A Study of the Manhattan Bridge:
The Discovery and Rediscovery of New York City

Hannah Pavlovich
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Adviser: Stan Allen
Second reader: David Billington

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Sanborn Tax Maps (edits by author), 2009; Google Maps, 2009; United States Department of the Interior, "Geological Survey," 1955,

1 Introduction

New York City has been continuously changing physically and conceptually since the Dutch settled it in the 17th century. By examining the history and physical surroundings of the Manhattan Bridge, the changing ideas of the city can be expressed in four different periods of the twentieth century: the period around the turn of the century that led to the construction of the bridge, the consolidation of an urban vision in the

1920's and 30's, the post-war move towards dispersal and suburbanization, and the rediscovery of the city at the end of the 20th century.

Links between Manhattan and Brooklyn were being established as early as the 17th century. The advent of the Fulton Ferry in 1814 allowed for a quick exchange along the narrow portion of the East River. Manhattan was a convenient trading post and Brooklyn was setting up an intricate system of factories and ports along its shoreline. Manhattan, however, was more important to the New York area than Brooklyn. It was more established and had more residents. However, some residents wanted to flee the traffic and overcrowding. The 1811 Manhattan gridiron plan created dispersion from Lower Manhattan. The connections with Brooklyn were also valuable. The Brooklyn Bridge, built in 1883, decreased travel time between the two areas, which created incentive to build suburbs for Manhattan. The city was changing from a conglomeration around a fort to a greater networked area. The density of the developed areas was not extreme and did not incite any type of radical development. It did, however, set the precedent for direct routes between Manhattan and Brooklyn as well as the idea of a main area with subsidiary areas.

The Manhattan Bridge was created in response to the desire to move between Manhattan and Brooklyn. The Brooklyn Bridge was becoming overcrowded and the Williamsburg Bridge was not in the correct location to properly alleviate the overcrowding and traffic congestion of the Lower East Side. Each of these bridges had their own connotations. The Brooklyn Bridge was created as a monument for Manhattan. It portrayed the idea of the expanding city as well as the material innovations that allowed for the creation of the long span. The Williamsburg Bridge was an attempt to express steel as an aesthetic material and use of the elastic theory. This ultimately failed because the deck was too thick to create the slender lines desired and the exposed steel was highly criticized. The Manhattan Bridge's slender deck and

structurally sound nature made it the most important of the East River Bridges. It had the ability to carry heavy cars and train systems.

In the 1920's New Yorkers from all over Brooklyn used the Manhattan Bridge to commute to the Lower East Side. The bridge was the most heavily used connection to Manhattan, which suggests that commuters were using it for more than getting into the Lower East Side. In 1924 the Regional Plan Association formed to solve the traffic problems of New York City, and their suggestions for the Lower East Side describe this condition. The RPA wanted to widen or repair roads stemming from the Manhattan Bridge to permit flow of traffic. The Municipal Art Society also realized the problems the roads around the Manhattan Bridge faced, but sought to solve the with an element of City Beautiful. Projected traffic maps of the region display the concept of Manhattan as the central focus of commuting and movement. There was no particular part of Manhattan that was the central focus of the maps. The commuter's objective was to reach the island. While all traffic flowed into the city, dispersal throughout the city or around it was not a main concern. The Manhattan Bridge was used as a connection between the entirety of Brooklyn and Queens and the entirety of Manhattan.

Robert Moses changed the concept of the Manhattan Bridge during his reign over New York City from the 1930's to 60's. His Brooklyn-Queens Expressway connected to the Manhattan Bridge, but his FDR Drive did not. The Manhattan Bridge was part of the Brooklyn and Queens infrastructure, but was left out of the loop around Manhattan. It was also used as a way to block out the undesirable aspects of Manhattan, like the purely infrastructural FDR Drive and Moses project housing. These elements were pushed to the periphery of the city to allow for the central area to become prominent. By hiding these elements, it was placing importance on the Lower East Side as its own entity. The city was becoming increasingly decentralized as former urban dwellers moved to the

suburbs on Moses' expressways, but the city itself was still seen as one large unit rather than a collection of neighborhoods.

Moses ultimately intended, however, to extend an expressway from the Manhattan Bridge to the Holland Tunnel. This would have destroyed the idea of the Lower East Side as a particular destination on the island. It also restructures the way of looking at the project housing. Instead of being pushed to make room for the growth of the Lower East Side, it was pushed to create room for a greater interstate system. By moving the people of the Lower East Side, he was setting up space for his expressway. The area would have been completely broken by a violent cut through it, putting the needs of those going through the city above the needs of those in the city. Jane Jacobs was a prominent figure in destroying this plan, describing how it would destroy the community and thus the safety of the city. She was a champion of the idea of the small city, even going as far as to say Manhattan and Brooklyn would have been better had they never been consolidated into the Greater New York. By destroying the Lower Manhattan Expressway, Jacobs secured the Manhattan Bridge as a direct connection to the Lower East Side. The BQE went along the shores of Brooklyn and Queens, distributing commuters to Manhattan via multiple bridges and tunnels like the Brooklyn-Battery Tunnel and Queensboro Bridge. This period marked the re-evaluation of the city. High population density and small, tightly-packed neighborhoods were now seen as positive attributes of the city. Today, the Dumbo (down under the Manhattan Bridge overpass) community of Brooklyn demonstrates the idea of New York City in the shadow of the Manhattan Bridge and other major infrastructure. The role of the Manhattan Bridge as a link between Manhattan and Brooklyn has been constantly evolving, revealing a series of distinct urban readings of New York City.

Figure 2.1 Map of Lower Manhattan and Brooklyn with Brooklyn Bridge, circa 1900
Sanborn Tax Maps (edits by author), 2009.

2 Starting the City

Settling and Planning Manhattan

When the Dutch first settled the southern tip of Manhattan in the early seventeenth century, their road layout was irregular and not in a normal grid pattern (figure 2.2). The Dutch originally set up Lower Manhattan, their New Amsterdam, in

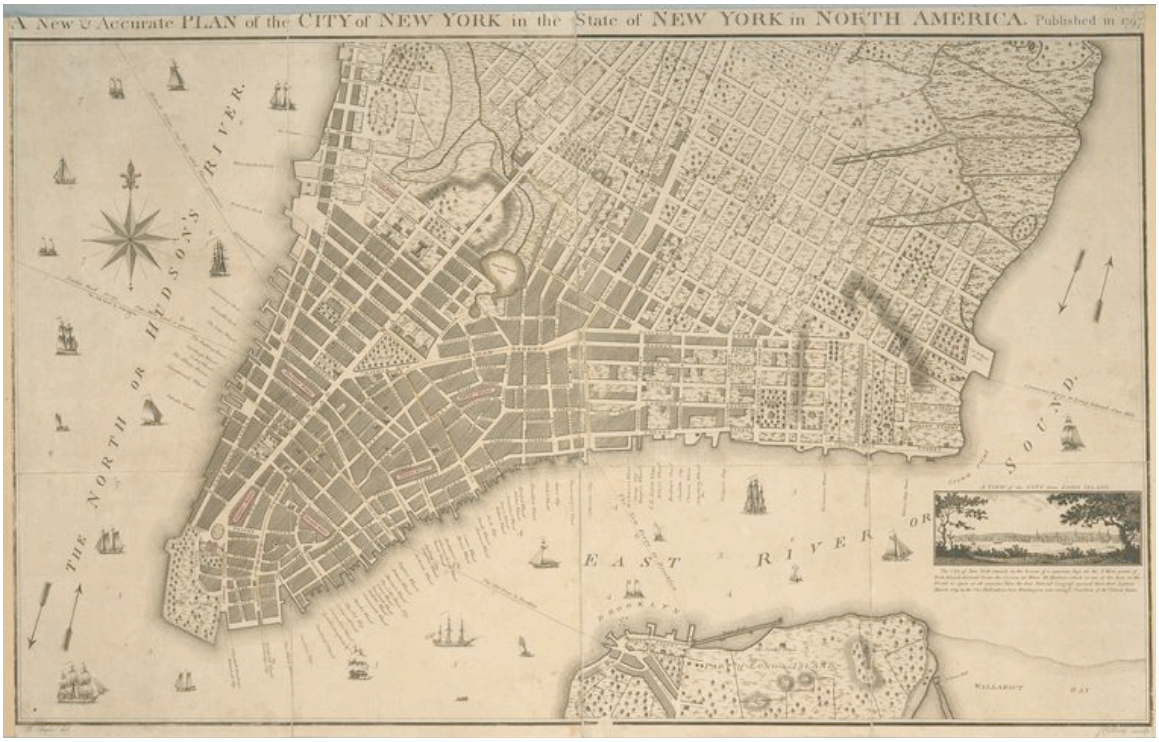

Figure 2.2 1797 Plan of New York
Benjamin Taylor, NYPL Digital Gallery, 2009.

1626 as a factory.[1] The "settlement" only consisted of 270 residents, whose purpose was to create European-style goods to trade for local goods. Those who worked in the factories were defined by their occupation. They would "sleep in the company barracks, work with company tools and equipment, and eat in the company mess."[2] This created the idea of tenement housing which lasted until the turn of the 20th century.

Security was a main concern when designing the city. Director-General Peter Minuit built a fort along the southern tip of Manhattan at the Battery, and the city grew out from there (figure 2.3). Settlement occurred mainly along the East River because a stream ran though the center of Broad Street, which then connected to the East River.[3] Living and working along the stream provided greater trading opportunities. The river was built over by Governor Edmund Andros in the 1670's, but today the canal still runs

[1] Edwin G. Burrows and Mike Wallace, *Gotham: a History of New York City to 1898* (Oxford: Oxford University Press, 1999), 24-26.
[2] Burrows and Wallace, *Gotham: a History of New York City to 1898*, 26.
[3] *The New York Times*, "The Evolution of Manhattan: I. the Dutch Settlement," March 27, 1904.

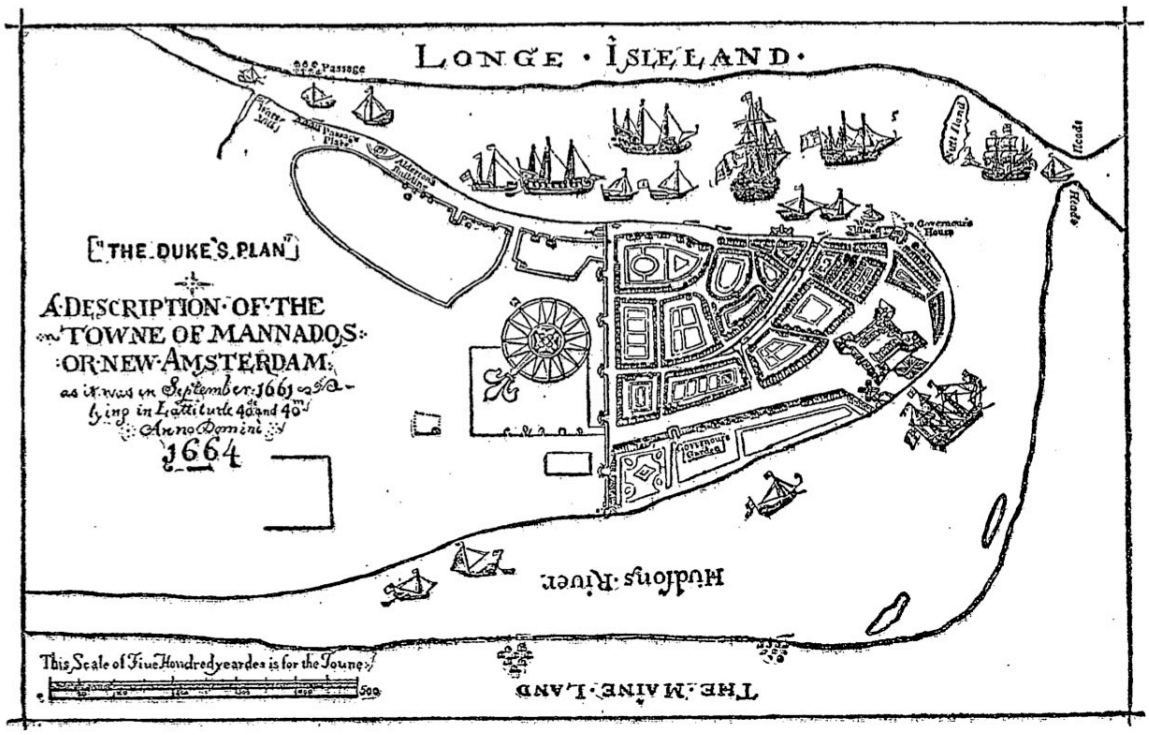

Figure 2.3 1664 Dutch Plan for Lower Manhattan around Fort (*the New York times*, 1904)
The New York Times*, "The Evolution of Manhattan," 1904*.

below the road. The small grid that runs parallel and perpendicular to the shoreline suggests a quick influx of people. People who worked in the small factories were more likely to live along the east side, where the close-knit community was safer than the less dense west side. The English threatened the Dutch's security in 1653.[4] The English in New England were planning to take over Manhattan, so the Dutch responded by building a wall at present day Wall Street, above which was only farmland. With the Treta of Breda in 1667, the English official took control of Manhattan, which the Dutch defined as the area between the wall and fort with developments along the rivers and canals.

After the Dutch established Manhattan, early settlers simply claimed the land they wanted. At this time, land acquisition was not seen as a major problem. The population was still substantially below the population of Philadelphia, which was the

[4] *Gotham: a History of New York City to 1898*, 63-67.

Figure 2.4 1811 Manhattan grid and topography, (Peter Maverick, 1811)
Peter Maverick, NYPL Digital Gallery, 2009.

largest city in the United States at the time. [5] Residents could stake their claim without fear of someone else taking over. There was enough room on the island for the wealthy to purchase the land they wanted. Those with large plots would subdivide the land to give to tenants, who would build on their small portion.[6] Inside the irregular grid small gridiron patterns were being made. This created the incentive to lay out the rest of the island as small plots for residents. The entire island was to be divided into small units for New Yorkers to settle.

Although the Dutch had carefully planned the roads of Lower Manhattan based on island shape, topography, and defense, the state legislature asked the Streets Commission, Governor Morris, Simeon De Witt, and John Rutherford to lay out a grid for the remaining Manhattan landscape in 1811 (figure 2.4). The Dutch plan was based on topography, whereas the new plan would be based on economy and efficiency. Fluid movement throughout the city created an easy way to trade within it. The congested streets of Lower Manhattan would not allow for the growth that New Yorkers dreamed of. The group created a plan with twelve avenues and 155 streets. The blocks were 200 feet wide by 600-900 feet long with avenues 100 feet wide. The streets did not reach the top of the island. According to the commissioners "it [was] improbable that the grounds

[5] Janet L. Abu-Loghod, *New York, Chicago, Los Angeles: America's Global Cities* (Minneapolis: University of Minnesota Press, 1999), 27.
[6] Abu-Lughod, *New York, Chicago, Los Angeles: America's Global Cities*, 27.

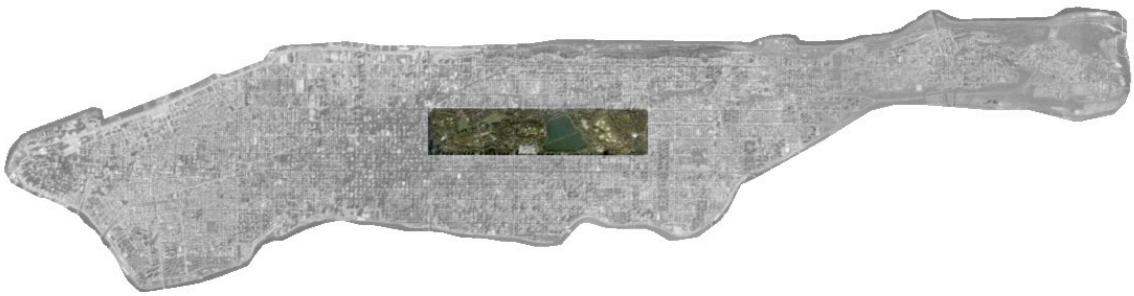

Figure 2.5 Map of Manhattan with Central Park highlighted
Google Earth (edits by author), 2009.

north of Harlem Flat will be covered with houses, and to have gone further might have furnished materials to the pernicious spirit of speculation."[7]

A main problem with the 1811 street plan was the lack of north-south routes. The plan creators saw movement in Manhattan as being primarily east-west, going from the East River to the Harlem River. The plan suggested the connection across the East River to Brooklyn as the most important connection for Lower Manhattan. The shape of the island, however, dictated that growth would be in a different direction. Residents found it easier to move north than across the rivers. This lack of foresight led to problems with traffic congestion on the avenues. These problems would be addressed later. The 1811 street plan also did not include Central Park. The commissioners believed that the expansive waterfront would cancel any need for a large park. This changed in 1844, when *New York Post* writer William Cullen Bryant suggested a "rural space" in Manhattan (figure 2.5).[8] As well as a respite from the busy urban city, the park was an acknowledgement that New Yorkers rarely left Manhattan. The connection to Brooklyn was not yet fully established, and New Yorkers would rather experience an open space by going north to the park than going across the East River. In Frederick Olmstead's "The Plan for the Park" (1858), he states that the park was "to supply to the hundreds of

[7] Kenneth Jackson, *Empire City: New York Through the Centuries* (New York: Columbia University Press, 2002), 117.
[8] Jackson, *Empire City: New York Through the Centuries*, 278.

thousands of tired workers…a specimen of God's handwork that shall be to them, inexpensively, what a month or two in the White Mountains or Adirondacks is."[9] New York was the first American city that offered a park available to people of all social classes and ages. It created a unity in the city that was not seen before; it was a "park for all people."[10] Central Park defined how Manhattan would develop. Stretching from 59th to 106th Streets and from 5th to 8th Avenues, the Park is overwhelmingly vertical. Developers would thus expand north, towards the park. Once the park was reached, the East and West sides of Manhattan were created, each with their own connotation. Development would continue around the park, stretching people upwards from Lower Manhattan. The grid helped move people north, even though there were not enough roads to carry the number of people moving uptown.

Early Public Transportation

The growing city in the mid 19th century called for a greater system of transportation in both Manhattan and Brooklyn. An early form of transportation for Manhattan was the omnibus. The buses were wooden vehicles that were neither reliable nor comfortable. An hour ride to Greenwich Village took just as long as walking. Montgomery Queen brought the omnibus to Brooklyn. After acquiring land from Bedford landowners, he wanted to make his new land more desirable to encourage people to move there. In the 1830's and 40's the omnibuses served this area of Brooklyn with their limited seating room and bumpy ride.[11] Soon the omnibus went to Flatbush, Gravesend, Flatlands, New Lots, and other Brooklyn towns, as it was a real estate selling point. In 1854, the railroad omnibus provided a faster and more comfortable mode of

[9] *Empire City: New York Through the Centuries*, 279.
[10] Norval White, *New York: a Physical History* (New York: Atheneum, 1987), 260.
[11] Ellen M Snyder-Grenier, *Brooklyn! an Illustrated History* (Philadelphia: Temple University Press, 1996), 92.

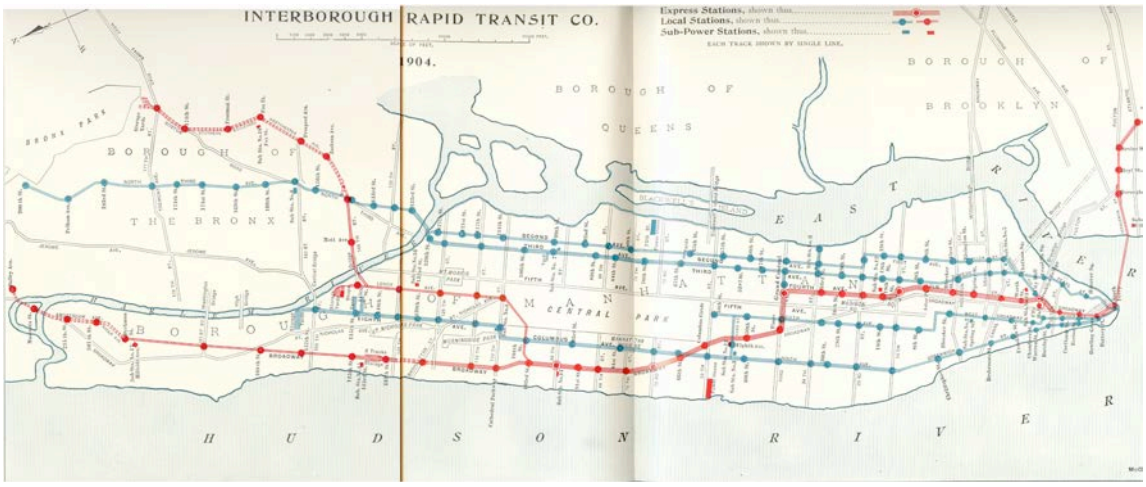

Figure 2.6 1904 Interborough Rapid Transit Map
NYC Subway Historical Maps, 2009

transportation. Instead of driving on the unpaved roads, the railroad omnibuses followed steel rails like the trains in Manhattan. The omnibuses plus the railroad omnibuses allowed for the continued growth of Brooklyn. Middle-income families who no longer wanted to live in the overcrowded main city were attracted to the larger lots and proximity to Manhattan that this area offered. The omnibuses in Manhattan and Brooklyn were not connected. The two boroughs used their own forms of public transportation, which spread growth throughout each city, but failed to create a convenient link between the two cities.

The New York and Harlem Railroad, a horse-drawn system running from Chambers Street to 26th Street, opened in 1832.[12] After this opening, steam-powered trains followed tracks up 4th Avenue, now Park Avenue, to Harlem. These lines allowed for the suburbanization of upper Manhattan. By 1880 almost all of the land south of 42nd Street had been built up, and the newly accessible land to the north provided a place for development.[13] This came at an appropriate time. Between 1855 and 1905 the population of the Lower East Side increased from 200,000 to 518,000, mainly due to the surge of immigration of Russian Jews and Italian peasants. The surface trains allowed

[12] *New York: a Physical History*, 54.
[13] *New York, Chicago, Los Angeles: America's Global Cities*, 72.

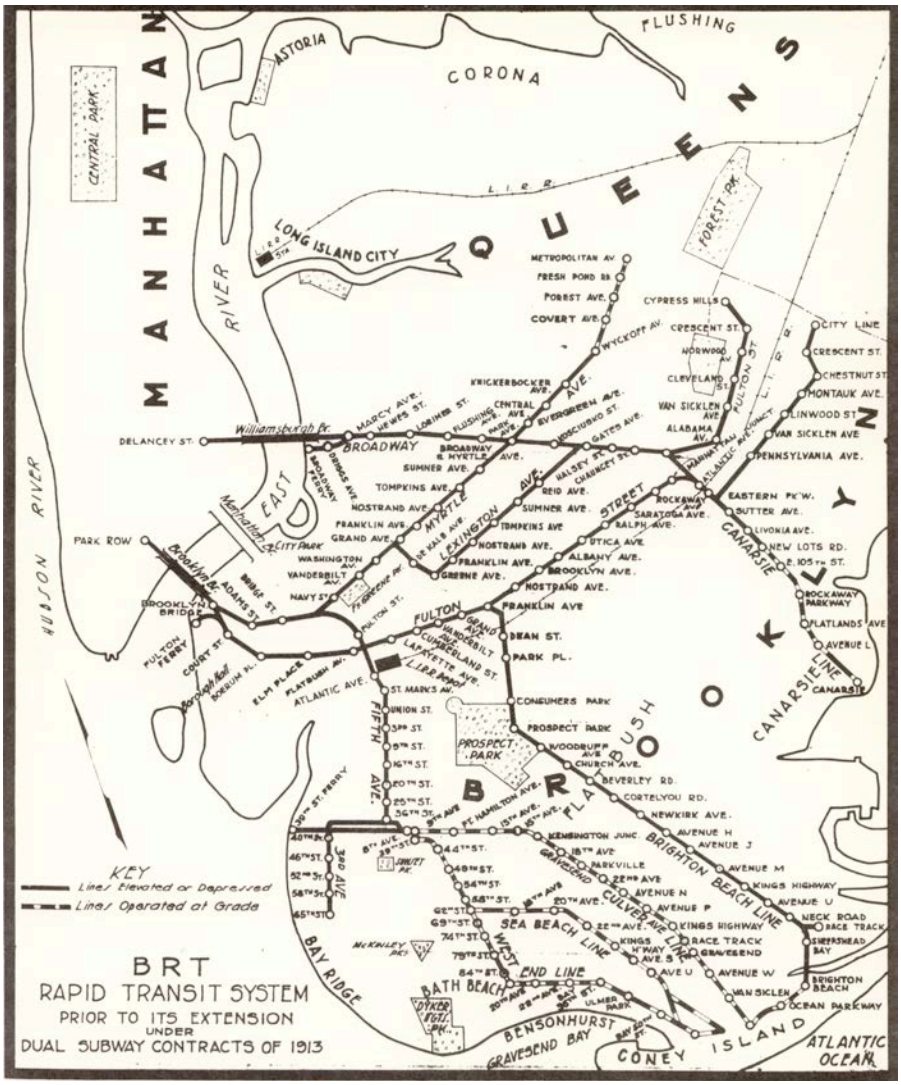

Figure 2.7 1912 BMT Route Map
NYC Subway Historical Maps, 2009.

Manhattan to connect with the surrounding areas of the island. There was still no main link with Brooklyn. Manhattan, however, kept becoming more connected (figure 2.6). In 1845 the New York and New Haven Railroad, which traveled to New Haven, Connecticut, and the New York and Harlem system were connected for the first great convergence of rail lines.[14] They met at the 26th Street Station, which lay between 26th and 27th Streets on 4th Avenue. Steam trains could not travel south of 26th Street, so patrons changed to horse-drawn carriages to travel farther south on 4th Avenue at this

[14] Kurt C. Schlichting, *Grand Central Terminal: Railroads, Engineering, and Architecture in New York City* (Baltimore: Johns Hopkins University Press, 2001), 8.

station. From this early Grand Central Station, steam-powered cable cars transported passengers to local destinations throughout the city. They were more convenient than the trains because they could fit in narrow streets.[15] The system being established in Manhattan would later allow for a link to Brooklyn.

The Brooklyn City Rail Road Company established its own surface railroad when it replaced the omnibus with a horse-drawn railroad.[16] These rails created Park Slope after Edwin Litchfield bought the area's farmland with the intention of residential use. Transit lines that ran along 5th Avenue, 7th Avenue, 9th Street, and Prospect Park West attracted people from Manhattan to the elegant homes in Brooklyn built along the rails (figure 2.7). As new lines were being constructed, the rest of Brooklyn became more accessible with shorter travel time for residents. A more accessible Brooklyn meant a stronger connection with Manhattan. Commuters could reach Manhattan from deeper within Brooklyn with the advanced system.

After the surface railroads were established, the elevated railroads, better known as the El, started to take form in 1870 Manhattan (figure 2.8). The Els were successful because the surface trains were more concerned with connecting the suburbs of Connecticut and Westchester to Manhattan and took local stops out of their lines. Soon, Els at 2nd and 3rd Avenues appeared, creating an H-form that unified the island. The El provided for Manhattan the same thing the surface railroads did, the possibility for developers to create new communities in northern Manhattan. There was continuing incentive to empty the overcrowded Lower Manhattan. Instead of moving only to Brooklyn, residents were being pulled out of the Lower East Side in all directions by public transportation. Soon, the grid laid out in 1811 was saturated with houses.

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[15] *New York: a Physical History*, 58.
[16] *Brooklyn! an Illustrated History*, 97.

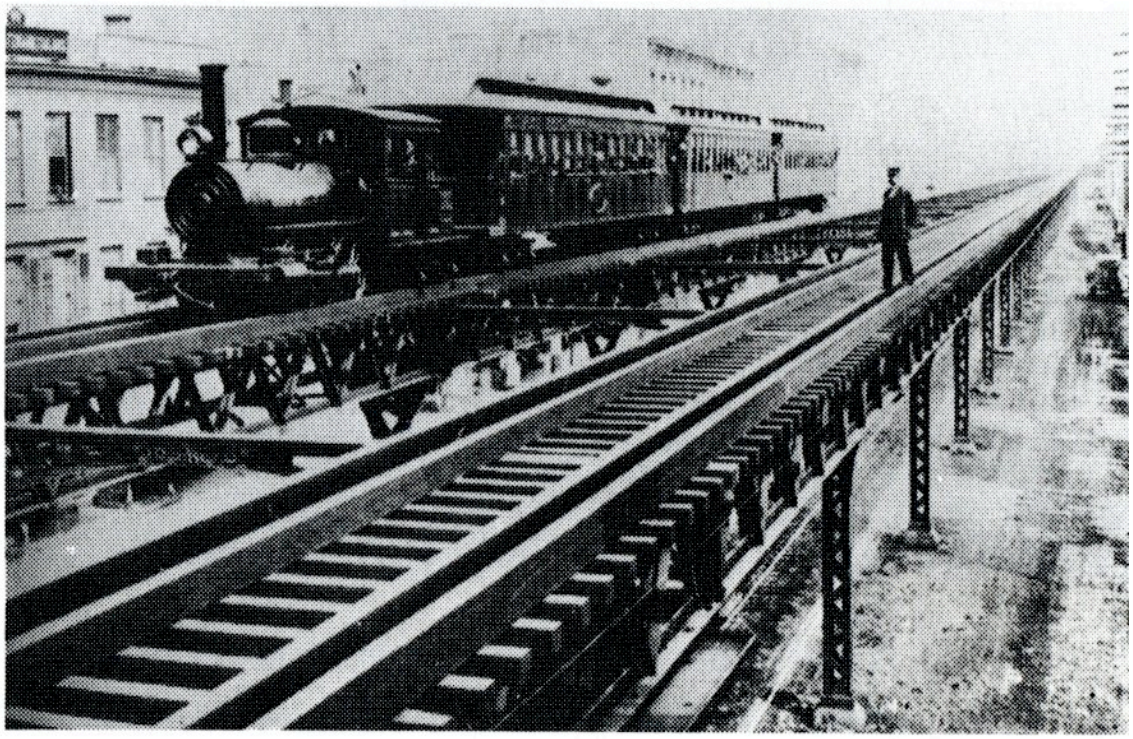

Figure 2.8 Third Avenue El, 1880.
White, New York: A Physical History*, 1987*.

When the El came to Brooklyn, the city was immediately transformed. The Kings County Elevated Company opened a route along Atlantic Avenue in 1891.[17] The line connected Brownsville, an area set up by proprietor Charles Brown for the working class, with downtown Brooklyn. Travel throughout Brooklyn was made easier so once one was in the suburb he could move within it. The El became more popular with the introduction of the East River bridges, and soon there were rails through Bedford, East New York, New Utrecht, and downtown Williamsburg. Although the Els did not provide a direct transfer across the river, a build-up of the separate systems set conditions for the Manhattan-Brooklyn connection.

The electrification of the elevated railway between 1885 and 1903 changed the way the city saw trains. The El was no longer seen as a noxious burden; the soot and

[17] *Brooklyn! an Illustrated History*, 100.

steam disappeared.[18] The main benefit of the electrification was the ability to put lines underground. The line that went along the surface of Manhattan connecting Grand Central Station to New Haven was placed under Fourth Avenue. Years later, Park Avenue was conceived in the newly available space. From placement of the El underground, the idea of the subway emerged. Before the subways were built, all of the Els were electrified. The subways were a needed solution to the elevated railroads, which were invasive and broke city streets. Even though electrification decreased the noise of the elevated railroad, those living near the subways had an even quieter home. Living near the subways was an advantage, especially compared with living near the El.[19] Electrification not only allowed the trains to go under ground, but also under water. The city leased the tunnels and tracks it built to the first subway company, the Interborough Rapid Transit Company (IRT), in 1900. The private system then began construction and opened in 1904. The most influential moment happened. On January 9, 1908.[20] Manhattan and Brooklyn were momentously connected with an underground tunnel. Ten years after the consolidation, Brooklyn and Manhattan were joined by a one-seat ride under the East River. Once in Brooklyn, the subways used the already-built elevated rails, as the Brooklyn subway did not open until 1912. With the trains out of sight, the communities could thrive without the invasive rails cutting through them.

Connecting the Boroughs Politically and Physically

In 1897 Brooklyn was becoming an independent city and a capital of commerce and manufacturing.[21] As the fourth-largest city in America after New York, Philadelphia, and Chicago, Brooklyn had five thousand factories by 1880, producing hats, clocks,

[18] *New York: a Physical History*, 61.
[19] *New York: a Physical History*, 61.
[20] *Brooklyn! an Illustrated History*, 109.
[21] *Empire City: New York Through the Centuries*, 411.

Figure 2.9 Map of the five boroughs of the greater New York City.
Google Earth (edits by author), 2009.

shoes, cigars, and books.[22] The area's great importance lay in the vast number of ports. Over two thousand ships a year docked in Brooklyn alone. Even with Brooklyn thriving, planner Andrew Haswell Green helped draft the Consolidation Law of 1895, which would unite Manhattan, Brooklyn, Queens, the Bronx, and State Island into the Greater New

[22] *Brooklyn! an Illustrated History*, 10.

York (figure 2.9).[23] From the beginning, Brooklyn was unexcited to join New York. The vote to consolidate only passed by 227 votes out of 129,211.

Manhattan's population of 1.5 million to Brooklyn's 1 million put it in a slightly better economic situation than Brooklyn, which prompted the idea for consolidation. The city was the monetary capital of America, monopolizing financial institutions.[24] Their tax benefits from the high incomes would help neighboring Brooklyn by offering less public debt, improved public utilities, and advanced infrastructure systems. The two cities were joined for a variety of reasons, not all financial. The boroughs were constantly expanding, which was a problem because there was physically not enough room in which to spill out. Instead of redrawing limits for each city, they were combined with no new boundaries. Expansion was then all kept within the same city.

The consolidation was based on the philosophy that "bigger was better, that a city would prosper under the centralized guidance of experts."[25] This was true in the case of public transportation. The rail system was easier to maintain under the control of one centralized government. Although Brooklyn and Manhattan worked well together during the construction of the Brooklyn Bridge in 1883, Mike Wallace stipulated that if the two cities were not merged there would be a war between the two.[26] The cities, which shared a river, would have rival ports, and they would be unwilling to share resources like drinking water. Urbanist Jane Jacobs believed that the smaller city was better off, and the five boroughs would have prospered on their own rather than part of a larger conglomeration. She stated that instead of the city thriving from pooled taxes, "the richest borough, Manhattan, has received some economic and cultural benefits, and the others have been stultified in their development."[27]

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[23] *Empire City: New York Through the Centuries*, 407.
[24] *New York, Chicago, Los Angeles: America's Global Cities*, 10.
[25] *Empire City: New York Through the Centuries*, 409.
[26] *Empire City: New York Through the Centuries*, 410.
[27] *Empire City: New York Through the Centuries*, 410.

Figure 2.10 Aerial view of Manhattan with Hudsona and East River.
Google Earth (edits by author), 2009.

Brooklyn and Manhattan are separated by the East River (figure 2.10). At only one-third to two-thirds a mile wide, the river is substantially narrower than the mile wide Hudson River,[28] which creates the New Jersey boundary. Thus, connecting Brooklyn and Manhattan was an easier task than connecting Manhattan with New Jersey. In 1906, New York had 152 ferryboats, or 28 percent of the nation's total.[29] Ferries that connected Brooklyn with lower Manhattan were, from north to south, the Catherine, Fulton, Wall St, and South Ferries. Ferries powered by oar first crossed the river, but they were soon eclipsed by Robert Fulton's steamboat in 1814. The *Nassau*, which connected what is now Fulton Street in Manhattan with Fulton Street in Brooklyn,

[28] Ellsworth Huntington, "The Water Barriers of New York City," *Geographical Review* 2, no. 3 (September 1916), 172.
[29] Ellsworth Huntington, "The Water Barriers of New York City," 172.

changed the half hour journey across the river to an easy twelve-minute ride. Commuting became a real possibility for the first time. Hezekiah Pierpont franchised Fulton's company with the intent of developing the land south of what is now Pierpont Street.[30] The Fulton Ferry was easily reached by the 2nd Avenue line, which stopped at Fulton Street. The Wall Street and South Ferries were also accessible with the 2nd Avenue line. A system was thus created that connected as north as 127th Street to the ferries on the southern tip of Manhattan. Once one got off the ferry on the Brooklyn side, he could take a Fulton Street elevated rail deeper into Brooklyn, closer to his residence.

The Fulton Ferry created Brooklyn Heights, commonly known as the first suburb of New York. Pierpont started buying vacant lots in Brooklyn in 1802, foreseeing that the area could have potential when connected with a greater network.[31] In 1819, he began advertising his acquired land as a "commuter's suburb," promoting the ease with which one could take the ferry from his home to bustling Lower Manhattan.[32] The area built up throughout the 19th century, with mansions on the bluffs overlooking the East River and row houses lining the streets. The affluent neighborhood was transformed by the introduction of the subways. Large townhouses were split to accommodate multiple families once the demand to live in the prime location was heightened.[33] The subways also moved residents away from Brooklyn Heights, towards the increasingly accessible downtown area.

The Brooklyn Bridge was constructed on almost the same course that the Fulton Ferry transported passengers from Manhattan to Brooklyn (figure 2.11). The iconic bridge opened May 24, 1883 to large celebrations. The bridge was the first physical link between Brooklyn and Manhattan, foreshadowing the political consolidation that would

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[30] *New York: a Physical History*, 52.
[31] *Brooklyn! an Illustrated History*, 86.
[32] *New York, Chicago, Los Angeles: America's Global Cities*, 434.
[33] *Brooklyn! an Illustrated History*, 90.

Figure 2.11 Drawing of the Brooklyn Bridge.
Schuyler, "The Brooklyn Bridge as a Monument," 1892.

come sixteen years later. Not all of Brooklyn was pleased with Manhattan's invasion into their community with the bridge. They believed the "territorial expansion" impinged on their independence, and credited the bridge with destroying any desire to create a Greater New York.[34] However, enough of Brooklyn disagreed, and the Consolidation Act still passed.

The Brooklyn Bridge was a fast and easy way to get from Manhattan to Brooklyn. In the mid-19th century, about one-tenth of the population of Brooklyn commuted across the East River to their Manhattan job.[35] The steamboat, although an improvement over the man or wind-powered ferries that preceded it, was not sufficient in carrying the masses of people who required transport into Manhattan. John Roebling, a successful engineer, created the idea of the Brooklyn Bridge when he was stuck in the ice on the East River while riding one of Fulton's ferries in 1856. He immediately began drawing

[34] John A. Krout, "Framing the Charter," in *The Greater City* (Connecticut: Greenwood Press, 1981), 47.
[35] Alan Trachtenberg, *Brooklyn Bridge, Fact and Symbol* (New York: Oxford University Press, 1965) 35

Figure 2.12 1883 image of the Brooklyn Bridge from Manhattan.
Trachtenberg, Brookylyn Bridge, Fact and Symbol, 1883.

plans for a bridge over the river, and in 1867 a bridge company was chartered with Roebling as chief engineer to create the bridge.

The Brooklyn Bridge was divided into five lanes. The two outer lanes were for horse-drawn carriages, the two inside those for a cable-train, and the center lane for pedestrians (figure 2.12). The latter was an important feature to Roebling, who believed that, raised 18 feet above the rest of the bridge, the pedestrians would "promenade over the bridge on fine days, in order to enjoy the beautiful views and pure air."[36] The cable-trains were an important part of the bridge, for they created a greater infrastructure system between Manhattan and Brooklyn. While the pedestrian route allowed one to see the city and experience a slower-paced life, the city could not grow without speed. The bridge's purpose was to lessen the time between Manhattan and Brooklyn, and the cable cars provided this swift connection.

[36] Alan Trachtenberg, *Brooklyn Bridge, Fact and Symbol*, 74.

Site selection was important to Roebling. The bridge starts at City Hall Park with grand masonry approaches. Roebling felt guilty that his Bridge Company would be destroying the neighborhoods on either side of the bridge. He wanted the company to "take responsibility to construct new streets and improve the site."[37] He chose the site specifically because he knew that he would be razing a majority of the streets and buildings. He saw an opportunity to do community development as well as build a bridge. Roebling even had a proposal to replace the old Fulton Market with a "good market hall."[38] The appropriateness of Roebling's actions appears uncertain. Although he was a great engineer, this did not mean that he had the experience or knowledge to plan parks for the entrances to the bridge. His grandiose views for the bridge's impact on society are displayed by the fact that he saw the Brooklyn Bridge as a sort of Union Pacific Railroad.[39] The Brooklyn Bridge connected Long Island with Manhattan, which then was connected to the Union Pacific Railroad and the rest of the country. His bridge was the one that would change the landscape of America.

The Brooklyn Bridge connected the system of elevated railroads in Manhattan and Brooklyn. Although one could change from Manhattan's 2nd Avenue El to the Fulton Street Ferry to the El in Brooklyn, the change to the steamboat took extra time. The cable cars that ran from one end of the bridge to the other provided a smoother transition. The El at City Hall Park became connected to the El in downtown Brooklyn by this system.[40] An elevated railroad could not go across the bridge, so the cable cars were the only option. Roebling saw the cable cars as transportation for the upper-class commuters who wanted the speed they provided.[41] The subways did not run over the Brooklyn Bridge, but instead used the 1904 tunnel to take the lines off the island

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[37] *Brooklyn Bridge, Fact and Symbol*, 74.
[38] *Brooklyn Bridge, Fact and Symbol*, 75.
[39] *Brooklyn Bridge, Fact and Symbol*, 76.
[40] *New York: a Physical History*, 60.
[41] *Brooklyn Bridge, Fact and Symbol*, 74.

Figure 2.13 Manhattan, Brooklyn, and Brooklyn Bridge in gray with subway tunnel in black
Google Earth (edits by author), 2009.

into Brooklyn (figure 2.13). Even though the bridge provided a fast way to get across the river, it was still not a one-seat ride. The only way to cross the river without transfer was by subway, which did not take the passenger to Brooklyn Heights. Many commuters who lived in the popular suburbs preferred the cable cars on the bridge to the circuitous subway route.

With the consolidation, the need to cross to Brooklyn created greater use of the Brooklyn Bridge. The increase in traffic volume was especially bad during rush hour,

Figure 2.14 Manhattan, Brooklyn, Brooklyn Bridge, and subway tunnel in gray with Williamsburg Bridge in black

Google Earth (edits by author), 2009.

when near-riots often broke out on the Bridge.[42] Although the rush hour at this time would probably not compare to what New Yorkers experience today, the congestion was still a problem that deserved the attention of the city. Rather than building an expensive tunnel, the city built the Williamsburg Bridge, which opened in 1903, connecting Manhattan's Delancey Street with Williamsburg, Brooklyn (figure 2.14). Only about 1.3 miles away from the Manhattan entrance of the Brooklyn Bridge, the Williamsburg

[42] Thomas Winpenny, *Manhattan Bridge: the Troubled Story of a New York Monument* (Easton, PA: Canal History and Technology Press, 2003), 7.

Bridge was intended to relieve the traffic on the 1883 bridge. The Williamsburg Bridge did for Williamsburg what the Brooklyn Bridge and the Fulton Ferry did for Brooklyn Heights. Developers converted old brownstones once occupied by German immigrants into multi-family homes to meet housing demands.[43] Slowly, as more people moved from Manhattan to the suburb, they dispersed into the island where the elevated rails could reach them.

The Williamsburg and Brooklyn Bridges had no real link between them on the Brooklyn side. They serviced different parts of Brooklyn that had different types of communities. While Brooklyn Heights was an affluent neighborhood of businessmen working in Lower Manhattan, Williamsburg was mainly a place of European immigrants who were looking to leave Manhattan for more space. On the Manhattan side, the 2nd Avenue El served both bridges, but there was no shuttle-type connection between the two. From this, one can conclude that the infrastructure set up in New York was not for getting around Brooklyn, but getting into and out of Manhattan. The infrastructure set up in Manhattan was to further ease travel within the borough, which was necessary because of the influx of people coming from Brooklyn over the bridges.

The main infrastructural elements of Manhattan and Brooklyn were set up well before the Manhattan Bridge was established. As speed of transportation increased, more Manhattan residents moved to Brooklyn, causing the need for direct, physical connections between the two boroughs. The Brooklyn Bridge, which served as an icon for New York, provided this link through pedestrian, private carriage, and public cable car traffic. However, the population was constantly increasing, and the Williamsburg Bridge had to take some of the burden. Soon, however, more congestion would need to be relieved, and another bridge would have to be built to help the Brooklyn Bridge.

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[43] *Brooklyn! an Illustrated History*, 48.

Reformers on the Lower East Side

Jacob Riis, author of *How the Other Half Lives* published in 1890, was a prominent figure in trying to clean up the slums of the Lower East Side. He exposed the living conditions of those living in tenement housing in the district called "The Bends," a "maze of narrow, often unsuspected passageways,"[44] areas that promoted health problems from overcrowding. The overcrowding was a result of immigrants flocking to the area after arriving in New York. Riis realized that the groups of immigrants were entirely different, each setting up their own community, but each one overcrowded. He tried to get the Board of Health to help the people by putting stricter rules on tenement housing. The Board of Health, however had to respond to the massive influx of people, and soon "the standard of breathing space required for an adult by the health officers as been cut down from six to four hundred cubic feet."[45] Riis considered his clearance of Mulberry Bend to be his greatest achievement, for he forced people out of the squalid living conditions. He did not take into account where the people would go. Most of those forced out fled to nearby slums, thus shifting the location of the problem. Many immigrants forced out ended up moving across the bridge to Brooklyn.[46]

Inspired by the City Beautiful's popularity in Chicago, planners sought to fix the problem of the slums in Lower Manhattan by creating diagonals that would break up the city (figures 2.15 and 2.16).[47] Ernest Flagg proposed a 900-foot-wide greensward between 6th and 7th Avenues, stretching from 14th Street to the Harlem River. In Lower Manhattan, Julius F. Harder placed diagonals through the Lower East Side while Edward P. North put boulevards from Delancey and Norfolk through to the Bowery and 23rd Street. North's plan incorporated the Williamsburg Bridge, extending his avenues

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[44] *Empire City: New York Through the Centuries*, 339.
[45] *Empire City: New York Through the Centuries*, 345.
[46] Joel Schwartz, *The New York Approach: Robert Moses, Urban Liberals, and Redevelopment of the Inner City* (Columbus: Ohio State University Press, 1993), 9.
[47] Joel Schwartz, *The New York Approach: Robert Moses, Urban Liberals, and Redevelopment of the Inner City*, 9.

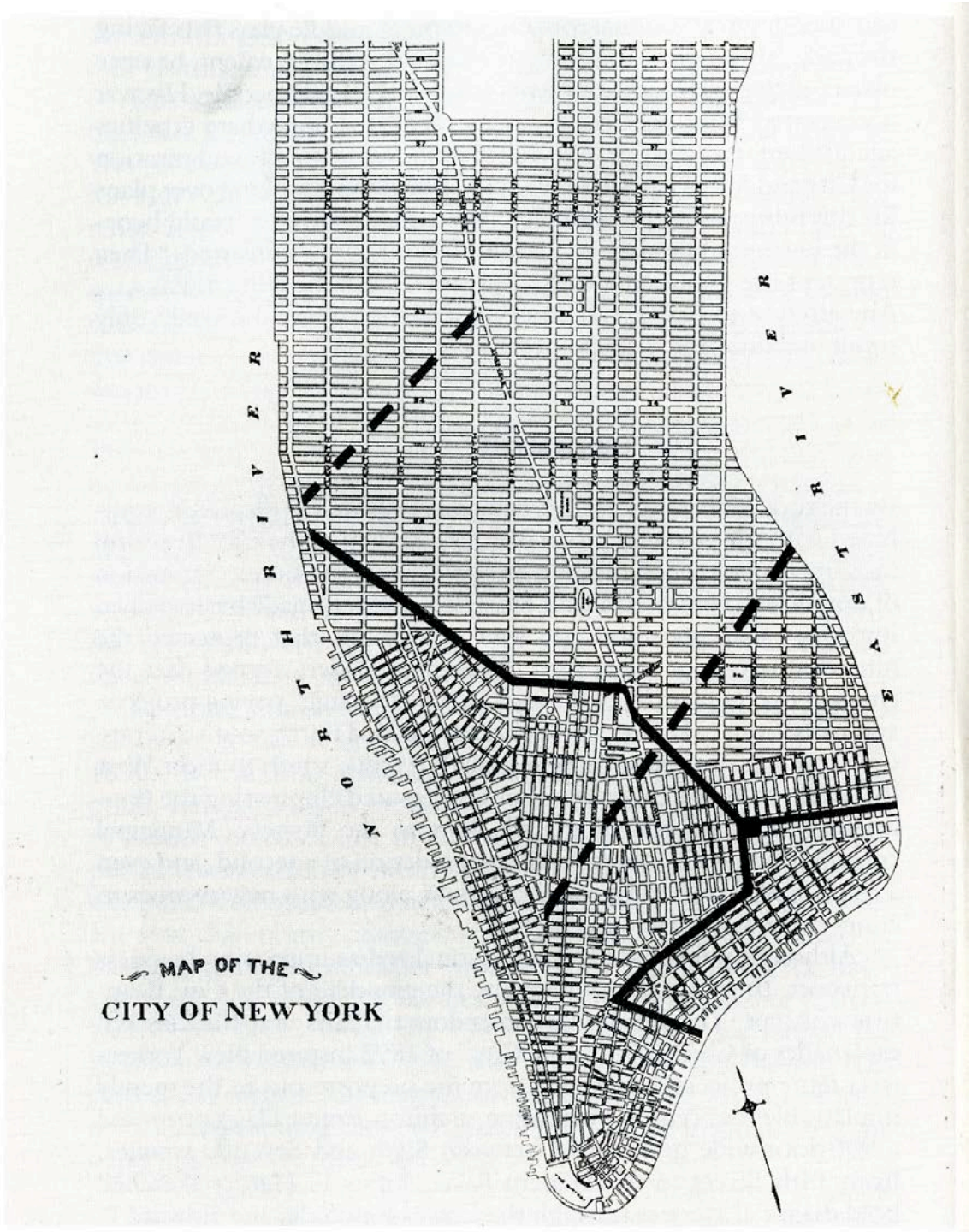

Figure 2.15 Engineer's routes through Manhattan, November 1, 1899.
Schwartz, The New York Approach, *1993*

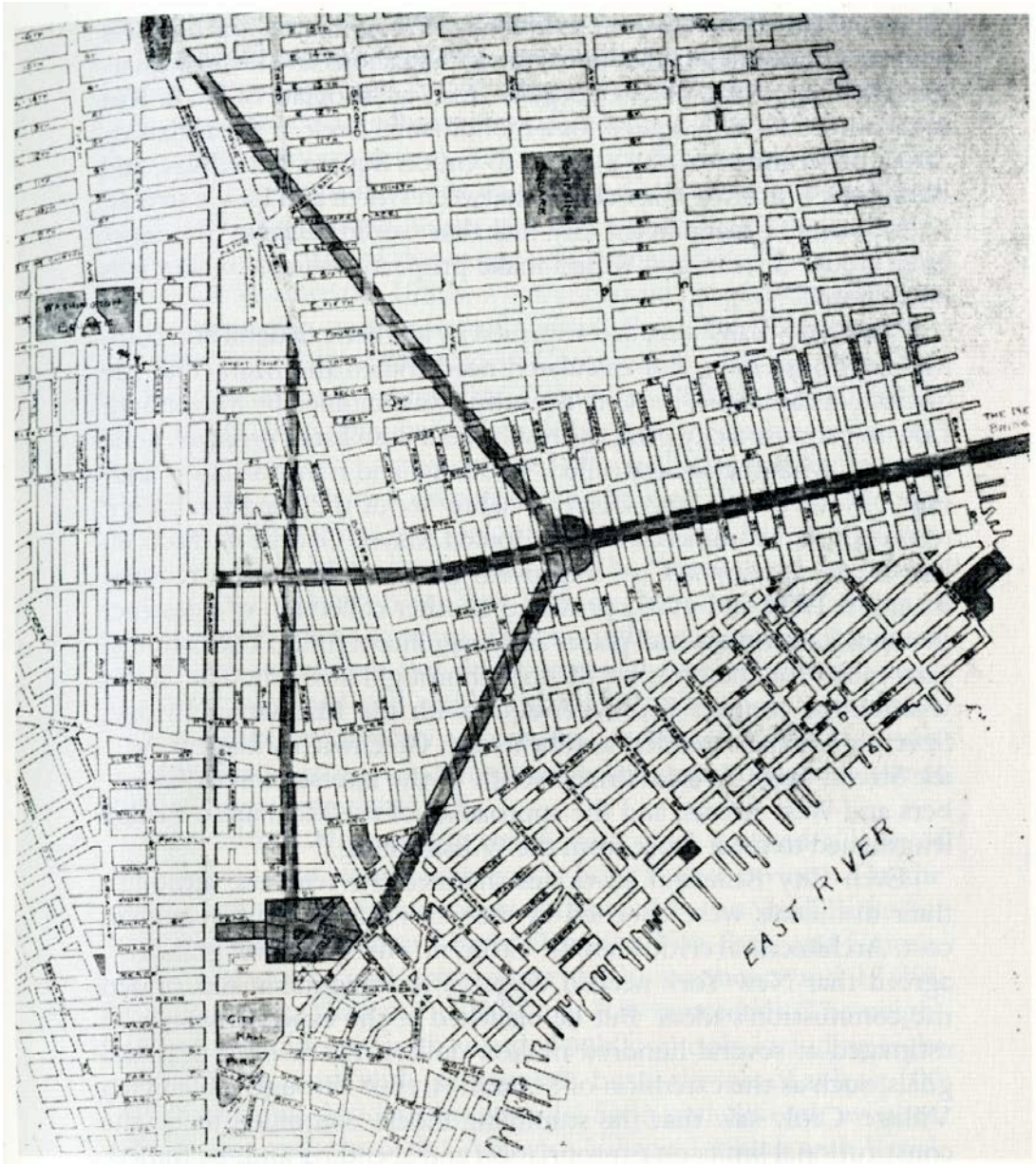

Figure 2.16 Engineer's routes through Lower Manhattan extending from the Williamsburg Bridge, November 1, 1899.
Schwartz. The New York Approach. *1993*

out of the entrance. These new avenues were called "Engineer's Routes," seen as an a necessary part of the city rather than artistic design. However, these plans did not go very far. Although the plans have broken up the slums of the Lower East Side, the overcrowding was not great enough to inject a dire sense of need for the project. The congestion problem was less about traffic on roads and more about overcrowding in buildings. Fixing roads would not have helped the buildings be healthier for tenants.

The new routes would make the street plan appear more beautiful, especially because it cut through the jigsaw puzzle Lower East Side in a more direct fashion. The aesthetics of the plan were the main consideration, not the squalor that the area was facing as seen by Riis. Planners did not see this problem as large enough to make considerable physical changes to the area. Roadways had no need to change because the overcrowding was not severe enough, or perhaps just did not affect the "correct" people. The rich had already moved to northern Manhattan, where the grid allowed for a more open, breathable space. The only people left in the area were poor immigrants. Therefore, no roadway changes were made in Lower Manhattan.

In summary, Manhattan was first developed to provide security. Protection from the English and Native Americans prompted Lower Manhattan's irregular grid. The connection between Manhattan and Brooklyn in this area was beginning to sprout in the period before the Manhattan Bridge. Planners were anticipating a strong connection between Manhattan and Brooklyn from the horizontal grid to the Engineer's Routes that visibly tied into the East River bridges. New Yorkers, however, were also moving to northern Manhattan. The 1811 grid created a different kind of city from the one the Dutch originally set up. The city was supposed to be perfectly laid out, built for efficiency and speed. Dependence on topography and land shape was dismissed, for it created what the English saw as the jumble of Lower Manhattan. Lower Manhattan, however, was already established as the commercial center of the city, regardless of the irregular grid. Looking at a map of the area can show the intent of establishing some sort of regularity within the confusion, but the parallels to the shorelines created awkward angles where streets cross. This was the city. The perfect grid was seen as the suburbs, a place of residence away from the commercial district. High speed was only necessary to get commuters into the bustle of the irregularity, where violent intersections slowed the pace.

Figure 3.1 View of Manhattan Bridge from Dumbo.
Photograph by author, 2009.

3 Supporting the City

John Roebling and The Brooklyn Bridge

The growth of the city required more links between Manhattan and Brooklyn. The Brooklyn Bridge was the first of the East River bridges. Although lauded for its innovative design and use of steel cables, the bridge is not crucial for infrastructure. Today, it does carry car traffic, but does not hold any public transportation as it first did. Reading the bridge as a piece of architecture rather than structure, as Montgomery

Figure 3.2 Brooklyn Bridge with Lower Manhattan in the background.
Photograph by author, 2009.

Schuyler did, explains that the bridge is a symbol for New York City. As a monument, the structure and direct purpose of the bridge is ignored. The Manhattan Bridge, conversely, is not viewed as a monument, only as a necessary piece of the road system. The bridge was intended to respond to the criticisms of the Brooklyn Bridge, but the latter still remains the more "beautiful" of the two in the eyes of New Yorkers.

John Roebling was already a renowned engineer when commissioned to build the Brooklyn Bridge (figure 3.2). He had completed the Niagara Railroad Suspension Bridge in 1855 and Cincinnati Bridge in 1867, both of which were successful. The two bridges have aspects that are seen in the completed form of the Brooklyn Bridge. Roebling made a major contribution to suspension bridge design with the Niagara Railroad Suspension Bridge.[1] He saw deck stiffness as a necessity for a successful bridge, especially under the heavy load of the trains. To counteract this load, he formed the deck as a large box girder with side trusses of timber and iron 18 feet deep (figure 3.3). The box girder allowed the deck to be not only stiff, but also lighter than if the deck were solid. A massive timber beam directly below where the train passed also provided stiffness for the deck. The

[1] Margaret Latimer, Brooke Hindle and Melvin Kranzberg, *Bridge to the Future: a Centennial Celebration of the Brooklyn Bridge* (New York: New York Academy of Sciences), 23.

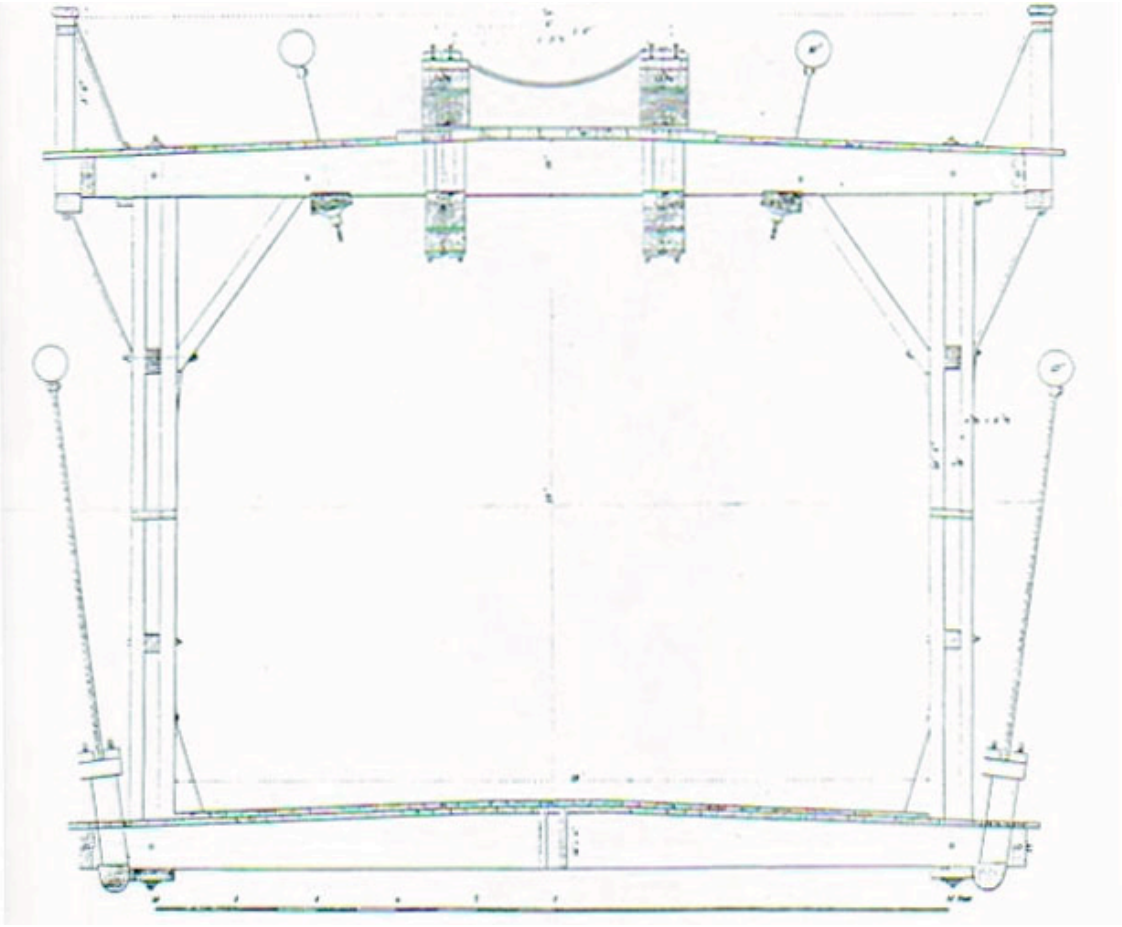

Figure 3.3 Cross section of Niagra Railroad Suspension Bridge
Buonopane, "Theory and Experience in Suspension Bridge Design, 1991.

method was so effective the deck's deflection was only 3 ½ inches. This method was then applied to the Brooklyn Bridge in his first proposal.

Stiffness in the Brooklyn Bridge was a large consideration in the single-deck scheme.[2] Roebling did not believe steam railroads would pass over the bridge, so he originally designed for stiffness to support cable cars. He made the tracks especially wide to resist lateral forces. To stiffen the deck, he originally designed five rows of trusses separating the traffic lanes. There were no deep side trusses, so these central trusses were necessary. Soon after in 1867 he added another longitudinal truss to create a passage for pedestrians. A major problem in Roebling's design came when he

[2] Margaret Latimer, Brooke Hindle and Melvin Kranzberg, *Bridge to the Future: a Centennial Celebration of the Brooklyn Bridge*, 25-36.

presented it to the War Department in 1869.[3] The department approved the bridge, except it had to be 135 feet above the water, as opposed to the current 130 feet. Roebling chose to make the deck thinner, replacing the stiffening trusses with stiffening girders.

Near the completion of the design for the bridge in May of 1878, the Board of Trustees insisted that the bridge be able to hold heavy trains so that Long Island and the rest of the nation could be better connected.[4] At this point, John Roebling's son, Washington Roebling, had taken over, as chief engineer John Roebling died from gangrene. This provided an opportunity for Washington Roebling to look into the new material steel for the deck. Before steel, iron was considered to be the best material for bridges and was used in Roebling's Cincinnati Bridge. Steel increases the load carried by the deck without a major increase in weight. The steel deck was successful and did not need modification until the 1950s.

The Brooklyn Bridge features cable stays that work independently from the classic suspension bridge form (figure 3.4).[5] The stays were to provide resistance to vertical forces, a point not considered in later bridges. Vertical vibrations from moving locomotives could not be fully supported by the suspenders. The stays also provide extra stiffness for the bridge, for Roebling believed the catenary curve itself did not assure the bridge's stability. Roebling was so confident in the stays that he claimed that if the suspender were damaged or even removed, the stays would be strong enough to support the bridge.

Alan Trachtenberg argues that need for stays could have also stemmed from bad wire used in the Brooklyn Bridge. Roebling, as well as being a successful engineer, had a lucrative wire company in Trenton, New Jersey, John A. Roebling's Sons.[6] The cables of the bridge required Bessemer steel, which Roebling could easily provide. Abraham

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[3] *Bridge to the Future: a Centennial Celebration of the Brooklyn Bridge*, 32.
[4] *Bridge to the Future: a Centennial Celebration of the Brooklyn Bridge*, 36-37.
[5] *Brooklyn Bridge, Fact and Symbol*, 70-71.
[6] *Brooklyn Bridge, Fact and Symbol*, 105-110.

Figure 3.4 Sketch of the Brooklyn Bridge with cable stays highlighted.
Schuyler (edits by author), "The Brooklyn Bridge as a Monument," 1892.

Hewitt, a politician overseeing the bridge said that no company with a personal interest could bid for the steel contract. Washington Roebling thus sold all his shares so his company could still bid, which they did, and they won. Hewitt then said that crucible cast steel would be a better fit for the contract than Bessemer steel, and the contract was given to J. Lloyd Haigh, the lowest bidder for that type of steel. The steel provided by Haigh, however, provided numerous problems for the bridge. Haigh was smuggling unapproved steel onto the bridge, some of which was Bessemer steel anyways. The margin of safety had to be very conservative; at least five times what it was initially anticipated. Cable stays would provide this factor of safety.

The Brooklyn Bridge Criticism and Influence

Montgomery Schuyler is the first American critic of architecture.[7] His article "The Brooklyn Bridge as a Monument" in *American Architecture* was the first instance of reading structure as architecture.[8] The main criticism of the bridge is that "it is a notable piece of engineering; it is not a work of architecture." Schuyler describes the bridge as the simplest form of suspension bridge. There are two parallel ropes passed over "forked trees," carrying a simple platform. He was particularly disappointed with the towers, which are an expression of how an engineer sees architecture, not how he would like architecture to be read. Schuyler accused Roebling as seeing architecture as the "unintelligent use of building material." This is evident in his towers. The gothic arches that create the monumentality in the bridge were not well conceived (figure 3.5). The use of masonry alone is "unintelligent," so Roebling immediately coupled it with architecture. The "crude mass" does not have any structural expression, an important component to the bridge, according to Schuyler. The purpose of the towers is to carry the cables, but by looking at the masonry masses, one would not be able to tell. The flat tops mask the cables (figure 3.6). There is not that much to see in the masonry, however, for the cable saddle is little more than a hole in a tower.

Schuyler's argument about the Brooklyn Bridge is flawed. Although the towers of the bridge are unnecessarily massive and hide the structure, they are also romantic and provide New Yorkers with a sense of pride. The gothic arches that create the openings for the roadways are a trite way of expressing monumentality, but Roebling was creating a monument. Roebling stated in his 1867 Report to the New York Bridge Company, "its most conspicuous features, the great towers, will serve as landmarks to the adjoining

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[7] David Billington, *The Tower and the Bridge: the New Art of Structural Engineering* (Princeton, NJ: Princeton University Press, 1983), 17.
[8] Montgomery Schuyler, "The Brooklyn Bridge as a Monument," in *American Architecture Studies* (New York: Harper & Brothers Publishers, 1892), 68-85.

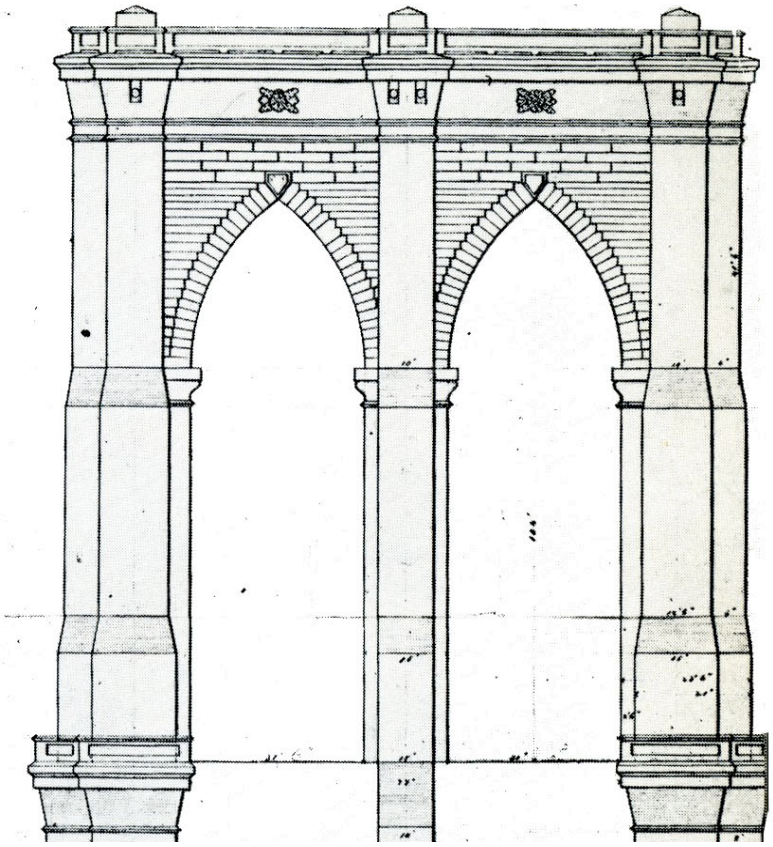

Figure 3.5 Top of Brooklyn Bridge tower design.
Trachtenberg, Brooklyn Bridge, fact and symbol*, 1965*

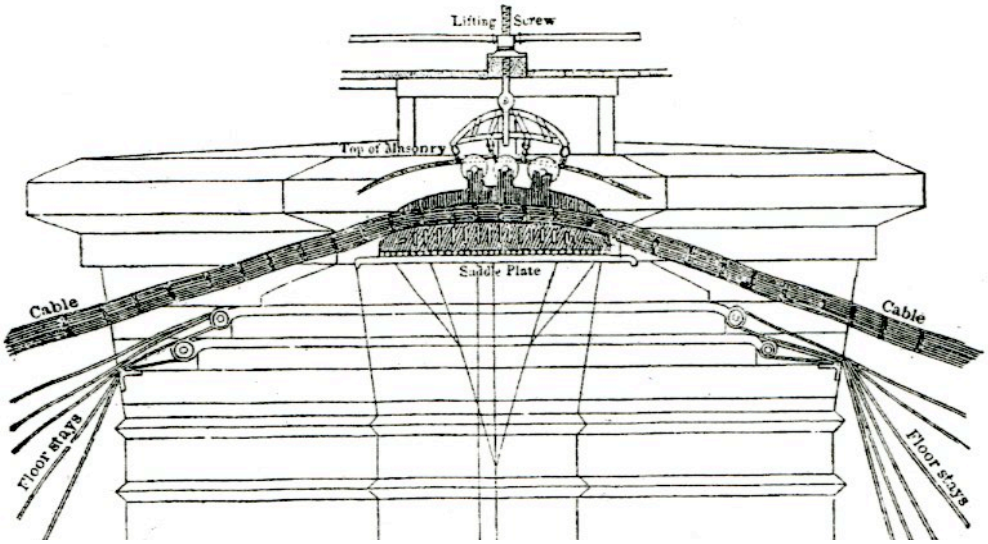

Figure 3.6 Brooklyn Bridge tower section showing cable saddle.
Schuyler, "Our Four Big Bridges," 1904.

cities, and they will be entitled to be ranked as national monuments."[9] The Gothic arch was used throughout Manhattan since the 1840's with the Gothic revival, so using the style made sense to Roebling. Roebling also saw architecture as only the inefficient use of material in a structure. Architecture was defined as ornamentation, not as an expression of a simple form. He thus needed something that would be ornate. A sleek design expressing the engineering advancements he made through the bridge would not be architectural, thus not monumental. The Gothic arch, however, lost meaning from overuse. It was seen in private homes, commercial buildings, and churches.[10] The symbol of medieval churches and old power was a standard, not a novel idea by Roebling to make his bridge special. The arch is something very tangible to the average New Yorker, who sees it as this symbol of the past, so he automatically assumes that it is important. Thus, the association that Roebling was searching for was found. Schuyler also says that the Gothic arch creates this feeling of monumentality, but instead of applauding the choice, he criticizes it. Roebling places more emphasis on the massive towers than the expression of structure. His engineering advancements were in the thin deck, not the towers. The structure is still adequately displayed because of the juxtaposition between the heavy towers and light deck, even with a covering of the towers.

The Manhattan Bridge directly responds to Schuyler's criticisms. The steel towers of the Manhattan Bridge are not masking, but slender (figure 3.7). In a later article, Schuyler says the towers show "abundant evidence of a more skilful and expressive and successful treatment than is to be found in any other suspension bridge anywhere."[11] The critic is particularly taken with the fact that every part of the bridge speaks of its structure. There is no hiding of elements, they are actually further

[9] *Brooklyn Bridge, Fact and Symbol*, 79.
[10] *Brooklyn Bridge, Fact and Symbol*, 79.
[11] Montgomery Schuyler, "Our Four Big Bridges," *The Architectural Record* XXV, no. 3 (March 1909), 158.

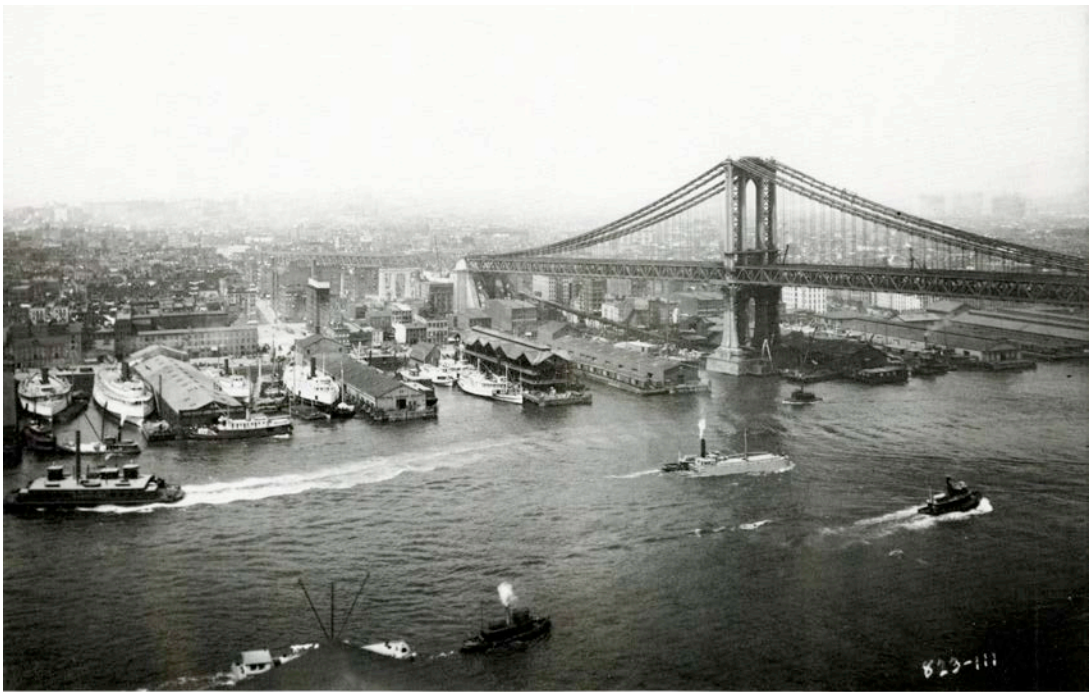

Figure 3.7 View of Manhattan Bride tower under construction, June 29, 1909.
Winpenny, Manhattan Bridge, the Troubled Story of a New York Monument*, 2003.*

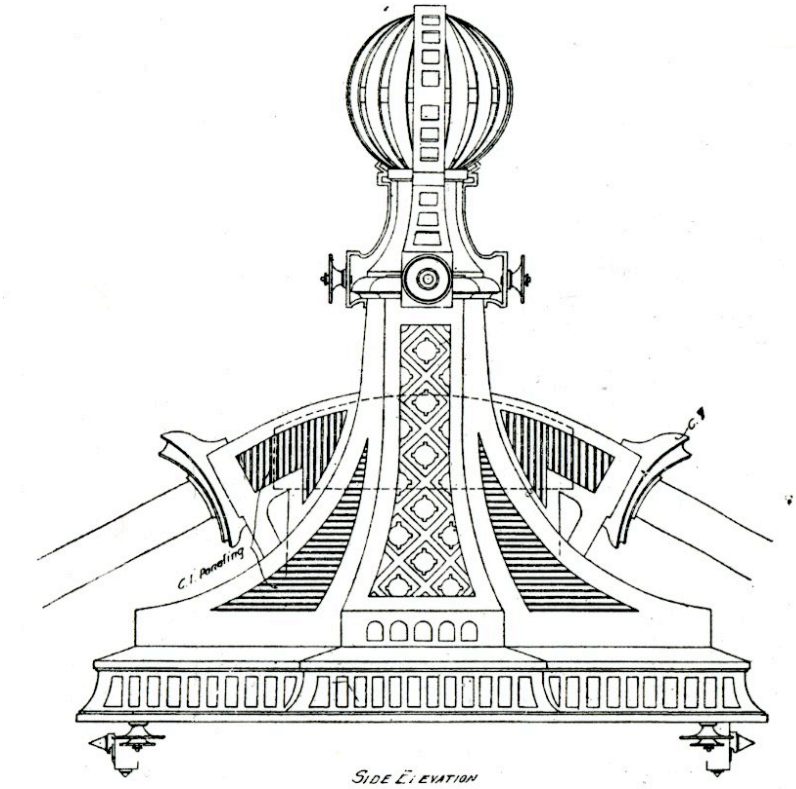

Figure 3.8 Cable saddle for Manhattan Bridge.
Schuyler, "Our Four Big Bridges," 1904.

Figure 3.9 Manhattan Bridge support with steel deck.
Photograph by author, 2009.

expressed through the bridge's architects, Carrère and Hastings. The parapet at the top of the tower is a focal point for the eye, letting the viewer know that this is where the cable connects to the tower (figure 3.8). Even though Schuyler says the structure is expressed in a nearly flawless manner, the monumentality seen in the towers of the Brooklyn Bridge is also seen in the anchorages of the Manhattan Bridge.[12] The anchorages project mass that Schuyler compares to Roman monuments (figure 3.9). The feeling of immobility in this bridge allows it to be read on the same level of the Brooklyn Bridge, even if it is not as iconic.

[12] Montgomery Schuyler, "Our four big bridges" 160.

Figure 3.10 Manhattan Bridge view from DUMBO.
Photograph by author, 2009.

The New York Times agreed with Schuyler's critique of the Manhattan Bridge.[13] The 1904 article stated that the architects used the engineer's lines to emphasize the structural elegance of the bridge. The towers, according to the article, should be left plain, the only decoration in a modest crowning of the tops. This goes directly against what Schuyler said, who thought more emphasis should be brought to the towers so the viewer would be aware of the structure. *The New York Times* opinion makes more sense, for the structural beauty of the bridge comes from the pure structure, not from the embellishments added to it. The parapets, which are a nod to the Gothic arches of the Brooklyn Bridge, distract the viewer from the structure, not draw the eye towards it. One

[13] *The New York Times*, "Plans for the Manhattan Bridge Made Public," June 30, 1904.

Figure 3.11 Manhattan Bridge anchorage with steel deck.
Photograph by author, 2009.

no longer looks at the cables and how they function with the bridge, but they look only at the ornamental details. If Schuyler wants pure structure, he should call for it.

Schuyler is correct that the Manhattan Bridge's structure is more impressive than the Brooklyn Bridge's structure. The deck is much thinner and the towers are lighter. The Brooklyn Bridge's deck, while thick, still looks elegantly hung from the towers because they are so massive they dwarf the deck. The Manhattan Bridge was able to achieve a thin deck while using seemingly two-dimensional towers. The need for the architect's input was not needed, for the elegance in the design is from the pure structural form, not the heavy anchorages or grand approaches. These elements make the Manhattan Bridge want to be more like Brooklyn Bridge, an established monument. The steel form would better be expressed if allowed to be the main focus of the bridge, instead of the clashing anchorages (figure 3.11). The anchorages and steel deck together

Figure 3.12 Road underneath Manhattan Bridge supports in DUMBO.
Photograph by author, 2009.

produce an uncomfortable dichotomy. While this works in the Brooklyn Bridge's convergence of heavy masonry towers and steel wire, the Manhattan Bridge is not successful. Steel rests on the masonry anchorages and is supported by masonry at its approaches. The masonry is used as part of the community. Its archways allow traffic to pass beneath and define boundaries for parks (figure 3.12). When the eye moves upward along the masonry, the harshness of the steel deck against masonry suddenly stops the eye's movement. The steel trusses do not flow into the masonry, they are independent and continue over the masonry as if not even part of it. A better integration of elements would provide a more successfully aesthetic bridge.

Roebling placed the suspension cables in saddles at the top of the towers. Schuyler then criticizes this as a structural problem. To avoid lateral strain on the

Figure 3.13 Aerial View of the Williamsburg Bridge, 1978.
Winpenny, Manhattan Bridge: the Troubled Story of a New York Monument, *2003*.

towers, the cables were not fastened to the towers, but rested on movable saddles.[14] The saddles move on 45 iron rollers, which yield to the tension of the wires. This system is flawed because the wires corrode and need repairs. The Manhattan Bridge fixes this by using flexible towers. The towers bend to the lateral forces placed on the bridge, so the cables do not move against anything and wear down.

The Williamsburg Bridge and the Elastic Theory

The Williamsburg Bridge was conceived of and opened on December 19, 1903 to relieve congestion on the Brooklyn Bridge to the south (figure 3.13). The bridge was designed to carry four trolley tracks, two elevated tracks, two pedestrian walks, and two carriage paths on its two decks.[15] Engineer Leffert Buck used the Elastic Theory in his design of the bridge, which led to the thick deck. The span "L" is 1600 ft and the truss

[14] Alfred C. Barnes, *The New York and Brooklyn Bridge: Illustrated* (Cambridge, MA: Fisher, 1883).
[15] Henry Grattan Tyrrell, *History of Bridge Engineering* (University of California: the Author, 1911), 253.

thickness “t” is 43 ft, giving the bridge an L:t ratio of 37:1, which is low when compared to later bridges.

Josef Melan first developed the Elastic Theory in 1888.[16] The theory says that the stiffening of the cable from the load of the bridge creates stiffness. The Elastic Theory uses many assumptions, which Steinman states.[17] The first assumption is that the cable is perfectly flexible, the form responding directly to suspender forces. The second assumption is that the truss is considered a beam and tied to the cable throughout its length. The next assumption says that the dead load across the span is uniform, thus the cable is in the shape of a parabola. Next, Steinman assumes the dead load is carried by the cable and causes no stress in the stiffening truss. The only stresses in the truss are live load and temperature changes. The last assumption is that the form of the cable curve remains unaltered by loading. This assumption is the most glaring problem of the Elastic Theory. The cable does change form with loading, changing from a perfect parabola to a catenary. This cable will then provide stiffness, which is the basis of the deflection theory, to be examined later.

The conservative design of the Williamsburg Bridge made Schuyler and other critics give the bridge a lot of negative criticism. He acknowledges the bridge’s scientific advances, but questions the necessity for such a thick roadway. While the Brooklyn Bridge uses the deck to “give emphasis to the roadway,” Schuyler accuses the Williamsburg Bridge’s deck of “insistent conspicuousness.”[18] The flaws in the Elastic Theory are clearly seen when Schuyler asks “whether a huge trussed girder is only assisting a suspension bridge or is only assisted by it to the extend of a suspensory

[16] Stephen G. Buonopane, "Theory and Experience in Suspension Bridge Design" (B.S.E. Thesis, Princeton University, 1991). 19.
[17] David Barnard Steinman, *A Practical Treatise on Suspension Bridges: Their Design, Construction and Erection* (Univesity of Wisconsin-Madison: Wiley, 1922), 19-20.
[18] Schuyler, “Our four big bridges” 153.

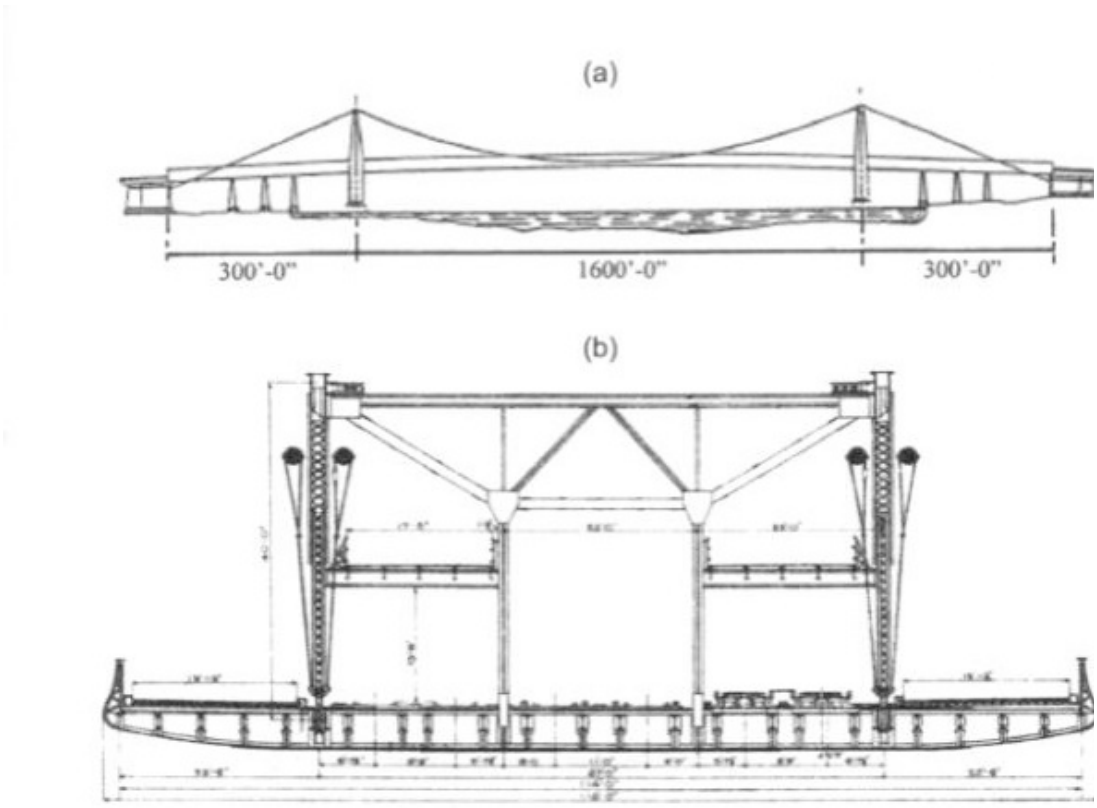

Figure 3.14 (a) diagrammatic profile and (b) cross-section of Williamsburg Bridge.
Schultz, "Aesthetics and Innovation and Innovation of the Manhattan Bridge," 2004.

arrangement to relive the strain of the centre."[19] Without a degree in engineering, the architecture critic can see that the bridge is too thick, and looks awkward against the other bridges of the East River (figure 3.14).

The towers are also a point of criticism in Schuyler's article.[20] He bluntly states, "the Williamsburg Bridge, as a work of art, has no friends." The first point of criticism in the towers is the choice of material. He does not understand why the engineer chose to use metal towers when masonry towers are more aesthetically pleasing. The Eiffel Tower, however, is still beautiful to Schuyler, so he then argues that the main ugliness in the tower comes from the "abrupt change of direction of their bounding lines." The almost vertical rise from the water then begins to narrow at the deck, giving the towers a "bandy-legged" aspect. Although the form may be correct in the engineering world,

[19] "Our four big bridges" 153.
[20] "Our four big bridges," 151-153.

Figure 3.15 Aerial view of the Delaware River Bridge.
Camden City Postcard Gallery, 2009.

architecturally the view is not fluid, and thus not aesthetically pleasing when looking in conjunction with the other bridges. The harsh criticism of the Williamsburg Bridge is not carried over to the Manhattan Bridge, so Schuyler's main issues can be assumed to not derive from the use of exposed steel, but from the thick deck and awkward towers.

The Deflection Theory

In 1906 Melan first published the Deflection Theory, which corrected the main problem of the Elastic Theory. The Elastic Theory says that the change in deflection of the cable under live loads is negligible, but the Deflection Theory states that this cannot be. Under the bridge's dead load, the cables are in the shape of a parabola, but the addition of live load deflects this shape. This concept becomes increasingly important as the bridge gets longer. The deflection of the sag, thus the deflection of the deck, becomes large enough that the stiffness given to the span requires less reinforcing than originally thought.

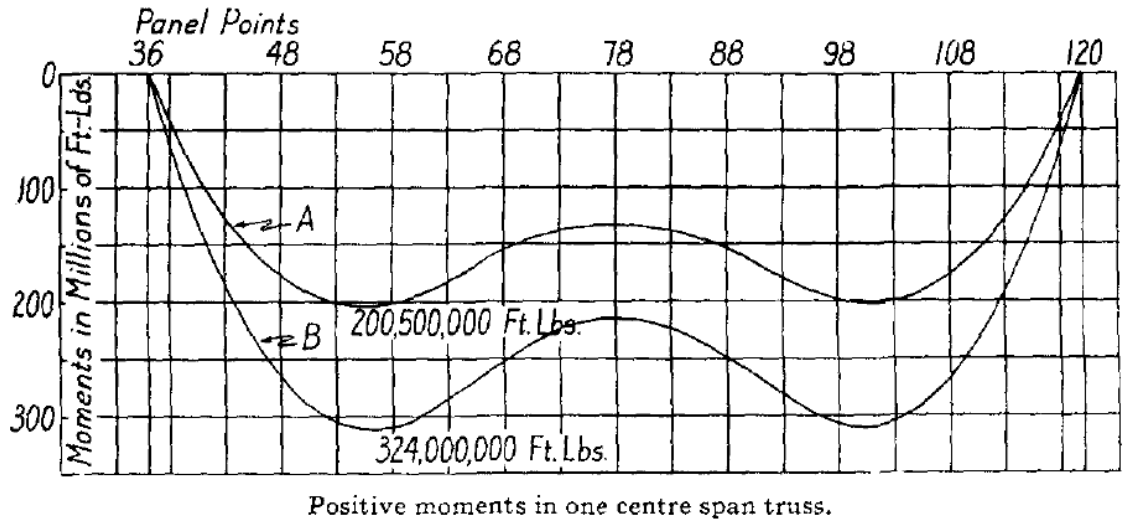

Figure 3.16 Comparison of Deflection Theory (A) and Elastic Theory (B) Moments
Moissieff, "The Towers, Cables, and Stiffening Trusses of the Bridge over the Delaware River between Philadelphia and Camden," 1925.

Leon Moissieff illustrates the benefits of the Deflection Theory over the Elastic Theory in a 1925 article in the *Journal of the Franklin Institute*. Using the Delaware River Bridge (figure 3.15) as an example, he explained that the moment acquired from the sagged cables relieve the moment in the truss, allowing the moment in the truss to be less than originally anticipated. The chart shows the differences in moments between the Deflection Theory, the upper line, and the Elastic Theory, the lower line (figure 3.16). The moment using the Deflection Theory is drastically less. By calculating the area between the two curves, Moissieff argued that theoretically the center span of the Delaware River Bridge would require 55% more material for chords and 43% more for diagonal web members using the Elastic Theory.[21] The actual reduction, however, was 51% for chords and 43% for web members after certain practical applications. Economically, this saved 3211 tons of steel used in the trusses proper.[22] Using contemporary steel prices, Moissieff calculated the savings at $548,000 for the trusses

[21] Leon Moissieff, "The Towers, Cables, and Stiffening Trusses of the Bridge over the Delaware River between Philadelphia and Camden," *Journal of the Franklin Institute*, October 1925, 461.
[22] Leon Moissieff, "The Towers, Cables, and Stiffening Trusses of the Bridge over the Delaware River between Philadelphia and Camden," 461.

alone. When compounded with costs of additional cable wire and suspender ropes to hold the truss and additional materials needed for the towers and anchorages, the total savings would be $850,000. Even though the Deflection Theory is more complicated, the economic savings are extraordinary enough to encourage its use.

The Manhattan Bridge was the first structure to use the Deflection Theory. Although not formally stated, the thin truss and long span suggest that the bridge was used under the theory's advisement.[23] A span of 1470 ft and truss thickness of 24 ft give the Manhattan Bridge an L:t ratio of 61:1, extremely thin compared to the Williamsburg Bridge's 37:1 ratio. A simple analysis of the bridge can show how the Deflection Theory lessens the moment on the bridge. Structural properties of the main span of the bridge are given in the table below. The properties are given for each of the four cables of the bridge.

Ralph Modjeski estimated the live load with the assumption that all the trains were full, placed end-to-end on all eight train tracks, all car lanes were filled with loaded cars, and the sidewalks were packed with pedestrians. He said this would be 18,300 lbs/ft of live load, but that heavy and regulated traffic would have a live load of only 6,960 lbs/ft. He thus chose 8 k/ft as the working load and 16 k/ft as maximum loading, or 4 k/ft per cable. Although these loadings would not stand for today's automobiles and trains, the upper tracks are no longer used for trains, so the loading conditions are safe.

L (ft)	1446.7
d (ft)	145.3
A_{cable} (ft^2)	1.96
q_{live} (k/ft)	5.82
q_{dead}	4
#of cables	4

[23] Allison Schultz, "Aesthetics and Innovation of the Manhattan Bridge" (M.S. Thesis, Princeton University, 2004), 35.

Basic vertical reactions and moments can be found for the bridge by simply treating it as a beam. The vertical reactions were be greatest at the supports and zero in the center, and can be found by the equation:

$$V = (q \cdot L)/2 = \left(\left(5.82\ k/ft + 4\ k/ft\right) \cdot 1446.7\ ft\right)/2 = 7{,}103.30k$$

The maximum moment would be at the center of the beam. Because the load is continuous, the equation for a simply supported beam gives the maximum moment as:

$$M = \left((q_{live} + q_{dead}) \cdot L^2\right)/8 = \left(\left(5.82\ k/ft + 4\ k/ft\right) \cdot 1446.7\ ft^2\right)/8 = 2{,}569{,}000\ ft \cdot k$$

According to Alison Schultz's calculations of the Manhattan Bridge using the Deflection Theory, the maximum moment is 63,350 ft-k and the vertical reaction is 727 k. This begins to show the large effect suspenders and cables have on the truss.

Othmar Ammann was a Swiss engineer who graduated from the Federal Technical Institute in 1902 and came to America two years later. He worked from 1912 to 1923 under Lindenthal.[24] After leaving the famous engineer, Ammann designed the Goethals Bridge and Outerbridge Crossing. His main achievement, however, was popularizing the deflection theory through the George Washington Bridge (figure 3.17). The GWB was originally designed to have two decks, but was only opened with one deck in 1931.[25] The thinness of the deck was achieved by its long span, 3,500 ft, which was the longest span at the time of construction. Stephen Buonopane displays in his Princeton University thesis that the deflection theory was vital for development of the GWB.[26] In the Elastic Theory analysis, the maximum positive moment at mid-span is 712,600 k-ft. The Deflection Theory shows the maximum moment as 57,776 k-ft, only 8% of the Elastic Theory moment. Using the Elastic Theory moment, Buonopane discovered that

[24] David Billington, *The Tower and the Bridge: the New Art of Structural Engineering*,130.
[25] Allison Schultz, "Aesthetics and Innovation of the Manhattan Bridge," 63.
[26] Stephen G. Buonopane, "Theory and Experience in Suspension Bridge Design," 42-47.

Figure 3.17 George Washington Bridge.
Schultz, "Aesthetics and Innovation of the Manhattan Bridge," 2004.

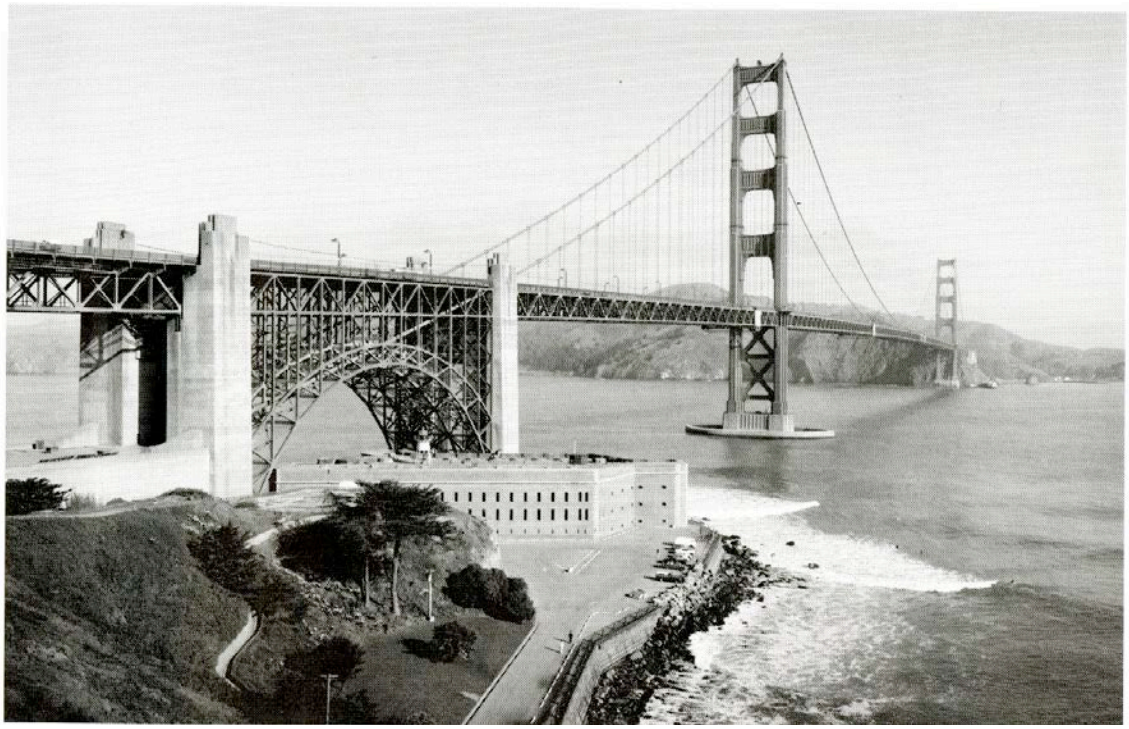

Figure 3.18 Golden Gate Bridge, 1984.
Winpenny, Manhattan Bridge, the Troubled Story of a New York Monument, *2003.*

to keep the depth of the GWB constant at 29 ft, the truss chords would have to go from 85 in^2 on top and 75 in^2 on bottom to 123 ft^2.

The great success of the GWB gave people confidence in the Deflection Theory. Before the addition of the second deck, the L:t ratio was 350:1, and after the addition was 120:1, still much thinner than the Manhattan Bridge. The confidence inspired by the bridge brought about the construction of the Golden Gate Bridge (figure 3.18) and Verrazano Bridge (figure 3.19), with L:t ratios of 168:1 and 180:1, respectively. The Golden Gate, since its construction in the 1930s, has since had to be stiffened, for the deck was too thin to resist wind loads.[27]

The Golden Gate Bridge was not the only bridge to experience problems with the deflection theory. The most dramatic collapse of the 20th century, the Tacoma Narrows, was the result of an improperly used deflection theory (figure 3.20).[28] Moissieff designed the "Galloping Gertie," as it was colloquially called, in 1939 with a span of 3,800 ft and 8 ft deep deck. This made the L:t ratio 475:1, much higher than the Golden Gate or Verrazano Bridges. This made the bridge susceptible to wind loads. Moissieff stated in his calculations that wind was only a horizontal force. This was a major flaw in the deflection theory, for wind blows in multiple directions, creating vertical forces on the span. The bridge could not resist these forces, the wind made the sides of the span twist in opposite directions. Clark H. Eldridge says in his account on the collapse that the deck was "tilting from side to side" while the center of space remained horizontal.[29] The winds were only blowing at 40 mph on November 7, 1940, but it was still enough to make the span collapse. The Tacoma Narrows is the perfect example of how a good theory can be taken too far, to the point where it is no longer usable.

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[27] *The Tower and the Bridge: the New Art of Structural Engineering*, 137.
[28] *The Tower and the Bridge: the New Art of Structural Engineering*, 135.
[29] Darl Rastorfer, *Six Bridges, the Legacy of Othmar H. Ammann* (New Haven: Yale University Press, 200), 32.

Figure 3.19 Verrazano Bridge
Rastofer, Six Bridges, *2000.*

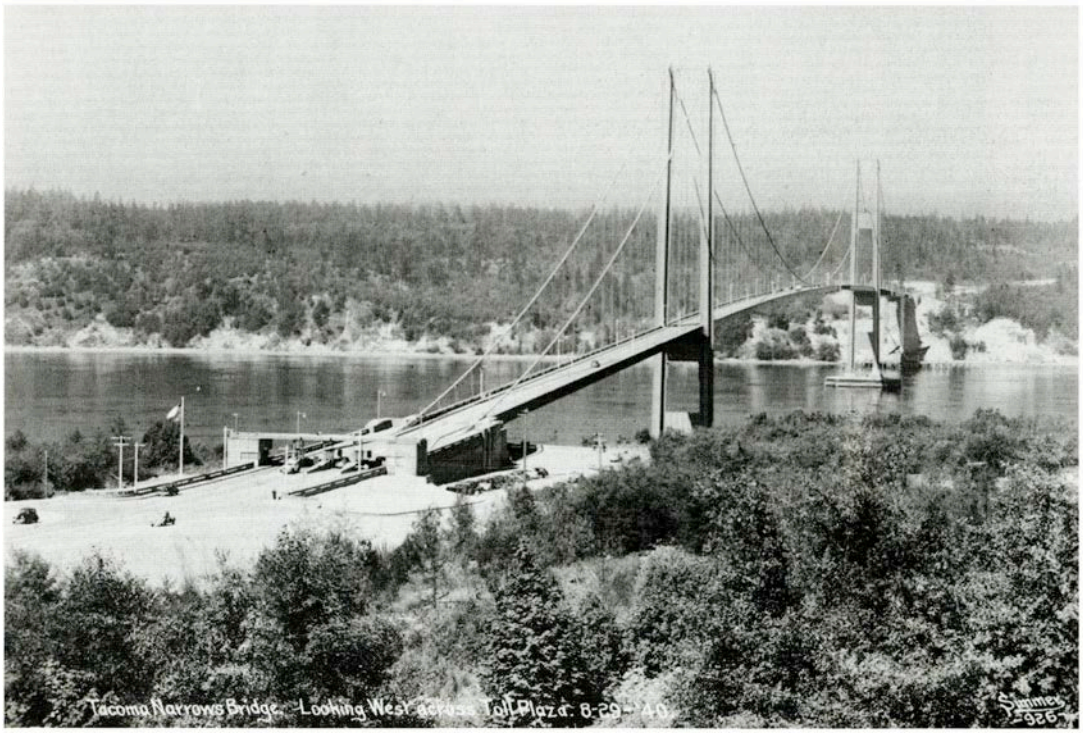

Figure 3.20 Tacoma Narrows Bridge, 1940.
Winpenny, Manhattan Bridge, the Troubled Story of a New York Monument, *2003.*

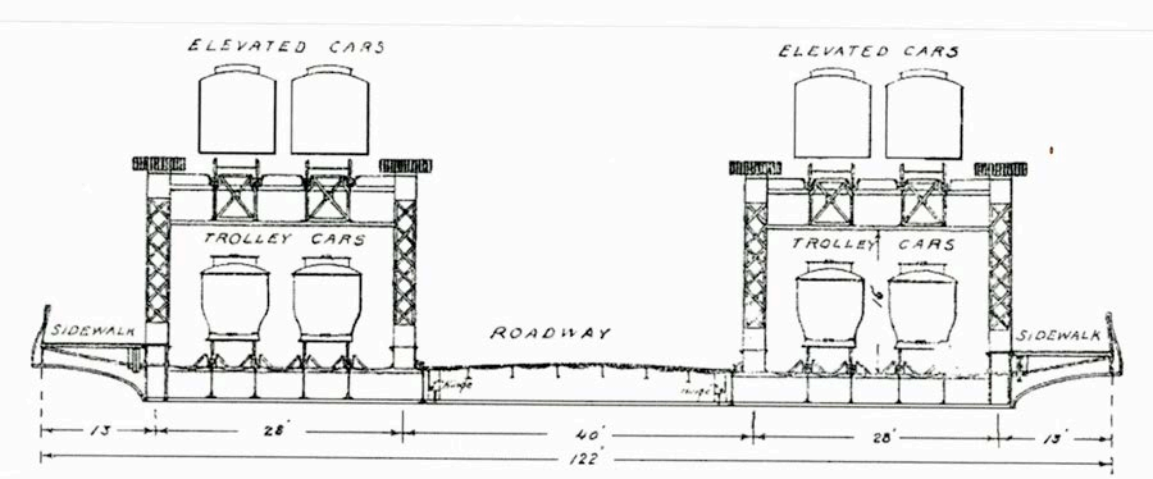

Figure 3.21 Cross-section of Manhattan Bridge deck, 1904.
Winpenny, Manhattan Bridge, the Troubled Story of a New York Monument, *2003.*

The Manhattan Bridge and Torsional Problems

The flexibility of the deck allowed by the Deflection Theory created problems for the Manhattan Bridge. Coupled with the flexibility, a major design flaw in the bridge was the decision to place the train tracks on the outer parts of the deck. The image of the original design shows eight railways, four on the upper deck and four on the lower deck, three lanes for vehicular traffic in the center of the deck, and two pedestrian walkways on the outermost lanes (figure 3.21). The most significant placement is that of the railways, which were placed on the outer lanes because it is beneficial to the load paths of the bridge. At this location, the suspension cables can carry the loads of the heavier trains more directly. The main problem of this design occurs when only one side of the deck is loaded, which provides instability across the deck. A 1980 inspection report states that when two trains are passing on one side of the deck, the deck may deflect several feet.[30] The report continues to say that this deflection does not threaten the bridge, only forces high maintenance costs. Since the original design, the upper levels have been converted

[30] Blair Birdsall, "Performance of Long-Span Bridge Structures: the East River Bridges at New York," *Annals of the New York Academy of Sciences* 352, no. 1 (December 1980), 140.

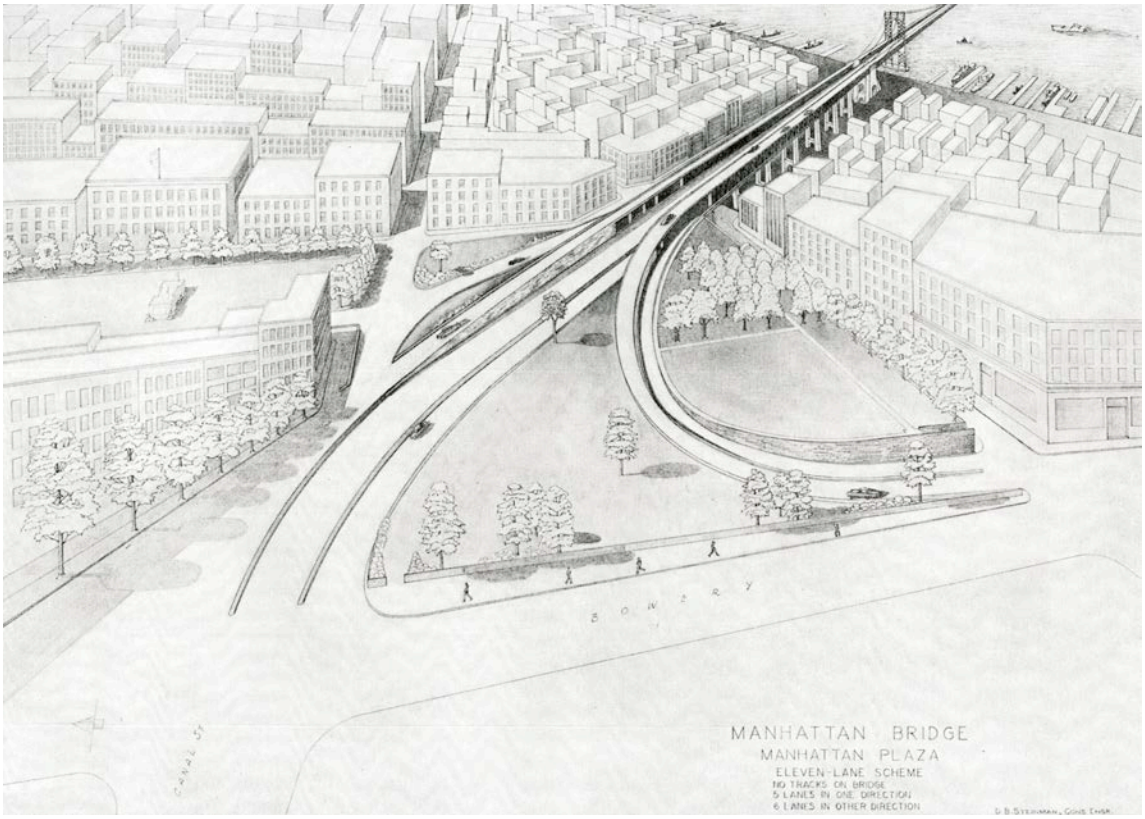

Figure 3.22 Eleven-lane scheme of Manhattan Bridge on Manhattan side.
Steinman, "Manhattan Bridge: Investigation of Structural Condition," 1955.

to automobile lanes, but torsion problems still exist when the now heavier trains go across.

The Department of Public Works commissioned David B. Steinman in 1952 to assess the problems being experienced with the Manhattan Bridge. The purpose of Steinman's investigation was to investigate eliminating the effect of unsymmetrical loading due to rapid transit on the bridge and eliminating rapid transit from the structure.[31] Steinman was also to assess the condition of the cables and supports of the bridge, for the department had already discovered a complete break in a lower chord member of a truss in the main span. Steinman concluded that this break was due to the

[31] D.B. Steinman, "Manhattan Bridge: Investigation of Structural Condition," Report to Department of Public Works (New York, April 1955).2.

heavy loading from rapid transit and twisting the chord was subjected to when the deck dipped.[32]

Steinman presented the Department of Public Works with three schemes. His favorite was the eleven-lane scheme, which would be the most farsighted and best for the bridge (figure 3.22).[33] This scheme would remove all rapid transit from the bridge and place it in an underground tunnel. This would then leave four lanes for vehicular traffic additional to the seven already on the bridge. Steinman estimated that the cost of remodeling the bridge as $15,500,000 and the cost of the new tunnels as $85,000,000, for a total of $100,500,000. The government did not approve of this costly scheme.[34]

The fourteen-lane scheme was Steinman's second pick (figures 3.23). This added three lanes to the center of the bridge, between the two upper roadways. The scheme also required repair to all defects on the bridge and a policy of "frequent inspection and adequate maintenance."[35] The tracks would remain, so defects would continue, but the cost was only $4,000,000. The third scheme was to remove the rapid transit to the center of the roadway (figure 3.24). The plan is referred to as the eight-lane scheme because it provides eight lanes of vehicular traffic, four on each level. Placing the tracks in the center would solve the problem of tipping on the sides, but would also create new problems. The central loads would be harder to carry, and greater stresses would be placed on the cables. Steinman recommended to stiffen the floor beams to reduce deflections caused by central trains. No cost was provided for this scheme, for Steinman recommended strongly against it.

The Department of Public Works chose none of these schemes, instead choosing to implement a short-term fix and repair the parts of the bridge that were in need. The

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[32] D.B. Steinman, "Manhattan Bridge: Investigation of Structural Condition," 2.
[33] "Manhattan Bridge: Investigation of Structural Condition," letter to Frederick Zurmuhlen
[34] "Aesthetics and Innovation of the Manhattan Bridge," 11.
[35] "Manhattan Bridge: Investigation of Structural Condition," letter to Frederick Zurmuhulen.

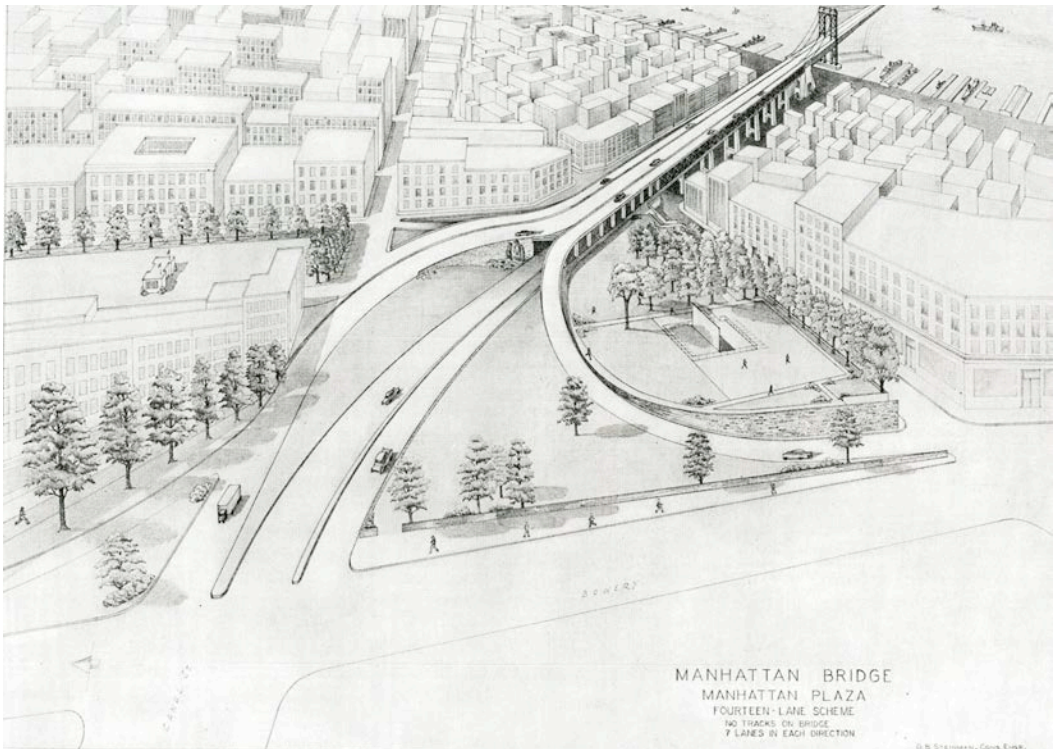

Figure 3.23 Fourteen-lane scheme of Manhattan Bridge on Manhattan side.
Steinman, "Manhattan Bridge: Investigation of Structural Condition," 1955.

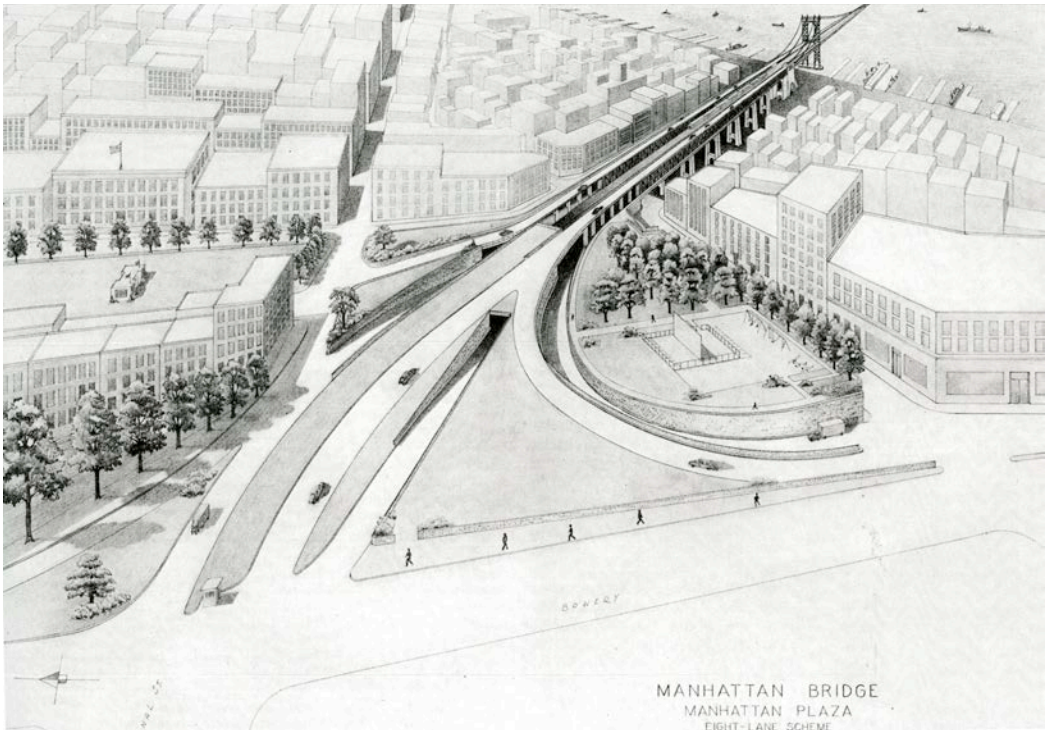

Figure 3.24 Eight-lane scheme of Manhattan Bridge on Manhattan side.
Steinman, "Manhattan Bridge: Investigation of Structural Condition," 1955.

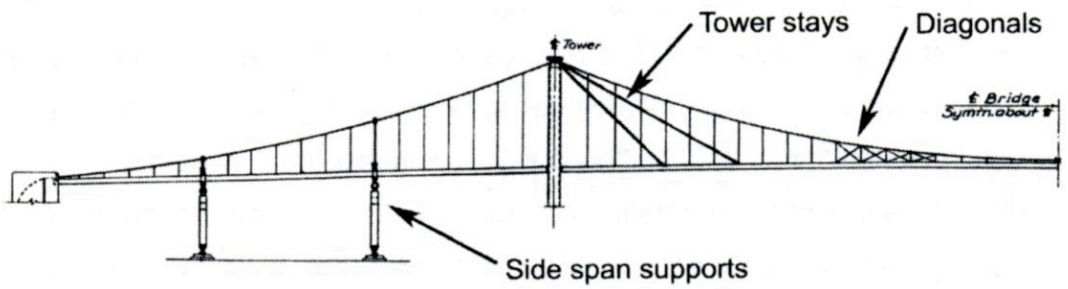

Figure 3.25 Recommendations to reduce torsional deflections.
Schultz, "Aesthetics and Innovation of the Manhattan Bridge," 2004.

cost of this was only $6.4 million.[36] Although this seems like a small cost, it was not a good decision, for in 1971 the engineering group Steinman, Boynton, Gronquist & London presented another report about problems in the Manhattan Bridge. Problems they saw in the bridge less than twenty years after repairs included cracks in stiffening truss chords, cracks in lower floor beams and stringers, wear of shims between stringers and lower floor beams, and wear of rocker pins.[37]

The engineers built a 1:50 scale model and performed a series of tests with different stiffening schemes. The engineers offered twenty-seven different schemes, two of which were recommended to the department of highways. Both schemes used side span supports to reduce torsional deflection. The first scheme used transverse stays and would cost $4,000,000, while the second would use tower stays and four panels of diagonals near the center span and would cost $4,400,000 (figure 3.25). The government chose neither of these spans in the end. Although they would reduce torsional deflection in the main span by 71% and 67%, respectively, they were undesirable due to lack of aesthetic considerations.[38]

Repairs for the bridge began again in 1982. Weidlinger Associates were charged with the rehabilitating the bridge, and although they claimed they would be done in eight

[36] "Aesthetics and Innovation of the Manhattan Bridge," 11.
[37] Steinman, Boyton, Gronquist, & London, consulting engineers, "Manhattan Bridge: Study and Recommendations for Reduction of Torsional Deflections in teh Suspended Spans," Report to Department of Highways (New York, April 1971), 6.
[38] "Aesthetics and Innovation of the Manhattan Bridge," 13.

to ten years, they did not finish until 2008. After studying the bridge, Weidlinger found out the bridge would deflect from two to eight feet on one side when a train would pass on another. They sought to fix this problem by added diagonal lateral bracing within the deck to help resist twisting by 50%.[39]

The problems the Manhattan Bridge has faced are not the result of the Deflection Theory or rapid transit lines alone. The combination of the two factors caused the torsion to wear away on the bridge. The torsion was made possible because Moissieff did not consider the vertical impact of wind on the bridge. This twisting would not have been as severe, however, if the design had not placed the rapid transit on the outside lanes. Even with these problems, the Manhattan Bridge still remains a triumph in Civil Engineering. The Deflection Theory was an important moment in creating larger bridges, which would later help shape New York. The structural soundness of the Manhattan Bridge compared to the uncertainty of the Brooklyn Bridge asserts it as the main crossing between Brooklyn and the Lower East Side.

[39] "Aesthetics and Innovation of the Manhattan Bridge," 15.

Figure 4.1 Map of Lower Manhattan and Brooklyn with Manhattan and Brooklyn Bridges, circa 1920
Sanborn Tax Maps (edits by author), 2009.

4 Condensing the City

The Regional Plan of New York and Its Environs and the Municipal Art Society

The Lower East Side's problems with traffic congestion and overcrowding increased after the construction of the Manhattan Bridge. Originally used as a way to alleviate the Brooklyn Bridge traffic, the structural soundness only provided more reason for people living in Brooklyn to drive to Manhattan daily for work. By 1924, problems with automobile traffic were severe. The already narrow streets originally made for the

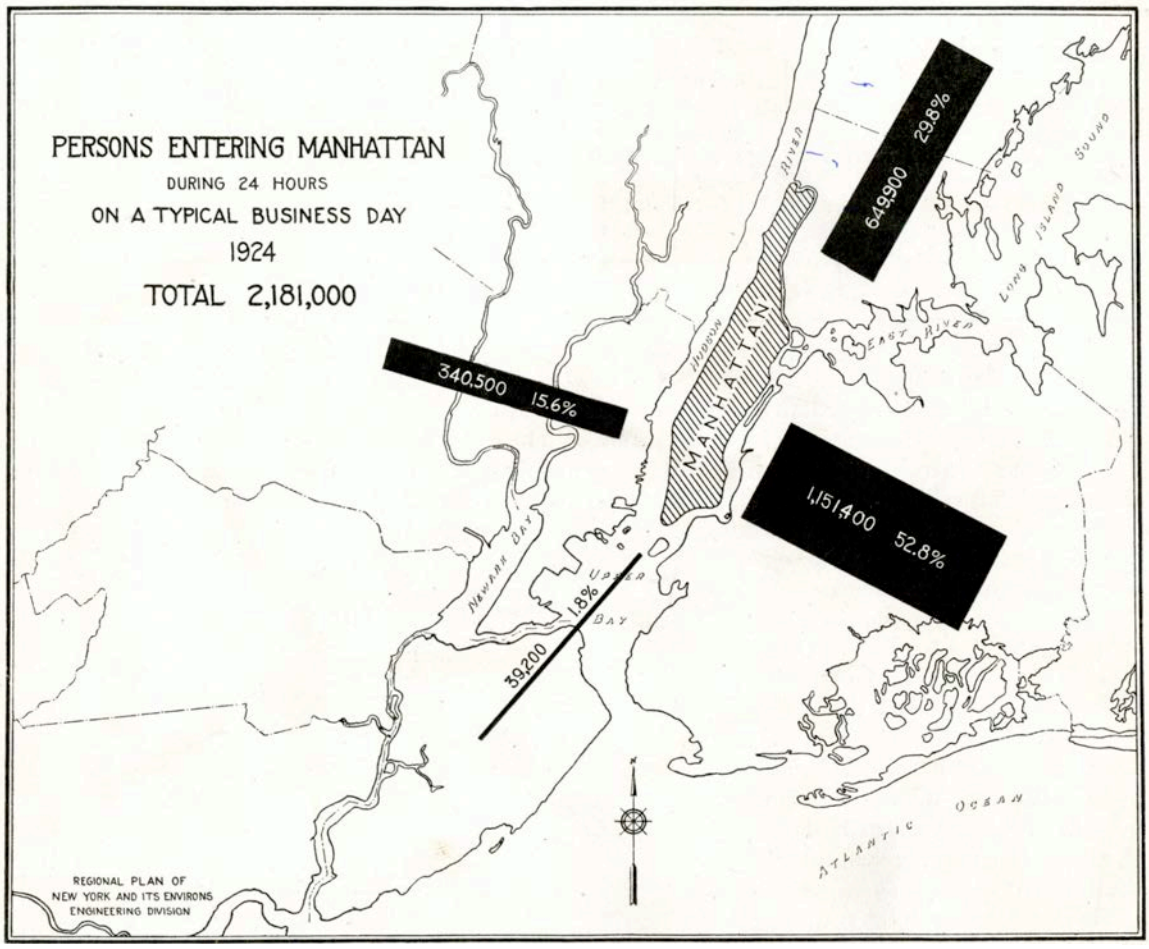

Figure 4.2 Diagram of day traffic
Regional Plan of New York, Transit and Transportation, *1927.*

Lower East Side could no longer contain the increase in day population. While the Bronx, Brooklyn, and Queens each increased in population by about 500,000, Manhattan lost 500,000, yet traffic increased. The development of the bridges, tunnels, and subway lines provided faster transit into Manhattan, giving people incentive to live in Brooklyn or more remote suburbs. In 1924, the 982,000 residents below 59th Street in Manhattan were compounded daily with 2,181,000 commuters, 1,151,400 of whom took the came from Brooklyn and Queens, most likely over East River Bridges (figure 4.2).[1] With the increased traffic, the Regional Plan for New York and Its Environs tried to solve

[1] Regional Plan of New York and Its Environs, *Regional Survey of New York and Its Environs Volume III: Highway Traffic* (New York: Regional Plan of New York and Its Environs, 1927), 62.

the problem using basic street widening and regulations. The Municipal Art Society also tried to fix the problem by creating Beaux-Arts style diagonals through Manhattan. Both of the plans focused on getting traffic into the city. Lower Manhattan was the magnet towards which the outer boroughs should go. Brooklyn tried to be relieved Manhattan's congestion because it had more space. The focus of transportation and traffic, however, was still Manhattan.

The Regional Plan Association of New York published the Graphic Regional Plan in 1929. The plan was created to improve the city conditions for a population of 20 million in 1965.[2] The third volume of the Regional Survey of New York and Its Environs, the survey that provided the research for the Graphic Regional Plan, addresses the issues of obstructions in the streets. Vehicular traffic created a large amount of congestion on the already overpopulated Lower East Side. The survey attributes the greater congestion to the dramatic increase in pleasure vehicles, which went from 84,912 in Manhattan in 1919 to 169,598 in 1926. Suddenly, the streets could no longer hold the amount of vehicles, reducing the speed of traffic and slowing the pace of the city.

The RPA provided both regulative and physical solutions to the problem of congestion. Each solution type approached the problem in a different way, although they would have to be applied together to relieve the streets. The main goal of these changes was to permit easy flow through the streets, not to provide better stopping places for those who lived in the area. Going through the area was more important than using the area as a vital part of the city. A main problem that was addressed through regulation was the stoppages of vehicles along the streets. While vehicles needed to stop to load or unload passengers or goods, they created a bottleneck. This problem was noticeably appeased with the 1924 twenty minute parking limits. While this increased the flow of traffic, officials noted that twenty minutes was not long enough to do a sufficient amount

[2] David A. Johnson, *Planning the Great Metropolis: the 1929 Regional Plan of New York and Its Environs* (London: Taylor and Francis, 1996), 1.

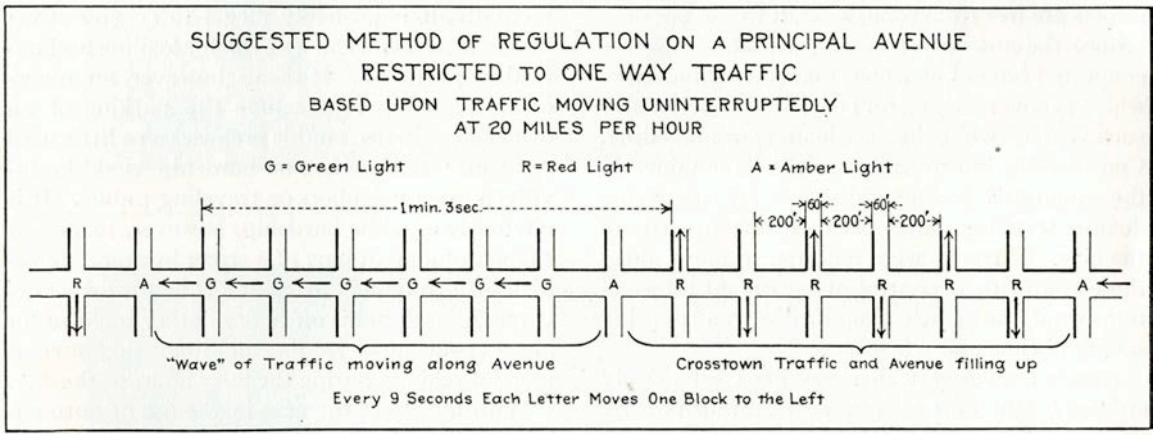

Figure 4.3 Diagram showing how the "platoon system" would alleviate traffic
Regional Plan of New York, Transit and Transportation*, 1927.*

of business.[3] To alleviate this problem, officials created parking spaces along empty streets. The platoon system was then developed, which increased the average speed of cars and number of vehicles passing a point (figure 4.3). The traffic lights were timed to allow a "wave of traffic" seven blocks in length followed by a gap of seven blocks, where cross-town traffic would then move.[4] Another suggestion was segregation of traffic, which would allow for passenger cars to move more easily throughout the city, but may have caused problems for trucks. Blocking trucks from certain routes allowed more room for pleasure vehicles, but increased traffic on the roads designated for trucks.

The first suggested physical improvement was to bypass congested areas, which included many streets of the Lower East Side.[5] Traffic would be taken around the busier areas when entering is not necessary. Although this creates a longer distance, the time of travel is shorter enough to make a difference. There could also be multiple roads to the same destination when going around a city, thus not only relieving the congestion of the one area, but the surrounding routes as well. This idea is seen later in the interstate highway system. As suggested in this portion of the survey, however, the proposed routes

[3] Regional Plan of New York and Its Environs, *Regional Survey of New York and Its Environs Volume III: Highway Traffic*, 96.
[4] *Regional Survey of New York and Its Environs Volume III: Highway Traffic*, 95.
[5] *Regional Survey of New York and Its Environs Volume III: Highway Traffic*, 101.

do not go around Manhattan, but the cities en route to the main destination. The new way of thinking was applied to the congested areas of Newark, Queens, and Brooklyn.[6] Only once outside Manhattan could commuters more easily reach their residential destination.

The Regional Plan only assumes that people are trying to get into Manhattan, not around it. Commuters from the city still needed to drive through the congested Manhattan if they were going from suburb to suburb. The suburbs were completely secondary to the city and did not create a network. The thought of going from one suburb to the other directly did not make sense, because suburbia's main attraction was its proximity to the city. If all the suburbs shared this proximity, there was nothing one had to offer the other. This idea of direct funneling into the city is clearly displayed in the images of the graphically shown highway traffic capacities in 1922 and projected for 1965 (figures 4.4 and 4.5). The five boroughs are hatched out, only showing the main arteries getting more congested has they head towards the core. The Regional Plan Association did not see any need to change what was inside this hatched area, because it was the destination. By hatching out the area, the RPA is assigning equality to all areas inside the city. Being in Upper Manhattan was the same as being in Lower Manhattan. There were two areas to the New York region: the city and outside the city. There were no reasons to go around it the city. The RPA's only purpose was to find better ways to get out.

Street widenings and elevated roads were two other physical changes the Regional Plan offered to fix congestion. These two solutions are the most obvious, for they blatantly make the traffic area larger, thus reducing congestion. Congestion happens, according to the plan, because the buildings are too large for the street to hold.[7] The image of the arcading in a 60 foot street in the Regional Plan demonstrates how

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[6] *Regional Survey of New York and Its Environs Volume III: Highway Traffic*, 101.
[7] Thomas Adams, *Regional Plan of New York and Its Environs Volume II: the Building of the City* (New York, 1931). 275.

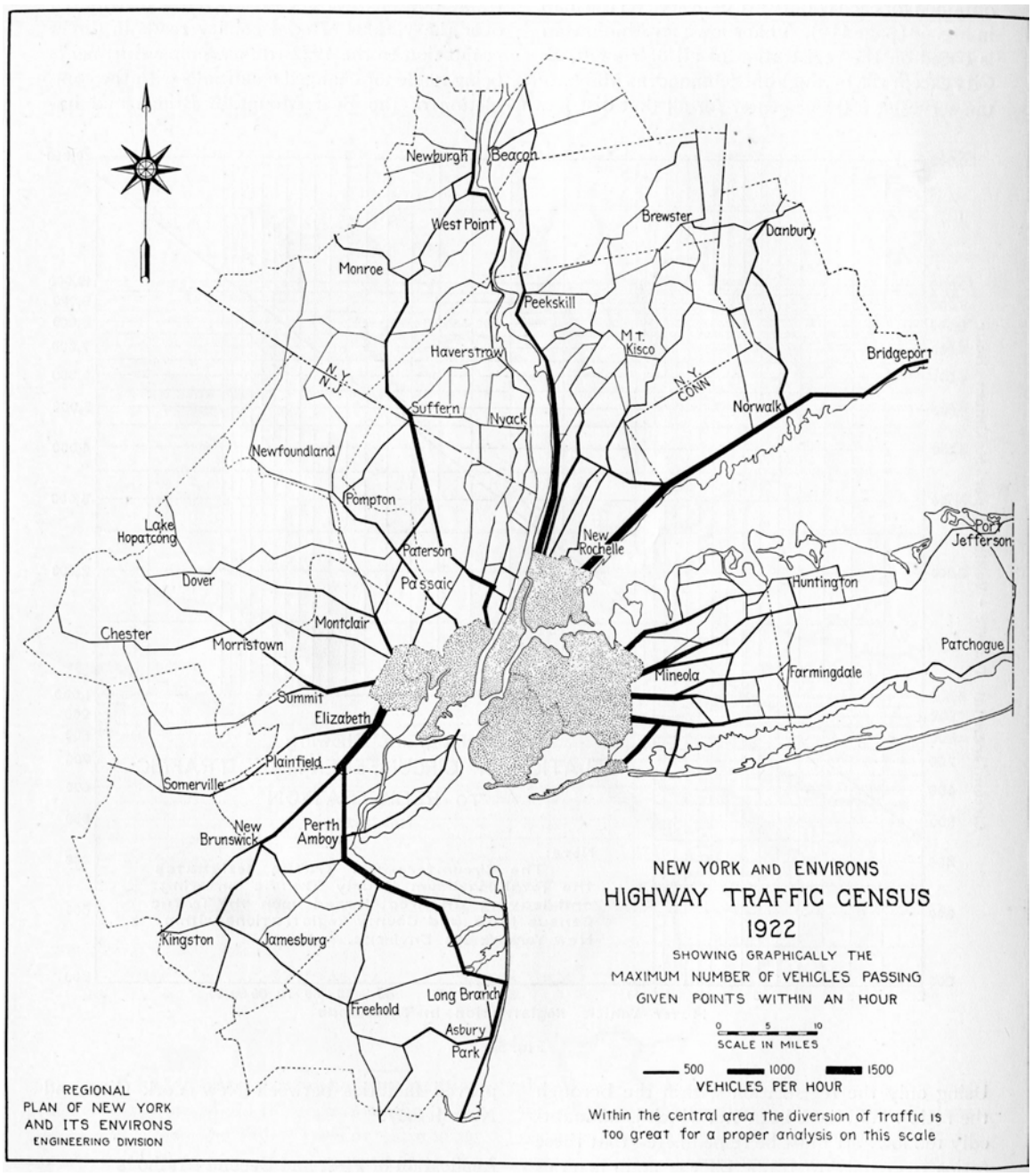

Figure 4.4 Traffic flow into New York City in 1922
Regional Plan for New York, Highway Traffic*, 1927.*

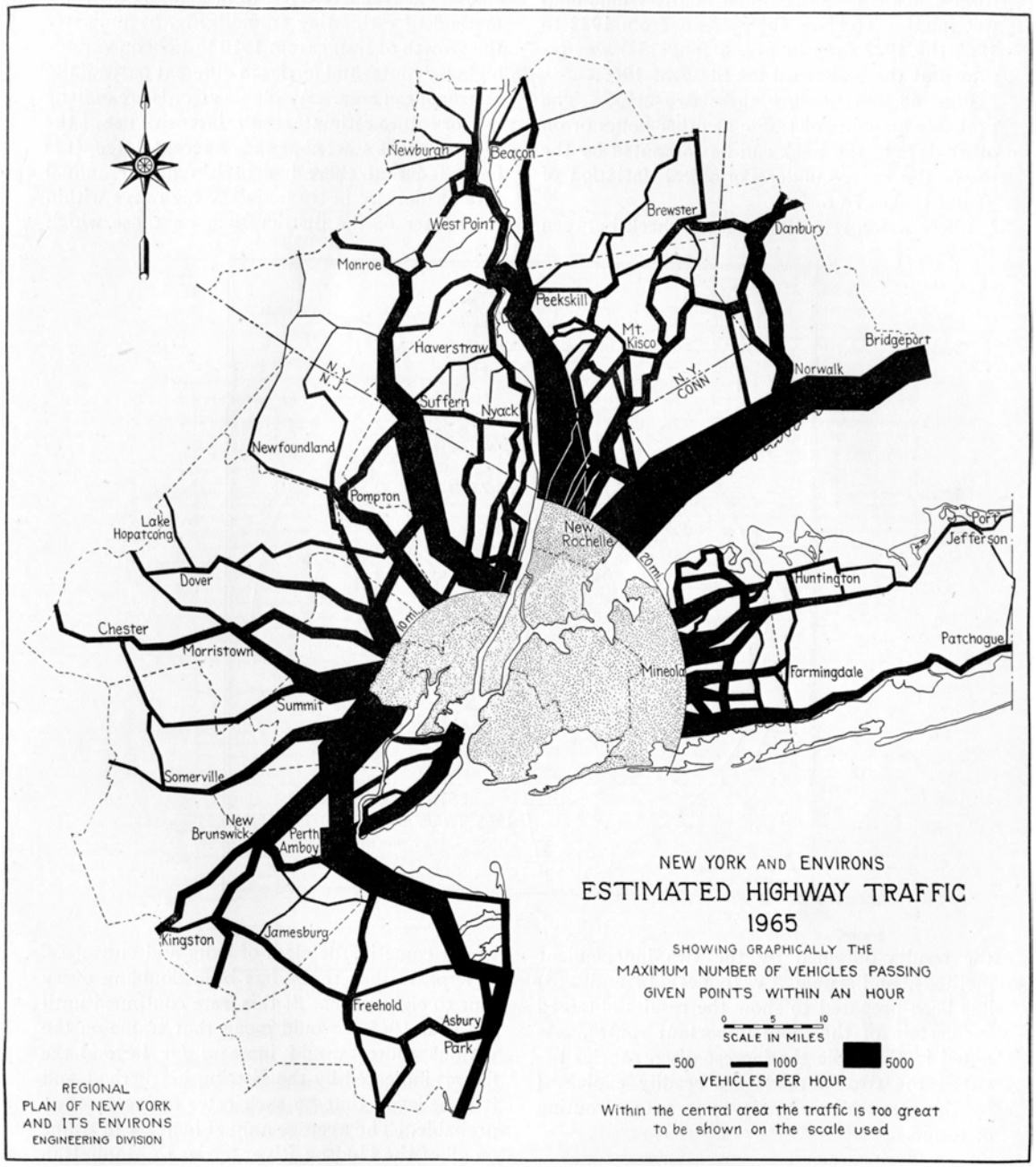

Figure 4.5 Projection traffic flow into New York City for 1965.
Regional Plan for New York, Highway Traffic*, 1927.*

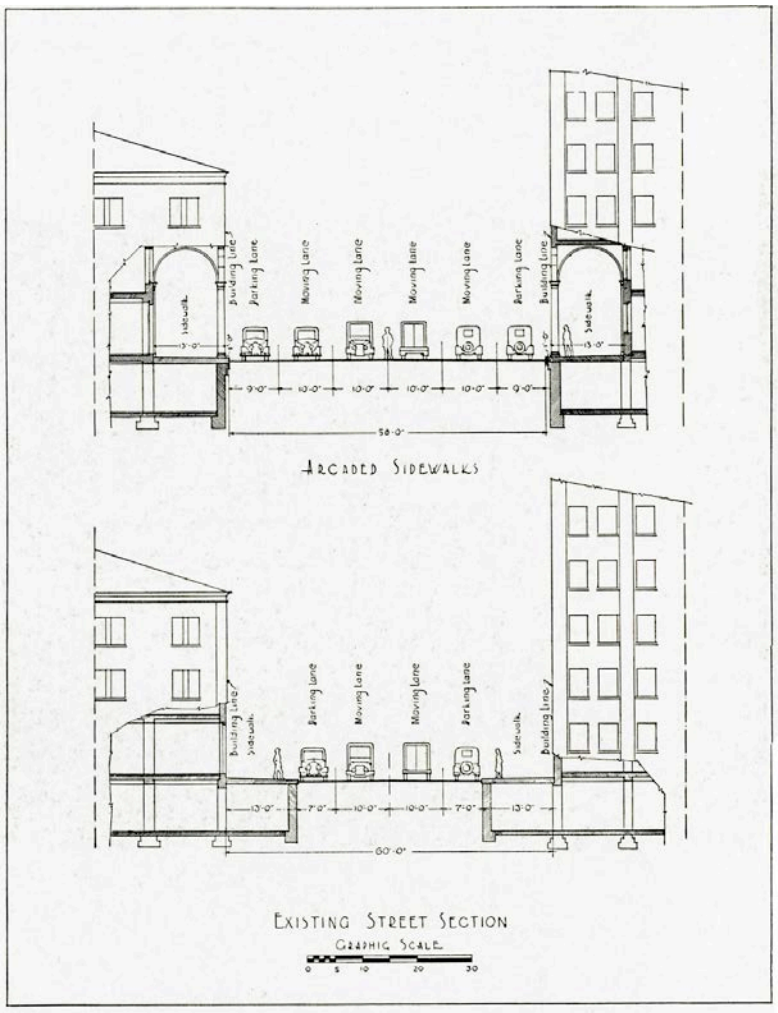

Figure 4.6 Drawings showing method of arcading.
Adams, Regional Plan of New York and Its Environs Volume II: the Building of the City, *1931*.

cutting into the buildings and producing an arcade would open the streets (figure 4.6). Placing the sidewalk beneath the building allows for two new lanes of traffic. The building line remains the same; only the lower portion is scooped out to create pedestrian room that would impede the flow of traffic. Cutting into the building or narrowing the sidewalk would cost a tremendous amount of money. Elevating the roads and creating a superstreet would relieve congestion because of the addition of lanes. The cross section perspective of this superstreet demonstrates the tremendous capacity (figure 4.7). There are multiple types of transportation, subway, automobile, and pedestrian, and they are all working together without intersecting. Once the buildings

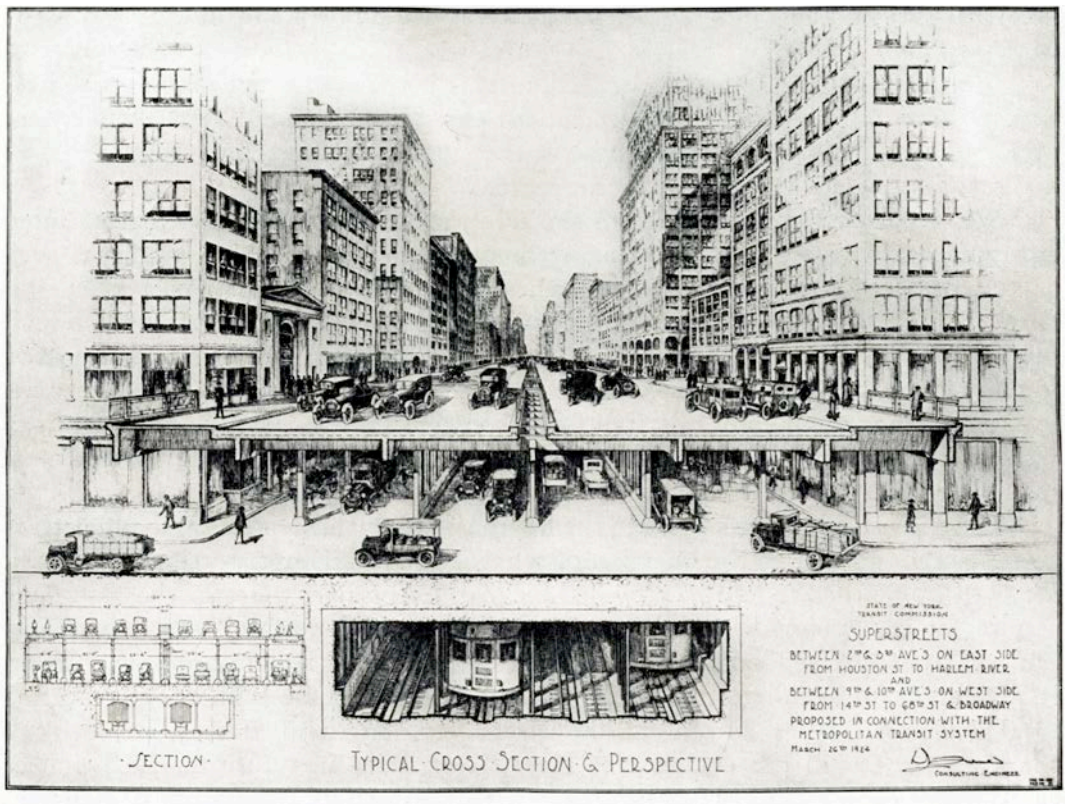

Figure 4.7 Cross-section perspective of superstreet.
Adams, Regional Plan of New York and Its Environs Volume II: the Building of the City, *1931*.

are too large, expanding the street or building another level would not be possible, for there would be a building in the way. The plan still proposed these improvements in multiple places in Lower Manhattan: widening of East Broadway and an elevated roadway along the line of Houston Street. The proposed elevated driveways around the borough of Manhattan demonstrate the congestion relief on main passageways (figure 4.8). The map shows a need for congestion relief around the entrance to the Manhattan Bridge and around the island. These routes around Manhattan are later seen as the sites of the West Side Highway and the FDR Drive. The idea of decongesting the Manhattan Bridge entrance was seen in the Engineer Routes of 1899, except they were decongesting the Williamsburg Bridge. The elevated highways were needed where people enter the city. Once they disperse to their destinations, congestion is lessened. With the same idea as elevated highways, elevated sidewalks removed pedestrian traffic, allowing cars to

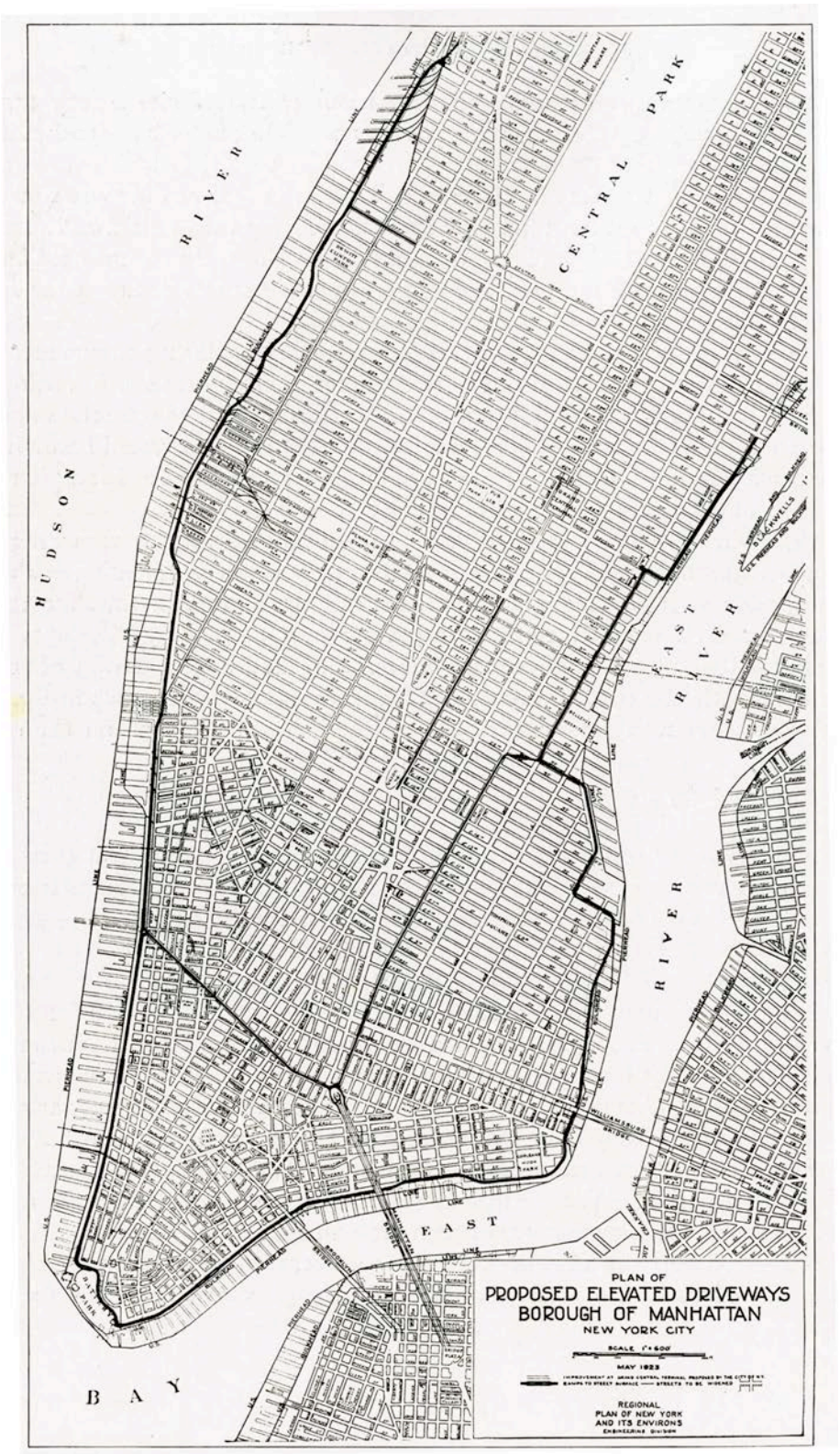

Figure 4.8 Proposed elevated roads in Manhattan.
Adams, Regional Plan of New York and Its Environs Volume II: the Building of the City, *1931*.

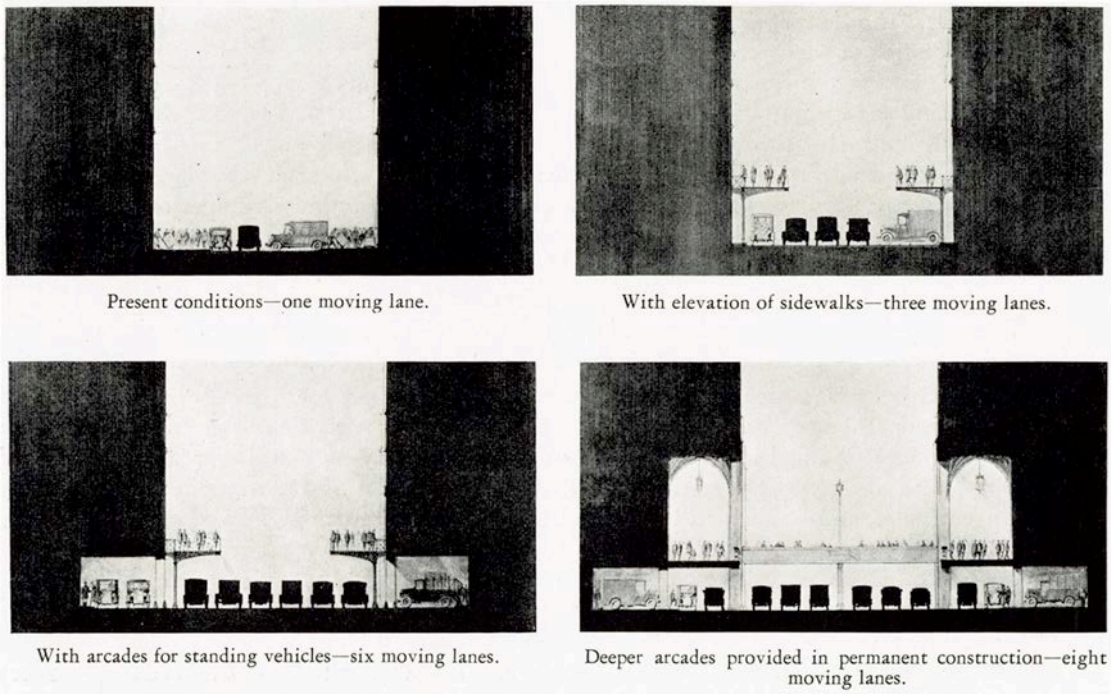

Figure 4.9 Cross-section of street showing changes of street capacity.
Adams, Regional Plan of New York and Its Environs Volume II: the Building of the City, *1931*.

move smoothly. Cross sections showing the progression of elevated sidewalks, cutting into buildings, and creating sidewalk arcades show how each step allows for more traffic (figure 4.9). Neither of these developments took place, probably because of the project's large expense.

The Regional Plan Association realized that just widening the streets would not be enough, for it would create bottlenecks at the intersections. Thus, they suggested expanding the intersections, which "permit continuous movement of traffic."[8] This idea was proposed at the junction of New Chambers Street and New Bowery, but was never fully realized. Along with widening the intersections, elevated roads above the original streets would also provide for a better traffic flow (figure 4.10). The sketch showing the suggested method for separation of grades at an important intersection illustrates how cars can elude the busy intersection. Traffic that wants to continue on the same path is not stopped by the traffic underneath. The rail lines also take these elevated routes,

[8] Thomas Adams, *Regional Plan of New York and Its Environs Volume II: the Building of the City*, 286.

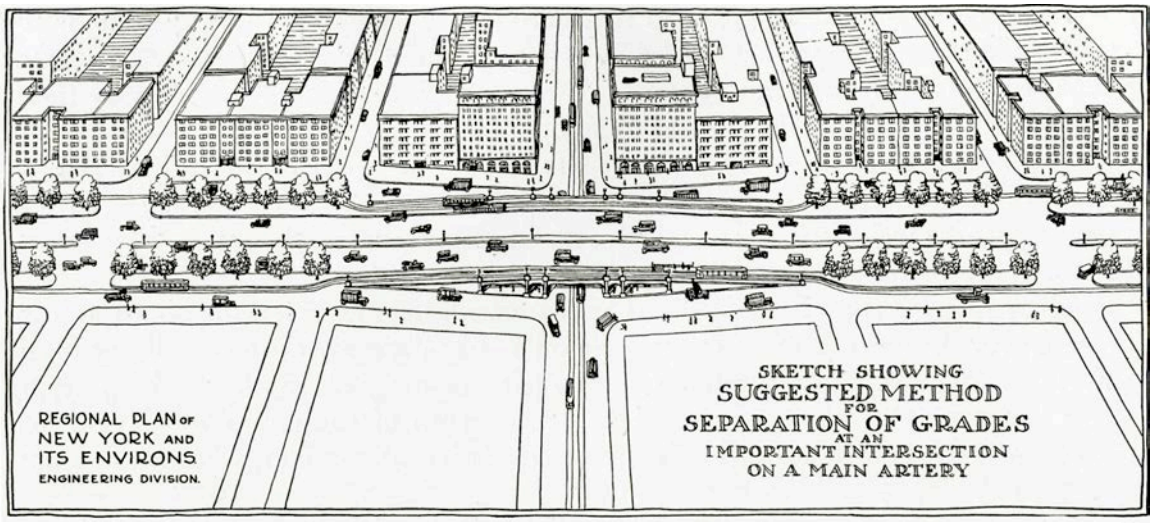

Figure 4.10 Elevated roads at intersetions.
Regional Plan for New York, Highway Traffic, *1927*.

leaving the intersection clear for automobile traffic. This solution was not practical because it was very expensive.

Instead of changing the existing street, the Regional Plan suggested creating large diagonal streets that cut through the existing grid and urban fabric of the city. The diagonal would reduce distance between points and create a route with fewer intersections, addressing both problems mentioned above.[9] The plan addresses the impracticality of cutting diagonals across the extensive system already in place on the island. Diagonals were cut in 1919 for the Seventh Avenue extension and in 1930 for the Sixth Avenue Extension. These were exceptions, as they relieved traffic entering the Holland Tunnel. The negative effects it had on the surrounding area were trumped by the improvements of lessened congestion. According to the plan, "the value of a diagonal street is in proportion as it succeeds in diverting traffic away from crowded intersections or assists in giving more space at such intersections."[10] Nevertheless, the plan suggests two sets of diagonals: two diagonals connecting a waterfront pier between the Manhattan and Brooklyn Bridges with Allen Street widened and diagonal streets leading from

[9] *Regional Plan of New York and Its Environs Volume II: the Building of the City*, 285.
[10] *Regional Plan of New York and Its Environs Volume II: the Building of the City*, 288

Figure 4.11 Proposed building development between Brooklyn and Manhattan Bridges. *Adams,* Regional Plan of New York and Its Environs Volume II: the Building of the City, *1931*.

Manhattan Bridge Plaza in a southwesterly and northeasterly direction (figure 4.11). This proposal demonstrates a way of connecting the bridges with the shore and destroying the slums of the Lower East Side. Roads that viciously cut through the fabric are meant to relieve congestion, but this is also the area Jacob Riis talks about being one of the worst areas in Manhattan. The beauty of the diagonals could also allow the more aesthetic street plan to lead to a more beautiful neighborhood. Neither of these proposals was built, probably because of the cost factor.

The Municipal Art Society proposed the idea of diagonals before the Graphic Regional Plan. Charles Lamb, Chairman of the Committee on Thoroughfares of the Municipal Art Society, based his plan on the idea that Manhattan's center would shift from the far south of the island to Union Square.[11] When Manhattan was first planned, it was planned for east-west movement without realizing that Manhattan moves on a north-south axis. Thus, the center of the city would be shifted north, towards a more

[11] Gregory F. Gilmartin, *Shaping the City: New York and the Municipal Art Society* (New York: Municipal Art Society of New York, 1995), 83.

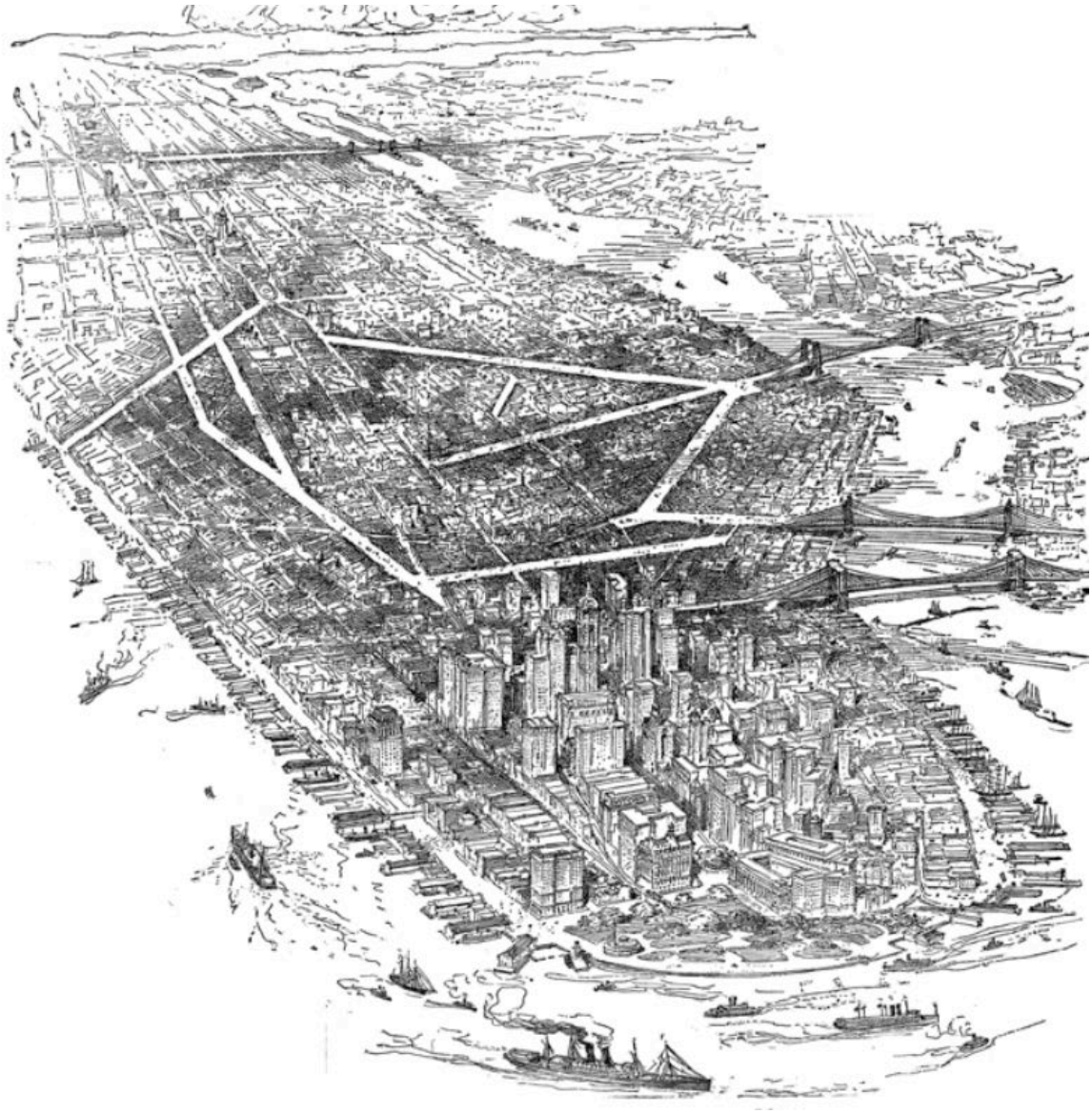

Figure 4.12 Lamb's plan for Manhattan with broad diagonals.
The New York Times, "Planning Great Boulevards for New York City," 1908.

appropriate center. The north-south movement also made Lamb worry that people in Manhattan would not radiate to the outer boroughs. Without the diagonals leading them directly to nodes of transportation, congestion would worsen because people would not be moving away.[12] His argument is patronizing, as he is implying people need to be led in order to reach their destination. After the construction of the East River Bridges and

[12] Gregory F. Gilmartin, *Shaping the City: New York and the Municipal Art Society*, 83

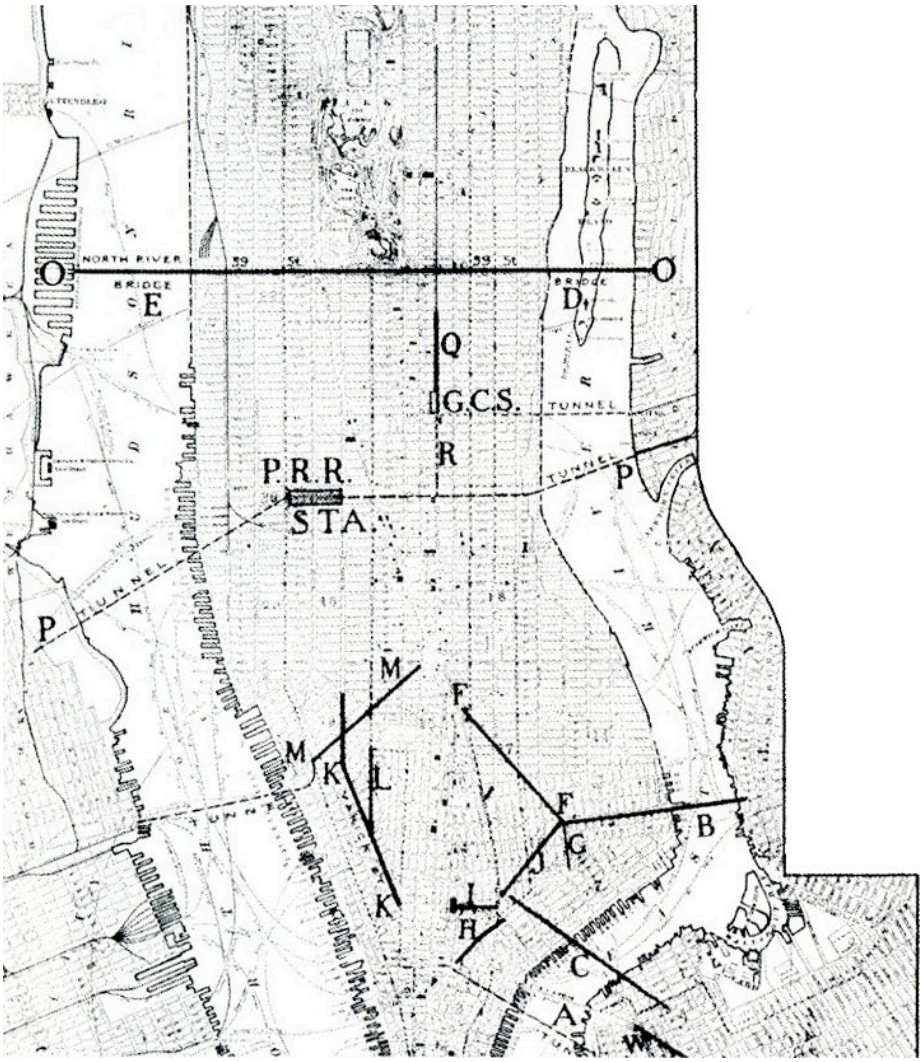

Figure 4.13 Lamb's plan showing diagonals through Manhattan.
Gilmartin, Shaping the City: New York and the Municipal Art Society, *1995.*

right-angle subway lines, New Yorkers radiated away from Lower Manhattan without his diagonals.

Lamb's plan was made as a "series of 100-foot highways encircling Manhattan from Union Square and Christopher Street on the north to Franklin Street and the Manhattan bridge on the south and Williamsburg Bridge on the east." (figures 4.12 and 4.13).[13] Lamb immediately realized that he could not make his cuts through Lower Manhattan, where tall buildings and valuable property dominated the landscape.

[13] *The New York Times*, "Planning Great Boulevards for New York City," August 9, 1908.

Instead, he set to connecting major points throughout the city.[14] One boulevard went from Cooper Square to the Williamsburg Bridge. From here, one could either cross the bridge to Long Island, or turn south on an avenue from the bridge to Canal and Chrystie Streets, the terminal for the Manhattan Bridge. Then, a diagonal would be cut from the Bowery to Broadway, the city's main traffic thoroughfare. The avenues would be connected better with the widening of the existing Franklin Street and extended five blocks.

When written out, Lamb's plan for Manhattan sounds very practical. Main nodes are being addressed. The city center's shift from the tip of Manhattan where there cannot be growth to a central location also makes sense. In perspective and plan, however, Lamb's proposal only looked like a typical City Beautiful movement to destroy the gridiron. The avenues that violently pierced the fabric were reminiscent of Baron Haussmann's wide boulevards in Paris, which were a main contributor to the City Beautiful movement (figure 4.14). The plan is also similar to Burnham's Plan for Chicago, a plan conceived at the height of City Beautiful (figure 4.15). The civic center with radiated avenues in Chicago is very similar to Lamb's Union Square, even though this is not exactly what he proposed. The moral improvement of the city, which was a popular concept, is apparent in Lamb's plan when he specifically chose routes that would uproot and destroy slums.[15] The plan was never adopted and the grid was never broken. The city was reluctant to adopt a plan that would displace such a large number of people and require such great capital.[16]

The Municipal Arts Society and the Regional Plan Association treated the problem of congested narrow streets very differently, even though they proposed similar things. Both suggested widening streets and creating diagonals for better traffic flow

[14] "Planning great boulevards for New York City."
[15] "Planning great boulevards for New York City."
[16] *Shaping the City: New York and the Municipal Art Society*, 103.

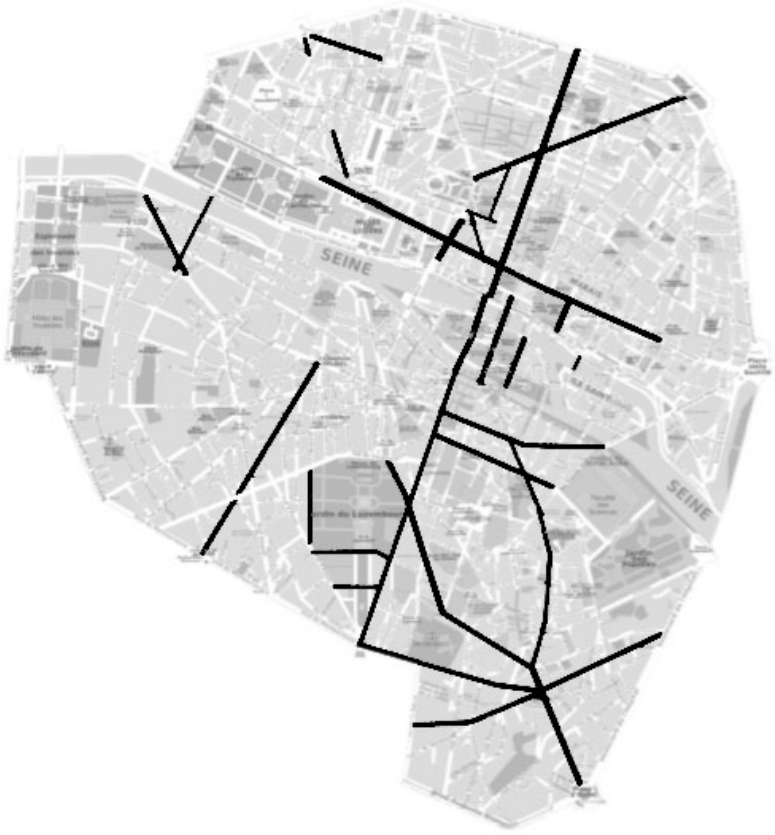

Figure 4.14 Plan of Paris with emphasized Haussmann boulevards.
Edits by author, "En toutes letters," 2009.

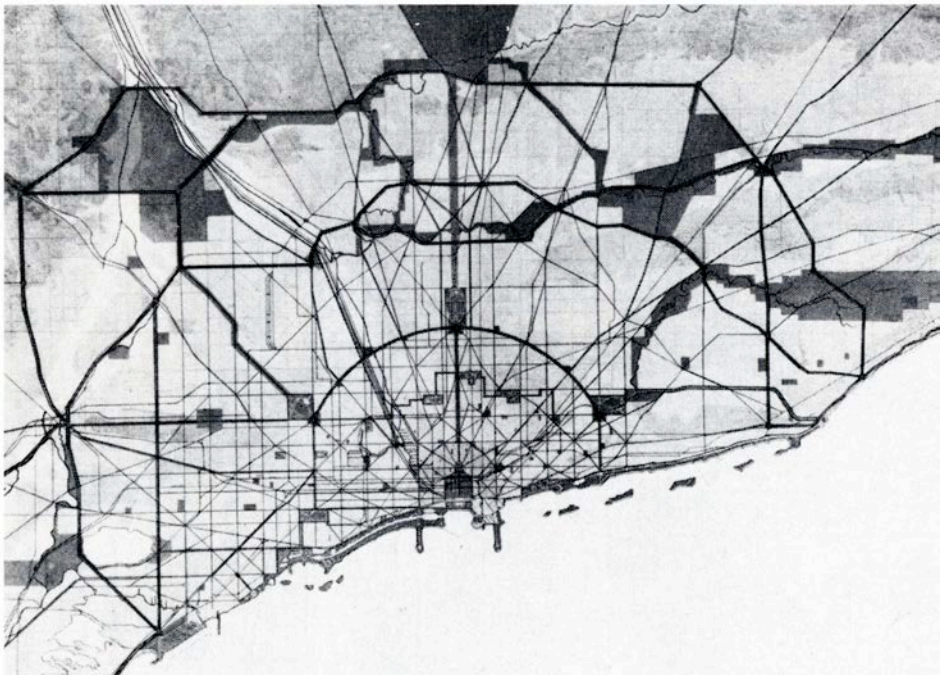

Figure 4.14 Burnham's 1909 plan for Chicago.
Hines, Chicago architect and planner*, 1974.*

throughout the city. The Municipal Arts Society was changing the city for aesthetic reasons as well, trying to make the grid look less regimented and more like Paris. The Regional Plan did not address this same issue. The Plan was created based on data collection from all aspects of city planning. While Lamb made some good points in his plan, they were a dream of aestheticism, not planning.

As stated before, the traffic mostly came from commuters from the other four boroughs or Long Island. Of the 204,750 vehicles entering Manhattan daily, 21,700 took the Manhattan Bridge, more than any other of the East River Bridges. Only 1,060 vehicles crossed the monumental Brooklyn Bridge daily, which would only allow horse-drawn vehicles to cross. All horse-drawn traffic was removed from the Manhattan Bridge in July 1922 to relieve congestion.[17] The reaction to this decision was overwhelmingly positive, for traffic flowed at a better pace. A *New York Times* report even said that the bridge was being "used to 100 percent capacity" without the carriages slowing the pace of the bridge.[18] A strong negative reaction came from the post office, which used the Brooklyn Bridge regularly to go from Brooklyn's City Hall to Manhattan's City Hall, for it was a direct link between the two.[19] This plea was ignored; the congestion relieved was more important than the $10,000 a year avoiding the Brooklyn Bridge would cost the city. This set precedence for the Manhattan Bridge as the most important infrastructural element of the East River Bridges, even though it was not as great a monument as the Brooklyn Bridge. The bridge was newer and the structural analysis was more precise, thus the choice to place the heavier burden on this bridge was safer.

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[17] *The New York Times*, "Brooklyn Bridge closed to motor traffic, Manhattan Bridge to horse-drawn vehicles," July 7, 1922.
[18] "Brooklyn Bridge closed to motor traffic."
[19] *The New York Times*, "Bars Mail Motors on Brooklyn Bridge," July 9, 1922.

Brooklyn and a Changing Image

After the Manhattan Bridge, Lower East Side residents had even more incentive to move to Brooklyn. The population of 2,560,000 in 1929 had increased from 1,634,000 in 1910 and had surpassed Manhattan's population. The boroughs rapid growth caused a committee to form in December 1911 to devise a plan for the betterment of Brooklyn. Daniel Burnham of the Plan of Chicago was called in to help on the plan, but he declined any kind of official status. Instead, another Chicago architect and figure involved with the Plan of Chicago, Edward Bennett, was appointed to study the region for a year and a half with his committee of Brooklyn Citizens.[20] The committee came to several conclusions. First, there should be a thoroughfare from Brooklyn to Queens, connecting the Williamsburg Bridge and Long Island City. This would relieve Lower Manhattan's bridges, for passengers could take the Queensboro to a destination in northern Brooklyn rather than have to drive through the Lower East Side. A separate conclusion was that a railroad should connect both the industrial Navy Yard and Bush Terminals in South Brooklyn. This commercial traffic going through Brooklyn Heights created congestion. The need for parks was addressed as well as the need for a civic center.

Brooklyn's waterfront was mainly industrial in 1929, with residential areas dominating further inland. This development is attributed to the bridges. The overpasses drop commuters a few thousand feet into Brooklyn. Continuing into Brooklyn is then easier than turning back and moving towards the industrial areas, which are left in peace on the waterfront. The committee was an important first step for Brooklyn. The Regional Plan, however, had grander plans. The plan acknowledges the changes to Brooklyn, which have the widening of Livingston Street by 30 feet in 1905, and the cutting of the Flatbush Avenue Extension to meet the Manhattan Bridge in 1909. This creates an easy approach to the bridge, something that is lacking in the Brooklyn Bridge. In front of the

[20] Committee on the City Plan, *Development and Present Status of City Planning in New York* (Harvard University, December 31, 1914), 29-33.

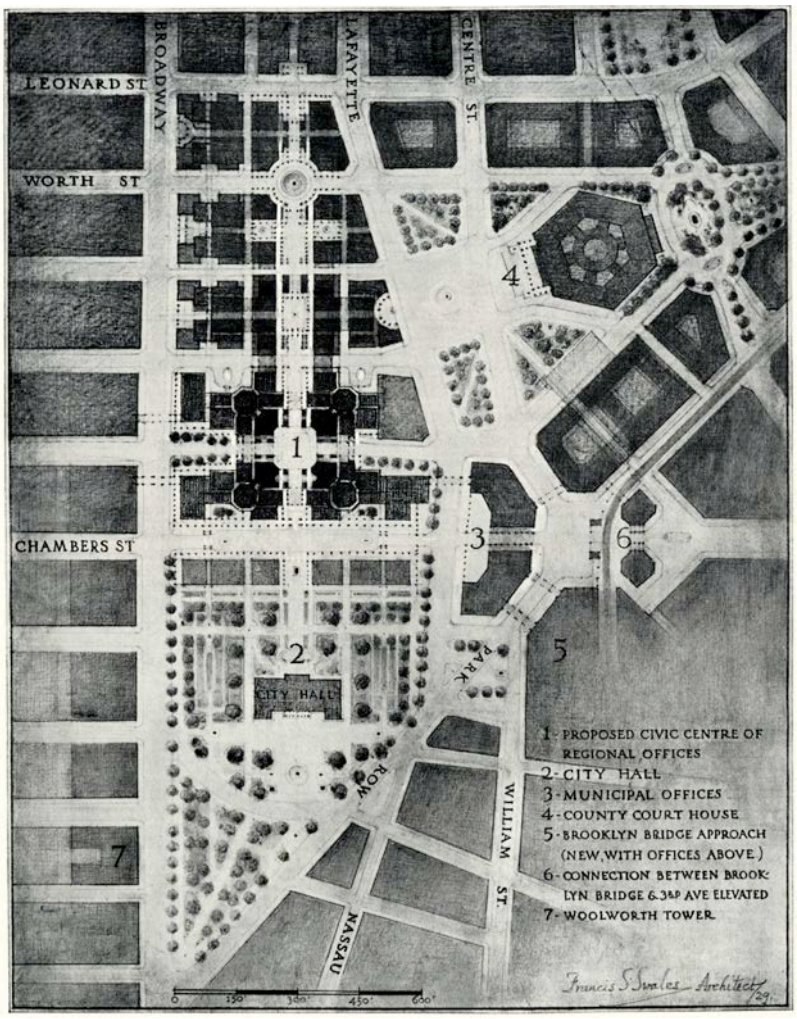

Figure 4.15 Plan for the Brooklyn Civic Center.
Adams, Regional Plan of New York and Its Environs Volume II: the Building of the City, *1931*.

Brooklyn Bridge is a jumble of surface lines and an elevated railroad, which slows the development around the bridge as well as movement on the bridge.[21]

The main focus of the Regional Plan for downtown Brooklyn was fixing the approach to the Brooklyn Bridge. The plan's purpose for fixing the approach was not an infrastructural reason; the traffic carried by the bridge was not enough to warrant such drastic changes. The changes would, however, allow for an improved area between Fulton Street, Washington Street, and the Brooklyn Bridge (figures 4.15 and 4.16). The preferred plan shows a widening of Washington Street and abandonment of Liberty

[21] *Regional Plan of New York and Its Environs Volume II: the Building of the City*, 476.

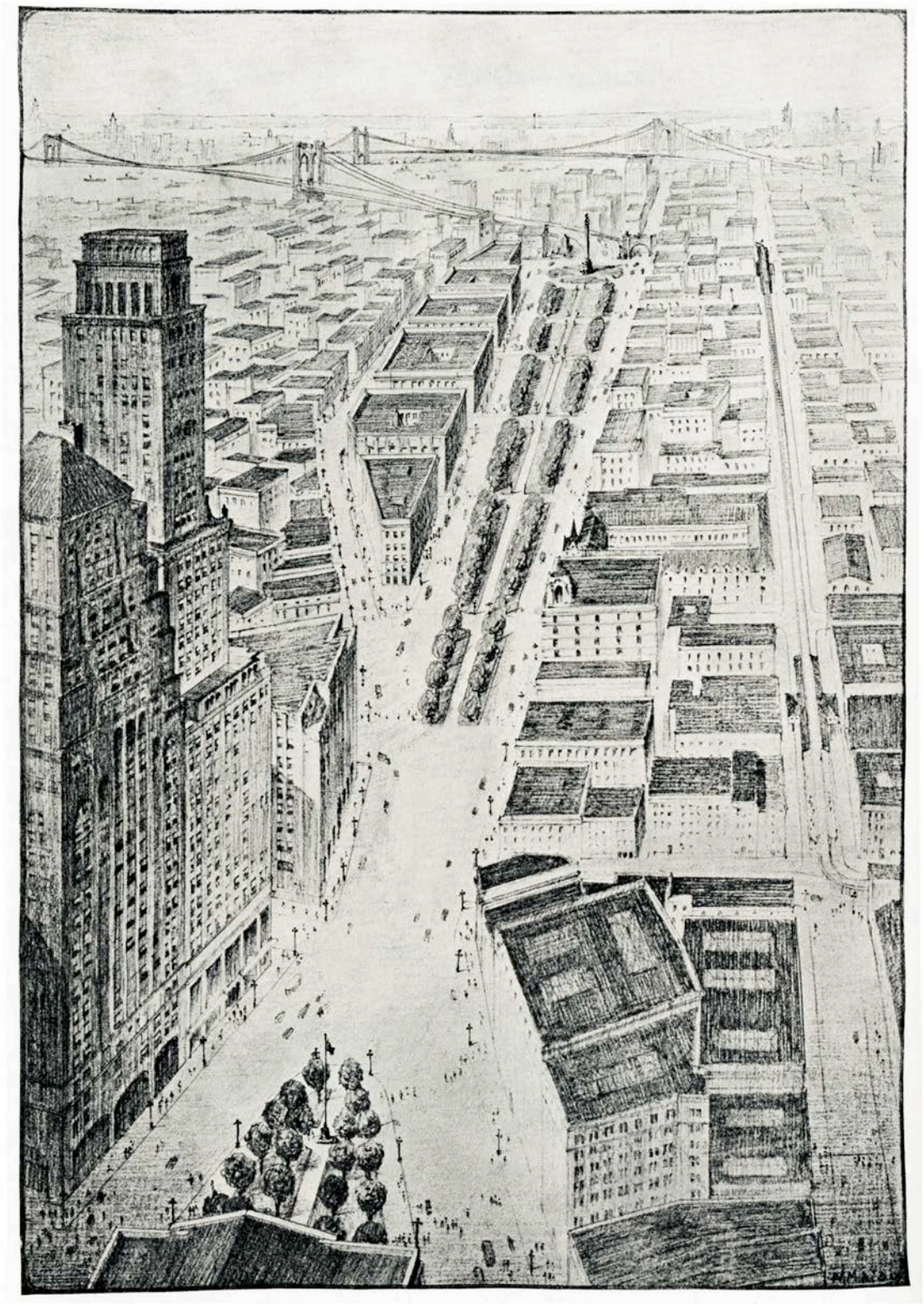

Figure 4.16 Perspective of proposed Brooklyn Civic Center.
Adams, Regional Plan of New York and Its Environs Volume II: the Building of the City, *1931*.

Street.[22] A wide Washington Street would allow for a straight view to the Manhattan Bridge's tower. There would also be an open plaza in front of the Brooklyn Bridge. Jay Street would be widened to allow for subway traffic, and Tillary Street would also be widened for easier access to the Williamsburg Bridge. The community near the bridge would also be changed. Six blocks more suitable for modern building would replace the two irregular blocks between Fulton and Washington. The neighborhood would be allowed to have the modern buildings of the era, rather than trapped with the small tenement-like buildings that were there.

Entering Manhattan

The regional road system is an important way of experiencing the city, even thought it is not actually part of the grid plan that comprises Manhattan. The pattern suggested by the Regional Plan Association is the metropolitan loop, which consists of concentric circles with radial lines running out from the center circle (figures 4.17, 4.18, and 4.19).[23] These radial lines normally met highways that are part of the national highway system. The aim of the plan is to distribute "incoming traffic at the periphery before it reaches the congested centers."[24] The largest outer loop would connect the entirety of the Greater New York. From any spot on the loop, a driver could easily choose to where they would like to travel. Manhattan is seen as part of a larger network in this scheme. The map is reminiscent of the diagram showing the traffic congestion, also radiating towards the circumference of the city. The spindle roads attract the outside traffic, bringing it to the circle, creating density as they move closer. Manhattan is like a magnet in this scheme. It is attracting the entirety of the suburbs, with Manhattan as the

[22] *Regional Plan of New York and Its Environs Volume II: the Building of the City*, 478-479.
[23] Regional Plan of New York and Its Environs, *The Graphic Regional Plan; Atlas and Description* (New York: Regional Plan of New York and Its Environs, 1929), 214.
[24] Regional Plan of New York and Its Environs, *The Graphic Regional Plan; Atlas and Description*, 215.

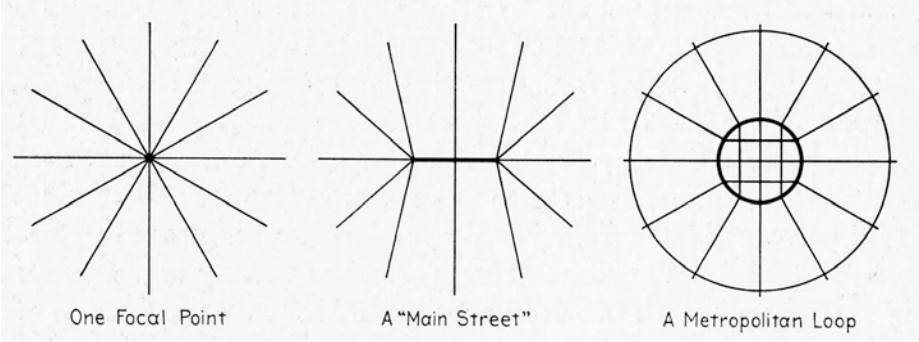

Figure 4.17 Diagrammatic representation of roadway systems.
Regional Plan of New York, Highway Traffic, *1927.*

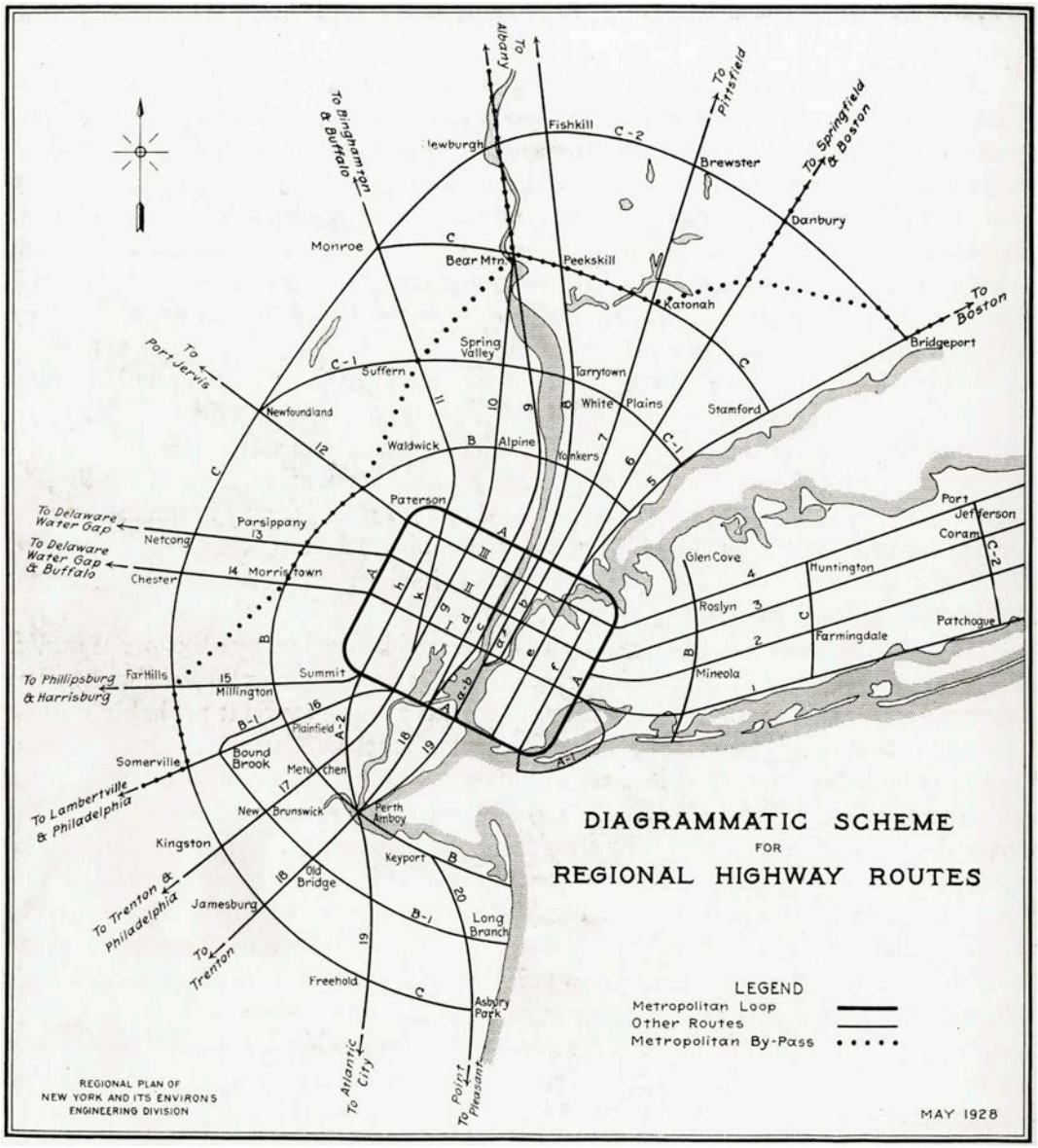

Figure 4.18 Diagrammatic representation of highways.
Regional Plan of New York, Highway Traffic, *1927.*

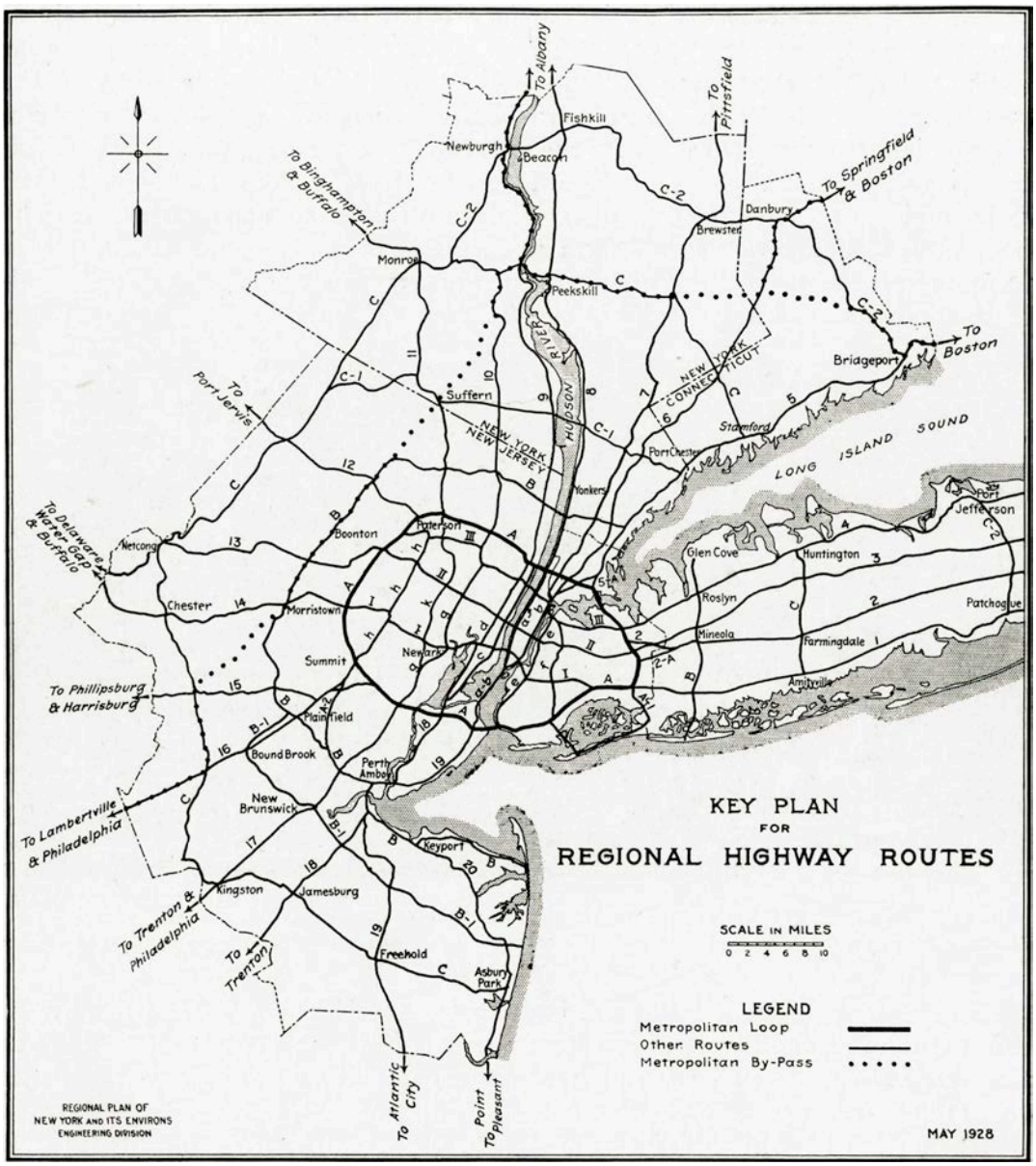

Figure 4.19 Plan of highways.
Regional Plan of New York, Highway Traffic, *1927.*

only logical destination. This is in line with the theme of the era; Manhattan is the destination, and commuters radiate away for residential purposes only.

A problem arises when one is in the Bronx and they would like to get to New Jersey. Using this system, they would either have to drive around the circumference of the circle or drive through the city. The loop is made for getting into the city, while going around the city provides a larger problem. Movement between the suburbs was not an

option. There was no purpose in going to somewhere that was not Manhattan. This is the opposite of the plan inside the city, which in the diagrammatic scheme is just a basic grid. Inside this grid is a jumble of automobile traffic. The Manhattan Bridge is inside this grid. The planners chose not to involve what was inside the inner circle with their regional highway plan because it was not part of a greater system; it was the goal. Changing the perfect grid on the diagrammatic scheme would go against organizational logic. The idea was to bring people from the chaos of the outer area into the more refined inner area. Infrastructural elements like the Manhattan Bridge provide direct connections from one part of the city to another. Even with these direct connections, the inside ring was full of chaos, and creating a system that would help bring more people into it would just create greater confusion. The benefit of this system is for the outside commuters, not those already living in the city. The improvements they need are not addressed; their situation is only worsened by the increase of day traffic.

Rapid transit both created and solved the problem of congestion in the Lower East Side. It allowed for people to live further from their place of employment, thus the Lower East Side was allowed to open up when people could move away. Conversely, the rapid transit brings a large number of people into the city that contributes to the day population.[25] On a normal business day in 1924, 2,181,000 persons enter Manhattan, and 63% of these commuters used rapid transit to get into the city (figure 4.20). To accommodate this large flux of people, problems need to be addressed on the level of the street, as mentioned before. The large number of people can also lead to congestion on the rapid transit if not handled properly.

The subway system changed with the creation of the Dual System in the beginning of the 20th century (figure 4.21). At this moment, officials realized that a massive expansion of the system needed to be undertaken in order to accommodate all

[25] Regional Plan of New York and Its Environs, *Regional Survey of New York and Its Environs Volume IV: Transit and Transportation* (New York: Regional Plan of New York and Its Environs, 1927), 36-37.

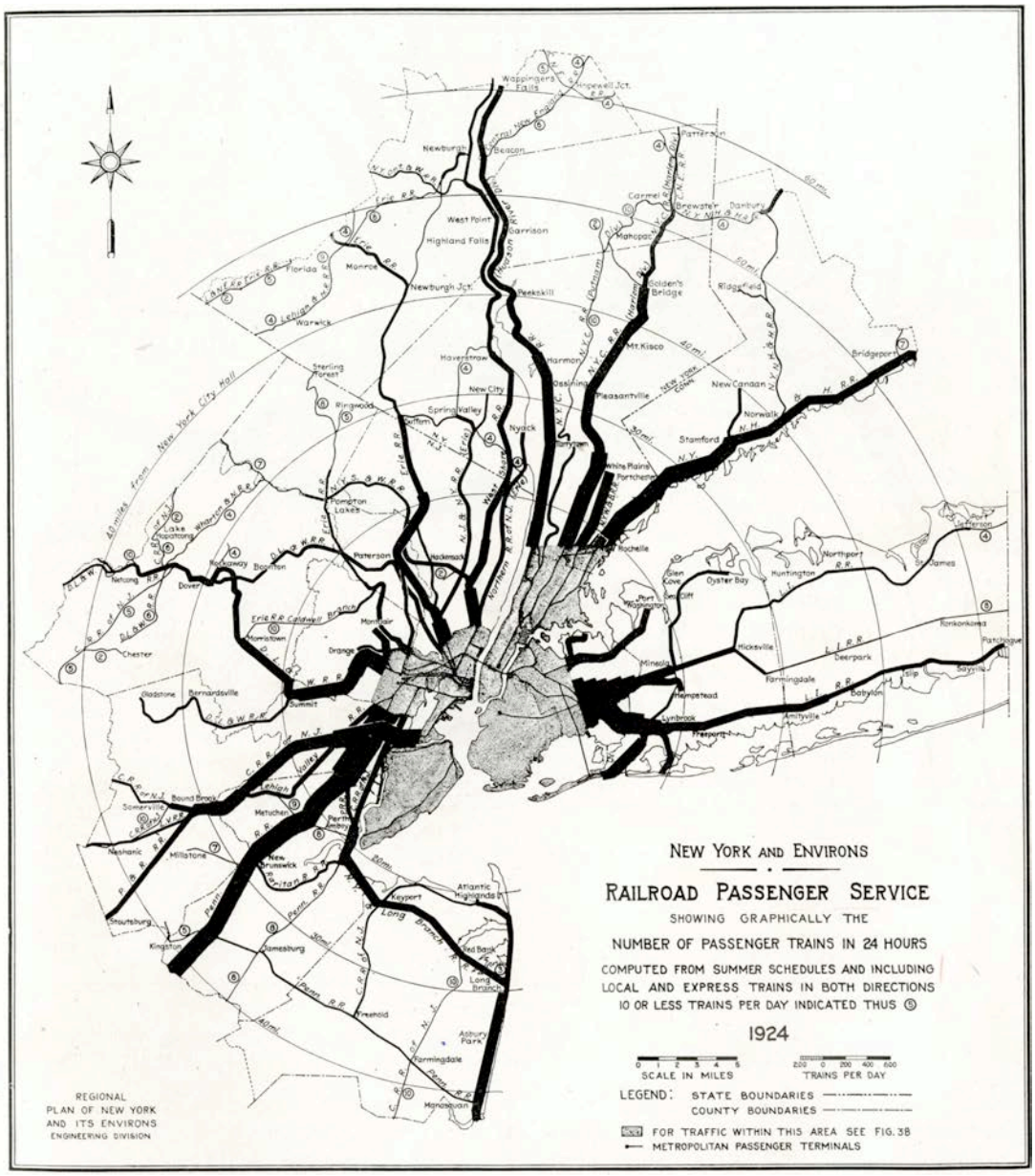

Figure 4.20 Railroad passenger traffic entering New York City.
Regional Plan of New York, Transit and Transportation, *1927*.

the people that wanted to take the trains. The financial burden this would be on any person or company was enormous, and Manhattan Borough President George McAneny undertook the project in 1913.[26] McAneny then got the two large rapid transit companies in New York, the IRT and BRT, to join the city financially to create the Dual System. The

[26] Peter Derrick, "Development of the New York City Rail System," *Japan Railway and Transportation Review* 23 (March 2000), 17.

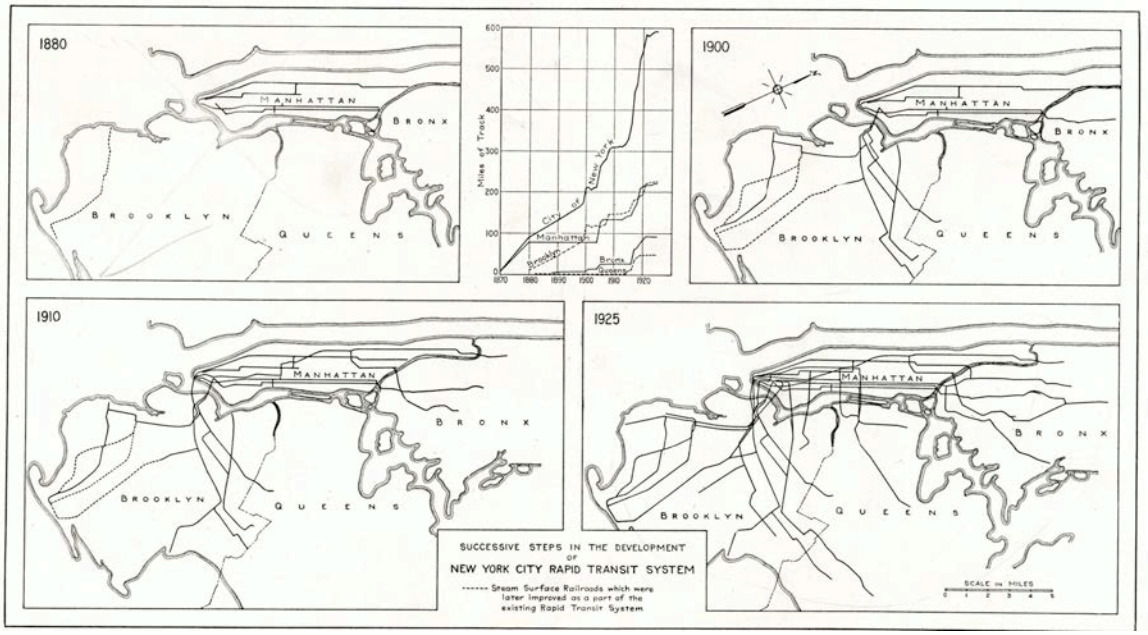

Figure 4.21 Evolution of transit system.
Regional Plan of New York, Transit and Transportation, *1927*.

plan allowed for the two independent companies to expand their lines by using the other company's lines and building new ones. The Dual System saw the greatest increase in rapid transit routes. Over 200 miles in line were laid down between 1914 and 1921.[27] After the Dual System was created, congestion was immediately relieved. People moved further away from the overcrowded Lower East Side. The subway system did not become one unified body until 1940. The City of New York purchased lines from the IRT and the Brooklyn Manhattan Transit Corporation, the BRT's successor.[28]

As the subways grew under the dual system, the motor buses and surface transit lines suffered. No new lines were built, but rider congestion was not a problem. Surface transit was not a popular mode of transportation. The lines already laid out have created a network in the outer ring of the city. The buses and surface lines then act as feeders for the rapid transit lines that extend to these outer limits.[29] The Regional Plan suggests leaving the suburban areas open between subway routes and letting the buses and

[27] Regional Plan of New York and Its Environs, *Regional Survey of New York and Its Environs Volume IV: Transit and Transportation*, 40.
[28] Peter Derrick, "Development of the New York City Rail System," 19.
[29] *Regional Survey of New York and Its Environs Volume IV: Transit and Transportation*, 65.

surface lines cover the distance.[30] This works well, for the suburbs of 1929 did not have to worry about traffic as much as the city did. Using surface lines is less intrusive to the environment than a subway. There does not need to be digging of more tunnels, only a bus on an already constructed street.

The maps of the rapid transit system in the Greater New York are similar to the road maps in the Regional Plan. The subway maps show concern for getting into the heart of Manhattan, not moving around the suburbs. To move directly north in Brooklyn, a resident would need a car, for the public transportation would not be helpful. Even with the buses to aid public transportation in the suburbs, the changing mode of transportation creates a break. The real connection to the city is through the subway; the bus is only a mediator. The bus still cannot help one move from one suburb to another. A commuter would have to go through the busy city in order to reach his destination. Highways in Manhattan show the same concern with entering the city, not going around it.

The Manhattan Bridge was important to both the subway system and the road system. The first one seat ride over the Manhattan Bridge by subway was on June 22, 1915 on the 4th Avenue subway of the BRT line.[31] Before this moment, the trolleys were the only connection between the two borough's subway systems over the bridge. The trolleys remained on the bridge until the 1940s, when the automobile took over the spots the trolleys once acquired. Brooklyn and Manhattan were finally integrated in a more fluid way than before. Having no option of a trolley makes the commuter see the greater system between the two boroughs, rather than the momentary connection that the bridge offers.

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[30] *Regional Survey of New York and Its Environs Volume IV: Transit and Transportation*, 65.
[31] Mark S. Feinman and Peggy Darlington, *BMT 4th Avenute Subway*, 2005, www.nycsubway.org/lines/4thave.html (accessed January 10, 2009).

The Manhattan Bridge in the Greater System

The Regional Plan of New York and its Environs has a significant flaw: the highway system and public transportation are completely disconnected.[32] The study shows the two as completely different issues. The highways and the street were immediate responses to congestion issues New York City was experience at the time. The two systems are seen as a burden that the city needs to fix rather than something that can actually help the city. The public transit system, conversely, was actually about moving people throughout the city. Public transportation was not responding to any greater problem like bottlenecks, they were just creating an easier way to more about the city.

The Manhattan Bridge is unique; it is the only component in the city to carry both transit and highway traffic. The bridge becomes both a glorified road and greater infrastructural element when applying Johnson's critique of the Plan. Vehicle transport makes the bridge lose a great amount of its significance. Highway traffic causes only congestion, but there is no way to "widen" the bridge to allow for relief like one would a road. The need for relief pushed by the RPA creates the idea of the street as a very direct connection between two points. The problem is not having enough of these direct connections, which is why diagonals were proposed as a way to create relief. The bridge in this sense is just a way from point to point.

On the opposite side of the spectrum is the subway and idea of public transportation. The RPA wanted to expand the public transit to create a flow throughout the city and to the suburbs. The Manhattan Bridge creates the perfect link to the suburbs by bringing the subways to the heart of Downtown Brooklyn. Although there are tunnels that provide the same purpose, the bridge still carries four tracks, enough to make a difference in the larger scheme. The bridge is no longer shown as a direct point A to B

[32] David A. Johnson, *Planning the Great Metropolis: the 1929 Regional Plan of New York and Its Environs*, 147.

connection. The subway system is what is really important; the Manhattan Bridge is secondary, serving as a small component to a large plan.

Figure 5.1 Map of Lower Manhattan and Brooklyn.
United States Department of the Interior, "Geological Survey," 1955,

5 Expanding the City

The 1939 New York World's Fair and Two Ideal Cities

Robert Moses changed the physical appearance of New York City immensely. He changed the road system and housing. Pushing people to the outer boroughs and Long Island could solve the problem of congestion in New York City. The system of expressways and parkways enticed people to move further away from the city. Manhattan was becoming obsolete. Roads went around it; Moses even planned to

violently cut through it with an expressway. Instead of finding new ways to bring people into the city, Moses was trying to find ways to bring people around or through the city. He was ignoring Manhattan and focusing on suburbia and the commuter. The city was exploding away from Manhattan, expanding further into Brooklyn and Long Island. The idea of the exploding city was exemplified in the 1939 New York World's Fair in Flushing Meadows, Queens. The fair's theme was "World of Tomorrow," and its purpose was to "extol the benefits of 'mechanical progress,' reveal the consequences of 'new process and products,' and demonstrate the 'interrelated activities and interests' of Americans."[1] The new technology developed was on display, including the Ford Exposition, the Railroads Building, and the Con Ed Building. Each exhibit championed science and technology for the new machine age.

The fair featured two "cities of tomorrow," Democracity and Futurama. Henry Dreyfuss designed Democracity for the Perisphere. The industrial designer created Democracity for the year 2039 to extend over an area of 11,000 square miles with 1.5 million inhabitants (figure 5.2).[2] The core of the city was a commuter city; the center had no residents, but 250,000 workers from the 70 satellite towns commuted here daily. The towns were either exclusively residential or a combination of light industry and suburbia with 30 mile patches of green for farming and recreation. Arteries stemming out of the center provided transportation. Large highways solved the congestion problem. Dreyfuss comments on suburbia with this plan. He believed that the suburbs are the solution to congestion. By creating the city's center without residents, he saw congestion as the product of people living, not the problem of them moving within the city. His plan would actually create more congestion because so many people would be moving to the same spot at the same time. As the 1929 Regional Plan states, congestion can be created from large buildings on too narrow roads. The road leading to the main

[1] Leonard Wallock, ed., *New York, Culture Capital of the World, 1940-1965*, (New York: Rixoli, 1988), 19.
[2] Leonard Wallock, ed., *New York, Culture Capital of the World, 1940-1965*, 20.

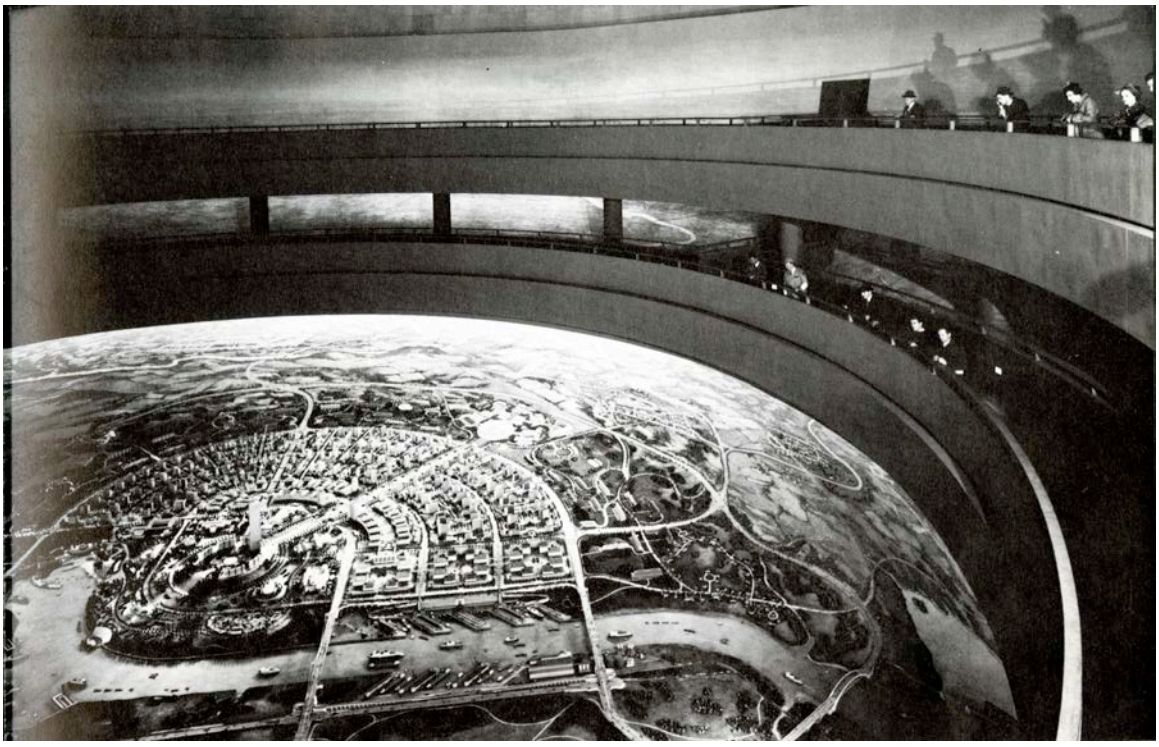

Figure 5.2 Deomocracity exhibit.
Wurts, The New York World's Fair, 1939/1940 in 155 photographs, *1977*.

civic center would have to be immense in order to hold the traffic of the people commuting to the main building.

Norman Bel Geddes designed Futurama for General Motors. The design was a model of 1960 America, and was very clearly sponsored by a car company. Multilane superhighways crossed the country, connecting all parts of the city (figure 5.3). Unlike Democracity's harsh break between the city and suburbia, Futurama integrated the cities and towns with expansive roads, cloverleaves, and overpasses. Parks would border the superhighways Geddes used so industry could not build up around them, thus segregating the highway and the town.[3] Geddes, like the Municipal Art Society, sees the city as something that is ugly and should be hidden with extensive landscaping. This is similar to Dreyfuss's idea of completely separating places of work and residence. The highways would also avoid going though major cities. Geddes believes that the highway

[3] Paul Mason Fotsch, "The Building of a Superhighway Future at the New York World's Fair," *Cultural Critique* 28 (Spring 2001), 69.

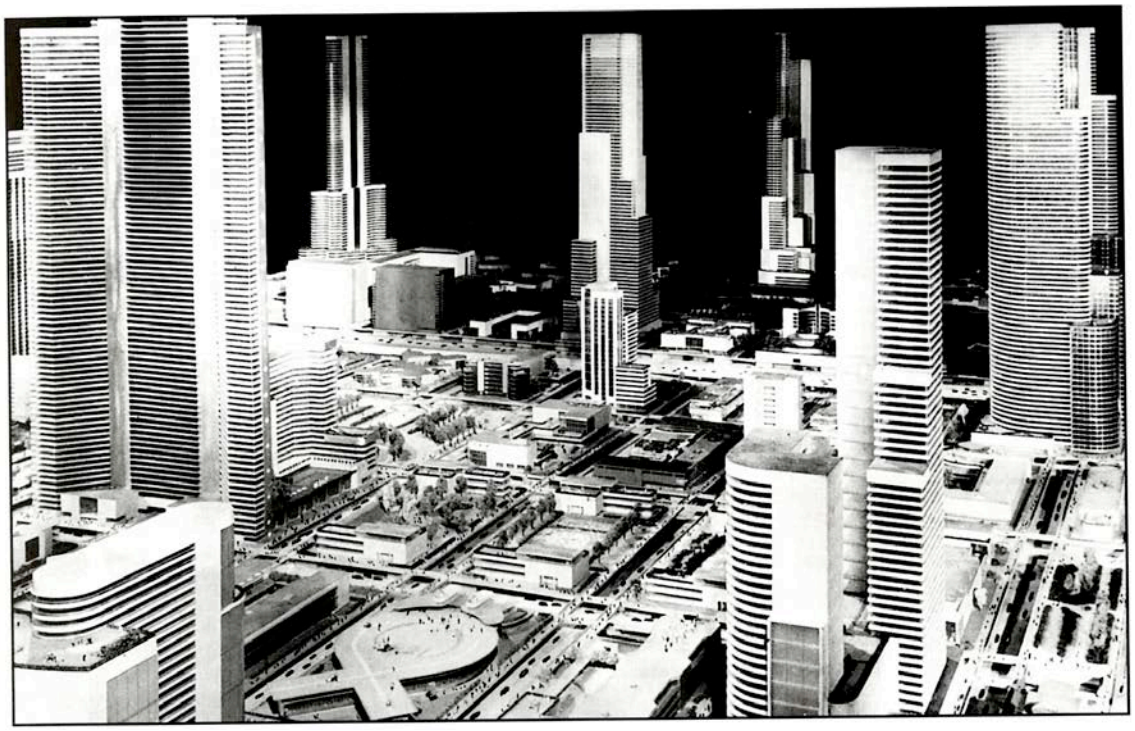

Figure 5.3 Futurama exhibit.
Rosenblum and Bletter, Remembering the future*, 1989.*

should be in the country where there is room and the highways do not run the chance of destroying the already built community. Democracity does not take this into account, and Dreyfuss creates highways through the center of his urban center. This does not allow the city to expand, thus creating more congestion in years to come. Futurama was the better of the two idealistic models because it did not work against the city like Democracity did. The city was still the main focus, with arteries to the residential. Democracity was about bringing the residents in the periphery to the center of city.

The architectural support behind the Fair of the Future was modernism, thus planners favored an open plan for the fair (figure 5.4). Critics, however, had not yet embraced the modernist ideals, and preferred a Beaux-Arts plan reminiscent of Burnham's 1893 plan for the Chicago Fair (figure 5.5). The plan of the fair radiates out from the center attraction of the Perisphere and Trylon, almost identical to the radiating of the Burnham's Plan for Chicago. The buildings, however, did not always follow this

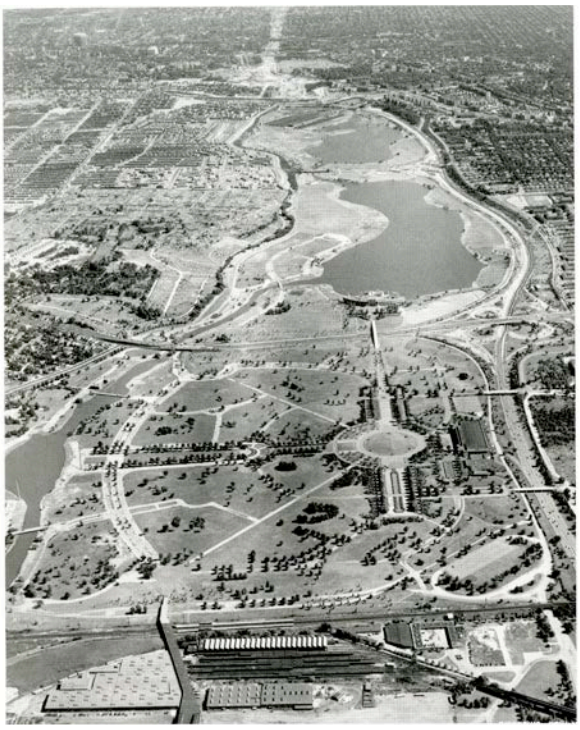

Figure 5.4 Aerial view of 1939 World's Fair.
Ballon and Jackson, Robert Moses and the Modern City*, 2007.*

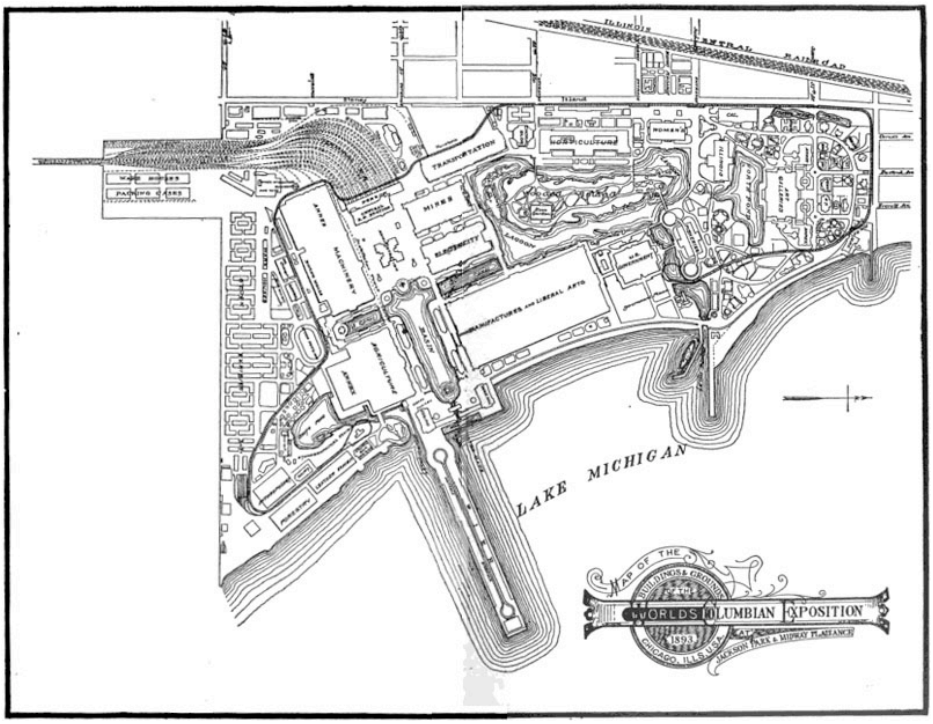

Figure 5.5 Plan of 1893 Columbian Exposition.
White and Iglehart, the World's Columbian Exposition, Chicago, 1893*, 1893.*

Beaux-Arts style. The fair demonstrated a strange dichotomy between the popular modernist style and the City Beautiful style.

Robert Moses and Creating New York City for the Automobile

Robert Moses was the executive officer of the New York City World's Fair Commission. By the time of the fair Moses had risen to considerable power. He was New York City parks commissioner, New York State parks commissioner, chairman of the Triborough Bridge Authority, and sole member of the New York City Parkway Authority.[4] His power began in 1924 when he was elected chairman of the State Council of Parks. Nine years later, he ran for Mayor of New York City, but lost to Fiorello La Guardia. La Guardia ended up being the biggest champion for Moses. As Mayor, La Guardia vowed to clean up the corruption of Tammany Hall that had defined New York politics. He also looked for ways to solve the congestion problems in New York City as well as the unsatisfactory living conditions throughout the Lower East Side and Harlem. He appointed Moses as the first citywide commissioner of parks in 1934. With La Guardia's backing, Moses was able to build numerous parkways, public facilities, and housing.

On July 11, 1936, Robert Moses completed his first bridge construction project, the Triborough Bridge (figure 5.6). The bridge connected 125th Street in Manhattan, Astoria in Queens, Randall's Island, and the Bronx, making the first major connection between all three boroughs. The bridge was momentous, with three spans and two miles of viaduct over Randall's and Wards islands.[5] A main component of the bridge was that it only carried vehicular traffic. The bridge made the statement that this was the age of the automobile. On April 7, 1933 the Triborough Bridge Authority was created to oversee

[4] David Gelenter, *1939, the Lost World of the Fair* (New York: Free Press, 1995), 79.
[5] Hillary Ballon and Kenneth T. Jackson, *Robert Moses and the Modern City: the Transformation of New York*, (New York: W.W. Norton & Co., 2007), 229.

Figure 5.6 Aerial view of Triborough Bridge.
Ballon and Jackson, Robert Moses and the Modern City*, 2007.*

the completion of the Bridge, including approaches.[6] The Manhattan approach was a six-lane, vertical-lift span, which allowed for ships to pass beneath with the deck lifting like an elevator. The crossing between Wards Island and Astoria required a larger span, so Othmar Ammann, the chief engineer for the project, designed a suspension bridge. The Bronx arm was a truss span over the narrow Bronx Kills.

At the time of construction, Manhattan was mainly operating below 59th Street, which was already serviced by multiple bridges and tunnels. As people moved north, they desired a connection between Manhattan, the Bronx, and Queens. The TBA used the area at 125th Street, the heart of downtown Harlem, for their site, which they acquired from engineer Edward Byrne. Although by the time of construction this spot was no longer the business district it once was, the TBA did not want to change location and risk the bridge

[6] Hillary Ballon and Kenneth T. Jackson, *Robert Moses and the Modern City: the Transformation of New York*, 230.

not being built. The bridge was a critical moment for Moses, who became TBA chairman before it was even completed. The bridge was an immediate success, carrying 11,043,000 vehicles its 1937,[7] which was about half of the Manhattan Bridge's 22,363,915 vehicles in 1925.[8] This may appear to mean that the Triborough Bridge was not flourishing, but the congestion in Lower Manhattan was much greater than the traffic in Upper Manhattan. The success of the bridge gave Robert Moses power, and his TBA oversaw every other major vehicular bridge and tunnel since this moment in 1936.[9]

When Moses first started implementing his strategy to connect New York City as a greater metropolis, a federal mandate impeded him.[10] Highway construction was tightly regulated, so in order to build the superhighways he dreamed of, he had to build parkways, parks that would have roads running beside them. Moses created this idea in 1924 with Jones Beach, the first state park (figure 5.7). He envisioned the beach as a place of recreation, thus the only people needing a road to get here would be pleasure seekers. To get to the south shore of Long Island from Manhattan would take an expansive parkway system, starting with the Southern State Parkway and Wantagh Parkway. At this time Moses also constructed the Ocean Parkway and sections of the Northern State Parkway, and concluded this system with the Meadowbrook Parkway. Each of these parkways mirrored its destination. The thin, landscaped, winding roads created the idea of leaving the congested city. He produced a dichotomy between urban and suburban life with these roads, which is a theme that was prominent in Dreyfuss's future plan. The idea also calls upon City Beautiful. Although the parkways are not the city, the system still beautifies the city. New Yorkers use the roads to immerse themselves in more aesthetic surroundings than the plainness of the gridiron plan.

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[7] *Robert Moses and the Modern City: the Transformation of New York*, 231.
[8] *Regional Survey of New York and Its Environs Volume III: Highway Traffic*, 157.
[9] *Robert Moses and the Modern City: the Transformation of New York*, 231.
[10] *Robert Moses and the Modern City: the Transformation of New York*, 86.

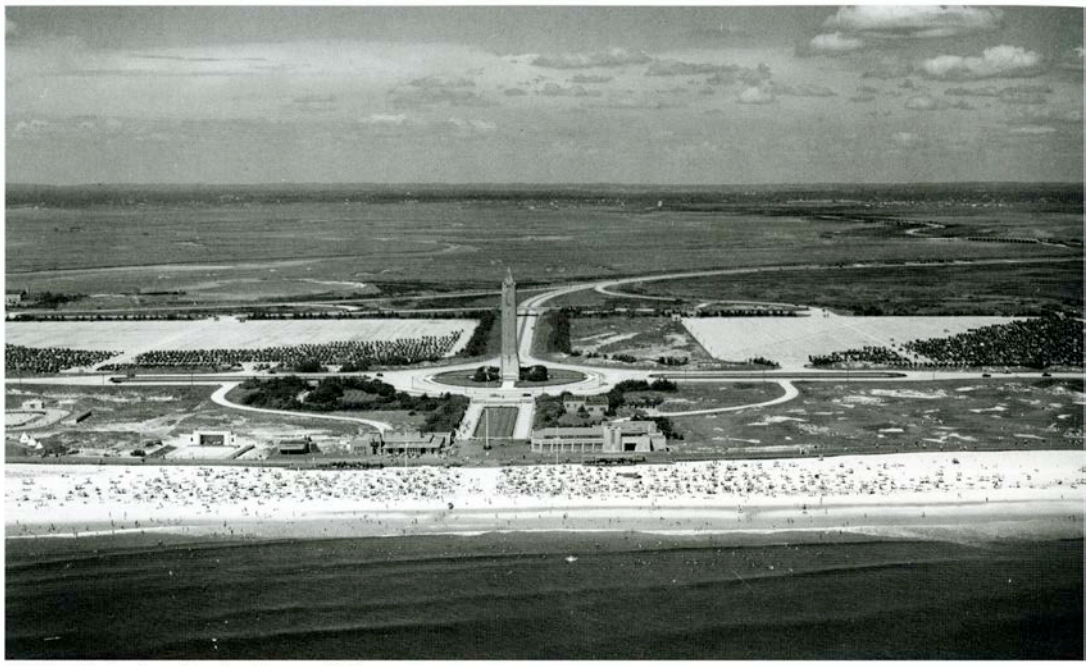

Figure 5.7 Aerial view of Jones Beach.
Ballon and Jackson, Robert Moses and the Modern City*, 2007.*

Moses was allowed more opportunities to build up the New York Area with President Franklin Roosevelt's New Deal (figure 5.8). The policy allotted money for public projects to stimulate the failing economy. Suddenly, Moses was given freedom to create numerous infrastructural elements including the West Side Highway, Henry Hudson Parkway, Interborough Parkway, Belt Parkway, and Long Island Expressway among others. Moses also found financing for projects by using tolls on his roads, something not seen on the earlier East River Bridges. After the Hudson Memorial Bridge was constructed, Moses waited until enough receipts were collected to build the second level.[11] The tolls were increasingly more effective as the automobile took precedence in the lives of New Yorkers. Commuters had to habitually use the roads and bridges, so Moses could easily collect money for projects.

[11] *Robert Moses and the Modern City: the Transformation of New York*, 89.

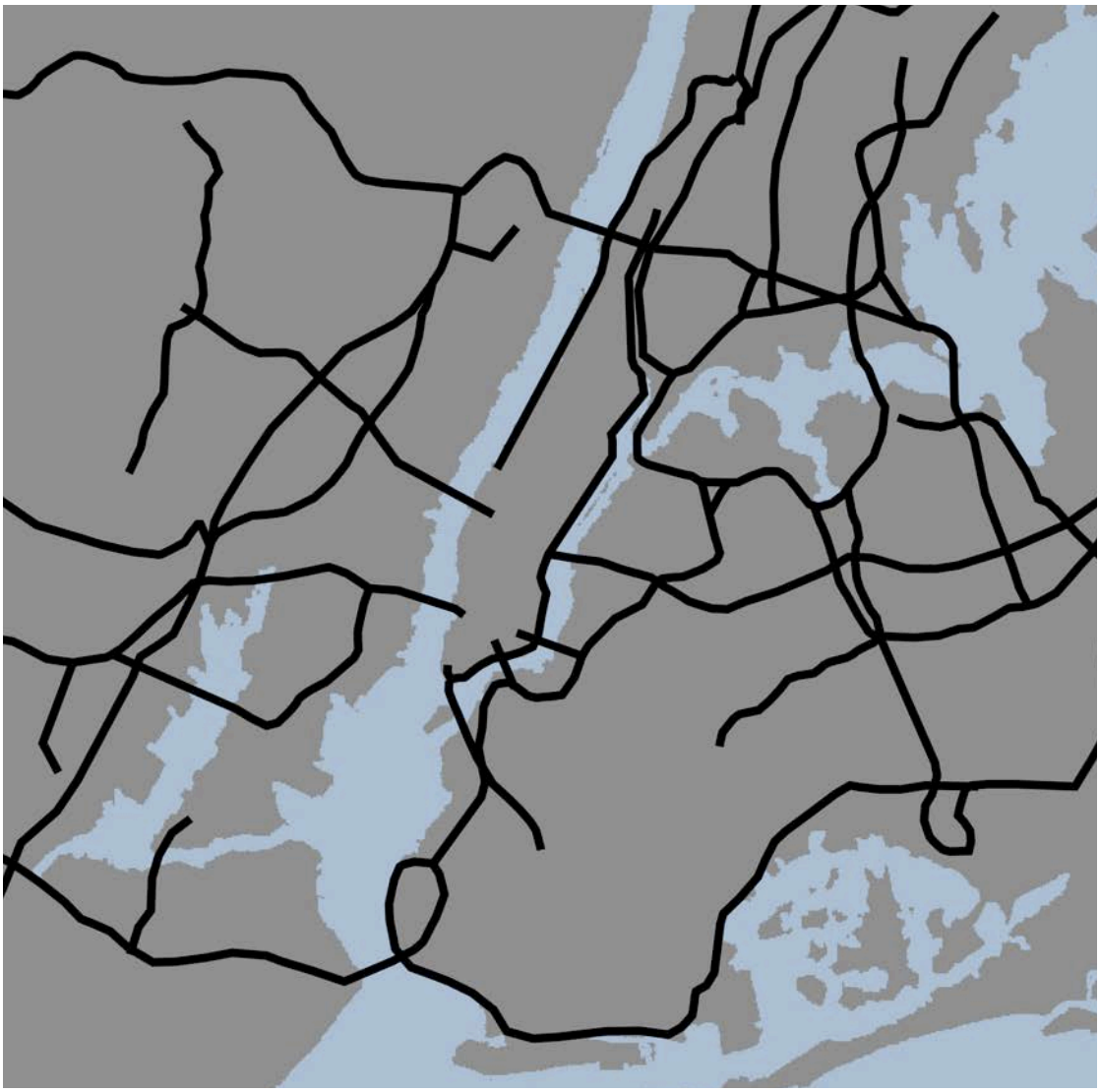

Figure 5.8 Diagrammatic map of New York area with arterial roads.
Google Earth (edits by author), 2009.

Slowly, the parkway turned into the expressway. The parkway was no longer a feasible way to transport everyone. The curved roads could not move traffic as swiftly as a straight one, the narrowness and low bridges made truck traffic almost impossible, and the roads were just not large enough to carry the traffic demanded of them. People were moving out to the suburbs, not only using the roads to go to the beach. The new roads were widened and straightened, a geometry more suited towards the needs for traffic and

congestion relief.[12] This geometry, however, was the opposite of Moses' original idea, a scenic drive through the suburbs. The public did not see the disappearance of parkways as negative, for they believed that Moses was doing the right thing in creating arterial roads to assist the flow of traffic.[13] Moses was creating what the world fair offered, a step towards tomorrow. He was given the power to create the roadways to carry trucks and buses, not just pleasure vehicles. Soon he had plans for the Bruckner, Van Wyck, Cross-Bronx, and Brooklyn-Queens Expressways, to name only some.[14] The expressways were going to allow people to move more quickly into the suburbs from their jobs in the city. This was the point, however, that started the downfall of Moses. His original plan was timid; he only wanted to create a system of parkway to ease transportation. Slowly, he expanded his vision to connect the entirety of the Greater New York into one physical system.

The Brooklyn-Queens Expressway and Franklin D. Roosevelt Drive

The idea of the Brooklyn-Queens Expressway was created in conjunction with the Brooklyn-Battery Tunnel. The tunnel was conceived by the Regional Plan Association to realize the bottleneck problem the East River bridges were creating. The entrances to the Manhattan and Williamsburg Bridges were creating congestion problems from high traffic volume on narrow streets.[15] The tunnel was hesitantly accepted because the RPA feared the effect it might have on the harbor. Another solution by the RPA was a connecting highway between the three bridges. The tunnel was eventually built, but the idea of creating a direct link to move traffic throughout Brooklyn became the BQE (figure 5.9). The first six and a half mile section of the BQE was opened in 1939. The route

[12] *Robert Moses and the Modern City: the Transformation of New York*, 90.
[13] *Robert Moses and the Modern City: the Transformation of New York*, 90.
[14] Robert Caro, *The Power Broker: Robert Moses and the Fall of New York* (New York: Knopf, 1974), 896.
[15] Charles G. Bennett, "To Expedite City Driving," *The New York Times*, November 17, 1940.

Figure 5.9 Brooklyn-Queens Expressway through Brooklyn.
Ballon and Jackson, Robert Moses and the Modern City*, 2007.*

extended from the Brooklyn Bridge Plaza to Queens Boulevard.[16] Plans included widening existing streets, removing intersections, and building a viaduct over the Newton Creek, which would become the Kosciusko Bridge. This small section required tearing down 633 buildings, something Moses could easily achieve through his immense power as Park Commissioner.

Moses received a lot of positive support for his Brooklyn-Queens Connecting Highway in Downtown Brooklyn. The highway hearing in 1943 concerning a 2.7-mile BQE link from Navy Street to Congress Street that would skirt Brooklyn Heights was unanimously approved.[17] Residents were excited that the arterial road would link with the large highway already there, thus getting rid of the bottleneck that it created.

[16] George M. Mathieu, "New Brooklyn-Queens Highway to Open in Fall," *The New York Times*, April 23, 1939.
[17] *The New York Times*, "Highway Hearing Ends; Brooklyn Groups Approve New Link in Heights Section," March 11, 1943.

Planners also saw an opportunity to use the BQE to create a better surrounding for the Brooklyn Bridge.[18] Brooklyn Borough President John Cashmore instructed the road engineers to not disturb the foundation of the historic bridge. Following these instructions, they cleared the old buildings that congested around the approaches, allowing the bridge to be seen. The BQE also uses the approaches for the bridge to integrate the masonry and modern highway. Cashmore said that the "finished job will be an example of the modern progress, supplementing a traditional monument without intrusion."[19]

Moses tried to make sure that the tenants he had to relocate to build his BQE would not suffer from the "necessary condemnations."[20] He applied to have the tenants be able to move their houses to new locations. He also tried to make the transition easier for those removed by saying they would not be dispossessed until other accommodations were provided.[21] In 1946, Moses said that only 110 families would be relocated because of his construction, even though attackers insisted that the number was much larger. Through the *New York Times* articles by Moses, he seems to be concerned with how the people he is moving are dealt with, even though he is the one forcing them to have such a large change in their lives.

The BQE was connected to the Manhattan Bridge in October 1959 with a cloverleaf to allow commuters to more easily access Lower Manhattan (figure 5.10).[22] The connection was completed after the Brooklyn Bridge approach was opened in January 1959. [23] The Brooklyn plaza was planned for reconstruction for a smoother connection, while the Manhattan plaza was planned for reconfiguration to aid transition to the planned Lower Manhattan Expressway. The link with the BQE was important

[18] *The New York Times*, "Planning to give the city a clearer view of its famed Brooklyn Bridge," June 5, 1944.
[19] "Planning to give the city a clearer view of its famed Brooklyn Bridge."
[20] *The New York Times*, "Tenant relocation part of road plan," February 1, 1946.
[21] *The New York Times*, "2 new expressways to oust few families from their homes this year, Moses reports," May 11, 1946.
[22] Charles G. Bennett, "Manhattan span to be revamped," *The New York Times*, October 25, 1959.
[23] *The New York Times*, "New Brooklyn Bridge link to open today," January 12, 1959.

Figure 5.10 Paths (red) from BQE to Manhattan and Brooklyn Bridges.
Google Maps (edits by author), 2009.

because trucks could not cross into Manhattan using the Brooklyn Bridge. Congestion was also relieved on the Brooklyn Bridge, for now traffic had a choice of bridge to get to their immediate Manhattan destination. The streets in Brooklyn were also relieved by the connection to the Manhattan Bridge. The narrow streets of Brooklyn could not handle the traffic that accumulated from those trying to use the bridge to get into Manhattan, which created a bottleneck. The linking of the Manhattan Bridge to the BQE made the bridge seem like an extended exit ramp, providing a connection from Brooklyn to the Lower East Side rather than from Manhattan to Downtown Brooklyn. When one was coming from Manhattan to Brooklyn, he was part of a system that connected him with the rest of the city.

Two areas of Brooklyn that were affected by the BQE, Downtown Brooklyn and Northern Brooklyn, were changed in significantly different ways after construction.

Figure 5.11 BQE clearance in Northern Brooklyn.
Perlmutter, "Our changing city: Northern Brooklyn," 1955.

Northern Brooklyn is composed of Greenpoint, Williamsburg, Bushwick, Ridgewood, Bedford-Stuyvesant, and Crown Heights. These old communities differ culturally, but they are also in a period of poverty and overcrowding.[24] The homes were beginning to dilapidate, and instead of fixing the property, residents would move to the new town of Flatbush or Bay Ridge. The BQE cuts a major path through this region (figure 5.11). The winding path through Williamsburg and Greenpoint cut through a slum-factory area, which helped Moses with urban renewal. It also displaced a lot of residents, which could have led to the population decrease and decline of the area.

The "Our Changing City" segment of the *New York Times* title's Northern Brooklyn's article as: "Area Has Had Big Population Shifts, but Is Still Drab," while

[24] Emanuel Perlmutter, "Our changing city: Northern Brooklyn," *The New York Times*, July 22, 1955.

Downtown Brooklyn's article is named: "Transformation, In Few Years Since War, Tops Rest of New York."[2526] Downtown Brooklyn was physically modified more extremely than Northern Brooklyn. The Brooklyn Bridge Plaza was the causes for these changes. Its construction started slum clearance, which proved beneficial for the area.[27] The BQE created the opportunity for the new plaza, so the BQE indirectly helped the district. In this area, the BQE created a promenade that would jut-out from Remsen to Middagh Streets. The promenade was the third deck of the BQE along this section. The promenade attracted many to this area and heightened its desirability for residence.

Moses planned for a system of parkways around and through Brooklyn and Queens. The Gowanus Parkway, Belt Parkway, Cross Island Parkway, Whitestone Parkway, and Grand Central Parkway created a seamless chain from Red Hook to the Triborough Bridge upon the Gowanus Parkway's completion in 1941. The BQE created a complete loop with these other roads, connecting the Triborough Bridge to the Brooklyn-Battery Tunnel, two of Moses' projects. Now, if a commuter were to take any of the East River crossings, they could easily travel to their destination along this main loop (figure 5.12). The loop also provided an easy way to enter Manhattan at the exact point of destination. Residents in Queens and Brooklyn no longer had to drive up and down the congested island; they could use the expressway closer to them. The solution to New York's congestion problem was to move traffic out of Manhattan, and this is exactly what the BQE provided.

The Franklin D. Roosevelt Drive, originally known as the East River Drive, provides an example of how Moses could have worked. Stanley Isaacs was able to build this road without causing the damage that Moses did during his projects (figure 5.13). Isaacs, however, was not as successful as Moses. He did not complete the project in the

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[25] Emanuel Perlmutter, "Our changing city: Northern Brooklyn."
[26] Charles Grutzner, "Our changing city: Downtown Brooklyn glistens," *The New York Times*, July 18, 1955.
[27] Charles Grutzner, "Our changing city: Downtown Brooklyn glistens."

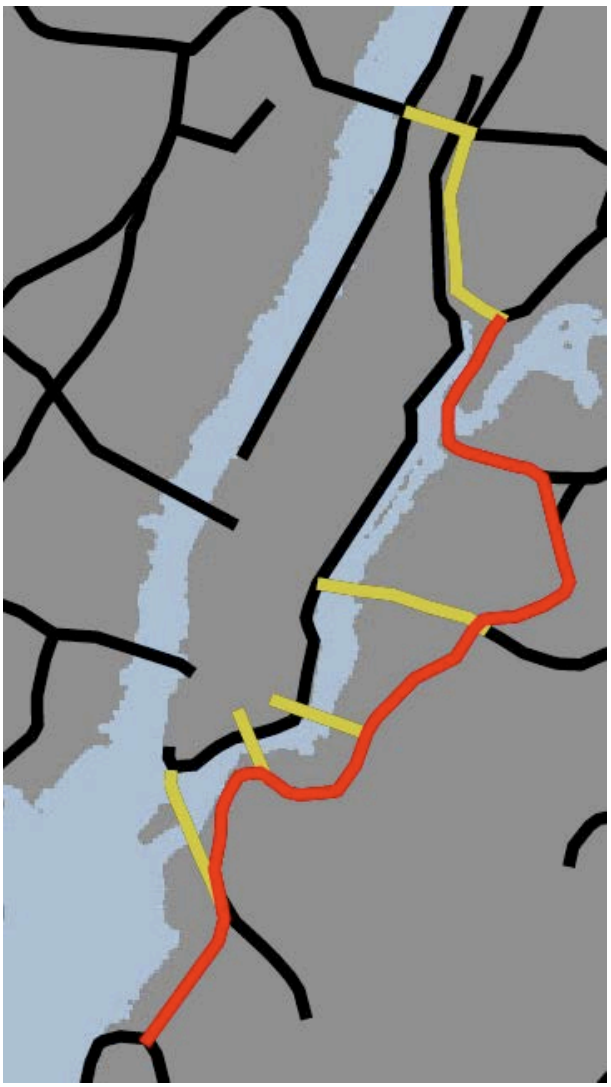

Figure 5.12 BQE (red) with connections to Manhattan (yellow).
Google Maps (edits by author), 2009.

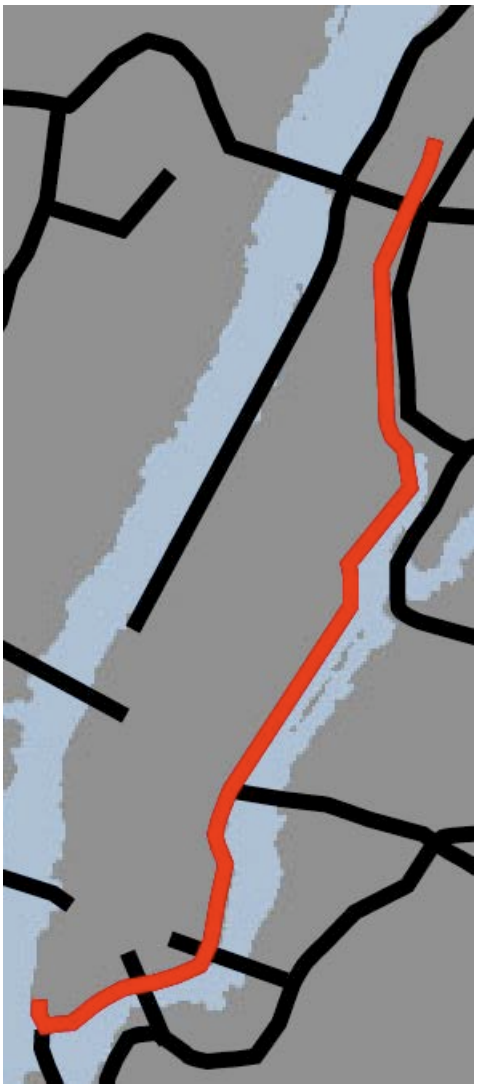

Figure 5.13 Map of Manhattan with FDR Drive (red).
Google Maps (edits by author), 2009.

four years he promised it would take; he completed it in eight years.[28] The drive also did not provide adequate access for those coming from Brooklyn to access the rest of Manhattan. Moses was able to take under his control the connection to crossings. The Manhattan Bridge, the most frequently used East River crossing cannot easily access the highway. When one lands at the intersection of Canal and the Bowery, there is no cloverleaf to then take them to the FDR Drive. If they want to go south on the FDR Drive,

[28] "The path of prosperity: New York City's East River Drive, 1922-1990," 170.

they must turn underneath the Manhattan Bridge, drive along the narrow East Broadway and St. James Place to the Brooklyn Bridge's cloverleaf, which will then take them to the FDR Drive (figure 5.14). If they plan to go north, they must drive from the Bowery to East Houston Street for the entrance to the highway (figure 5.15). Although these roads are not as narrow, they have many traffic lights that impede a quick flow of traffic. The bridge thus acts as a neighborhood connection, rather than a part of Moses' extended system.

The FDR Drive was first conceived in the 1929 Regional Plan, which expressed the need for a north-south route in Manhattan. Five years later, Mayor Fiorello La Guardia put the plan for the FDR Drive in action. The plan, much like the BQE, stemmed from Moses' Triborough Bridge. Moses used La Guardia's announcement of the plan for the FDR Drive to announce a parkway leading from 92nd Street to the entrance to his bridge at 125th Street. La Guardia had originally planned to use the funding from the Board of Estimate to construct the section of the drive along the Lower East Side, but Moses saw this as a threat to his bridge.[29] He needed traffic to use his bridge so he could collect tolls, something not on the lower East River Bridges.

The drive experienced multiple problems with acquiring land from residential and commercial neighborhoods. The work of Stanley Isaacs, Manhattan borough president, helped mitigate these issues. The first problem appeared with La Guardia's proposal for a Sutton Place bypass tunnel to alleviate work done in the affluent Sutton place neighborhood.[30] The neighborhood was located on the waterfront in the East 50's. It connected to York Avenue, which would bring traffic directly to 92nd Street and Moses' Triborough Bridge approach. La Guardia tried to lessen the displacement of residents by proposing an underground tunnel. Isaacs disregarded this idea, saying it was a "stupid

[29] Owen D. Gutfreund, "The path of prosperity: New York City's East River Drive, 1922-1990," *Journal of Urban History* 21, no. 2 (January 1995), 157.
[30] Owen D. Gutfreund, "The path of prosperity: New York City's East River Drive, 1922-1990," 159.

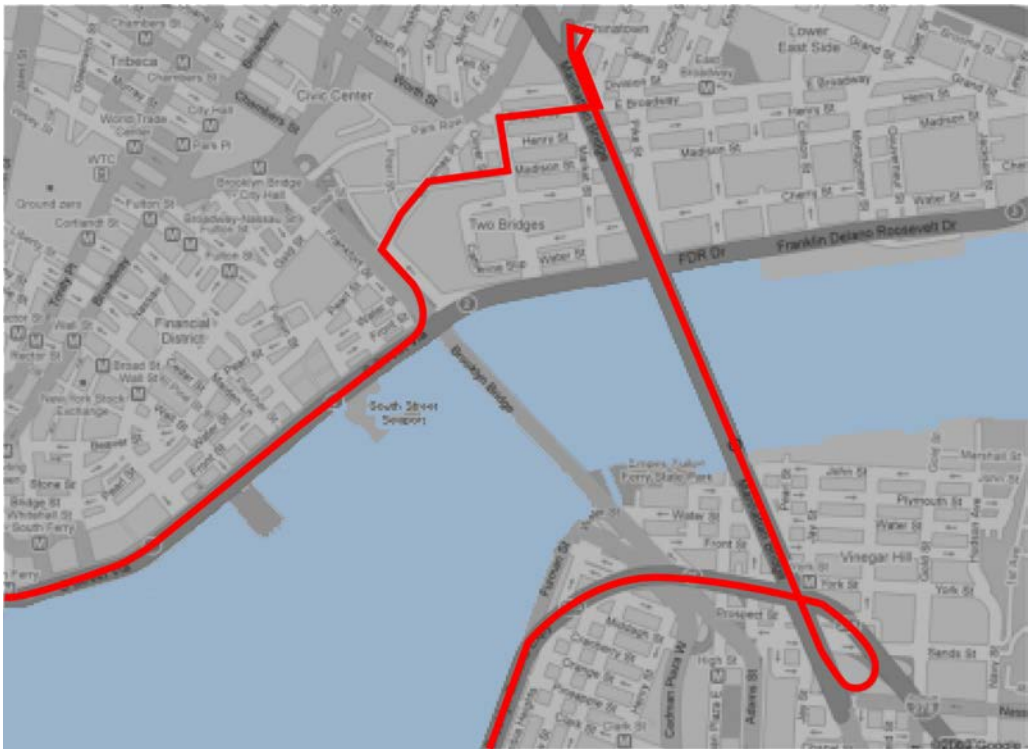

Figure 5.14 Path (red) from BQE to southbound FDR Drive.
Google Maps (edits by author), 2009.

Figure 5.15 Path (red) from BQE to northbound FDR Drive.
Google Maps (edits by author), 2009.

and bad arrangement."[31] Traffic would go below Sutton Place, but the traffic it then dumps on York Avenue would create congestion. Building around York Avenue seemed impossible to Isaacs. The area along the waterfront at Sutton Place and Carl Schurz Park, which extends along the waterfront from 84th to 90th Streets, did not provide enough space for a multi-lane highway to be built.

Isaacs commissioned Walter Binger to fix the problems with the FDR Drive. Binger proposed using a double-deck road system that would stack the southbound lands above the northbound lanes, conserving space in the especially tight spots along the waterfront. He also incorporated a third level that would later be useful when Isaacs was trying to gain the support of local property owners. Moses was again incorporated into the project with his involvement concerning Carl Schurz Park. Isaacs planned to use Binger's three-tiered plan for the section next to the park, but he need Moses' cooperation, for he was the Parks Commissioner. Moses agreed to the idea because he had control over the six acres the third tier created and the roadway would improve traffic use for his Triborough Bridge.

Isaacs went about his acquisition of property in a different method from Moses' "get-out-of-my-way, here-home-the-bulldozers" style.[32] The main goals for acquiring property and changing neighborhoods were to create a beneficial solution for the property owners while not costing the city and retaining the property as taxable. He first applied this to the wealthy residents of Sutton Place. In place of allowing the FDR Drive to be built, residents were given additional yard and garden space from the third tier of the roadway. This was an improvement to their living situation that they could not have gotten otherwise, thus beneficial for them. Beekman Place offered a similar situation. Isaacs had to use Moses' condemnation tactic to build on the undeveloped land between 53rd and 56th Streets that belonged to the estates. The only redeeming factor to the

[31] "The path of prosperity: New York City's East River Drive, 1922-1990," 162.
[32] "The path of prosperity: New York City's East River Drive, 1922-1990," 168.

project was Isaacs made the foundation for the drive from 54th to 56th Streets sturdy enough to support a high-rise building if the Phipps Estate wanted to build one there. Isaacs had to negotiate with commercial property owners as well. The exchanges were very similar to those for the residential properties. The New York Steam Corporation, New York Hospital, Farmer's Feed Market, and Aetna Mortgage Company were among the companies that Isaacs either gave land or building improvements to in order to complete his drive. Mutual Life's #10 Grace Square was one of the few examples that Isaacs could not be alleviate. The lower floor apartments' main perk was the riverside view they offered. With the building of the wall, however, this advantage would disappear, and there was nothing Isaacs could do.

The drive was officially inaugurated on May 25, 1942. After the inauguration, modifications and improvements to the FDR Drive were slow.[33] Traffic lights at 18th, 20th, and 23rd Streets were removed after the expensive process of building an elevated section. The connection to Moses' Brooklyn-Battery Tunnel was announced in 1948. A tunnel was built under Battery Park to create a fluid motion from the southern to northern tips of Manhattan. These were the only two crossings that were connected with the FDR Drive. Moses was opposed to the East River bridges, which did not have tolls and thus he could not collect profit from them.[34] A connection with the Manhattan Bridge was never formed, and the connected with the Brooklyn Bridge was not completed until 1970.

Slum Clearance

Robert Moses took on the problem of the slums in the 1930s and post-World War II New York City with the same intensity as the creation of parkways and expressways. In the 1930s, Moses tried to tackle the problem through public projects with WPA funding.

[33] "The path of prosperity: New York City's East River Drive, 1922-1990," 171.
[34] *Robert Moses and the Modern City: the Transformation of New York*, 205.

He created numerous parks, beaches, playgrounds, and vacant lots that employed architects and engineers who were out of work from the depression.[35] His goal was to create places where people in New York could congregate. He was at first successful with Jones Beach, 7,700 acres of swamp on the south shore of Long Island that swiftly became a popular weekend spot. The creation of pools in congested New York was a response to the Progressive Era idea of integrating modern buildings into the existing fabric of the city. Large open-air pools are a way to "bathe" the public, clean out the city to make for a more suitable environment.[36] He took this idea directly from the European Modernist movement, which asked for pools to create "new spaces of public informality." Lewis Mumford called Moses' pools "sound vernacular modern architecture," for the pools dismissed the popular Beaux-Arts "fussiness" of the early twentieth century.[37]

Modernist ideals were used later in the 1950s when Moses started his urban renewal projects through slum clearance. Moses was chairman of the Mayor's Committee on Slum Clearance, and thus used Title I to his full advantage during his twelve years in charge.[38] Title I of the U.S. Housing Act of 1949 provided the federal funding for clearance of slums to stimulate reconstruction. Since the beginning of the twentieth century, slums and tenement housing proved to be a problem. They facilitated congestion and did not allow automobile traffic to move easily throughout the city. Title I sought to solve this problem by using three elements.[39] The first was large-scale clearance, replanning, and private development. Trying to fix the buildings was not enough, the "cancer" had to be removed in order to save the city. The second element was to break away from the rigid gridiron plan and create what the modernists thought were essential for humans: open space, light, and air. The main idea was to construct a

[35] *Robert Moses and the Modern City: the Transformation of New York*, 72.
[36] *Robert Moses and the Modern City: the Transformation of New York*, 73.
[37] *Robert Moses and the Modern City: the Transformation of New York*, 78-79.
[38] *Robert Moses and the Modern City: the Transformation of New York*, 94.
[39] *Robert Moses and the Modern City: the Transformation of New York*, 96-97.

Figure 5.16 Le Corbusier's Ville Radieuse.
Mooney, Pile, and Brook, Unruly Cities?*, 1999.*

tabula rasa from multiple street blocks, creating a large open space with multiple high-rises, based off Le Corbusier's Ville Radieuse (figure 5.16). Moses was needed to totally plan the community. The third element was that the redevelopment had to be under private businesses, except for low-income housing, which was less appealing to private companies. Government money helped the projects, but Moses wanted emphasis to be on the private sector because he feared a federal takeover of housing.

Moses' towers-in-the-garden plan made little sense. The less affluent people still remained in the area, so it continued to be just as poor. Changing the envelope of the buildings did not change the economic makeup of the area. The overcrowding shifted from being primarily horizontal to vertical. Moses saw these vertical towers of congestion as better because there were green spaces between them. The open spaces did not allow breathing room he desired, only a greater distance from the rest of the city. The breathing space was a gap that did not exist before, providing an extra barrier to be more connected with the more affluent people in the rest of the city. Also, those displaced by slum clearance were dispersed throughout the city. Instead of helping the actual people who made the area bad with legislative reforms, Moses brutally ripped them out, creating greater discord in their lives. He cared very little for the people he was claiming

to help. His strong methods showed a greater commitment to changing the city plan than the lives of the less affluent.

On the Lower East Side, Moses implemented his Title I power to create middle and low-income housing projects. One of the most perfect examples of Title I housing is the Governor Alfred E. Smith Houses (figure 5.17). The site selected was a jumbled mess of roads in 1910. The area contained the infamous Five Points. This area was one where reformers constantly tried to fix. By the 1950s, however, very few residents lived here and the area consisted mainly of small factories. The community was not beneficial towards New York City, creating a congested disease rather than an open breathing space. Moses gutted the area between the Brooklyn and Manhattan Bridges to create a tabula rasa to build his high rises on. Twelve large x-shaped buildings were constructed along the FDR Drive (figure 5.18). The space is completely open for parks and gardens, with only one suburban-type road, Catherine Slip, going through part of the project. The footprints of the buildings take up very little of the site, which was advantageous for Moses.

The Governor Smith Houses are their own city. The language in this area is completely separate from the rest of the Lower East Side. The superblock Moses created was similar to the Corlears Hook and the Park Row Settlements, but they were dispersed throughout the Lower East Side, hidden by the large infrastructural elements like the East River Bridges and FDR Drive. These projects strongly resemble Le Corbusier's Plan for Paris (figure 5.17). The Lower East Side, however, looks more like Paris without Le Corbusier's violent intrusion. A strong visual divide thus exists between the two types of communities that are right next to each other. The housing projects are completely separate from the fabric of the city, thus creating their own city. There are no real roads through this "city." The Manhattan Bridge and Brooklyn Bridge pass over the area, ignoring the people who live there and their community. The FDR Drive passes the area

Figure 5.17 Moses' Governor Alfred E. Smith houses.
Photograph by author, 2009.

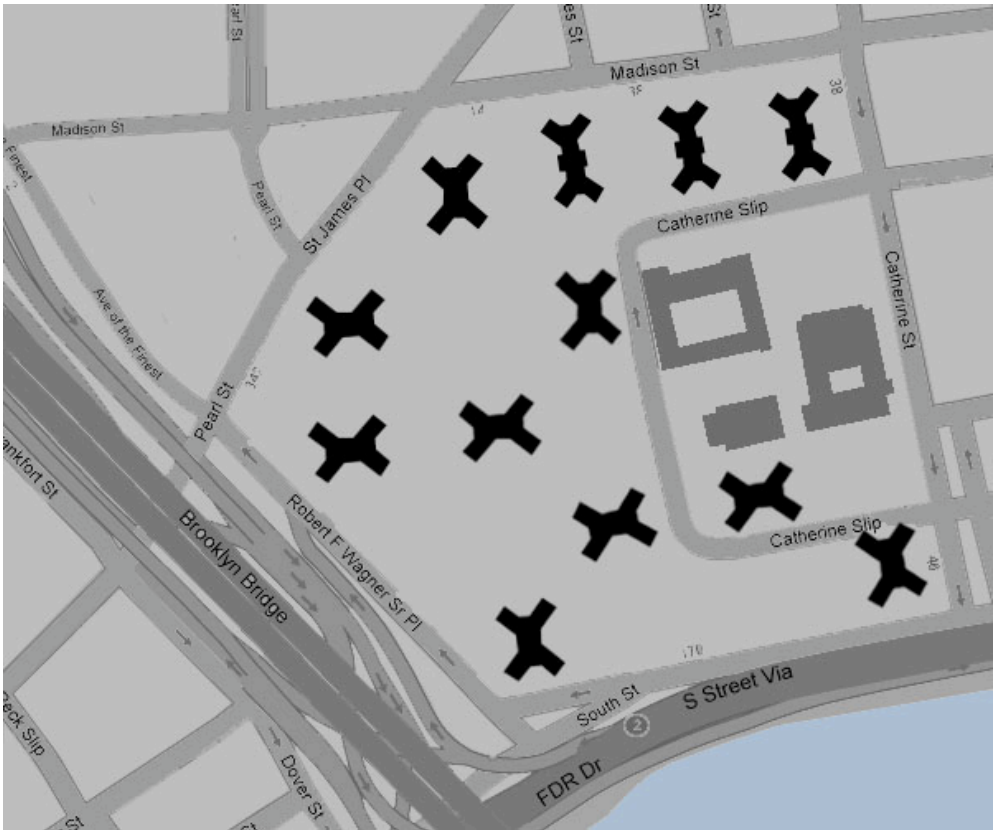

Figure 5.16 Plan of Governor Alfred E. Smith houses.
Google Maps (edits by author), 2009.

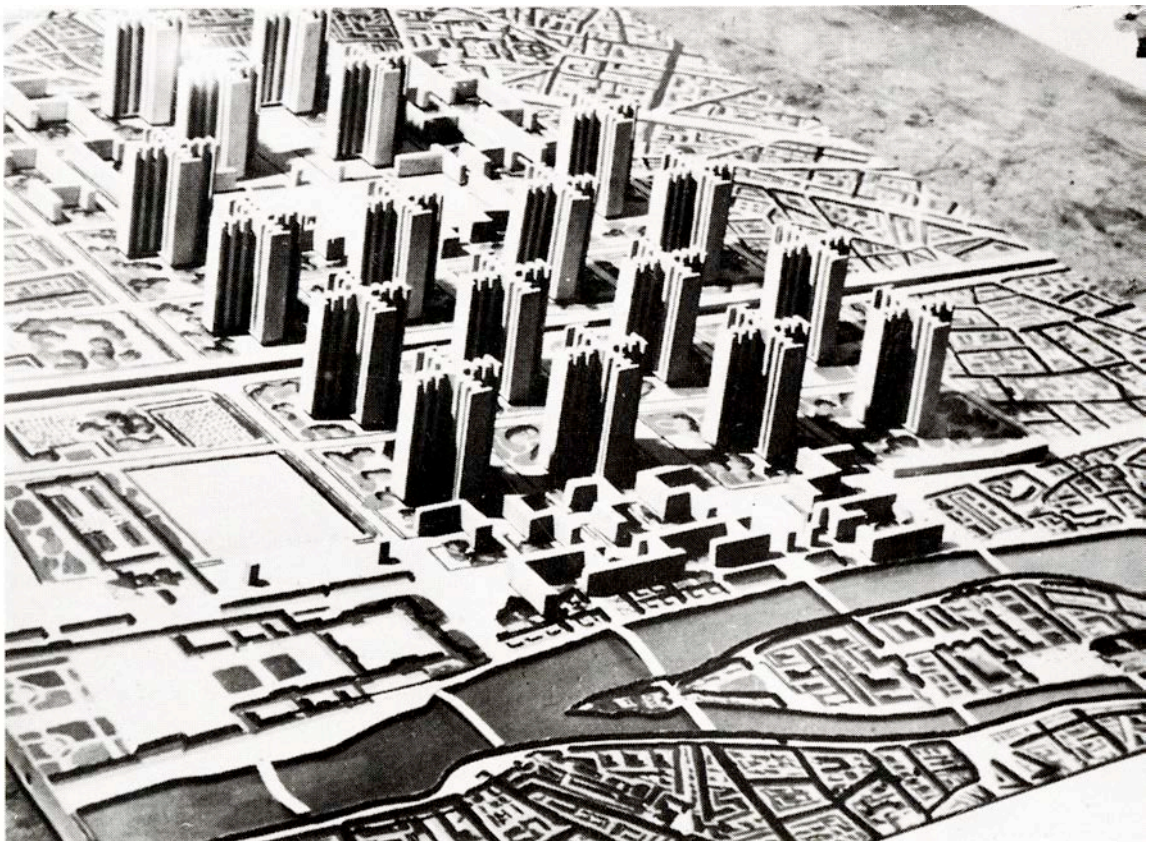

Figure 5.17 Le Corbusier's Plan for Paris.
Le Corbusier, Le Corbusier: architect of the century, *1987.*

in the same fashion. The road system of Lower Manhattan completely bypasses the community, having no give or take with the buildings or systems Moses created. In this sense, the Moses projects are Lower Manhattan. The expressway system Moses developed left Manhattan out of the plan. Going from suburb to suburb was more important than actually getting into the city. Here, going around the low-income housing, pretending it does not exist, is achieved by the roads not penetrating Moses' towers-in-the-garden. The projects are hidden from view. They are not important to the commuter, so they are not important to the city.

The Manhattan Bridge in Moses' Plans

Moses also used his Title I authority to create projects in Brooklyn. Moses created the Brooklyn Civic Center, which is near the entrance to the Manhattan Bridge and

Figure 5.18 Cadman Plaza
Ballon and Jackson, Robert Moses and the Modern City*, 2007.*

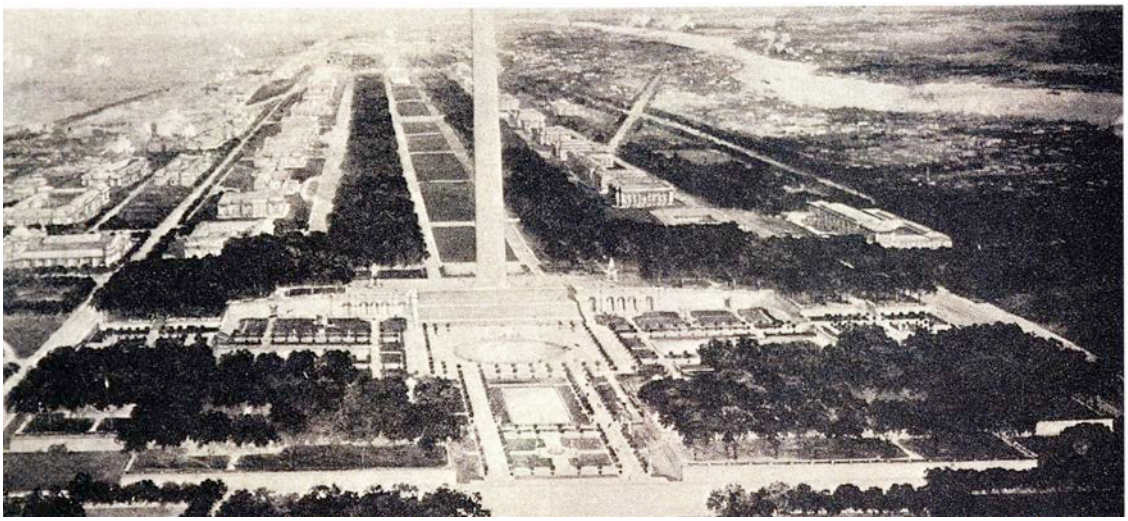

Figure 5.19 Washington D.C. Mall
Rocheleau, Daniel H. Burnham: visionary architect and planner*, 2003.*

exactly at the entrance for the Brooklyn Bridge (figure 5.18). He saw the civic center as a necessity for Brooklyn; no one had ever considered the needs of Brooklyn before.[40] Moses needed to create an entirely new downtown Brooklyn including colleges, hospitals, residences, and commercial centers. Borough President Cashmore welcomed the project. He thought New York City had been treating Brooklyn like the "stepchild," for they were not getting the Title I projects or city improvements that were appearing in

[40] *The New York Approach: Robert Moses, Urban Liberals, and Redevelopment of the Inner City*, 239.

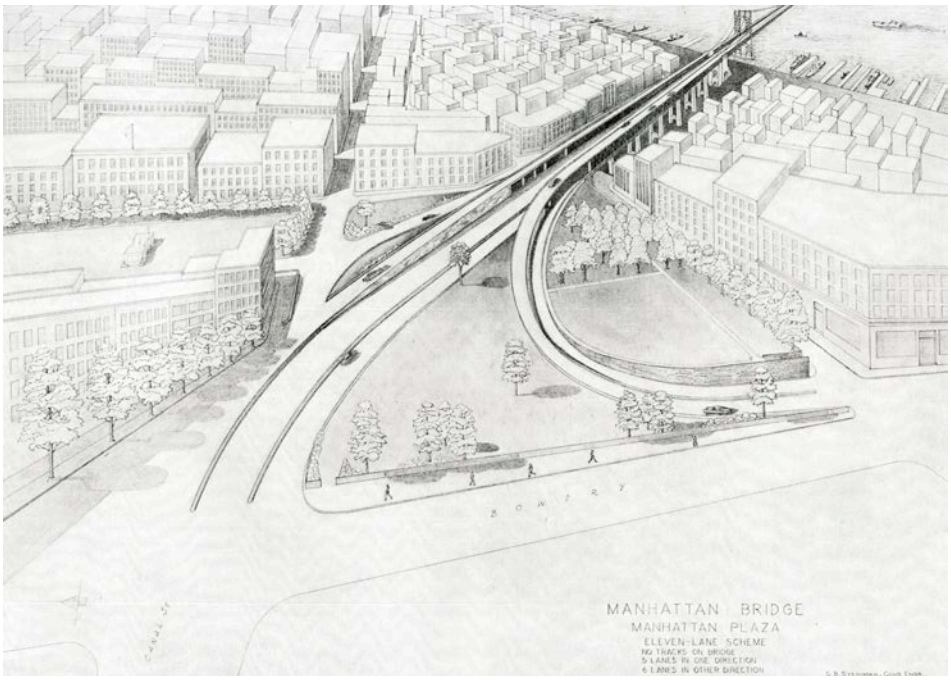

Figure 5.20 Eleven-lane scheme of Manhattan Bridge on Manhattan side.
Steinman, "Manhattan Bridge: Investigation of Structural Condition," 1955.

the rest of the city.[41] The plan for the Civic Center was based on the Beaux-Arts Washington D.C. style, which was a step back from his modernist plans for his other projects (figure 5.19). The large Borough Hall was the center of the plan. It was situated on an 8-acre grassy mall that ran to the Brooklyn Bridge.[42] Along the sides of the mall were municipal buildings including the New York City Board of Transportation, Welfare Center Building, the Brooklyn Men's house of detention, and a branch of the Brooklyn Public Library. The project had a modernist component because it was about tall buildings with large open spaces. The grand avenue-like mall, however, was more reminiscent of the 1929 Regional Plan's for roads or a Haussmann boulevard.

Moses' Brooklyn Civic Center combined with David Steinman's images from his 1955 report on the Manhattan Bridge create a greater understanding of the role of the bridge within Moses' infrastructure (5.20). The idea behind Moses' civic center was to create an idea of the arts for the completely structural bridge. The style reverts away

[41] *The New York Approach: Robert Moses, Urban Liberals, and Redevelopment of the Inner City*, 242.
[42] *Robert Moses and the Modern City: the Transformation of New York*, 301.

from his normal modernist style seen in the housing projects and embraces City Beautiful, a safer choice. The plan for Washington D.C. was popular in the 1929 Regional Plan, so Moses assumed that it was still popular when choosing to model his civic center after it. The beauty in the plan completely disregards the structural nature of the bridge. Moses designed the plaza when he was still developing parkways and trying to hide the infrastructural necessities with beauty and landscaping. A bridge cannot have either side be landscaped, so the entrances have to be beautifully planned. Moses, however, did not design the Manhattan Bridge, so his reasons for wanting to mask it are unclear. By creating a grand entrance, he was drawing attention to the bridge while also hiding it. New Yorkers were attracted to the civic center, but not for the purpose of seeing the bridge. The bridge was already heavily used, however, so need to popularize it seems unneeded. The way that he was achieving this was by creating fabric around the bridge rather than exposing it as an object. The fabric around the bridge gave importance to that particular area. The bridge was going from plaza to plaza, not road to road. The plaza, however, was one for the entirety of Brooklyn, so while it was just a point connection to Brooklyn, that point was representative of Brooklyn as a whole.

The images from Steinman's report show a bridge landing in a type of suburbia, even though both sides of the bridge are almost completely urbanized by this point. The bridge beautifully flows into the landscape, creating no disruption to the local fabric. This was the idea behind the parkways. The harsh infrastructural and structural nature of the bridge is dismissed with carefully placed trees. The idea of the expressway and direct speed is still evident in the cloverleaves seen coming out of the bridge's exits. The expressway is in suburbia, which was Moses' main idea. The displacement of main paths of traffic from an entirely urban context to a suburban context helps facilitate movement throughout the city as a whole. The main idea in this picture is seeing large roads outside

of the city, even though the Manhattan Bridge is an important link for the city. The bridge is seen as part of the greater system rather than its own object connecting points.

Figure 6.1 Map of Lower Manhattan and Brooklyn
Google Maps, 2009.

6 Reviving the City

Jane Jacobs Rediscovers the City

Jane Jacobs' 1961 book, *The Death and Life of Great American Cities* changed the way Americans understand cities. She published it during the peak of Moses' power, when he was swiftly building expressways and crossings throughout the city, creating project housing, and destroying slums. Although she used multiple cities to shape her argument, her main focus was New York City. She dedicates the book to New York City,

where she "came to seek [her] fortune and found it."[1] She planned to use "common, ordinary things" to attack "the principle and aims that have shaped modern, orthodox city planning and rebuilding."[2] She specifically attacked Moses throughout her book to illustrate her points. She championed the medieval organic city, but was strongly against the modernist planning of Moses and Le Corbusier. The organic city allowed for small neighborhoods to form, creating a small-town feel even in a city as large as New York. Her personal experience of living on Hudson Street, a former Irish slum, in Greenwich Village provided material for her book. She spoke of her street as an "intricate sidewalk ballet," bustling with city life and different mixes of people on her sidewalk.[3] This ballet throughout the city was brutally ripped apart by Moses and those advocating urban renewal.

Jacobs believed strongly in the sidewalk culture of a city. The sidewalk is the product of density and congestion, words Jacobs used positively rather than as a kind of disease. The sidewalk kept the city safe. The activity produced by the combination of residential and commercial buildings allowed for multiple eyes to watch the sidewalks. When there is an expressway, the sidewalk disappears because the street needs to be taken over by the cars. There is no one left to watch the sidewalk, which becomes more dangerous, in turn making the buildings more dangerous. In addition, the sidewalk also allows for a greater sense of community. The expressway destroys this. The physical break causes a social break as well. Suddenly, there is a difference between living on the north or south of the expressway. Business is ruined because commuters no longer stop at the small shops on their way to work; they take the expressway that bypasses small business. The expressway also destroys the small blocks that Jacobs advocated. She enjoyed living in Greenwich Village because the Dutch blocks were smaller than that of

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[1] Jane Jacobs, *The death and life of great American cities*, (New York: Random House, Inc., 1961), dedication.
[2] Jane Jacobs, *The death and life of great American cities*, 3.
[3] *The death and life of great American cities*, 50.

the gridiron plan. When an area is isolated, when it no longer has the sidewalk culture, it deteriorates.[4] The expressway calls for more land and less small streets, thus larger blocks. According to Jacobs, this would destroy the neighborhood.

Her arguments against the expressways developed by Moses are the same arguments she used when fighting the Lower Manhattan Expressway (LME) (figure 6.2). The LME and the Mid-Manhattan Expressway were two Moses projects that never came to fruition (figure 6.3). Both were intended to solve the problem that Manhattan was an obstacle for anyone wanting to get from Long Island to New Jersey. The commuter would have to cross the Manhattan Bridge, land in an area of narrow roads, and drive across the width of the island until he reached either the Holland or Lincoln Tunnel. The idea of creating a cross-Manhattan expressway was nothing new. The 1929 Regional Plan included four expressways crossing Manhattan that were never developed. Moses was able to create an expressway across Manhattan at 175th Street connecting the George Washington Bridge and the Cross Bronx Expressway. The expressway was a crucial link, and it did not disturb the culture and importance of mid and lower Manhattan.[5]

The Lower Manhattan Expressway came much closer to being built than the Mid-Manhattan Expressway. Moses first proposed the LME to La Guardia in 1940 with the intent that those traveling from Long Island to New Jersey would no longer have to circumvent Manhattan; they could drive through the middle. The LME would pass through portions of Soho, Little Italy, the Bowery, Chinatown, and the Lower East Side (figures 6.4 and 6.5). Moses chose a route that went from the Williamsburg and Manhattan Bridges, connected at Broome Street and Broadway, and continued to the entrance of the Holland Tunnel.[6] He was designating these bridges as the main traffic carriers of the era.

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[4] *The death and life of great American cities*, 178.
[5] *Robert Moses and the Modern City: the Transformation of New York*, 212.
[6] *Robert Moses and the Modern City: the Transformation of New York*, 213.

Figure 6.2 View of Mid-Manhattan Expressway.
Ballon and Jackson, Robert Moses and the Modern City*, 2007.*

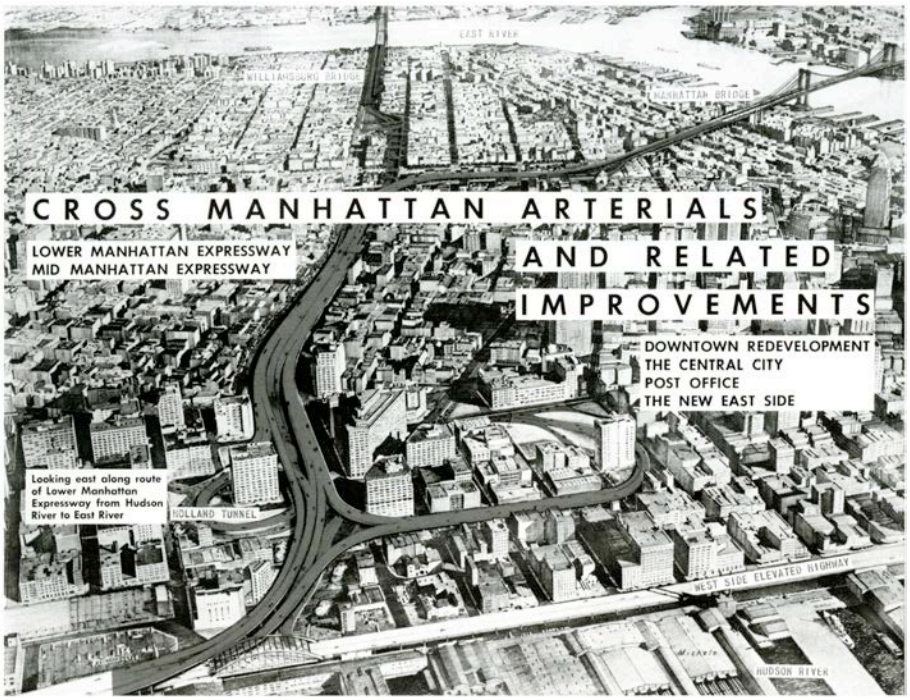

Figure 6.3 Brochure for the LME.
Ballon and Jackson, Robert Moses and the Modern City*, 2007.*

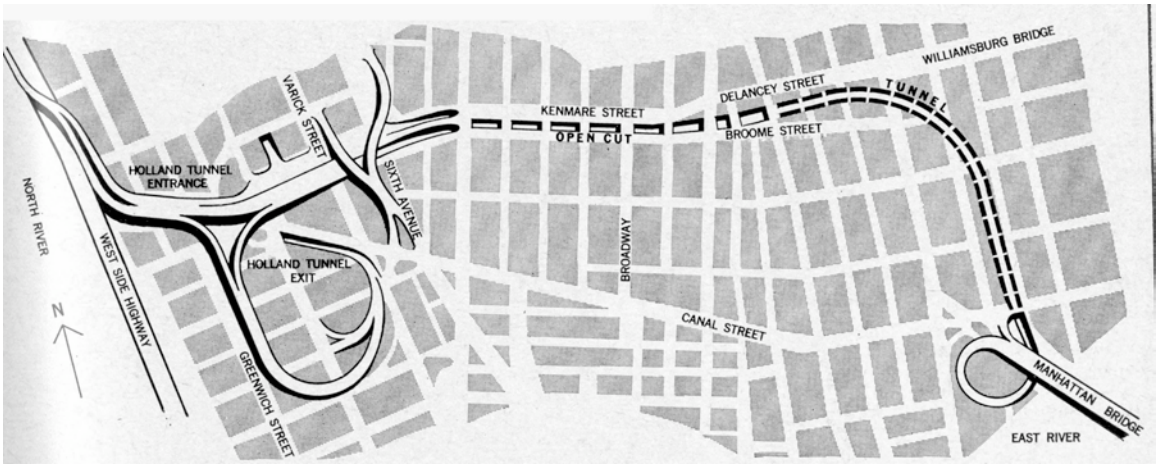

Figure 6.4 Plan for the LME across Lower Manhattan.
Silver, "Lower Manhattan Expressway," 1967.

Moses' view of the FDR Drive was very different from his view of the proposed LME. He did not provide easy access to the East River bridges from the FDR Drive. He saw the FDR Drive as a way to move through Manhattan not into it, so connecting the bridges would create congestion in the densest of the boroughs. In contrast, the LME's connection to the bridges would not create traffic problems in Manhattan because the approach to it would be direct. Rather than entering the bridge from multiple smaller locations, one large entrance would provide for less traffic. The cars would travel directly across without a large reciprocal relationship to it. The main idea of the LME was to get across the island, which was opposite from the FDR Drive, which distributed traffic throughout the island.

Manhattan Borough President Hugh Rogers first discussed the plan for the elevated LME in 1946 after a few years of discussing the LME as part of the State Arterial Highway System.[7] The Board of Estimate approved the project in October 1960 on economic bases. The ten-lane, two and a half mile long highway would be 90 percent

[7] Robert Harold Silver, "Lower Manhattan Expressway," *Architectural Forum*, September 1967, 66.

Figure 6.5 Plan for the LME across Manhattan.
Silver, "Lower Manhattan Expressway," 1967.

federally funded.[8] If they considered the social impact, they would have taken into consideration the 1,972 households and 804 businesses along the route that would need to be removed. The displacement made Wagner, an original advocate, opposed to the idea of the LME. However, he could not reverse the plan because it was already on the

[8] Alice Sparberg Alexiou, *Jane Jacobs: urban visionary*, (New Brunswick, N.J.: Rutgers University Press, 2006), 107.

official map for the City Planning Commission, so he championed the plan again in 1965. Moses' TBTA always stayed behind their plan for the LME. Brochures showed "long tapering cantilever arms" over a "mall" for parked cars, painting a picture similar to the lauded Brooklyn Civic Center.[9] The TBTA also tried to convince the public that the project would carry 80% local traffic, making it a worthwhile investment for the city.

Jacobs stated that the LME would completely destroy the Lower East Side. She joined with Father La Mountain, pastor at the Church of San Salvatore, one of the eight churches doomed by the expressway. Together they formed the Joint Committee to Stop the Lower Manhattan Expressway, including Villagers and Lower East Side Dwellers.[10] Members of the group lived in the areas that were fated to be destroyed, and they fought hard against the power of Moses. The highway would ruin their communities, destroying the small bakeries, supply stores, and lighting shops that characterized this area. They also argued that the expressway would turn New York City into Los Angeles. Los Angeles is a city that is completely based on the car. Neighborhoods are spread far apart and there is no real connection between them. New York City was based on the pedestrian, but Moses was trying to create a city more about the car and suburbanization. A highway through Lower Manhattan would create a separation between the north and south parts of the city, thus making the idea of distance that is prominent in Los Angeles. Los Angeles also has to deal with the "futility of sacrificing its living space to expressways and parking lots."[11] At a Board of Estimate meeting in December 1962, the LME was being proposed by Moses and his supporters. Jacobs and her group went to the meeting and fought strongly against it. They were successful with the help of a letter from Lewis Mumford that expressed concern for the "Los Angelization" of New York. The board put

[9] Robert Harold Silver, "Lower Manhattan Expressway," 67.
[10] Alice Sparberg Alexiou, *Jane Jacobs: Urban Visionary*, 108.
[11] *Jane Jacobs: Urban Visionary*, 108.

the project on hold, to the dismay of Moses, whose power was slowly being drained by new Governor Nelson Rockefeller.

The LME was revived in 1965 under Mayor John Lindsay. Lindsay, previously opposed to the LME, decided that if the highway were built below street level instead of elevated, there would be fewer the objections. Ada Louise Huxtable, however, said that the depressed highway would turn Lower Manhattan into a "concrete no man's land."[12] Even though the road itself was just a line across the borough, Huxtable argued the endless entrances and exits would completely destroy the entire area. At an expressway hearing in 1968, numerous community members spoke against the LME, telling stories of how it would destroy their homes and businesses. The most dramatic member was Jacobs. She led a peaceful protest during the meeting, walking those opposed to the LME across the stage. She was arrested for disorderly conduct after supposedly destroying the stenographer's tape, becoming a martyr for her cause. From this moment on, the LME started to fail again. Lindsay eventually gave up on the idea of a Lower Manhattan Expressway. In July 1969 Lindsay stated that he was against the LME, and he officially removed it from the city map of arterial highways in August 1969. Moses was infuriated and still believed that the need for the LME was inevitable.[13] By 1970, Moses had completely lost power, and was ridiculed rather than hailed as the savior of New York.

Jacobs took her argument concerning expressways and applied it to Moses' project housing. Moses wanted to destroy the small blocks, create a super block, and have a tower-in-the-garden plan. Everything about this was wrong to Jacobs. Moses completely reversed her small block argument. He saw the small block as only creating congestion and not allowing cars to drive throughout the city. The superblock opened up the roads by providing one central space where people could recreate. Jacobs said that the block had to be integrated into the idea of recreation. These large parks by towers

[12] Ada Louise Huxtable, "Where it goes nobody knows," *The New York Times*, February 2, 1969.
[13] *Jane Jacobs: Urban Visionary*, 134.

were where battles occurred. Street gangs ruled the parks.[14] Instead of playing on the safe streets, adolescents used the open spaces next to their slums as a place to get into trouble. The tall buildings surrounding these spaces only exacerbated the problem. Above the fifth floor of a building, people lose their connection to the street and the people who walk by the entrance to their building. Residents could not patrol the street anymore.

The buildings themselves were also criticized by Jacobs. She said, “in orthodox city planning, neighborhood open spaces are venerated in an amazingly uncritical fashion, much as savages venerate magical fetishes.”[15] These “magical fetishes” were the idea that a park could transform “ugly, regimented, institutional, identical, conformed, faceless” buildings into beautiful structures with the addition of a park.[16] Without the integration between the two, however, the buildings are still ugly. They cannot provide protection for the large open spaces that have taken over, which supply more room for muggings.

The large buildings did not solve the problem of slums. Jacobs said that the “perpetual slum” occurs from people moving in and out of residences too quickly.[17] There is no time for community to take hold when the population is constantly changing. Moses thought his buildings provided an advantage because the city could regulate tenants. The overcrowding of the Lower East Side tenements would not occur in buildings like these. However, moving people to the towers did not solve the problem of slums because people still moved in and out of the buildings at the same pace as they did in smaller buildings. The only way to “unslum” an area is to connect the slum to city life.[18] When the slum is completely removed from the city, like it is in Moses’ plan, this

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[14] *The death and life of great American cities*, 76.
[15] *The death and life of great American cities*, 90.
[16] *The New York Times*, "Moses denies city is obsolete; sees residential site at Battery," January 25, 1961.
[17] *The death and life of great American cities*, 275-279.
[18] *The death and life of great American cities*, 279.

will never happen. Thus, Jacobs argues that the developments will rmain in a state of "perpetual slum."

Robert Caro took a similar stance to Jane Jacobs in his 1974 book *The Power Broker: Robert Moses and the Fall of New York.* Caro's argument is overtly stated in the title; he believes that Moses destroyed New York City. He argues that Moses' arrogance and disregard for democracy led to a car-based system with insufficient mass transit, something important to Caro. Caro's beliefs are a lot like Jacobs', that individual communities create the city atmosphere. Moses destroyed these communities with his bulldozers for expressways and bridges. In addition, the more roads and automobile routes were built, the more cars were encouraged to take these roads, thus creating congestion before it even started. Moses' confidence allowed him to completely take control of the funding supplied by the federal and state governments, which he then used for his "monstrous" creations. Most of Caro's argument attacks Moses as a person. He uses stabbing prose to create an image of Moses as a spoiled child who only wanted to get his way. Although he does attack Moses' developments, his disregard for mass-transit, and his disregard for minorities, the book could be stronger had he written with a more even hand.

Moses Reconsidered

After Jacobs and Caro attacked Moses, he became a figure of public contempt. Moses remained this way until recently. Kenneth Jackson reevaluated Moses in his article "Robert Moses and the Rise of New York: The Power Broker in Perspective." He portrayed Moses as the one who helped bring New York City into the automobile age. Moses created an infrastructure system that allowed automobiles to navigate the congested areas, an important part of being an American city. Without the confidence that Caro criticized Moses for projecting, Moses would have never been able to get the

projects done with such great speed. Jackson's position on Moses was that "he saw wastelands that would become parks, bridges that would span rivers and bays, and a necklace of highways and parkways that would weave the city and region into one."[19] Moses' grand vision was needed to create New York.

Jackson's opinion of Moses makes more sense than Jacobs' or Caro's approach. He does not deny the fact that Moses had problems with racism and neglect of mass transit. Moses' programs were geared towards the car, so those without a car, the less affluent, did not benefit from these programs. He did not build up the mass transit system, which has remained virtually unchanged since the 1920s. Even with these flaws, Jackson sees that Moses was needed in order to take New York City into the future. During the 1970s, when Jacob and Caro were writing, New York was in a sharp state of decline. They pointed their fingers at Moses, as he was the apparent scapegoat. He destroyed the communities of the city, so former residents fled to the suburbs. Moses created an infrastructure system that focused on suburbia. Although showing correlation, this does not mean causation. Post-war America was defined by the rise of the car, family life, and the suburbs. His systems made this easier, but city dwellers did not leave because of the systems. The increasing density of New York City was perceived as a bad thing during Moses' time, when garden space was valued. Moses met a need with his parkways and housing projects.

The Manhattan Bridge and a Revived New York City in Dumbo

The Dumbo (down under the Manhattan Bridge overpass) community in Brooklyn provides an example of a community bounded by major infrastructure (figure 6.6). The area was originally created as a response to Lower Manhattan expansion and Fulton's Steamboat. The grid for the area is very similar to the Dutch grid of Lower

[19] Michael Powell, "A tale of two cities," *The New York times*, May 6, 2007.

Figure 6.6 Map of Brooklyn highlighting Dumbo.
Google Maps (edits by author), 2009.

Manhattan. It follows the shape of the river, allowing a better connection between the streets and water. The area was primarily industrial, producing goods for the New York area. Factories were established in the period before the Manhattan Bridge because of the proximity to the water without the overcrowded nature that plagued the Lower East Side.

During the past twenty years Dumbo has gone through a dramatic shift. The new connotation started from an informal takeover of abandoned industrial buildings for residential uses (figure 6.7). The construction of the Manhattan Bridge protected Dumbo from residential development, creating these open spaces for artists. Brooklyn, although part of the Greater New York, was not the goal of commuters from the outer boroughs and Long Island during the 1920's as much as Manhattan was. Commuters from Brooklyn crossed the Manhattan Bridge to get to their jobs in Lower Manhattan. Once

Figure 6.7 Industrial buildings turned into residential.
Photograph by author, 2009.

they landed on the Brooklyn side from Manhattan, they would continue on the Flatbush Avenue Extension to their ultimate destination. Entering Dumbo would be awkward because they would have to make a complete u-turn upon exiting the bridge. While the tremendous flow of traffic into Manhattan could have been disastrous because Dumbo is in the path on the way to Manhattan, it was ultimately saved by the bridge ramp that extends deep into Brooklyn. The area remained primarily industrial while the rest of Brooklyn was being set up as a suburb for Manhattan.

The Brooklyn-Queens Expressway did the same thing for Dumbo during the 1960's and 70's that the Manhattan Bridge did for it in the 1920's and 30's. Moses was illustrating an idea of the exploding city and the growth of a suburban culture with his elaborate plan of expressways and parkways. The expressways went around Manhattan,

Figure 6.8 Map of Lower Manhattan highlighting SoHo.
Google Maps (edits by author), 2009.

avoiding the congestion that Moses believed undesirable. By avoiding Manhattan, he also avoided Dumbo. The BQE does not enter Dumbo, but creates a wall around it. To get from the BQE to Manhattan, a commuter takes the Manhattan Bridge, which also avoids the neighborhood. While the BQE gutted a substantial amount of Brooklyn, it left Dumbo perfectly in tact with its industrial buildings.

The artists used the buildings built along the piers as inexpensive places to live, much like artists did in SoHo starting in the early 1960's (figure 6.8). SoHo also remained primarily industrial during the 1920's. It was destined to be destroyed by Moses' plan for the LME. Therefore, industries either changed location to the larger blocks of midtown or the projected larger blocks of Lower Manhattan in the Downtown-Lower Manhattan Association's plan.[20] Artists started to illegally move into these industrial areas not zoned for residential use, but a 1964 law permitted artists to occupy two floors of an abandoned factory (figure 6.9).[21] The area changed in 1973 when it was designated a historic district, known as the SoHo Cast-Iron district after the cast-iron industrial buildings.[22] The buildings that were once viewed as a burden on the efficiency and economy of Manhattan were labeled as beautiful pieces of the history of New York City.

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[20] James R. Hudson, *The Unanticipated City* (Amherst: University of Massachusettes Press, 1987), 72.
[21] Germano Celant, "SoHo art lofts," *Lotus International*, no. 66 (1990), 8.
[22] Herbert Muschamp, "Behind Cast-Iron Facades, Dreams are Wrought," *The New York Times*, May 9, 1997.

Figure 6.9 Artist Roy Lichtenstein in his SoHo loft.
Celant, "SoHo art lofts," 1990.

The same change in building use happened in Dumbo about twenty years later. The rediscovery of the area for its affordable and mostly illegal housing in abandoned warehouses lead to the appreciation of the beauty of the old factories. The community retained its original street grid. It was never redeveloped because of the barrier provided by infrastructural elements. Dumbo's cobblestone streets and small blocks illustrate the "medieval city" that Jacobs championed. Rather than trying to destroy the area for increased automobile flow like Moses would have done, the artists created studio spaces. The narrow roads stop cars from speeding past buildings. The slower pace transfers onto the sidewalk, where Jacobs' ballet is in full effect. Small shops have moved into the bottom of the warehouses with residents living on upper floors (figure 6.10). The seamless integration of commercial and residential allow for a vibrant atmosphere on the sidewalk.

Figure 6.10 Boutique clothing shop in Dumbo warehouse.
Photograph by author, 2009.

Figure 6.11 View of Dumbo with Manhattan Bridge.
Photograph by author, 2009.

Since the 1970's, SoHo has lost its artistic charm to an onslaught of consumerism. While the street is very important to SoHo, it is used more as an open-air mall than a source to create a tight-knit community. SoHo is in the middle of Manhattan and along the path from the Manhattan Bridge to the Holland Tunnel. Traffic through the area does not always intend to go there. The constant flow allows for more change, for more people to become aware of the area. In contrast, the Manhattan Bridge brings people over Dumbo, not directly to it. Once over the bridge, through traffic uses the BQE to get to their specific destination, creating a negative space in Dumbo. Less car traffic to clog the narrow streets creates more pedestrian traffic, thus a sidewalk city. Dumbo, however, is not just for the pedestrian. Dumbo is part of the decentralized city that can still incorporate the automobile because the area is not used as a throughway (figure 6.11). The cars that come to Dumbo come for a purpose, thus avoiding the drive-though nature of SoHo. The subway system services the community, connecting it the rest of Brooklyn and by one stop to Manhattan. This makes Dumbo part of the centralized city with Manhattan as the center and the decentralized city with a focus on suburbia. The emphasis on pedestrian traffic with the integration of public transportation and automobiles creates a small vibrant community that has been flourishing for the past ten years while retaining its unique, artistic quality.

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