Yards will be the site of the central plaza linking the High Line, Hudson River Park and Hudson Boulevard. The site will eventually host 16 buildings including offices, residences and even a school, while Hudson Boulevard will be extended north to West 38th. In 2012, Related Companies began work on the first building of the project, a 51-story headquarters for luxury-goods maker Coach.⁵⁴

⁵² *New Building Project*, Whitney Museum of American Art Official Website.

⁵³ Gregor, Alison. "As a Park Runs Above, Deals Stir Below." *The New York Times* 10 Aug, 2010.

⁵⁴ Faddegon, Thomas. "Hudson Yards: The High Line's Final Phase." *Elegran Real Estate & Development* 6 Mar, 2013.



Figure 12 – Illustrative Rendering of Hudson Yards Plan in 2005

Map source: Department of City Planning, City of New York

A modification to the zoning in the area made these developments possible. Changes in neighborhood characteristics, a growing demand for development, art-related uses, and the proposal for the High Line Park all contributed to the request for changes in zoning, and this took place in 2005. The result was a conversion of zoning in the area from manufacturing to commercial. This work was supported by the New York City Mayor.

This zoning modification affected many additional development projects for areas adjacent to the High Line. The areas used to be categorized as Manufacturing District (M1-5) and Residential District (R8, R8A, R94); after the

zoning modification, the areas were re-categorized as Special West Chelsea District (C6-2, C6-2A, C6-3, and C6-4).

Establishing a Special West Chelsea District not only accelerated property development along the High Line, but also raised the properties' values. The overall purposes of designating this special district was "to facilitate the restoration and reuse of the High Line elevated rail line as an accessible, public open space through special height and setback regulations, High Line improvement bonuses and the transfer of development rights from the High Line Transfer Corridor."⁵⁵ Figure 13 and 14 show the previously existing zoning and the new modified zoning after 2005.

⁵⁵ West Chelsea Special District (N 050161(A) ZRM), enacted 6/23/2005, http://www.nyc.gov/html/dcp/pdf/westchelsea/west_chelsea_final.pdf

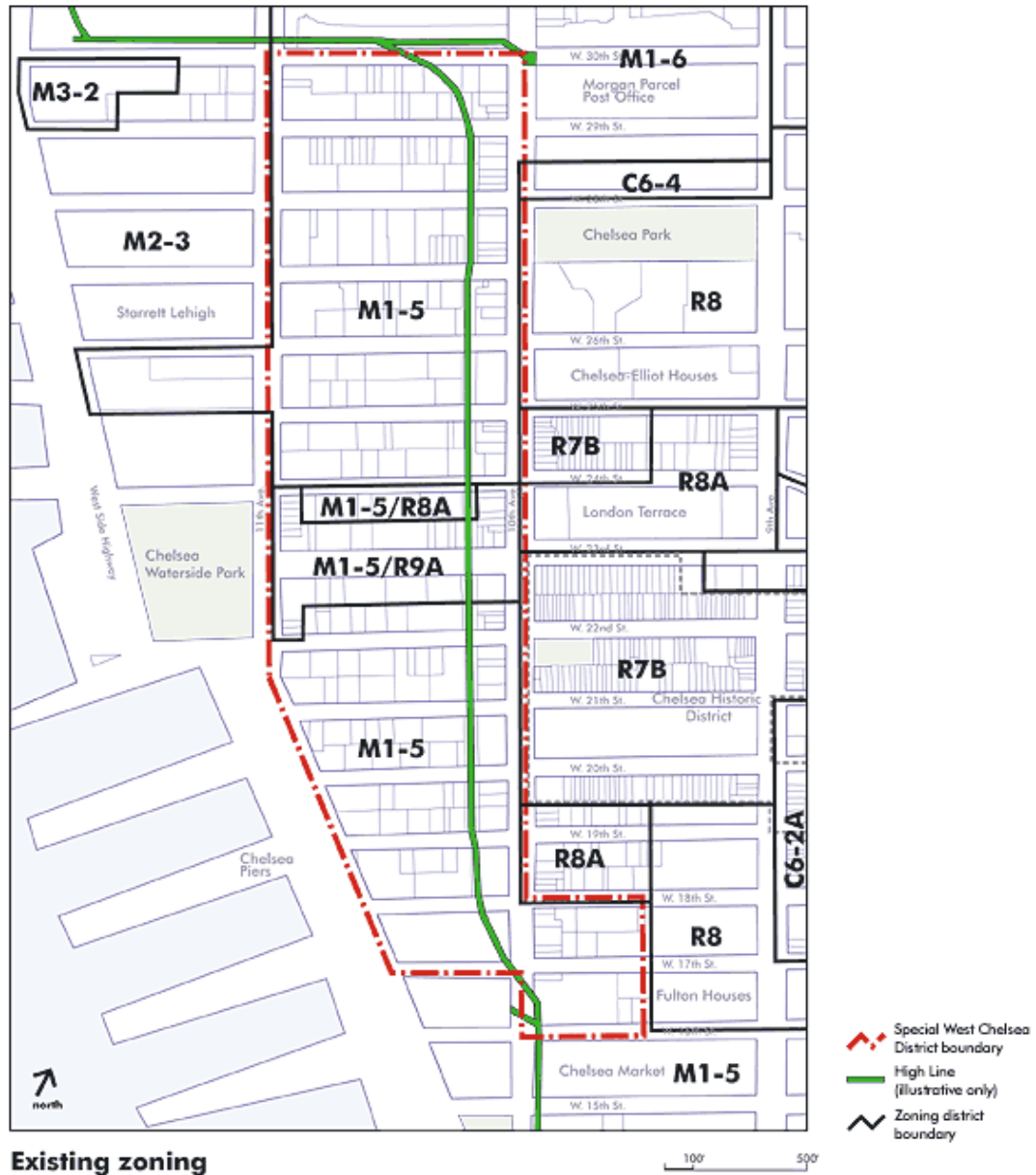
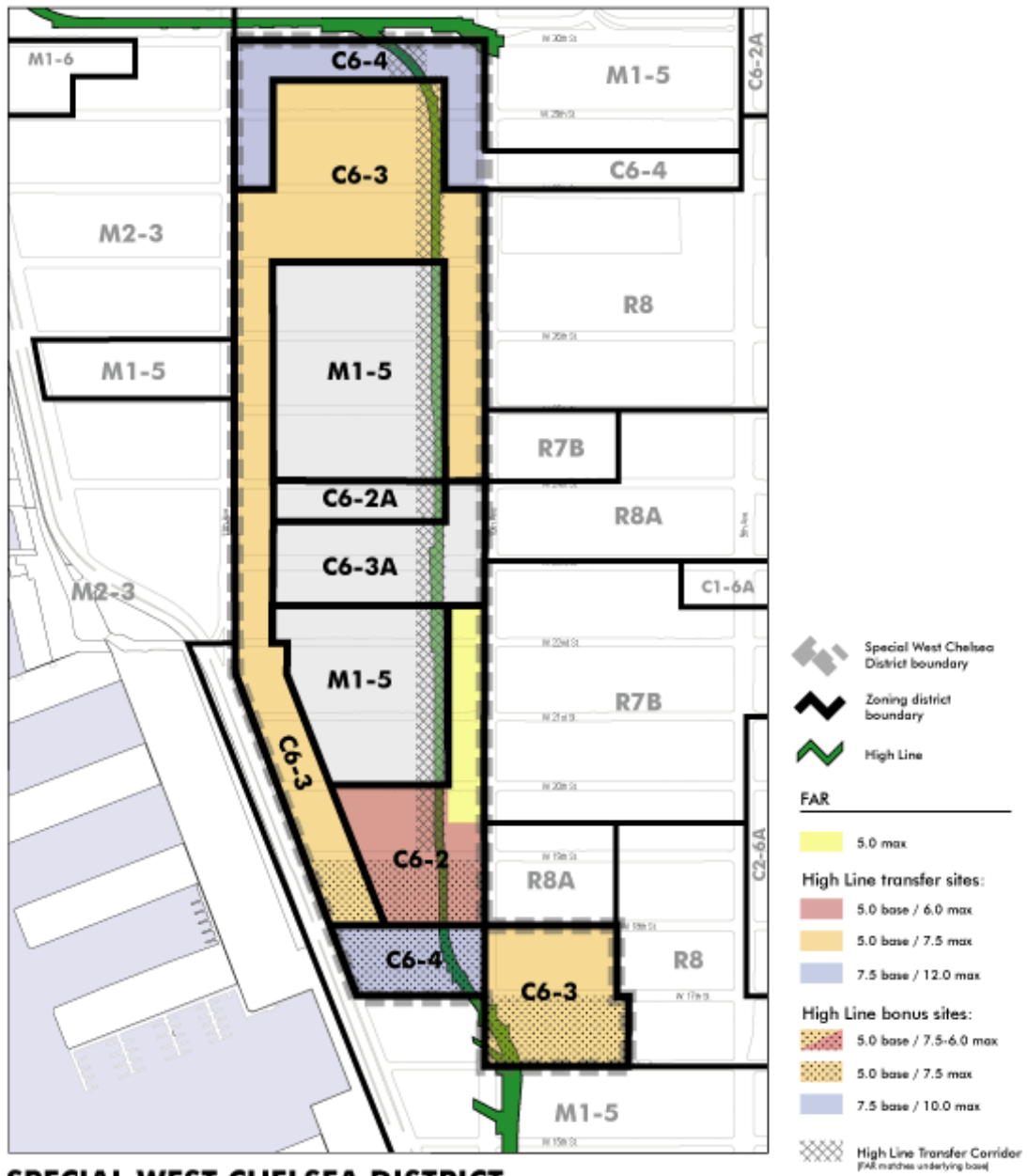


Figure 13 – Existing Zoning Map before the Modification in 2005

Map Source: NYC Department of City Planning



**SPECIAL WEST CHELSEA DISTRICT
 PROPOSED ZONING + FAR**

Figure 14 – Adopted Zoning Proposal Map in 2005

Map Source: NYC Department of City Planning

Developers and property owners hope for further increases in real estate values around the High Line. A strong submarket has been formed by these development projects as shown in Figure 15, which illustrates the projects underway or planned. Although this thesis does not include the construction costs or economic benefits from individual real estate projects, it does examine the economic impact on household income in New York City, and measures the changes in property values for five years brought on by increases in new investment and real estate prices in the area around the High Line.

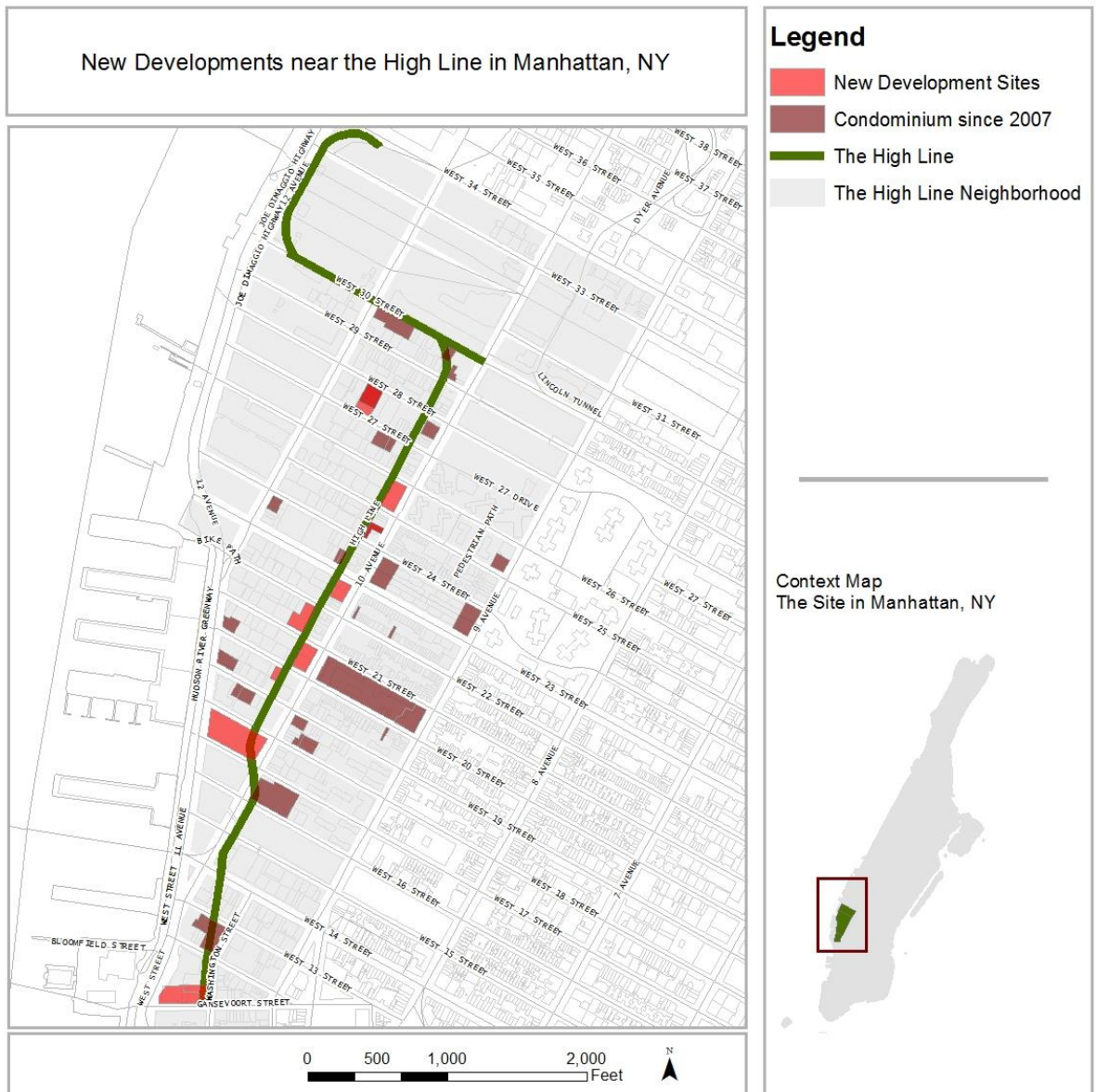


Figure 15 – The New Developments near the High Line

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyeon

Song

CHAPTER 2: METHODOLOGY AND DATA

This chapter introduces the quantitative methodology and data used in my thesis. There are two main methodologies for this study to measure the economic impact. Section 1 examines economic impact analysis, using IMPLAN (IMpact Analysis for PLANning) software. It will display the effect of the High Line's reuse on the total economic output on New York City economy. Section 2 discusses the method by which data was collected about the property values along the High Line. For the two main methodologies, a variety of information was collected from several sources. Each section will explain the sources of the data and how they were managed.

Section 1: Economic Impact Analysis using IMPLAN

There are three regional economic impact modeling systems available: the fairly simple Regional Input-Output Modeling System (RIMS II) of the U.S. Department of Commerce; the more complex Minnesota IMPLAN; and the most sophisticated input-output-econometric model, known as REMI, developed by Regional Economic Modeling, Inc. Among the three methods, this study employs the IMPLAN software due mainly to the easier accessibility to the IMPLAN database compared to those of other models from the Department of City and Regional Planning at Cornell University. The IMPLAN software is commonly used by planners, economists, and other professionals in creating economic impact models and analyses within a variety of industries.

It is worth discussing the basic principles and logic that define the input-output analytic framework in order to understand Social Accounting Matrix (SAM) model, which this thesis uses. Developed in the late 1930s by Wassily Leontief, the input-output modeling technique is used to analyze the interdependence of industries within an economy and predict how changes in demand influence industrial output levels.⁵⁶ Input-output framework quantifies the transmission of the dollar amount between economic agents such as firms and households. Firms are connected to other firms by selling and buying goods and services; households are connected to firms by selling their labors and buying goods and services from them. The input-output matrix is generated on basis of these linkages. The matrix, a collection of a transaction table, represents the production flows in the economy during a particular year.⁵⁷

The transaction table, known as Input-Output (I-O) table, can be read in two ways. Each inner column represents the purchases by inner sectors on the top from those on the left. Each inner row represents the sales of inner sectors on the left to those on the top. The outer columns of an I-O table consist of two main parts: industry purchases and final demand (e.g.

⁵⁶ Miller, Ronald and Blair, Peter, *Input-Output Analysis: Foundations and Extensions*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1985. 1.

⁵⁷ Armstrong, Harvey and Taylor, Jim, *Regional Economics and Policy*, Oxford, England: Philip Allan Publishers Limited, 1985. 27.

household consumption). The outer rows also consist of two main parts: industry sales and value added (e.g. labor compensation).

Table 1 – Illustrative Input-Output Transactions Table

		Producers					Final Demand			
		Agriculture	Construction	Manufacturing	Services	Other	Personal	Gross private	Net exports of	Government
							Consumption	domestic	goods and	purchases of
							Expenditures	investments	services	goods and services
Producers	Agriculture									
	Construction									
	Manufacturing									
	Services									
	Other									
Value Added	Employees compensation						Gross Domestic Product			
	Profit type income and capital consumption allowances									
	Government (Indirect business taxes)									

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Because the I-O transaction table is a data descriptive framework, which is not a model that can be used for impact analysis, several computations and matrix algebras were performed to the figures used in the transaction tables in order to create economic models. In this study, Social Accounting Matrix (SAM) data—produced by IMPLAN and based on the notion of Input-Output framework—are used. Then, three SAM models were built based on the SAM transaction data. The SAM model can be used to explain income distribution among households grouped by income levels. This is because a SAM model determines final consumption and household income endogenously. Table 2 shows the simplified SAM transaction table.

Table 2 – Simplified SAM Transactions Table

SAM	Factors	Households	Production	Exogenous Accounts
Factors			T ₁₃	T ₁₄
Households	T ₂₁	Endogenous		T ₂₄
Production		T ₃₂	T ₃₃	T ₃₄
Exogenous Accounts		T ₄₂	T ₄₃	

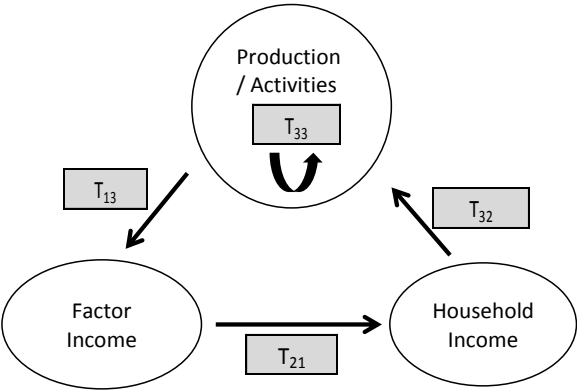


Figure 16 – Circular Flow of Demand in SAM

As shown at Table 2 above, SAM model provides more detailed information of disaggregated households and distinguished factors (e.g. employment compensation) from household incomes. This is beneficial for the analysis of income distributions' inequality. By treating consumption and income distribution endogenously, SAM captures the circular flows as shown in Figure 16.

For this study, two SAM data, the 2002 New York City's data and the 2010 New York City's data were exported from IMPLAN software, an economic impact modeling application. The computation processes of transferring the tables to the models are performed by using Microsoft Excel.

The IMPLAN data constructed the Social Account Matrix (SAM), which was used for the calculation of the economic impact analysis. A SAM is a square matrix whose corresponding columns and rows represent the expenditure and receipt accounts of industries. In the SAM, industry sectors, household incomes, three factors (Employee Compensation, Proprietor Income, and Capital Income) were treated as endogenous variables. The SAM data, a square matrix, were created with columns and rows with those sectors, household incomes, and factors. The total receipts (income) and expenditure of each sector were identical; the sum of each column and corresponding row was identical.

In order to simplify the model, SAM data was aggregated in accordance with North American Industry Classification System (NAICS). This industry classification system was adopted by the Office of Management and Budget (OMB) in 1997. The statistical agencies of the United States use this as the industry classification system.⁵⁸ The classified sectors are embedded in IMPLAN software for aggregating the detailed industries in the United States.

⁵⁸ United States Census Bureau Official Website, *Development of NAICS*, <http://www.census.gov/epcd/www/naicsdev.htm>

The original sectors were aggregated into 20 categories based on 2 Digit NAICS show in Table 3, and then activities where changes originated, such as Construction, Accommodation & Food Services, and Transportation & Warehousing, were left dis-aggregated in the impact analysis. The definition of each industry is described in Appendix C.

Table 3 – 20 Industry Sectors Based on 2 Digit NAICS

2-Digit NAICS Sectors
1 Agriculture, Forestry, Fishing and Hunting
2 Mining
3 Utilities
4 Construction
5 Manufacturing
6 Wholesale Trade
7 Retail Trade
8 Transportation and Warehousing
9 Information
10 Finance and Insurance
11 Real Estate Rental and Leasing
12 Professional, Scientific, and Technical Services
13 Management of Companies and Enterprises
14 Administrative and Support and Waste Management and Remediation Services
15 Educational Services
16 Health Care and Social Assistance
17 Arts, Entertainment, and Recreation
18 Accommodation and Food Services
19 Other Services (except Public Administration)
20 Public Administration

After the aggregation process, the model was needed to be rebuilt. In order to do that, the multiplier function in the IMPLAN program was used. After constructing the SAM model, the Industry Detail SAM file was exported.

In order to construct a SAM model, A SAM Coefficient “A matrix” was constructed by dividing the cells in each column by the column sums. Then, the identity matrix (I Matrix) was generated in order to calculate the SAM multipliers, $(I - A)^{-1}$. With the $(I - A)^{-1}$ matrix, the exogenous variables (a column of “d”) were inputted. The calculation of the exogenous variables was made for each scenario. Using the I-O multiplier framework, which is $X = (I - A)^{-1} \cdot d$, matrix multiplication was performed through Excel function MMULT. This resulted in the economic output multipliers of each industry sector, factor, and household. Also, the employment impact was calculated. It is the result of diagonal matrix, called “W”, that shows the coefficients between the number of workers and the total of labor resources for each industry sector.

$$W = L / X$$

And then, this matrix was linked with Leontief inverse matrix, $(I - A)^{-1} \cdot d$.

$$\text{Employment Impact} = [(I - A)^{-1} \cdot d] \cdot W$$

The employment impact means that if the demand of a sector is increased, the new number of works is generated.⁵⁹

With the matrix algebra that was applied to the matrix of New York City’s 2002 and 2010 data, two different SAM models (2002 NYC SAM model and 2010 NYC SAM model) were built with three different scenarios.

⁵⁹ See Appendix B for the detailed computation.

Exogenous shocks for these three cases are various, although all of them have the same calculation mechanism as described above. In order to obtain the dollar amount of exogenous shocks, the total initial investment on certain industry sectors was investigated.

Scenario 1 is the Economic Impact of the Construction Project (the first and the second section) of the High Line in 2006. Exogenous shocks for the 2002 NYC SAM model are estimated to \$238.5 million, consisting of \$152.3 million for constructing Section 1 and 2 as well as \$86.2 million for design and constructing opened areas on the tracks. The estimated \$238.5 million was treated as exogenous shocks (dY) to “Maintenance and repair of highways, streets, bridges, and tunnels” industry among industry sectors.

The “Maintenance and repair of highways, streets, bridges, and tunnels” industry is one of the original IMPLAN sub-sectors under “Construction” sector. All the other sectors were aggregated based on two digit NAICS except for the “Construction” sector. The IMPLAN original data contain 13 different construction activities ranging from residential structure to maintenance construction. Since the High Line project’s activities affect a sub-sector among 13 “Construction” sub-sectors, the “Construction” activities were left dis-aggregated in the impact analysis. The sub-sectors under “Construction” category include: New residential 1-unit structures, nonfarm; New residential additions and alterations, nonfarm; New farm housing units and additions and

alterations; Manufacturing and industrial buildings; Commercial and institutional buildings; Highway, street, bridge, and tunnel construction; Water, sewer, and pipeline construction; Other new construction; Maintenance and repair of farm and nonfarm residential structures; Maintenance and repair of nonresidential buildings; Maintenance and repair of highways, streets, bridges, and tunnels; and Other maintenance and repair construction.

Table 4 – Cost and Funding Source for the High Line’s Section1 and 2 Project in 2006

Cost		\$
Section 1 and 2		238,500,000
Funding		\$
Section 1 and 2		
Federal Government		20,300,000
State Government		400,000
City Government		112,200,000
Raised Funds by Friends of the High Line		44,000,000

Source: the New York City Economic Development Corporation

Through matrix multiplication $(I - A)^{-1} \cdot dY$, the output column dX was generated. Also, the employment impact was calculated by obtaining the data of the number of employees in each industry from IMPLAN. Two columns had to be generated to calculate the employment impact in Excel; the number of employees (L) and the total output (X) of each sector. The equation of employment impact is $L/X \cdot dX$.

Scenario 2 shows the economic impact of the High Line’s third section project in 2011. The process and calculation methodology of scenario 2 are identical to those of scenario 1. Scenario 2 adopted the IMPLAN data of NYC in the year of 2010. The cost of section 3 was estimated as \$90 million. This was injected into a sub-sector of “Construction” sector, “Maintenance and repair construction of nonresidential structures”.⁶⁰ The sub-sectors under “Construction” category for the IMPLAN 2010 data set include: Construction of new nonresidential manufacturing structures; Construction of other new nonresidential structures; Construction of new residential permanent site single- and multi-family structures; Construction of other new residential structures; Maintenance and repair construction of nonresidential structures; Maintenance and repair construction of residential structures.

Table 5 – Cost and Funding Source for the High Line’s Section 3 Project in 2011

Cost		\$
Section 3	90,000,000	
Funding		\$
Section 3		
City Government	10,000,000	
Raised Funds by Friends of the High Line	20,000,000	
Related Companies and Oxford Property Group	27,800,000	

Source: the New York City Economic Development Corporation

⁶⁰ The classification of industries and the number of IMPLAN sectors are different between the IMPLAN data in 2002 and the IMPLAN data in 2010. IMPLAN 509 is to be used with 2001-2006 IMPLAN data sets. It has 509 sectors. For this thesis, the IMPLAN NYC 2002 data was aggregated from IMPLAN 509. IMPLAN 440 is to be used with 2007 and later IMPLAN data sets. It has 440 sectors. The IMPLAN NYC 2010 data was aggregated from IMPLAN 440.

Scenario 3 is the economic impact of the High Line visitors' spending on New York City. As the High Line has become one of the tremendous tourist attractions in New York City, it is valuable to assess the visitors' spending on New York City. This is because the economic impact analysis from scenario 1 and 2 resulted from the increased demand in one industry sector—the construction industry. It may result in significant indirect effects to the city's economy. However, since the number of visitors to the High Line has increased dramatically, their spending on various NYC's industries may be significant and the indirect effects due to the expenditures may be estimated with significant dollar amounts in many sectors.

In order to calculate the exogenous shocks into the SAM model, several data were collected from the NYC & Company office's website⁶¹: (1) the total number of visitors to New York City in 2010, (2) the visitors total spending of in 2010, and (3) the proportion of the travelers' spending by industry. The number of visitors to the High Line in 2010 was obtained from the Friends of the High Line's website.⁶²

After collecting the data, some calculations were made. In order to measure the average spending of one visitor in NYC, the total spending of NYC's visitors was divided by the NYC total visitors. This calculation brought that an average spending of one NYC visitor is \$645 per day. This dollar amount of

⁶¹ <http://www.nycgo.com/articles/nyc-statistics-page>

⁶² <http://www.thehighline.org/blog/2010/04/02/the-high-line-celebrates-its-200000th-visitor>

the money was multiplied by the number of visitors to the High Line. The total High Line visitors' spending was estimated to be \$1,290,983,606.

The proportion of the New York City visitors' spending on each industry is used in order to calculate the exact dollar amount of expenditures from the High Line's visitors. To be specific, the total spending of tourists account for lodging (28%), food service (23%), transport(20%), retail & service (19%), and recreation (10%).⁶³ Table 6 represents how the High Line visitors' spending dollar amount was estimated.

Table 6 – The High Line Visitors' Spending

NYC Total visitors	48,800,000
NYC Total Spending	\$31,500,000,000
Spending per Person (=NYC Total Spending / NYC Total Visitors)	\$645.49
Number of High Line Visitors	2,000,000
High Line Visitors' Spending (= Spending per Person X Number of High Line Visitors)	\$1,290,983,606.56

The certain proportions of total estimated \$1,290,983,606 are spent in the most affected industries by visitors. Table 7 shows the percentage of travelers' spending by industries and the estimated dollar amount.

⁶³ NYC Statistics in 2010, NYC & Company (New York City's official marketing, tourism and partnership organization)

Table 7 – The Percentage of Visitors’ Spending by Industries

Percentage of Travelers' Spending by Industries	%	Dollar Amount	Million
Lodging	28%	361,475,409.84	361.48
Food Service	23%	296,926,229.51	296.93
Transport	20%	258,196,721.31	258.20
Retail & Service	19%	245,286,885.25	245.29
Recreation	10%	129,098,360.66	129.10
High Line Visitors' Spending	100%	1,290,983,606.56	

Aggregation and dis-aggregation process were performed in order to present more specific industry affected by the tourists. Particularly, “Accommodation & Food Services” sector and “Transportation and Warehousing” sector were disaggregated.

After five exogenous shocks were estimated, the estimated dollar amounts were injected into the computation for the model. Table 8 indicates five exogenous shocks and the dollar amount which are injected into the corresponding industries.

Table 8 – Exogenous Shocks

Industry Sector	Dollar Amount (unit: Million)
Accommodation	361.48
Food services	296.93
Transportation	258.20
Retail trade	245.29
Arts, entertainment & recreation	129.10

Section 2: Property Value Change Analysis

This section examines the economic impact of the High Line to determine the extent of the increased the property values. As many articles and journals have revealed, new development projects have begun since the High Line project started.

To demonstrate the urban spatial development patterns along the High Line, this study used a Geographic Information System (GIS), showing the changes of the property values over time (2007-2011). In order to do that, the spreadsheet was generated to include a collection of land values and total market values in the boundary of the High Line neighborhood from 2007 to 2011. This was joined to NYC GIS map in the year of 2011. The land values and total markets values were collected from NYC's Finance Department, and NYC 2011 GIS map was obtained from Olin Library Media Center at Cornell University.

In order to determine the impact of the High Line on the nearby real estate markets, detailed information was required, about property values in New York City. Since the property values in one year would only show the comparison between the High Line neighborhood and the other areas in New York City, the changes in property values over the five years are more relevant for measuring the impact of the High Line.

There was a limitation to obtaining some of that data, the property assessment rolls in 2005 and 2006. This was because the Property Assessment Roll Archives in NYC list only from 2007. The land/market values since 2005 until now might be a better way to measure the impact of the High Line regarding the fact that the zoning modification took place in 2005 and the first phase of construction on Section 1 of the High Line began in 2006. The future study will be more valuable if the property value changes from 2005 to the present are measured.

The first step for the property value change analysis was to set the boundary of the neighborhood. The distance of the rail track corridor is 1.45 miles, linking the Hudson Yards, the West Chelsea, and the Meatpacking District. The tracks are situated only one and a half blocks east of the Hudson River. Thus, the boundary of the High Line neighborhood to the west is set at the edge of the Hudson River shore. While setting the boundary, the West Chelsea Zoning map adopted by City Council was reviewed. Since the zoning changes might be one of the significant factors to increase the property values in this neighborhood, the boundary for this study had to be larger than the Special West Chelsea District, so that the analysis of the changes of property values affected by the High Line Project are relevant. Also, the neighborhood boundary should not be too large so that the scope of this project is manageable. Figure 17 shows the research boundary, which consists of 51 blocks.

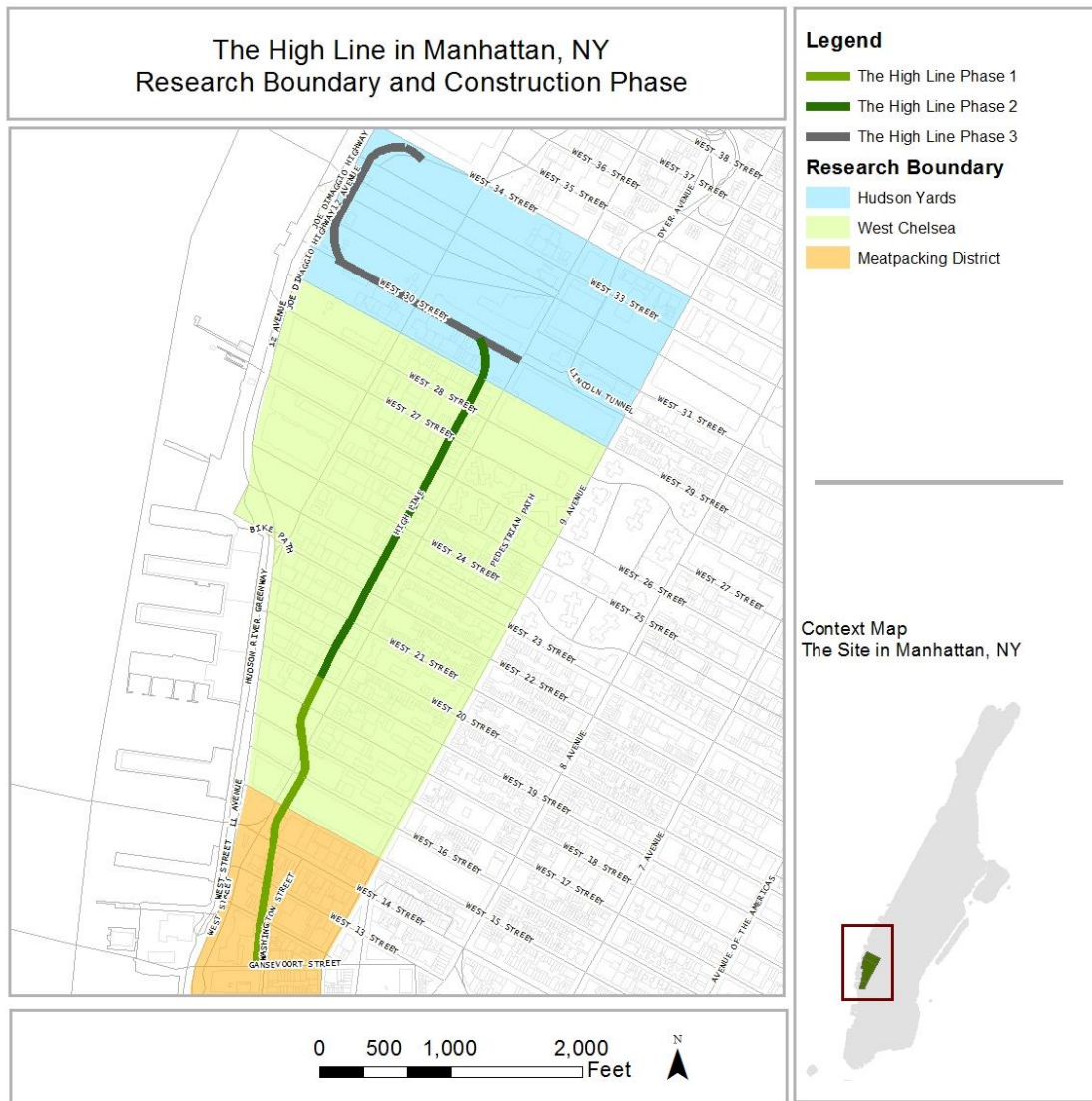


Figure 17 – Research Boundary and High Line’s Construction Phase

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyoung Song

After setting the survey west boundary, the spreadsheet was generated. Since the scope of examination for this study is only the neighborhood in the set boundary, property information corresponding to the study area was extracted from the extensive database which includes the assessed values of every

property in NYC. After removing all other parcels not in the research boundary, 2074 parcels' information in 51 blocks within the boundary was extracted.

Creating the database of property value change was one of the huge tasks for the study. There are two matching processes. The first process was to match some different number of parcels in different years. For example, block number 690 with lot number 42 had only one land value in 2007. However, because of the condominium development in 2009, the same location had 26 lot values with each condominium unit number. Thus, I inserted 25 more rows below the value in 2007 and 2008 in order to place the land values with the same location in the same rows in the spreadsheet. At the end of the process, I had the same number of rows in every year's data from 2007 to 2011. Table 9 shows the illustrative example of spreadsheet.

Table 9 – Illustrative Example of the Spreadsheet

2007			2008			2009			2010			2011					
BLOCK	LOT	Land Value	BLOCK	LOT	Land Value	BLOCK	LOT	Condo Unit#	Land Value	BLOCK	LOT	Condo Unit#	Land Value	BLOCK	LOT	Condo Unit#	Land Value
690	42		690	42	269320	690	42	1001	269320	690	42	1001	269318	690	42	1001	269318
690	42		690	42	67471	690	42	1002	67471	690	42	1002	67471	690	42	1002	67471
690	42		690	42	101751	690	42	1003	101751	690	42	1003	101751	690	42	1003	101750
690	42		690	42	98861	690	42	1004	98861	690	42	1004	98861	690	42	1004	98860
690	42		690	42	73110	690	42	1005	73110	690	42	1005	73110	690	42	1005	73110
690	42		690	42	94321	690	42	1006	94321	690	42	1006	94321	690	42	1006	94320
690	42		690	42	91503	690	42	1007	91503	690	42	1007	91503	690	42	1007	91502
690	42		690	42	73110	690	42	1008	73110	690	42	1008	73110	690	42	1008	73110
690	42		690	42	94321	690	42	1009	94321	690	42	1009	94321	690	42	1009	94320
690	42		690	42	91503	690	42	1010	91503	690	42	1010	91503	690	42	1010	91502
690	42		690	42	73110	690	42	1011	73110	690	42	1011	73110	690	42	1011	73110
690	42		690	42	94321	690	42	1012	94321	690	42	1012	94321	690	42	1012	94320
690	42		690	42	91503	690	42	1013	91503	690	42	1013	91503	690	42	1013	91502
690	42	1590000	690	42	2760000	690	42	1014	73110	690	42	1014	73110	690	42	1014	73110
690	42		690	42	94321	690	42	1015	94321	690	42	1015	94321	690	42	1015	94320
690	42		690	42	94600	690	42	1016	94600	690	42	1016	94600	690	42	1016	94599
690	42		690	42	73110	690	42	1017	73110	690	42	1017	73110	690	42	1017	73110
690	42		690	42	94321	690	42	1018	94321	690	42	1018	94321	690	42	1018	94320
690	42		690	42	94600	690	42	1019	94600	690	42	1019	94600	690	42	1019	94599
690	42		690	42	73110	690	42	1020	73110	690	42	1020	73110	690	42	1020	73110
690	42		690	42	94321	690	42	1021	94321	690	42	1021	94321	690	42	1021	94320
690	42		690	42	94600	690	42	1022	94600	690	42	1022	94600	690	42	1022	94599
690	42		690	42	154953	690	42	1023	154953	690	42	1023	154953	690	42	1023	154952
690	42		690	42	107075	690	42	1024	107075	690	42	1024	107075	690	42	1024	107074
690	42		690	42	202933	690	42	1025	202933	690	42	1025	202933	690	42	1025	202932
690	42		690	42	194766	690	42	1026	194766	690	42	1026	194766	690	42	1026	194765

The second process was to match the block and lot number in the spreadsheet with block and lot number in the GIS map. To connect the two files, I used an identification feature labeled as “BBL”, which consists of block and lot number in 10 digits. For example, block number 691 with lot number 7501 is 1006917501. I created a column in my spreadsheet and put the same identification number in it. The lots in the GIS map are not separated into condo units, that is, all land values are classified by lots, not condo units. Since the land values in my spreadsheet were separated into unit numbers, I had to merge the units into corresponding lots.

For these two matching processes, I investigated every lot merging and lot boundary change by searching the “Library of Tax Maps” and the “History of Tax Map Changes” in the NYC Finance Department. Due to the High Line project and zoning modification, the parcels in the High Line neighborhood have changed considerably: the lot boundaries changed in 31 cases. After matching the number of rows in the spreadsheet with the number of features in the attribute table of NYC 2011 map, the spreadsheet containing the land values and market values of properties in the five years (2007-2011) was successfully incorporated into the NYC 2011 map.

The chapter discussed the methodologies and data for measuring the economic impact of the High Line. The two methods, the economic impact analysis using IMPLAN software and a collection of the property values,

needed a variety of approaches for estimating the economic benefits of the project in the city as well as the nearby areas. The section 1 examined the three scenarios, the economic impact of the sections 1 and 2 of the High Line in 2006, the economic impact of the section 3 of the High Line in 2010, and the economic impact of the High Line visitors' spending in 2010. This section introduced the notion of both the Input-output frame work and the SAM model. The section 2 discussed how the changes in property values along the High Line were calculated. This chapter also included the data sources and the process of managing the data.

CHAPTER 3: THE RESULT, THE ECONOMIC IMPACT OF THE HIGH LINE IN NEW YORK CITY

This chapter examines the results of the economic impact of the High Line in two methodologies. Section 1, the economic impact analysis using IMPLAN, includes three scenarios: (1) the economic impact of the High Line's first and the second section in 2006, (2) the economic impact of the High Line's third section in 2010, and (3) the economic impact of the High Line visitors' spending in New York City. Each scenario has three results: (1) outputs of the industry sectors in New York City's economy, (2) the income earned by households because of the new outputs, and (3) the number of jobs that is expected to be generated because of the new outputs. Section 2, the economic impact of the High Line in terms of changes in property values, presents data in two ways: the percentages of property value changes for the five years, and the spatial analysis of the property value changes using the GIS maps.

Section 1: Economic Impact Analysis using IMPLAN

Scenario 1 measured the economic impact of the High Line project (the first and the second section) in 2006. Injection of \$238.5 million into "Maintenance and repair of highways, streets, bridges, and tunnels" industry, resulted in a considerable economic impact on each industry, household income, and employee factor in New York City. This total investment created a total of

2251 new jobs and increased multipliers of \$943.25 million. Table 10 indicates the economic impact of the investment in section 1 and 2 of the High Line in 2006.

Table 10 – Scenario 1: The Economic Outputs of the Sections 1 and 2 of the High Line in 2006

Factors	\$ (Million)	%
Employee Compensation	126.86	68%
Proprietary Income	19.93	11%
Other Property Income	38.78	21%
Total	185.58	100%
Household Income	\$ (Million)	%
Households less than 10k	0.85	1%
Households 10-15k	0.93	1%
Households 15-25k	2.46	3%
Households 25-35k	3.58	5%
Households 35-50k	6.51	9%
Households 50-75k	13.01	18%
Households 75-100k	9.66	13%
Households 100-150k	13.64	19%
Households 150k+	22.44	31%
Total	73.09	100%
Industry Sectors	\$ (Million)	%
Ag, Forestry, Fish & Hunting	0.04	0%
Mining	10.11	1%
Utilities	6.23	1%
Construction	0.00	0%
New residential 1-unit structures, nonfarm	0.00	0%
New residential additions and alterations, nonfarm	0.00	0%
New farm housing units	0.00	0%
Manufacturing and industrial buildings	0.00	0%
Commercial and institutional buildings	0.00	0%
Highway, street, bridge, and tunnel construction	0.00	0%
Highway, street, bridge, and tunnel construction	0.00	0%

Other new construction	0.00	0%
Maintenance and repair of farm and nonfarm residential structures	0.07	0%
Maintenance and repair of nonresidential buildings	0.69	0%
Maintenance and repair of highways, streets, bridges, and tunnels	477.00	70%
Other maintenance and repair construction	0.04	0%
Manufacturing	8.84	1%
Wholesale Trade	13.85	2%
Transportation & Warehousing	13.59	2%
Retail trade	30.63	4%
Information	3.90	1%
Finance & insurance	10.22	1%
Real estate & rental	15.83	2%
Professional- scientific & tech svcs	27.99	4%
Management of companies	2.05	0%
Administrative & waste services	8.41	1%
Educational svcs	1.78	0%
Health & social services	14.88	2%
Arts, entertainment & recreation	1.76	0%
Accommodation & food services	4.80	1%
Other services	14.42	2%
Government & non NAICs	17.45	3%
Total	684.59	100%
Grand Total	943.25	

Data source: 2002 NYC IMPLAN

The number of employees also increased in 2006 through impacts of the project. Table 11 demonstrates the increased employment. The result shows that most increased in jobs were in the industry of Maintenance and repair of highways, streets, bridges, and tunnels (1,211 people) and Other services (179 people).

Table 11 – New Jobs from the High Line project in each industry in 2006

Industry Sectors	Number of Employment Before the Project	Employment Impact
Ag, Forestry, Fish & Hunting	117.74	0.09
Mining	137.61	0.47
Utilities	5,762.34	2.68
Construction	5,137.09	0.00
New residential 1-unit structures, nonfarm	1,988.50	0.00
New residential additions and alterations, nonfarm	7,318.05	0.00
New farm housing units	138.21	0.00
Manufacturing and industrial buildings	1,408.49	0.00
Commercial and institutional buildings	17,806.23	0.00
Highway, street, bridge, and tunnel construction	3,217.62	0.00
Highway, street, bridge, and tunnel construction	679.73	0.00
Other new construction	3,157.71	0.00
Maintenance and repair of farm and nonfarm residential structures	1,264.40	0.18
Maintenance and repair of nonresidential buildings	6,555.89	2.96
Maintenance and repair of highways, streets, bridges, and tunnels	804.35	1211.57
Other maintenance and repair construction	755.93	0.15
Manufacturing	56,762.23	31.81
Wholesale Trade	92,513.34	41.45
Transportation & Warehousing	47,045.64	63.83
Retail trade	147,385.47	169.51
Information	158,010.81	9.33
Finance & insurance	408,584.19	25.19
Real estate & rental	154,044.75	32.56
Professional- scientific & tech svcs	407,048.91	132.33
Management of companies	53,773.46	4.94
Administrative & waste services	170,919.42	65.83
Educational svcs	92,063.77	18.52
Health & social services	229,016.19	91.23
Arts, entertainment & recreation	118,086.98	18.92

Accommodation & food services	147,980.97	42.61
Other services	200,381.05	179.10
Government & non NAICs	483,544.97	105.79
Total	3023412.06	2251.05

Data source: 2002 NYC IMPLAN

Scenario 2 quantified the economic impact of the construction project (the third section) of the High Line in 2011. The initial investment of 90 million dollars in the construction industry resulted in an increase of \$359.8 million in NYC's economy. As table 12 shows, the most affected household income class from the investment in 2010 is "Households 150k+." Even though the initial injections of scenarios 1 and 2 went to the construction industry, the most affected industries are different between these two scenarios. In the process of scenario 2, the top three industries which increased the most output are Construction, Real Estate & Rental, and Health & Social Services. The cause of the different results is that the economic activities in the city in 2010 are different from 2006.

Table 12 – The Economic Outputs of the Section 3 of the High Line in 2011

Factors	\$ (Million)	%
Employee Compensation	66.76	76%
Proprietary Income	6.88	8%
Other Property Income	13.93	16%
Total	87.57	100%

Household Income	\$ (Million)	%
Households LT10k	0.18	1%
Households 10-15k	0.15	0%
Households 15-25k	0.59	2%
Households 25-35k	1.01	3%
Households 35-50k	2.03	6%
Households 50-75k	4.28	12%
Households 75-100k	3.47	10%
Households 100-150k	5.68	16%
Households 150k+	17.24	50%
Total	34.63	100%
Industry Sectors	\$ (Million)	%
Ag, Forestry, Fish & Hunting	0.00	0%
Mining	0.08	0%
Utilities	1.56	1%
Construction	0.00	0%
Construction of new nonresidential manufacturing structures	0.00	0%
Construction of other new nonresidential structures	0.00	0%
Construction of new residential permanent site single- and multi-family structures	0.00	0%
Construction of other new residential structures	0.00	0%
Maintenance and repair construction of nonresidential structures	180.14	72%
Maintenance and repair construction of residential structures	0.03	0%
Manufacturing	12.19	5%
Wholesale Trade	3.50	1%
Retail trade	8.26	3%
Transportation	0.87	0%
Warehousing and storage	0.03	0%
Information	1.09	0%
Finance & insurance	4.54	2%
Real estate & rental	8.72	4%
Professional- scientific & tech svcs	7.29	3%
Management of companies	0.30	0%
Administrative & waste services	1.68	1%
Educational svcs	1.05	0%
Health & social services	8.48	3%

Arts, entertainment & recreation	0.66	0%
Accommodation	0.27	0%
Food services and drinking places	2.01	1%
Other services	4.58	2%
Government & non NAICs	1.33	1%
Total	248.64	100%
Grand Total	370.84	

Data source: 2010 NYC IMPLAN

The number of jobs also increased in the year of 2011 through the project.

Table 13 demonstrates the increased employment, which totals 706. The

most affected industries in terms of the increase in employment are

Maintenance and repair construction of nonresidential structures, Retail Trade, and Health & social services.

Table 13 – The increased jobs affected by the High Line project in each industry in 2011

Industry Sectors	Number of Employment Before the Project	Employment Impact
Ag, Forestry, Fish & Hunting	99.09	0.00
Mining	2,626.22	0.10
Utilities	6,652.10	0.98
Construction	8,644.34	0.00
Construction of new nonresidential manufacturing structures	899.36	0.00
Construction of other new nonresidential structures	10,330.65	0.00
Construction of new residential permanent site single- and multi-family structures	2,784.20	0.00
Construction of other new residential	9,789.80	0.00

structures		
Maintenance and repair construction of nonresidential structures	6,560.60	479.80
Maintenance and repair construction of residential structures	1,208.50	0.10
Manufacturing	27,393.98	10.63
Wholesale Trade	78,249.98	9.89
Retail trade	152,276.45	43.68
Transportation	17,928.50	3.28
Warehousing and storage	1,056.94	0.15
Information	153,437.41	2.43
Finance & insurance	384,161.84	8.71
Real estate & rental	129,598.68	11.75
Professional- scientific & tech svcs	371,037.53	23.44
Management of companies	57,392.23	0.82
Administrative & waste services	143,106.48	10.34
Educational svcs	108,757.10	7.22
Health & social services	239,794.39	39.67
Arts, entertainment & recreation	114,308.83	5.35
Accommodation	29,176.81	1.29
Food services and drinking places	149,944.83	15.88
Other services	132,374.89	22.76
Government & non NAICs	461,403.25	7.90
Total	2800994.97	706.16

Data source: 2010 NYC IMPLAN

Scenario 3 explored the economic impact of the High Line visitors' spending on New York City. Unlike the scenarios 1 and 2, four initial exogenous shocks were injected into the NYC economy in order to examine the High Line visitors' economic effects.

Table 14 – The Four Exogenous Shocks and the Dollar Amount Injected

Industry Sector	Dollar Amount (unit: Million)
Accommodation	361.48
Food services	296.93

Transportation	258.20
Retail trade	245.29
Arts, entertainment & recreation	129.10

By injecting money into these five industry sectors, the economy of NYC experienced a significant increase in economic output of each industry and household income. The Table 15 shows the increased demand of industry sectors resulted from the High Line visitors' spending in New York City in the year of 2011. The industry sectors most affected from the multiplier effect are Retail Trade, Food services and drinking places, Accommodation, Transportation, and Arts, Entertainment & Recreation. It is noteworthy that even though the real estate & rental industry did not experience a direct impact from the shocks, the indirect impact is significant. Nearly 148 million dollars were increased indirectly through the multiplier effect in 2011. Since the number of the High Line visitors have continuously increased since its open in 2009 (2 million in 2010, 3.7 million in 2011), the multiplier impact will increase in the following years.

Table 15 – The Economic Outputs of the High Line Visitors' Spending in 2011

Factors	\$ (Million)	%
Employee Compensation	852.55	69%
Proprietary Income	108.64	9%
Other Property Income	269.31	22%
Total	1230.51	100%
Household Income	\$ (Million)	%

Households LT10k	2.43	1%
Households 10-15k	2.04	0%
Households 15-25k	7.87	2%
Households 25-35k	13.45	3%
Households 35-50k	27.08	6%
Households 50-75k	56.58	12%
Households 75-100k	46.27	10%
Households 100-150k	76.66	16%
Households 150k+	245.21	51%
Total	477.58	100%

Industry Sectors	\$ (Million)	%
Ag, Forestry, Fish & Hunting	0.00	0%
Mining	0.59	0%
Utilities	47.99	2%
Construction	0.00	0%
Construction of new nonresidential manufacturing structures	0.00	0%
Construction of other new nonresidential structures	0.00	0%
Construction of new residential permanent site single- and multi-family structures	0.00	0%
Construction of other new residential structures	0.00	0%
Maintenance and repair construction of nonresidential structures	10.60	0%
Maintenance and repair construction of residential structures	0.48	0%
Manufacturing	104.03	3%
Wholesale Trade	37.69	1%
Retail trade	560.79	18%
Transportation	446.97	14%
Warehousing and storage	1.91	0%
Information	18.52	1%
Finance & insurance	88.31	3%
Real estate & rental	148.54	5%
Professional- scientific & tech svcs	91.96	3%
Management of companies	18.45	1%
Administrative & waste services	57.61	2%
Educational svcs	15.29	0%
Health & social services	116.62	4%
Arts, entertainment & recreation	193.71	6%

Accommodation	469.79	15%
Food services and drinking places	540.55	17%
Other services	63.39	2%
Government & non NAICs	125.34	4%
Total	3159.15	100%
Grand Total	4867.24	

Data source: 2010 NYC IMPLAN

The High Line visitors' spending on four industry sectors results in an increase in many industries indirectly as shown in Table 16. 15,848 jobs were newly created through the activities of the High Line visitors in 2011. The number of jobs is increasing significantly more than scenarios 1 and 2. The attractive raised open space increases visitors. If the High Line had been demolished and new residential buildings had been constructed on the site, the visitors' extra payment on each industry related to the tourism wouldn't have been spent.

Table 16 – The increase in jobs as a result of the High Line Visitors'

Spending in each industry in 2011

Industry Sectors	Number of Employment Before the Project	Employment Impact
Ag, Forestry, Fish & Hunting	99.09	0.00
Mining	2626.22	0.70
Utilities	6652.10	30.24
Construction	8644.34	0.00
Construction of new nonresidential manufacturing structures	899.36	0.00

Construction of other new nonresidential structures	10330.65	0.00
Construction of new residential permanent site single- and multi-family structures	2784.20	0.00
Construction of other new residential structures	9789.80	0.00
Maintenance and repair construction of nonresidential structures	6560.60	28.23
Maintenance and repair construction of residential structures	1208.50	1.86
Manufacturing	27393.98	90.76
Wholesale Trade	78249.98	106.63
Retail trade	152276.45	2964.77
Transportation	17928.50	1677.53
Warehousing and storage	1056.94	9.28
Information	153437.41	41.29
Finance & insurance	384161.84	169.40
Real estate & rental	129598.68	200.17
Professional- scientific & tech svcs	371037.53	295.82
Management of companies	57392.23	50.92
Administrative & waste services	143106.48	354.24
Educational svcs	108757.10	105.25
Health & social services	239794.39	545.45
Arts, entertainment & recreation	114308.83	1566.11
Accommodation	29176.81	2268.78
Food services and drinking places	149944.83	4278.79
Other services	132374.89	315.19
Government & non NAICs	461403.25	746.25
Total	2800994.97	15847.68

Data source: 2010 NYC IMPLAN

Section 2: Property Value Change Analysis

Section 2 examined the economic impact of the High Line in terms of changes in property values. The assessed land values and market values were collected to show the economic impact of the High Line on the neighborhood.

All properties in the set research boundary are within five minutes walking distances to the High Line.

Depending on the characteristics of the parcels, the percentages of the raised property values would vary. In order to come up with the results, some important assumptions had to be made. First, all parcels in the boundary are valued as the same regardless of their land uses. For example, the commercial buildings and the residential buildings were treated as having the same uses. Second, parcels that were assessed as \$0 in land/market values in the previous years and gained positive values due to new construction were excluded for the calculation because they cannot be calculated in the format of percentage.

The results of property changes are presented in two ways: the average calculation table and the GIS spatial analysis. The calculation output table was generated in two ways: a total average change of values in 606 parcels in 51 blocks excluding all condominium developments and a total average change of values in 625 parcels in 51 blocks including condominium developments. Both cases resulted from the calculation of total average percentages of land/market values of properties near the High Line. The total average land/market values in the High Line neighborhood have continuously increased. The largest increase occurred between 2007 and 2008. Depending on if the condominium development cases are included or

excluded, the total average changes are shown differently. Overall, the change in land values from 2007 to 2011 ranges from 79% to 95%, and the change in total market values from 2007 to 2011 ranges from 41% to 108%. The table 17 shows the property value changes between 2007 and 2011 excluding condominium developments. The table 18 shows the property value changes between 2007 and 2011 including condominium developments.

Table 17 – The Property Value Changes between 2007 and 2011

Excluding Condominium Developments

	2007-2008	2008-2009	2009-2010	2010-2011	2007-2011
Land Value Changes	17%	32%	23%	2%	79%
Market Value Changes	24%	6%	9%	12%	41%

Table 18 – The Property Value Changes between 2007 and 2011 Including

Condominium Developments

	2007-2008	2008-2009	2009-2010	2010-2011	2007-2011
Land Value Changes	19%	35%	26%	2%	95%
Market Value Changes	32%	14%	20%	13%	108%

The following GIS Maps were generated on the basis of the property values. Figure 18 shows the household income distribution from 2005 to 2009. The lower parts of the Special West Chelsea District and the Meatpacking District show a high household income distribution, more than \$150K. However, there

are low income households between West 18th Street and West 14th Street as well as between West 26th Street and West 30th Street.

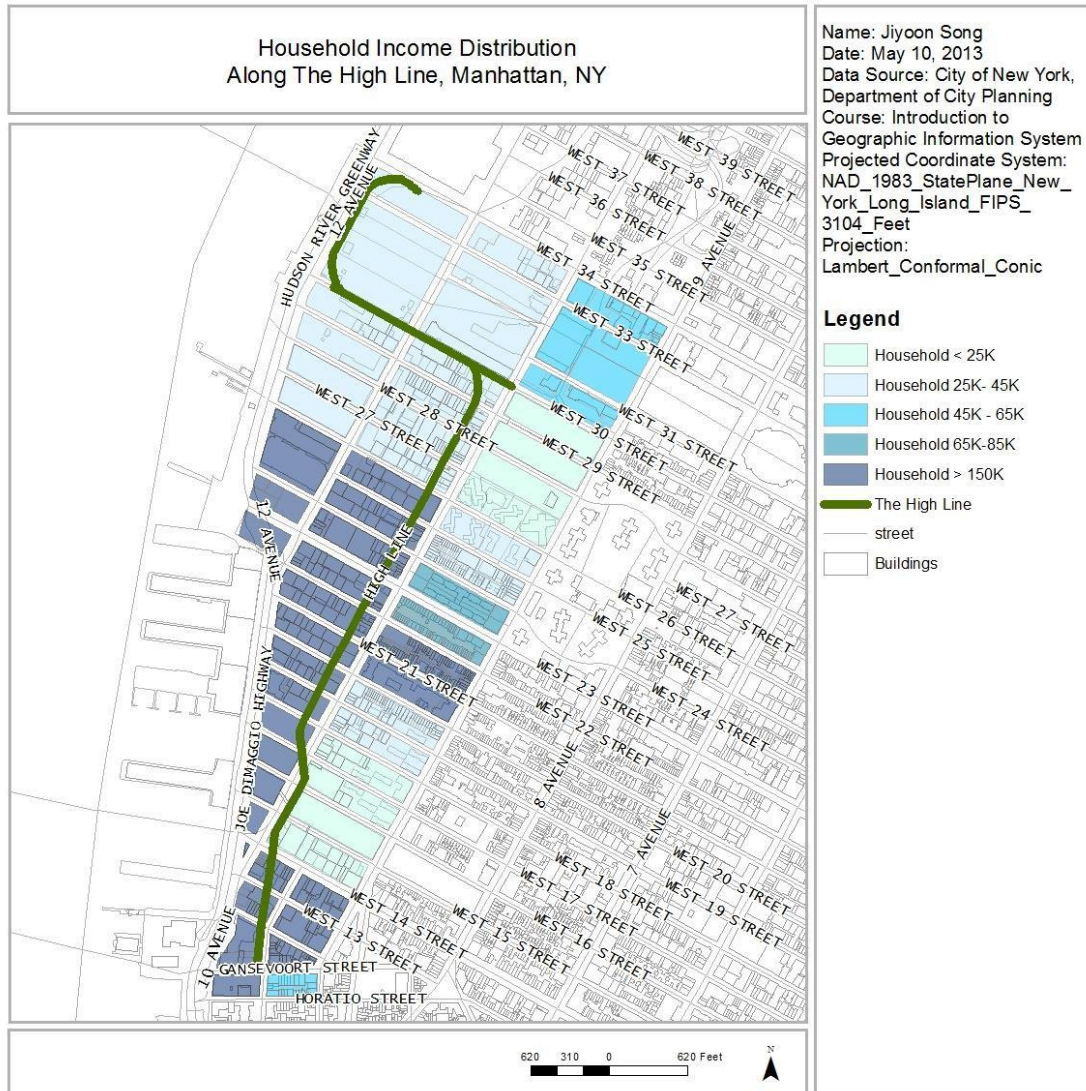


Figure 18 – Household Income Distribution from 2005 to 2009 along the High Line

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyoong Song

Figure 19 presents the spatial analysis of new development related to the newly constructed buildings since 2005. It shows that the closer areas to the High Line have a larger number of new buildings. The black colors in the map show all the parcels including the buildings constructed after 2005. For the spatial analysis, I created four buffers (Buffer is a zone around the High Line feature measured in unit of feet). Four buffer zones within 150feet, 500 feet, 1000 feet, and 2000 feet from the High Line were created in GIS. The table below the map shows the estimated percentages of new building footprints among the each buffer area. Although the percentage change is not significant, it still shows the impact of the High Line in the map.

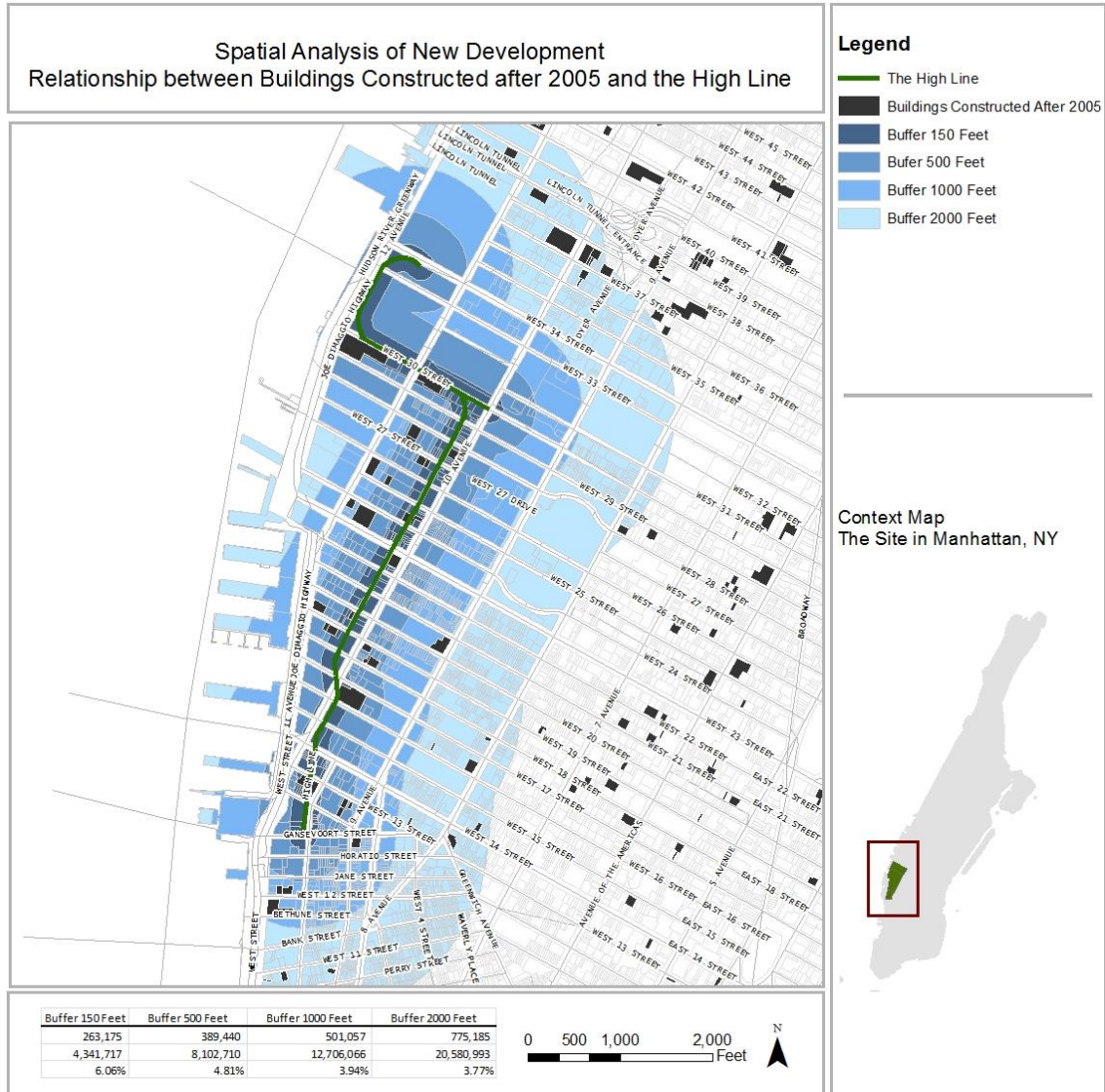


Figure 19 – Spatial Analysis of New Development, Relationship between Buildings Constructed after 2005 and the High Line

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyeon Song

In order to compare the measured property value changes in the site with the other areas in NYC, the average change in land value per square foot in the city was calculated from the spreadsheet developed based upon the Property Assessment Roll Archives. The total average change in value laid in NYC is estimated to be \$226 from 2007 to 2011.⁶⁴ On the map (Figure 20) blue circles represent that the changes in land values between those years are higher than the total average changes in NYC. This shows how much the land value per square foot has been increased in comparison to the other areas in NYC.

⁶⁴ Land value per square feet of all areas in NYC was annually calculated. NYC Finance Department provided Property Assessment Roll Archives which include the assessed value of every property in New York City. Among five boroughs—Manhattan, Bronx, Brooklyn, Queens, and Staten Island—only land values of Manhattan areas were extracted. The calculation was made by dividing the sum of all land values by total areas of Manhattan.

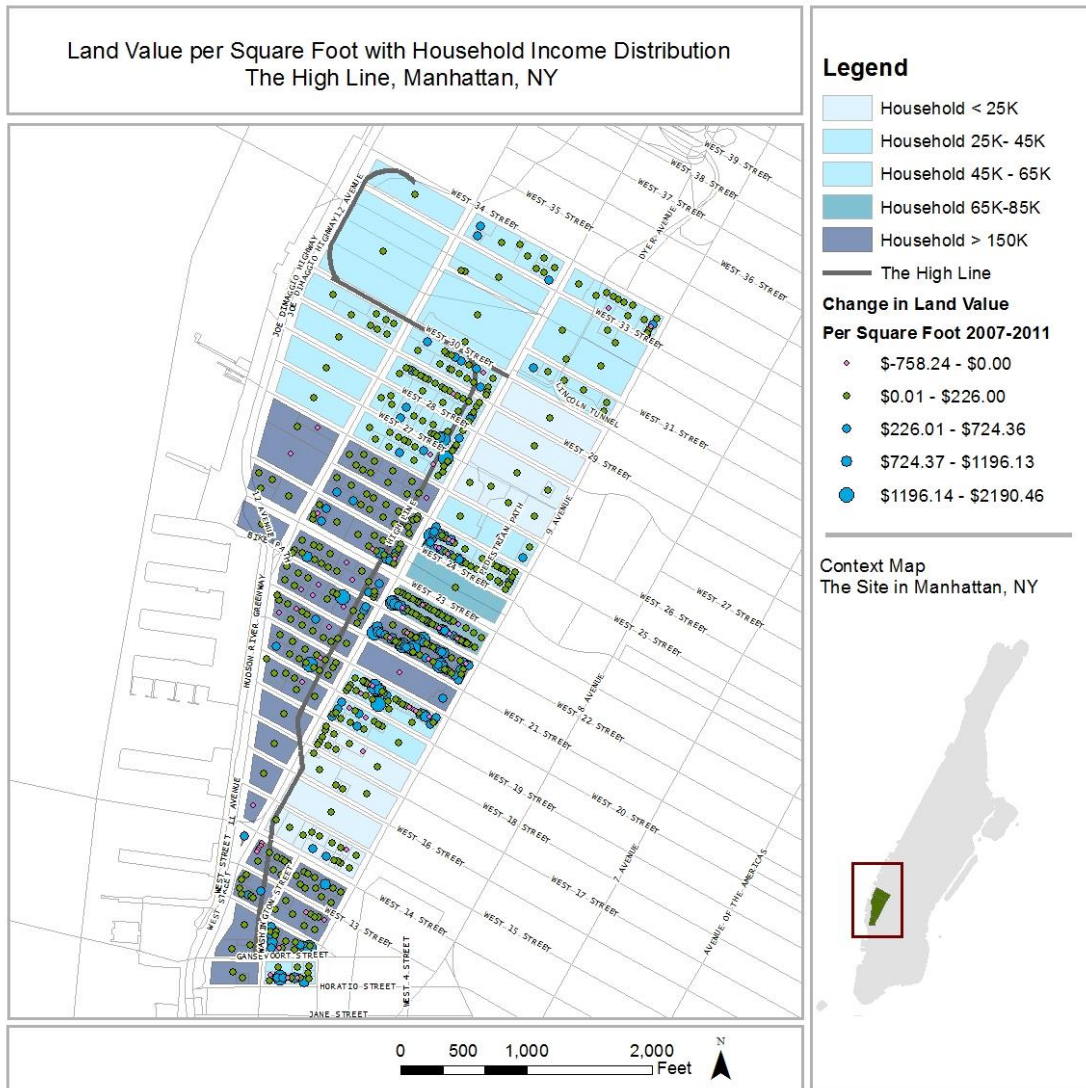


Figure 20 – Land Values per Square Foot with Household Income Distribution Along the High Line

Data Source: Department of City Planning, City of New York / GIS Map created by Jiyoung Song

The economic impact of the High Line is considerable as shown and discussed in this chapter. The two methodologies, IMPLAN and a collection of property values, demonstrated the impact of the project in the city as well as

the nearby areas. The economic impact analyses with three scenarios show that the project of reusing the railroad track created significant amounts of money on a variety of industry sectors and increased jobs in the city. Although the direct investments were injected into construction industry in the scenarios 1 and 2, the indirect effects were considerable in the economic outputs, the household incomes, and the employments. As the scenario 3 examined, the 3.7 million High Line visitors per one year generates a considerable economic benefits on various industries in the city. Their expenditures on the industries including lodging, food service, transport, retail & service, recreation bring about the increase in the economic outputs in the other industries indirectly. The High Line has positively affected the neighborhood's economy. The section 2 examined which areas had been benefited and how much the property values had increased for the five years. As presented in the chapter, the areas had been developed and changed considerably. Many properties in the neighborhoods have higher percentages of changes in land value per square foot than the average in Manhattan.

CONCLUSION

The High Line's economic impact both on New York City and on the nearby areas has been considerable. The public and private funds invested in the project went back to the city and had multiplier effects throughout the city. Also, the High Line neighborhood experienced raised property values.

As the High Line project was inspired by an elevated rail track used for open space, Promenade Plantée in Paris, other cities in the United States have been inspired by the High Line. Advocates in Chicago, the borough of Queens (NYC), St. Louis, Philadelphia, and Jersey City have undertaken similar projects with their abandoned railroad corridors. They are trying to reuse their elevated rail tracks as an open space, a park, or a trail, in ways that are similar to the High Line but with specific visions suited to their own cities.⁶⁵

Among these cases, the Philadelphia example was investigated through an Interview with the board of directors of the Friends of the Rail Park. The main advocate as well as one of the directors of this organization, Mr. Aaron Goldblatt agreed that the High Line is an important model for their project. However, the vision they pursue is based more on their own community. They see the Rail Park as serving the residences in the city primarily as well as

⁶⁵ Appendix A

people who come to the convention center that is right next to the rail track. Mr. Goldblatt said the idea of the project is viewed favorably by government officials and people in the city. The key for the project at this point is funding sources and feasibility studies.⁶⁶ This thesis, which demonstrates the economic values of reusing elevated rail tracks, could be helpful in forecasting the economic impact of the similar projects. Particularly, the methodologies and the process of obtaining the data to measure the benefits are applicable.

Historic preservation has greater positive economic impact than new construction.⁶⁷ The value of historic preservation and adaptive reuse should be included when considering the value of projects undertaken in the city. The worth of previously abandoned infrastructure needs to be reconsidered since it also holds intrinsic value as historic cultural resources to be preserved. This thesis found that the reuse of disused rail tracks for the High Line Park generated economic value. In 2006, the project of sections 1 and 2 of the High Line's rail tracks created value in the amount of nearly \$943 million across the whole NYC economy. Through the project, 2251 new jobs were created in the same year. In 2011, the project of section 3 of the High Line's rail tracks generated nearly \$371 million in the whole NYC's economy. It brought about new 706 jobs in the city in the year. Also, those 3.7 million High Line visitors in 2010 spent \$1,290 million in NYC.

⁶⁶ Aaron Goldblatt. Personal interview. 04/24/2013

⁶⁷ Rypkema, Donovan D. *Economics of Historic Preservation: A Community Leader's Guide*. (Washington, D.C.: National Trust for Historic Preservation, 1994.)

The total increased household income was shown to be nearly \$4.8 billion. 15,848 new jobs were created because of the High Line visitors' spending. The results demonstrate that the idea of transforming and reusing the abandoned High Line rail tracks was feasible and beneficial for the city's economy.

While conducting the research for this thesis, several limitations were encountered. One difficulty was obtaining the NYC's IMPLAN data and the property values along the High Line. The only available IMPLAN data for my thesis before 2005 (the beginning year of the construction) was the year of 2002. I used the IMPLAN data of 2002 to measure the economic impact of the section 1 and 2 of the High Line. Since the section 2 of the High Line started in 2009, measuring the economic impact of the section 2 in 2008 would have been more relevant.

Problems obtaining data was not limited to IMPLAN. Property value data for 2005 and 2006 was also difficult to acquire. This was because the Property Assessment Roll Archives in NYC list are only available online from 2007. Since the first phase of construction on Section 1 of the High Line started in 2006 and the zoning was modified in 2005, a future study will be more useful if the property value changes from 2005 to the present are measured.

While managing the data on property valuation, all the targeted real estate was aggregated because the scope of this research and the time available was limited. For more exact results, sorting properties by use and calculating the average changes of property values by use will be helpful for understanding the economic situation better.

It would be helpful if future studies examined the impact of the historic structure with different scenarios but similar methodologies. For example, setting two different scenarios and comparing two impacts will show more obvious value of economic impact of historic preservation. One scenario can be the demolition of historic resource, and the other can be the preservation of it. IMPLAN software will be useful for the study measuring the economic impact. This will be a valuable process for making decisions about historic preservation, urban development, and city/community planning.

My thesis examined the bright side of the High Line by measuring the economic impact. The idea of appreciating the historical infrastructure is important. However, reusing the corridor as a park was not the only option. It could have supported tourism trains or the real estate could have been used for more museums. Mr. Nathaniel Guest, J.D., a train enthusiast, the Preservation Initiatives Director and National Railway Heritage Grants Program Director for the National Railway Historical Society, argued that transforming the rail tracks into parks is “the last good option” because it

prevents use of this property for railroads in the future if it is needed, due to issue of ownership and the challenges of transforming the use back to railway transport again.⁶⁸

Based on a community's specific conditions and its feasibility study, the future of abandoned rail tracks can vary widely. Measuring the economic impact of the abandoned rail tracks as a transportation use would be one of the important studies for preserving railroad tracks in the United States.

⁶⁸ Nathaniel Guest, Personal interview. 04/29/2013

Appendix A: Interview Description

The Interviewee: Aaron Goldblatt, the boards of director of the Friends of the Rail Park in Philadelphia

The Interview Date: 04/24/2013

People use Promenade Plantée in Paris to go to places. That's the absolutely the way in which we see in this project. We see it as a commuter bicycle and commuter route as much as the destination at its own, whereas the High Line is the only a destination. You can't even take a bike up there, because it is too small. Bike will kill people whereas ours is huge. It is also a three miles long.

Philadelphia Museum of arts, Rodin museum, the barns foundation, the range of cultural institutions are all along this route. This is a part of Philadelphia museum of arts, called Broumon building, the tunnel through which this passes, so you could connect 3000 feet. Submerged and comes up, 20 feet above. This is the Philadelphia convention center, there used to be a bridge it goes right here was the train shed. The train shed is now part of the convention center. There is nothing green here. The need for a park is extremely important to this community. This is the community that will be most impacted by the economic stuff. Because they are working classes and poor people live here. They will be forced out because the property values will really

sour. The huge development will be right here. That is all devoted to affordable housing. 23 story towers. The china town development corporation will build that.

Question: The purpose of this park is for the community or for the tourists?

It will be great if the tourists came for. But by the time this is built, there are so many things here. So, later there will be someone who just come here just to see this.

We see this as serving the residences in the city primarily as well as for people who come for convention center. It is a huge convention center, hundreds and hundreds and thousands of people come here a year. So there is a possibility of using this as a beautiful walkaway to the cultural quarter of the city. You know, they don't have to cross the street. I mean this is a three miles safe street. And they can come up to go to any one of the institutions, having taking a lovely stroll to the park, but not so much as a destination.

Questions: Could you specify the economic enhancement to the community?

It is a broad. We don't have any data. Our next task is to raise the money to commission of feasibility study for the entire thing. And that will include things like its economic impact. People have been working on the small piece for ten

years. This tiny part will be on the construction during this year. Two people have been working on this for ten years. They see it as a neighborhood park. That we are bringing to the table is the idea of connectivity cross the whole city. They are seeing this as a local destination. It has got a beautiful view of the city, you are up in the air, it is gorgeous, and it is lovely.

We have only done the plan only from here to here. We are most interested in this area right near the Broad Street. The way Philadelphia is laid out from Broad Street and Market Street, called the Avenue of the arts. The street improvement was a huge civic investment. We think this thing will make the connection between street level and 25 feet below, making connection of this park and north broad street. It is very important in developing Avenue of Arts. Now it is kind of abandoned entirely. It will bring people there. Actually we don't want to spend whole of our time in design right now. We want people to imagine what it is going to be like. But the real data gathering is more important; feasibility study. I love the high line. But it emphasizes on design very much. Partially it is a destination only. And ours is more emphasizing more on values than design.

Question: Where to ask the funds for? How?

(talking about the small piece which already under construction) As far as I know they already got the money. She has a power behind this partial piece.

Sarah lives in here around this neighborhood. She brought in the organization called, Central City district, which is very powerful government agency in Philadelphia. Paul levy is the director. He has taken on the project. So he is raising the money to build this piece. He raised money to design and hired landscape architects Brian Hynn studio that designed it. He may have already raised the money for it. He is force of nature. He is very powerful get it done. He has done huge project of city hall. He is really sophisticated in capital dollars. (Dollars for the capital project.) and William Penn foundation, a lot of local foundation and government money that's what's going do this. Although the governments all say we don't have any money. But if you are good, you are going to figure it out where we get it from. And local foundation, what may be interesting to Sarah and John is funds for programming. Jugglers, music events, gardening, all kinds of program that activate the space, public history projects, and there are so many different kinds of sources of funds for that that all depend on what it is doing. I mean I can imagine the public art projects along the park, I can think of several different sources funds for that. The Night Foundation, pew charitable trust. And funders for public history project. Walks. Talking about Industrial heritage of the entire site.

Question: Ownership of the Rail Park?

It is mostly owned by SEPTA. There couple of specifically are. It is not clear who owns it. We are going to have lots of legal costs. That is part of our feasibility study, (ownership issues), but mostly SEPTA.

From here to here, it is a reading international corporation. They used to own trains. Now they own Darral real estate. They own some of reading viaduct as well as some of the properties along the way. Their real business is now entertainment, movie theaters all over the United States. They even do some producing of film. How they got there? I have no idea. They were a big railroad. They own many of the abandoned rights-of-the way in the United States. They still own this one, and city is trying to get them to either the property to over to the city or they are negotiating. The negotiation is going nowhere. There are things more urgent.

Question: I was wondering how the Philadelphia city government reacts to this project. Have you proposed it yet?

Yes, sort of. I mean everybody knows about it. Every city agent and SEPTA are supporters of the project with the some reservation. Everyone we talked in the city all extremely support to our project. They all have some skepticism. They all little bit...where is the money is going to come from? How is it going to pay for itself? Feramna park system, which is one of the largest park systems in the world, cannot afford the park to maintain it. The number of

acres per park per employees of the park agency is they can't handle it at all. The idea of giving them another 200 acres makes them very nervous. Again, the feasibility study in my mind is very important, business plan. How it will sustain itself. It include there are 8 neighborhood which this passes; Friends of groups, in which of the neighborhood would help to maintain it. Our organization, Friends of Rail Park, overall would like to be an operator. So we would raise the money to help maintaining it every year. We would make some program to make some money. We would handle the rentals for spaces along the way, which money will help to sustain it. That's our plan. But we don't have data yet to support that. Like I said, everybody likes the idea, there are some competing plans. One is BRT. Like a trolley system on the route. We don't think that is going to actually happen in our lifetime. That is because millions and millions of dollars will take just for the infrastructures. The whole park is big enough so we could do both, be a park and BRT. It is not going to do much. It goes only here to here back and forth. It is not that far. You can walk there in 20 minutes. Short answers: yes real support, there is some competing interest, there is some skepticism that money can ever be found, there is also.

The city is about to release a plan, called PLAN 2035. It is about a vision for the city over the next twenty years. It involves lots of. People do supportive. We won't there involvement in its being made so that we don't even need to send this to them. They have been involved in the production of it.

We will be the owners of it because we are going to raise the money for. But they will have drafts. In the plan we did design in this piece, had a community task force that included the people from city agency including SEPTA and planning commission. We are going to do feasibility but they are going to be involved. So it is not handing something from outside. So, at some point, there will be official "here is the plan" but they have been known about it on and on.

Question: What are the land uses of the area?

There are some light industries. There are heavily china town. There is a lot of small family-based manufacturing in china town which is another reason to be careful, because of their jobs. Force them out because of expansion of expensive residential areas are more valuable. So developers come and force out the manufacturing, no one which lives here would like that. We want their participation. So being careful about the economic impact doesn't screw up the economic drivers is an important part of our conversation. The area is residential, institutional, there is community college (30 acres campus), museums. Actually developers own major chunk of some areas. He wants to put a giant casino, 700000 square foot casino and hotel complex. This is real problem for us because they want to cover some bridge over us. This is the reason why we design this partial first. He doesn't own the right of way. But if he builds it we lose the sky space, which will be negative impact.

Question: Have you undertaken any existing structure survey?

We have not done. There are toxic soil issues. They looked at Structural issues for the bridges. There are 10 bridges over streets. I think overall they are in good shape. That survey will be part of our feasibility study. Hundreds fifteen thousand dollars study; legal cost, the engineering cost, business planning, all the study need consultants.

Question: How to deal with the prevention of gentrification issue?

Zoning issues. Retaining certain zoning status by industry. Not letting the viaduct part take that zoning right away. It has to do with making deals with developers. A developer comes in and it is going to do a hundred million dollar high end residential project, x number of units have to reserve for low market costs for low income housing. Those kinds of deals happen all the time. They can only happen representials' interests at the table.

This is the last remaining infrastructure for the history of industrialization. I want to see it in some way interpreting that for the city. This is part of our heritage. Regional planning authorities are going to support this.

Appendix B: Computation of Multiplier for SAM Model

In order to build a SAM model, the technical coefficients were calculated. The coefficient was computed as:

$$a_{ij} = z_{ij} / X_j$$

The coefficient was computed for every sector in the SAM. X_j means the total output of industry j , a_{ij} means for every dollar of good j produced requires a_{ij} dollars of input i . z_{ij} is the amount of output from industry i sold into j . After constructing a table of technical coefficients, A matrix, the equations were performed. The output of an industry can be computed with an equation,

$$X_1 = a_{11} \cdot X_1 + a_{12} \cdot X_2 + a_{13} \cdot X_3 + \dots + d_1$$

Where A is matrix of I-O coefficients, X is vector total output, and d is vector of exogenous shock. The equation as a matrix is:

$$X = A \cdot X + d, \quad (I-A) \cdot X = d, \quad \text{or} \quad X = (I - A)^{-1} \cdot d$$

Appendix C: NAICS Code Description

Source: NAICS Association (<http://www.naics.com/>)

Sector 11 -- Agriculture, Forestry, Fishing and Hunting

The Agriculture, Forestry, Fishing and Hunting sector comprises establishments primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats.

Sector 21 -- Mining, Quarrying, and Oil and Gas Extraction

The Mining, Quarrying, and Oil and Gas Extraction sector comprises establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas. The term mining is used in the broad sense to include quarrying, well operations, beneficiating (e.g., crushing, screening, washing, and flotation), and other preparation customarily performed at the mine site, or as a part of mining activity.

Sector 22 – Utilities

The Utilities sector comprises establishments engaged in the provision of the following utility services: electric power, natural gas, steam supply, water supply, and sewage removal. Within this sector, the specific activities

associated with the utility services provided vary by utility: electric power includes generation, transmission, and distribution; natural gas includes distribution; steam supply includes provision and/or distribution; water supply includes treatment and distribution; and sewage removal includes collection, treatment, and disposal of waste through sewer systems and sewage treatment facilities.

Sector 23 -- Construction

The Construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems). Establishments primarily engaged in the preparation of sites for new construction and establishments primarily engaged in subdividing land for sale as building sites also are included in this sector.

Sector 31-33 -- Manufacturing

The Manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The assembling of component parts of manufactured products is considered manufacturing, except in cases where the activity is appropriately classified in Sector 23, Construction.

Sector 42 -- Wholesale Trade

The Wholesale Trade sector comprises establishments engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The merchandise described in this sector includes the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing.

Sector 44-45 -- Retail Trade

The Retail Trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

Sector 48-49 -- Transportation and Warehousing

The Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation. Establishments in these industries use transportation equipment or transportation related facilities as a productive asset. The type of equipment depends on the mode of transportation. The modes of transportation are air, rail, water, road, and pipeline.

Sector 51 -- Information

The Information sector comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products, (b)

providing the means to transmit or distribute these products as well as data or communications, and (c) processing data.

Sector 52 -- Finance and Insurance

The Finance and Insurance sector comprises establishments primarily engaged in financial transactions (transactions involving the creation, liquidation, or change in ownership of financial assets) and/or in facilitating financial transactions. Three principal types of activities are identified:

Sector 53 -- Real Estate and Rental and Leasing

The Real Estate and Rental and Leasing sector comprises establishments primarily engaged in renting, leasing, or otherwise allowing the use of tangible or intangible assets, and establishments providing related services. The major portion of this sector comprises establishments that rent, lease, or otherwise allow the use of their own assets by others. The assets may be tangible, as is the case of real estate and equipment, or intangible, as is the case with patents and trademarks.

Sector 54 -- Professional, Scientific, and Technical Services

The Professional, Scientific, and Technical Services sector comprises establishments that specialize in performing professional, scientific, and technical activities for others. These activities require a high degree of expertise and training. The establishments in this sector specialize according

to expertise and provide these services to clients in a variety of industries and, in some cases, to households. Activities performed include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services.

Sector 55 -- Management of Companies and Enterprises

The Management of Companies and Enterprises sector comprises (1) establishments that hold the securities of (or other equity interests in) companies and enterprises for the purpose of owning a controlling interest or influencing management decisions or (2) establishments (except government establishments) that administer, oversee, and manage establishments of the company or enterprise and that normally undertake the strategic or organizational planning and decision making role of the company or enterprise. Establishments that administer, oversee, and manage may hold the securities of the company or enterprise.

Sector 56 -- Administrative and Support and Waste Management and Remediation Services

The Administrative and Support and Waste Management and Remediation Services sector comprises establishments performing routine support activities

for the day-to-day operations of other organizations. These essential activities are often undertaken in-house by establishments in many sectors of the economy. The establishments in this sector specialize in one or more of these support activities and provide these services to clients in a variety of industries and, in some cases, to households. Activities performed include: office administration, hiring and placing of personnel, document preparation and similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal services.

Sector 61 -- Educational Services

The Educational Services sector comprises establishments that provide instruction and training in a wide variety of subjects. This instruction and training is provided by specialized establishments, such as schools, colleges, universities, and training centers. These establishments may be privately owned and operated for profit or not for profit, or they may be publicly owned and operated. They may also offer food and/or accommodation services to their students.

Sector 62 -- Health Care and Social Assistance

The Health Care and Social Assistance sector comprises establishments providing health care and social assistance for individuals. The sector includes both health care and social assistance because it is sometimes difficult to distinguish between the boundaries of these two activities. The

industries in this sector are arranged on a continuum starting with those establishments providing medical care exclusively, continuing with those providing health care and social assistance, and finally finishing with those providing only social assistance. The services provided by establishments in this sector are delivered by trained professionals. All industries in the sector share this commonality of process, namely, labor inputs of health practitioners or social workers with the requisite expertise. Many of the industries in the sector are defined based on the educational degree held by the practitioners included in the industry.

Sector 71 -- Arts, Entertainment, and Recreation

The Arts, Entertainment, and Recreation sector includes a wide range of establishments that operate facilities or provide services to meet varied cultural, entertainment, and recreational interests of their patrons. This sector comprises (1) establishments that are involved in producing, promoting, or participating in live performances, events, or exhibits intended for public viewing; (2) establishments that preserve and exhibit objects and sites of historical, cultural, or educational interest; and (3) establishments that operate facilities or provide services that enable patrons to participate in recreational activities or pursue amusement, hobby, and leisure-time interests.

Sector 72 -- Accommodation and Food Services

The Accommodation and Food Services sector comprises establishments providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption. The sector includes both accommodation and food services establishments because the two activities are often combined at the same establishment.

Sector 81 -- Other Services (except Public Administration)

The Other Services (except Public Administration) sector comprises establishments engaged in providing services not specifically provided for elsewhere in the classification system. Establishments in this sector are primarily engaged in activities such as equipment and machinery repairing, promoting or administering religious activities, grantmaking, advocacy, and providing drycleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services.

Sector 92 -- Public Administration

The Public Administration sector consists of establishments of federal, state, and local government agencies that administer, oversee, and manage public programs and have executive, legislative, or judicial authority over other institutions within a given area. These agencies also set policy, create laws, adjudicate civil and criminal legal cases, provide for public safety and for national defense. In general, government establishments in the Public

Administration sector oversee governmental programs and activities that are not performed by private establishments. Establishments in this sector typically are engaged in the organization and financing of the production of public goods and services, most of which are provided for free or at prices that are not economically significant.

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Images

“The High Line Then and Now”

www.skyscrapercity.com/showthread.php?t=1374161

Internet Resources

Abandoned Rails: www.abandonedrails.com/links.aspx

Brotherhood of Locomotive Engineers and Trainmen: <http://www.ble.org>

Whitney Museum of American Art Official Website <http://whitney.org/> Railroad History: www.american-rails.com/railroad-history.html

NYC EDC: www.nycedc.com/project/high-line

The High Line: www.thehighline.org

HR&A: www.hraadvisors.com/featured/the-high-line/ NAICS Association

<http://www.naics.com>

NC State University

[http://vagallo2.wordpress.ncsu.edu/2012/11/25/the-high-line/NYC & Company Incorporation](http://vagallo2.wordpress.ncsu.edu/2012/11/25/the-high-line/NYC%20%26%20Company%20Incorporation) <http://www.nycgo.com/articles/nyc-statistics-page>

NYC Dept. of City Planning:

<http://www.nyc.gov/html/dcp/html/about/pr092012.shtml>

United States Census Bureau: <http://www.census.gov/epcd/www/naicsdev.htm>

Internet Media Resources

“High Line History”: www.youtube.com/watch?v=oH5rs2ktazQ

“New York’s New High Line Park”:
www.youtube.com/watch?v=_W2Yq1zzxAc