“Heartbreak Highway”

The Cross-Bronx Expressway

Steve Alpert

1.011 Final Project
Spring 2003

The Cross-Bronx Expressway, one of the last freeways to be completed in New York City, represents the end of an era. Socially, it marked the last time a neighborhood would be torn apart while ignoring the voices of the people living there. Politically, it marked the end of Robert Moses' career as head of the Triborough Bridge and Tunnel Authority (TBTA). No planned freeway has been built in New York City since the completion of the Cross-Bronx (the Bruckner Expressway was already under construction), and the Cross-Bronx cannot reasonably be widened or rerouted. In short, the twenty years of heavy expressway construction following World War II came to a head with one of the most notorious highways still standing.

After looking at a history of freeways in New York City and the development of the concept of a freeway crossing the heavily developed Bronx borough, this paper will go into the justification for the project, analyzing risks, potential costs, and potential benefits. Then, as the project unfolds, this paper will examine the social, political, and other construction problems Moses faced while still in charge of the TBTA, analyzing the costs they introduced. After sections on the Highbridge and Bruckner Interchanges, which "cap" the freeway on the west and east ends respectively, this paper concludes with a look at the effects of the Cross-Bronx, both local and national, and the state of the freeway today.

History

New York, in particular the New York City area, had been a pioneer in highway construction since the advent of the automobile. In 1908, William K. Vanderbilt, a racing fanatic who had already led races along local Long Island Streets, opened the Long Island Motor Parkway (LIMP) as a racecourse that could be used as a public highway, for a fee. Minus the tolls, which disappeared with the Parkway in April 1938, the concept of the New York parkway was introduced – a high-speed, limited-access roadway with few if any grade crossings and

prohibited to commercial traffic. While this first freeway was a private venture, once Robert Moses became Parks Commissioner of both the New York State and Long Island commissions in 1924, parkways became state ventures and thus were untolled.

The debut of the modern parkway system came just one year after that appointment, with the opening of the Bronx River Parkway in 1925. Although there were some grade intersections, a few of which are still present, it remained true to the original LIMP in having completely controlled access – in other words, there were few public and no private access points along the road. The Northern State Parkway, which caused the demise of the antiquated LIMP, opened in 1938, at which point the parkway system was quite developed. By 1945, when the expressway system was first proposed for all vehicles (because no commercial vehicles were allowed on any parkway), the parkways had formed an extensive network.

After Robert Moses became head of the New York City Parks Commission and the TBTA in 1933, he spent many years building necessary tunnel and bridge links; very few have since been constructed. Thus when the Regional Plan Association proposed to add expressways to the parkway network in December 1936, nothing more than proposals, such as the dashed lines on the above map, came to be. After World War II, though, Moses was ready to build, and in late 1945 he proposed over 100 miles of new expressway construction, more than had yet been

proposed anywhere else in the country. Many of these roads could be found on the earlier RPA proposal, yet Moses today receives the credit for the original concept.

Just before the United States joined World War II, the New York City Planning Department reviewed the RPA proposal and made recommendations as to which expressways should be constructed. Among these was the Bronx Crosstown Highway, projected to cross difficult terrain and "heavily built-up areas." Despite the significant topological challenge and the costs of displacing people and acquiring land, the 1941 estimate of the Cross-Bronx Expressway cost was just $17 million, or just under $28 million in 1950 dollars.

The planned expressway would connect with seven other freeways, cross 113 streets and six subway lines (five elevated), and three rail lines [source: nycroads.com]. It would have to be carved out rock for much of the route, and then get across lowlands in the middle. As it was originally planned, it would tie into the Washington Bridge, a four-lane crossing from the Bronx to Manhattan built in 1888, and the Bruckner Circle, at that time the meeting point for Bruckner Boulevard and the Hutchinson River Parkway. While the improvement of the circle would wait for the much-delayed Bruckner Expressway through southern Bronx, the Washington Bridge was upgraded almost immediately. Bids were let in 1949 to remove trolley tracks, narrow sidewalks, and widen the bridge to allow six lanes of travel with a median. Although the bridge would still have a traffic light on the Bronx side, the Interstate system had not yet been proposed, so there was no perceived need to bypass it.

Other preliminary work included tying the proposed expressway to the George Washington Bridge on the far side of Manhattan, at the time still only a single span (it would be double-decked in 1962 for the opening of the Cross-Bronx). The Port Authority of New York and New Jersey at the time sat on top of a two-lane tunnel that linked the bridge to the east side

of Manhattan; they let almost $7 million of contracts to build a new, parallel tunnel concurrently with Washington Bridge construction. In addition, the Highbridge interchange linking the Washington Bridge and the Port Authority tunnel underwent initial improvements from 1949 to 1952.

Risks and Uncertainties

The first part of this section concerns the risks and uncertainties that were faced heading into the project; the second part deals with sensitivity analyses for selected scenarios (i.e. how sensitive overall project cost is if a certain scenario plays out).

A big uncertainty heading into any project is time. The Cross-Bronx Expressway was proposed at the same time as the rest of the New York City area expressway network, and was expected to be completed in at most ten years. While some of the other parts of the highway system were not built until the 1960's, such as the Verrazano Narrows Bridge and Bruckner Expressway, the Cross-Bronx had by far the longest duration of construction of any of the projects. One of the major factors that delayed the expressway was overcoming community opposition and relocation people; materials availability was another problem. Nevertheless, the projected completion time in 1954 was four years (the actual time was twice that).

Another uncertainty is the effect of community opposition. Even in the 1941 proposal from the city's planning department, difficulties due to existing development were foreseen. However, the social and political ramifications of the contested routing, to be discussed later, were unprecedented for any project, and set a tone of opposition for future projects. This uncertainty leads to the risk that after building some sections of the highway, other sections will be proposed but never built. While the Cross-Bronx ultimately defeated its opponents, highways such as I-95 through Washington, D.C. and Boston lost after being partially constructed; their

remnants are I-395 and US 1, respectively. Considering that the Cross-Bronx truly only serves the purpose of conducting traffic through, not into, the Bronx, had the middle section been blocked the entire expressway would have been useless (whereas I-395 at least serves downtown Washington).

A third uncertainty is construction problems; civil engineering projects tend to account for these by reserving a certain percentage of total expected cost for mishaps, shortages, and other concerns that cannot be foreseen. Materials availability led to the delay of many projects, such as the Unionport Bridge over the Westchester Creek, and poor materials selection and treatment also caused problems. The issue of materials will be discussed in more depth, but it was not the only construction problem. There were also some worker fatalities, caused by an incomplete understanding of the geology of the Bronx and some inexperience with the technology being used; again, these will be discussed later. These setbacks contributed to delays and increased spending.

The first spreadsheet [next page] gives the results of a few different scenarios. Had the middle section of the expressway been built without community opposition, it and the rest of the expressway would have been completed sooner, meaning lower cost to New York City and greater benefit by 1964. Had newer technology been introduced, and used effectively to reduce time and decrease costs, it would have had an even greater effect. Within this category, machinery that reduces the amount of laborers needed and more efficient paving machinery would probably have the greatest effect, since those two categories tended to contribute the most to cost. Technology that would enable the use of less costly materials would also have been very welcome. Finally, if the interest rate or the inflation rate increased, benefits would have decreased. An increase in the interest rate is discussed in the sensitivity analysis that will shortly

be conducted. The increase in inflation rate has an uncertain effect; because the dollar is worth less each year, costs and benefits would both rise, but they should be about the same in 1950 dollars. The big issue here is whether higher bid prices either scare away contractors or scare away the Federal government; if either of those happened, the project would die.

Scenario	Sum of costs over life (1950 dollars)	Benefits thru 1964 (approximate; 1950 dollars)	Net benefit (1950 dollars)	% change from base
Base	$77.45 million	$101.85 million	$24.40 million	0.00%
No delay on middle portion	$69.69 million	$108.08 million	$38.39 million	57.34%
Interest and discount rates double	$90.55 million	$99.24 million	$8.69 million	-64.39%
Advanced technology	$65.19 million	$113.76 million	$48.57 million	99.06%
Inflation rates increase after 1950	$76.60 million	$97.19 million	$20.59 million	-15.61%
Benefits include improved traffic flow, an increase in travel through the Bronx and along the entire I-95 corridor (which was completed by the Cross-Bronx), and increase in commercial throughput (less delays mean more product shipped and less shipping time, and this can have national ramifications for a place as important as New York City).				

Playing out different scenarios such as those above, the largest uncertainties in this project were the movement of the economy, project duration, and the effectiveness and reliability of technology. To safeguard against some of the most negative effects of the economy, the Cross-Bronx was completed in several distinct sections. While the disadvantage of this was that the community had a chance to kill one part after others had already been constructed, the advantage is that at least some parts were usable, decreasing the amount of wasted money should part not be completed. I-189 in Burlington, Vermont, shows why a project should be divided; although several hundred feet of freeway were fully constructed and paved but not usable, at least a mile of the freeway is open, allowing traffic to access Burlington from points south and east.

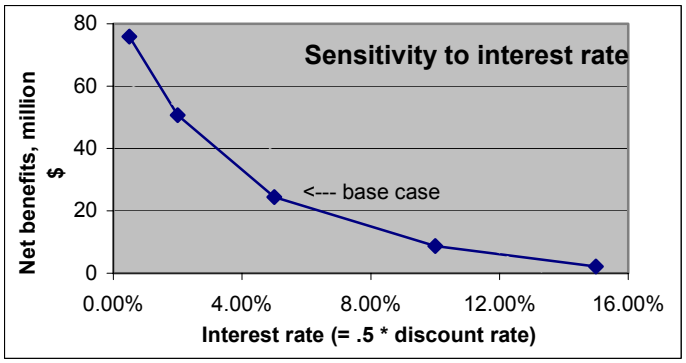
Project duration has already been discussed as an uncertainty; years of delays and costly legal battles to get the middle alignment approved over opposition added $30 million in increased costs, three years of delays, and benefits of a complete freeway that would not yet be realized. As for the technology factor, the freeway was a fairly new concept at the time of the Cross-Bronx Expressway, having been developed in New York City just twenty years before; the first fully directional cloverleaf interchange had been built shortly afterward in 1929. This probably led to the crane collapse in 1962 during Highbridge construction – people did not have enough experience to know what problems could arise and how to effectively prevent them.

The table below shows how cost estimates changed over the life of the project. The initial estimate was far too low, simply given the cost per mile of constructing and paving a highway, and not even taking into account property acquisition or area topography. By 1949, the cost estimate was reasonable given the expected completion time of around 5-6 years. In just one year, though, the estimate was revised upward to account for slow progress, as construction crews blasted through the rock underneath the Bronx. The final estimate shows how cost projections rose significantly due to the new issue of opposition to the middle section. After 1952, there were no significantly revised projections, and the overall cost, minus the separate Highbridge and Bruckner interchanges, matched the 1952 cost.

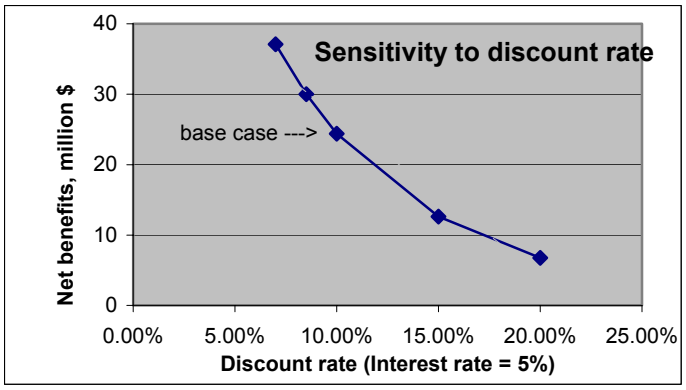
Year	Expected Cost	Cost in 1950 dollars (adjusted for inflation)
1941	$17 million	$27.8 million
1949	$53 million	$53.75 million
1950	$57 million	$57 million
1954	$86 million	$77.9 million

One of the key factors that kept project costs near $86 million in 1952 dollars was the Federal government "pegging" interest rates around 5%. This forestalled inflation and encouraged borrowing, both of which contribute to favorable conditions to starting a project. As can be seen in the chart on the next page, if the city could otherwise invest its money at twice the

interest rate (in other words, its discount rate is twice the interest rate), net benefits quickly dissolve as the interest rate increases. Even for just a small decrease in the interest rate, millions of dollars of added benefit would be realized, simply because the potential value of project costs would decrease if they were invested outside of the project (and thus the net discounted cost as perceived by the city decreases).



However, the discount rate is not necessarily twice the interest rate. This second chart shows that if the city believed it could have a return even just three times the interest rate by otherwise investing its money, the perceived benefits of the project are cut in half. The closer to the interest rate the city's discount rate is, the less benefit the city would see by investing its money in another project or in no project at all. In addition, since future benefits are also reduced by the discount rate when computing the worth to the city, the benefits of the project have more present-day (1950) worth when the discount rate is lower, since they are reduced by less when projecting backward.



Progress and Problems

As the preliminary work on the Highbridge interchange and Washington Bridge was being completed, the first parts of the expressway were already under construction and progressing quite smoothly. By 1950, before those pre-projects had even been completed, a

short section of the Cross-Bronx Expressway jutted out from its then-eastern terminus at the Bruckner Circle into eastern Bronx. In late 1952, construction on both the western and eastern segments had progressed to the point that paving work could be done on 1.72 miles of existing roadway, and .65 more miles of roadway would soon be ready (source: New York Times). In 1953, a railroad bridge was raised, paving was completed, and those first two sections of highway opened in 1954. Although traffic was not much better off than before, still forced to wait for traffic lights and pedestrians on the local roads of central Bronx, it seemed that the project would be complete by 1958, as the middle section could not possibly take more than four years to approve and build.

In fact, despite the problems that were brewing, the eastern half of the middle section, from Longfellow Avenue to Anthony Avenue, had already been approved by a 10-6 vote of the Board of Estimates. That vote had been held up due to public sentiments opposing the project, which had just started to surface. Relocation had begun in 1946, when about $50 thousand of contracts were let to the Tenant Relocation Bureau to buy property, give rent remission to tenants living in that property, and help them move within two months. It was understandable that at some point people would oppose leaving their neighborhood to the hungry jaws of progress, but even in 1951 a $120,140 bid to demolish 1.23 miles of buildings to finish constructing the eastern section of the expressway had not faced any problems.

What had arisen was twofold, a social and political demon that threatened to destroy the remaining parts of Robert Moses' vision for New York, and indeed spelled doom for Moses' career. Bronx Borough President James Lyons initiated the political side of the conflict simply by supporting his constituents. Those in the path of the expressway supported an alternative route, using the cleared land of Crotona Park to reduce the number of families that had to be

moved out of the way. While the actual reduction has been variously estimated from minimal to almost the full number of families that ultimately were moved (1400), the routing clearly has an advantage in that it does not at all impact the neighborhood directly to the north of the park.

However, Moses had his reasons for supporting his version of the project. There is a noticeable "kink" in the route at the eastern section, a feature that today would not be allowed on an Interstate highway, and would probably have had a lower speed limit than the rest of the freeway. In addition, Moses' planned route was already surveyed and studied, a sunk cost that would be for nothing if the new route were chosen. According to Moses, the alternative route would create an unacceptably steep grade along a crossing elevated subway and increased construction costs.

Robert Moses was known for getting his way, and he ultimately got Lyons to agree with him. Moses argued with Lyons that the Federal Highway Administration (FHWA) would not approve the change, and threatened to stop construction if Lyons and the Bronx won the argument. Moses was quoted by the New York Times with the suspicious comment that Lyons "lost some 20 million dollars" by resisting the other expressway through the Bronx, the Bruckner. There was clearly a veiled threat that Moses possessed the power to starve the Bronx

of money if Lyons continued to resist. With this much pressure on him and his borough, Lyons caved in and did not oppose Moses for the remainder of his tenure.

Another suspicious comment from Moses, that he strongly felt the New York State Department of Public Works would not let the $6 million contract for the middle section if it were altered, caused Bronx Borough Council President Rudolph Halley to accuse him of blackmail. Finally, Robert Caro, in his biography of Robert Moses, The Power Broker, suspects that Moses had friends with vested interests in the properties along the proposed route. Moses' political machinations would come back to hurt him, as will later be discussed.

There would not have been political issues, of course, had Bronx citizens not opposed the route. The East Tremont Neighborhood Association was one of the strongest social forces standing in the way, a tenants' association formed after the portent of eviction threatened those along the proposed route. On October 14, 1953, a packed public rally drew the promise from elected officials that Moses' route would not stand, but neither the officials nor the public had the strength to influence the highway giant. The "Heartbreak Highway" thus slowly got underway, and the Cross-Bronx faced no more challenges, only delays.

Unusually difficult construction challenges faced crews, but there were surprisingly few fatalities. The Unionport Bridge exemplified the aforementioned materials shortage. Intended to replace an existing bridge across the Westchester Creek, a $5.287 million contract was let in the middle of 1949 for the work. By 1952, not only had the bridge not been completed, but work had not even started. In addition to this amazing fact, materials still were not available, being sucked up by other expressway projects across the country as well as in New York City, and it would take another two years after materials were secured just to start construction. The main

culprit was a steel shortage, and it affected the entire project, probably even more than the opposition to the middle section.

Materials again became an issue while working on the Alexander Hamilton Bridge (which was to replace the substandard Washington Bridge over the Harlem River). For some reason, a "hurry-up" method of concrete drying was used on the pavement, instead of air-drying over 72 hours. Since concrete requires weeks to gain its final strength, the saving of a day by scooping up excess water and applying blacktop early seems pointless, and in fact it ended up hurting the project. The concrete was determined to be too weak, and thus had to be torn up and reapplied. To make sure it had the proper strength, the bridge was diagonally bored every fourteen feet and the resulting samples were tested. The entire bridge cost $8.8 million, and the cost of this mistake added $7.5 million to that. In terms of percentage, this actually hurt the Hamilton Bridge more than community opposition AND materials shortage hurt the Cross-Bronx Expressway in its entirety.

The terrain of the Bronx, which influenced the construction of elevated versus submerged subway lines, was taken into account from the beginning but still was a major challenge. The varied elevation of the Bronx resulted in part of the Cross-Bronx being built in a rock trench and part being built dozens of feet above the existing roads and buildings. While blasting away rock for the trenches, extreme care was taken to not disturb the surrounding building foundations. Precise measurements and chiseling away rock fragments were necessary to build the highway below the Bronx, preserving

community ties via overpasses as much as possible and minimizing the noise and visual impact.

Robert Moses was a principal proponent of design. His parkways featured extensive landscaping and more greenery than one would find anywhere else in New York City. While land values prevented the Cross-Bronx from enjoying such an atmosphere, many overpasses were constructed to add beauty to the project. Each of the original overpasses differs slightly in its architectural treatment, and even the retaining walls are varied in material and color (the top photograph above shows a brick retaining wall, for example). This, of course, added to construction complexity, and the number of materials used increased costs and delays.

One of the most interesting results of the expressway's route is that it passes under every subway line it encounters. While five of these are elevated, one is not. When the freeway passes below the Grand Concourse, then and now one of the principal surface routes in the Bronx, it also passes below a subway line that is otherwise submerged, something not duplicated by any non-tunneled roadway (the Fort Point Channel Tunnel of I-90 in Boston passes below the Red Line subway, for example). Another subway-related construction problem occurred along the initial eastern section. In order to push the freeway through the Hugh Grant Circle, the East 177th St. station on the elevated IRT Pelham Bay Line had to be raised. The goal that was set forth, and achieved, was to maintain full service along that line while first elevating the station and then pushing the Cross-Bronx underneath.

Finally, as mentioned, fatalities were minimal, but there were two incidents in particular that demonstrate difficulties concerning the project. In 1959, a retaining wall collapsed along the slowly progressing middle section, killing one worker and injuring six others. The cause of this was a rain-weakened hill behind the wall sliding forward and overcoming the concrete; after this incident, the existing retaining walls were strengthened and new ones built more strongly, thus

adding to cost and causing some project delays. Then, as already mentioned, a crane buckled in 1962 while working on the Bronx side of the Highbridge interchange (soon to be discussed), presumably due to either an excessive load being handled or to improper construction of the crane.

Tying It Together: The Highbridge and Bruckner Interchanges

Twelve years after the first section opened and eight years after the eastern and western segments had been completed, the middle section of the Cross-Bronx Expressway opened in 1962. Just one year before, the Cross-Bronx Extension, now I-295, opened to connect the Bruckner Circle to the newly built Throgs Neck Bridge. At this point, the Harlem River Drive had been constructed in Manhattan, connecting the Triborough Bridge and the Harlem River Driveway. Minor work had been done on the Highbridge Interchange to facilitate the movement of traffic between the new parkway, the Cross-Bronx Expressway via the Washington Bridge, and the George Washington Bridge. The Bruckner Circle now served the Hutchinson River Parkway to the north, the extension of that parkway south to the Whitestone Bridge, Bruckner Boulevard, both sides of the Cross-Bronx Expressway, and the I-95 portion of the Bruckner Expressway (opened in 1961), and the I-278 portion of the Bruckner Expressway to the southwest was already under construction.

The Highbridge interchange was the first to undergo major work. The George Washington Bridge had a second deck added in 1962 to provide traffic relief between New York and New Jersey, and this put a major demand on cross-Manhattan traffic. The Port Authority took care of the Trans-Manhattan Expressway, turning the four lanes underneath its bus terminal into the current twelve and coming up with traffic configurations to allow both decks of the bridge to access the same roads. From there, though, the underpowered Highbridge Interchange

and non-freeway Washington Bridge could not hold the traffic volume being inflicted on them from the west. With the Major Deegan Expressway (I-87) nearing completion, the $60 million renovation of the Highbridge began, 18 months behind schedule.

$16.3 million of that sum went to the construction of the Alexander Hamilton Bridge, a sum explained previously by construction problems. Initially intended to serve the opposite direction as the Washington Bridge, the concern over the traffic light at the eastern end of the Washington led to the Hamilton serving both directions of traffic between the George Washington Bridge across the Hudson River and the Cross-Bronx Expressway. The Hamilton Bridge, now I-95, iseight lanes wide, whereas the Washington Bridge could not be widened beyond six.

Most of the money, though, went to the completely new interchange with the Major Deegan Expressway. A complicated, fully-directional tangle of ramps, it had to satisfy a 150- foot disparity between the highways, compared to a normal separation of under 20 feet, while using a minimal area in order to minimize neighborhood impact and right-of-way (land acquisition) costs. The Hamilton Bridge opened in 1963, and the full interchange opened in 1964.

The Bruckner Interchange's construction was far more difficult than that of the Hamilton Bridge. As was the situation with the Pelham Bay Line railroad station, traffic on the existing traffic circle had to be maintained while the new highways were built above. In fact, an initial contract to construct the interchange was denied because it would have demolished one of Bruckner Boulevard's two parallel drawbridges in order to finish the work.

Due to this complexity, the problem arose that only one company bid on the project. Luckily, Slattery Associates both met the price expectations of the city and executed the interchange on time and without interrupting traffic flows. The Bruckner contract was the largest single highway contract ever awarded, at $67.8 million. Another early problem was that labor and materials costs rose significantly the summer before construction began. Finally, the entire interchange was supposed to have been built a long time earlier, but opposition to the Bruckner Expressway that would enter it atop the existing Bruckner Boulevard delayed both that highway and the interchange.

The complexity of the finished product can be easily seen; note that unlike the Cross-Bronx Expressway, which replaced roads through the Bronx, the Bruckner is completely elevated and thus the Bruckner Boulevard continues to use the lower level of the interchange. The boulevard's drawbridge between the three freeway spans, as well as a part of the original circle, remains to this day.

Aftermath, Conclusions

Today the Cross-Bronx Expressway is known not only for ruining neighborhoods, but for being the site of the worst traffic jams outside of California. The reason for the delays that happen at any time of day or night is that the corridor carries over 175,000 vehicles AADT (Average Annual Daily Traffic, measured as the number of cars in an average day that pass a given point) between the Highbridge and Bruckner Interchanges. Assuming a space of two seconds between vehicles, the highest number that could pass a given point per lane per day is 43,200. Thus for a six-lane highway, the maximum number of cars it can safely carry is 259,200 – this is operating at full capacity 24 hours a day.

The Cross-Bronx, which, including relatively light overnight traffic, is operating at 68% capacity, understandably is rated F in the level of service it provides. There is no way to widen the highway without incurring enormous costs of relocation, property acquisition, and further blasting and demolition, as well as a complete replacement of the viaduct across the low area of the Bronx. The only alternate route utilizes the even more congested Bruckner Expressway (carrying 250,000 vehicles, or 96.5% of capacity).

The ramifications of the Cross-Bronx Expressway start with Robert Moses. Due to his political and social fighting, many people came to despise him rather than revere him, despite his efforts to preserve parks, build playgrounds, and convert tenements to modernized public housing. In 1959, pressured to leave his position, Moses resigned as head of the Triborough Bridge and Tunnel Authority and as New York City Parks Commissioner, and became president of the World's Fair – which, incidentally, was constructed between three of Moses' projects, the Grand Central Parkway, Van Wyck Expressway, and Long Island Expressway. In 1968, New York State fired Robert Moses from the remaining jobs he held there, and he died in 1981.

Moses' remaining projects shared his fate of rejection and eventual death. As can be seen in the appendix, several useful expressways, such as the Mid-Manhattan, Bushwick, and Cross-Brooklyn Expressways, were proposed, and some, such as the extension of the Nassau Expressway and the Lower Manhattan Expressway, had progressed beyond this to the design and planning stage. Once Moses resigned his positions, though, these all were rejected, and eventually were taken off of the city plans. There is just one remnant of the unbuilt dozens of freeway miles, a lone I-78 shield in the Bronx, far away from the current end of that Interstate in Manhattan.

Other freeways in other cities proceeded to succumb to the opposition of their respective communities. The Park Freeway West in Milwaukee is left without a Park Freeway East, which would have cut off the waterfront from the rest of the city. Boston is left without the Inner Loop, and nearby the Northeast Freeway ends prematurely, both victims of community opposition in their paths. Even some freeways already built and opened to traffic were taken down; San Francisco's elevated Embarcadero was demolished in 1989 to restore the waterfront, and Boston's Central Artery is being replaced with a freeway tunnel to link both halves of the historic downtown.

Given the widespread, intensive construction of freeways in the period following World War II, it was inevitable that one of the new projects would create the first significant community movement against a proposed highway. The nascent freeway network needed to reach some minimum density, and a highway cutting across the heart of the Bronx could only

have been avoided with highways running through nearby neighborhoods. New York City was too dense for Robert Moses to avoid displacing people, but the impact of the Cross-Bronx could and should have been lessened via the Crotona Park routing – 30% of all displaced families (5000 total) lived in the path of the middle section of the expressway.

The highway, despite its current capacity inadequacy, is a critical link in the I-95 transportation corridor. Because neither tunnel across the Hudson River ends in a freeway, and I-278 to the south does not allow truck traffic along one section, most commercial through traffic follows the Cross-Bronx Expressway. In hindsight, it would have been good to acquire a wider right-of-way; although property costs were high, if traffic counts had been estimated for fifty years into the future (i.e. the present day), the benefits in decreased congestion and increased throughput realized by extra lanes would likely have compensated those costs. Community opposition would prevent a current widening of the highway, or other solution such as an elevated double-decked freeway.

Construction problems, social and political conflicts, massive delays, and material shortages all conspired against the completion of one of the most ambitious highway projects ever achieved. The Cross-Bronx today stands as a testament to Robert Moses, and this is in large part thanks to the 1957 National System of Defense and Interstate Highways passed by Dwight Eisenhower. Had the expressway not been considered as part of the Interstate system, funds would not have been available to complete it. Had the opposition held, or if Moses were forced from his position just a few years earlier than he was, there would be no freeway through central Bronx. In the end, though, New York City's longest-lasting project is well worth the pains it underwent.

Appendix A

Spreadsheet showing total cost per year for various categories, as well as overall project cost in 1950 dollars (bottom right hand cell). 5% interest rate can be assumed because government prevented interest rate from changing significantly throughout the 1950's. Also assumed is 10% discount rate, or that New York City could expect a 10% return if it invested the money elsewhere that went into this project – this affects the cumulative cost projection, since money is devalued by the city at the city's discount rate. See the Risks and Uncertainties section for an analysis of discount and interest rates.

	Costs (million $)							million 1950 $
YEAR	Right of way (ROW) acquisition, planning	Materials	Construction	Pavement	Demolition/ relocation	Labor/ testing	Total cost for year	Cumulative cost (adjusted for inflation)
1945	0.48	0	0	0	0	0	0.480	0.627
1946	0.48	0	0	0	0.04	0	0.520	1.235
1947	0.48	0	0	0	0	0	0.480	1.715
1948	0.48	2.4	0.211	0	0	0.2	3.291	4.094
1949	0.24	6.45	9.451	0.4	0	2.625	19.166	17.280
1950	0	0.8	6.013	3.717	0	1.665	12.196	25.673
1951	0.16	0	0	2.808	0.120	0.26	3.348	28.698
1952	5	0	0	0.64	1.947	0.08	7.667	33.581
1953	0.15	0	0.444	1.92	0.243	0.41	3.167	36.675
1954	1.1	1	2.105	2.16	0.1	0.75	7.215	41.201
1955	0	0	0.550	2.38	0.76	0.35	4.040	44.655
1956	0.72	0	0	0	0	0	0.720	47.107
1957	0.72	0	0	0	0	0	0.720	49.655
1958	0.84	0	0	0	0	0	0.840	52.337
1959	0	4.75	4.524	3	0	0.87	13.144	57.796
1960	0	0.25	2.898	2.425	0	0.54	6.113	61.847
1961	0	0.15	0.698	3.375	0	0.36	4.583	65.735
1962	0	0	0.698	0	0	0.36	1.058	69.186
1963	0	0.1	0.582	0.375	0	0.36	1.417	72.839
1964	2.5	0.9	0	4.125	0	0.18	7.705	**77.449**

Appendix D

Highway, Photograph, and Historical Sources

New York Area Roads, Crossings, and Exits. Steve Anderson. http://www.nycroads.com.

The New York Times historical archives.

Map and Overhead Photograph Source

Mapquest. http://www.mapquest.com/maps.

Robert Moses Biographical Sources

Robert Moses. The Isamu Noguchi Garden Museum. http://www.noguchi.org/moses.html.

The Godfather of Sprawl. Atlantic Monthly. http://www.theatlantic.com/unbound/flashbks/moses.htm.