

A Better Billion

Expanding Transit & Housing for a More Affordable New York



A Better Billion

Credits and Contributors:

Franklin Tang: Author, Photographer

Andrew Lynch: Author, Graphic Designer

Elif Ensari: Author, developed Housing Creation Component

Alon Levy: Author, developed Cost Methodology Component

Nolan Hicks: Project Editor, Contributing author

Eric Goldwyn: Executive Editor, Author

Steven Zheng: Photographer

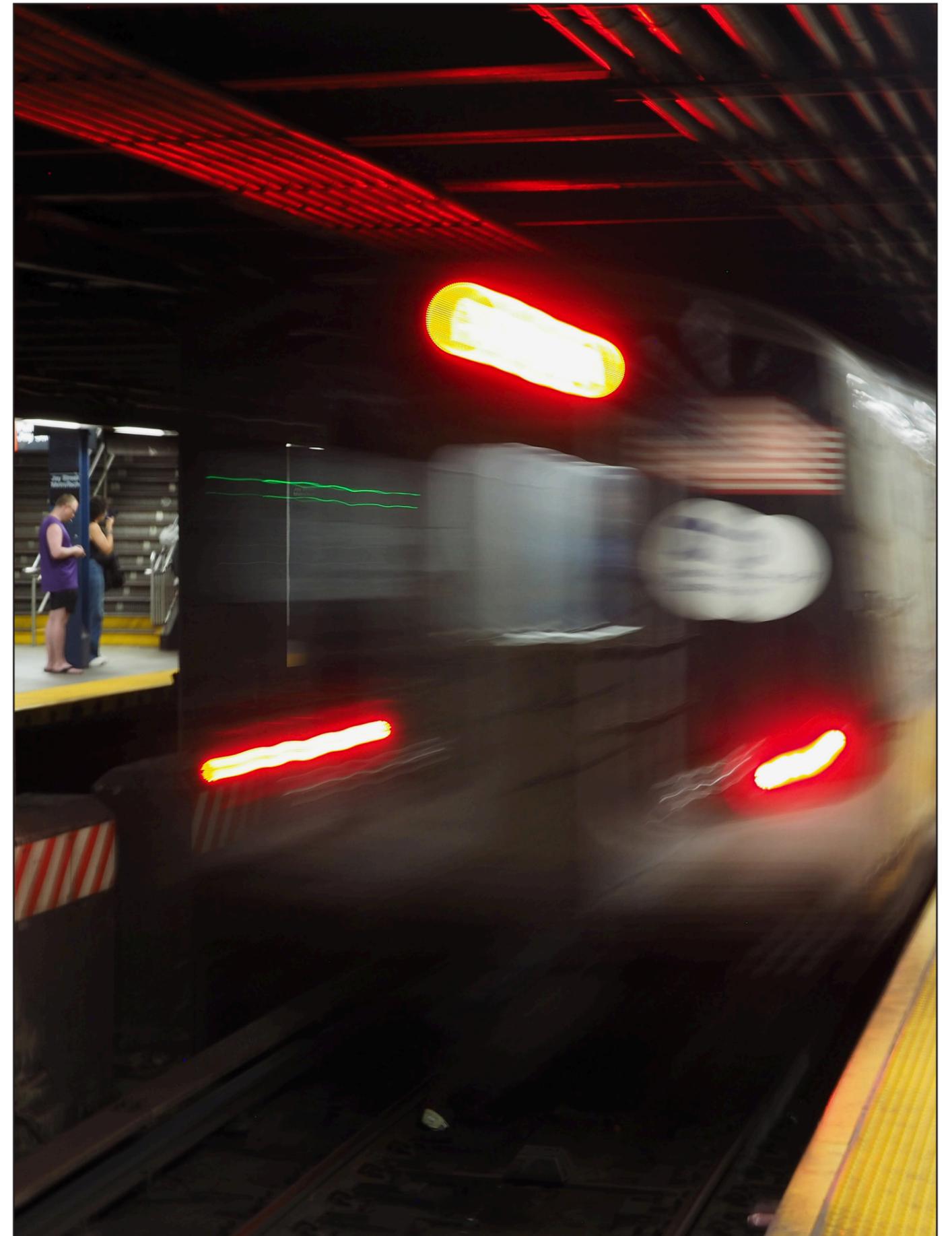
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An A line train (right) pulls into the Jay Street-Metrotech station in downtown Brooklyn

Credit: Nolan Hicks





Introduction

Mayor Zohran Mamdani ran an electric campaign for mayor promising to make New York City more affordable. During the campaign, he repeatedly called for the construction of 200,000 new units of affordable housing over the next 10 years and fast and free buses as a way to combat New York’s affordability crisis. These are distinct policy goals that stand on their own. What is missing, however, is a plan to tie the mayor’s affordability agenda together to make New York more affordable.

Integrated transportation and housing solutions are the key to attacking the affordability crisis. Throughout the city’s history, rapid transit, both elevated trains and then the subway catalyzed apartment building booms that now line Central Park West, Eastern Parkway in Brooklyn, and the Grand Concourse in the Bronx. Even today, housing construction is most active in neighborhoods along the subway. New skylines have blossomed in Long Island City, Downtown Brooklyn, and the South Bronx.

A Better Billion is an ambitious plan to realize the mayor’s promise of a more affordable New York through sustained investment in 41 miles of subway extensions across 12 projects over a 40-year period. We estimate that delivering new subway service to these neighborhoods has the potential to add 167,064 units of new housing around the 64 new stations in our program with no additional upzoning required.

In other words, A Better Billion is the expansive and audacious plan necessary to usher in a more affordable New York City. While our housing calculations assume no new zoning changes, we strongly encourage the new administration to seize on the vision and advocate for even more housing. A Better Billion combines Mayor Mamdani’s transit ambitions with a generational vision worthy of New York City.

Transit is Part of the Solution

Transit makes New York more affordable rather than contributing to the affordability crisis. New York City residents, on average, spend a smaller percentage of their income on transportation than the average American. The basic math is simple: the Bureau of Transportation Statistics reports that the average annual cost of owning and operating an automobile in 2024 was \$12,296. Based on OMNY’s new \$35 weekly fare cap, it will be impossible to spend more than \$1,820 over a 52-week period on bus and subway trips.

In addition to transit’s relative affordability, ubiquitous subway service will connect New Yorkers to more schools, apartments, jobs, parks, and Mets games while also centralizing development opportunities near stations. The subway’s power to nurture density rather than breakdown because of it explains the spaghetti bowl of subway lines that feed the city’s tallest buildings in Lower Manhattan,

Midtown Manhattan, Downtown Brooklyn, and Long Island City.

Even though A Better Billion focuses on subway expansion, we equally support policy changes that speed up New York City’s buses and ease connections between buses and subways. We also welcome additional measures to make the fare more affordable, be it expanding who qualifies for the Fair Fares program or greater discounts for daily, weekly, and monthly passes. When it comes to free buses, however, we need to ask the question: at what cost?

Free buses, like free lunches, aren’t free. The MTA pays to operate buses whether or not fares are collected. When we examined the total fares collected by the MTA on New York City Transit and MTA Bus Company buses, we found that in 2019, the year prior to Covid, bus riders paid \$1.38 billion (in 2025 dollars). It’s reasonable to revise down that number based on current ridership, but the \$600-\$700 million estimate that has been floated by others is much too low, especially if there will be increased ridership that necessitates additional service if fares become free. For the sake of ease, we split the difference between the two figures and assume it will cost an extra billion dollars per year to operate free buses citywide.

Free buses will cost the MTA an extra \$1 billion a year in operating subsidy.

A Better Billion

If we had an extra billion dollars per year to spend on transit over the next 40 years, we would focus on the higher-capacity and faster subway. In constructing this plan, we assume that \$150 million per year, 15%, will be dedicated to ADA station upgrades. The remaining \$850 million per year will be used, in combination with federal support via the Federal Transit Administration’s New Starts program, to build the \$48 billion (in 2025 dollars) A Better Billion plan. Typically, the MTA leverages local money to get as much as a 60% federal match when it builds a new capital project, like Phases 1 and 2 of the Second Avenue Subway. Since New York has the highest absolute costs in the country, we project a more conservative 30% match, or \$360 million per year. All totaled, over 40-years, we expect the local contribution, \$34 billion, to attract \$14 billion in federal funding.

The subway enables 8.5 million people and 5 million jobs to concentrate in the city’s 300 square miles, with 44% of those jobs in the 9 square miles of Manhattan south of 60th Street where subway density is greatest. The Dallas-Fort Worth metroplex also boasts 8.3 million people and more than 4 million jobs sprawled across 8,991 square miles. That means that Dallas houses as many people as New York City but requires 30 times more land to do it while providing fewer jobs. The subway’s ability to move people into and out the busiest neighborhoods without a car allows New York to capture the

A Better Billion builds:

41

**miles of new
subway**

64

**new, modern
stations**

167,000

**new apartments
and houses**

benefits of a dense, vibrant city without squandering valuable land to surface parking or succumbing to the pollution, congestion, crashes, and noise cars create.

A new, more affordable New York requires a subway-expansion vision that matches the mayor’s soaring rhetoric. Over a 40-year period, we propose 12 distinct projects that would extend the subway by 41 miles and 64 new stations across Manhattan, Brooklyn, Queens, and the Bronx.

A Better Billion is organized in four 10-year phases and is proposed in addition to the MTA’s five-year capital plans. The City of New York will only shape its transit future by taking a more active role in funding and supporting the MTA. We selected projects based on the need for subway infrastructure (i.e. addressing existing subway deserts), historic and current project proposals, existing transit ridership, and housing development potential. We identified four flagship projects, one for each phase. These four projects will be the most expensive investments, represent the largest service expansions, and have the potential to be the most transformative projects in each decade.

Below we detail each A Better Billion project, provide cost estimates based on real projects, identify significant civil works, and calculate the potential for new housing construction based on the City of Yes for Housing Opportunity zoning amendment. For a more comprehensive discussion of our assumptions and methodology, please refer to the appendices.

Phase 1: 2026-2035

- Project 1:** Utica Avenue Line
- Project 2:** Second Avenue Line Phase 2 Western Extension
- Project 3:** Rockaway Branch Reactivation, “QueensLink”

Phase 2: 2036-2045

- Project 4:** Long Island Expressway Line
- Project 5:** 6 Extension to Co-Op City
- Project 6:** F Extension to Queens Village-Springfield Blvd

Phase 3: 2046-2055

- Project 7:** Second Avenue Line Phases 3 & 4
- Project 8:** 7 Extension to Northern Blvd
- Project 9:** E extension to Springfield Blvd

Phase 4: 2056-2065

- Project 10:** Cross Bronx Express Line
- Project 11:** N/W Extension to LGA Airport
- Project 12:** Interborough Express Extension to Astoria

A Better Billion: Expanding Transit & Housing for a More Affordable New York



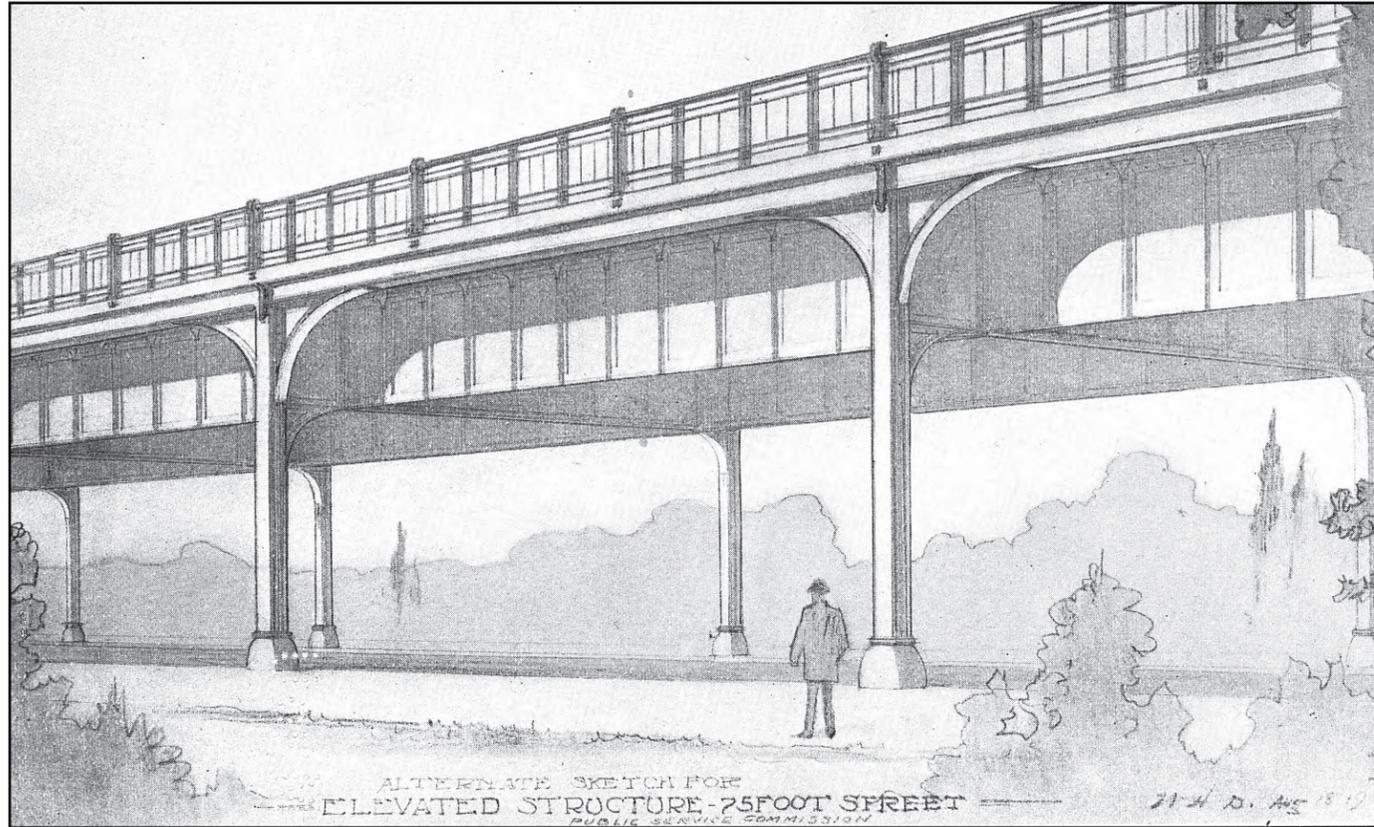
Line by line

The First Decade

2026-2035



Utica Avenue

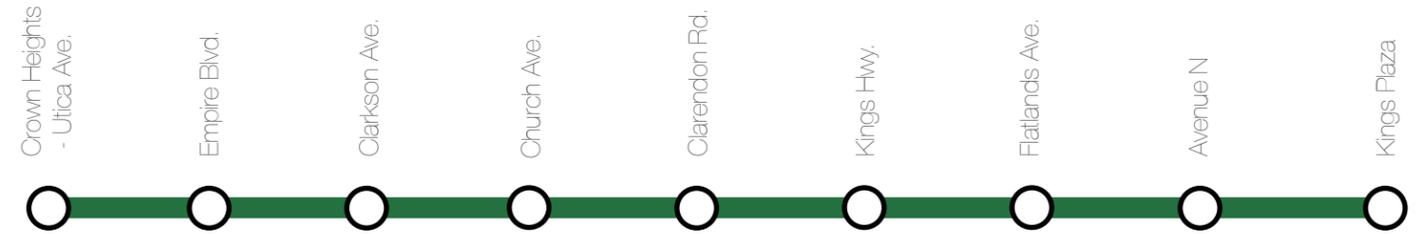


The Utica Avenue subway was first proposed in 1917 and has perennially appeared on plans ever since. The case today is as strong as it was 100 years ago: Southeastern Brooklyn is one of the densest subway deserts in the city; the buses there, namely the B46 on Utica itself, the B44 on Nostrand a mile west, and the B41 on Flatbush in between, are among the 15 busiest in the city. In 2019, those three bus routes totaled 90,000 weekday riders. Not only is the existing need clear,

An illustration published by the Public Service Commission of its elevated line designs from the 1910s.

southeastern Brooklyn has a large number of parking lots and auto dealerships that could easily be converted to housing with improved access to the city.

A Better Billion embraces elements of historical plans for Utica, but includes a crucial change to help reduce costs: elevated rather than underground construction south of Kings Highway, saving an estimated \$1.8 billion. The



planned transfer to the IBX will give East Flatbush residents fast, reliable transit heading both north-south and east-west for the first time in history.

Location: Brooklyn

Alignment: Utica Avenue - Flatbush Avenue to Kings Plaza

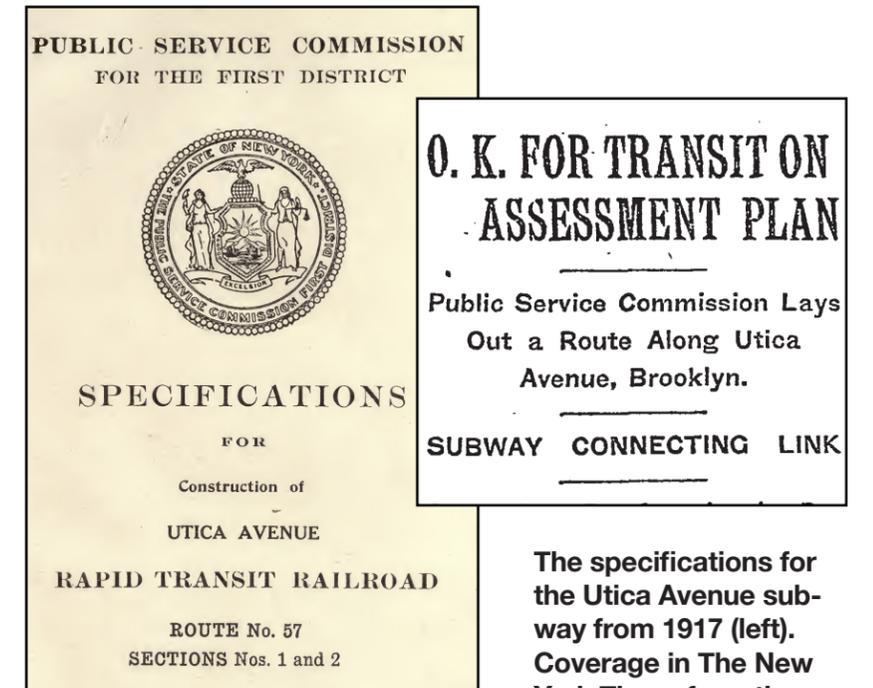
New Stations (8): Empire Boulevard, Clarkson Avenue, Church Avenue, Clarendon Road, Utica Avenue-Kings Highway, Flatlands Avenue, Avenue N, Kings Plaza-Avenue U

Significant Civil Works: New tunnel from Eastern Parkway to Kings Highway that will connect to a new elevated segment from Kings Highway to Kings Plaza.

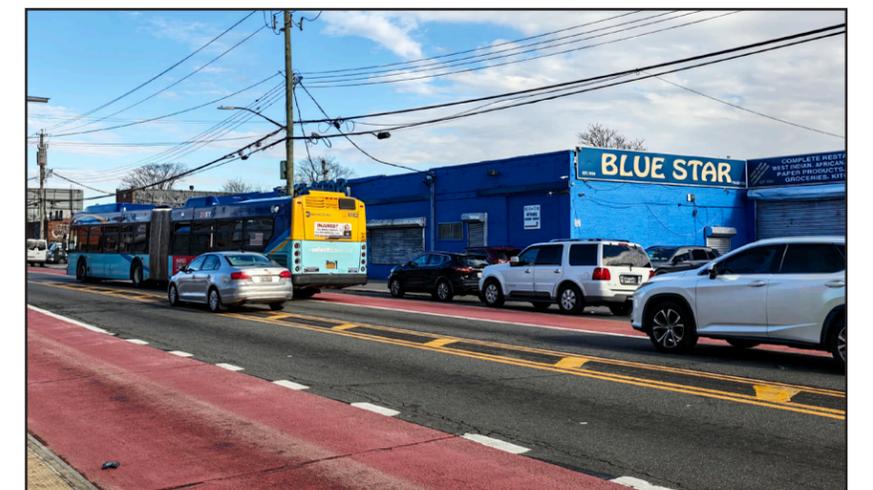
New Transfers: Interborough Express X line

New Housing: 17,314 potential units of housing, or 10.36% of the program's total estimated housing stock. Amongst the 17,314 units created, 1,458 units will be affordable (8.42%).

Cost Estimate: \$5.9 billion in 2025 dollars.



The specifications for the Utica Avenue subway from 1917 (left). Coverage in The New York Times from the era (above).



The Utica Avenue of modern day is one of the busiest bus corridors in the city and is surrounded by low-slung buildings.

SAS Crosstown



Harlem's iconic crosstown thoroughfare, 125th Street, has long been one of the most heavily used bus corridors in the city and one of the most congested streets overall. The Bx15, M60, M100, and M101 serve 8,900 riders per mile every weekday, right between the top two routes in the city (M86: 9,300; M14: 8,500). The MTA has rightly already begun some of the planning work to make this line a reality with a tentative proposal to extend the Second Avenue Subway westward from its soon-

A rendering of the stop at 125th Street-Lexington Avenue, which is set to become the end of the line with Phase 2 of the Second Avenue Subway.

Source: Metropolitan Transportation Authority

to-be terminus at 125th Street and Lexington Ave. This Phase 2-West would be in addition to the four phases of the line, which have been long-planned Upper East Side (Phase 1), then East Harlem (Phase 2), then East Midtown (Phase 3), then Lower Manhattan (Phase 4).

Despite heavy bus ridership, the buses on the corridor are slower than walking, so a fast, congestion-free subway would produce immediate benefits and stimulate additional ridership. Columbia University is expanding its campus



to and beyond 125th; Columbia is already the biggest job center Uptown, followed by Mount Sinai and Weill-Cornell on the Upper East Side. Finally, the new transfer opportunities would provide a direct east-west connection between the existing 125th stations for the 2, 3, and A/B/C/D lines.

Lastly, the tunnel boring machines (TBM) used to drill Second Avenue Subway Phase 2 will be staged for partial digging under 125th in 2026 and 2027 for the extension of the line to Lexington Avenue, and to dig the tail tracks, which will reach all the way to Lenox. The incremental cost of extending the tunnel bores to Broadway is low. If the MTA commits now, it can take advantage of the existing TBMs and avoid the high cost of digging an additional TBM launch box years later.

Alignment: 125 St and Lexington Avenue to 125 St and Broadway

New Stations (3): 125 St-Malcolm X Boulevard, 125 Street-St. Nicholas Avenue, 125 Street-Broadway

Significant Civil Works: Tunneling from Malcolm X Boulevard to 125th Street and Broadway

New Transfers: 1 line, 2/3 lines, and A/B/C/D lines

The M125 (below) is one of several bus lines that traverse the crucial 125th Street crosstown corridor in Harlem, which is one of the most heavily used in the city.



Photo: GojiMet86 via Flickr

New Housing: 9,332 market rate units + 5,675 affordable units, or 15,007 total housing units created.

Cost Estimate: \$3.4 billion in 2025 dollars. For this estimate, we assume that the three new stations will be mined and that the existing Phase 2 TBMs will continue west to 125 St and Broadway.

QueensLink



Subway construction in Queens has significantly lagged population growth. Since 1940, when subway expansion slowed, Queens' population has grown by over a million people while the Bronx's population has remained flat and those of Brooklyn and Manhattan have fallen. Queens features prominently in A Better Billion to reflect this reality.

The Queens Boulevard Subway has long struggled with crowding on its express lines, infrequent and insufficient local service, and larger

An abandoned and elevated L.I.R.R. track in Queens offers the MTA a chance to dramatically improve the overcrowded Queens Boulevard Line.

Credit: QueensLink

reliability issues caused by the various services crisscrossing in front of one another as they make their way to Manhattan. The MTA has made improving this line—one of just two Queens trunks—a planning priority: it was one of the first to receive computerized signaling, CBTC, and the agency recently swapped the tunnels used by the F and M lines to reach Manhattan to unclog a choke point in western Queens. A Better Billion takes a page from the Interborough Express program to address one of the biggest capacity constraints on the line: putting



Credit: QueensLink

Putting the abandoned track back to work would also restore rail service to several eastern Queens neighborhoods.

the Long Island Rail Road's old Rockaway Branch tracks back to work to bypass the ancient and poorly designed terminal at 71st-Continental Avenue.

As envisioned, this innovative project would connect the local tracks of the Queens Boulevard Line to the disused Rockaway Branch via a new tunnel under Rego Park. This would unlock major benefits for Central and Southeastern Queens:

- A one-seat ride from the western Rockaways to Long Island City and Manhattan, speeding up some of the longest commutes in the city
- New infill stations at Forest Hills, Woodhaven, and Ozone Park, improving connectivity between these neighborhoods, western Queens,

and Manhattan

- A dramatic boost in service to JFK Airport via Howard Beach, a faster route to Manhattan than the current A Line
- A reliable and rapid alternative to parallel bus service through Central Queens on Woodhaven Boulevard, which corridor had 31,000 weekday boardings in 2019
- Expansion in local service frequency on Queens Boulevard, to be served by the G, M, and R lines

Location: Queens

Alignment: Queens Boulevard Line to 63rd Drive-Rigo Park, a new tunnel via 67th Ave to Metropolitan Ave, where it connects to the dormant Long Island Rail Road Rockaway Branch and thence runs onto the A line to JFK and the Rockaways; one possible service pattern is to run to Rockaway Beach, replacing the shuttle.



A crowd of riders waits to board the Q52/Q53. An estimated 31,000 people road these lines daily in 2019.

New Stations (4): Metropolitan Avenue-Parkside Avenue, Jamaica Avenue-104 Street, Atlantic Avenue-Woodhaven, Liberty Avenue-Rockaway Boulevard

Significant Civil Works: A pair of new tunnels between 63 Drive-Rigo Park and Metropolitan Avenue-Parkside Avenue stations

New Transfers: J/Z lines (Jamaica Ave-104th Street) and A line (Rockaway Blvd)

New Housing: 4,413 market rate units + 393 affordable units, or 4,806 total housing units created.

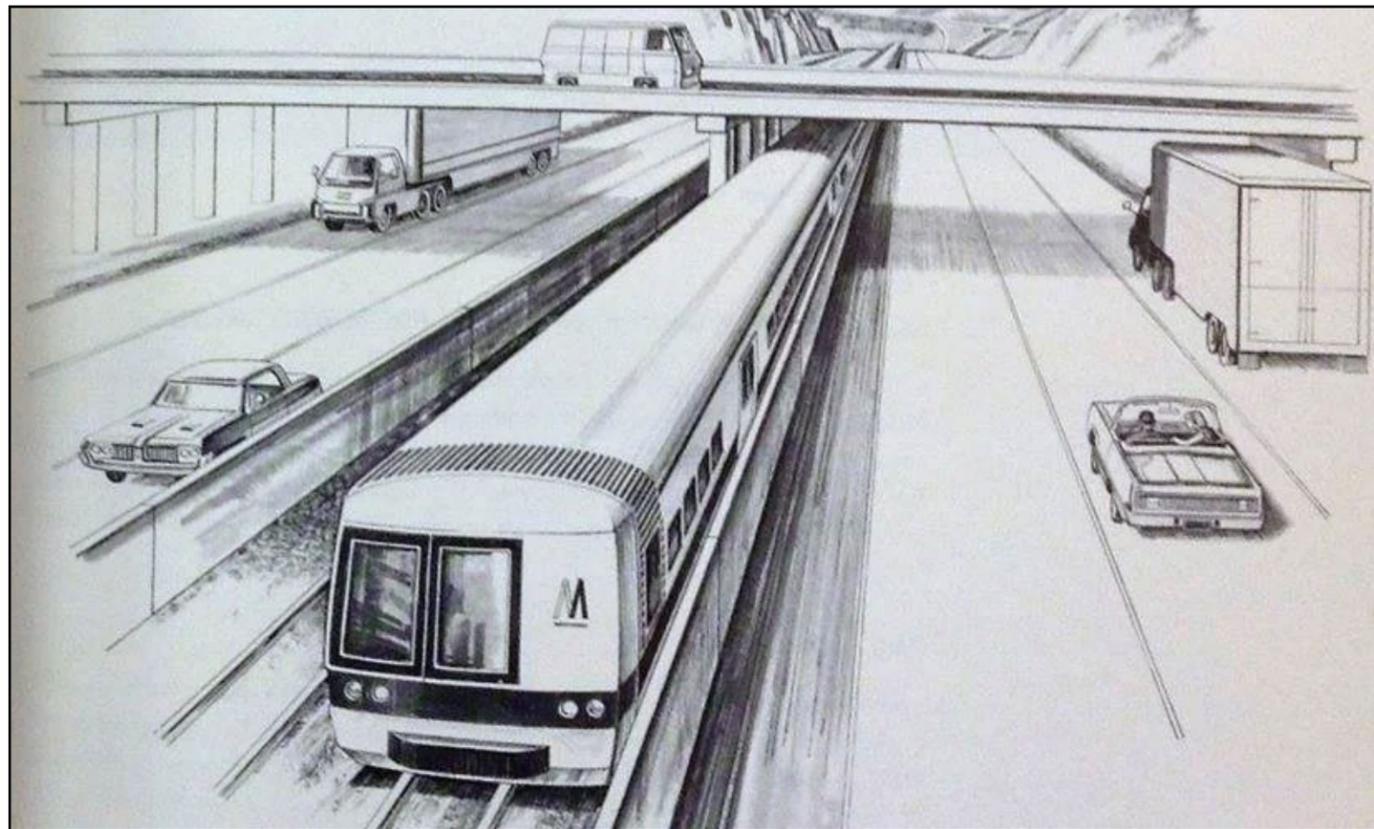
Cost Estimate: \$2.8 billion in 2025 dollars.

The Second Decade

2036-2045



L.I. Expressway



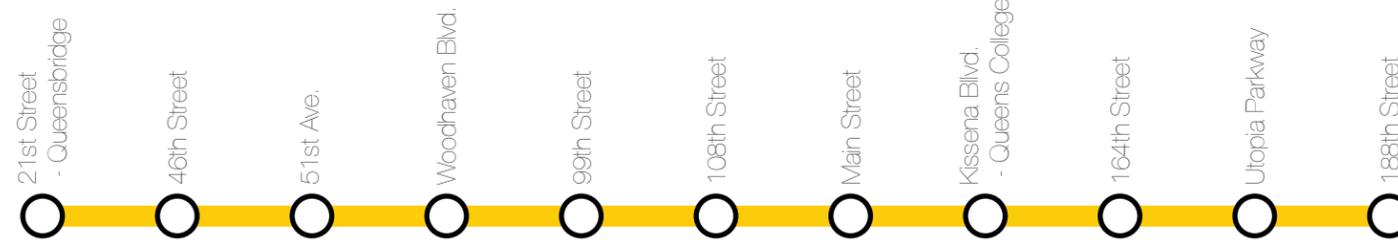
Rail transit in Queens developed unevenly creating a disconnected network: overburdened in the north and underutilized in the south. A Long Island Expressway (LIE) subway addresses this historic oversight by pushing coverage deeper into Queens where there is no subway and car ownership rates, understandably, are the highest in Queens, Brooklyn, Manhattan, and the Bronx. It offers the immediate benefit of reducing crowding at the Jackson Heights-Roosevelt Avenue and 74th Street-Broadway complex

An artist's rendering of a 1960s-era proposal to build a subway line down the center of what would become the Long Island Expressway.

(E/F/M/R/7) and incentivizes a dramatic increase in housing along the corridor at a moment when the mayor is prioritizing housing construction.

An LIE subway would provide valuable connections to unserved destinations like Queens College and simplify the existing N/Q/R/W running patterns in Manhattan, which allows the MTA to run more consistent service. The LIE subway achieves this in three steps.

- It takes advantage of unused LIRR Main Line right-of-way



from 68th Street at Queens Boulevard to Woodhaven Boulevard.

- By accessing Manhattan via the underutilized 63rd Street, the MTA would be able to add all these additional trains without reducing other services on the Broadway trunk.
- Building new side tracks at a key junction at 57th Street and 7th Avenue allows the MTA to separate and better balance express and local Broadway Line services (Figure 1). This overhaul of the Broadway Line eliminates delay-inducing merges that throttle capacity.

Alignment: 63rd Street Tunnel Provisions - LIRR Main Line - Long Island Expressway

New Stations (10): 46th Street, 51st Avenue, Woodhaven Boulevard, 99th Street, 108th Street, Main Street, Kissena Boulevard-Queens College, 164th Street, Utopia Parkway, and 188th Street

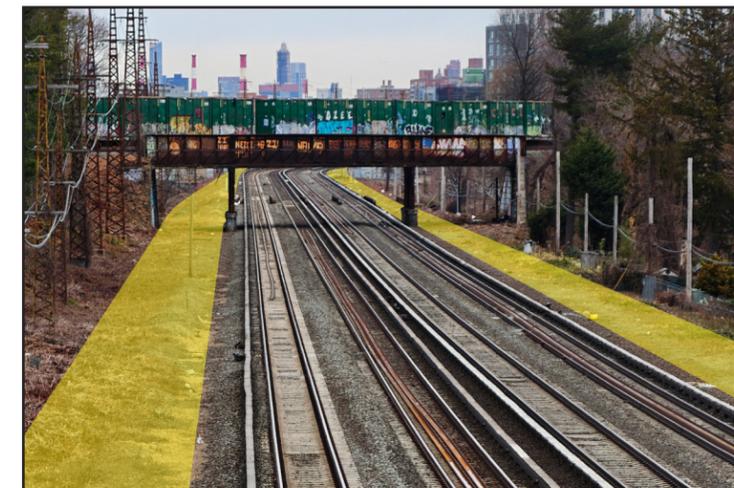
Significant Civil Works: Tunnel from existing 63rd Street Tunnel at Northern Boulevard to Queens Boulevard and 52nd St; portal and viaduct along Queens Blvd to the LIRR Main Line; adding two outer tracks along the LIRR Main Line (former LIRR Rockaway Branch trackways); elevated viaduct on the Long Island Expressway to 188th St.

New Transfers: 7 train, E/F/M/G/R trains

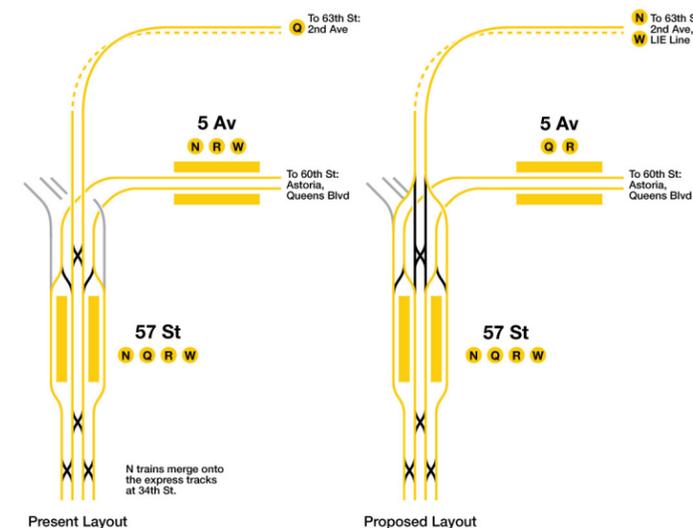
New Housing: 22,206 market rate units + 9,847 affordable units, or 32,053 total housing units created.

Cost Estimate: \$7.1 billion in 2025 dollars.

Innovations:



We put disused space along the LIRR Main Line back to work, adapting a proposal first made in the 1960s (above). We simplify the Broadway trunk, improving reliability and speeds on the N, Q, R and W lines (below).



Co-Op City



Between 1900 and 1940, when the subway was extended from Manhattan into the Bronx, the borough's population exploded from 200,000 to 1.4 million. As highway construction replaced subway construction, the borough's fortunes turned. Ian Frazier recently wrote that "The subways created the modern

The city sought to tackle an earlier affordability crisis in the 1960s by constructing Co-Op City. The subway never followed from Pelham Bay Park.

Credit: The International Ladies Garment Workers Union Archives — Kheel Center, Cornell University.

Bronx and the highways almost destroyed it."

Co-Op City was built in the 1960s and 1970s, firmly in the post-subway era, to provide affordable housing in the North Bronx. It is far from the subway, and as a result, its 40,000 residents are cut off from the rest of the city by the



highways that encircle it.

The MTA is already at work on a project that will partially connect Co-Op City by delivering a new rail service directly to Midtown via the portion of the Northeast Corridor that travels over the Hell Gate Bridge. However, it only partially addresses the isolation of Co-Op City, because the complex is located nearly a mile from the alignment.

To resolve this isolation, we call for an elevated extension of the 6 line from Pelham Bay Park to Bartow Avenue, between Co-Op City proper and the Bay Plaza shopping complex. Because the Baychester Avenue alignment of this extension is very wide and the buildings have ample setbacks, an elevated line would not disturb residents with noise or visual impact.

A No. 6 Line train arrives at Astor Place as it charges through Manhattan.

Credit: Marc A. Hermann / MTA

Location: The Bronx

Alignment: Fully Elevated Viaduct East of I-95 Alignment in Bronx to Bartow Avenue

New Stations (2): Erskine Place (Provision) and Bartow Avenue-Co-Op City

Significant Civil Works: Concrete Viaduct to Bartow Avenue

New Transfers: Metro North Railroad Co-Op City Station (Penn Access)

New Housing: 987 market rate units + 113 affordable units, or 1,100 total housing units created.

Cost Estimate: \$1 billion in 2025 dollars.

Queens Village



A F Line train runs through the Roosevelt Island station and the 63rd Street tunnel in October 2024.

Credit: Marc A. Hermann / MTA

Hillside Avenue is a key bus artery in Eastern Queens carrying nine routes: the Q1, Q2, Q3, Q17, Q36, Q47, Q76, Q77, and Q82, which moved 59,000 passengers every weekday in 2019. Without a high-capacity, reliable transit link into Manhattan, commutes from neighborhoods like Jamaica, Hollis, and St. Albans exceed 50 minutes in each direction.

Extending the subway down Hillside as far as Springfield Boulevard would slash commute

times. Furthermore, it would allow the MTA to make bus routes more efficient on north-south arterials. Routes running along Francis Lewis Boulevard, for instance, could run straight rather than diverting onto Hillside to reach 179th Street and Jamaica Center for subway service. The Hillside subway extension is a powerful example of how a well-considered subway project delivers not just new rail service but can dramatically improve corresponding bus routes, too.

Alignment: Hillside Avenue from 179 Street to Springfield Boulevard

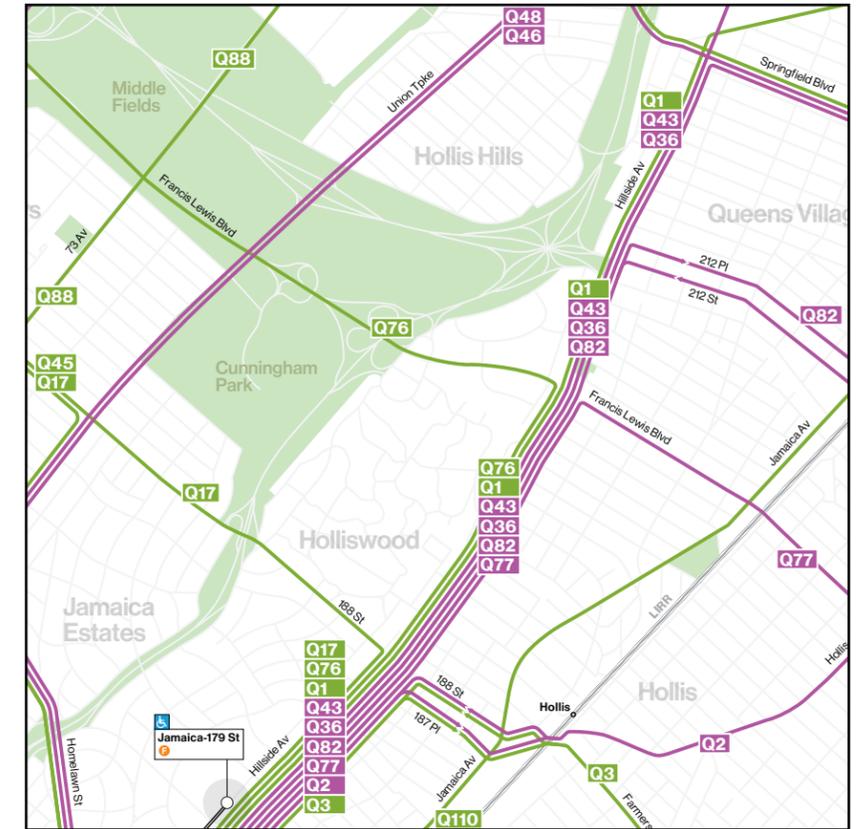
New Stations (4): 188-191 Street, Francis Lewis Boulevard, 214th Street, and Queens Village-Springfield Boulevard

Significant Civil Works: Tunneling under Hillside Avenue to Francis Lewis Boulevard and a viaduct farther east to Springfield Blvd

Transfers: None, System Extension

New Housing: 7,224 market rate units + 183 affordable units, or 7,407 total housing units created.

Cost Estimate: \$3.1 billion in 2025 dollars.



The MTA routes as many as nine bus lines across Hillside Avenue (above), making it one of the most heavily trafficked bus corridors in the city (below).



Credit: Luis Rivera via Flickr

The Third Decade

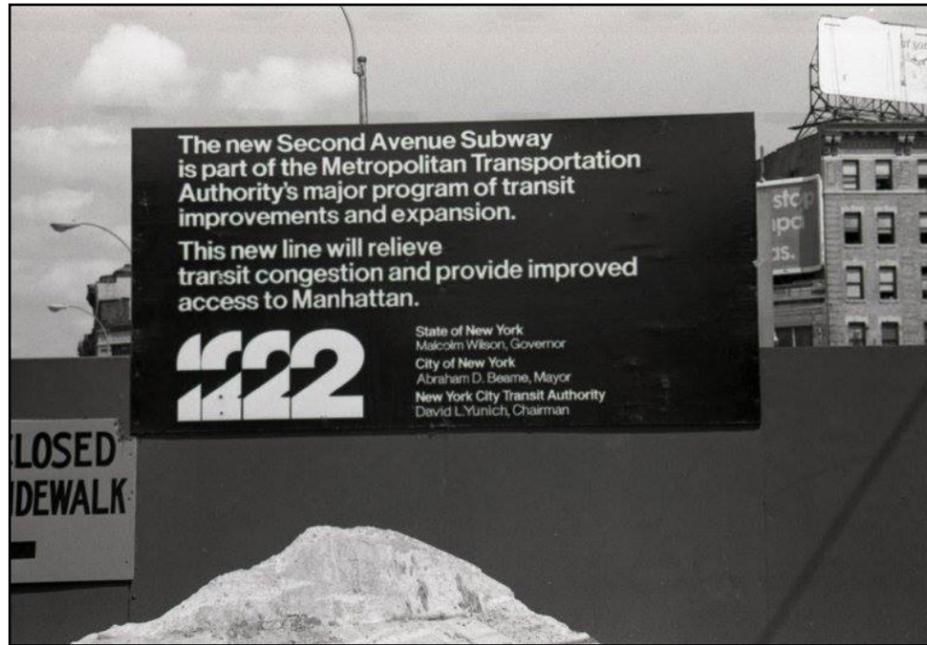
2046-2055

A Better Billion: Expanding Transit & Housing for a More Affordable New York

The Third Decade



SAS DOWNTOWN



Second Avenue Subway was planned and environmentally cleared as a single project from 125th Street to Lower Manhattan. While Phases 1 and 2 are easier to connect to the Q train, Phases 3 and 4 are planned to pass through dense Manhattan neighborhoods in their own right. The ridership projection was 257,000 for the two phases in the 2004 Final Environmental Impact Statement; that for Phase 1, 202,000, was nearly reached within three years of opening before ridership took a hit in the pandemic. Indeed, the bus route on First and Second Avenues, the M15, is the single busiest in the city, with 46,000 daily riders in 2019. Moreover, while the line doesn't pass through the heart of Midtown with its very

A sign announcing the 1970s-era beginning of construction on the Second Avenue Subway. The project's tortured history stretches back a century.

Credit: The Transit Museum via NY1



high job density, the job density east of Third Avenue is still respectable, and Phase 4 would reach Lower Manhattan.

We propose building the two phases as a single project. This would introduce the long-awaited T train running along the entirety of the route, introducing the first new color into the system since the opening of Sixth Avenue Line in 1940.

However, we call for a substantial modification to Phase 4. The MTA-planned route comprises a new tunnel down to Hanover Square where Manhattan narrows, with high construction costs due to the constraints and age of the site. Instead, we suggest connecting Phase 4 to the current J/Z alignment along Nassau Street down to Broad Street; Service on the J/Z trains will be cut back to Chambers St.

Alignment: 55th St to Broad Street via 2nd Avenue, Christie Street, Park Row, and Broad Street

New Stations (10): 55th St, 42nd Street-UN, 34th Street, 23rd Street, 14th Street, Houston Street-2nd Avenue, Grand Street-Bowery, Chatham Square, *Fulton Street* and *Broad Street* (via Nassau Street line)

Significant Civil Works: Constructs



GROUND IS BROKEN FOR 2D AVE. LINK

Downtown Subway Section Begins With Ceremony Led by Lindsay and Ronan

By EDWARD C. BURKS

Two veteran pick-and-shovel men—John V. Lindsay and Dr. William J. Ronan — broke ground yesterday for the downtown section of the Second Avenue subway while state officials were elaborating plans for a “breakthrough” in inter-city rail service.

In the city, at the Canal Street end of the Manhattan Bridge in Chinatown, it was a case of the Mayor and the Metropolitan Transportation Authority chairman opening construction of the southern part of the Second Avenue line, a project first talked about 45 years ago.

Then-Mayor John Lindsay and then-Gov. John Rockefeller broke ground on the Second Avenue Subway in Harlem in 1972 (above). And again, downtown, in 1973 (left).

Credit: The New York Times

Phase 3 and Phase 4 to Chatham Square, then constructs merge into the Nassau Street Line; extends Fulton St and Broad St station platforms

New Transfers: J/Z Lines, B/D/F/M Lines, L Line, A/C/2/3/4/5 Lines at Fulton Street.

New Housing: 15,113 market rate units + 4,872 affordable units, or 19,985 total housing units created.

Cost Estimate: \$9.3 billion in 2025 USD.

No. 7 Extension

Track map courtesy of NYCSubway.org



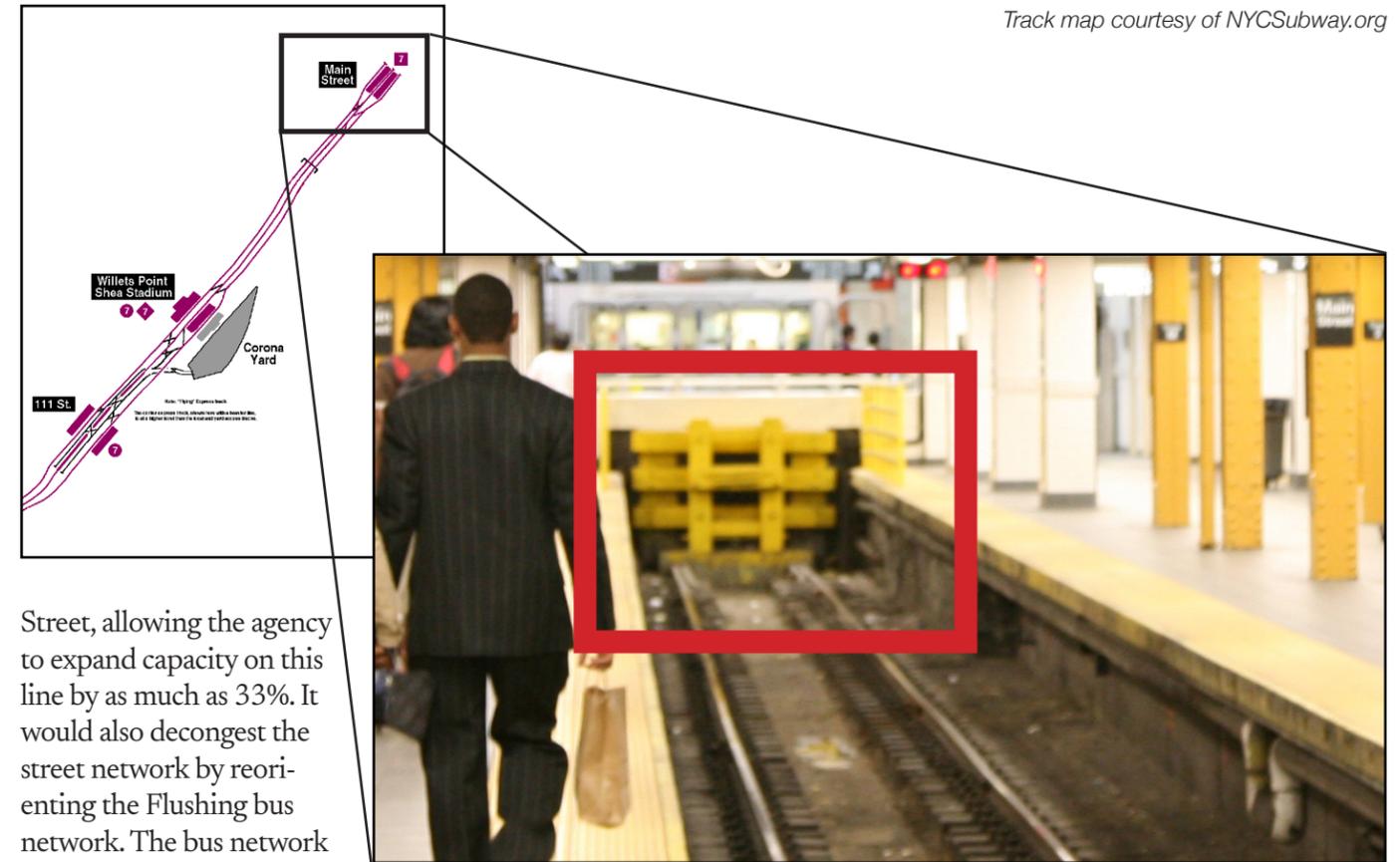
The 7 Line's Flushing terminus is tied with 74th/Broadway for busiest subway station outside Manhattan. It is also a major operational bottleneck that dramatically limits the number of trains the MTA can run. Underground, the bumper tracks constrain the trains to a maximum throughput of 24 trains per hour (tph) as the trains have to enter the terminal at low speed to manage safely crossing in front of departing trains; the rest of the line has the signaling for much higher frequency, 32 tph. Above-ground, buses have to use a

A No. 7 Line train rides along the aerial structures in Long Island City, providing this stunning backdrop

Credit: Patrick Cashin / MTA

few blocks of Downtown Flushing where traffic congestion is the worst, which jams up the feeder network. Traffic will only get worse as Downtown Flushing's commercial development increases. From 2007 to 2022, the number of jobs within half-a-mile of the subway has grown from 13,000 jobs to 41,000.

A short extension of the 7 Line would address both problems. Proposals to extend the 7 train beyond Flushing go back to the 1930s. Extending the line to Northern Boulevard would enable the MTA to build an efficient terminal at 162nd



Street, allowing the agency to expand capacity on this line by as much as 33%. It would also decongest the street network by reorienting the Flushing bus network. The bus network improvements would also build upon improvements to the bus routes unlocked by the previously proposed expansion of the F Line down Hillside Avenue.

Location: Queens

Alignment: Roosevelt Avenue to 162nd Street-Northern Boulevard

New Stations (2): 149th Street-Murray Hill, 162nd Street-East Flushing

Significant Civil Works: Tunneling Under Roosevelt Avenue and tail tracks east of 162nd Street Station

New Transfers: LIRR Port Washington Branch Broadway Station

New Housing: 6,591 market rate units + 1,013 affordable units, or 7,604 total housing units created.

Cost Estimate: \$2.3 Billion in 2025 dollars.

Bumpers (highlighted in red) immediately at the end of the platform force trains on the No. 7 to slow down as they enter the terminal at Main St., which reduces line capacity

Photo via Wikipedia

E to Springfield

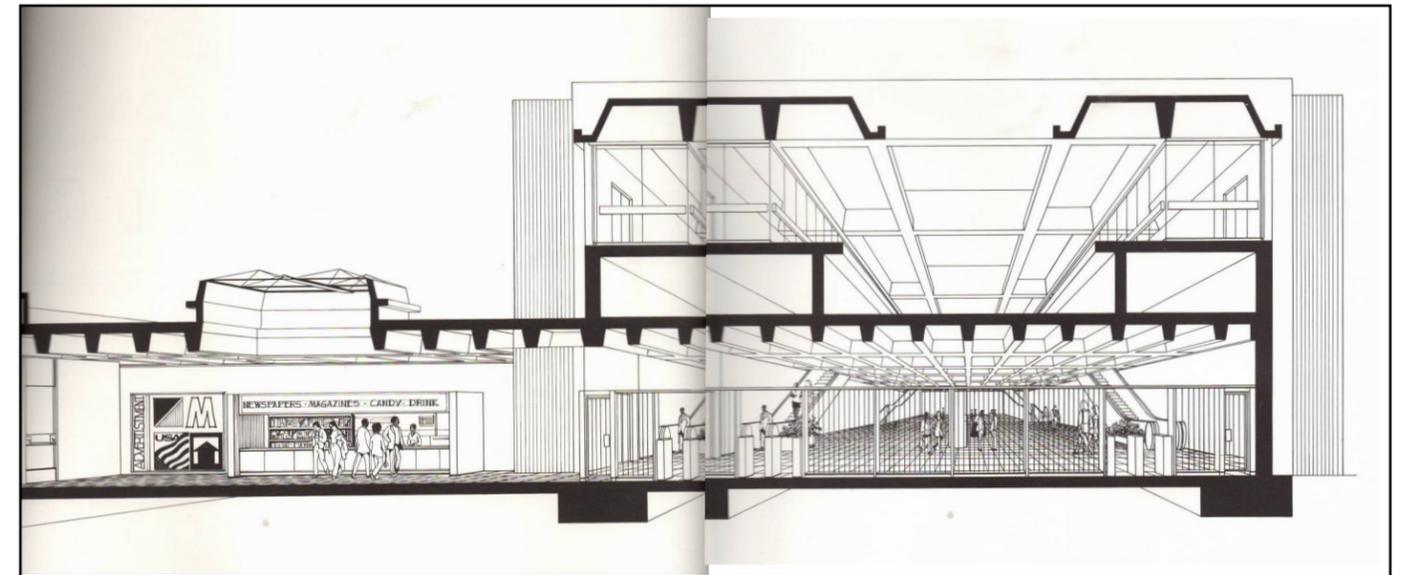


Southeast Queens is one of the most bus-dependent parts of the city and its residents have some of the longest commutes in the city, estimated at 51 minutes each way. The main bus corridors from Jamaica to the southeast, Guy Brewer and Merrick Boulevards, carried a total of 46,000 riders per weekday in 2019, split across six routes. This part of Southeast Queens is a subway desert and is currently only served by infrequent, high-fare LIRR trains. The key to solving this problem cost-effectively lies along these very same LIRR tracks.

An E train zooms through Queens on the express tracks.

Credit: Leo Hidalgo via Flickr

In the 1970s, the newly created MTA supported an engineering study for the Archer Avenue Subway (E) Line to take over the LIRR Atlantic Branch east of Jamaica station up to Laurelton-Springfield Boulevard. We would pull this proposal off the shelf and refresh it. If modernization of the LIRR to service levels similar to those of the subway is not possible, then an E extension will deliver fast and frequent rail service with good local bus connections. Because there is an existing right-of-way, the project's significant civil work would be



systems (tracks and signals) conversion and portal engineering to connect the tunnel to the right-of-way.

The New York City Transit Authority's tentative design for the E Line extension stations in the mid-1970s, recompiled from the archives.

Location: Queens

Alignment: LIRR Atlantic Branch east of LIRR Jamaica station

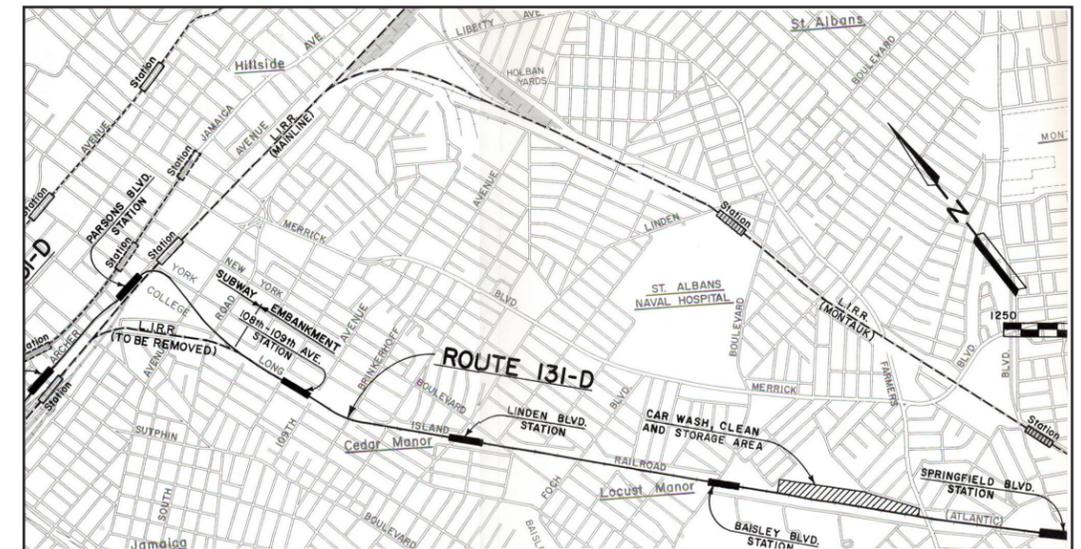
New Stations (5): 109 Avenue, Linden Blvd-Cedar Manor, Baisley Blvd, Farmers Blvd-Locust Manor, Laurelton-Springfield Blvd

Significant Civil Works: Portal connection of connecting existing tunnel to the LIRR Atlantic Branch

New Transfers: None, System Extension

New Housing: 13,957 market rate units + 4,288 affordable units, or 18,245 total housing units created.

Cost Estimate: \$1.7 Billion in 2025 dollars.



The New York City Transit Authority's tentative route map for the E Line extension in the mid-1970s. The tunnel beneath York College was constructed

The Fourth Decade

2056-2065



The Cross-Bronx



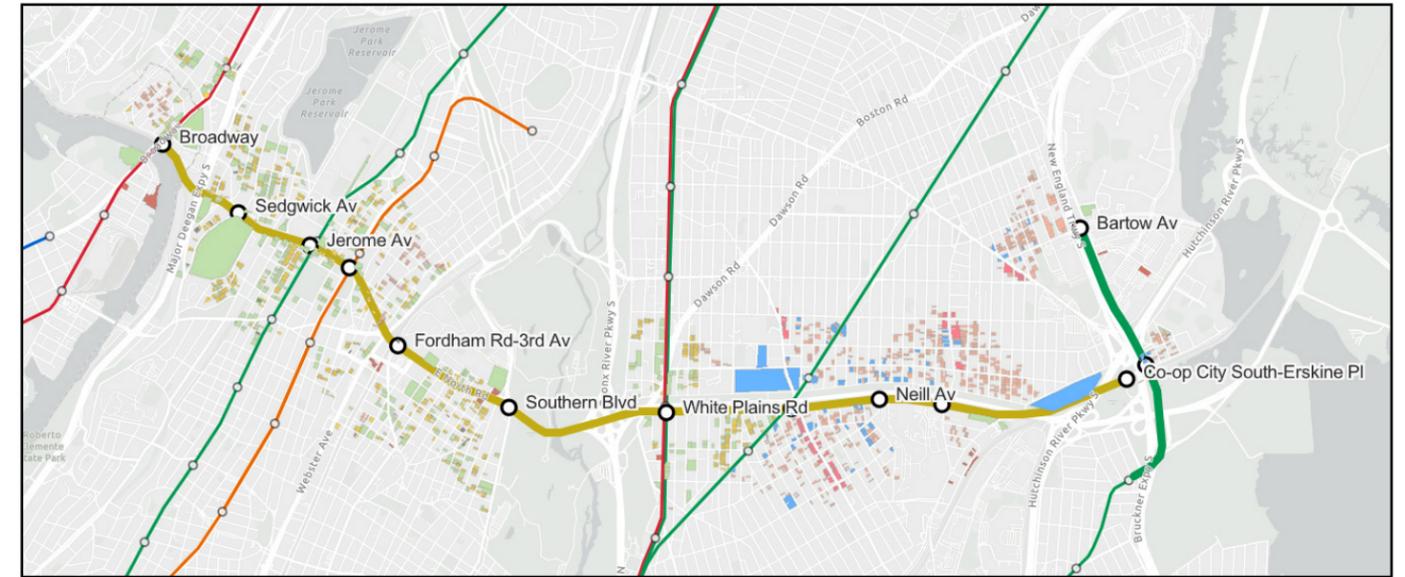
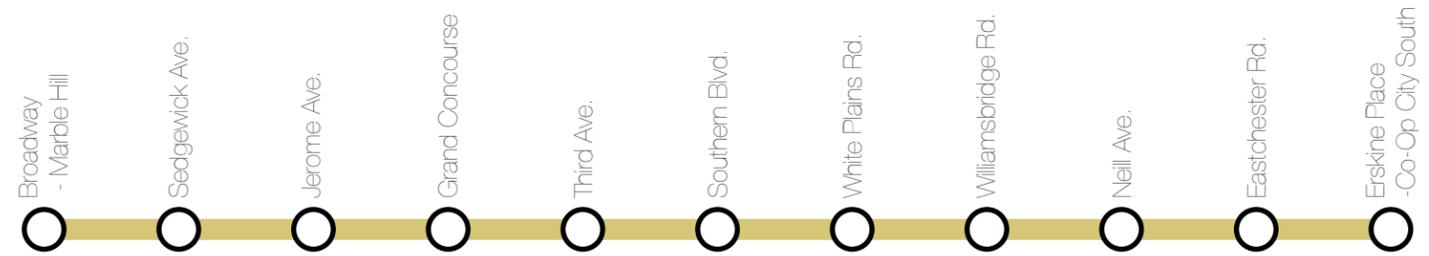
The Bronx developed around its north-south subway lines more than a century ago. This made going from east to west difficult. Robert Moses cut the Cross Bronx Expressway through seven miles of densely populated neighborhoods to solve this transportation problem. Moses correctly identified the enormous east-west travel demand in the Bronx, which explains why the Cross Bronx is one of the most congested roadways in the country. What he didn't anticipate, however, was that car ownership rates in the western Bronx would remain extremely low; thus, Bronxites wouldn't be the immediate beneficiaries.

We seek to turn this legacy on its head by

A train runs on Paris's newly automated Line 14, which has become one of the busiest in the city.

Credit: Eric Salard via Flickr

delivering a rapid rail link that runs across the Bronx. In 2019, the Bronx's crosstown buses were the busiest in the borough and among the top 10 busiest in the city. The Bx12, the busiest of those crosstown buses, connects Bronxites to subways into Manhattan, Metro-North, and two of the five densest job clusters in the borough. It alone carried 40,000 riders per day in 2019, making it the second busiest line in the en-



tire city. Our proposed crosstown line would trace the route of the Bx12 and follow along Fordham Road, providing a giant upgrade to transit riders now stuck in traffic.

The Cross Bronx Express Line, like the IBX, should be built as a self-contained line rather than an extension. This would allow the MTA to run it as an automated light metro, utilizing smaller trains than the traditional subway but making up for the reduced capacity by running trains every 90 seconds. Beyond the operating savings, such a system would allow the MTA to reduce construction costs by shrinking the size and cost of new stations. Brescia, Italy, Paris, Copenhagen, and Vancouver have used this technique to build lines that run 120-150' long trains every 3 minutes or less for under \$500 million per mile.

Alignment: 225 St - Kingsbridge Rd - Fordham Rd - Pelham Bay Parkway

New Stations (11): Marble Hill, Sedgewick Avenue, Jerome Avenue, Grand Concourse, Third Avenue, Southern Boulevard, White Plains Road, Williamsbridge Road, Neill Avenue, Eastchester Road, and Erskine Place-Co-Op City South

Significant Civil Works: Tunnel between Sedgewick Avenue and Crotona Avenue

Transfers: 1, 4, B/D, 2, 5, 6, and Metro North Rail Road

New Housing: 25,243 market rate units + 10,660 affordable units, or 35,903 total housing units created.

Cost Estimate: \$6.4 Billion in 2025 dollars.

Subway to LGA



LaGuardia Airport is the last major airport in the region without a rail connection. Both passengers and workers are shunted onto buses and forced to make inconvenient transfers when traveling to and from the airport. We propose a short extension of the Astoria Line (N/W) to the airport to solve this problem. The Astoria Line is elevated through Astoria, and so an extension should also be elevated, but should not go above the neighborhood's streets, which are not very wide. Instead,

Once both reviled and mocked, the rebuilt LaGuardia Airport has won plaudits for its new terminals and architecture.

Credit: The Port Authority of New York and New Jersey

we route the extension via the industrial zone north of 20th Avenue including the Con Edison and Steinway plants. Much of that area is post-industrial and could be redeveloped into housing if the subway is extended.

The new line would need little to no proper tunneling. A short tunnel through airport grounds just south of Runway 4/22 could be built cut-and-cover or even trenched, and the rest of the route can run elevated or at-grade without disturbing residents or low-flying planes.

Alignment: 19 St-LGA Terminal Area

New Stations (5): Steinway Street, Hazen Street, LGA Terminal A, LGA Terminal B, and LGA Terminal C

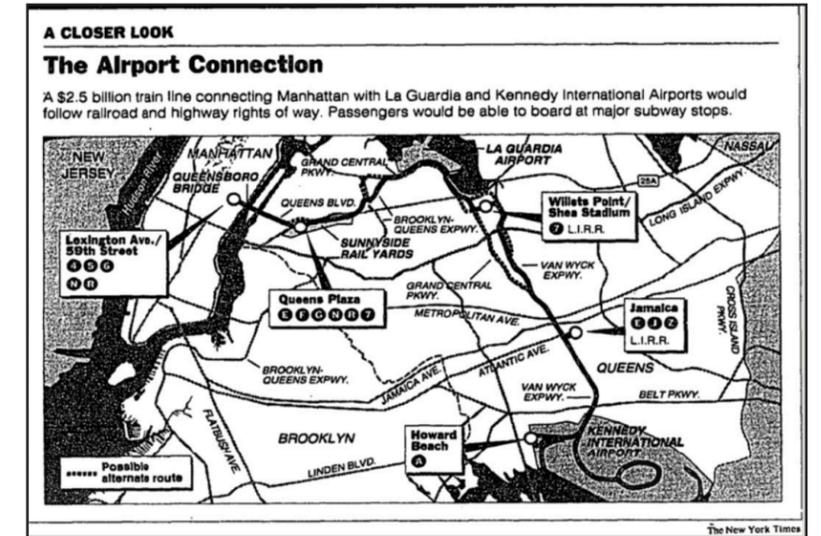
Significant Civil Works: Viaduct extension along 31st Street and 19th Avenue to LGA Terminal Area with minor trenching near Runway 4/22

New Transfers: None, System Extension

New Housing: 1,060 total housing units created.

Cost Estimate: \$2.5 Billion in 2025 dollars.

Past plans:



Credit: The New York Times

The Port Authority prepped plans in the 1990s for a line from Manhattan to LGA and JFK via Willets Point and Jamaica (above). The Jamaica-JFK leg became the JFK AirTrain.

Then-Gov. Andrew Cuomo attempted to revive the LGA-Willets Point segment, which was mocked as the 'backward' AirTrain (below).



Credit: Port Authority

IBX to Astoria



The hodgepodge development of western Queens left the borough with a street grid that is often hostile to making even short trips between neighborhoods. Expanding the IBX to deliver a fast and grade separated link between Jackson Heights and Astoria would solve this now century-old problem. Past plans, such as the Triboro RX from the RPA's Third Regional Plan, used the Hell Gate Line to the Bronx, but high freight traffic makes that right-of-way difficult to use. Instead we propose to run

A rendering of the proposed IBX system, which would provide a rapid transit beltway line running from the Brooklyn Army Terminal to Jackson Heights.

Credit: Metropolitan Transportation Authority

trains along the BQE with some tunneling to connect to Astoria Boulevard on the N/W Lines.

It is difficult to estimate potential demand from bus service, as the Queens street grid does not have an arterial street between the two neighborhoods. However, the three buses that comprise the best currently available routes – the Q18 zigzagging between Jackson Heights and Astoria, and the Q33 and Q47 connecting Jackson Heights with LGA – totaled 24,000 riders in 2019.

Location: Queens

Alignment: Phase 2: CSX Fremont Secondary-BQE-Astoria Boulevard

New Stations (3): Northern Boulevard, Steinway Street, and Astoria Boulevard

Significant Civil Works: Tunnels under Astoria Blvd and sides of BQE

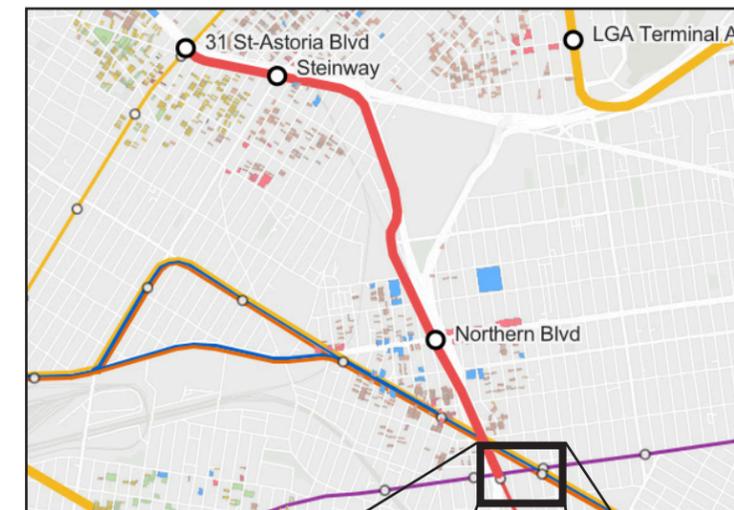
New Transfers: N/W Line

New Housing: 6,317 market rate units + 263 affordable units, or 6,580 total housing units created.

Cost Estimate: \$2.4 Billion in 2025 dollars.

The IBX extension would bring the line northwest of the current proposed terminus at Roosevelt Boulevard (right) to Astoria's 31st Street N Line stop (top right).

Credit: MTA



2

Conclusion

Mayor Mamdani's call for free buses citywide inspired us to create A Better Billion. We believe that transit is part of the affordability solution and that any large-scale transit policy should directly address the primary cause of the affordability crisis, housing. Second, understanding that free buses will cost an additional \$1 billion per year in operating subsidy, we used that as a constraint to develop a subway expansion plan that increases the subway's reach, speeds up travel, creates opportunity for more housing development, and provides modern subway service to parts of the city that have never had it.

The subway has always been New York's secret weapon. It allowed New Yorkers to escape overcrowding in lower Manhattan and spread out across the five boroughs while maintain-

ing intense residential- and job-density in Manhattan. New York's density has served it well. It has enabled 8.5 million people and 5 million jobs to flourish. It is too bad that the subway did not continue to expand significantly to reflect development patterns, like the construction of Co-Op City or Queens' growth. Thankfully, A Better Billion shows how New York could build 41 miles of subway, add 64 stations, and incentivize the development of 167,064 new housing units. Mayor Zohran Mamdani has the opportunity to chart a course where no other contemporary mayor has had the vision to reimagine New York's subway at scale. A Better Billion provides a blueprint to expand the subway system so that all New Yorkers have access to more housing, jobs, and opportunities.

3

Appendix I

Subway-Elevated Construction Cost Ratios

The great majority of the detailed information is sourced from subway projects rather than elevated lines. In projecting the costs of elevated lines, we've had to rely on observed ratios of underground to elevated costs. The ratio is difficult to compute globally, since the lowest-cost countries tend not to build any above-ground rapid transit as they can afford to tunnel their entire systems.

Within-country, the ratio of underground to elevated cost/km, computed as the ratio of the intercepts of the regression line of the cost on the underground % at 100% and 0%, is 2.07 in China, which comprises about 60% of our database by line length, and 2.33 in India, which comprises 6% and is the second most represented country. This ratio does not quite compare apples with apples, as ELs are usually built on easier alignments outside city centers, but in practice this proposal too follows the common practice of building subways in more difficult areas, and therefore we use the averaged Sino-Indian ratio of 2.1.

Construction Methods

All tunnel construction is assumed to use TBMs for tunnels between stations. Some subway projects use cut-and-cover construction to save money, which in our database appears to be about as expensive as elevated construction. However, cut-and-cover is rare due to the extensive street disruption it causes, and we do not recommend that New York return to this method.

Civil works for tunnels have the smallest New York premium over the world average that we have found, a ratio of about 2 rather than the 10 found for overall costs. In 2025 dollars, SAS Phase 1's tunneling, exclusive of systems, cost \$300 million per route-mile. We retain this number in the high- and medium-cost models. In the low-cost model, we use \$140 million/mile, found in dense but ordinary environments in Rome, Milan, and suburban Paris.

Stations can be built by cut-and-cover, even when the tunnels are bored, or by mining. During SAS Phase 1 the 72nd and 86th Street stations were mined and the 96th Street station was built via cut-and-cover. For Phase 2, 106th and 116th Street stations will be built via cut-and-cover and the 125th Street station will be mined, but the former have gone through multiple redesigns, including ones considering mining. In Phase 1, the cost per cubic meter dug was 50% higher for the mined stations than the cut-and-cover station. Elsewhere, where we found reliable hard cost data for individual station digs (in Italy), we found that for each project, within each construction environment, the hard cost of a station is linear in the total excavated volume.

In addition, we have found a consistent trend within New York and

English-language peers such as Toronto, Los Angeles, and London in which station dig volumes are much larger than necessary for break rooms, systems, crossovers, or signature architecture. For the two mined stations of Phase 1, the digs were about twice as large as required based on train length, and for 96th Street, it was about three times as large. In contrast, digs in the low-cost countries that we studied are 3-10% longer than the train length.

In the high-cost model, we use SAS's construction costs inflated to 2025 dollars, which are almost exactly \$1 billion per station averaged over the three of Phase 1. In the medium-cost model, we divide by 3 to get \$340 million, since the MTA has begun shrinking the station, and is transitioning to cut-and-cover stations. Where stations are forced to be mined, we use \$500 million in the medium-cost model and still \$1 billion in the high-cost one. In the low-cost model, we begin with \$340 million or \$500 million, but see below for further savings on systems and procurement.

Systems

The hard costs of SAS Phase 1 break down as 53.5% civil infrastructure 46.5% systems and finishes. This ratio holds for both tunnels and stations. The share of systems is atypically high: in Italy, Sweden, and France, it ranges between 20% and 40% and averages about 27%, which we attribute to a lack of systems standardization in the United States driving up costs.

In the high- and medium-cost scenarios, we keep the station costs as above. In the low-cost one, we modify accordingly to take lower systems costs into account, yielding \$250 million for a cut-and-cover station and \$380 million for a mined one, before further adjustments for procurement.

In all scenarios, we add the system's multiplier to the hard costs of tunnels. In the high- and medium-cost scenarios, this increases tunneling costs to \$580 million/mile. In the low-cost one, it increases them to \$210 million/mile.

Soft and Unallocated Cost Ratios and Project Delivery

In our Second Avenue Subway case, we found that the design and management contracts added 21% on top of the hard costs of construction, and that overall contracts other than those of hard costs added 50%. These numbers appear similar across the United States and United Kingdom. No effort has been made to reduce the soft cost multiplier. Thus, in the high- and medium-cost models, we add 50% to the hard costs of stations and tunnels above.

In the low-cost model, we follow French, Italian, and Swedish practices, in which design and management costs add 5-10%, and the overall additional cost is 20%. We also include an adjustment for procurement and project delivery problems. In interviews, we have

identified a project-wide factor of 2 cost premium coming from a variety of procurement problems, which explains the difference in the cost of tunneling civil works. However, the station costs, coming from SAS numbers, have to be further reduced in this scenario.

Building out Accessibility

The New York City Subway is only 30% accessible to wheelchair users, among the lowest shares in the world; among the major metro systems worldwide, only Paris is worse. The Americans with Disabilities Act text amendments full accessibility, and as the MTA has argued that it doesn't have the money to retrofit all existing stations, it has been put under a consent decree. The MTA must both retrofit stations at a prescribed rate of 85 stations by 2035 and 90 per decade thereafter, and spend at least 14.69% of the subway capital program on accessibility, under an assumption that 25% of the capital program is spent on expansion and 75% on the State of Good Repair (SOGR) program and normal replacement of fixed plant.

Whether the consent decree implies that the 14.69% figure must be increased if there is further expansion spending is unclear. It does not explicitly say so, but it does reduce the 14.69% figure proportionately if the share of expansion is reduced from 25%. We assume that new capital money for the subway must include 14.69% for accessibility, and not the higher figure of 14.69/25. Thus, the annual budget is set at \$850 million/year in 2025 prices. At current MTA costs, this would, in addition to the program outlined in this report, permit an additional 20-25 stations to be made accessible every decade.

Cost Model

The costs below already incorporate the soft cost multipliers and can be applied readily to each line. These are rounded to the nearest \$10 million, but we caution against using them for higher than first-order precision. All numbers are given in constant 2025 dollars; in our experience, costs do not rise faster than inflation without an underlying reason—for example, the increase in American construction costs in the last generation is attributable to larger station footprints than were normal in the 1980s, precisely what the MTA has begun to claw back.

Item \ Scenario	High (2010s MTA) in millions	Medium (MTA with reforms)	Low (world average)
Tunnel (1 km)	\$530	\$530	\$160
Tunnel, underwater (1 km)	\$1,050	\$1050	\$310
Elevated or trench track (1 km)	\$260	\$260	\$70
Station (cut-and-cover)	\$1,550	\$510	\$150
Station (mined)	\$1,550	\$770	\$230
Station (elevated or trench)	\$490	\$240	\$70

4

Appendix

We began by identifying all tax lots located within a 10-minute walking distance (approximately 0.5 miles) of existing and proposed station locations, based on the street network, as delineated by network-based isochrones. From this initial set, we conducted a sequential filtering process guided by the City of Yes text amendments. Our approach followed a subtractive logic, starting with the most permissive and highest FAR-yielding provisions and progressively applying the more restrictive ones to the remaining eligible lots that did not qualify for previous amendments.

For each amendment, we operationalized changes in FAR applying to eligible lots to determine potential increases in allowable residential floor area. Among all lots that yielded at least one additional dwelling unit of 850sq ft., considering both the existing underbuilt floor area and the additional capacity created under City of Yes, we retained only those capable of accommodating at least a 100% increase in residential floor area relative to their existing built area. This ensured that our analysis focused on lots with a meaningful capacity for redevelopment or densification.

In this analysis, we excluded considerations related to height limits, setbacks, and lot coverage maximums. We also did not incorporate specific provisions introduced by City of Yes concerning Accessory Dwelling Units (ADUs), Parking text amendments, or Campus Infill. Instead, we assumed that the maximum allowable FARs could be achieved under the flexibility afforded by these amendments, which are intended to remove regulatory barriers to densification.

The following paragraphs detail how each City of Yes amendment was interpreted and implemented in our spatial and quantitative analysis based on the MapPluto 2025 data, along with our results.

Exclusions

First we excluded lots with Building Classifications of 'Parks and Recreation Facilities', 'Outdoor Pools', 'Beaches', 'Stadium, Race Track, Baseball Field', 'Elementary, Middle School and High School Buildings', 'Brooklyn College Buildings', 'Other University Buildings', 'Transportation Facilities', 'Utility Bureau Properties', 'Government Structures' (with BldgClass='Y', which don't include all government owned lots, but those that are less likely to be redeveloped, such as those owned by the NYPD, FDNY and MTA Bridges and Tunnels) and Miscellaneous Structures (these would include structures such as the UN and cemeteries).

Additionally we excluded lots owned by NYC Citywide Administrative Services, Landmarks, lots that were in Historic Districts and lots that were zoned as 'Park' (these only include very large parks, but not small parks, playgrounds and recreational open areas).

We disregarded all lots smaller than 2000 sq ft, as we assumed them too small to be redeveloped feasibly, and lots that showed non-zero values for number of buildings or units, but had no building area information.

Split Zone Lots

Where a lot fell into two Zoning Districts, we assumed existing and new FARs based on the averages allowable by the two districts. We determined the eligibility of lots for the City of Yes Amendments based on their Zoning District 1, as this value indicates the district the majority of the lot falls into.

Town Center Zoning

Town Center Zoning allows for FAR increases for low density residential lots (R1-R5) with commercial overlays and C4-1 lots. Of these lots, those that are within the Greater Transit Zone receive an FAR of 2.5 and those that don't, get FARs in the range of 1.5-2.5 depending on their Zoning Districts (See DCP's City of Yes guide for new FARs applicable to each Zoning District).

Transit Oriented Development

TOD Zoning applies to low density residential lots (R1-R5) that are within the Greater Transit Zone that are at least 5000 sq ft and adjacent to a 75 feet-wide or wider street, or on the short side of a block (less than 250 feet). These lots receive FARs in the range of 1-2 depending on their Zoning Districts.

District Fixes

District Fixes apply to low density residential lots (R1-R5) that do not qualify for Town Center or TOD Zoning and grant lots FARs between 0.75-2, depending on their Zoning Districts.

Universal Affordability Preference (UAP)

UAP applies to medium to high density residential districts (R6-R12) that are outside the Mandatory Inclusionary Housing Zone and allows FARs between 2.40 to 15. We applied these changes to lots that were at least 5000 sq ft as we assumed a lot could only be eligible for UAP if redeveloped, and smaller lots would be infeasible to do so.

For lots that were smaller than 5000 sq ft but larger than 2000 sq ft and that were eligible for UAP, we searched for vacant lots with neighbors that also fit UAP criteria. If two or three neighboring lots had fewer than three owners combined, we considered them fit for assembly, and calculated housing units that could be built on them



A rendering of what transit oriented development may look like under New York's City of Yes reforms. This law only applies to currently built subway stations.

Credit: Department of City Planning

with the additional UAP allowance, minus the existing built area on the non-vacant lot.

Conversion of Non-Residential Buildings to Housing

City of Yes makes it possible to convert floor area of buildings in non-residential zones that allow some residential FAR, to residential units. To find buildings eligible for conversions, we looked at all commercial and industrial buildings with residential FARs, and had built areas that were used for non-residential uses, that were large enough to yield at least one residential unit of 850 sq ft.

Non-City-of-Yes Opportunities for Additional Housing

In addition to calculating how many additional units the City of Yes eligible lots could generate, we also calculated how much additional housing could be built on vacant lots and residential zoned lots that did not qualify for City of Yes. The vacant lots included commercial and industrial lots with allowable residential FARs and we assumed their total floor areas could be used for housing. For the non-City-of-Yes qualifying residential lots, we calculated the additional housing units (at least 850sq ft) that could be built with the underbuilt floor area that was available as-of-right.

Results

We processed 85,530 lots, and found that 35,828 of these had unused floor areas large enough to accommodate at least one 850 sq ft housing unit. 30,343 of these lots qualified for City of Yes amendments and the rest presented other opportunities for more housing as described above. 16,659 of the lots processed were at least 50% underdeveloped, creating 167,064 units that can be built profitably, 38,765 (23%) of which were generated by the UAP amendment, hence were required to be affordable. An additional 233,507 units can be built as of right in the processed lots, but these include commercial or industrial building conversions, that we did not include in the profitable category, or lots that are more than 50% developed and so are not expected to be created without additional upzoning in the project corridors proposed in this report.

We only report the units buildable in the profitable lots (those at least 50% underdeveloped) that fall within the 10-minute walking distance of stations proposed for each project. Lots falling within the intersection of the IBX extension and LaGuardia line stations are only reported under the IBX to avoid double counting.

213 of the processed lots and 136 of the profitable lots are owned by the government, which have the potential to yield 21,318 units, 8,883 of which would be affordable. These do include NYCHA owned lots, many of which are currently occupied by residential communities, which we calculated to have enough space for 15,820 additional housing units. We did not exclude the 29 community

gardens and 29 playgrounds from our calculations, which yield 264 and 3003 profitable units respectively. Our decision to include NYCHA properties, community gardens, and playgrounds reflects precedents demonstrating successful redevelopment of such sites. However, we acknowledge that NYCHA projects would require careful planning to avoid resident displacement during construction, and that maintaining access to recreational open space remains essential for healthy urban communities.

Table of results:

Project Name	No. of lots	Total lot area (sq.ft)	Exist. Unbuilt Res Area	Exist. Buildable Res Units	New Unbuilt ResArea	New Buildable Res Units	Total Buildable Res Units	Affordable Units	Percent Affordable	Percent of Total Produced
IRT Utica Avenue Line	3,349	12,795,864	8,104,894	8,855	16,116,498	8,459	17,314	1,458	8.42%	10.36%
Second Avenue Line Phase 2 Western Ext.	256	3,578,593	7,893,303	9,163	11,411,451	5,844	15,007	5,675	37.82%	8.98%
IND Queens Boulevard Cap. Improvement	970	4,417,983	2,014,744	2,221	4,501,356	2,585	4,806	393	8.18%	2.88%
IND Long Island Expressway Subway	3,016	18,688,276	13,162,864	15,218	28,461,812	16,835	32,053	9,847	30.72%	19.19%
IRT Pelham Line to Co-Op City	145	936,100	370,694	425	872,620	675	1,100	113	10.27%	0.66%
IND Hillside Av to Queens Village-Springfield	1,669	10,044,542	1,632,063	1,814	6,998,401	5,593	7,407	183	2.47%	4.43%
Second Avenue Line Phases 3 & 4	257	3,273,079	12,969,483	15,133	11,910,065	4,852	19,985	4,872	24.38%	11.96%
IRT Flushing Line Ext. to Northern Blvd	1,037	6,299,319	2,863,938	3,162	6,910,949	4,442	7,604	1,013	13.32%	4.55%
IND Archer Av Line Ext. to Laurelton-Springfield	2,492	17,059,406	6,140,935	7,085	16,538,528	11,160	18,245	4,288	23.50%	10.92%
Cross Bronx Express Line	1,907	13,598,182	19,482,462	22,256	29,759,070	13,647	35,903	10,660	29.69%	21.49%
BMT Astoria Line Ext. to LaGuardia Airport	336	1,275,858	95,372	103	1,070,965	957	1,060	0	0.00%	0.63%
Interborough Express (IBX) Ext. to Astoria B.	1,233	4,546,869	2,878,967	3,182	6,117,984	3,398	6,580	263	4.00%	3.94%
	16,667	96,514,071	77,609,719	88,617	140,669,699	78,447	167,064	38,765	23.20%	99.99%

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