

## = 7 Subway Extension =

The 7 Subway Extension is a subway extension of the New York City Subway's IRT Flushing Line. The extension stretches 1 mile ( 1 @. @ 6 km ) southwest from its previous terminus at Times Square , at Seventh Avenue and 41st Street , to one new station at 34th Street and Eleventh Avenue . A second station at 10th Avenue and 41st Street was dropped from the plans in October 2007 . The entirety of the extension is located within the New York City borough of Manhattan and is served by the 7 local and < 7 > express services . The extension , a key part of the Hudson Yards Redevelopment Project , is expected to bring business and entertainment into the area , as well as aid redevelopment of nearby Chelsea and Hell 's Kitchen , located around the Long Island Rail Road 's West Side Yard . The extension also serves the nearby Jacob K. Javits Convention Center .

The project was originally proposed in 2005 as part of the Hudson Yards project , which included the failed attempt to build the West Side Stadium for the New York Jets and the city 's bid for the 2012 Summer Olympics . Although the stadium plan was rejected by the state legislature , the rest of the Hudson Yards , including the 7 subway extension plan went forward . Construction on the extension started in 2007 .

The extension 's opening was pushed back multiple times from its original target of December 2013 . The delays were attributed to a variety of problems , mostly involving the 170 @-@ foot @-@ long ( 52 m ) incline elevators that were custom @-@ designed for the new station . The extension finally opened to the public on September 13 , 2015 .

## = = Historical context = =

Proposals to extend the transit system to the Far West Side to support massive redevelopment were floated as early as 1969 , when the New York City Planning Commission 's ( CPC 's ) master plan proposed to expand midtown westward along a 48th Street transit line to replace what the plan described as " blocks of antiquated and deteriorating structures of every sort " between Eighth and Twelfth avenues . That proposal for the West 40s and 50s failed after voters rejected a state bond issue that would have financed the proposed new east @-@ west transit line or " people mover . " Subsequently , attention shifted to the West 30s and the IRT Flushing Line .

In response to the CPC 's 1993 proposal to improve access to the Manhattan Central Business District , the Metropolitan Transportation Authority ( MTA ) began exploring the possibility of a 7 extension to New Jersey . In 2001 , a business and civic group convened by Senator Charles Schumer argued that a westward extension of the Midtown office district could not be accomplished without a subway extension , saying :

The long blocks along the avenues make the walk as long as 20 minutes to the westernmost parts of the area . In addition , there is no convenient link from Grand Central Station or elsewhere on the east side of Manhattan , making the Far West Side a difficult commute for workers from parts of Manhattan , Queens , Westchester and Connecticut .

An extension of the Flushing Line was then proposed as part of the New York City bid for the 2012 Summer Olympics . The City wanted to get funding before July 2005 , at which time the International Olympic Committee would vote on funding . However , due to shortfalls in the MTA 's Capital Program , as well as preexisting funding for the Second Avenue Subway and East Side Access , the MTA could not pay to fund the extension . After a proposal for the West Side Stadium , an Olympic stadium to be located above the nearby West Side Yard , was rejected in 2005 , New York City quickly lost their Olympic bid . However , in a report entitled No. 7 Subway Extension ? Hudson Yards Rezoning and Development Program , the government of New York City , devised a rezoning plan for the Hudson Yards area and proposed two new subway stations to serve that area . The subway extension was approved following the successful rezoning of about 60 blocks from 28th to 43rd Streets , which became the Hudson Yards neighborhood .

Mayor Michael Bloomberg 's December 12 , 2006 , address to the New York League of Conservation Voters noted that in November 2006 , the government began issuing bonds to fund the extension of the 7 subway to Eleventh Avenue and 34th Street . The \$ 2 @. @ 4 billion extension

was funded with New York City funds from municipal Tax Increment Financing ( TIF ) bond sales that are expected to be repaid with property tax revenues from future developments in areas served by the extension .

= = Construction progress = =

In October 2007 , the Metropolitan Transportation Authority ( MTA ) awarded a \$ 1 @. @ 145 billion contract to build 7 @, @ 000 feet ( 2 @, @ 100 m ) of twin @- @ tube tunnel from the 7 train 's then @- @ terminus at Times Square to the then @- @ planned shell of the 34th Street ? Hudson Yards station . The contract was awarded to S3 , a joint venture of J.F. Shea , Skanska USA Civil , and Schiavone . The extension 's construction was overseen by the MTA 's Capital Construction division . Dattner Architects , designed the 34th Street station . After excavating the new terminal 's shell and creating the first 1 @, @ 000 feet ( 300 m ) of tunnel using the drill @- @ and @- @ blast method , S3 placed two tunnel @- @ boring machines ( TBMs ) in the ground to dig the remaining 6 @, @ 000 feet ( 1 @, @ 800 m ) ; as it dug , each TBM placed precast concrete liner segments to create the tunnel interior .

Early on in the project , it was announced that the new stations would feature platform screen doors . The stations ( along with the new South Ferry station on the IRT Broadway ? Seventh Avenue Line and the three Phase 1 Second Avenue Subway stations in the Upper East Side ) would include special air @- @ cooling systems to reduce the temperature along platforms . Due to its depth , the extension has ventilation towers , rather than the ventilation grates ubiquitous in the rest of the subway system .

However , in October 2007 , soon after the announcement of the new extension , the 10th Avenue station was canceled due to an overrun of the \$ 2 @. @ 4 billion budget , and the MTA did not have an extra \$ 500 million to build the 10th Avenue station . On December 3 , 2007 , the MTA conducted a ceremony at the Times Square subway station marking the launch of construction of the 7 train extension . The contractor began excavating the station cavern adjacent to the Javits Convention Center . One physical hindrance to the construction of the extension was the lower @- @ level platform at 42nd Street ? Port Authority Bus Terminal on the IND Eighth Avenue Line . The abandoned platform was partially razed to allow the 7 train extension to be built .

In June 2008 , construction on the tunnels began along Eleventh Avenue in Manhattan . In February 2009 , S3 lowered the first of two tunnel @- @ boring machines into a giant shaft at the corner of 25th Street and Eleventh Avenue . The two boring machines dug parallel 7 @, @ 100 @- @ foot ( 2 @, @ 200 m ) long tunnels north along Eleventh Avenue to the current terminus of the 7 service at 41st Street and Times Square . The MTA posted a construction update with photographs on its website in November 2008 , showing substantial progress .

The MTA completed excavation of a 150 @- @ foot ( 46 m ) long cavern in June 2009 . The cavern was dug below the bus entrance ramp to the lower level of the Port Authority Bus Terminal and formed part of the eastern end of the new extension and connected it to the Times Square station . At the same time , tunnels were being dug northward from the machine shaft at 26th Street ; soft ground at 27th and 28th Street required 300 feet ( 91 m ) of ground to be frozen so that the tunnel @- @ boring machines could easily dig through the soil . On December 21 , 2009 , it was announced that a tunnel @- @ boring machine broke through the 34th Street station cavern wall . Both tunnel @- @ boring machines were scheduled to finish the required tunneling in the spring of 2010 .

In June 2010 , one of the TBMs completed its tunnel at the cavern . The second TBM broke through the wall of the cavern on July 15 , 2010 , completing its tunneling operation . The TBMs were partially disassembled and backed up to the 25th Street shaft , where they were lifted out . In April 2011 , the MTA announced that the contract covering the tunnels , the 34th Street station mezzanine and passenger platform was 85 % complete , and that the systems contract , covering mechanical and electrical systems , electric power , lighting and train tracks would be awarded by July 2011 . A second entrance to the station is planned . In May 2012 , the MTA announced that the extension , now 65 % complete , had received the installation of the first set of rails .

On August 21 , 2013 , the MTA announced that the 7 Subway Extension was 90 % complete . On

December 20 , 2013 , Mayor Michael Bloomberg took a ceremonial ride on a train to the new terminal , celebrating a part of his legacy as Mayor ; at the time , the proposed opening date was June 2014 .

== Delays ==

Soon after Bloomberg 's ceremonial ride , the opening date of the subway extension was pushed back from June to early fall 2014 , then to November 2014 , then to February 2015 , and then to May 2015 . Most of the problems were attributed to the incline elevators being installed in the station , and to the ventilation fans along the tunnel .

On October 1 , 2014 , the MTA told the New York Daily News that the agency had signed a new agreement with the prime contractor , offering up to \$ 4 @. @ 75 million in incentive payments if the new station was finished and ready to open to the public by February 24 , 2015 .

Just two and a half months later , though , the MTA stated that it was unable to open the subway extension for service until April to July 2015 , due to the failure to get the inclined elevators to work properly . Problems with the security and fire alarm systems were also blamed for the delays . A December 2014 New York Post article attributed the delay to Hudson Yards ' developer , The Related Companies ' , need to dig caissons for the foundations , just above the subway station , and the foundation work needed to be complete before the MTA could open the station . Continuing trouble with the fire and security alarms in March 2015 would delay the opening until summer .

The use of inclined elevators was intended to provide wheelchair @-@ bound patrons with a shorter , easier path to the train platform , as well as to reduce tunneling costs . The two elevators were manufactured by Maspero Elevatori , in Appiano Gentile , Italy , using a controller made on Long Island , speed governors made in Ohio , and buttons and other parts in Queens . The software for the elevator was written in the United States . Maspero Elevatori assembled the elevators in Italy , and they failed an operational test there , prior to being shipped to the United States . The MTA said the manufacturer chose to use American subcontractors in place of local Italian suppliers after reading the specifications the transit agency submitted . The MTA has been working with the manufacturer to try to resolve the problems caused by a very high level of customization .

On June 1 , 2015 , a representative for the MTA described the extension as " 99 % complete " . That day , test runs of 7 trains started running to 34th Street ? Hudson Yards in preparation for the summer 2015 opening of the extension . However , on June 15 , the extension was pushed back again to " before the end of the third quarter " . On July 20 , 2015 , it was reported that the MTA planned to open the extension to the public on September 13 , 2015 . The opening date was confirmed on August 28 , 2015 . The station was opened at a ribbon @-@ cutting ceremony on September 13 at about 1 p.m.

== Gallery ==

== Construction areas ==

== 34th Street ? Hudson Yards station ==

The 34th Street ? Hudson Yards station is at the intersection of 11th Avenue and 34th Street . It is the only station on the extension , and it opened on September 13 , 2015 . The MTA says that the new station will " make it possible for new housing , restaurants and entertainment to grow " in the surrounding neighborhoods , including Hell 's Kitchen and Chelsea . The station is also close to the Jacob K. Javits Convention Center .

Passenger access to the station includes a pair of incline elevators . The project has been plagued by delays because of the mishaps involved in the installation of the custom @-@ made elevators . In June 2012 , the extension 's opening was delayed to June 2014 , with the rest of the 34th Street ?

Hudson Yards station to open at the end of 2015 ; As of December 15 , 2014 , the opening date was changed to mid @-@ 2015 . In April 2014 , the first of the 170 @-@ foot @-@ long ( 52 m ) incline elevators was installed in the station . The 80 @-@ foot ( 24 m ) high incline elevators are the first of their kind in the system .

= = = Above @-@ ground structures = = =

The extension contains five street @-@ level structures :

Site A , a ventilation building at 11th Avenue between 25th and 26th Streets

Site J , a ventilation building at 11th Avenue between 33rd and 34th Streets next to the main entrance and elevator entrance

Site K , a ventilation building at 11th Avenue between 35th and 37th Streets

Site L , a ventilation building at 41st Street and Dyer Avenue

Site P , the secondary station entrance between 11th Avenue between 34th and 35th Streets

= = Proposals = =

= = = 10th Avenue station = = =

Although a new station at 10th Avenue and 41st Street was part of the original plan , the intermediate station was eliminated in October 2007 due to cost overruns , leaving the terminal station at Eleventh Avenue and 34th Street as the only new station on the extension . The MTA indicated that the 10th Avenue station could be included in the project if funding were found . The station was not included in the original ( 2007 ) contract award , but was listed as a \$ 450 million option . In late December 2007 , reports indicated that the postponed station might be partially built if the City of New York and the MTA agreed on the additional financing for the station shell . In February 2009 , the MTA announced that it would build the station if the agency received sufficient funds from the federal economic stimulus package . In June 2010 , the city announced it was seeking funding to assess the feasibility of constructing the station at a later date using a two @-@ platform , two @-@ entrance model without an underground connecting passage .

= = = Proposed New Jersey extension = = =

Seventeen years after a 1993 MTA study on extending the 7 service across the Hudson River , The New York Times reported that Mayor Michael Bloomberg 's administration had been considering an extension to Hoboken and to Secaucus Junction in New Jersey , where it would connect with most New Jersey Transit commuter lines . It would offer New Jersey commuters a direct route to Grand Central Terminal on the East Side of Manhattan and connections to most other New York City subway routes .

If opened , the extension would take the New York City Subway outside the state 's borders for the first time . The plan would replace the Access to the Region 's Core ( ARC ) tunnel , which was canceled by New Jersey Governor Chris Christie in October 2010 .

On February 2 , 2011 , the city 's Economic Development Corporation voted to budget up to \$ 250 @,@ 000 for a feasibility study of a tunnel for the subway line extension . The engineering firm Parsons Brinckerhoff carried out the study . The report was released in April 2013 . The proposal includes the construction of the in @-@ fill station at 10th Avenue , tunnels running along the path of the ARC tunnel , and a multi @-@ level multi @-@ modal addition to Secaucus Junction . A widening of the right @-@ of way of the Northeast Corridor was considered .

The New York Post has reported that the Flushing line extension to Union City and Secaucus will have a formal proposal made by Mayor Bloomberg around the end of 2012 . New Jersey Governor Chris Christie and the Port Authority are on record as supporting the plan , along with splitting the estimated US \$ 10 billion cost if it is officially approved .

A subway extension would cost less than the ARC tunnel , as it would start at the planned station at Eleventh Avenue and go west , avoiding the expensive tunnel boring work east to Herald Square and the complex station deep underground there . However , travel times into Manhattan might be longer than under the original ARC proposal , because riders would need to transfer to the subway from New Jersey Transit trains at Secaucus . Additionally , because NJT trains would continue to or from Penn Station , the key goal of reduced tunnel congestion between New Jersey and New York would not be achieved . On the other hand , as Governor Christie said " It would actually connect us to the east side of Manhattan , like we always wanted to ... " Bloomberg had yet to meet with New York Governor @-@ elect Andrew Cuomo and the project , which could require five additional years to develop , would not be automatically entitled to the federal funding allotted to the ARC tunnel .

Amtrak 's February 2011 announcement of the Gateway Project includes a proposal to extend the 7 service three blocks east of Eleventh Avenue to New York Penn Station , instead of five miles west to Secaucus . Gateway , under auspices of Amtrak , would include a high @-@ speed rail right @-@ of way from Newark Penn to New York Penn and provide more capacity on New Jersey Transit rail operations . US Congress allocated \$ 15 million for studies for the project in November 2011 . It is likely the two projects , Gateway and the subway extension , will be in competition for funding .

In April 2012 , citing budget considerations , the director of the MTA , Joe Lhota , said that it was doubtful the extension would be built in the foreseeable future , suggesting that the Gateway Project was a much more likely solution to congestion at Hudson River crossings . However , a feasibility study commissioned by the city and released in April 2013 revived hope for the project , with Mayor Bloomberg saying " Extending the 7 train to Secaucus is a promising potential solution ... and is deserving of serious consideration . "

In a November 2013 Daily News opinion article , the president of the Real Estate Board of New York and the chairman of Edison Properties called for the line to be extended to Secaucus in tunnels to be shared with the Gateway Project . Later in November 2013 the New Jersey Assembly passed a Resolution 168 supporting the extension of the line to Hoboken and Secaucus .

= = Awards and innovations = =

The New York State Society of Professional Engineers awarded the first construction phase , " Running Tunnels and Underground Structures , " its 2013 Construction Project of the Year . According to the society , the project team won the award " for outstanding professional engineering efforts in developing creative solutions and innovative technologies in construction of an infrastructure project . The No. 7 project used the first double @-@ shielded tunnel boring machines ( TBMs ) to tunnel under New York City while placing precast concrete segments to form the tunnels ? walls . For the first time in the world , a ground freezing method was used to harden soil to act as rock to allow TBMs to maintain proper course while boring and placing the tunnel liners . " While the extension extends 1 mile ( 1 @. @ 6 km ) , the tunnels are actually 1 @. @ 5 miles ( 2 @. @ 4 km ) long .