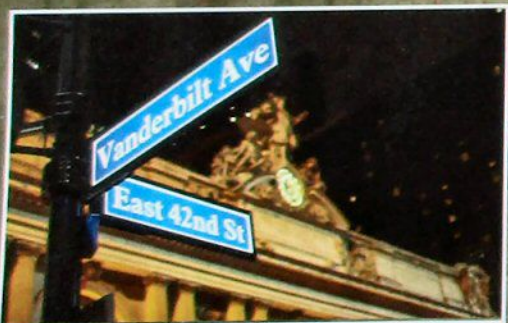


LONG ISLAND BETS BIG ON GROWTH

Largest expansion in 100 years brings residents to Grand Central Terminal

by Dan Zukowski

Photos by MTA Construction & Development



Above: Manhattan's ornate Grand Central Terminal is getting a new 8-track concourse for LIRR trains. Dan Zukowski Main: Workers prepare tracks and switches in the new tunnels leading to the LIRR's new terminal in Grand Central.





This is one of two tunnel boring machines that cut under Sunnyside Yard in Queens, N.Y. Two more, from Italy, bored under Park Avenue in Manhattan.

Chartered in 1834, the Long Island Rail Road is one of the oldest surviving flags in the industry, an enduring part of rail history in America, and a powerful engine in the growth and development of the New York City area. For more than a hundred years, it has been synonymous with Penn Station, operating from there since 1910, three months before the Pennsylvania Railroad did.

Soon, East Side Access, an \$11.1 billion multidecade project, will take Long Island trains to Grand Central Terminal. "Next year, when we finish all of this, this is going to be a transformational moment for the Long Island Rail Road," says Janno Lieber, president of MTA Construction & Development.

The project is immense in scope, from LIRR's new eight-track multilevel station below Grand Central to a new storage yard across the river and the complete rebuild there of Amtrak's Harold Interlocking. East Side Access will rely on the Long Island's ongoing mainline expansion to handle more trains and it opens the way for Metro-North trains from Connecticut to serve Penn Station.

Early planners had dreamed of an LIRR terminus on Manhattan's East Side, close to where New York Central had its original 42nd Street depot and would later build Grand Central beginning in 1903. Construction started in 1892 on a tunnel in Long Island City, just across the river from Manhattan. But a dynamite explosion killed five workers, and the combination of lawsuits and the financial panic of 1893 ended the project. Other bridge and tunnel ideas came and went.

The Pennsylvania Railroad, which was seeking to cross the Hudson River side of

Manhattan, took control of the LIRR in 1900. Various schemes were proposed to connect both lines. One was to tunnel from the lower tip of Manhattan, known as the Battery, to Brooklyn. Another, designed mainly for freight traffic, proposed a circuitous 31-mile route from Rahway, N.J., across Staten Island, on to Long Island under the Verrazano Narrows, and then back to Manhattan for passenger trains via a bridge over the East River.

PRR President Alexander Cassatt decided to separate merchandise and passenger traffic. Carfloats would take freight cars between New Jersey and Long Island, and passenger trains would travel via tunnels under the Hudson and East rivers. That Penn Station landed on the west side of Manhattan at 34th Street and Seventh Avenue came down to physics: ruled by maximum grades on the east and west approaches to the 21-track station.

Today, the Midtown East area around Grand Central is home to the most desirable and expensive commercial real estate in Manhattan. Rockefeller Center, the Chrysler Building, Waldorf Astoria, Saks Fifth Avenue, and the headquarters of the United Nations all lie within this world-renowned district.

With East Side Access, Lieber points out that LIRR commuters are "going to have access to some of the best employment opportunities in the country," adding, "It's a benefit to the employers that are concentrated in those buildings." But it's been a long time coming.

The 1950s saw renewed discussions of a Long Island Rail Road station on the East Side. The following decade brought together two projects, a willing governor, and taxpayer money. The New York City Transit Authority wanted to build a two-track East River tunnel to carry subway trains from

Queens to make a connection with the proposed Second Avenue subway. Voters approved a \$2.5 billion transportation bond in 1967, and the following year, the head of the Metropolitan Transportation Authority, William Ronan, suggested to New York Gov. Nelson Rockefeller that an additional tunnel for the LIRR would be a good idea. Construction got underway in 1969 to build the four-track tunnel, two over two, with the upper level for subway trains and the lower for LIRR trains.

The river tunnels were laid and completed by 1972, but New York City was heading into a disastrous financial crisis. In 1975, the city ran out of money, was unable to borrow, and faced bankruptcy. Congress prepared legislation to provide a \$4 billion loan guarantee to the city. President Gerald Ford threatened to veto it, resulting in the famous New York Daily News headline: "Ford to City: Drop Dead."

ISLAND INVESTMENT

Ford later relented, but while the upper-level subway tunnels entered service in 1989, the Long Island Rail Road connection was stopped cold for two decades. Advocates and civic boosters kept the plan alive.

"We can certainly take a share of the credit for jump-starting this project back in the 1990s when we came out with a plan for the metropolitan region in 1994," says Chris Jones, senior vice president and chief planner of the Regional Plan Association.

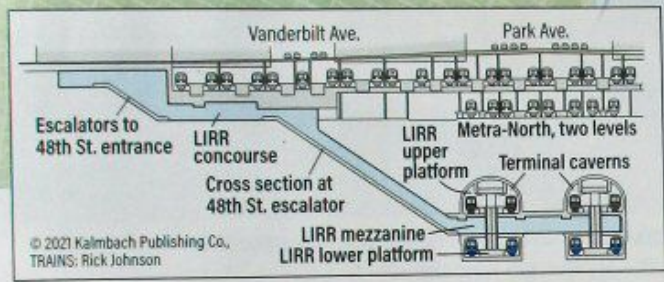
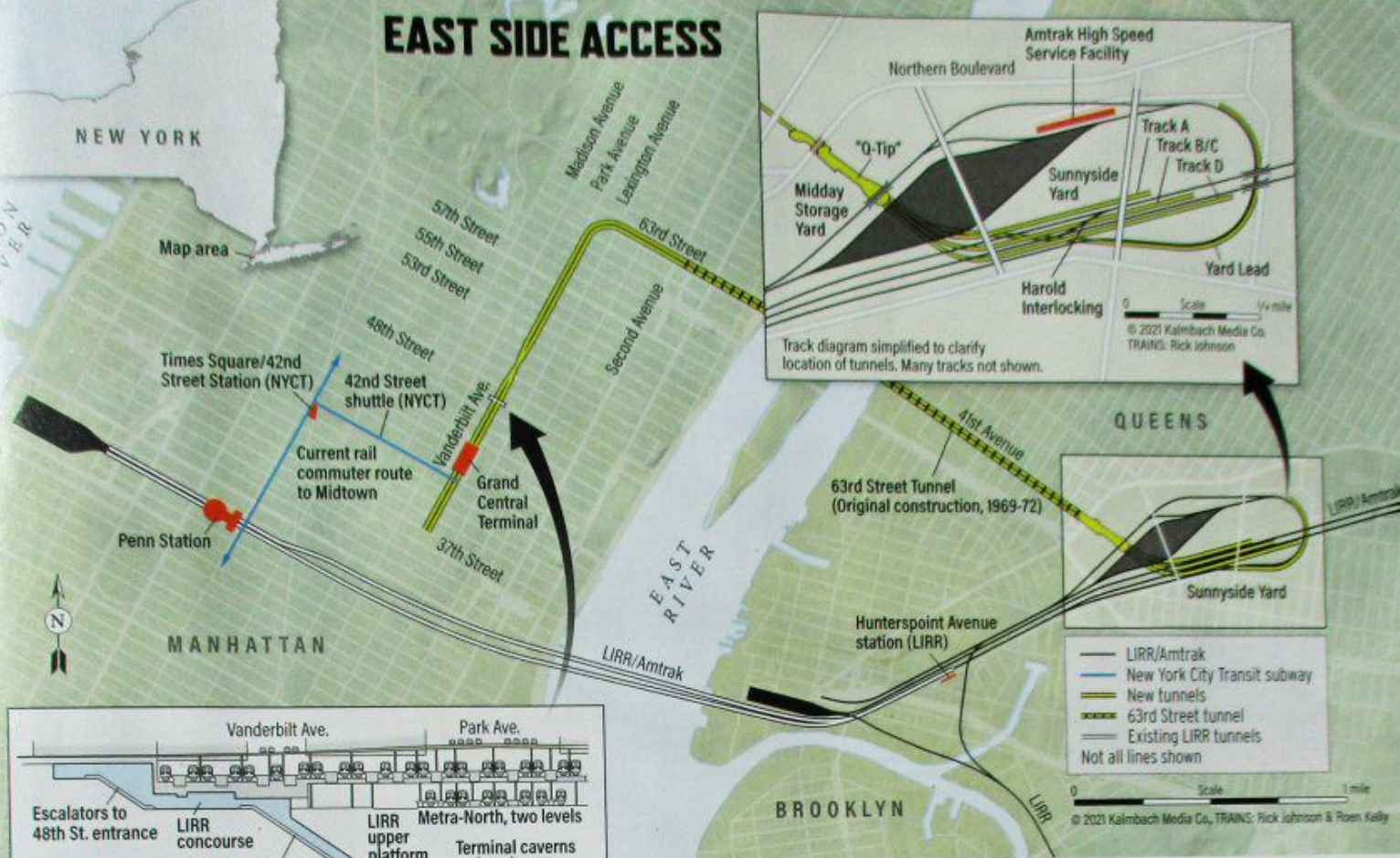
The project was estimated to cost \$3.2 billion and take 10 years to complete. Environmental reviews began in 1995, and on May 21, 2001, the Federal Transit Administration signed off on the final environmental statement, allowing the East Side Access project to go forward.

Although Congress and the Bush



These are the cutting heads of a tunnel boring machine. TBMs are specialized to deal with hard rock, like in Manhattan, or a mix of rock and soft soils, like in Queens.

EAST SIDE ACCESS



administration continued to fund the project in small amounts, and the FTA designated East Side Access as “highly recommended,” little work took place in the early 2000s. The dam broke in late 2006 when the FTA awarded \$2.6 billion to East Side Access, announced by Transportation Secretary Mary E. Peters at a press conference in Grand Central Terminal. By then, the cost of the project had risen to \$6.3 billion.

Soon after, a disassembled tunnel boring machine arrived from Italy. It was lowered into the empty eastbound lower tube of the 63rd Street Tunnel on the Queens side of the East River. After being carried through the tunnel to a launch box under 63rd Street and Second Avenue, it was reassembled and began its slow march through hard rock southwest to Park Avenue and south to Grand Central under the existing Metro-North tracks. On July 2, 2007, after eight months chewing through a mile of Manhattan schist, gneiss, and granite, the 200-ton machine broke through its first heading. A second tunnel boring machine, launched three months after the first, bored out the westbound tunnel. Just five feet of rock separates the two tunnels. To prevent damage while boring the westbound tunnel, the second tunnel boring machine needed to have its gripper and thrust pressure reduced by almost half.

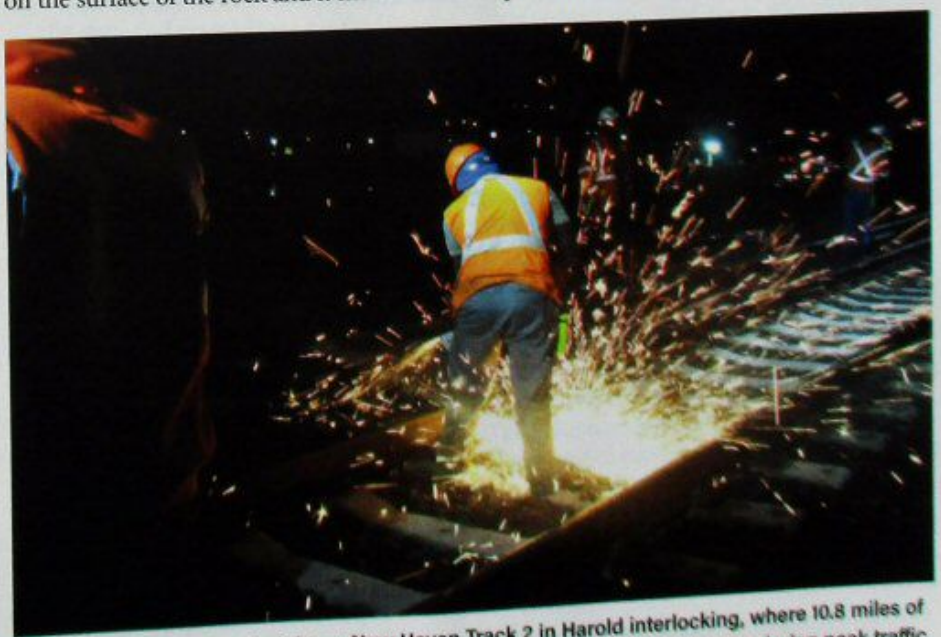
Bret Bennington is a geologist at

Hofstra University on Long Island. In 2018, he toured the caverns where the new Long Island Rail Road station was being excavated. He explains the problem of boring a tunnel in this area: “Manhattan is sitting on the edge of the continent, which is the zone of collision. One of the challenges of trying to drill these tunnels is that you don’t know exactly what you’re going to run into in terms of the rock.”

“The cutter heads are putting pressure on the surface of the rock and it shatters

into chips. These chips are flaking off and they’re collecting them, and they run down a conveyor belt to the back of the machine. But if they hit rock that’s got unusual amounts of really hard mineral, it slows things down. It just kind of gums up the works.”

Bennington likens the tunnel boring machine to “an enormous mechanical caterpillar.” And like a real caterpillar, these machines had to go backward as well as forward. That’s because each main tunnel splits into four tunnels at the approach to



An Amtrak crew works at night on New Haven Track 2 in Harold interlocking, where 10.8 miles of new track was laid to accommodate Grand Central trains and improve fluidity during peak traffic.



Construction crews install track at the Mid-Day Storage Yard in Long Island City, Queens. Located on the site of the former LIRR Yard A, adjacent to Northern Boulevard, trains will reach it via a tunnel that branches off from the Manhattan tunnels.

Grand Central. The LIRR station itself consists of eight tracks; four on each level. There are also 2 miles of auxiliary tunnels. Grades of 3% required a strong braking system for the TBMs.

"From an engineering standpoint, the scale of these projects is just astonishing," Bennington says.

If you could lift away the monumental Beaux-Arts GCT building and the office towers around it, you could peer down into 48 acres of perhaps the most complex, dense web of tracks, interlockings, and passenger platforms in the world. This is where the New York Central boarded celebrities to Chicago on its famed *20th Century Limited*, where the New Haven's brightly colored EP-5 Jets took bankers to Boston on the evening *Merchants Limited*, and where uncounted millions of commuters have begun and ended their workdays.

Metro-North now occupies both levels between Lexington Avenue on the west and Madison Avenue on the east, stretching south to north from 42nd Street to 55th Street. Lower-level tracks climb to join the upper-level alignment at 57th Street, where four tracks continue north.

Subway tracks run north-south under Lexington Avenue — uptown and downtown in New York City parlance. Another subway line crosses beneath the Metro-North tunnel at East 53rd Street, and cross-

town lines for both the Times Square shuttle and the 7 train Flushing line lie below 42nd Street.

BY THE NUMBERS

Out of sight of everyday commuters west of track 117 on Grand Central's lower level was Madison Yard. Metro-North stored trains there during the midday off-peak hours. Tracks 113 to 117 are now gone. That's where the new Long Island Rail Road concourse is taking shape. Four tail tracks extend beyond the platforms to 37th Street and the railroad has use of upper-level storage tracks on the Lexington Avenue side of Grand Central, designated East Yard.

To replace Madison Yard, Metro-North completed construction in 2003 of High-bridge Yard on the site of a former freight yard in the Bronx, along the Hudson Line, to serve as daytime train storage. A new maintenance facility is also located there.

Once the tunnel boring machines completed their assignments under Manhattan, construction crews went to work creating two enormous caverns for the LIRR terminal. Each is 1,143 feet long, roughly the equivalent of turning two Chrysler Buildings on their side. For six years, 1,000 employees working 24 hours a day, five days a week, conducted more than 2,400 controlled blasts to excavate the two cav-

erns. According to the Gothamist news site, 857,000 cubic yards of rock and muck were removed, enough to cover Central Park 1 foot deep.

Gary LaBarbera, president of the Building and Construction Trades Council of Greater New York, says, "The East Side Access project has been a source of employment for hundreds of our tradesmen and tradeswomen, who have been able to either launch their careers in the trades as a result of the project or continue to earn a family sustaining wage that helps bolster New York's middle class."

Nearly 10 city blocks long, the new station occupies 350,000 square feet, with 25,000 square feet of retail space on the mezzanine level, named the Madison Concourse. Seventeen high-rise escalators, each 180 feet long, carry passengers from street level to the bright glass and marble station. "It very much echoes the design vocabulary of Grand Central," Lieber says, "but it also has some very cool design features." Digital signage, luminous tiles, and granite tiles adorn the platforms.

Passengers will access the Madison Concourse from the lower level of Grand Central. Additional entryways will be available directly from nearby office buildings, including the new One Vanderbilt skyscraper, rising 1,401 feet, now Manhattan's tallest office tower. Additional entrances

are along Madison Avenue at 45th Street, 47th Street, and 48th Street.

24 TRAINS AN HOUR

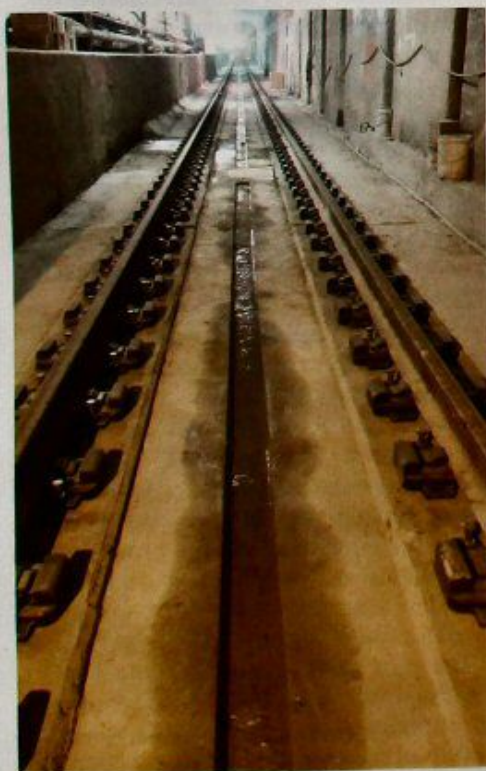
The LIRR terminal will be able to handle 24 trains an hour at peak times, and it's expected that nearly half of the railroad's riders will use it. Richard Murdocco, a public policy expert at Stony Brook University who toured the site, says, "It was unlike anything I've ever seen. The impression it left was just the sheer magnitude of the project."

But there's much more to East Side Access on the other side of the East River.

The unused lower level of the 63rd Street tunnel extended to 41st Avenue and Northern Boulevard in Queens, on the northwest edge of Sunnyside Yard. That's where the tunnel boring machines were sent into Manhattan, and where two other tunnel boring machines began their journey tunneling under the Amtrak yard. These machines were different, custom-built to handle a mix of varying soils, boulders, and landfill.

The two tunnels from Manhattan become four separate tunnels under Sunnyside Yard. The Yard Lead Tunnel allows trains from Grand Central to access LIRR's Mid-Day Storage Yard, on the site of the former Yard A, adjacent to Northern Boulevard. The new yard contains more than 80 new switches and some 90 wayside signals.

The other three emerge on the opposite side of the yard at Harold Interlocking, a 100-year-old, 1.5-mile-long complex that is



Track work installed using direct fixation fasteners in the Long Island Rail Road tubes of the 63rd Street Tunnel.



An artist's rendering shows the proposed Penn Station modernization. The station will also serve New Haven Line Metro-North trains once work on the Hell Gate Line is complete.

PENN STATION TO GET A MAKEOVER

ON THE OTHER SIDE OF TOWN, confusing, poorly lit Penn Station is about to get a makeover as it prepares to add Metro-North train service to Connecticut and the expansion to come with the Gateway Tunnel program.

Under a proposal unveiled to the MTA Board of Directors by Janno Lieber, who heads major construction for the agency, Penn Station's warren of corridors, hallways, and fast-food shops will give way to a brighter, more open, and inviting space, improving passenger circulation and reintroducing daylight to the dark, dingy station. Some 30 new escalators, elevators, and stairways will relieve crowding to the station platforms.

Two design alternatives are under consideration: single-level or two-level layouts. Either would unify the existing station with the Moynihan Train Hall one block to the west and with a planned additional station between 31st and 30th streets, called Empire South. That facility is necessary to connect with the new Gateway Tunnel, which will add eight tracks to the overall station complex. Penn Station is expected to see 832,000 daily riders by 2038, not including those who use Moynihan Hall.

"We really need to make sure this is a facility that passengers can use safely and quickly and intuitively, and that's what this redesign of Penn is meant to accomplish," says Janno Lieber, president of MTA Construction & Development. It also makes way for Metro-North Hudson Line trains to serve Penn Station via the Empire Tunnel used by Amtrak, and for Metro-North west-of-Hudson service via the proposed Secaucus Loop in New Jersey.

Madison Square Garden would remain, although one option includes taking over the Hulu Theater, located beneath the main Madison Square Garden arena. Neal Zuckerman, a management consultant who serves as an MTA commissioner, calls the Penn Station plan "an amazingly bold vision." Next steps are to work with Amtrak and New Jersey Transit on the preferred design and begin environmental reviews.

Once East Side Access is complete and some LIRR trains begin running to Grand Central, Amtrak will undertake necessary repair work on the East River tunnels. That's also when the MTA will turn its attention to the Penn Station Access project, enabling Metro-North trains off the New Haven line to serve Penn Station. This will give Connecticut commuters direct access to the burgeoning area around 34th Street on Manhattan's West Side, close to the city's convention center and popular Hudson Yards commercial and residential complex. All commuter trains currently diverge at CP 216 (formerly Shell Interlocking) to a junction with Metro-North's Harlem Line, en route to Grand Central. Amtrak trains follow the Hell Gate Line, which it owns, through the East Bronx and Queens to Penn Station.

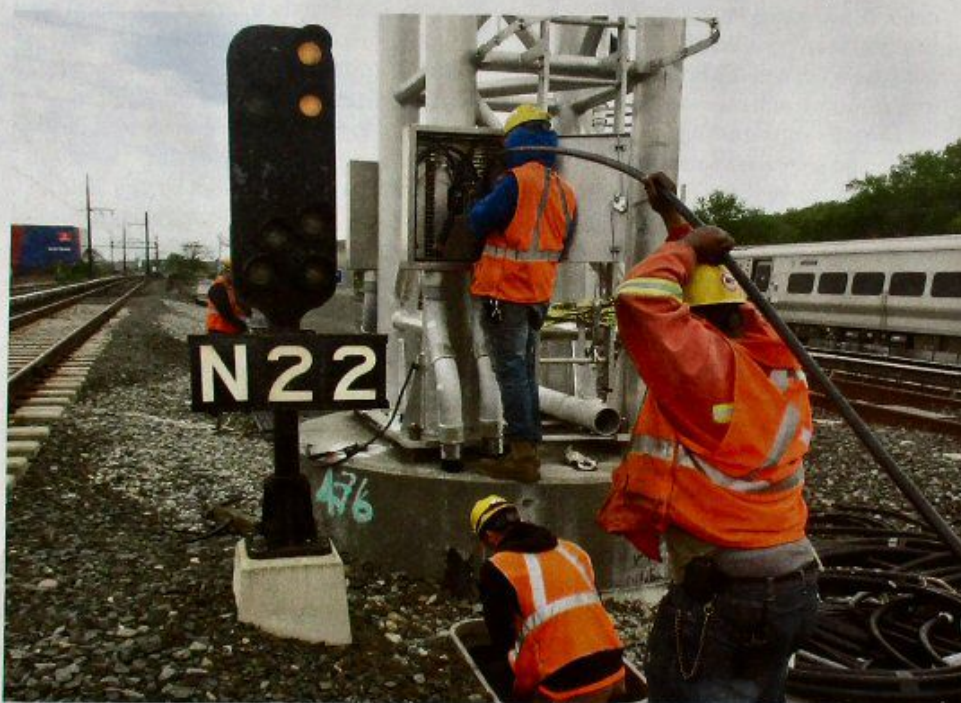
The Pelham Line subway and premium-priced express buses serve the East Bronx, but they can take an hour or more to reach Manhattan. Four new ADA-accessible stations will be added along the Hell Gate Line for Metro-North use, at Co-Op City, Morris Park, Parkchester, and Hunts Point. These areas include large apartment communities and traditional neighborhoods where 25% of East Bronx residents are below the poverty level. Metro-North trains will also open up new job opportunities for them in Westchester County and Connecticut. "Penn Station Access will be able to serve East Bronx folks who right now are living in a transit desert," Lieber says.

The project will install 19 miles of new and rehabilitated track, renovate four rail bridges, and reconfigure existing interlockings and the Metro-North yard at New Rochelle, N.Y.

"Amtrak is working with MTA to be service neutral during construction," says Amtrak spokesman Jason Abrams. "We have an outage plan agreement which will not impact Amtrak's normal levels of service along the Hell Gate Line. It is Amtrak's goal to keep our service running with little to no impacts." — Dan Zukowski



The caverns housing the new terminal below Grand Central are 1,143 feet long. For six years, 1,000 employees working 24 hours a day, five days a week blasted out the new spaces.



Crews install a power cable at Harold Interlocking, which was rebuilt for better routing and more capacity. The position light-style signal is a vestige of the former Pennsylvania Railroad.

being completely rebuilt. Altogether, the Harold Interlocking work entails laying 10.8 miles of new track, installing 96 new switches, 15 new signal bridges and 51 signal towers, along with five railroad bridges and 296 catenary poles. "We have completely rebuilt Harold Interlocking," Lieber says. "We're adding trackage and routing so that there can be additional capacity and certain bypass opportunities depending on traffic and other conditions."

Harold Interlocking routes LIRR trains, Amtrak trains to and from the Hell Gate Line, and deadhead moves in and out of Sunnyside. Amtrak will benefit from fewer conflicts and delays through the busy interlocking. While work related to East Side

Access is due to be finished this year, additional work will continue for several more years. A proposed new Sunnyside Station is planned along the route from Penn Station at Queens Boulevard but must wait for completion of the East Side Access project.

To handle more trains and provide service to two Manhattan stations, the Long Island Rail Road is adding capacity throughout its system. Along 9.8 miles of its busy Main Line in Nassau County between Hicksville and Floral Park, the railroad is adding a third track. Double-tracking of the Ronkonkoma Branch was completed in 2018. Two years later, it completed a \$136 million expansion of the Mid-Suffolk Yard at Ronkonkoma, which

enables 50% more service during the morning peak. Numerous bridges have been rebuilt or replaced, stations have been renovated, and eight at-grade crossings are being eliminated along the Main Line.

The railroad's hub, Jamaica Station, where all but one of the LIRR's 11 lines converge, is undergoing a thorough makeover. A new platform was added in 2020, and all platforms are being lengthened to handle 12-car trains. Additional work includes installing higher-speed switches, adding track routes east of the station, and bringing the facility up to good repair.

Although the COVID-19 pandemic devastated ridership, it didn't stop construction. MTA spokeswoman Meredith Daniels says that management, working with the MTA and contractors, provided masks, gloves, sanitizers, and cleaning supplies to workers, and required them to maintain social distancing on the worksite. While the pandemic affected staffing levels for several crafts, adequate crews were available to keep the project moving. She added that vaccinations were provided to MTA employees, contractors, and consultants.

But will the pandemic leave a legacy of reduced ridership due to economic issues or increased reliance on remote office work?

Weekday ridership remains more than 60% below pre-pandemic levels. The New York Times reports that 90% of Manhattan office workers are still working from home. Major Manhattan employers such as Spotify, Salesforce, and JPMorgan Chase & Co. have told their staffs to expect full or partial remote work going forward. But New York City and the East Side Access project already have survived through financial crises, 9/11, and the Great Recession.

Murdocco says, "We can't let the shifting needs from the pandemic blind us to the overall need for this. It may not be needed in six months at this point, but in six years we will be very thankful."

As of March 2021, Long Island had lost 112,300 private sector jobs over the previous year, but the nonprofit Long Island Association believes the region is in recovery mode. They see business and consumer optimism improving. Home sales in Nassau County jumped 21.4%, with Suffolk County up 22%. Economic and population growth will pick up as the pandemic subsides.

The Trade Council's LaBarbera says, "The more we encourage investment in public works projects — which are proven to stimulate economic opportunity in the midst of crisis — the sooner we'll turn the corner on this crisis. Good public works projects, like the East Side Access project, are exactly what New York needs at this



Seventeen imposing 180-foot-long escalators will carry LIRR passengers from street level down to their new terminal. Eight tracks will handle 24 trains per hour.

moment.” Lieber also sees “huge benefits in terms of the regional economy.”

The LIRR is banking on a return of riders. It ordered 202 M9 electric multiple-unit cars, built by Kawasaki Rail Car Inc., in Yonkers, N.Y. Final deliveries will be complete by April 2022, and the MTA is looking to order 160 M9A cars.

LONG-TERM PAYOFF

East Side Access has taken nearly three decades to complete, and the cost has more than tripled in that time. That’s not uncommon for a project of this size. As public policy expert Murdocco explains, “It’s highly complex, but it’s in New York, and in the United States our infrastructure per mile is a lot more expensive than across the world.” None of that will matter to riders who arrive at Grand Central, walk to a nearby office, take a subway to Wall Street or a Metro-North train to White Plains.

By adding more trains and making more connections among regional transit lines, New York’s transportation network becomes more valuable to more people. Some may leave their cars at home, reducing road congestion on the Long Island Expressway,



Glass and marble panels line the escalators and platforms, providing design cues that invoke the interior of the full Grand Central Terminal above.

reducing air pollution over New York, and reducing carbon emissions into the atmosphere. “East Side Access just opens up all those possibilities,” says Murdocco.

In the late 1950s and 1960s, the Long Island Rail Road billed itself as “The Route of the Dashing Commuter” portrayed by a briefcase-toting man nicknamed “Dashing Dan” rushing for the train. LIRR riders may still rush for their train, but they are going

in many directions at all times of the day for many reasons. Lieber explains another benefit of the railroad’s expansion, its first in more than 100 years: “What frequently gets missed is that having the additional track-side capacity and the additional tunnel capacity allows you to have reverse commuting from New York out to the Island.”

Transportation systems attract passengers when their service is frequent, reliable, affordable, and offers convenient connections. “East Side Access is going to benefit a lot of people beyond people who commute from Long Island. It’s a missing link in the region’s transportation network that has multiple benefits,” says regional planner Chris Jones. Major construction on the East Side Access project was completed in May.

More than a hundred years ago, arch-enemies New York Central and the Pennsylvania Railroad were competing to build magnificent train stations in Manhattan, stations that would be both civic and corporate monuments. Grand Central opened its doors in 1913. Soon, trains of the Long Island Rail Road — once owned by the Pennsy — will arrive and depart from their own monument to 21st-century engineering and optimism.

Lieber beams, “This is truly a new era for the railroad.” **I**