



ORANGE LINE

A TOTAL TRANSFORMATION

TIM DOHERTY/PHOTOS BY THE AUTHOR EXCEPT AS NOTED

I started on a train that took people to work,” remarked the Medford, Mass.-born travel writer Paul Theroux, as he embarked on the Orange Line to begin a long train journey from Boston to the tip of South America. Boarding at the newly opened Wellington station in the late 1970s, Theroux joined the 100,000 other daily Orange Line passengers on a line midway through a modernization project that would see both ends of the line entirely replaced.

The Massachusetts Bay Transportation Authority (MBTA), or “the T,” as it is more commonly known by riders, fans, detractors, and the public at large in Massachusetts, is the sixth-largest transit system in the U.S. Serving 171 cities and towns across eastern Massachusetts and operating all modes of service from streetcars to ferry boats, MBTA is complex, old, and currently in a long period of crisis.

Shortly after its creation, MBTA

commissioned a new marketing and design system to bring unity and simplicity to the information it gave passengers. The use of colors and graphics according to the standards developed in 1965–1966 remains in place today. The bold red, blue, green, orange, yellow, and purple represent the four rapid transit lines, the bus network, and the commuter rail system. How did the Orange Line become orange? The color looked good on the map compared to the other lines associated with distinct locations — red for Harvard University, blue for the ocean bordering the line to Wonderland, and green for the Emerald Necklace of public parks that runs through Boston and Brookline. The Cambridge Seven architecture firms that developed the design guidelines would

OPPOSITE: Amtrak’s Northeast Corridor and MBTA Commuter Rail share the right-of-way between Boston South Station and Wickford Junction in Rhode Island. On November 7, 2022, Amtrak Train 137 passes an inbound Orange Line train at Roxbury Crossing station.

ABOVE: An Orange Line train leans into the curve near Dover station on the old Washington Avenue Elevated on August 30, 1986. Less than a year later, the southern portion of the Orange Line would move to the new Southwest Corridor alignment. STEVE ZABEL PHOTO, ANDREW GRAHL COLLECTION



ABOVE: After the Washington Street Elevated closed on April 30, 1987, the Northampton station house was moved to Seashore Trolley Museum in Kennebunkport, Maine, in 1988. GLENN SMITH PHOTO, ANDREW GRAHL COLLECTION



RIGHT: An Orange Line train departs North Station on March 29, 1975. The old Charlestown Elevated closed on April 4, and the new Haymarket North extension opened on April 7. STEVE ZABEL PHOTO, ANDREW GRAHL COLLECTION



BELOW RIGHT: An Orange Line train departs Egleston station on August 30, 1986. The old Washington Street El had all the charm of turn-of-the-century urban transportation as it passed through old neighborhoods of South Boston. STEVE ZABEL PHOTO, ANDREW GRAHL COLLECTION



LEFT: In a 1982 image taken from the roof of Tower H just beyond the old Forest Hills terminal of the Washington Street Elevated, a nearly new train of Hawker-Siddeley cars approaches the storage yards to the south. The cleared area on the left is the former New Haven main line where the Southwest Corridor trench and new Forest Hills station will be built. RICHARD CHEEK PHOTO, LIBRARY OF CONGRESS HAER MASS,13-BOST, 127-82

go on to design multiple MBTA projects, including the Orange Line's new Forest Hills station.

The Main Line Elevated

When MBTA was created in August 1964, the Main Line Elevated was eight miles long with 15 stations, including five in downtown Boston. Opened in 1901, the northern end came above ground on the Charlestown Elevated at the Canal Street Incline between Haymarket and North Station and continued to Everett, just north of Boston via Sullivan Square, and Charlestown in Boston. The tunnel under Washington Street, with its five stations, connected the northern end with the Washington Street Elevated, which continued over the street all the way to Forest Hills. On the present Orange Line, both the northern and southern ends have changed dramatically, rebuilt in a flurry of mass transportation construction that began in the 1960s and ended in the 1980s.

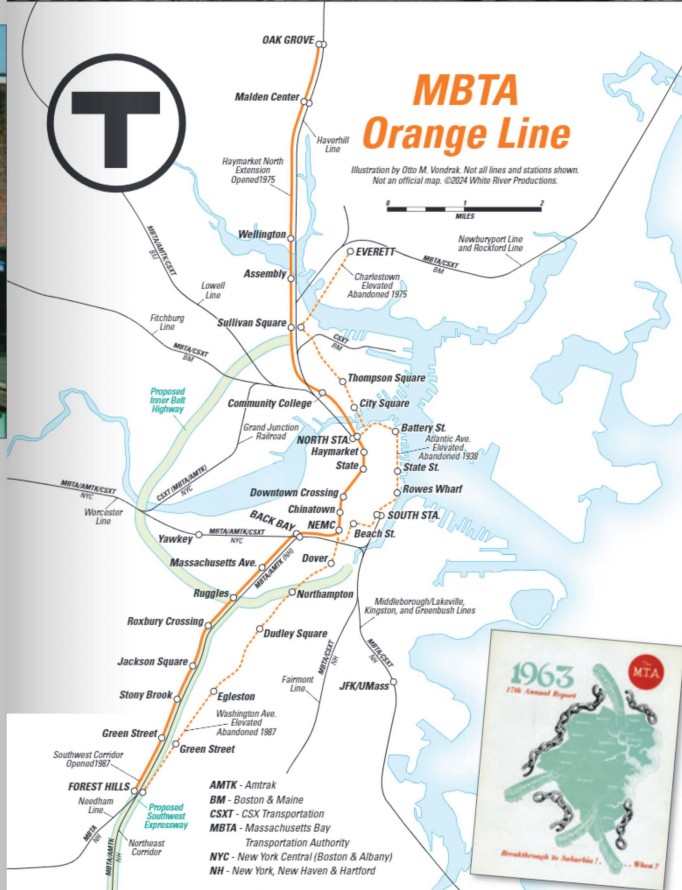
Right before the turn of the 20th century, the congestion caused by the large number of streetcars coming into the center of the city spurred the construction of the subways and elevated lines by the Boston Transit Commission, financed with city and state funds. Once completed, these lines were leased back to Boston Elevated Railway for operation. The core of the MBTA's modern rapid transit lines was constructed between 1897 and 1927, with the last section opening just before World War II.

As the first subway along Tremont Street was being constructed, work

began on the Main Line Elevated. Seeking economy, the Boston Transit Commission constructed elevated lines rather than underground subways in the interest of cost savings. Opening on June 10, 1901, between Sullivan Square and Dudley station, the elevated lines were true rapid transit lines with limited stations, electric multiple-unit (EMU) equipment, and a dedicated right-of-way that provided much faster travel times than did streetcars in city traffic. The Main Line initially shared a portion of the Tremont Subway until the tunnel under Washington Street opened in 1908. The parallel Atlantic Avenue Elevated opened first in 1901, connecting North and South stations as well as the many steamship and ferryboat docks along Atlantic Avenue. Less than successful during its operation, the Atlantic Avenue Elevated ran its last train on September 30, 1938, and is the only Boston rapid transit line

to be abandoned, dismantled, and sold for scrap.

When the elevated lines opened, the surface streetcar operation changed dramatically, as all these lines now terminated at various elevated terminals instead of running through downtown. The long-haul radial streetcar lines that once went into the city were rearranged and connected to the rapid transit lines that now provided long-haul service to the center of Boston. Operating on surface streets, these routes now collected passengers from their neighborhoods and transferred them to the rapid transit lines. Boston was one of the earliest systems to coordinate surface operations with rapid transit through transfers. The extensive and complex transfer systems from surface lines to outlying rapid transit stations like Harvard, Sullivan, Lechmere, Wonderland, Ashmont, and Forest Hills remain today.



The postwar economy increased car ownership, and G.I. Bill incentives supercharged suburban housing beyond the reach of what was then the Metropolitan Transportation Authority. Responding to the challenge of declining ridership, MTA converted surface routes to buses, cut headways, and deferred maintenance. By 1969, the total passenger volume was reduced to 153 million trips per year, down 24 percent from 1960 and 65 percent from the postwar high of 1946. More surprisingly, it was only 11 percent above the total in 1891.

By increasing the headways — the time intervals between trains, buses, or streetcars passing the same points on the same routes — MTA repeatedly sought to limit costs but also drove away passengers. Headway increases saved labor costs by requiring fewer vehicles and operators rather than cutting routes completely. Over time, these changes compounded the impacts on passengers, as the efficiency of connecting to the rapid transit system decreased, causing longer wait times and risking missed connections. Similar challenges to the transfer system occurred more recently, as widespread slow orders from infrastructure defects caused longer travel times on the combined rapid transit system and bus feeders, slowing the MBTA's post-pandemic ridership recovery.

By 1960, neither Boston's rapid transit lines nor the surface lines transferring to them reached far enough to catch the ever-increasing number of commuters now traveling into Boston in their cars. The previously highly efficient system now struggled to increase suburban ridership while limiting costs. Recognizing the need to achieve greater market reach, the cover of MTA's 1963 annual report (which would be its last) asked, "Break-through to suburbia... When?"

Haymarket North Extension

The Haymarket North Extension, initially intended to reach Route 128 in Reading, would replace the Charlestown Elevated when proposed in the early 1960s. This, and the South Shore



Your new Orange Line extension is ready. Please pick it up at Haymarket Station.

We hope you'll enjoy riding the new Orange Line extension. If you have any environmental questions, please call us at 722-5677.

the answer

the answer

ABOVE: The North Station “superstation” combines the Orange Line station constructed during the Haymarket North project opened in 1975 and a new Green Line station opened in 2004, allowing cross-platform transfers to the light rail system.

RIGHT: An Orange Line train crosses the Mystic River on Dana Bridge at sunset in April 2008. The bridge carrying the Orange Line and Haverhill commuter rail line was named after Edward Dana, general manager of Boston Elevated Railway and its successor Metropolitan Transit Authority from 1919 to 1959.



extension of the Red Line, were the first two new subway projects undertaken in Boston since the Great Depression. The present-day Orange Line is shaped by the dual postwar scourges of American cities — urban renewal and the interstate highway system; Boston lost nearly a third of the city.

Urban renewal sought to open up large

portions of city land for redevelopment and to increase property taxes by removing what were believed to be blighted neighborhoods and buildings. In Boston and across the country, these efforts were made without regard to the residents of areas subject to redevelopment. Furthermore, cities received federal loans for land acquisition and slum clearance,

as well as grants to cover two-thirds of their costs in excess of the sale price to developers.

A primary purpose of the Haymarket North Project was to open large tracts of land located on either side of the elevated, from North Station to the Boston & Maine railroad yards across the Charles River and within Charlestown.



ABOVE: A pair of Orange Line trains passes Assembly station on December 15, 2019. Opened in 2014, Assembly was the first new MBTA rapid transit station to open since 1987. The infill station has successfully leveraged the massive mixed-use redevelopment of the adjacent Assembly Square and Assembly Row complexes built on the site of a former Ford plant in Somerville, Mass.

LEFT: No service beyond North Station. After the 30-day shutdown of the Orange Line in 2022, MBTA passengers have become familiar with temporary line closures to complete repair work beyond the previous overnight hours. MBTA has planned for an additional 39 days of shutdowns on the Orange Line in 2024 to remove the remaining slow orders.

The Central Artery, the first highway through Boston, also needed to be connected to I-93 in the same area.

The transportation needs for the elevated were widely understood, as it carried 75,000 people into Boston per day in the early 1960s. The construction of the highway above would be done in parallel and provide a portion of the funding required for this transit project.

The Haymarket North Extension would move the line out of Charlestown under the Charles River just to the east of North Station. The tracks would run under the overhead construction of I-93 past the new Community College station, then on a viaduct over the Mystic Division of B&M to a new Sullivan Square station. Following the B&M Western Route (Haverhill Line) north to Medford, Malden, and Melrose in its initial phase, this line had the potential to run all the way to Route 128 in Reading. A third express track was constructed between Community College and Wellington to serve the Reading extension. Once begun, construction work was constrained by the need to maintain B&M railroad operations and the construction of the

highway. Delays in purchasing the Western Route right-of-way from B&M slowed design reviews, contracting, and eventually construction until MBTA took ownership.

The Charlestown Elevated closed on April 4, 1975, and the Haymarket North Extension opened three days later from the new underground North Station, Community College station, and Sullivan Square station. The station at Wellington, with a parking lot that initially held 1,000 cars, opened on September 6, 1975. Adjacent to this station stood the new Wellington Shops along with the storage, repair, and maintenance facilities for the Orange Line. The station at Malden opened on December 27, 1975, and the northern terminus at Oak Grove opened on March 19, 1977. At the opening of Oak Grove, state officials announced that the T was no longer considering extending the line farther north into the suburbs.

In contrast to the Washington Street Elevated, the demolition of the 74-year-old Charlestown Elevated was welcomed by the community and their elected officials as a significant step toward neighborhood revitalization. The ceremony kicking off its demolition was attended

by more than 500 people, some of whom broke bottles marking the “destruction of that black serpent of blight,” as reported in news stories at the time.

Highway Crisis Spurs Subway Expansion

By the late 1960s, Boston had developed a massive plan for urban highways constructed and funded through the Federal interstate highway program. The 1956 Federal-Aid Highway Act provided the funding to build 41,000 miles of highways over a 10-year period. The favorable funding terms of 90 percent federal funds and 10 percent local funds made highways very attractive.

The construction of interstate highways has had wide ramifications for public transit, railroads, cities, and environmental rules ever since. The greatest friction occurred when highways came to the edge of cities. Highway planners were more focused on efficiently placing highways through cities than on improving the cities’ internal transportation needs or addressing impacts the highways created when blasting through existing cities. The excesses of constructing the interstate highway system resulted in extensive, time-consuming, and expensive requirements for new projects, which not coincidentally became an issue after the 1972 statutory deadline for the completion of the interstate system. Few new highways have been planned since then, but the same federal requirements now hamper the construction of new rail lines, transit lines, and entire new systems.

Conceived to mirror the existing Route 128 outer ring around Boston, the 7.3-mile-long inner belt of I-93 would run through Somerville, Cambridge, and Boston. A third harbor tunnel would connect the highway to Logan Airport in East Boston. A new Southwest Expressway would branch off from the inner belt, running parallel to the New Haven main line through Boston to Route 128 near the location of the Route 128 station. The center of the Southwest Expressway would provide the right-of-way for an expanded Orange Line that would reach Route 128.

The earlier heavy-handed construction of the Massachusetts Turnpike into the center of the city, and the massive land and housing takeovers required to construct the Southwest Expressway and inner belt through Boston and Cambridge, fueled widespread and deepening opposition to highway construction. In hindsight, the projects would have placed the city center in a moat of highways, cut off from the city’s other neighborhoods. Furthermore, the land and

housing takeovers were significant, with limited funds to replace the lost housing and compensate property owners and tenants. (These earlier excesses led to a federal rules change in 1970.)

Public opposition to the highway projects, although initially unsuccessful at the state level, finally caused the Federal Highway Administration to conduct a reevaluation study, which slowed work. Massachusetts Governor Francis Sargent, seeking a way out of this crisis in late 1969, called for a study of the transportation planning process in the Boston area. Shortly thereafter, the governor

RIGHT: Built during the Southwest Corridor project and opened in 1987, modern Back Bay station has three sets of tracks with the Orange Line in the middle, the MBTA Worcester Line (Boston & Albany) main line to the north, and Northeast Corridor with Amtrak and the MBTA commuter rail to the south.

BELOW: In 1974, MBTA purchased Boston & Maine's Western Route to rebuild the Orange Line from Sullivan Square to Oak Grove, and replaced Draw 8 over the Mystic River with the Edward Dana Bridge. On July 16, 2008, B&M successor Pan Am Railways' Peabody local is an Oak Grove-bound Orange Line train crosses the Dana Bridge against the backdrop of Boston.

imposed a highway construction moratorium and stopped property acquisition required for construction while a comprehensive report was generated to guide future transportation projects. Once the state highway commissioner, Sargent was the right person at the right time, when "everyone was sure that highways were the only answer ... for years to

come. We were wrong. Today, we know more clearly what real needs are — what our environment means to us, what a community means to us, and what is valuable to us as a people." The new comprehensive transportation planning process looked at a wide range of transportation alternatives from highways to transit. Revolutionary at the time, it is



ABOVE: A poster advertising the opening of the Orange Line Southwest Corridor extension on May 4, 1987. MBTA

LEFT: A Forest Hills-bound Orange Line train is just beyond Jackson Square station on the Southwest Corridor with the three parallel railroad tracks in the foreground on November 2, 2023. The 154-car order of CRRC-MA No. 14 cars should allow peak headways of one train every four minutes.

BELOW LEFT: Afternoon Orange Line riders at Roxbury Crossing station on June 25, 2024, illustrate that public transit is not just for traveling to and from work, as yes, you can bring your hula hoop on the train.



park above. The construction of an arterial street between Forest Hills and the Expressway was also a part of the project, to improve local access and facilitate the redevelopment of the 108 acres of property that were taken and cleared for the canceled highway project.

The over-70-year-old Washington Elevated structure had not aged well by the mid-1970s. Last fully painted in the 1930s, the steel structure dripped rust in wet weather and cast deep shadows on the street below. Six stations provided access to the Orange Line, ranging from simple covered platforms to complex bus feeder transfer complexes at Dudley and Forest Hills. Looking old and tired, the Elevated did not present the image of a modern, safe, and efficient transit system that was needed to attract new riders.

The evolution of the Southwest Corridor project in the wake of successful community opposition to the highway delivered a product far different than a traditional transportation project. The MBTA, its design teams, and its stakeholders engaged in a massive community outreach process that actively sought out the involvement of the public in all aspects of the project, down to the fine details of station lighting design. As a result, the project delivered a new transit system, a new linear park, new commercial areas around stations, and land for future economic development. Furthermore, Boston received a billion-dollar investment in the city instead of a neighborhood-destroying highway.

An important element of the Southwest Corridor project was the shift during construction of all Amtrak Northeast Corridor trains and MBTA commuter trains to a rehabilitated former New Haven Midland Division/MBTA Fairmount Line that had not seen passenger trains since

now required procedure for large federally funded projects. Returning to the public in November 1972, Sargent dropped most of the highway projects and announced a major investment in transit.

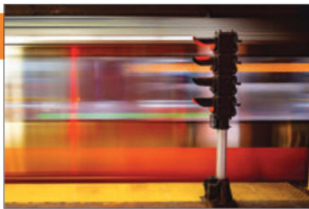
Transit and the MBTA initially had a modest role in the 1960s highway crisis. The MBTA was focused on the replacement of rolling stock on the Green and Blue lines, expansions to both the Red and Orange lines, and the replacement of the Charlestown and Washington Street elevated structures on the Orange Line. However, these projects did not have the same funding that highway projects did with their 90 percent match of federal funds to local funds. With limited funding opportunities, transit projects did not initially present a viable alternative to highway projects.

Critical funding for the transit projects came from a new interstate transfer program included in the 1973 Federal

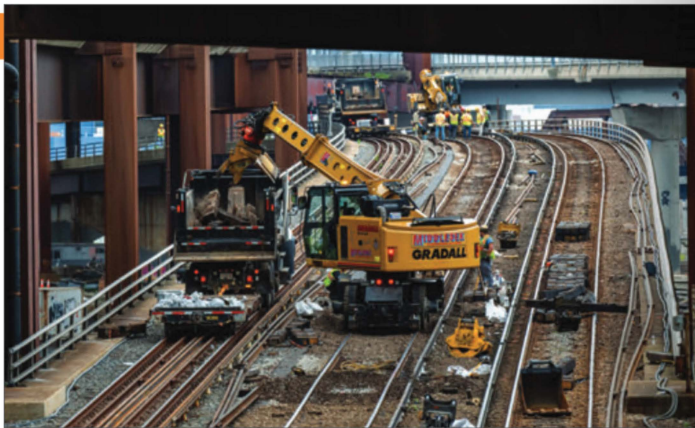
Highway Act that allowed funds from canceled highway projects to be used for transit. This mechanism funded the Orange Line relocation to the Southwest Corridor and became the basis for new transit investments nationwide.

The Southwest Corridor

The former New Haven main line into Boston was constructed on a high stone embankment that effectively walled off the neighboring communities along its route from Forest Hills. Located approximately four blocks north and west of the Washington Street Elevated, the NH route was chosen to relocate the Orange Line and railroad lines side by side for 4.7 miles between South Cove and Forest Hills. The two rapid transit tracks of the Orange Line and three tracks for commuter and intercity (Amtrak) trains would be completely rebuilt in a partially covered trench, creating a parallel linear



ABOVE: A new Orange Line train blurs by the departure signal at Forest Hills station. In addition to track repairs and new subway cars, MBTA is replacing the signals on the Orange Line with a new digital system that will allow faster and more flexible operation. The older relay-based train control system dates back to the 1970s and 1980s.



ABOVE RIGHT: At the end of June 2024, one of the longest-lasting speed restrictions is lifted as ties and rails are replaced on the tracks between Community College and Sullivan Square stations, including the 1,500-foot Orange Line viaduct over the commuter rail tracks near FX interlocking in Charlestown.



RIGHT: It's twilight time at Oak Grove station at the northern end of the Orange Line in Malden. Oak Grove opened as the northernmost stop on the rebuilt northern portion of the Orange Line on March 21, 1977. The low geometric design of the station is a common element of the Haymarket North Extension stations. MBTA later added new elevators to all the stations for improved ADA accessibility.



LEFT: Boston's Back Bay skyline looms over the Southwest Corridor's five-track right-of-way on November 5, 2023. The three nearest tracks are shared by Amtrak and MBTA commuter rail trains, and the two farthest are the Orange Line tracks to and from Forest Hills.

BELOW LEFT: The now-ubiquitous MBTA station countdown signs were implemented quickly in the early 2010s, like this one announcing the next train to Oak Grove arriving at Green Street on October 3, 2023.



1960s to the 1980s, MBTA entered a trough in the 1990s and 2000s, racking up a staggering backlog of needs to return the system to a "state of good repair." Multiple reports between 2002 and 2023 estimated the cost of restoration at a jaw-dropping \$24.5 billion.

Four back-to-back blizzards in winter 2015 shut down both ends of the Orange Line, leaving only the portion of the line in the Downtown tunnel running. MBTA's systemic failures resulted in widespread public awareness and the political will to finally do something to improve the system. Massive investments in capital funding have followed, attempting to address the state of good repair backlog. Both before and during the pandemic, MBTA leaders sought to massively increase capital spending to jump ahead on repairs while continuing to operate and maintain the system.

A Look to the Future

By the end of *The Old Patagonian Express*, Paul Theroux's train journey took him to the tip of South America after beginning on the Orange Line. Over the last two years, it has seemed to some passengers that they wouldn't even make it to downtown Boston. Faced with multiple challenges, MBTA took the radical step of shutting down the entire Orange Line for 30 days in August 2022 in an attempt to jump ahead with construction work. A 30-day shutdown of the line that carried 101,000 daily riders, 49 percent of the pre-pandemic average, would provide, according to the T, the equivalent of

five years of weekend shutdowns. Rather than returning a fully functional Orange Line, as the public was led to believe, the shutdown exposed two truths — first, there was a lot more work required to address the many challenges on the system, and second, complete line shutdowns were efficient ways to complete repair work despite disrupting passengers.

The Orange Line is not alone in its struggles. At their peak in May 2023, 25.1 percent of the rapid transit lines had speed restrictions. On his first day on the job in April 2023, MBTA General Manager Phillip Eng promised to provide a schedule of when the speed restrictions would be lifted, and he followed through six months later with a December 2024 completion date. Eng has been up-front with the public in his commitment to turn MBTA around for its passengers, stating, "You'll start to see meaningful improvements. It'll be slow at the beginning. But as you start to see them come, I think people will regain that trust." As of May 2024, less than 10 percent of the network had speed restrictions.

So what's next? MBTA faces large capital needs to return to a state of good repair, a stalled return to pre-pandemic levels of ridership, and the challenge of finding stable, long-term funding. MBTA's list of active future projects is limited, which raises the question of whether an extension of the Orange Line along the Needham Line would return to the discussion. In any case, passengers should be able to expect more frequent service as the final sets of new cars are delivered, and more dependable travel times as speed restrictions are removed.

In the 1970s and 1980s, the Orange Line underwent a total transformation from elderly elevated to a modern rapid transit line, thanks to forward-thinking and radical improvements. Hopefully, that spirit will take hold once again so the Orange Line will remain a vital link in Boston's busy rapid transit system. ■

the 1950s. This route between South Station and Readville allowed the new Orange Line and railroad segments to be constructed without interference from railroad operations.

On May 1, 1987, the Washington Street Elevated line was closed, and on May 4, 1987, MBTA Orange Line operation on the Southwest Corridor began. Later that year, on October 5, Amtrak service returned to Back Bay station after a seven-year relocation to the Fairmount Line during the Southwest Corridor construction. While an Orange Line extension to Needham had been pulled from earlier concepts, commuter rail service returned to the Needham Branch on October 18.

The replacement service for the Washington Street Elevated was discussed in the approval documents for the Southwest Corridor. There was a certain optimism about what that might be, but they contained the caveat that such service was subject to approval for capital funds. The nature and quality of the replacement service would be bitterly challenged by community members, politicians, and transit leaders for years, even after the Silver Line bus rapid transit service was implemented along Washington Street to Dudley, now called Nubian Square.

New Cars and a Massive State of Good Repair Backlog

After the opening of the Southwest Corridor, the MBTA and state transportation officials' efforts turned toward the Big Dig highway project and the commuter rail mitigation projects it required. At the same time, new private sector real estate development began to occur along the Orange Line. Around the new Ruggles station, Northeastern University buildings have sprouted from land cleared for the inner belt highway.

North of Boston, images from the opening of the Haymarket Extension show the vast tracts of land that have now been replaced by commercial development. For example, the construction of Assembly station next to a former railroad yard between Wellington and Sullivan stations gave rise to a mini-city of new

construction that grows more buildings every time you look. When it opened in September 2014, Assembly was the first new rapid transit station added to the system since the 1980s.

The next large Orange Line project in the 2000s was spurred by the pressing need to replace the No. 12 Main Line cars built by Hawker-Siddeley of Canada. Delivered between 1979 and 1981, the 120 No. 12 cars are similar to the No. 4 Blue Line cars and to New York's Port Authority Trans-Hudson (PATH) PA3 cars.

In 2014, MBTA engaged in an open procurement process to replace all the Orange Line cars and 78 of the Red Line cars with an option to replace the entire Red Line fleet. With the help of state funds, MBTA was able to require that the final construction of the cars take place in Massachusetts. There were six bidders

for the car order, and the winner was CRRC-MA, the Massachusetts-based subsidiary of the Chinese-owned company China Railway Rolling Stock Corporation (CRRC). As all the documents are publicly available, it is easy to see MBTA's reasoning in accepting CRRC's bid for the cars, which was significantly less than the other bidders. However, the world has changed quite a bit since 2014, and the bid process on either side could not account for rising concerns about Chinese industrial competition, a trade war with tariffs, supply chain issues during the pandemic, and labor challenges. As a result, the delivery of the cars is running late, CRRC is likely losing money on the order, and MBTA is funding a recovery plan for the completion of the cars.

After the burst of funding from the