As an integral part of New York City's Department of Transportation, the Division of Bridges has a two-fold mission: to maintain an optimal transportation network by ensuring smooth mobility on the city's bridges, and to ensure the safety of the public.

The New York City Department of Transportation's Division of Bridges is comprised of four major bureaus. The **Chief Bridge Officer** is responsible for formulating policy and providing executive direction. He oversees all aspects of the design, construction, rehabilitation and reconstruction, maintenance, operation and administration of the 789 bridges and 4 tunnels, and 53 culverts presently under the jurisdiction of the New York City Department of Transportation (NYCDOT). In addition to broad supervision, the Chief Bridge Officer also provides overall executive and administrative direction for the Division of Bridges, and ensures that all contractors are promptly paid.

Reporting to the Chief Bridge Officer, the **Community Affairs Unit** maintains liaison with all stakeholders: elected officials, community boards, community groups, and civic/neighborhood associations. The Unit takes a pro-active approach in addressing design issues and coordinating construction by working with communities throughout the life of a project. The unit is committed to strategic community interaction that considers the cultural and linguistic diversity of the city and employs a variety of communication tools including social media to ensure the delivery of timely information. This enables the Division to proceed with its capital program as well as on-going maintenance projects with community input and full awareness. Partnering with stakeholders creates opportunities for success.

The **Bureau of Bridge Maintenance, Inspections and Operations** employs over 530 engineering, professional, administrative, and skilled trades employees in the maintenance and smooth operation of New York City's elevated infrastructure, and in specialized skilled trades and contract supervision functions. It is composed of seven sections:

The ***Flag Engineering*** section is an engineering group that reviews, routes, and tracks hazardous or potentially hazardous safety and structural conditions ("flags") in or on the city's 789 bridges and 4 tunnels. The Flags staff is on call 24 hours a day to respond to bridge emergencies. The section can be alerted to flag conditions by city and state inspectors and other sources, such as the Communications Center. All conditions undergo an evaluation involving review of the flag report and photographs of the condition, and, if necessary, a visit to the site. Subsequently, a "flag packet" describing the type of repair or response that is required is created and routed to an appropriate group, in-house or contractor, for elimination. The section monitors the status of each flag, reporting on all activities on a monthly basis.

Bridge and Tunnel Operations is responsible for operating the 24 City-owned movable bridges that span city waterways. This section operates under a variety of federal mandates that call for 24-hour coverage at many locations; its mission is to provide safe and expedient passage to all marine and vehicular traffic under and on movable bridges. In calendar year 2017, Bridge Operations effected a total of 4,927 openings, 4,148 of which allowed 7,310 vessels to pass beneath the bridges. The remaining 779 openings were for operational and maintenance testing. The section also operates the city's five mechanically-ventilated tunnels, performing electrical maintenance and monitoring of the tunnels' electrical and mechanical systems.

The ***Bridge Repair*** section is composed of two major units. *Bridge Repair* performs repairs to resolve flagged conditions. Flag repairs include structural and safety work, such as the repair of steel members damaged by corrosion or accident impact, the replacement of box beams and bridge railings, the replacement of roadway gratings, repairs to traffic control devices, brick and masonry repairs, concrete deck repairs, and the rebuilding of wooden walkways. Much of this work is performed in the off-hours, either to accommodate traffic or in response to emergencies.

This section also rehabilitates and replaces damaged, worn, or defective components whose failure can affect service. This type of work, known as corrective repair, primarily involves the electrical, mechanical and operational control systems for the twenty-four movable bridges, as well as the travelers (movable underdeck access platforms) on the four East River bridges. The Bridge Repair Section is also responsible for the lubrication of the movable bridges as well as the mechanical components and the main cables of the East River bridges.

The *East River and Movable Bridges Preventive Maintenance* unit administers federal funds for selected preventive maintenance activities on the East River and movable bridges. This unit is also responsible for highly specialized work such as the lubrication of cables inside anchorages, cleaning and lubrication of solid rod suspender bearings, operation and maintenance of travelling platforms on the East River bridges, and selected projects to replace the wearing surface on suspended spans. Work is performed with a combination of in-house and contracted personnel.

The engineers and inspectors of the ***When and Where Unit*** supervise the contractors' repairs of structural and safety flags citywide under both marine and general repair contracts, as well as a capital contract. The use of these contracts allows the unit greater flexibility in deploying the contractors' resources as necessary, and in obtaining a variety of construction equipment and materials that are not readily available to in-house forces. In addition, the unit responds to bridge emergencies during both working and off-hours, providing on-site inspection to verify field conditions, taking measurements for repairs and providing emergency lane closures. Some of the repair work is performed during night hours to reduce the impact on traffic and on public safety.

The ***Preventive Maintenance*** section is a vital part of the overall bridge program. This section is responsible for functions including debris removal, mechanical sweeping, pothole repairs, participating in the removal of homeless encampments, and drain cleaning; as well as emergency response, such as snow removal, oil/cargo spills, overpass hits, and assisting with expansion joint and through-hole repairs. The section also performs some corrective repair work such as asphalt deck repairs, sidewalk patching, and fence and guide rail repairs. Preventive Maintenance is responsible for conducting the Department's anti-icing operations on the four East River bridges.

The ***Bridge Painting*** section's function is to maintain the protective coating of the City's bridges. The section is divided into two programs, the in-house (expense) program and the capital program. The capital program oversees total paint removal and repainting, performed by contractors; this is done at twelve-year intervals on bridges measuring more than 100,000 square feet of painted area, and bridges over railroads. In-house personnel provide the inspection services on East River Bridge preventive maintenance contracts for quality control purposes. The in-house program is responsible for full steel painting of bridges measuring less than 100,000 square feet, and bridges that are not over railroads. This includes local surface preparation of deteriorated areas and overcoating of the entire bridge. In addition, the in-house program is responsible for salt splash/spot painting.

Salt splash/spot painting is performed four years after full steel painting, and again four years later. After another four years, we once again perform full steel painting. The interval between full steel applications remains twelve years.

Members of the in-house program respond to emergency flag repairs alongside the in-house repair forces, to perform surface preparation prior to, and painting upon completion of, the steel work. In-house painting personnel also perform environmental clean-up after the iron workers finish their repair work.

The ***Bridge Inspections and Bridge Management*** section performs three essential functions: *Bridge Inspections (*including *In-Depth Inspections), Bridge Management,* and *Research and Development.*

The *Inspections Unit* inspects the city's bridges in accordance with state and federal standards; monitors bridge conditions with a high hazard potential, such as temporary repairs, outstanding flags, and fire hazards; responds to emergency inspection requests from NYCDOT and external

sources; recommends repairs and remedial measures for hazardous conditions; generates flag and inspection reports for the Division; engages in special programs such as non-destructive monitoring of sensitive bridge components by advanced techniques; supervises inspections by consultants working for the Division; conducts inspections and inventories of expansion joints; and inspects non-structural cladding.

In-Depth Inspections are more detailed in scope than the federally-mandated biennial and interim inspections. Their findings can be used for advanced structural analysis, ultimately resulting in a legally binding load-rating of the structure. Two in-depth inspections teams are currently staffed and fully equipped. To that end, the Bridge Management Unit acquired a LIDAR high-definition laser scanning system. The system supplements In-Depth Inspection reports with high-precision 3-D laser scans of bridges. The scans can be used to verify existing drawings or provide as-built drawings where none currently exist. Once the scans are processed, 3D CAD models can be generated. The 3D models can then provide cross sectional details, accurate vertical clearance measurements or even before and after scans for bridges that are frequently damaged by impacts from trucks. The first in-depth inspection reports have already been transmitted to the Load Rating Unit within the Bureau of Engineering Review and Support.

The *Bridge Management Unit* develops and maintains the database for the City's bridge inventory, condition ratings, and inspection information. The unit is also responsible for maintaining records of privately-owned bridges in the City. The database is the source of information used in a variety of reports, including the present Bridges and Tunnels Annual Condition Report. This unit uses the bridge and span condition database to determine current and future needs for bridge rehabilitation, bridge component rehabilitation, flag forecasting, inspections and monitorings.

This Section is also responsible for investigating new materials and methods to improve existing bridge conditions. It sponsors a series of lectures by experts on subjects relevant to design, construction, and maintenance, such as seismic retrofitting of bridges, salt substitutes, cathodic protection against corrosion, concrete patching materials, new paint strategies, non-destructive bridge testing, and deck resurfacing. The unit also participates in research programs with interested transportation and infrastructure entities. In conjunction with the Port Authority, MTA Bridges and Tunnels, and NYS Bridge Authorities, it sponsored a report on suspension bridge cables that led to a federal project for the entire United States. A number of articles on bridge management are published by the unit in technical journals in the United States, Japan, France, and elsewhere. This section created the system for generating bridge inspection reports with portable computers; a similar system is now being adopted by the NYSDOT.

The overall mission of the Bureau of Bridge Maintenance, Inspections and Operations is to maintain the structural integrity of elevated structures and tunnels and to prolong their life by slowing the rate of deterioration. While our objective may be seen as "maintaining the status quo" of the infrastructure, we continue to take a new look at our methods, procedures, and general focus as we formulate our operational plans for the next several years.

As more bridges are rehabilitated, it becomes incumbent upon us to protect the government's investment in the infrastructure by developing and implementing a more substantive preventive maintenance program to keep these bridges in good condition.

The Deputy Chief Engineer for Bridge Maintenance, Inspections and Operations also acts as the **Deputy Chief Bridge Officer**, assuming the responsibilities of the Chief Bridge Officer in that person's absence.

The **Bureau of Bridge Capital Design & Construction** is made up of six major groups:

The **East River Bridges Group** is responsible for all design and construction activities for all rehabilitation/reconstruction work that is planned, or currently taking place on the four East River

Bridges. This involves overseeing and supervising design consultants who prepare plans and specifications for bridge rehabilitation/reconstruction projects on the four East River Bridges, as well as overseeing and supervising contractors, Resident Engineers and Inspection Consultants, and Construction Support Services Consultants during the construction phase.

The **Movable Bridges Group** is responsible for all design and construction activities for all rehabilitation/reconstruction work that is planned, or currently taking place on the City-owned movable bridges and tunnels. This involves overseeing and supervising design consultants who prepare plans and specifications for bridge rehabilitation/reconstruction projects on the Movable Bridges, as well as overseeing and supervising contractors, Resident Engineers and Inspection Consultants, and Construction Support Services Consultants during the construction phase.

Each of these groups is headed by a Director to whom Section Heads or Engineers-in-Charge report. Each is assigned a specific bridge, or bridges, where they are responsible for all design and construction activities. The Directors, in turn, report to the Deputy Chief Engineer of the Bureau.

The **Brooklyn and Manhattan Roadway Bridges Group** is responsible for both design and construction activities for all rehabilitation/reconstruction work that is planned, or currently taking place on all City-owned, non-movable bridges in Brooklyn and Manhattan, with the exception of the East River Bridges. This involves overseeing and supervising design consultants who prepare plans and specifications for bridge rehabilitation/reconstruction projects, as well as overseeing and supervising contractors, Resident Engineers and Inspection Consultants, and Construction Support Services Consultants during the construction phase.

The **Bronx, Queens and Staten Island Roadway Bridges Group** is responsible for both design and construction activities for all rehabilitation/reconstruction work that is planned, or currently taking place on all City-owned, non-movable bridges in the Bronx, Queens, and Staten Island, with the exception of the East River Bridges. This involves overseeing and supervising design consultants who prepare plans and specifications for bridge rehabilitation/reconstruction projects, as well as overseeing and supervising contractors, Resident Engineers and Inspection Consultants, and Construction Support Services Consultants during the construction phase.

In each group, the workload is divided by Community Board. Engineers-In-Charge report to the Directors of each group, who, in turn, report to the Deputy Chief Engineer of the Bureau.

Component Rehabilitation is the revamping or replacement of damaged, worn or defective bridge components. This type of work is performed primarily on those structures not classified as being “deficient,” but which contain specific components that have low condition ratings. By rehabilitating these components, the Division can ensure that these bridges remain in “good” or “very good” condition; usually extending the bridge’s useful life by up to 10 years. Section Heads or Engineers-in-Charge report to the Director of Component Rehabilitation. Each is assigned a specific bridge, or bridges, for which they are responsible for all component rehabilitation activities. The Component Rehabilitation Program is an ongoing program with cumulative effects. Each Fiscal Year, a number of bridges are selected for inclusion in the program and construction is completed on others. For the ten year period ending fiscal year 2020, the program will obligate approximately $200.6 million.

The **Design-Build/Emergency Contracts Group** provides technical and procurement expertise related to the following areas: preparing Emergency Declarations for unsafe conditions that require immediate remediation; assisting the Chief Bridge Officer in the contractor selection process for declared emergency situations; providing technical expertise related to the development, procurement and administration of Design-Build contracts throughout the various areas of the Division; preparing and administering Design-Build agreements; and supervision of Design-Build project design, construction, and inspection services.

The **Engineering Review and Support Bureau** is responsible for providing Division-wide engineering support services. The following areas make up this Bureau: ***In-House Design, Engineering Support, Engineering Review, and Quality Assurance***.

In-House Design staff (comprised of the Structural, Electrical, and CADD Groups) prepare plans, specifications, and estimates for bridge rehabilitation/replacement projects that enable the Division to restore bridges considered "structurally deficient," to a "very good" condition rating. This unit also handles urgent Division projects, as well as special repair projects of the **Bureau of Bridge Maintenance, Inspections and Operations**. Over the last 10 years, In-House Design has completed contract documents for the following replacement/rehabilitation/demolition projects: Belt Parkway Bridge over Paerdegat Basin, 145th Street Bridge over Harlem River, Greenpoint Avenue Bridge over Newtown Creek, Bryant Avenue Bridge over Amtrak and CSXT, Henry Hudson Parkway Viaduct over Amtrak from West 72nd Street to West 82nd Street, Henry Hudson Parkway Viaduct over Amtrak from West 94th Street to West 98th Street, and the demolition of the Siah Armajani Lighthouse and Pedestrian Bridge. In-House Design also provided plans, working drawings, and shop drawings for in-house built projects such as the Hamilton Avenue Asphalt Plant conveyor supports, the concrete barrier at Cross Bay Boulevard from the Addabbo Bridge to East 1st Road, the pedestrian fencing at the Navy Street Pedestrian Bridge, and the bridge railing at Van Name Street Bridge. The Section has also developed NYCDOT standard pedestrian fencing drawings for bridges.

The Electrical Group reviews and/or prepares contract documents for the electrical and street lighting work for all projects in the Division's capital program. They further review plans and specifications prepared by consultants and review test results of electrical systems conducted by vendors on the movable bridges.

The ***Engineering Support Section*** is comprised of four units: *Specifications, Survey, Records Management,* and *Special Projects*.

The *Specifications Unit* prepares and reviews contract bid documents and specifications for all Federal and City-funded, private developer, City-let in-house and consultant-designed bridge and various other construction projects, processes the contracts for bidding, after ensuring that they comply with the City, New York State and Federal standards, prepares, reviews, and transmits advertisement packages, addenda, maintains and updates City-let bridge construction boiler plates in compliance with FHWA and NYSDOT Engineering bulletins and instructions, and updates and maintains an inventory of all NYC and NYS special specifications used in bridge and other construction projects. This Unit approves and issues item numbers for newly written special specifications for the city funded projects. In addition, it prepares "Revisions to NYSDOT Standard Specifications" (R-pages), which are compiled from NYSDOT Engineering Bulletins and Engineering Instructions, and reviews contract drawings for compliance with contract bid proposal books.

The *Survey Unit* performs field surveys and visual inspections of bridges and retaining walls, monitorings of cracks and longitudinal and transverse movements in bridge structures as well as foundation settlement. This unit surveys bridge girder alignments and twisted movements in steel girders and floor beams due to damage by oversized trucks or fires. It also prepares and verifies elevations in the field to find existing vertical clearances of bridge structures.

The *Records Management and Electronic Media Unit* establishes drafting guidelines and digital media standards for the preparation and archiving of contract plans. It reviews design contract plans, as-built plans, and shop drawings, in printed format as well as PDF and CAD digital formats for compliance with such guidelines and standards, and provides technical guidance to drawing preparers including the In-House Design group, consultants, and contractors. This unit also maintains an as-built drawing database for city-owned and maintained bridges, and regularly updates it with new as-built plans as they become available after project closing. It also responds to requests for as-built plans from in-house groups, City and State agencies, consulting firms, and private developers, following established drawing security protocols.

The *Special Projects Unit* reviews contract bid documents and specifications for public and private agencies to ensure compliance with City, State and Federal standards and guidelines.

The ***Engineering Review Section*** consists of eleven units: *Structural Review*, *Retaining Wall, Bridge Hold*, *Cost Estimate*, *Other Agency/Private Developer*, *Scope Development*, *Overweight Truck Permit*, *Geotechnical*, *Land Use Planning*, *Load Rating*, and *Utilities*.

The *Structural Review Unit* reviews all City-let bridge construction contract drawings, oversees seismic design requirements for City-let contracts for bridge projects, reviews load rating reports and design calculations and ensures that the work to be performed conforms to NYCDOT requirements. This unit establishes design standards, including seismic requirements.

The *Retaining Wall Unit* is responsible for inspecting City-owned retaining walls, identifying walls in poor condition, and creating an inventory of all City-owned retaining walls. Retaining walls in poor condition requiring immediate attention are referred to in-house repair staff or When and Where contractors. Data on poorly rated retaining walls are developed into scope packages and forwarded to the New York City Department of Design and Construction for permanent rehabilitation with DOT funding. Walls of questionable ownership are researched for ownership and jurisdiction. A consultant has been assisting the unit in the inspection, condition assessment, temporary repair design, inventorying and budgeting for the permanent rehabilitation of the retaining walls.

The *Bridge Hold Unit* was established in February 2011, based on OCMC requests to review construction permit applications for any proposed work located within 100 feet of any City-owned bridge structure. The permit applications may also originate from other City agencies, private developers, and utility companies. The Unit reviews the proposed work to ensure that it does not compromise the integrity of the structure and that it is in compliance with Agency requirements. Based on the review's recommendations, the hold will be released or rejected.

The *Cost Estimate Unit* reviews and oversees design and construction cost estimates of City projects.

The *Other Agency/Private Developer Unit* currently provides engineering review supervision of projects from other agencies and private developers such as the Atlantic Yards Project, the Eastside Access Project, the Riverside South Project, the Amtrak Gateway Tunnel project passing under the 11th Avenue viaduct, the Empire Outlet Project in Staten Island, the Hudson Park and Boulevard Project, the Hudson Yards Development Corporation Projects (Related) between 10th Avenue and 11th Avenue and 30th Street and 33rd Street, and the Extell Temporary Access Road. In addition, the unit conducts non-bridge engineering projects, such as the review of large character balloons for the Macy's Thanksgiving Day Parade, and art work installations proposed for bridge structures.

The *Scope Development Unit* reviews inspection reports, as-built drawings, and structural condition ratings, performs field inspection of bridges to develop the scope of work for the rehabilitation of deficient bridges, and initiates the procurement of Design Consultant contracts. The Unit is also responsible for reviewing of quarterly budgetary plans for bridge rehabilitation projects and coordinates these reviews with the Bureau of Bridge Maintenance, Inspections and Operations, and the Capital Procurement and Capital Planning Sections.

In New York City, overweight and over-sized trucks threaten public safety and our transportation infrastructure. The trucks' longer breaking distances and reduced stability, combined with their greater mass, can lead to severe crashes. Studies have also found that the useful life of pavement can be reduced by up to 25 percent if just one to three percent of trucks are overweight. The *Overweight Truck Permit Unit,* in coordination with the Division's Truck Permit Unit, reviews the engineering aspects of overweight and over-dimensional truck and self-propelled crane permit applications, to ensure the safety of City owned bridges. Reviews routes proposed by the truck permit applicants, determines the number of City-owned bridges to be crossed over/under on the route, and determines if the proposed route is acceptable or not, considering the bridges' condition. Recommends alternate routes if needed. Reviews and recommends load posting signs for City owned bridges. The Unit also reviews resurfacing, snow

removal and other heavy equipment permit requests from within the Agency and from other agencies.

The *Geotechnical Engineering Unit* provides geotechnical-engineering services. This unit reviews bridge rehabilitation/reconstruction project reports, soil investigation/geotechnical foundation reports, City-let bridge construction contract drawings and other agency/private developers' geotechnical work which impacts City-owned projects.

The *Land Use Planning Unit* reviews and maintains a database of easement issues, right-of-way, and Uniform Land Use Review Procedures. This unit also reviews Design reports and Environmental Impact Statements of various other Agency projects with respect to their impact on City-owned bridges.

The Load Rating Unit was established in February 2015. Based on the in-depth inspection data received from the Inspections Unit of the Bridge Maintenance, Inspections and Operations Bureau, this unit performs the load rating analysis and maintains the record of safe load carrying capacity of City owned bridges. This information will be used: to determine which bridges have substandard load capacities that may require posting or other remedial action, to assist in the most effective use of available resources for rehabilitation or replacement, or to assist in the overload permit review process.

The *Utilities Unit* coordinates all issues related to utility design as they affect City-owned bridge projects and related projects.

The ***Quality Assurance Section*** ensures that materials installed for the Bridge Rehabilitation Program meet contractual requirements and are incorporated in strict compliance with plans and specifications. This section operates under its own formulated Quality Assurance Plan that is based on NYSDOT requirements and procedures. Quality Assurance has contractually retained the services of private inspection/testing firms. The provision of services required for various projects is better coordinated through this centralized method, which is also timely and cost effective.

Off-site Quality Assurance services relative to a wide variety of basic and manufactured construction materials including concrete, asphalt, soils, reinforcing steel, bridge bearings, timber, structural steel and precast/prestressed structural components for all bridge projects, irrespective of the funding source, are handled by this section. Through its engineers at bridge construction sites, Quality Assurance ensures that only acceptable materials are incorporated into rehabilitation/reconstruction work in strict accordance with plans, specifications and acceptable construction practice. Current major projects include the Unionport Bridge over Westchester Creek, the rehabilitation of the stone masonry walls of the Brooklyn Bridge approaches and ramps, Belt Parkway Bridge over Gerritsen Inlet, Belt Parkway Bridge over Mill Basin, City Island Bridge over Eastchester Bay, Harlem River Drive over East 127th Street Viaduct, Macombs Dam Bridge, Roosevelt Avenue Bridge over Van Wyck Expressway, Houston Street Bridge over the FDR Drive, Atlantic Avenue Bridge over LIRR, Restoration of the Electrical and Mechanical Systems for 12 Movable Bridges, Westchester Avenue Bridge over Hutchinson River Parkway, Metropolitan Avenue and Fresh Pond Road over LIRR, the rehabilitation /reconstruction of eight culverts, and the Restoration of Tunnel Systems at the Battery Park Underpass and West Street Underpass. In addition, the Section provides services to the Component Rehabilitation Section and the Bridge Painting Section on an as-needed basis.

Through its *Environmental Engineering Unit*, Quality Assurance also oversees the implementation of the Final Environmental Impact Statement on bridge construction projects involving the removal and disposal of lead-based paint. The unit's active involvement in training the supervisors and overseeing the abrasive blasting operations has resulted in the successful completion of various paint removal projects. This unit also oversees the proper and safe disposal of other hazardous waste and regulated waste encountered during construction activities.

In addition to enforcing the lead paint removal protocols, the unit manages other environmental concerns. These issues include, but are not limited to, asbestos abatement, soil sampling,

groundwater sampling, remediation of contaminated soils and groundwater, worker exposure to environmental contaminants, management of waste oil, storage of hazardous waste, management of storm water runoff, soil erosion controls, management of concrete washout wastewater, site safety, and OSHA compliance. Typically, the unit participates in the design stage to ensure that any environmental issues are addressed during the construction phase of the project. During construction, the unit provides on-site quality assurance oversight and environmental management to ensure compliance with environmental regulations and contract documents. The role of this unit in ensuring public safety has been recognized and commended by the community.

The unit continues to monitor impacts to the City's waterways for numerous projects. This includes dredging and dewatering activities, such as the Macombs Dam fender rehabilitation project, Belt Parkway Bridges project, Harlem River Drive over 127th Street, Unionport Bridge over Westchester Creek, and the reconstruction of the City Island Bridge. This work often includes dewatering of cofferdams and drill casings, dredge spoil dewatering, and treatment of water for discharge to recharge basins or to surface waters. Potential contaminants such as turbidity, pH, and suspended solids are monitored for compliance with regulatory standards.

The unit is responsible for site-specific discharge monitoring in conjunction with the NYS SPDES Discharge Permits for discharges at the Eastern Boulevard Bridge, Hunters Point Avenue Bridge, Greenpoint Avenue Bridge, Cropsey Avenue Bridge, Manhattan Plaza Underpass, Battery Park Underpass, and the Metropolitan Avenue Bridge. The unit continues to provide environmental oversight and compliance on major capital projects such as the Macombs Dam Bridge, Belt Parkway Bridges over Mill Basin and Gerritsen Inlet, the Harlem River Drive over 127th Street Viaduct, and the Unionport Bridge, as well as other Component Rehabilitation and Roadway Bridge projects.

The unit is currently monitoring completed mitigation projects such as the Floyd Bennett Field Wetland Mitigation and the Wetland Mitigation at Bergen Beach, which were initiated to compensate for disturbance of wetlands during construction activities such as at the Belt Parkway bridges. Wetland mitigation projects were also completed at Turtle Cove in the Bronx as part of the City Island Bridge Reconstruction project. Future wetland mitigation will take place as part of the Unionport Bridge reconstruction in the Bronx and the culvert reconstruction projects on Staten Island.

The unit also provides input and technical services for the East Side Coast Resiliency Project, which will consist of the construction of flood walls, levees and gates to protect lower Manhattan in the event of future flooding from storm events such as Superstorm Sandy. In addition, the unit works with other City agencies in the development of guidelines and standards for the implementation of the NYC MS4 permit system, which addresses the discharge of stormwater to NYC waterways.

The unit also oversees and provides quality assurance management of field coating application on bridge construction and maintenance projects. These responsibilities oversee quality of materials and equipment being used on projects and provide inspection oversight to ensure that proper SSPC or NACE steel cleaning and painting guidelines and standards are followed.

The **Bureau of Management and Support Services** provides essential administrative and analytic services to each of the operational bureaus of the Division of Bridges. The Bureau is divided into four primary sections: ***Office of the Executive Director, Administration and Finance, Capital Coordination, and the Truck Permit Unit.*** Each highly-specialized section is designed to address those issues and requirements that are critical to the operation of the respective Bureaus within the Division.

In addition to the Division-wide responsibility for conflict resolution, Equal Employment Opportunity enforcement, confidential investigations, Bridges' litigation claims, 311 Siebel

complaints, Bridges' Engineering Service Agreements, space allocation, and special projects, the ***Executive Director*** oversees, on an executive level, the following areas and functions:

The ***Senior Director of the Administration and Finance Section*** oversees and administers all administrative/personnel-related functions for the Division, acting as a liaison with the Central Personnel Coordinator in NYCDOT Personnel including, but not limited to, recruiting for vacancies (this includes reviewing for completeness and submitting the necessary paperwork, and reviewing and distributing candidates' resumes); maintaining all Managerial Position Descriptions; maintaining all Division organization charts; scheduling training; confidential investigations; maintaining records of IFA-funded positions; initiating and assisting in resolving disciplinary/grievance actions; serving as Conflicts of Interest and Financial Disclosure Officer; collecting and reviewing managerial and non-managerial performance evaluations; absence control; providing interpretive advice to Division management regarding City and Agency policy and procedures; and overseeing telephone and facility-related issues for personnel located at 55 Water Street and 59 Maiden Lane in Manhattan.

The Senior Director of the Administration and Finance Section also oversees the following three units:

The *Analytic Unit* prepares comprehensive bi-weekly and monthly reports that address major issues confronting the Division; compiles statistical data detailing the Division's productivity; processes and monitors all FOIL requests; frames issues in which oversight assistance is required for use by the Division, NYCDOT Executive Management and the Mayor's Office; and prepares the City Charter-mandated ***Bridges and Tunnels Annual Condition Report.***

The *Vehicle Coordination Unit* tracks the placement and condition of all vehicles under the jurisdiction of Bridges. It maintains a database and prepares reports containing this information; provides information and reports to appropriate inquiring Divisions and Agencies such as the Auditor General's Office, NYCDOT Legal Department and NYCDOT Litigation Support Services; coordinates the assignments of vehicles and their movement throughout various borough field locations and job sites; prepares reports on Vehicle Status and replacement; prepares reports for the purpose of tracking Overnight Vehicle Assignments for all Division vehicles; receives and routes vehicle Accident Reports, Police Reports and Security Incident Reports relating to vehicle accident, theft and/or vandalism; coordinates priorities for vehicle and equipment repair with Fleet Services; prepares reports and memoranda regarding vehicle safety issues and communication procedures for the NYCDOT Communication Center; and collects required documentation from field personnel for checking Driver Certifications with the Department of Motor Vehicles and EZ Pass.

The *Finance Unit* oversees the Division's entire expense budget process including, but not limited to, base-line preparation, spending plans, overtime control, financial plan changes, and budget modifications. The unit further oversees all Division-wide fiscal activities, including the establishment and monitoring of all IFA-related project budgets, while simultaneously ensuring that the budget and plans represent the Division's priorities.

The ***Senior Director of the Capital Coordination Section*** is responsible for preparing, coordinating and updating the capital budget and capital program initiative within the Division of Bridges. Currently, the Division's Ten Year Capital Plan is worth approximately $9.4 billion. This plan is designed to rehabilitate the City's bridges. Responsibilities include: administering and participating in the development and implementation of planning capital projects; acting as liaison with oversight agencies, DOT Administration and all responsibility centers within Bridges; reviewing and processing transfer of fund requests in an attempt to resolve funding issues; and maintaining the Division's registration report for all current year capital contracts. In addition, this section coordinates the Division's submission of Initial Financial Plans, Annual Financial Plan and Construction Management Plans prepared by Project Mangers that must be submitted to the Office of Finance, Contracts & Program Management.

The Senior Director of the Capital Coordination Section also oversees the following three units:

The *Project Delivery Section* monitors and collects data for all current and future capital Bridge projects from the identification and initiation phase through design and construction completion. The unit serves as a liaison with internal Agency divisions, sharing project schedule data related to procurement registration, Capital Commitment Plan forecasts, and project status.

The *Capital Consultant Section* serves as a liaison between the Division of Bridges and the Office of the Agency Chief Contracting Officer, other Agency Divisions, and the various consulting firms involved with the procurement process. The duties of this unit include: overseeing the Division's capital consultant contract procurement from scope to registration and preparing status reports. Certificates to Proceed [CPs] are a critical component for the registration of any Construction, Consultant Programs, Force Account, Change Order and Engineering Service Agreement and assigned ESA tasks. Coordinating the submission of New and Revised Certificates to Proceed for submission to the Capital Budget is overseen by this Unit.

The *Capital Contract Change Order and Force Account Section* serves as a liaison between the Division of Bridges and the Office of the Agency Chief Contracting Officer, other Agency Divisions, the public and private railroads; processes the Division's change orders through registration, and coordinates Railroad Force Account Agreements and railroad invoice payments for Division construction projects.

Railroad Force Account Agreements are a vital component in the rehabilitation/reconstruction program since train traffic affects 318 (40%) of City-owned bridges. The Railroad Coordinator provides a single point of contact for all railroad issues. The coordinator informs managers of "typical" railroad problems and attempts to avoid them through proactive measures. Upon registration of the railroad force account contracts between the City of New York and the respective railroad, Notices to Proceed [NTPs] are issued, and invoices are generated. The invoices, once approved by the engineers for the railroad and the corresponding DOT Project Manager, are sent to the Railroad Coordinator for processing and actual payment by the New York City Comptroller's Office.

Due to the nature of bridge construction projects, change order work is often on the critical path. Any delay in the issuance of a change order affects the overall project, and adds substantial overruns to the final cost. A tracking process for change orders has been implemented that significantly reduces the time for the approval process.

The ***Senior Director of the Truck Permit Section*** issues approximately 1,000 Annual Overweight Load Permits (mostly renewals), and approximately 50,000 Daily Oversize/Over-dimensional/ OD permits (including OD permits for film production vehicles and Supersize Truck Permits), and 250 Annual Self Propelled Crane Permits, all in accordance with the New York City Department of Transportation Policy and Procedures and the New York City Traffic Rules and Regulations section 4-15.

The Rockefeller Plaza Christmas Tree Traveling Through the Upper West Side of Manhattan (Utilizing a NYCDOT Permit) in November 2017. The Plaza's First Tree was Erected by Workers Building the Complex During the Great Depression. The First Official Tree Lighting was in 1933. (Credit: Emmett Linder) December 2017: Part of a Large Billboard Stanchion to be Erected in the Bronx. The Supporting Pylons Will be Driven 200 Feet Into the Ground.

ACCOMPLISHMENTS & PLANNED PROJECTS

Bridge Capital Design & Construction

East River Bridges

Movable Bridges

Roadway Bridges

Brooklyn and Manhattan Roadway Bridges

Bronx, Queens, and Staten Island Roadway Bridges

Design-Build/Emergency Contracts

Component Rehabilitation

Engineering Review & Support

In-House Design

Engineering Support

Engineering Review

Quality Assurance

Bridge Maintenance, Inspections & Operations

East River Bridges

BROOKLYN BRIDGE

Arguably the most influential bridge in American history, the Brooklyn Bridge remains one of New York City's most celebrated architectural wonders. Designed by the brilliant engineer John Augustus Roebling, and completed by his equally ingenious son Washington Roebling and daughter-in-law Emily Roebling, this elegant structure was, at the time of its completion in 1883, the longest suspension bridge in the world. The bridge remains the iconic representative of the hybrid suspension/stay system worldwide. It was declared a National Historic Landmark in 1967.

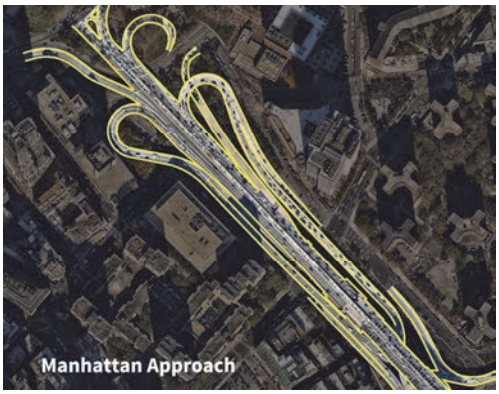
Brooklyn Bridge in July 2016. Testing the William Feehan Fireboat Near the Bridge in November 2015. (2016 Credit: Alaina Yuresko)

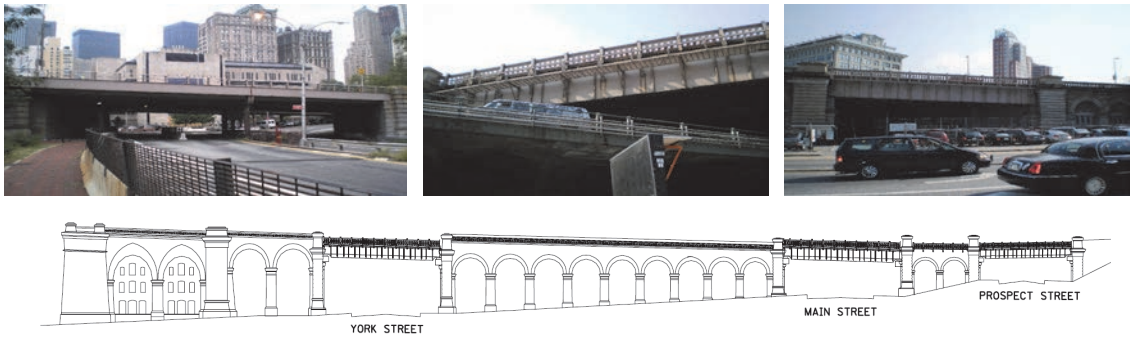
From one end to the other, the Brooklyn Bridge measures 6,016 feet, including approaches. The bridge has a 1595.5-foot long main span and 933-foot long side spans. Both the Manhattan and Brooklyn approaches consist mostly of masonry arches and a few simple span steel structures, and are an integral part of the bridge. In early 1950, to reduce congestion, and to improve traffic flow, a system of elevated ramps (Ramps A to J) was constructed at the Manhattan side, connecting the bridge to the FDR and local streets. Additional approach ramps to the FDR Drive opened to traffic in 1969. The bridge supports six lanes of H15 vehicular traffic, with a walkway/bikeway promenade situated at the middle of the bridge. On a weekday, the Brooklyn Bridge carries some 105,679 vehicles, 3,157 bicyclists, and 10,000 pedestrians. The $936 million reconstruction commenced in 1980 with Contract #1, and continued with Contract #6, which was substantially completed on January 5, 2017. This contract included the rehabilitation of both approaches and ramps, the painting of the entire bridge, as well as the seismic retrofitting of the structural elements that are within the Contract #6 project limits.

Work completed on the bridge to date includes reconditioning of the main cables, replacement of the suspenders and cable stays, rehabilitation of the stiffening trusses, and the replacement of the suspended spans deck and the four travelers.

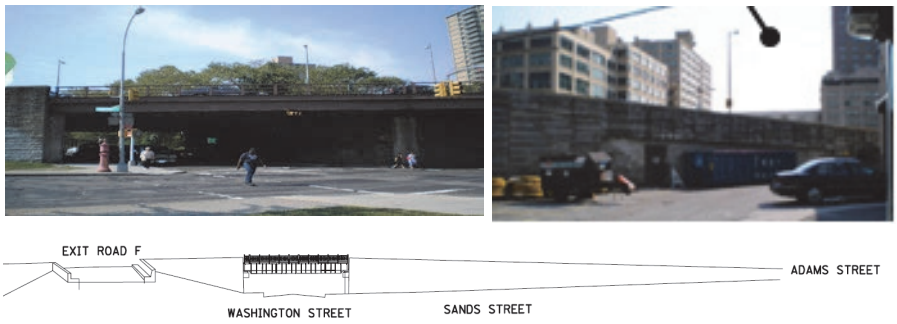
Contract #6A

The contract will rehabilitate the stone walls at the approach spans and ramps. The areas on the Manhattan approach are Ramps C, D, F, G, H, and I, and the Park Row Walls. The areas on the Brooklyn approach are York Street, Main Street, Prospect Street, Washington Street, and Sands Street.





Manhattan Approach: Park Row Structure. Brooklyn Approach: York and Main Streets.



Brooklyn Approach: Washington and Sands Streets.

The masonry façade at the east abutment of Prospect Street under the Brooklyn approach suddenly collapsed in July of 2014. Immediate measures were taken to inspect and evaluate the collapse. All additional loose masonry cladding was removed from the abutment wall, including a portion of the wingwall. The remainder of the east wingwalls were found to be in good condition, but based on the condition of the east wall, the decision was made to secure the masonry to the existing walls. The condition of the Washington Street abutment facade was assumed to be similar to Prospect Street and a decision was made to remove the portions of the masonry cladded walls below the bridge seat and along the sidewalks. All of the loose and unsecured stone was removed to a staging area for possible reinstallation.

Prospect Street East Abutment Collapse in July 2014. Washington Street East Abutment.

The scope of work for this project includes: Manhattan Approaches (Ramps C, D, F, G, H, and I) - the removal and replacement of masonry cladding at the walls and abutments including the removal and resetting of capstones; the removal and replacement of sidewalks along the walls; the repair of spalls on the walls as necessary; Park Row Walls - the replacement of the masonry stones wall façade at the west abutment; the repair of spalls on the walls as necessary; the repointing of the masonry stones at the east abutment; cleaning, repointing and the anchoring of the masonry stones at the northwest and southwest wingwalls; Prospect Street - the replacement of the masonry stones at the wall façade at the east abutment; repointing of the masonry stones at the west abutment; the removal and replacement of the masonry stones at the southeast wingwall as required with remaining areas to be anchored; the repair of spalls on the walls as necessary; Washington Street - the replacement of the masonry stones at the wall façade at the east and west abutments; cleaning and repointing of the masonry stones at the round column and cross girder on the north side of the west abutment; cleaning, repointing and anchoring of the masonry stones at the northeast and southwest wingwalls; the repair of the spalls on the walls as necessary; replacement of windows with double hung aluminum frames and iron bars security guards; installation of roll-up door and two doors on the abutment; Sands Street - anchoring of masonry stones at the north wall adjacent to the structure.

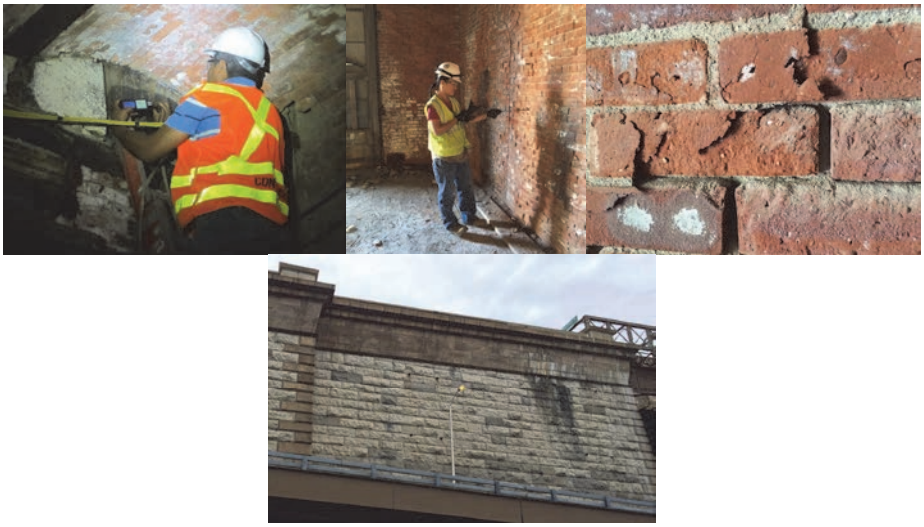
During the design phase, the original stone quarry from the 1800's that sourced granite for the original construction was located and was confirmed as remaining in operation. Where possible all existing granite will be reused and where new granite is needed, as much as possible it will be sourced from this quarry. A total of 29,840 square feet of four-inch thick granite blocks will be replaced in this contract. This project represents a $25 million investment in maintaining the historic and aesthetic integrity of our National Landmark. A Notice to Proceed for this project was issued to the contractor with a start date of October 30, 2017.

Contract #7

The scope of work for Contract #7 includes the rehabilitation of the approach arches, towers and ramp structures on the Brooklyn Bridge. The work is currently estimated to begin in mid-2019.

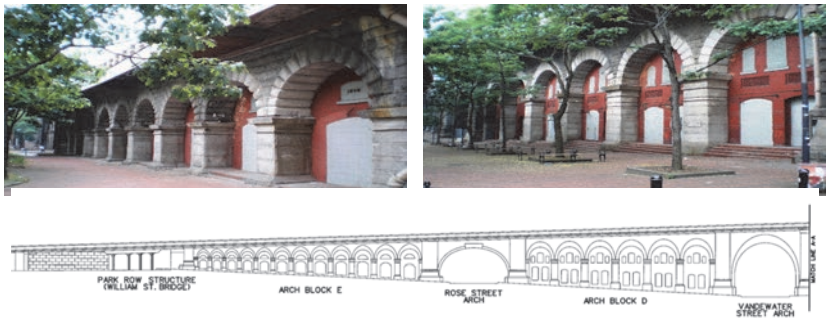
The Manhattan Approach is a continuous arch masonry structure consisting of brick, granite, limestone and infill concrete. The arches run between the Manhattan Anchorage at the east and

Park Row at the west, and have been grouped into Blocks A to E. The Manhattan Approach arches carry six lanes of traffic and the promenade for pedestrians and bicyclists. Three of the Manhattan Approach arches were designed to span cross streets. The original configuration of the arches was modified to accommodate two tunnels for use by subways. In 1953, the subway tunnels were removed, and concrete arches filled the gaps, matching the shape of the barrel walls. During Construction Contract #6, a waterproofing membrane was installed beneath the new roadway deck, which appears to have arrested the water infiltration into the arch block walls. In Arch Block B, sensors are in place to monitor movements across several cracks in the brick. The sensors are being monitored and maintained by the University of Illinois in Chicago.



Manhattan Approach Arch Block A – Measuring Web Section Loss Utilizing an Ultrasonic Thickness Meter. Inserting a Fiber Optic Borescope Into Drilled Holes in Arch Block B. Arch Block A – Flaking of Brick Surface of a Transverse Wall due to Exposure to Freeze-Thaw Cycles. Arch Block A South Elevation – Black Staining and Efflorescence.

The Brooklyn Approach is similar in construction to the Manhattan Approach except for the irregular geometry due to the local streets and Brooklyn Queens Expressway intersecting in highly skewed angles. The approach consists of three groups of brick arches with stone masonry facades. The group of arches called Block I, with individual arch spans of about 30 feet, extends between the Brooklyn Anchorage and the York Street Bridge, which spans the Brooklyn Queens Expressway. Block II, with individual spans of about 25 feet, extends between York Street and Main Street. Block III extends between Main Street and Prospect Street.

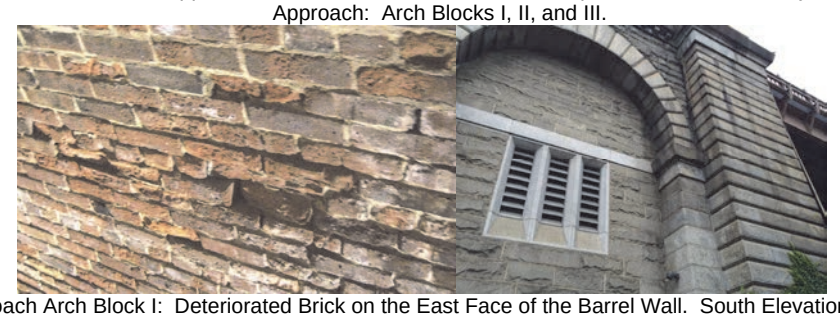


Manhattan Approach: Arch Blocks E and D.

Manhattan Approach: Rose Street Structure, and Vandewater Street Arch.

Manhattan Approach: Arch Blocks C, B, and A.

Manhattan Approach: Cliff Street Arch, and Franklin Square Structure. Brooklyn Approach: Arch Blocks I, II, and III.



Brooklyn Approach Arch Block I: Deteriorated Brick on the East Face of the Barrel Wall. South Elevation - Staining and Loss of Mortar at the Joints and Arch Stones.

The current project (Contract #7) is needed to correct structural deficiencies related to the substructures of the bridge, including the masonry approaches, towers and approach ramps.

Specifically, the project will address the rehabilitation of the interior brick walls, floors, foundations and granite façade of the masonry arches of the Manhattan Masonry Approach, as well as the brick infill walls of the granite façade arches. Similarly, the project will address rehabilitation of the masonry towers and substructure strengthening of the Approach Ramps to correct existing structural deficiencies. Construction work at the towers will be avoided during the nesting period of the peregrine falcons that may nest in an opening of the tower legs. On the Brooklyn Masonry Approach, the project will address rehabilitation of the granite masonry infill walls and facades as well as rehabilitation of the Washington Street abutment. Finally, the project also includes the rehabilitation of a few suspended span components such as the roadway expansion joints, and footwalk widening.

The Brooklyn Bridge is one of New York City's most popular tourist destinations, as well as a major transportation corridor. The existing promenade, shared by pedestrians and cyclists, is narrow and heavily crowded with tourists and mobile vendors vying for space with commuters and recreational users. From 2008 to 2015, pedestrian volumes increased 275% on weekends and cyclists increased 104%. The promenade, which was part of the original bridge, narrows to just 10 feet across in places from 17 feet at its widest point. In August 2016, the Agency's Transportation Planning and Management Division began a seven-month $370,000 engineering study to assess how much weight the bridge can carry and consider options for expansion, such as the structural feasibility of constructing additional space above the roadways on the existing truss system. The goals of the study are to relieve overcrowding, enhance the visitor experience, and to greatly reduce conflicts between and improve safety of cyclists, pedestrians, and visitors on the promenade.

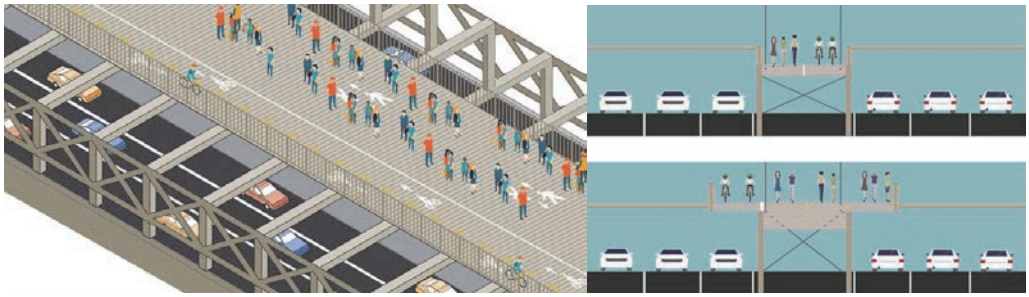
Conceptual Renderings of Possible Changes to the Promenade.

The Agency identified 8 different typologies and analyzed geometric constraints, conflict points, overcrowding, and vendor activity. Vehicular roadway traffic and pedestrian/bicycle promenade traffic flows were modeled to test alternative actions. A consultant was hired to determine structural feasibility of the proposals.

Pedestrian and Bicycle Traffic Flow Model.

The study's analysis showed that while the expanded promenade itself would add additional weight, the greatest increase would come from added pedestrian volume and live loads related to their presence. Results of the study recommended an inspection of the cables before considering a deck expansion. This inspection will take roughly two years and is part of regular bridge upkeep.

If the cable analysis shows an expansion to be feasible, and taking into account other bridge needs, the promenade will be widened when entire deck is raised to girder height as part of an upcoming contract.



Conceptual Renderings of Promenade Widening.

In August 2017, the Division of Bridges began the preliminary design of a new 32-foot wide walkway/bikeway. This will include a new structure at each end to accommodate separate pedestrian and bicycle traffic on the bridge and on the approaches.

MANHATTAN BRIDGE

The youngest of the three NYCDOT suspension bridges that traverse the East River, the Manhattan Bridge carries over 501,000 commuters – 104,000 passengers in 85,084 vehicles, 6,573 bicyclists, 500 pedestrians, and 390,000 mass transit riders - between Manhattan and Brooklyn on weekdays. It connects Canal Street in Manhattan to Flatbush Avenue in Brooklyn. The bridge's total length is 5,780 feet long abutment to abutment at the lower level, and 6,090 feet on the upper roadways portal to portal; its main span length is 1,470 feet and each of its four cables is 3,224 feet long. There are 7 spans in the Manhattan approach, three suspended spans and 7 spans in the Brooklyn approach. It was designed by Leon Moisseiff and first opened in 1909. The bridge supports seven lanes of vehicular traffic, a Class 1 bikeway, a walkway, as well as four transit tracks upon which four different subway train lines operate. The Manhattan entrance to the bridge is distinguished by an elaborate arch and colonnade (which was designated a City Landmark in 1975), designed by the architectural team of Carrère and Hastings, who also designed the main branch of the New York Public Library.

Manhattan Bridge in 2014 and 2016. (Credit: NYSDOT) October 2017: The Bicycle Path was Narrowed but Open While a Division Bridge Repair Crew Repaired the Manhattan Side of the Path.

The $930 million reconstruction program commenced in 1982 with Contract #1, and will continue with Contract #15 for structural and component rehabilitation. Work completed on the bridge to

date includes reconstruction of the south and north upper roadways, re-anchoring the north interior main cable, reconstruction of the north and south subway lines, installation of a truss stiffening system to reduce twisting, restoration of the Manhattan Plaza, including the historic arch and colonnades, reconstruction of the south walkway, installation of a new north bikeway, replacement of the lower roadway, rehabilitation of the Brooklyn Plaza, rehabilitation of the existing main cables with new wire wrapping and a neoprene barrier to insulate from weather, and replacement of the vertical suspenders.

Contract #15

The scope of work for the upcoming structural and component rehabilitation will include: replacement of the south fascia railing and fencing; replacement of the dehumidification system in the cable anchorages; rehabilitation of the masonry and cable housing at the anchorage; rehabilitation of the truss gusset plates at the approach and suspended spans to improve the load rating to HS20; replacement of the work platform at the anchorages; resealing of the relief joints in the south upper roadway; refurbishing the existing fire standpipe system; and strengthening of the subway floorbeam connections in the approach spans.

Manhattan Anchorage Maintenance Platform. Looking Northeast at a Trench Drain and Finger Joint on the Parking Deck. First South Rail at South Walkway. 2016: Inspecting the Bridge Using a Rolling Platform. (2016 Credit: NYSDOT)

2016: Inspecting the Bridge Using a Scaffold and Sky Climber. (Credit: NYSDOT) Bridge Saddle.

The scope also includes the removal and replacement of the tower ornamental cornices, globes, cable collars and brackets. These features of the bridge are constructed from cast iron (an alloy of iron and carbon) and are quite heavy. Cast iron is hard and brittle. It tends to crack rather than bend when subjected to tensile forces, like those imposed by pack rust. They are installed at the top of the towers and are exhibiting connection problems. Some of these elements are cracking and the connection bolts are severely corroded or missing. They have been red flagged under the biennial inspection program and need to be replaced. Ductile cast iron is much stronger, tougher and more ductile than conventional cast irons. The replaced elements will be produced from molds cast from the original pieces. Their appearance will be virtually identical. Undamaged rosettes will be refurbished and reinstalled. A few are missing and will be replaced. The Notice to Proceed for this two and a half year construction project is expected in summer 2018.

Ornamental Bordure, Horizontal Plate Supporting Rosette, Rosette, and Bracket. Ball, Ornamental Cable Band, Ornamental Top Castings, Rosettes and Castings, Rosettes and Ornamental Ceiling Brackets, and Bands Around the Ball.

Ornaments on the Manhattan Bridge Towers Were Flagged as Potentially Hazardous and Removed by In-House Ironworkers in October and November 2016. (Credit: Bojidar Yanev) Using Spider to Remove Ornament at Cable C West in 2016. (Credit: Samuel Teaw)

ED KOCH – QUEENSBORO BRIDGE

At the time of its opening in March 1909, the Ed Koch - Queensboro Bridge (popularly referred to as the 59th Street Bridge), was the longest continuous cantilever-truss bridge in the world. While its starring role in the hierarchy of bridges has since been eclipsed by longer and larger structures, the Queensboro Bridge's importance to the mobility and unity of New York City remains undimmed. The current upper roadways carry four traffic lanes to accommodate both buses (only at rush hours) and passenger cars (H-15 type). The lower level (also known as the inner roadways) carries four additional lanes permitting HS-20 trucks. Two individual outer roadways were adapted to a single lane for pedestrians and bicycles on the north cantilever side, and a Queens-bound vehicular lane allowing H-7.5 vehicles only on the south cantilever side, respectively.

The bridge was designated as a national landmark on November 23, 1973. The $1,048 million reconstruction commenced in April 1981 with Contract #1, and will continue with Contract #10 for the replacement of the upper roadways.

Ed Koch – Queensboro Bridge. (Credit: NYSDOT)

Inspecting the Ed Koch – Queensboro Bridge. (Credit: NYSDOT)

Work completed on the bridge to date includes the rehabilitation of the lower inner roadways, the lower outer roadways, the restoration of the Guastavino arches and the Bridgemarket area, rehabilitation of the overhead sign structures in Manhattan, the upgrading of roadway lighting by replacing all low-pressure sodium lights on the bridge and ramps with high-pressure sodium lights (which will be updated with low energy LED lighting), the replacement of the aviation lights, the geometric improvement of Crescent Street, bikeway and walkway improvement, repair of the south upper roadway concrete overfill and overlay, the promenade platform, the traveler platform, the sidewalk between 61st and 62nd Streets, and the underside of the 59th Street overpass, as well as the rehabilitation of the Sanitation Department area's arch infill, modifications to the maintenance facility beneath the Manhattan approach plaza, and the restoration of the abandoned trolley entrance or kiosk in the plaza on the Manhattan side of the bridge. This small historical structure was in an advanced state of disrepair and had been damaged by repeated vehicular impacts. The work on this vital link between Manhattan and the outer boroughs will enable this 75,000-ton workhorse to better provide the citizens and commerce of New York City with a second century of reliable, prosperous transport. The Ed Koch Queensboro Bridge carries some 170,277 vehicles, 5,406 bicyclists, and 1,000 pedestrians daily.

Contract #10

The Department plans to replace the south and north upper level roadways of the main bridge (truss spans). The existing decks consist of a concrete-filled grid deck system, which are supported on the original steel stringers. The current upper roadway deck has provided over 30 years of service on this heavily-travelled bridge. Project goals include installation of a lighter deck system on the main bridge to lessen the dead loads on the truss members as they are sometimes taxed by loads in excess of their inventory levels. Reducing the weight of the deck system will increase the service life of the bridge. In addition to being light, the proposed deck system will allow staged installation to permit maintenance of traffic during construction, and it will be durable, providing a 75-year service life. The contract work will also replace the concrete overfill in the Manhattan and Queens approach spans.

The Notice to Proceed for this four and a half year construction project is expected in spring 2018. The actual replacement of the upper roadway will begin summer 2020.

Current Roadway Condition.

Movable Bridges

As NYCDOT completes reconstruction work on the East River Bridges, more attention is being devoted to other key City-owned bridges, such as the movable bridges. Building on the success of the East River Bridge projects, the Department is implementing many of the innovative concepts originated during the rehabilitation of East River Bridges on these other major reconstruction projects.

BATTERY PARK UNDERPASS AND WEST STREET UNDERPASS (MANHATTAN) – EMERGENCY CONTRACT

The Battery Park Underpass is a two-span rigid frame reinforced concrete tunnel structure connecting eastbound and westbound traffic between the FDR Drive and West Street (Route 9A) at the southern end of Manhattan. The West Street Underpass is a one-span rigid frame reinforced concrete tunnel structure connecting southbound traffic from West Street heading toward the entrance to the Brooklyn Battery Tunnel (Hugh L. Carey Tunnel).

Battery Park and West Street Underpasses. October 2012 - Battery Park Underpass - View Looking West at the South Portal Entrance Near the FDR Drive. View Looking South at the North Portal Entrance Near West Street. West Street Underpass – Approach at South Portal Looking Southeast. Both Tunnels Were Flooded to Their Roofs, Which Means That all Tunnel Ventilation, Electrical, and Mechanical Systems Were Entirely Submerged in Saltwater.

On October 29, 2012, the New York Metropolitan area was impacted by Hurricane Sandy, causing flooding, loss of power and damage to many components of New York City's infrastructure. On October 30, 2012, a site inspection by the Department revealed major damage to both underpasses. Specifically, certain electrical, mechanical and structural issues with regard to the tunnels had to be addressed.

Battery Park Underpass - September 2013 - Span 2 Looking Westbound (FDR Drive to West Street). June 2014 – The Underside of the Tunnel is Completely Covered With Tiles.

Salt water penetrated the electrical and mechanical equipment in both underpasses, including but not limited to, motors, lighting and pumps. It was therefore, necessary to solicit the services of a specialty contractor to perform all necessary repairs. The original design from 1946 and 1947, as well as previous contracts from 1996, 1997 and 2004 utilized some equipment and systems which are now outdated and were superseded by newer products, as well as code changes which required design modifications in order to be compliant with current codes.

Due to the potentially serious danger to life and public safety posed by the current condition, it

was critical that the repair work be performed as expeditiously as possible.

May 2015: Paver Installation in Battery Park. June and July 2015: Removing Existing Conduits at West Street and Battery Park Underpasses. (Credit: Reza Sharif)

On November 7, 2012, in the interest of public safety, pursuant to Section 103(4) of the General Municipal Law and Section 315 of the New York City Charter, the Department declared that an emergency existed relative to the Battery Park Underpass and West Street Underpass on Route 9A in Manhattan.

April 2016 - Installing Cables. July 2016: Painting Standpipe in the Southbound Battery Park Underpass. August 2016: Installing Conduits in the West Street Underpass.

A Letter of Intent for the emergency repairs of these underpasses was issued to the contractor with a start date of February 17, 2015. The scope of work includes replacement of all of the exhaust fans, motors, sump pumps, traffic signals/VMS, heating and ventilation units, fire and CO monitoring control systems, and the street lighting and emergency response systems. The scope of work also includes the installation of a SCADA system (Supervisory Control and Data Acquisition) for the remote monitoring and control of all systems. Construction is expected to be complete in July 2018.

August 2017: West Street Underpass Elevation North and South. North Concrete Portal. Variable Message Board Will Be Replaced.

August 2017: Battery Park Underpass Elevation South and North. South Tube North Portal. Variable Message Board Will Be Replaced.

Battery Park Underpass – June and November 2017 – Installation of Cables and Conduits. January and July 2017: Lighting Fixture Repairs. August 2017: Surface Preparation for Turning Vane Painting. Intumescent Painting Application. October 2017 – Placement of Reinforcement for the New Fans' Bases. (Credit: Darlyn Alvarez)

METROPOLITAN AVENUE BRIDGE OVER ENGLISH KILLS (BROOKLYN), GRAND STREET BRIDGE OVER NEWTOWN CREEK (BROOKLYN/QUEENS), GREENPOINT AVENUE BRIDGE OVER NEWTOWN CREEK (A.K.A. J. J. BYRNE MEMORIAL BRIDGE (BROOKLYN/QUEENS), PULASKI BRIDGE OVER NEWTOWN CREEEK (BROOKLYN/QUEENS), BORDEN AVENUE BRIDGE OVER DUTCH KILLS (QUEENS), HUNTERS POINT AVENUE BRIDGE OVER DUTCH KILLS (QUEENS), UNION STREET BRIDGE OVER GOWANUS CANAL (BROOKLYN), CARROLL STREET BRIDGE OVER GOWANUS CANAL (BROOKLYN), THIRD STREET BRIDGE OVER GOWANUS CANAL (BROOKLYN), NINTH STREET BRIDGE OVER GOWANUS CANAL (BROOKLYN), THIRD AVENUE BRIDGE OVER HARLEM RIVER (BRONX/MANHATTAN), MADISON AVENUE BRIDGE OVER HARLEM RIVER (BRONX/MANHATTAN), 145TH STREET BRIDGE OVER HARLEM RIVER (BRONX/MANHATTAN), MACOMBS DAM BRIDGE OVER HARLEM RIVER (BRONX/MANHATTAN), AND WEST 207TH STREET/WEST FORDHAM ROAD BRIDGE OVER HARLEM RIVER (BRONX/MANHATTAN) (A.K.A. UNIVERSITY HEIGHTS BRIDGE) – EMERGENCY CONTRACT

On October 29, 2012, the New York Metropolitan area was impacted by Hurricane Sandy, causing flooding, loss of power and damage to many components of New York City's infrastructure. On October 30, 2012, a site inspection by the Department revealed major damage

to the operational portions of these bridges. Specifically, certain electrical and mechanical issues parts had to be repaired or replaced immediately.

Salt water penetrated the electrical and mechanical equipment in the bridges, including but not limited to, motors, electric relays, lock control devices, gates, pier lights, and pumps. It was therefore, necessary to solicit the services of a specialty contractor to perform all necessary repairs.

As the procurement proceeded, the groupings of bridges were changed. The Metropolitan Avenue Bridge was bid separately due to the number of openings. All of the other bridges were bid together.

The Metropolitan Avenue Bridge over the English Kills is located between Queens and Brooklyn and is a double-leaf trunnion bascule that carries four lanes of vehicular traffic and two sidewalks. The bridge opens approximately 450 to 500 times per year for marine traffic, primarily taking barges of fuel oil to a facility south of the bridge. This is heating oil for homes and businesses in the New York City area. As a result, the majority of the openings occur in the winter months. All of the mechanical and electrical systems of the Metropolitan Avenue Bridge were flooded. The high water levels completely filled both bascule pits and submerged all of the operating, tail lock, and emergency hydraulic machinery. Additionally, the main electrical room was flooded with approximately three feet of water and the emergency generator located on the exterior of the building was flooded.

The Grand Street Bridge over the Newtown Creek is located between Queens and Brooklyn and is a rim-bearing swing bridge that carries two lanes of vehicular traffic and two sidewalks. The bridge opens approximately 3 times per year. The bridge was subject to extreme surge tide.

The Greenpoint Avenue Bridge over Newtown Creek is located in Queens and is a double-leaf trunnion bascule that carries four lanes of vehicular traffic and two sidewalks. The bridge was subject to an extreme surge tide and minor repairs are necessary. The navigation lights on the fender system were flooded.

The Pulaski Bridge over Newtown Creek is located in Queens and is a double leaf trunnion bascule that carries four lanes of vehicular traffic and two sidewalks. The bridge was subject to heavy winds. Minor repairs are required to the warning gate arms damaged during the storm.

The Borden Avenue Bridge over Newtown Creek is located in Queens and is a single-leaf retractile span that carries two lanes of vehicular traffic and two sidewalks. The bridge and its mechanical and electrical systems were subject to heavy flooding.

The Hunters Point Avenue Bridge over the Dutch Kills is located in Queens and is a single-leaf rolling bascule bridge that carries two lanes of vehicular traffic and two sidewalks. The bridge was subject to heavy flooding as well as high winds. The warning gate arm was damaged due to high winds.

The Union Street Bridge over the Gowanus Canal is located in Brooklyn and is a double leaf rolling bascule that carries two lanes of vehicular traffic and two sidewalks. The bridge opens approximately 36 times per year. The bridge was subject to heavy flooding.

The Carroll Street Bridge over the Gowanus Canal is located in Brooklyn and is a single-leaf retractile span that carries one lane of vehicular traffic and two sidewalks. The bridge opens approximately 95 times per year. The bridge and its mechanical and electrical systems were subject to heavy flooding which resulted in extensive damage.

The Third Street Bridge over the Gowanus Canal is located in Brooklyn and is a double-leaf rolling bascule that carries two lanes of vehicular traffic along with two sidewalks. The bridge and its mechanical and electrical systems were subject to heavy flooding.

The Ninth Street Bridge over Gowanus Canal is located in Brooklyn and is a tower-drive vertical lift bridge that carries four lanes of vehicular traffic and two sidewalks. The bridge opens approximately 600 times per year. The bridge and portions of its mechanical and electrical systems were subject to minor flooding.

The Third Avenue Bridge over the Harlem River is located between Manhattan and the Bronx and is a center-bearing swing bridge that carries four lanes of vehicular traffic and two sidewalks. The bridge opens approximately 4 times per year. The bridge was subject to flooding of the land on either side of bridge as well as the center pivot fender system.

The Madison Avenue Bridge over the Harlem River is located between Manhattan and the Bronx and is a rim-bearing swing bridge that carries four lanes of vehicular traffic and two sidewalks. The bridge opens approximately 6 times per year. The bridge was subject to flooding of the land on either side of bridge as well as the center pivot fender system.

The 145th Street Bridge over the Harlem River is located between Manhattan and the Bronx and is a rim-bearing swing bridge that caries four lanes of vehicular traffic and two sidewalks. The bridge opens approximately 6 times per year. The bridge center pivot pier was subject to an excessive high tide.

The Macombs Dam Bridge over the Harlem River is located between Manhattan and the Bronx and is a rim bearing swing bridge that carries four lanes of vehicular traffic and two sidewalks. The bridge opens approximately 20 times per year. The bridge was subject to an extreme surge tide, and the center pivot pier and fender were flooded.

The West 207th Street (University Heights) Bridge over the Harlem River is located between Manhattan and the Bronx and is a rim-bearing swing bridge that carries four lanes of vehicular traffic and two sidewalks. The bridge opens approximately 23 times per year. The bridge was subject to an extreme surge tide and the center pivot pier and fender were subject to flooding. The traffic signal assembly was subject to high winds and was damaged.

The level of repair varies from bridge to bridge. In general, the work entails the rehabilitation of the mechanical and electrical systems that are used to operate the movable spans, provide navigational lighting to guide mariners in the waterway and provide vehicular traffic control when a bridge opening is necessary.

Common to all the bridges will be the need for the maintenance and protection of traffic. This shall primarily consist of daily temporary lane or shoulder closures to allow contractor access to the bridge for material delivery and equipment usage. For the structures that have extensive damage to the electrical system, full roadway closures will be performed to allow the operating systems to be tested. This will be done at night and occur over a period of evenings. On bridges that have sidewalks, at least one walkway will be maintained through the contract.

Also common to all the bridges will be the local removal of hazardous or asbestos containing materials. Areas where suspect materials that may contain lead, PCB and/or asbestos have been identified based on visual inspection. Testing will be performed as part of the contract prior to the start of work to confirm their presence. This will include PCB caulking, lead paint and/or asbestos containing material in various components. If testing proves their presence exists, abatement will be done before repairs occur to the mechanical and electrical systems.

These bridges provide a necessary service in compliance with federal law which requires that the bridges be operational for marine traffic. It is critical that the repair work be performed as expeditiously as possible.

On November 20, 2012, in the interest of public safety, pursuant to Section 103(4) of the General Municipal Law and Section 315 of the New York City Charter, the Department declared that an emergency exists relative to these 15 movable bridges in the Bronx, Brooklyn, Manhattan, and Queens.

As of May 28, 2013, all Hurricane Sandy-related damages on the Pulaski Bridge and Greenpoint Avenue Bridge were repaired by the in-house bridge maintenance group. As such, these two bridges were eliminated from the first group of bridges, leaving only the Metropolitan Bridge in this category.

A Letter of Intent for the emergency repairs of the Metropolitan Avenue Bridge over English Kills (Brooklyn) was issued to the contractor with a start date of June 23, 2014. The contractor

performed the following work: repaired/replaced various components of the bridge operating machinery; repaired/replaced the tail lock machinery; replaced the existing hydraulic machinery; replaced the bridge's span brakes; replaced the primary and secondary motors, resistors, brakes, limit switches, encoders, tachometers, motor control centers, drive cabinets and other miscellaneous electrical equipment damaged by Hurricane Sandy; replaced the bridge's fire alarm and security system; replaced the light fixtures, channel flood lights, electrical receptacles, and channel navigational lights; replaced damaged conduits, junction boxes, and wiring that were damaged due to flooding; installed new sump pumps; installed a new generator, load bank and other associated wiring; repaired damaged barrier gates; repaired the bridge's central joint to address the expansion issue during hot summers; and removed falling tiles from the control house.

The electrical equipment room was sealed to prevent damage from future flooding, and an alternative power source was raised to a higher platform to enable the operation of the bridge in case of main power failure. The emergency repair project was substantially completed on May 6, 2016.

Metropolitan Avenue Bridge in September 2015: Tail Locks Machinery Alignment Checks After Rehabilitation. Structural Steel for East Machinery Platform. October 2015: Above Average High Tide From Hurricane Joaquin. Bridge Joint. Operating Machinery Lowered Inside Machine Room and Into Bascule Pits. 2016: Flood Proof Windows Were Installed in the Electrical Room. December 2012: Old Generator was Completely Below the Water Line. New Generator on a Raised Platform.

The second group of bridges consists of Macombs Dam Bridge over Harlem River (Bronx/Manhattan), 145th Street Bridge over Harlem River (Bronx/Manhattan), Third Avenue Bridge over Harlem River (Bronx/Manhattan), Madison Avenue Bridge over Harlem River (Bronx/Manhattan), Hunters Point Avenue Bridge over Dutch Kills (Queens), Carroll Street Bridge over Gowanus Canal (Brooklyn), Ninth Street Bridge over Gowanus Canal (Brooklyn), Third Street Bridge over Gowanus Canal (Brooklyn), Union Street Bridge over Gowanus Canal (Brooklyn), West 207th Street/West Fordham Road Bridge over Harlem River (Bronx/Manhattan), Borden Avenue Bridge over Dutch Kills (Queens), and Grand Street Bridge over Newtown Creek (Brooklyn/Queens). A Letter of Intent for the emergency repairs of the second group of bridges was issued to the contractor with a start date of December 15, 2014.

In April 2015, all Hurricane Sandy-related damages on the Union Street Bridge were repaired by the in-house bridge maintenance group. As such, contract work on this bridge was eliminated from the second group of bridges.

Project Location Maps: Harlem River Bridges, Gowanus Canal Bridges, and Hunters Point Avenue Bridge.

The contractor performed the following work on the Grand Street Bridge in 2015: cleaned the center pivot and flushed the grease; repaired the southwest sidewalk hatch; and repaired the access platform under the bridge. The following work was performed in 2016: replaced the channels on the center pivot wheels; installed electrical components in the control house; completed asbestos abatement; and installed the temporary operating system. The following work was performed in 2017: installed the refurbished/replaced roller bearings, brake and brake wheels, bushed bearings on the span drive and wedge machinery, electrical motors and limit switches for the span drive and wedge machinery; replaced the navigation lights conduit boxes, and wiring for the span drive and wedge machinery; and addressed safety flags.

The contractor performed the following work on the Carroll Street Bridge in 2015: installed a new temporary operating system; removed the existing operating machinery from the control house; repaired the deteriorated sections of the existing rail tracks; removed the existing conduits and wiring in control house and pier; and repaired the leaking control house roof. The following work was performed in 2016: demolished the existing conduits and wiring in the control house and pier; casted, poured, and tested the new hoist; rehabilitated 80% of the machinery; installed new navigation lights and their respective conduit and wiring; and erected a new steel platform in the control house. The following work was performed in 2017: installed the rehabilitated bridge machinery and the new control desk; replaced the span drive wire ropes and hardware; replaced the motor, secondary resistors, brakes and limit switches; replaced the cable reel assembly including motor and junction box; replaced the conduits and wiring in the control house and on the pier; replaced the navigation lights, conduit boxes and associated wiring; and raised the operating machinery and electrical equipment in the control house.

December 2017: Touch-Up Painting on Carroll Street Bridge Machinery. Pier Lights.

The contractor performed the following work on the Ninth Street Bridge in 2015: removed the span locks, including the motors, limit switches, brakes, and gear reducers driving the limit switches; and replaced the navigational lights on the fenders along with conduit, junction boxes

and wiring. The following work was performed in 2016: replaced the span locks, including the motors, limit switches, brakes, and gear reducers driving the limit switches; completed 90% of the electrical installations, including conduit, junction boxes and wiring; installed and tested the flood barrier system; installed and tested the new generator; installed HVAC systems; waterproofed the generator house; and performed intermediate bridge balancing. The following work was performed in 2017: installed and tested the new emergency generator; installed the HVAC systems; waterproofed the generator house; replaced the navigational lighting system on the fenders along with conduit, boxes, and wiring, installed the new transformer and performed associated work to incorporate the existing with the new generator; installed a new Automatic Transfer Switch (ATS); and performed the final bridge balancing.

2017: Completed Ninth Street Bridge Flood Barrier.

The contractor performed the following work on the Borden Avenue and Hunters Point Avenue Bridges in 2016: completed asbestos abatement work; continued the electrical installation of wiring and conduit; and removed the mechanical machinery and sent it to the manufacturer for rehabilitation. The following work was performed in 2017: installed the submarine cables using the directional drilling method; replaced the motor disconnect switch, conduit boxes, flexible cables and wiring on the west pier; installed a new support and platform for the terminal box; replaced conduit, boxes and wiring in the operator house basement and along the pier. At the Hunters Point Avenue Bridge, the contractor removed and replaced span and tail lock actuators; replaced all electric motors, limit switches, tachometers, and over speed switches; replaced the motor brakes and machinery brakes; replaced conduits, boxes and wiring in the bascule pier and span lock area; replaced the northeast warning gate arm; and installed and successfully tested the flood resistant doors.

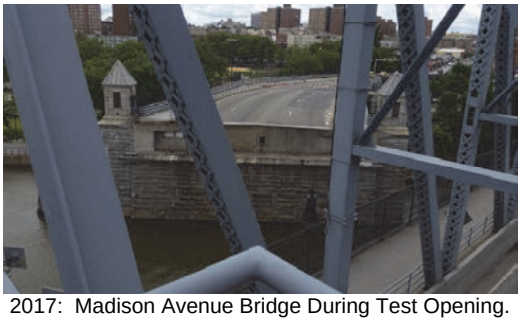
2016: Borden Avenue Bridge Operator House. 2017: Borden Avenue Bridge Traffic Panel. Submarine Cables. 2017: Hunters Point Avenue Bridge New Double Doors. Sump Pump and PVC Pipe.

The contractor performed the following work on the Third Street Bridge in 2016: accepted bridge turnover from NYCDOT; began mechanical component removals; and began installation of the temporary operating system. The following work was performed in 2017: completed the rehabilitation of the gear reducers and completed their reinstallation; replaced roller bearings, span drive motors, brakes, limit switches, over speed switches, tachometer, and position transducers; installed the elevated platform for the new generator; and replaced the warning gates.

December 2017: Third Street Bridge Generator Platform. Droop Cables.

The contractor performed the following work on the Third Avenue Bridge in 2016: completed installations of new electrical components in the Bronx side electrical vault, including the new sump pump with appurtenances and new grounding lugs; installed and tested the new flood barrier system; and performed bridge system testing. Work at this bridge was completed in October 2016.

The contractor performed the following work on the Madison Avenue Bridge in 2016: installed and tested the flood barrier systems on the Bronx and Manhattan sides; made repairs to the electrical equipment in the Manhattan side transformer vault; replaced the navigation lights, and installed the new sump pump in the Manhattan side transformer vault. The following work was performed in 2017: installed the flood barrier systems on the Bronx and Manhattan electrical vaults, and replaced the cabling between the main circuit breaker and the transformer.



2017: Madison Avenue Bridge During Test Opening.

The contractor performed the following work on the 145th Street Bridge in 2016: began the rehabilitation/cleaning of the mechanical components on the center pivot pier; installed all navigation lights, including conduit, wiring, and fixtures; removed the existing submarine cables in the east channel (from the Bronx side to the center pier); installed new submarine cable conduit and cable in the east channel; terminated new submarine cables into the Bronx side gate house and the control room on the center pier; and re-installed the submarine cable control cabinet on the center pier platform. The following work was performed in 2017: modified and raised the existing submarine cable platform, and replaced the damaged bridge lightning protection system.

The contractor performed the following work on the Macombs Dam Bridge in 2016: excavated, formed, and poured new generator platform footings; erected the steel for the new platform; performed CO2 blasting for rehabilitation/cleaning of the mechanical components on the center pivot pier; and installed all navigation lights, including conduit, wiring, and fixtures. The following

work was performed in 2017: removed the existing submarine cables from the center pivot pier to both rest piers and installed new submarine cables; replaced all navigational lights, conduit, junction boxes and wiring on the center pivot pier fender; installed the new automatic transfer switch (ATS) cabinet and navigational lighting cabinet; and installed new platform with a ladder for access for the ATS and navigational lighting cabinets.

2016: Macombs Dam Bridge CO2 Containment.

The project is being funded by the Federal Highway Administration (FHWA) and the Federal Emergency Management Agency (FEMA). The work on all twelve bridges will be performed under a single construction contract, and is expected to be complete in December 2018.

Inspection in Late 2012: East End of the West 207th Street Bridge - Missing Traffic Signal was Knocked Down by the Hurricane Winds. Borden Avenue Bridge Operator's House Basement Level – Depicted Flood Line was Approximately 5 Feet Above the Floor. Third Street Bridge – Northwest Channel Light Missing. Ninth Street Bridge – Manually Pulling the Cable Reel Because the Motor Failed.

Inspection in Late 2012: Carroll Street Bridge - Navigational Fixtures on North Side of Span – Only the Center Span Fixture was Operational. Grand Street Bridge – Standing Water in the Access Light Fixture at the East Wedge Walkway. Typical Impact Damage to Pier Light.

Inspection in Late 2012: Union Street Bridge – Standing Water in East Span Maintenance Light. Madison Avenue Bridge - General View of Fender and Center Pier—the Red Line Depicts the Approximate Water Level. Macombs Dam Bridge – Pier Lighting Fixture with Cover Removed – Silt Deposit on Lamp Tops, and Corrosion on the Fixture Frame. 145th Street Bridge in August 2015. (Credit: Litcy Barreto)

Grand Street Bridge in October 2015 (Pier 1- Right Side) and October 2016.

BELT PARKWAY BRIDGE OVER MILL BASIN (BROOKLYN)

Opened on June 29, 1940, the Mill Basin Bridge is adjacent to the Jamaica Bay Wildlife Refuge and the Gateway National Recreation Area. It was the only movable bridge on the Belt Parkway. The current clearance over Mean High Water is 35-feet. When the Mill Basin Bridge was constructed during the first half of the 20th century, New York City's inland waterways were among the most heavily navigated thoroughfares in the country. However, as maritime traffic in New York City steadily decreased since the mid-1960s, the need for movable bridges lessened as well. In 1941, during its first full year of operation, the Mill Basin Bridge was opened 3,100 times; by 1953, that figure decreased to 2,173; by 2017, in its final year of operation, the number of openings declined further to a total of only 190 openings.

Mill Basin Bridge Open in December 2017.

In addition, significant and costly traffic congestion resulted from the operation of this outmoded drawbridge. In 2016, the Mill Basin Bridge carried 137,226 vehicles per day. The average opening and closing time for the bridge (and others like it) was ten minutes. Thus, this structure's operation had a negative and significant effect on the efficiency of New York City's vehicular traffic flow.

Mill Basin Bridge in 2010. (Credit: NYSDOT) Construction Site in October 2016.

In 2015, on a New York State-mandated scale from 1 to 7, this bridge had a condition rating of 3.209, or "fair." While the bridge was not in any immediate danger of structural failure, its reconstruction was required in order to maintain mobility and public safety on this vital artery.

The old Mill Basin Bridge was 864-feet long and 14 spans, including double movable leaf bascule spans and a steel superstructure, supported on reinforced concrete pier on timber piles, and abutments supported on pre-cast concrete piles. The existing structure and immediate approaches will be demolished and replaced.

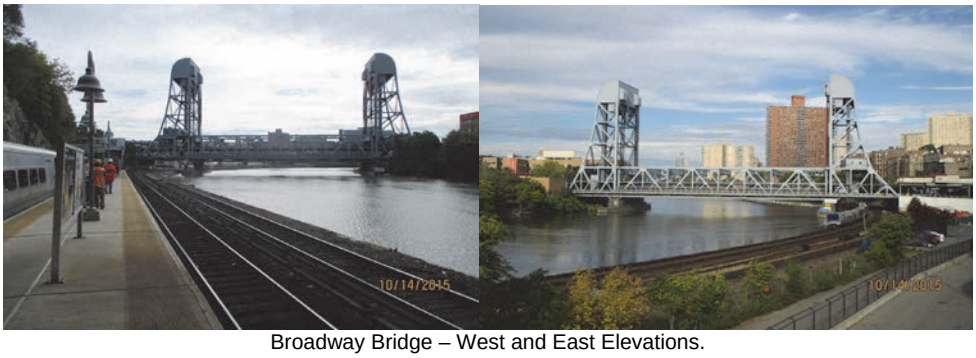
The replacement will be a 2,645-foot long, 17 span, 60-foot high fixed bridge. It will consist of a steel composite superstructure and reinforced concrete substructure on piled footings, and will be constructed on a new alignment set on the north side of the existing bridge and partially overlapping with the existing bridge. The new bridge and approach will have three 12-foot wide traffic lanes, a 12-foot wide right shoulder on the bridge, a 10-foot wide right shoulder on the approaches, and a minimum left shoulder in each direction. The eastbound side will carry a dedicated pedestrian/bicycle path along the south fascia. The new bridge will be a fixed structure with a 60-foot vertical clearance over Mean High Water, obviating the need for opening and closing the structure to accommodate tall vessels. The new design of the bridge will result in increased sight distances, an increase in lane width from 11-feet 4-inches to 12-feet, and the inclusion of safety shoulders in both directions. The channel will remain navigable during construction, and the clear channel width will remain the same after the new structure is in place. A new fender system will be installed to protect the bridge substructure from marine traffic. The reconstruction of the Mill Basin Bridge (part of the second Belt Parkway Group) is scheduled to last approximately 4 years. A Notice to Proceed for the replacement of this bridge was issued to the contractor with a start date of June 22, 2015.

On December 4, 2017 all Belt Parkway traffic was removed from the moveable bridge and shifted on to the new bridge. On December 8, 2017, the old bridge was put in the open position. Demolition, according to approved procedures, of the steel superstructure started on December 12, 2017, and continues.

BROADWAY BRIDGE OVER THE HARLEM RIVER (BRONX/MANHATTAN)

Broadway extends from the southern tip of Manhattan, through the Bronx and terminates in Westchester County. The Broadway Bridge, a lift type movable bridge crossing the Harlem River, is located between West 220th Street in Manhattan and West 225th Street in the Bronx. The bridge carries Broadway and the #1 IRT subway over the Harlem River. The bridge provides vehicular, subway, pedestrian and bicycle access across the river between the Inwood section (New York County) and the Marble Hill section (New York County) which is surrounded by the Kingsbridge section (Bronx County). In 2016, the bridge carried approximately 36,027 vehicles per day. The superstructure consists of east and west steel thru-trusses, girder/floor beam systems at track and roadway levels and cantilevered sidewalks. Three tracks of the IRT subway are carried on its upper level and a five-lane two-way roadway with sidewalks on either side is carried on its lower level.

The vertical lift bridge is the third movable steel structure at this location. The original steam powered single-deck swing span built in 1895 carried only highway and pedestrian traffic. The first swing span was moved to a new nearby location as the University Heights Bridge. The second structure was built in 1905 to accommodate the extension of IRT subway into the Bronx from Manhattan. The second bridge was again a double level swing span to carry the subway line on the upper deck and highway traffic on the lower deck. The current structure, a double level vertical lift bridge to carry the subway and vehicular traffic, was built in 1960.



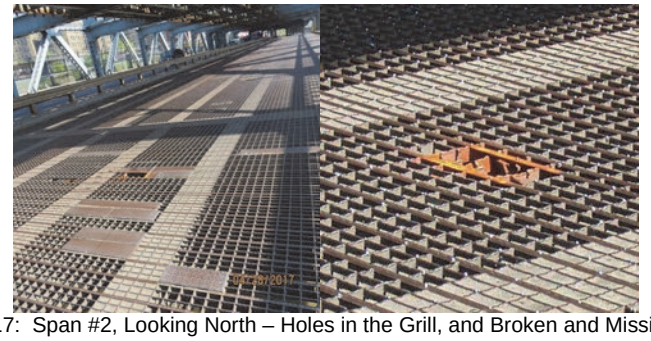
Broadway Bridge – West and East Elevations.

The bridge underwent a protective coating project to protect the steel components of the bridge against the effects of corrosion. This project was completed in 2003. The bridge also underwent component rehabilitation, including miscellaneous steel repairs, grating replacement, sealing and waterproofing of its deck, repair of spalled concrete pavement, new expansion joints and a new median barrier. This project was completed in May 2004.

A major reconstruction project is currently anticipated to start in the summer of 2018. The project's scope of work includes a major rehabilitation of the roadway deck, superstructure steel and substructure elements of the vertical lift span, as well as the approach spans, and the repair of the truss members (chords, batten plates, gussets and lacings) throughout the structure. It will also include the replacement/rehabilitation of the electrical and mechanical components of the vertical lift span, provision of access to bicyclists in the outer roadway lanes, of the granite on the river piers, rehabilitation of the control house, the two machinery houses, the gate house, and the two gateman's shelters (including asbestos abatement), replacement of the pedestrian fencing, and installation of pigeon-deterrent, intrusion, and shielding measures. Construction is anticipated to be complete in the summer of 2021.

2015: Northbound and Southbound Roadways. South and North Piers. November 2015: Span 2 Right Sidewalk, Beginning and End Approaches, (Credit: NYSDOT)

2015: Framing Span 2. November 2016: Pier 1, Finger Joint at Southbound Roadway - Misaligned Fingers. December 2016: Span 2, Northbound Roadway - General View of Steel Grid Deck. (Credit: NYSDOT)

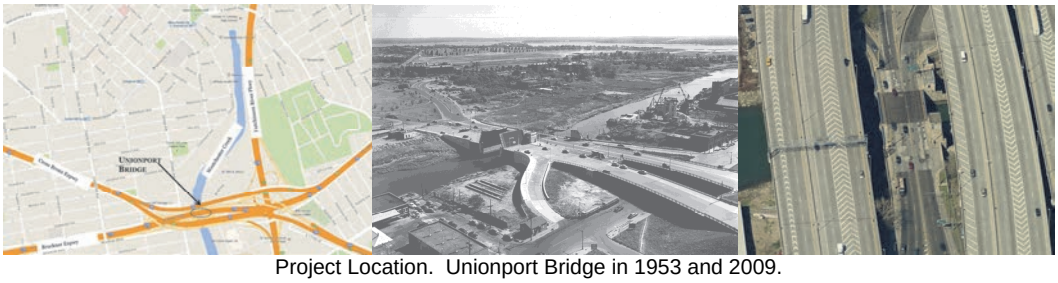


April 2017: Span #2, Looking North – Holes in the Grill, and Broken and Missing Bars.

Existing Roadway Looking North and Proposed Bicycle Lanes.

BRUCKNER EXPRESSWAY (NORTHBOUND & SOUTHBOUND SERVICE ROAD) OVER WESTCHESTER CREEK (UNIONPORT BRIDGE) (BRONX)

A bridge has been located in this location since the late 19th century: the original swing-type bridge was built around 1872, replaced by a new double-leaf bascule bridge in 1918. The current double-leaf trunnion bascule bridge was built in 1953, and underwent major modifications in 1971, including the demolition of the north side of the bridge, to allow for the construction of the overhead Bruckner Expressway. The approach roadways, ramp structures, and south bascule span were altered accordingly to accommodate two-way traffic. The resulting condition placed a maze of elevated highways around the legacy double leaf bascule. In addition to maintenance over the years, several enhancements were made in the 1990's. The mechanical and electrical systems and traffic control devices were rehabilitated. The bascule span open deck grating and grating support channels were replaced in the late part of 1997 and early part of 1998.



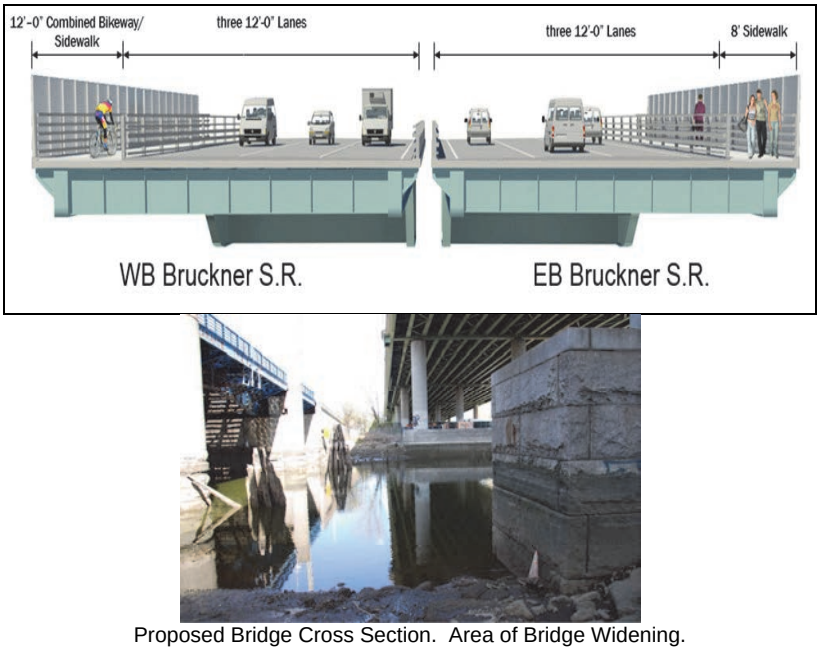
Project Location. Unionport Bridge in 1953 and 2009.

The Unionport Bridge lies in the midst of the Bruckner Expressway (I-278) interchange which is comprised of the Bruckner Expressway (I-278), the Cross Bronx Expressway (I-95) and the Hutchinson River Parkway. Along with providing a connection to the Bruckner Interchange and Cross Bronx Expressway, the Unionport Bridge also connects the local streets including Brush Avenue, east of the bridge, and Zerega Avenue, west of the bridge. It is an important link between the Unionport section and Schuylerville sections of the Bronx. This 17-span structure (three waterway spans and fourteen concrete approach spans) carries five lanes of the Bruckner Boulevard Expressway service road traffic over Westchester Creek. The bridge is the only street level crossing of Westchester Creek readily accessible to the local residential, industrial, and commercial areas on either side of the creek. The bridge is equally important to the local non-driving community. Westchester Creek is a barrier not just to trucks and automobiles, but also to pedestrians, bicyclists and transit riders who do not have the option of using the elevated expressways. This bridge opens for important fuel oil deliveries up to 300 times a year. The bascule span open deck grating and grating support channels were all replaced by Division staff during the late part of 1997 and early part of 1998. In 2016, the bridge carried approximately 63,024 vehicles per day.

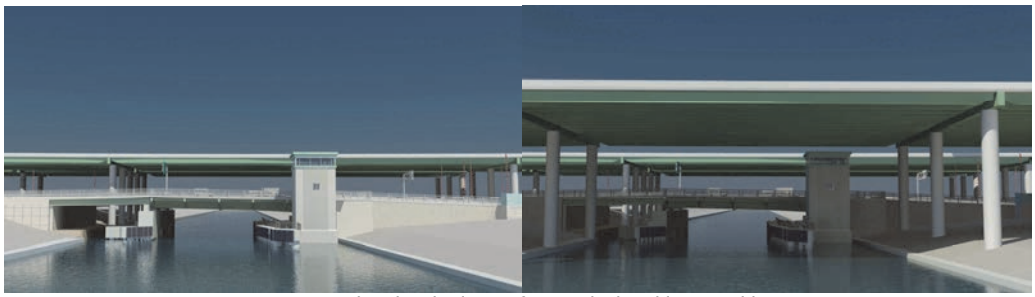
2015: Span #9, Open Deck Grating at Westbound Roadway, Looking Ahead and Right. Loose and Bouncing Plates. Plastic Delineator Posts Mounted to the Concrete Median are Missing the Majority of Posts Due to Vehicular Impacts. Span #9 Right Sidewalk, Looking Back. Asphalt Tiles Over the Bascule Span are Severely Deteriorated and Exhibit Several Missing Tiles. Existing Bridge in September 2016 – Left and Right Elevations. (Credit: NYSDOT)

The project, to replace the existing bridge in its entirety, is ongoing. Due to overhead and lateral site constraints, other movable bridge types such as swing spans or vertical lift bridges were not deemed feasible. The new, wider roadway will maximize use of the space between the elevated structures. The single leaf bascule built in the open position, offset from and behind the existing bascule, will allow traffic to continue on a skewed alignment across the existing bridge as the new

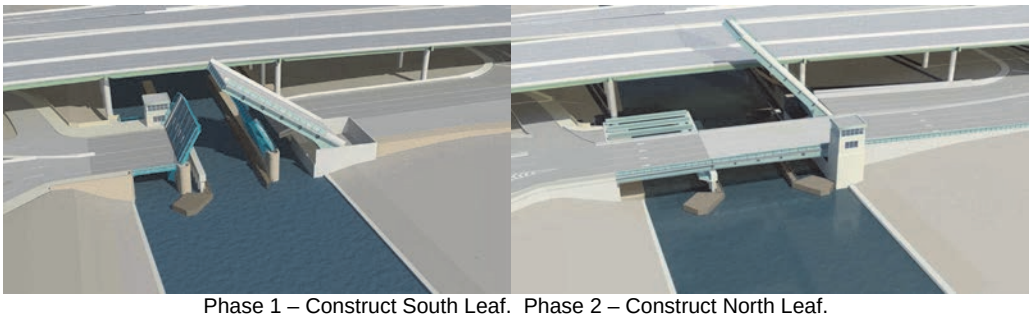
span is built. The resulting twin bascules will allow one span to be taken out of service if required for future maintenance or reconstruction while providing ample room for traffic on the remaining span.



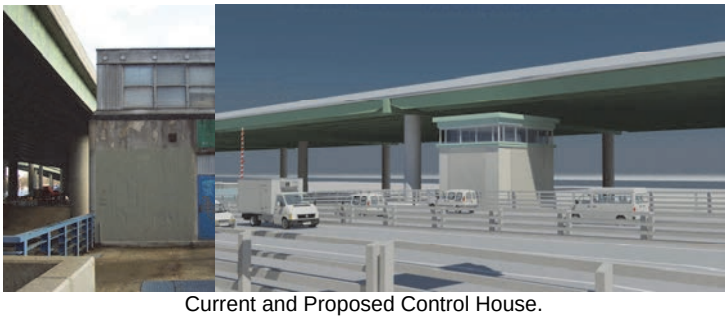
Proposed Bridge Cross Section. Area of Bridge Widening.



Proposed Twin Single Leaf Bascule (Looking North).



Phase 1 – Construct South Leaf. Phase 2 – Construct North Leaf.



Current and Proposed Control House.

Looking West – Towards Current And Proposed Bridge.

Looking East – Towards Current And Proposed Bridge.

The project's scope of work includes: a complete replacement of the bascule, flanking, and approach substructures and superstructures, providing six 12-foot travel lanes with shoulders on both sides of the bridge; a new 12-foot bicycle/pedestrian path and a 8-foot sidewalk, separated from traffic with a barrier; a new existing mechanical and electrical systems for the bascule span; a new bridge operator and control houses, and a new fender system, sheeting, dolphin clusters, drainage system, street lighting, traffic signal facilities, and gates. All asbestos containing materials, contaminated soils, lead paint, and other regulated materials will be removed and discarded. The new west and east approaches and ramps will be constructed with new modular retaining walls and filled with soil at grade. The new protected bicycle/pedestrian path will close a gap between the Hutchinson River Greenway east of the bridge and the existing bikeway network west of the bridge. Additional improvement measures will be implemented at the Brush Avenue intersection to enhance safety and operation. A Notice to Proceed for this project was issued to the contractor with a start date of July 17, 2017. Construction is anticipated to be completed in summer 2021.

January 2017: Bridge Grating. October 2017: Span 9, Right Side, Eastbound Travel Lanes. The Top of the Steel Open Grid Deck has Multiple Steel Plates Installed Throughout the Eastbound Lanes to Cover the Damaged Areas of the Gratings. Span 9 Right Sidewalk. (Credit: NYSDOT)

MACOMBS DAM BRIDGE OVER THE HARLEM RIVER (BRONX/MANHATTAN)

The Macombs Dam Bridge, which has one of the longest swing spans in the world, was opened in 1895, and was designated a City landmark in 1992. It connects West 155th Street in Manhattan with East 161st Street and Jerome Avenue in the Bronx. The bridge and the West 155th Street Viaduct carry two lanes of traffic in each direction. The bridge is comprised of the 155th Street Viaduct; the swing span over the Harlem River; the Jerome Avenue approach spans; and the four Major Deegan Expressway access ramps. The 155th Street Viaduct serves as the western approach to the bridge in Manhattan and provides connections to West 155th Street, Macombs Place, and Adam Clayton Powell Jr. Boulevard. The main swing span over the Harlem River is 408 feet long and provides two shipping channels each with 150 feet of horizontal clearance.

Macombs Dam Bridge. Project Location. Aerial View.

In 2016, the bridge carried approximately 38,183 vehicles per day. The $145 million reconstruction of this landmark bridge, which was completed in May 2007, included the West 155th Street viaduct, the west approach plaza over the Harlem River Drive and Seventh Avenue, the swing span over the Harlem River, the deck and camelback trusses over Metro-North

Railroad and Conrail, the Major Deegan interchange (consisting of the east approach and four ramps), and the Jerome Avenue viaduct. The rehabilitation work not only strengthened the structure, it returned the bridge's appearance to its turn of the century grandeur.

West 155th Street Viaduct. The Timber Fender.

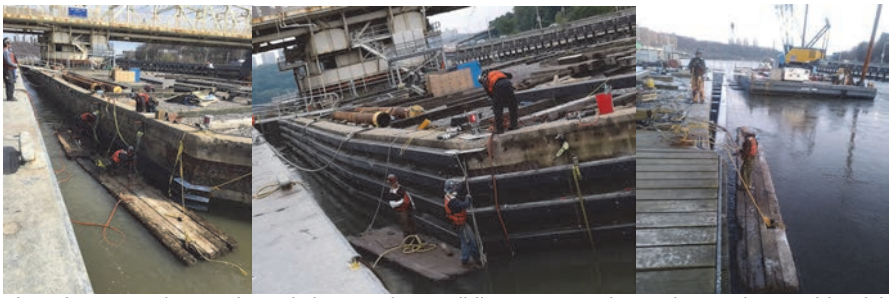
The current construction project will rehabilitate the West 155th Street Viaduct and the fender system. The scope of work includes replacement of columns, floorbeams, girder ends, bearings, expansion deck joints above floorbeams, cross frames and lateral bracings, and the ornamental brackets. Based on coordination with the New York City Landmarks Preservation Commission, components that are replaced will be reconstructed in kind to the extent possible, with the new members built up from bars, plates and angles that are similar to the original construction, so that the new components will be virtually indistinguishable from original components, with the exception that the new components will be constructed with bolts and not rivets. A Notice to Proceed for this rehabilitation project was issued to the contractor with a start date of July 27, 2015.

Steel Repairs at the Viaduct Began in Summer 2017. Temporary Supports for New Strut Replacement. Temporary Shoring Tower System Assembly. "Flying" 12T Jacking Beams from Top of Viaduct and "Sliding" Them Below the Viaduct Atop the Supports. Removing Existing Column. Installing New Column. Sawcutting and Removing the Deck. Removing Existing Floorbeam. Steel Roadway Plates Placed Over the Cut Section of the Deck. New Floorbeam Installation. New Column Wheelguard.

The existing swing span fender is misaligned with the swing span in open position, and the timber cribbing is under attack by marine borers which could lead to the failure of the timber cribbing and the collapse of the stone fill. In 2016, the contractor installed formwork around the perimeter of the existing fender, filled the voids in the fender with sand-cement grout, and bonded the existing timber and rock into one solid mass. This grouting work was completed in 2017. The rest of the structural repair work also progressed in 2017. Remaining work includes the construction of a fender extension on the northeast corner. In addition, in connection with the fender repair, the work activities will include removal of debris located on the river bottom in the channels adjacent to the swing spans. Construction is anticipated to be substantially complete in July 2019.

Fender Grouting - Started Spring 2016- Completed Summer 2017. Grouting Test Sections Filled with Stones Were Constructed Offsite, Inside a Port-a-Dam (Similar to a Pool), with Placed Concrete in a Manner Simulating the Fender Conditions. The Grouting Test Sections Were Cut in Sections and Confirmed that the Grout Moves Around Underwater and Encapsulates the Stones and Timber. Divers Installed Underwater Formwork on the Cribbing Around the Fender. Grouting Operations Started with Pumps on Land. Grouting Slick Lines Transfer the Concrete from Land Through the Sidewalks and Down to the Fender (About 800' Away). Typical Drilling at the Fender to Install Grouting Tubes all the Way to the Bottom of the Fender Cribbing (About 30-40' from Top of Ground). Drilling for Core Samples to Verify the Grouting. Core Samples Extracted.

Fender System Rehabilitation Began in Summer 2017. Aerial View Prior to Construction. General View of the Fender and the Swing Span. Removal of the Existing Timber Rubbing Strips From the Fender.



Installation of New Lumber on the Existing Fender. Building an Extension at the Northeast Side of the North Fender with New Lumber.

MADISON AVENUE BRIDGE OVER HARLEM RIVER (BRONX/MANHATTAN)

The Madison Avenue Bridge connects the boroughs of Manhattan and the Bronx, and was constructed in 1910 with reconstruction projects in the 1960's and 1990's. The structure consists of a swing span with two flanking spans, two approach ramps on the Manhattan side and one approach structure on the Bronx (at 138th Street). The swing span is 307.6 feet long, supported on a center pier and two rest piers.

General View of Truss Swinging in 2010 and Right Elevation of Span 15 in 2012. (Credit: NYSDOT) North Elevation View.

A project for electrical, mechanical, and miscellaneous operating system-related work is necessary, as the bridge is currently operating with very old machinery components, along with a temporary electrical system known as the "Interim Drive System" installed during the 1994 rehabilitation contract. Some of the machinery components currently in service are over 100 years old and have far exceeded their service life. Moreover, the bridge does not have any back-up operating system which renders the bridge inoperable in case of failure of any component of the Interim Drive System. The preliminary design phase of this project began in early 2011, and was completed in January 2016. The final design was completed in September 2017. The scope of work will also include the replacement of the navigation lighting system, the rehabilitation of the traffic gates, architectural repairs to the gate houses and machinery room (including the removal of lead paint from the gatehouse walls), and the replacement of the end dam at the rest piers. Construction is anticipated to begin in summer 2018. In 2016, the bridge carried approximately 44,338 vehicles per day.

Madison Avenue Bridge in 2016: Left and Right Elevations Spans 12 to 15. Pier 13 – Existing Rack and Pinions. (Credit: NYSDOT)

Non-operational Span Drive Machinery. Current Operator Desk and Bronx Approach End Dam. Gate House.

PARK AVENUE TUNNEL OVER 34TH STREET (MANHATTAN)

The Park Avenue Tunnel was originally built as an open cut in 1836 to accommodate horse drawn trolley cars between East 33rd Street and East 42nd Street. In 1854, a five course brick arch roof was constructed and the underground tunnel was used by the New York and Harlem River Railroad steam engine trains from East 42nd Street to its terminal then located at East 30th Street and Park Avenue. In 1870 the rail road was converted to electric powered trolleys.

The tunnel in its present form was converted to vehicular traffic only in 1917, when trolley tracks were covered with fill and roadway pavement was built. In its present form, the tunnel is located under the center mall of Park Avenue South. The roadway width inside the tunnel varies from 19'-2" to 22'-5" and used to carry a single lane of traffic in each direction. As of summer 2008, the traffic in the tunnel is restricted to only a single northbound lane.

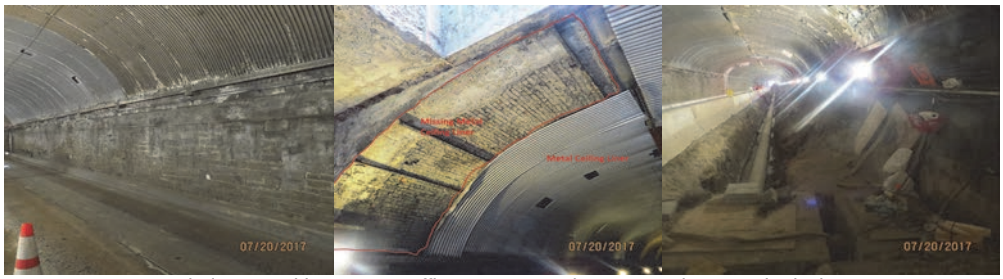
Park Avenue Tunnel – Left and Right Elevations in 2016. Begin Left Wingwall - Stones are Partially Dislodged, Cracked and With Missing Mortar. End Right Wingwall - Wall is Spalled and Exhibits Hollow Concrete Areas That are Shielded With Wire Mesh. End Abutment (Near South Portal) – Bricks Exhibit Deteriorated Mortar. (Credit: NYSDOT)

Some rehabilitation work was completed on the tunnel in November 2005. That contract included the rehabilitation of the fans and the ventilation system. A Notice to Proceed for this rehabilitation project was issued to the contractor with a start date of July 25, 2016. The scope of work encompasses complete rehabilitation of the civil and structural components of the tunnel, including: removal and replacement of the tunnel and approach roadway pavements and curbs; removal of the existing corrugated metal cladding and stainless steel gutters at the brick arch section; waterproofing the brick arch from the inside of the tunnel; strengthening the brick arch section of the tunnel with shotcrete reinforced with lattice girders; removal and replacement of the roof slab and stringers at the Park Avenue median and the south side of 34th Street; repairs to the

concrete tunnel roof and beams at the south and north portal sections; repairs to the joints at the tunnel abutment walls; repairs to the stone masonry walls and parapets of the south open approach; repairs to the concrete walls at the north portal section and installation of architectural precast concrete wingwall fascia panels to simulate south open approach masonry wingwalls; repairs to the concrete walls and metal picket fence at the north open approach; replacement of the catch basins and manholes; replacement of the storm sewer line; cleaning and painting the steel stringers; repairs to the damaged sections of the iron fence; cleaning and painting of the iron fence; lead abatement of various tunnel components; replacing in kind missing sections of the stone parapet walls located at the south portal and at the north end of the east wingwall of the south open approach at the Park Avenue median; modifying the parapet wall at the north portal; milling and re-grading at the 33rd and 40th Street intersections; providing a concrete median and picket fence extending from the south wingwall to the pedestrian refuge area at 33rd Street; providing a traffic railing along Park Avenue at both wingwalls of the north and south open approaches; extending the median refuge area at 38th Street; installing a concrete barrier with integrally cast stone masonry veneer at the 34th and 38th Streets median refuge area; and cleaning the exposed walls and ceiling associated with the tunnel. It will also include safety improvements at the East 33rd, 34th, and 39th Street intersections. Construction is anticipated to be complete in January 2019.

March 2016: 34th Street Entrance, Looking Northeast. March 2016: Missing Joint Plates at Tunnel Crown. August 2016: Performing Overnight Preventive Maintenance.

July 2017: Elevation South and North. South Portal Segment, Looking Northeast - Concrete Slab on Grade is Removed. Temporary Lighting Fixture Installed on the East Liner.

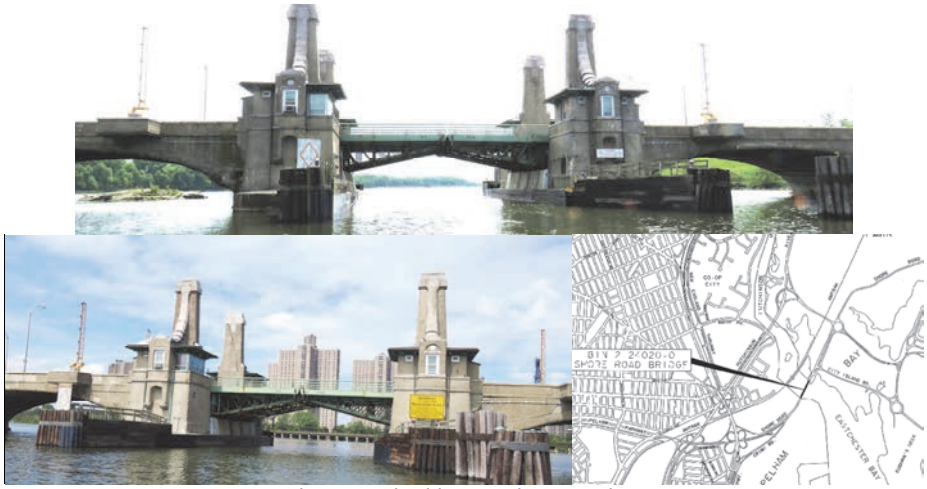


July 2017: West Tunnel Liner, Looking West - Efflorescence and Water Leakage and Missing Mortar Between the Masonry Stones. North Side End of Brick Arch, Looking Southeast - Missing Section of Metal Ceiling Liner and Mortar Between Bricks. East Side of Tunnel, Looking Northeast - Installation of New Drainage Pipe.

SHORE ROAD BRIDGE OVER THE HUTCHINSON RIVER (BRONX)

This bridge, built in 1908, was originally called the Pelham Parkway Bridge over Eastchester Bay. The bridge crosses the mouth of the Hutchinson River at the western edge of Eastchester Bay, a tidal cove of Long Island Sound, connecting two separate sections of Pelham Bay Park. The bridge and its approaches are located entirely within the Pelham Bay Park. The existing bridge is 865 feet long and consists of seven spans. The movable span is a double leaf rolling lift bascule span flanked by two short fixed steel spans over each counterweight. Each moving leaf is about 40 feet long. On either side of the movable span there are three earth-filled concrete spandrel arch spans. The arches are supported by concrete and stone piers and abutments which in turn bear directly on rock and/or timber piles driven to rock.

The bridge carries two traffic lanes in each direction, and a sidewalk on its south side. The bridge provides recreational access to Pelham Bay Park via the sidewalk and also functions as the route of the Mosholu-Pelham Bay Greenway bicycle and pedestrian path. In 2016, the bridge carried approximately 16,849 vehicles per day. This bridge is one of the busiest movable bridges in New York City and required 809 openings in 2017 to allow navigation of tall marine traffic.



Shore Road Bridge. Project Location.

The width of the channel at the crossing is delineated by a fender system which is directly attached to the bascule piers. The existing horizontal clearance is the least of all of the bridges over the Hutchinson River. In the closed position, the bridge provides only approximately 13 feet of vertical clearance above the mean high water level, and the channel between the bridge's fenders is only approximately 59 feet wide.

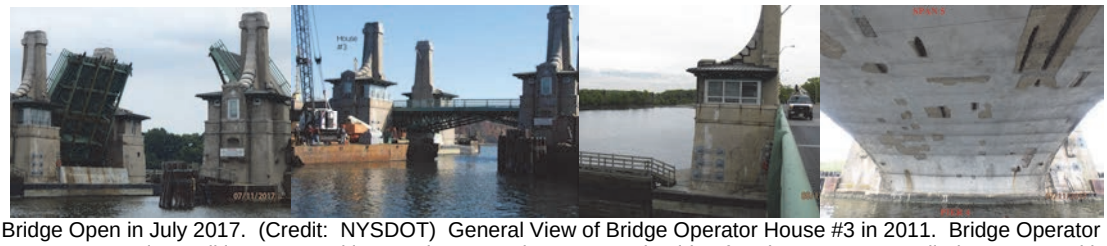
Numerous instances of marine vessel hits have been reported to the fender system of the Shore Road Bridge. Damage to the fender system due to these vessel impacts has become a chronic problem requiring frequent repairs to the fender system over the life of the bridge.

After over a hundred years, the bridge has reached the end of its service life and it does not meet current design standards. There are numerous non-standard transportation features (e.g. lane widths, geometry and clearances), obsolete mechanical and electrical systems, inadequate seismic capacity, severely deteriorated structural members, and susceptibility of the fender system to marine vessel impact.

The project objective is to replace the existing movable bridge with a new movable bridge structure. The approaches of the new bridge will transit back to the existing connections with the street and highway network. The new bridge structure will include new substructures and a superstructure, a new movable span with state-of-the-art electrical, mechanical and bridge control systems, and a new fender system. The existing bridge shall be removed in its entirety. The new

bridge shall be designed to meet all current structural, seismic and geometric design standards and shall eliminate existing deficiencies.

In 2015, a detailed scope of work for procuring the design services was prepared and a request for proposals was solicited in 2016. The preliminary design phase commenced in June 2017, and construction is anticipated to begin in 2021. The new bridge is anticipated to be in service in 2025.



Bridge Open in July 2017. (Credit: NYSDOT) General View of Bridge Operator House #3 in 2011. Bridge Operator House #3 Exterior Wall in 2016, Looking Northwest. July 2017: Underside of Arch Span # 5 - Spalled Concrete With Exposed Rebar is Secured With Netting.

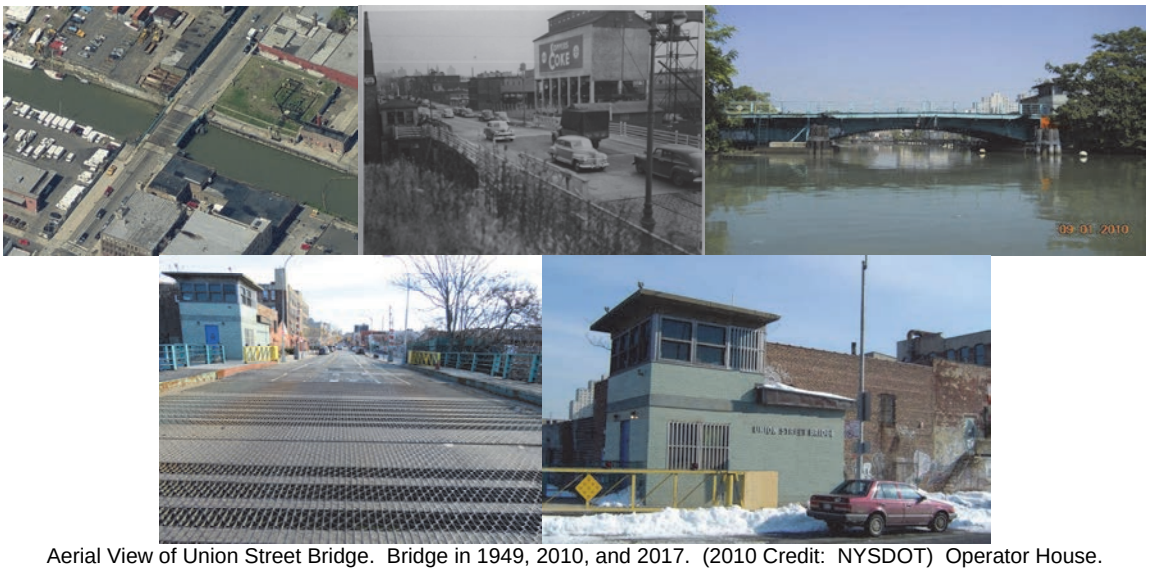
July 2017: Pier 1 Begin Face. Pier 2, Left End of Pier Nose - Typical Mortar Loss Between Stones. Span 6 Right Sidewalk Exhibits Full Width Shallow Spalls – Partially Patched by With Asphalt. Top of Span 4. (Credit: NYSDOT)

July 2017: Beginning Approach. Left Elevation Spans 1-4. Left Elevation Span #4. (Credit: NYSDOT)

July 2017: Left Elevations Spans 4 – 7. (Credit: NYSDOT)

UNION STREET BRIDGE OVER GOWANUS CANAL (BROOKLYN)

The original Union Street Bridge over the Gowanus Canal was constructed in 1870 as part of the construction of Prospect Park. A major crossing over the Gowanus Canal, this bridge is the last in a series of five eastbound crossings, and it is 885 feet from the canal's end. The neighborhood, located in the Gowanus section of Brooklyn, is primarily industrial; however, public facilities such as schools, parks, and public transportation are nearby.



Aerial View of Union Street Bridge. Bridge in 1949, 2010, and 2017. (2010 Credit: NYSDOT) Operator House.

In its current configuration, the bridge is a double-leaf Scherzer-type (rolling lift) bascule bridge, which was opened in 1905. The total bridge length is approximately 108 feet between the existing abutments. The bridge opens by translating away from the channel while rotating upwards. The bridge carries one lane of eastbound traffic, delineated bicycle lanes, and sidewalks. It has a vertical clearance of approximately 12 feet 9 1/2 inches at mean low water and approximately 8 feet 10 inches at mean high water in the closed position. The bridge provides horizontal channel clearance of approximately 52 feet between piers. In 2016, the bridge carried 3,910 vehicles per day.

Union Street Bridge - 2016: Severe Corrosion and Peeling Off Paint Under Deck of Span #3. Span 3 - The Left Fascia Stringer Exhibits Impact Damage. (Impact Credit: NYSDOT) April 2017: Steel Plates Covering the Steel Grid Deck. December 2017.

During the preliminary design, eight alternatives were identified for the rehabilitation/replacement of the bridge. In 2015, the Agency revisited all eight with an emphasis on resilience during an extreme storm event. We are contemplating proceeding with either a vertical lift bridge or a heel trunnion bascule bridge at this location to ensure that the majority of electrical and mechanical systems will be located above the flood plain during an extreme storm event. In 2017 the Agency continued the Navigation Impact Study to evaluate the feasibility of a fixed bridge replacement alternative. The fixed bridge alternate was presented to the community in May 2016. The construction is anticipated to begin around April 2021.

Roadway Bridges

BROOKLYN BRIDGES

ATLANTIC AVENUE BRIDGE OVER LIRR – ATLANTIC BRANCH (BROOKLYN)

The Atlantic Avenue Bridge is a 53-feet wide, 75 span viaduct located between Eastern Parkway and Georgia Avenue in Brooklyn. The bridge carries two traffic lanes each eastbound and westbound, divided by a center median. There are single lane service roads along each side of the bridge with approximately 10' – 6" wide parking lanes. Two LIRR tracks (of the Atlantic Branch) run under and parallel to the bridge for its entire length. The bridge was built in 1942 by the Transit Commission. It was built over an existing subway line at Sackman Street as well as over East New York Avenue. The bridge superstructure consists of steel stringers and floor beams. The substructure consists of steel piers and concrete bearing walls founded on spread footings. The sections of the bridge walls that are open and grilled consist of steel arch trusses. Exterior curtain walls are finished with ashlar stone masonry, while the arches are topped with ring stone. The Agency replaced the structural deck in 1985 with a new concrete slab deck with high density/latex modified overlay. Other work completed at that time included steel repairs (column and beam reinforcement), interior and exterior bridge wall repairs, and new drainage scuppers and piping to the service road street level. Between 1999 and 2002, the paint on the structural steel was removed and a spot prime and two paint coats were applied. There are no sidewalks on the bridge.

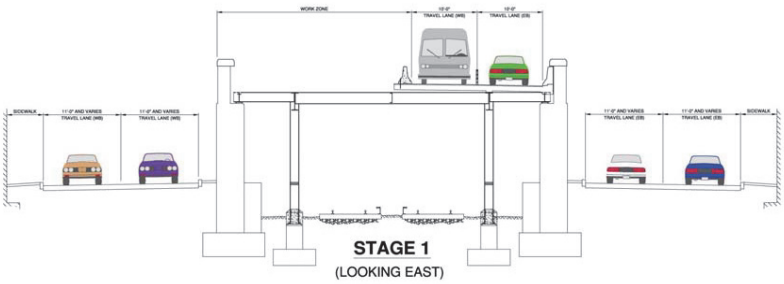
Project Limits. Location Map.

The project will include rehabilitating the deteriorated steel members, concrete abutments and bearing walls; replacing the existing reinforced concrete bridge deck, drainage scuppers, and expansion joints; performing localized concrete deck repairs; and retrofitting the viaduct to meet current seismic requirements. In addition, the action includes the rehabilitation or replacement of the end approach slab and travel lane approach pavement milling and resurfacing as necessary, milling and resurfacing of the adjacent Atlantic Avenue service roads, concrete barrier end terminal improvements, roadway and under bridge lighting repairs, the removal of graffiti, and new reflectorized pavement markings. The bridge will still consist of two 11-foot travel lanes in each direction, separated by a 2-foot wide concrete median barrier. The existing horizontal and vertical alignment will remain unchanged. The coping stones are to be stored during construction and reinstalled in its original location. The contractor will have new steel ready on site prior to deck removal operations so the rehabilitation can begin immediately as each span of the deck is removed. Before the retrofit construction begins, the LIRR will temporarily relocate the third rail to the opposite side of both tracks for the duration of the project.

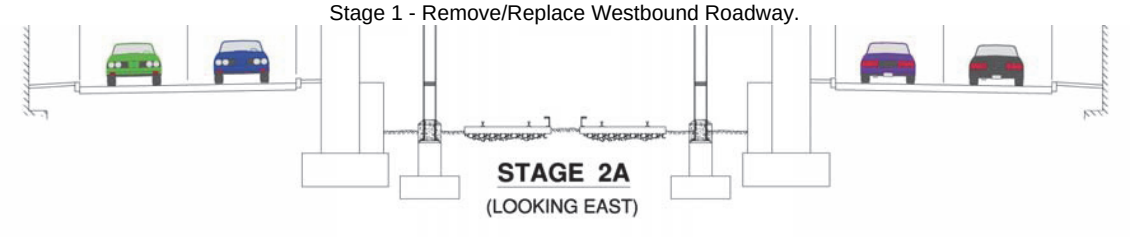
Beginning and End Approaches in 2014. Elevation Left – Spans 1 – 20, 38 – 45, and 50 - 75. Elevation Right Spans 1-20, 5 – 34, 28 – 43, 43 - 52, and 48 - 58. (Credit: NYSDOT) Stone Curtain Wall. Typical Scupper, Downspout and Outlet to Street.

May 2016: Span 43, Right Side Fascia - the Stone Masonry Curtain Wall Exhibits Localized Moderate to Heavy Efflorescence Formation at Several Mortar Joints at the Outside Face and at the Underside of the Arch. Pier 19 Joint, Atlantic Avenue Westbound - Approximately 40% Length of Joint Compression Seal is Slightly Debonded. Spans 33 thru 35, Top of Deck, Right Fascia at Right Bridge Railing - Separation (up to 2") of the Fascia Stones From the Bridge Railing. (Credit: NYSDOT)

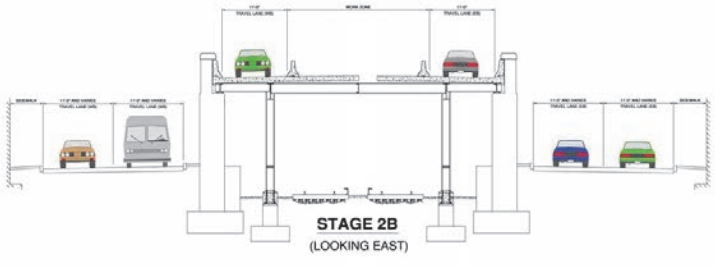
Superstructure rehabilitation will be performed in stages with a minimum of one lane open in each direction. No work shall occur on the Atlantic Avenue service road while work is also occurring on the main roadway.



Stage 1 - Remove/Replace Westbound Roadway.



Stage 2A - Remove/Replace Eastbound Roadway.



Stage 2B - Remove/Replace Center Median.

During construction LIRR service may be impacted due to planned temporary track closures. To minimize service disruptions the bulk of the work will be done on weekends and off-peak hours. When construction operations do take place during normal train service protective shields will be installed to protect tracks, equipment, and most importantly, the public.

Upon completion, the $77.8 million project will restore the integrity of structural elements, extend the life of the viaduct while reducing long term maintenance costs, incorporate effective accident reduction measures, and improve operational conditions. A Notice to Proceed for this project was issued to the contractor with a start date of July 24, 2017, and is estimated to continue for 42 months.

Early December 2017: Shield Installation to Underside of Bridge – Forklifts Were Utilized to Bring the Material Needed From the Staging Yard Across the Street to the Entrance of the Station Where Another Forklift was Utilized to Lower the Material to the Track Level, Where a Railroad Cart was Used to Move the Material to its Desired Location Down the Rail. Once the Material Reached its Destination, it was Installed by Laborers and Carpenters Utilizing a Movable Scaffold to Access the Underside of the Bridge.

BELT PARKWAY BRIDGES OVER PAERDEGAT BASIN, FRESH CREEK, ROCKAWAY PARKWAY, GERRITSEN INLET, MILL BASIN, BAY RIDGE AVENUE, AND NOSTRAND AVENUE (BROOKLYN)

The newly constructed Paerdegat Basin Bridges and the reconstructed Fresh Creek, Rockaway Parkway, and Bay Ridge Avenue Bridges are now rated "very good." On a New York State-mandated scale from 1 to 7, the remaining three of the seven bridges possess a condition rating of "fair" (3.001 – 4.999). In 2015, the Gerritsen Inlet Bridge was 3.239 and the Mill Basin Bridge was 3.209*;* and in 2014, the Nostrand Avenue Bridge was 4.264. By the end of 2017, the existing bridges over Gerritsen Inlet and Mill Basin were taken out of service, and the replacement structures were fully opened to traffic. The Nostrand Avenue bridge is the original structure, which was built beginning in 1939. While the remaining bridge is not in any immediate danger of structural failure, its reconstruction is required in order to maintain mobility and public safety on this vital artery.

The Seven Belt Parkway Bridges.

Reconstruction of the seven bridges and their approaches on the Belt Parkway (over three local streets and four waterways) began in the fall of 2009. Group 1 (Paerdegat Basin, Fresh Creek, and Rockaway Parkway Bridges) was substantially completed in August 2013. Bay Ridge Avenue Bridge started in November 2013 and was substantially completed in November 2015. Gerritsen Inlet Bridge started in February 2013 and is expected to be complete in summer 2018. Mill Basin Bridge started in summer 2015, and is expected to be complete in winter 2021. Nostrand Avenue Bridge was removed from the current Belt Parkway Project, and its design was terminated. It will be added to another Belt Parkway bridge project in the future.

During the past 75 years, traffic demand along the Belt Parkway corridor has increased dramatically. The opening of New York International Airport (now JFK Airport) in 1948, the development of suburban communities on Long Island post World War II, and the opening of the Verrazano-Narrows Bridge in 1964 have dramatically increased demand on the Belt Parkway. When the parkway first opened, the two-way average daily traffic was about 20,000 vehicles per day. Presently, it is about 150,000 vehicles per day.

Reconstruction of these bridges and their approach roadways is necessary to alleviate substandard conditions and bring these areas into compliance with current state and federal standards. These standards require wider lanes, safety shoulders, concrete median barriers, super-elevation of the roadway around curves, and realignment of the approach roadways to improve sight distances. The Department anticipates that these improvements will reduce the accident rate on this section of the Belt Parkway by approximately 45%.

NYCDOT conducted research to provide recommendations and design guidelines for the treatment of the parkway corridor. The goals of the analysis were threefold: first, to propose improvements to the parkway to satisfy safety and accessibility standards; second, to preserve and re-establish the historic character of the parkway; and third, to retain and improve public access for all parkway users. The recommendations also included complementary designs of the seven bridges.

On July 18, 2006, the Art Commission (now known as the Public Design Commission) selected the Seven Belt Parkway Bridge Reconstruction Project for a Design Award in its 24th annual Excellence in Design Awards.

All of the bridges, except for the Bay Ridge Avenue and Nostrand Avenue Bridges, are located adjacent to the Gateway National Recreation Area (GNRA), a division of the National Park Service. This bridge and highway program is in full compliance with New York City Department of Environmental Protection requirements for the initiation of a long-term plan that will increase wetlands, decrease pollution into the bay, and decrease the highway's footprint around the rim of Jamaica Bay. NYCDOT continues to work closely with New York City Department of Parks and Recreation, the New York State Department of Environmental Conservation, Gateway National Recreation Area, the US Coast Guard, and the US Army Corps of Engineers to ensure compliance with all environmental protocols.

A series of upland mitigation projects, to be administered by the New York City Department of Parks and Recreation, includes the planting of replacement trees to offset the number of trees being removed during the course of the bridge replacement project. The number of trees that will be planted is determined in accordance with the caliper rule for tree replacement. In September 2016, the NYCDPR contractor started work on final landscaping of the Contract 1 site (within the Paerdegat Basin, Rockaway Parkway and Fresh Creek construction limits). September 2016 contract work included erecting fencing, clearing the area, and removing invasive planting. In March 2017, the contractor started planting the first upland mitigation project on the eastbound side. Planting continued in November 2017. NYCDPR has been clearing and grading areas for construction of a bicycle path extension on the east side of the Paerdegat Basin, from the main Belt Parkway bicycle path to Canarsie Park. Bicycle path asphalt paving, and drainage was placed in November 2017. The NYCDPR project is anticipated to last for approximately three years.

In addition to mitigating environmental impacts along the Belt Parkway corridor, an off-site Tidal Wetland Mitigation project was performed. A Notice to Proceed was issued to the contractor with a start date of March 8, 2011. The plan focused on compensating for wetland losses at the waterway bridges by increasing and improving the quality of habitats at a nearby location. Approximately 2.3 acres of land at Floyd Bennett Field was cleaned of rubbish and debris and converted to tidal wetland area. The project was substantially completed during 2012.

The overall goal of the mitigation project was to restore selected areas of the Floyd Bennett shoreline with productive habitats, including unvegetated intertidal areas, vegetated intertidal areas restored with naturally occurring Spartina marsh, and high marsh habitats. A significant portion of the area involved the removal of approximately 20,000 cubic yards of previously filled areas and the restoration of the areas to productive vegetated and unvegetated wetland resources.

Restoration of the area, specifically, the removal of existing fill and debris, has increased the functional value of the site. This area is an important contributor to primary production and breakdown of organic materials. In addition, algal communities often found in these areas are producers, and provide a food source for snails and other benthic organisms, which in turn, provide food sources for larger animals that forage along the shorelines of Jamaica Bay.

Planting at the intertidal wetland and the high marsh zones was completed in summer 2011. The installation of cabled concrete erosion control revetment was started in June 2011 and completed in July 2011. In fall 2012, all replacement and final upland tree plantings were completed. Monitoring of the wetland mitigation project, as mandated by the New York State Department of Environmental Conservation, was completed in early 2017. The Tidal Wetland Mitigation project was substantially completed on January 30, 2017.

On October 29, 2012, Hurricane Sandy impacted the east coast and caused major damage. A survey after the storm discovered severe plant and revetment damage at the contract site. The established site grades were overwhelmed by the storm surge, ground protection and slope stabilization measures were displaced, and the plantings were uprooted and washed away. The

National Park Service put the worksite off limits while Hurricane Sandy cleanup operations were in progress. A site inspection was held in the winter of 2013, and again in the summer of 2014. In June 2015, approximately 22,000 intertidal wetland plants (*Spartina Alterniflora*) were re-established. In addition goose fence and overhead protection were installed. The location of the planting was also adjusted to better fit the tidal contours. The plants were watered in June and July, and the site was monitored in September. The area was monitored through early 2017. On May 26, 2017, the New York State Department of Environmental Conservation issued a project acceptance letter to NYCDOT.

In June 2011, the contractor was directed to perform wetland mitigation of 1.4 additional acres at Bergen Beach to offset the work associated with outfalls at the Paerdegat Basin and Rockaway Parkway bridges, the temporary trestles at the Paerdegat Basin Bridge, and the temporary bridge at Fresh Creek. Later, the Agency decided to increase the mitigated wetland area to 3.6 acres at the Bergen Beach site, adjacent to bridle paths and a horse riding academy. The additional acreage was used to offset future impacts on the Belt Parkway bridge projects at Gerritsen Inlet and Mill Basin. The mitigation converted the invasive reed *Phragmites Australis* into native salt marsh species, *Spartina Alterniflora*. At the low marsh (twice daily tides), *Spartina Alterniflora* was planted, and at the high marsh (above mean high water), *Spartina Patens*, Distichlis Spicata, and high marsh shrubs were planted. Other work that was performed included removal of all surface debris on the site, clearing and grubbing, followed by excavating to intertidal grades, seeding and planting. Existing stands of *Spartina* and native coastal communities on site were protected and preserved. The Bergen Beach mitigation work was completed in two phases. The first phase of 1.4 acres was started in the first week of June 2013. By the end of June 2013, grading was completed. Planting started on July 9, 2013, and was completed by the end of the month. The second phase grading started in mid-September 2013, and was completed on November 13, 2013. The planting was completed in the spring and fall planting seasons of 2014, and will be monitored for five years in accordance with the requirements of the New York State Department of Environmental Conservation.

Tidal Wetland Mitigation Site. Before Mitigation – Large and Heavy Surface Debris and Deteriorated Bulkhead. Inspecting the Hurricane Sandy Damage at the Site in January 2013.

July 2013: Phase I Planting at the Bergen Beach Mitigation Area. August 2014: Grass Plantings Protected by Waterfowl Exclusion Fence. Placing the Plantings. Fence in October 2014.

The old Paerdegat Basin Bridge was a 692-foot long, 13 span, multi-girder, simple supported steel superstructure, supported on reinforced concrete pier cap beams and abutments supported on reinforced concrete piles. The bridge had two 34-foot wide roadways carrying three lanes of traffic in each direction, with a 3-foot safety walk on the north side, a 4-foot wide center median/barrier, and an 8-foot wide south pedestrian/bicycle sidewalk. The existing structure and immediate approaches were demolished and replaced by two new bridges and new approach roadways on split alignments. The existing structure was permanently closed to traffic on December 20, 2012, upon opening of the new westbound structure. Demolition of the existing structure was completed in May 2013.

The two replacement bridges consist of trapezoidal steel box girder structures: the 825-foot, 3 span westbound bridge, north of the existing structure, and the 1,227-foot, 5-span eastbound bridge, south of the existing structure, remaining at 28 feet over the navigable channel. Both bridges have a 36-foot wide roadway with a 12-foot wide right shoulder. The eastbound bridge has a 4-foot wide left shoulder, while the westbound bridge has a 10-foot wide left shoulder. The southern structure carries eastbound traffic while the northern structure accommodates westbound traffic. Both the horizontal and vertical alignments changed, resulting in improved sight distances on the bridges and their approach roadways. The bridge carrying eastbound traffic also has a dedicated pedestrian/ bicycle path along the south side. The pedestrian/bicycle path is separated from traffic lanes by a concrete barrier on the bridge, and by a 15-foot wide grass mall on the approach roadways.

Old Paerdegat Basin Bridge. New Bridges in November 2013.

The Fresh Creek Bridge was a 264.5 foot, 5-span, multi-girder, simple supported steel superstructure, supported on pre-cast concrete columns founded on four reinforced concrete piers on concrete piles with concrete gravity abutment walls on timber piles. One navigation channel passed under the bridge. The bridge had two 34'-2" wide roadways, a 5-foot wide center median/barrier, and a 10-foot wide south sidewalk. The parkway, east and west of the bridge, has a 10-foot wide bicycle/pedestrian path on the south side. The existing structure and immediate approaches were demolished in spring 2012, and the replacement structure was fully opened in August 2013.

The replacement bridge is a 316-foot, 3-span structure; the new structure has only two support piers, resulting in a wider channel. The bridge deck and approaches were widened to 126 feet from the former 86 feet to accommodate three 12-foot lanes in each direction, 12-foot wide right shoulders, and a 12-foot wide bicycle/pedestrian path, separated from the traffic lanes by a barrier system. The profiles of the approach roadways and bridge structure accommodate stopping sight distances for a design speed of 60 miles per hour. The remainder of the construction resulted in improved landscaping on the bridge approaches. The existing pedestrian and bicycle pathway were maintained and open at all times during construction.

Old Fresh Creek Bridge. New Bridge in November 2013. (2002 Credit: NYSDOT)

The Rockaway Parkway Bridge was a 150-foot, 4-span, multi-stringer, simple supported steel superstructure, supported on steel cap beams on concrete filled steel pipe columns, and reinforced concrete abutment walls supported by concrete pile foundations. The bridge had two 34'-2" wide roadways, a 5-foot wide center median/barrier, and a 10-foot wide south sidewalk. The existing structure and immediate approaches were demolished in fall 2012, and the replacement structure was fully opened in August 2013.

The replacement bridge is a single span structure to improve visibility along Rockaway Parkway. The new structure was built in the same alignment as the existing bridge. The bridge deck was widened to 109 ½ feet from the former 84 feet to accommodate three 12-foot lanes with a 12-foot wide right shoulder and 4-foot left shoulder in each direction, including 5 ½ feet for median and parapet width. The right shoulder on each approach is 10 feet wide (while the width of the right shoulders on the bridge structure are 12 feet), with the other dimensions the same width as those on the bridge. In addition to reconstruction of the bridge, four access ramps were also reconstructed, as was Rockaway Parkway in the vicinity of the Belt Parkway.

Old Rockaway Parkway Bridge. New Bridge in November 2013. (2002 Credit: NYSDOT)

A Notice to Proceed for the reconstruction of the Group 1 bridges was issued to the contractor with a start date of October 26, 2009. Milestone A consisted of all work required to complete the reconstruction of the Paerdegat Basin, Fresh Creek, and Rockaway Parkway Bridges, including all roadway sections and ramps, within the limits of the construction, adjacent to and between the bridge structures. The contract provided for an incentive of $35,000 per day for each day that milestone A was finished early, with a maximum incentive of $14.98 million. There was a similar disincentive if the milestone date were to be exceeded, with no maximum. By reaching substantial completion on August 22, 2013, the contractor earned the maximum incentive. On December 12, 2013, the project was awarded the Excellence in Partnering Award for Informal Partnering from the AGC of New York State, LLC.

Summer 2014: Paerdegat, Fresh Creek, and Rockaway Parkway Bridges.

The Bay Ridge Avenue Bridge was a 58-foot long, single span, reinforced concrete deck on a multi-girder system superstructure over Bay Ridge Avenue. The superstructure is supported by concrete gravity type abutments on pile foundations. There is pedestrian access under the bridge to both the American Veterans Memorial Pier and the Shore Parkway Seawall pedestrian and bicycle paths. The underpass also serves as access to the NYCDEP Owl's Head Wastewater Treatment Plant. The existing superstructure was demolished and replaced.

The replacement bridge superstructure consists of precast, pre-stressed concrete box beams and a reinforced concrete slab. The bridge has three 12-foot wide lanes in the eastbound direction and two 12-foot wide lanes separated by a 4-foot wide painted stripe flush median in the westbound direction. There is no pedestrian/bicycle path on the structure. The clearance was increased to 14-feet 6-inches, which eliminated the need for clearance signs previously posted for a substandard condition. A Notice to Proceed was issued to the contractor with a start date of November 4, 2013.

Permanent reconstruction of the bridge included the new concrete barriers along the median and eastbound roadway, new pre-stressed concrete box beams, superstructure slab, pavements, pressure relief joints, approach slabs, and upper abutment stem wall reconstruction for the center and eastbound segments of the new bridge and approaches. The Bay Ridge Avenue Bridge was substantially completed on November 2, 2015.

Old Bay Ridge Avenue Bridge in 2012. (Credit: NYSDOT) New Bridge in October 2016.

The original Gerritsen Inlet Bridge was a 520-foot long, 9-span, steel girder and reinforced concrete beam superstructure, supported on reinforced concrete piers, and abutments supported on timber piles. The structure and immediate approaches are in the process of being demolished and replaced.

Gerritsen Inlet Bridge in 2013.

The replacement bridge consists of a 496-foot, 3-span bridge, aligned 10'-6" north of the centerline of the existing structure, and remaining 35 feet over the navigable channel. The bridge will have a 36-foot wide roadway with a 12-foot wide right shoulder and a 4-foot wide left shoulder in each direction. The eastbound side will carry a dedicated pedestrian/bicycle path along the south fascia. A Notice to Proceed was issued to the contractor with a start date of February 25, 2013.

Construction operations performed in spring 2013 included the installation of temporary concrete barriers as part of the Stage 1 maintenance and protection of traffic; the installation of construction fences and tree protection; clearing and grubbing along the north side of the parkway including the removal of existing trees as specified in the contract; and the installation of soil stabilization and erosion control measures. As the summer and Stage 1 progressed, the contractor installed earth embankments for the new eastbound and westbound approach roadways, installed new drainage structures and pipe, and repaired bridge flags on the existing bridge structure. In the fall, the Stage 1 abutment piles and footings were constructed, as were the two deep foundation cofferdams for the new water piers. The pier pile installation work was completed in December 2013, in advance of the substructure work, including the pier footings, plinths, columns and pier caps.

June 2013: North Side of Gerritsen Bridge - Turbidity Curtains Placed on Both Sides of Navigable Channel. July 2013: Work Barges Driving Steel Sheeting for Pier #1 Cofferdam. September 2013. October 2013: Rebars and Form Work for Footing and Walls at the Northwest Abutment. Stage 1 Piles. November 2013: Inspecting Rebar. December 2013: Tremie Concrete Pour at Pier #2. Inspecting Spans 7 and 8 of the Existing Bridge From a Barge. (Inspection Credit: NYSDOT)

In 2014, the contractor completed all of the Stage 1 (north side) substructure work, including the placement of the concrete piers and abutments. The Stage 1 concrete approach roadways on the north side of the project were also completed in 2014, as were the temporary asphalt transition areas on the approaches.

Gerritsen March 2014: Setting Footing Rebars Prior to Placing Pier Rebars and Concrete at Pier No. 2. April 2014: Setting Rebars for Footing and Pier Inside Cofferdam at Pier #1. May 2014: Plinth and Column Reinforcement Inside the Cofferdam for Pier 2. June 2014: Placing and Vibrating Concrete for Plinth at Pier #1. Rebars for Column in Place. West Abutment of Bridge. New Roadway Under Construction at top Next to Westbound Lanes. East Abutment of Bridge. Crane on Barge at Cofferdam for New Pier #2. August 2014: Workers Inside Rebar Cage During the Pumping Concrete Operation at the Pier #2 Column. November 2014: Steel Sheeting in Place for the East Approach Temporary Access Roadway.

Navigation lights were repaired In January 2015. Temporary drainage installation to relieve flooding, installation of demolition shielding for Stage 2, and preparation of embankment for the temporary east side access road were completed in February. In March, Stage 1 east side structural steel shop painting was completed and the steel was moved to a marine yard for assembly.

Erection of the Stage 1 structural steel was completed in April 2015, followed by placement of stay in place forms, and stud shear connectors, and the placement of the concrete bridge deck in July. Approach slabs on both sides of the bridge were placed in July, as were asphalt pressure relief joints. Finally, an armorless joint system was installed for the bridge.

Gerritsen March 2015: Lowering a Girder onto the North Side of Pier #1 - Facing Southwest. April 2015: Four Girders With Diagonal Braces Set Between the East Abutment and Pier #2. June 2015: Placing and Finishing Deck Concrete. July 2015: Placing Armorless Joint in the Deck of the Westbound Bridge.

On August 14, 2015, the contractor transitioned to Stage 2, through the movement of all traffic to the new northern (westbound) section of the bridge. Stage 2 work completed in 2015 included the demolition of the northern portion of the existing bridge, placement of embankment material for the Stage 2 approach roadway, and installation of the Stage 2 drainage facilities. Installation of the Stage 2 cofferdams began in late 2015, and were followed by all foundation operations in early 2016.

Old Gerritsen Inlet Bridge in August 2015 - Span 6, Right Fascia, Looking Left. Span 6, Pier 5, Column 3 – Construction Sign and Non-Functioning Light. (Credit: NYSDOT) September 2015: Removing Saw-Cut Deck Panels.

Deck Removed Prior to Steel Removal. October 2015: Stage 2 Traffic Pattern. Westbound Traffic at Right on New Bridge. Eastbound Traffic at Left on Existing Bridge. December 2015: Driving 14-Inch Diameter Steel Shell Piles at East Abutment - Facing East.

In the spring and summer of 2016, the contractor embarked on an ambitious acceleration program with the goal of opening the Stage 2 bridge and roadway before Thanksgiving. By mid-July, the contractor had completed all substructure concrete placements, including the abutments, the pier footings, plinths, columns and pier caps. Steel erection was performed during overnight periods in August, and was followed by installation of the stay in place forms, and stud shear connectors. The concrete bridge deck placements were then completed in September and October. During November, the contractor completed placement of both approach slabs, the asphalt pressure relief joints, and the armorless joints. On November 18, 2016, the contractor transitioned from Stage 2 to Stage 3 by shifting all eastbound traffic from the existing southern half of the existing bridge to the center portion of the new structure. During stage 3, pedestrian/bike traffic was shifted to a temporary pathway on the new eastbound bridge on December 2, 2016.

Gerritsen Inlet February 2016: Galvanized Rebars in Place for East Abutment Footing. March 2016: Driving 24" Diameter Steel Shell Piles at Extension of Pier #1 Cofferdam. New Westbound Bridge at Left. Existing Eastbound Bridge at Right. April 2016: Completed Portion of New East Abutment of the Bridge. New Bridge at Left. Placing Concrete at West Abutment Back Wall With a Crane and Bucket. May 2016: Placing and Finishing On-Grade Pavement at Approach. Cofferdam at Pier at Pier #2. Column, Pier Cap and Structural Steel Placed in Stage 1. June 2016: Rebar Cage Placed Inside Steel Pipe Pile Prior to Concrete Operation. Lowering Column Rebar Cage Onto Footing Rebars at Pier # 2.

July 2016: Pier #2. Placing Pier Column Forms Around Galvanized Steel Rebar Cages on Top of Plinth. August 2016: Placing High-Strength Bolts Through Girder Splice Plates. September 2016: Torqueing Girder Web Splice Plate Bolts. October 2016: Welder Attaching Shear Studs to the Top Flange of the Eastbound Bridge During Stage 2.

Stage 3 work completed in 2016 included the demolition of the approach roadways and the remaining southern section of the existing bridge, the placement of embankment material for the Stage 3 approach roadways, and the installation of the Stage 3 drainage facilities. Installation of the Stage 3 cofferdams began in early 2017, and was followed by the foundation operations.

With approval from the United States Coast Guard to temporarily restrict the navigable channel, starting on December 27, 2016, during Stage 3, removal of the existing bridge deck and structural

steel was started, and was completed on January 18, 2017, followed by removal of the existing concrete columns. On March 17, 2017 with approval from the NYFD, and USCG, the footings were demolished by blasting. The blasted pieces were removed from the navigable channel and the surrounding area.

During the winter and spring of 2017, the contractor continued an accelerated program by constructing all of the substructures, including the abutments, the pier footings, plinths, columns and pier caps. During March, steel sheet piles were driven for the cofferdams at Pier # 1, and Pier # 2, and excavation commenced within the cofferdams. Marine piles and tremie concrete were completed in Pier # 1 by March 25, 2017. Pier # 2 piles and tremie were completed by mid-April 2017. Land piles at the east and west abutment were also completed.

Gerritsen Inlet January 2017: Final Demolition of the West Abutment During Stage 3. Barge-Mounted Crane at Right in Process of Removing the Last Sections of Structural Steel From the Old Bridge. The Last Structural Steel Section of the Bridge Being Lowered Into a Barge for Removal From the Site. February 2017: Driving Sheet Piles for the New Bridge Pier #1 Cofferdam. Old Pier #4 After Columns Were Removed is Visible East of New Cofferdam. Clearing and Maintaining the Pedestrian/Bicycle Path in the Vicinity of the Bridge After the February 9 Snow Storm.

Gerritsen Inlet March 2017: Drilling Holes in Footing of Old Bridge Prior to Placing Blasting Charges. Placing Blasting Mats on the Old Bridge Footing. Blasting of the Old Footing, at Midnight. New Stage 3 Portion of Bridge at Right, With Traffic Halted Off the Bridge During the Blasting Operation. Placing Rebars for the Pile-Supported East Abutment.

Gerritsen Inlet April 2017: Pier #1 Cofferdam. Pumping Concrete Into Steel Pipe Piles. New Pier #1 Footing and Plinth From Previous Stage Show in Background. East Abutment Footing With Rebars and Formwork for Abutment Wall. Stage 3 Completed Bridge is in the Background. West Abutment Forms and Rebars in Place for Footing. Concrete Abutment Wall Rebar Placement in Progress. Site Visit – Assistant Civil Engineers Khalid Mohammed, Yuriy Kheyman, and Juan Medina-Yan, Associate Project Manager Alina Platonova, Community Associate Shahnaz Begum, Associate Staff Analyst Vera Ribakove, Administrative Engineer Daniel Hom, and Civil Engineer Chetan Patel – (Credit: Eric Callender)

The approach roadways were completed during the summer and fall, as were the new pedestrian/bicycle paths. On November 8, 2017, all pedestrian/bicycle traffic was shifted on to the new path on the west side of the project. The east side path was opened to pedestrians and bicyclists on December 7, 2017.

Gerritsen Inlet June 2017: Pumping Concrete for Plinth at Pier #2. Barge Mounted Backhoe Removing Blasted Concrete Debris From the Navigable Channel and Placing it on the Barge. Placing Reusable Column Forms on Top of Completed Plinth at Pier #2. Prefabricated Rebar Cage for Pier #1 Cap Beam to be Placed on Columns (Visible at Left) Completed Previously. Setting Forms for Bearing Pads at the East Abutment. Site Visit: Chief Bridge Officer Robert Collyer, Quality Assurance Assistant Civil Engineer Khalid Mohammed, and Administrative Engineer Daniel Hom.

Gerritsen Inlet July 2017: Pier #2 - Plinth and Columns Completed Prior to Cap Beam Installation. Placing P.C.C. Pavement in Approach Roadway Block Out for Catch Basin Frame and Grate. August 2017: Driving Steel Posts for Steel-Backed Timber Guide Rail at Asphalt Shoulder of Approach Pavement. Installing the Rail. September 2017: East Abutment at Top. Pier #2 With Bearings In Foreground, and Temporary Support Between Pier #2 and the East Abutment, Prior To Delivery Of Eastbound Steel Girders. Iron Workers Bolting up Girder Splice at Pier #2 on The Eastbound Side Of the Bridge. Girder Being Lowered Onto Pier #2 and Temporary Support. Pier #1 – New Pier Wall.
(Pier#1 Credit: NYSDOT)

Gerritsen Inlet September 2017: Left and Right Elevations. (Credit: NYSDOT)

Gerritsen Inlet October 2017: Erecting Final Eastbound Girders at the Gerritsen Inlet Bridge. Pier #1 at Right. Westbound Approach Pavement of the Bridge During Pavement Grinding Operation. Grinder at Left, Water Truck at Right. Working From Man-Lifts on Barges Bolting the Steel Connections. (Manlift Credit: Jessica Wang) November 2017: Welding Shear Stud Connector to Top Flange of the Bridge Girders on the Eastbound Side. Newly Paved Bicycle/Pedestrian Asphalt Path on the Eastbound Side of the Belt Parkway at the West Approach to the Bridge. Pier #2 Facing West, Hot Air Hoses in Place Which were Used to Maintain Curing Temperatures When the Eastbound Deck Concrete was Placed in Late November 2017. Barge-Mounted Crane Placing Riprap Stones on the South Slope of Gerritsen Inlet at the West Abutment. The Turbidity Curtain Prevents Contamination of Jamaica Bay Riprap Placement Will be Completed in Spring 2018. Crew Members Clean out the Drainage Pipe at the Gas Station Near the Bridge to Alleviate Long-Term Flooding Conditions on the Belt Parkway.

Structural steel was erected during the Stage 3 phase for the new eastbound bridge starting in late September 2017, and was completed by October 27, 2017. Following the installation of the stay-in-place forms and the shear stud connectors, the concrete bridge deck placements were completed in November using winter concrete procedures. In December, the contractor completed the placement of the concrete bridge barriers and installation of the bridge railing systems, as well as the placement of the approach slabs, the pressure relief joints and the armorless joints. In January 2018, the contractor will transition from Stage 3 to Stage 4 by shifting the eastbound traffic on to the new bridge structure. This will be the start of Stage 4A, during which a work zone will be created at the center of the bridge to allow for the construction of the final median barrier.

December 2017: Wood Forms Erected on the Bridge for the Future Concrete Barrier Separating the Pedestrian/Bicycle Walkway from the Future Eastbound Belt Parkway Traffic. Pedestrian Fence Anchor Bolts at Left. Diver at Pier # 2 Entering the Waterway to Cut the Steel Cofferdam Sheeting Prior to Removal. Removing Steel Sheeting Cut from Cofferdam #2. Gerritsen Inlet Bridge in December 2017.

Substantial completion of the project is expected by the end of February. During 2018, the contractor will complete the project. Stage 4 primarily includes the installation of the concrete bridge barrier in the median, as well as work on the approaches, both in the shoulders and in the median. Other outstanding operations include the installation of the fender navigation system and the inspection platforms, and the completion of final project landscaping. It is anticipated that a final acceptance will be issued during the summer of 2018.

Opened on June 29, 1940, the old Mill Basin Bridge was adjacent to the Jamaica Bay Wildlife Refuge and the Gateway National Recreation Area. It was the only movable bridge on the Belt Parkway. The clearance over Mean High Water was 35 feet. When the Mill Basin Bridge was constructed during the first half of the 20th century, New York City's inland waterways were among the most heavily navigated thoroughfares in the country. However, as maritime traffic in New York City steadily decreased since the mid-1960s, the need for movable bridges lessened as well. In 1941, during its first full year of operation, the Mill Basin Bridge was opened 3,100 times; by 1953, that figure decreased to 2,173; by 2017, the number of openings declined further to a total of only 190 openings.

In addition, significant and costly traffic congestion resulted from the operation of this outmoded drawbridge. In 2015, the Mill Basin Bridge carried 141,303 vehicles per day. The average opening and closing time for the bridge (and others like it) was ten minutes. Thus, this structure's operation had a negative and significant effect on the efficiency of New York City's vehicular traffic flow.

The existing Mill Basin Bridge was 864-feet long and 14 spans, including double movable leaf bascule spans and a steel superstructure, supported on reinforced concrete piers on timber piles, and abutments supported on pre-cast concrete piles. Demolition of the existing structure and immediate approaches began in 2017 and will be completed in 2018.

The replacement is a 2,645-foot long, 17-span, 60-foot high fixed bridge. It consists of a steel composite superstructure and reinforced concrete substructure on piled footings, and is constructed on a new alignment set on the north side of the old bridge and partially overlapping. At the end of the construction project, the new bridge and approach roadways will have three 12-foot wide traffic lanes, a 12-foot wide right shoulder on the bridge, a 10-foot wide right shoulder on the approaches, and a minimum left shoulder in each direction. The eastbound side carries a dedicated pedestrian/bicycle path along the south fascia. The new bridge is a fixed structure with a 60-foot vertical clearance over Mean High Water, obviating the need for opening and closing

the structure to accommodate tall vessels. The channel has remained navigable during construction, and the clear channel width is the same after the new structure is in place. A new fender system was installed to protect the bridge substructure from marine traffic. The contract is being completed in four stages of work (including two additional sub-stages) and maintains three lanes of vehicular traffic in each direction, as well as pedestrian and bicycle traffic during all construction stages. Construction began in the summer of 2015 and is scheduled to last for 5 ½ years, including demolition of the existing bridge.

Mill Basin Bridge in 1946. Old and Proposed Bridge.

Old Open Bridge. Freshwater and Tidal Wetland Mitigation Sites.

A Notice to Proceed for the replacement of this bridge was issued to the contractor with a start date of June 22, 2015. Bridge deck flag repairs were made, as required, in August. The contractor mobilized on the site, and completed all tree removal, guide rail repairs, and clearing and grubbing operations in September of that year. Temporary, asphalt approach roadways were placed throughout the fall, and traffic was transitioned on to the temporary roadways in December.

October 2015: Temporary Walkway on North Side of Bridge for Access to Pier #9. Elevation Left Span Elevation Right Span 8, 9-14, 1-7. (Inspection Credit: NYSDOT) November 2015: Extracting Wood Piles From the Existing Bridge Fender System at New Pier #9 Site. Pier #9 Steel Framing for the Cofferdam on the West Side of the Existing Bridge. December 2015: Outfall #2. Pressure Treated Wood Piles – Facing East.

Substructure work, including the installation of cofferdams, excavation of footings, and installation of piles, began in the fall of 2015. The installation of drainage facilities also began in 2015.

In 2016, substructure work progressed at all 17 piers and at both abutments. A total of approximately 860 piles were driven to in turn support the foundations of the new bridge piers.

Each pier consists of a rectangular concrete footing, which supports a series of concrete columns and a concrete pier cap. On each side of the waterway are six pairs of piers, and within the channel are four single pier structures.

Mill Basin January 2016: New Pier #9. Cofferdam With 24-Inch Steel Shell Pipe Piles. Existing Moveable Span at Upper Right. March 2016: Scaffolding in Place at Pier #11 for Flag Repairs of Existing Bridge. North Abutment at Right. April 2016: Pier #3 of New Bridge. Footing, Rebars, and Top of Pile Rebars in Place. Galvanized Rebar Columns Cage at Left Prior to Setting on Footing. On-Site Fabrication of Pier Column Galvanized Steel Reinforcement Bar Cages. May 2016: Galvanized Steel Rebar Cages for Columns at Intermediate Pier. Nightime Repair – Westbound Deck Grating. June 2016: Setting Forms and Placing Rebars for Intermediate Pier Cap on the South Side.

During 2016, the abutment and piers on the west side of the waterway were completed and steel was erected from the abutment to Pier 5. Placement of the new concrete bridge deck was completed for the south (eastbound) side of the new bridge. On the east side of the waterway, the abutment was also completed and approximately 50% of the pier construction was completed. Steel erection also proceeded for the south (eastbound) side of the new bridge and portions of the new concrete bridge deck were placed. In the waterway, all four pier operations were conducted within cofferdams, and approximately 40% of the pier construction was completed during the year.

August 2016: Concrete Pour for Pier 14 Cap at Sunrise. Southwest Quadrant Pier Footing. September 2016: Pumping Concrete for Columns at Pier # 15 for the Westbound Bridge. October 2016: Between the South Abutment and the Waterway. Stay-in-Place Forms, Epoxy-Coated Rebars and West Deck Curing in Progress. North Abutment at the Top. November 2016: Setting Column Rebars Inside the Cap Beam at Pier #9. Setting Girders on Pier Caps in Southwest Quadrant. December 2016 Pier #8 Cofferdam. Footing and Plinth Completed. Setting Column Forms.

On the approaches to the new bridge, construction of the new drainage and electrical facilities continued throughout 2016, as did placement of new embankment and surcharge material. The new concrete roadway pavement placements began on the west side of the new structure, and continued on both sides of the new bridge during 2017.

In the early part of 2017, construction continued on the substructures, and the operations necessary to complete the active stage of construction were completed in April of 2017. The erection of the steel also continued, as the connecting sections that span the navigational channel were set in place in June and July of 2017. The concrete bridge deck sections were then

placed, followed by the concrete bridge barriers and modular expansion joints. The approach slabs and pressure relief joints were also placed in advance of shifting traffic to the new bridge.

Mill Basin January 2017: Northwest Quadrant Pier #10 - New Columns and Cap Beams in Place. Existing Bridge Columns, Cap Beams, and Deck-Carrying Traffic at Right. Southwest Quadrant Pier #6. Southwest Quadrant Eastbound Deck Preparation at Pier #3 – Epoxy-Coated Rebars for Future Median. Completed Northbound Deck at Left. Stay-in-Place Galvanized Steel Forms at Right. February 2017: Structural Steel Set on Pier #10. The Existing Mill Basin Bridge is in the Background. New Pier #9 at Far Right. Fiberglass Reinforced Plastic Piles for Future Fender System at Pier #9. March 2017: Pier # 6 at the Southwest Quadrant. April 2017: Pumping and Finishing Deck Concrete at Pier #2, Unit 1, Westbound. Dewatering Pier#2 Cofferdam Into Barges to Settle and Filter Water Discharge Into Jamaica Bay.

Mill Basin May 2017: New Mill Basin Bridge Columns, Cap Beams and Structural Steel in Place at Pier #10 Over the Navigable Channel. Old Mill Basin Bridge Carrying Belt Parkway Traffic is in the Background. Wet Cure of New Concrete Deck Over Pier #5. Epoxy-Coated Barrier Rebars in the Foreground. June 2017: Erecting Structural Steel in Northwest Quadrant Between Pier #8 and Pier #9. Placing P.C.C. Pavement at the Approach to the Bridge Utilizing a Conveyor. Pavement Forms, Reinforcing Mesh and Joint Dowels are in the Foreground. Stay-in-Place Galvanized Steel Forms, Shear Studs and Scupper in Place for Future Deck Concrete Placement. Westbound Roadway and Barrier. FHWA Site Visit and Project Review: Jason Lin (NYSDOT), Senior Area Engineer Region 11 Richard Beers (FHWA), Area Engineer Region 5 Lorin Willett (FHWA), King Fong (NYSDOT), Administrative Engineer Daniel Hom, and Associate Project Manager Jessica Wang.

On August 30, 2017, the three westbound lanes of traffic were shifted from the old bridge to the new bridge during overnight operations. Westbound traffic was temporarily placed on the future eastbound lanes while the permanent westbound lanes remained under construction. On November 15, 2017, westbound traffic was shifted to the permanent westbound lanes.

Mill Basin July 2017: Installation of Lateral Cross Frames for Span 9 Westbound. (Credit: Jessica Wang) August 2017: Westbound Mill Basin Bridge: Prior to Shifting Westbound Traffic onto the New Bridge. Finishing the Concrete Deck From a Temporary Work Bridge. Project Visit by DOT Budget Office and NYC Office of Management and Budget: From far Left and Back, Construction Project Manager Amir Youssef, Highway Transportation Specialist Eric Callender, Resident Engineer Rudy Fogarty, Administrative Staff Analyst Lucia Candu, Community Associate Igor Yaroslavsky, Associate Project Managers Jessica Wang and Alina Platonova, Associate Commissioner for Budget and Capital Program Management Elisabeth Franklin, S. Chatthaworn (NYCOMB), Associate Director for Infrastructure and Capital Project Scope Development Lizette Christoff (NYCOMB), Assistant Civil Engineer Khalid Mohammed, Resident Engineer Paul Dombrowski, Asha Jayaraman (NYCOMB), and Administrative Engineer Daniel Hom. (Credit: Yuriy Kheyman) September 2017: New Mill Basin Bridge at Left Carrying Westbound Belt Parkway Traffic. Eastbound Belt Parkway Traffic at Right. Mill Basin Bridge Approach - Forms in Place for Future Eastbound PCC Pavement.

With the westbound section of the old bridge and roadway permanently out of service, the contractor commenced with the demolition of the existing roadway and continued the construction of the new drainage facilities, placement of embankment and placement of concrete roadway pavement on the approaches. The contractor also began the placement of the concrete barriers in the median.

On December 4, 2017, the three eastbound lanes of traffic were permanently shifted off the old bridge and on to the new bridge. Finally, the pedestrians and bicyclists were then shifted to the new bridge on December 8, 2017. The old movable span was locked into the upright position. At that time, the existing Mill Basin bridge was permanently taken out of service, and demolition was started.

Mill Basin October 2017: Epoxy Coated Rebars for Future Left Side Barrier of Westbound Mill Basin Bridge. The Westbound Traffic is on the Eastbound Side of the New Bridge in This Stage. November 2017: Belt Parkway Roadway Facing South. Westbound Traffic on the Right Side Going Over the New Mill Basin Bridge. Left Side Shows New Roadway Prior to the Shift of Eastbound Traffic onto the New Bridge.

December 2017: South Leaf of the Mill Basin Bridge During Demolition. Sidewalk and Median Removed. The New Bridge is at Left Carrying Eastbound and Westbound Belt Parkway Traffic. North Leaf of the Mill Basin Bridge During Demolition. Steel Bridge Deck, Median, and Walkways are Removed. New Mill Basin Bridge is at the Right Side. Erecting the 7-rail Bridge Rail and Fence at the East Side of the Bridge for the Bicycle/Pedestrian Walkway.

Following the 2017 traffic shifts to the new bridge, the traffic configuration was in a temporary condition with reduced lane widths. The temporary traffic configuration will remain through the demolition of the existing bridge and the construction of the remainder of the new bridge. In 2018, the remaining substructures at Pier 8 through Pier 13 will be constructed, followed by the erection of the remaining structural steel, and the concrete placement operations on the bridge and approach roadways. The contractor will also continue with the construction of the new fender systems around the waterway piers, and will begin to establish final project landscaping.

Mill Basin Bridge in December 2017.

The existing Nostrand Avenue Bridge is a 140-foot long, 3-span, multi-girder superstructure, consisting of a concrete deck with an asphalt overlay over Nostrand Avenue. The superstructure is supported by concrete pier columns with a steel cap beam, and abutments on concrete filled steel pile foundations. The existing structure and immediate approaches were to be demolished and replaced. This bridge was removed from the current Belt Parkway Project, and its design was terminated. It will be added to another Belt Parkway bridge project in the future. The condition rating of this bridge is better than the other remaining bridges in this program; rescheduling will not negatively impact the bridge users.

Nostrand Avenue Bridge Pier 1 and 2 Columns in December 2014. Left and Right Elevations in 2014. (Credit: NYSDOT)

June 2015: Span 1 Deck – Hollow Sounding Concrete Areas are Covered by Timber Planks That are in Good Condition. April 2016: Span 2, Underside of Deck, Bay 3 - Exhibits Scaling, Mapcracking with Localized Efflorescence, and Dampness Over Approximately 50%-60% of its Surface. (Credit: NYSDOT) July 2016: Span 2 Timber Shielding. July 2017: Cladding on the Left Side of the End Abutment in Good Condition.

BROOKLYN-QUEENS EXPRESSWAY – ATLANTIC AVENUE TO SANDS STREET (TRIPLE CANTILEVER)

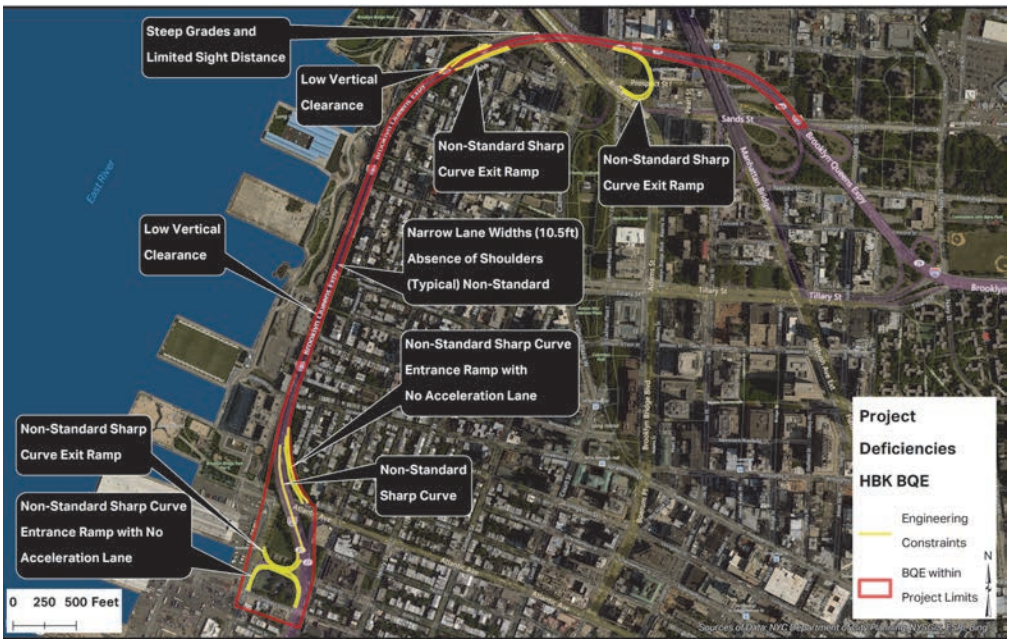
The Brooklyn-Queens Expressway (BQE) is a key urban arterial of New York City and the only interstate highway in Brooklyn. The BQE carries over 140,000 vehicles a day, as high as 18% of which are trucks during certain peaks. Trucks that traverse this roadway provide not just this borough, but the entire City, with the much needed supplies and goods.

Approximately 1.5 miles, which include 21 bridge structures as well as several retaining walls of the BQE between Atlantic Avenue and Sands Street need to be reconstructed or replaced. Its most unique segment is the triple cantilever – a reinforced concrete, multi-level structure constructed from 1944 through 1954. It consists of six lanes carried on two cantilevers, with the three eastbound lanes located above the three westbound lanes. The third cantilever features the Brooklyn Heights Promenade, a pedestrian walkway with views of the East River and the Manhattan skyline. Furman Street runs parallel to the Interstate, at grade. Local street intersections and connections to the Brooklyn Bridge and Manhattan Bridge north of the triple cantilever further add to the complexity of the corridor.

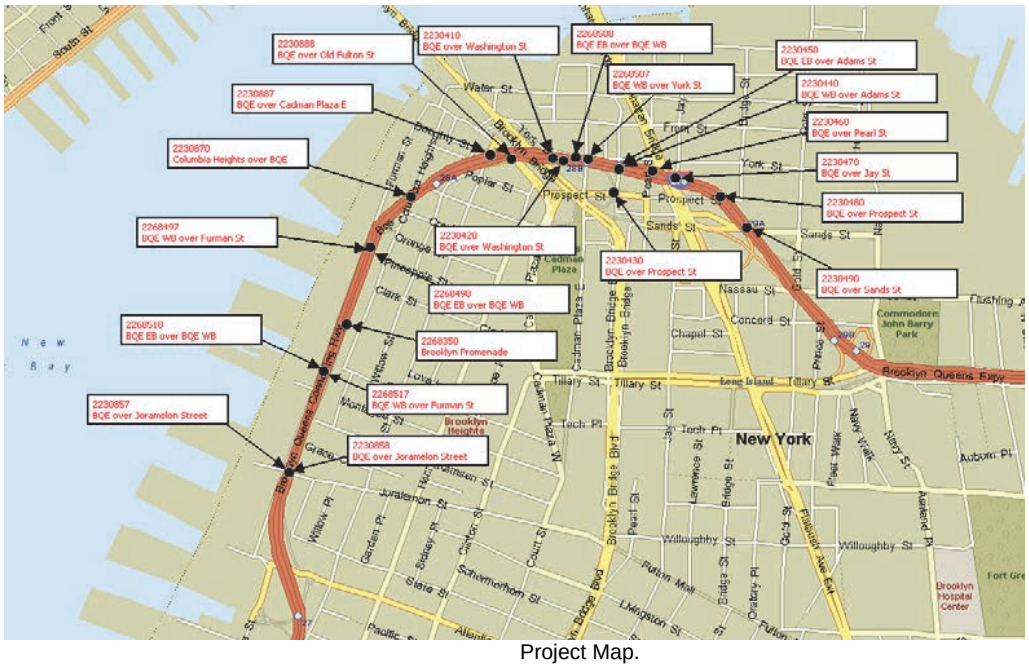
Overall, the bridges have undergone limited structural rehabilitation since their construction and deterioration has been noted especially in the concrete superstructures and substructures. Signs of superstructure deterioration include scaling, efflorescence, transverse cracking, mapcracking, and spalling with exposed and corroded rebar at the underdeck. The lack of waterproofing membrane on cantilever structures allows permeation of water and de-icing salts into the concrete, accelerating deterioration. Water leakage through failed expansion joint seals has also contributed to structural deterioration.

A number of interim repairs to the structure were completed by the Agency in recent years to correct identified problems and extend the life of the bridges. Frequent maintenance and repair efforts and their associated lane closures, while necessary to maintain the integrity of the bridges exacerbate congestion on the BQE, require diversion of traffic to local streets, are costly, and do not provide a long-term solution to the underlying deterioration problem of the structures.

At certain locations within the project limits, the vertical clearance is lower than 14 feet – the minimum specified standard for interstate roadways. Other nonstandard features include narrow lanes (10.5 feet compared to the 12 feet standard for interstate roadways), lack of shoulders (compared to the interstate standard minimum of 10 feet for right shoulders and 4 feet for left shoulders), short merge/weave distances near on-ramps and off-ramps, nonstandard horizontal curvature, and limited safe stopping sight distances.



The accident rate within the project limits exceeds the statewide average for roadways of similar classification to the BQE. Accident rates for all collision types within project limits are over five times the statewide average in the eastbound direction and nearly 10 times the statewide average in the westbound direction. Accidents along this segment of roadway include high volume-related and merge-related rear-end and sideswipes collision types. These incidents result in harm to individuals, financial loss, a significant increase in congestion, delay along a substantial length of the BQE, and diversion of traffic onto the local street network. The diversion of large trucks to local streets due to inadequate vertical clearances on the BQE also creates a hazard for pedestrians.



Project Map.

The 21 bridges included in this project can be split into three types: concrete arches, multigirder structures, and cantilever structures.

The concrete arches are BIN #2230440 BQE Westbound over Adams Street, #2230450 BQE Eastbound over Adams Street, #2230470 BQE over Jay Street, #2230430 BQE over Prospect Street, and #2230460 BQE over Pearl Street.

In general, the arch bridges have an adequate load-carrying capacity, however, there are areas of map cracking and visible leakage through the joints. Mesh has been installed at the underside of the deck to prevent debris from falling on vehicles or pedestrians below.

The multigirder bridges are BIN#2230410 BQE Eastbound over Washington Street, #2230420 BQE Westbound over Washington Street, #2230480 BQE over Prospect Street, #2230490 BQE over Sands Street, #2230870 Columbia Heights over BQE, #2230887 BQE Westbound over Cadman Plaza, and #2230888 BQE Eastbound over Old Fulton Street.

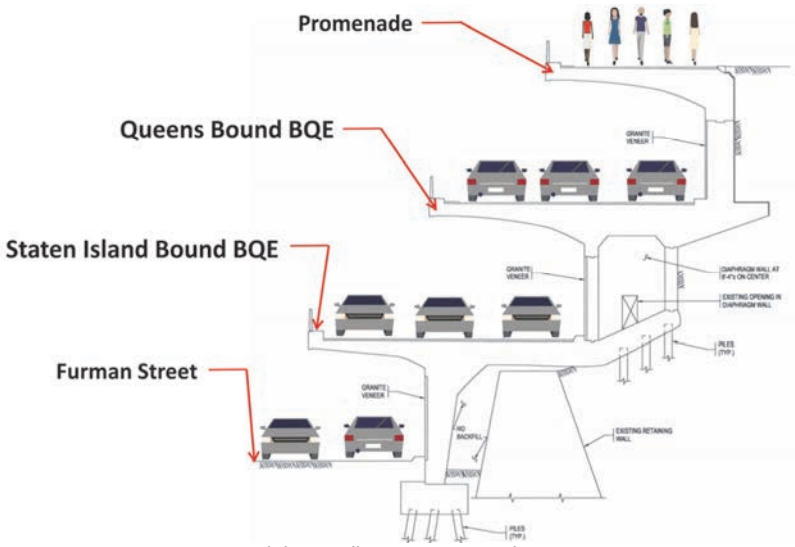
The joints at the multigirder bridges have deteriorated and the asphalt pavement exhibits alligator cracks and an uneven riding surface. Temporary supports have been placed at multiple locations to transfer the load from deteriorated bearings and/or bearing seats. The bridges have adequate load carrying capacity.

The cantilever structures are BIN #2268497 BQE Westbound over Furman Street, #2268498 BQE Eastbound (B.Q.E.) over BQE Westbound/Southbound, #2268507 BQE Westbound over York Street, #2268508 BQE Westbound over BQE Westbound/Southbound), #2268517 BQE Westbound over Furman Street, #2268518 BQE Eastbound over BQE Westbound, #2268350 Brooklyn Promenade over BQE Eastbound, #2230857 BQE Westbound over Joralemon Street., and #2230858 BQE Eastbound over Joralemon Street/BQE Westbound.

$1.7 billion have been set aside in the capital plan for the reconstruction project to address the deterioration of the 21 bridges and the various retaining walls; to address the nonstandard features that contribute to high accident rates and levels of congestion on the roadway; and to eliminate the diversion of large trucks onto local streets by addressing deficient nonstandard

vertical clearances.

There is a lack of connectivity between the highway and key local arterials i.e. streets designated as major truck routes, and other major through streets in the Brooklyn Heights, Downtown Brooklyn, DUMBO, and Cobble Hill neighborhoods as well as the Brooklyn and Manhattan Bridge gateways to Manhattan. The project will seek to address these deficient and/or discontinuous connections.



Triple Cantilever Cross Section.

Brooklyn-Queens Expressway Corridor. December 2017 Public Information Meeting – Chief Bridge Officer Robert Collyer, Senior Program Manager Tanvi Pandya, and New York State Senator Brian P. Kavanagh.

The Division completed the registration of the design contract. The first phase of the rehabilitation which started in summer 2017 is the preparation of environmental documents and alternate analyses using the data from the studies already completed in the previous year, as well additional efforts as needed to meet current goals and requirements. As a highly anticipated project with a significant level of interest from the public, active participation from stakeholders is anticipated throughout the design development process. While the formal public engagement process is anticipated to begin in 2018, the informal process continued throughout 2017, including a design team introduction in June. The project team is also continuing with significant coordination efforts with NYSDOT and FHWA as well as other stakeholders such as NYTA and NYDPR. A preliminary design for reconstruction is slated to be completed by 2019, and with the Design Build authority, the rehabilitation is currently projected to begin in 2020 and end in 2025.

HILL DRIVE BRIDGE (TERRACE BRIDGE) OVER PROSPECT PARK LAKE (BROOKLYN)

The landmark Hill Drive Bridge was built in 1890, and was designed by Calveart Vaux. It was previously known as the Breeze Hill Bridge. The existing Parks bridge is a three span simply supported steel girder/beam structure, with the center arch span crossing Prospect Park Lake, and the other two spans consisting of underground masonry cellular structures with multiple interior masonry-bearing walls and non-composite concrete deck and concrete sidewalk. The substructure of the bridge consists of solid gravity masonry abutments with U-type wing walls.

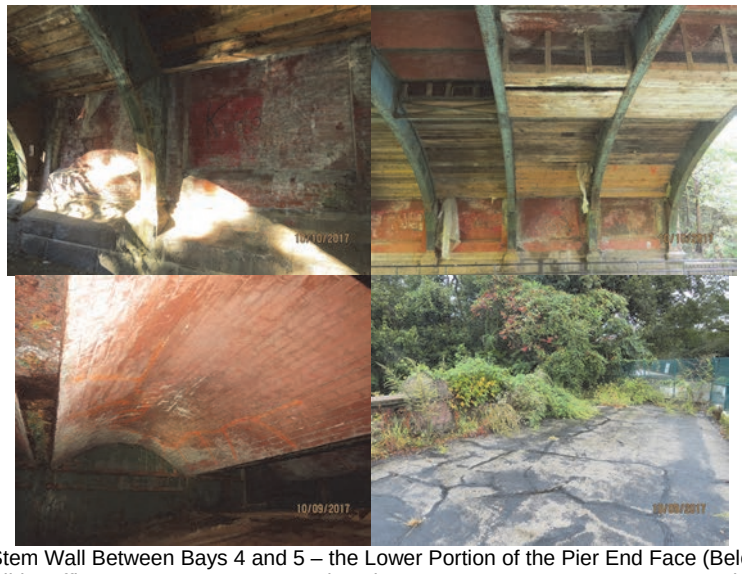
Hill Drive Bridge Span 2 Pier 1 End Face in 2013. View of Bridge in 2012. (Credit: NYSDOT)

This project will include the replacement of the existing masonry cellular abutments with new reinforced concrete abutments clad with existing stone and new brick masonry; the removal, storage, and reinstallation of the existing stone wing walls with a new reinforced concrete core; the replacement of the existing stringers and floor beams with new steel stringers; the reinforcement of the existing arch girders with new cover plates; the reinstallation of the steel arch girders at their current locations to replicate original construction; and the replacement of the existing masonry arches spanning between floor beams by masonry cladding on the underside of the new arched concrete deck. The concrete deck, approaches, sidewalk, and roadway will be replaced within the project limits.

The ornamental cast iron and stones will be rehabilitated and reinstalled, replicating all the historic features and aesthetics of the original bridge. New bridge lighting and drainage systems will be installed. The park landscape will be restored, and trees identified by the Prospect Park Alliance as rare and/or historic shall remain undisturbed during construction.

Hill Drive Bridge in 2017: Span 1, Left Exterior Enclosed Wall. End Abutment, Stones on Left Wingwall – Void Due to Missing Stones. . (Credit: NYSDOT)

Hill Drive Bridge in 2017: Spans 1 Through 3, Asphalt Wearing Surface - The Deck Top Exhibits Large Areas of Cracked Pavement Due to Deck Deterioration Along the Entire Left Side of the Bridge for a Width of Approximately 12 feet. Most of These Cracks Have Been Sealed With Bituminous Material. Water Seeping Through These Sealed Cracks is Causing Heavy Deterioration of the Deck. Span 1, Stone Coping on Left Railing. (Credit: NYSDOT)



Pier 1 Solid Stem Wall Between Bays 4 and 5 – the Lower Portion of the Pier End Face (Below the Timber Shielding) Exhibits Efflorescence, Dampness and Leakage Over a Large Area. Span 2, Underside General View. Span 2, Underside Brick Arch at Girder Near Pier 2 Exhibits Efflorescence over Most of the Surface Area. Span 3, Left Parapet and Railing Interior Face. (Credit: NYSDOT)

This bridge is closed to vehicular traffic. The north half of the bridge is completely closed with chain link fencing, and the south side is open to pedestrians, but closed to vehicles by the use of large concrete planters. The design is expected to begin in fiscal year 2019, and the reconstruction in fiscal year 2021.

17TH AVENUE AND 27TH AVENUE PEDESTRIAN BRIDGES OVER BELT PARKWAY (BROOKLYN)

The 17th Avenue and 27th Avenue Bridges are three-hinged, steel arch girder bridges with granite-faced concrete abutments and Art Deco steel railings. The 17th Avenue Bridge was built in 1939, and the 27th Avenue Bridge was built in 1940. Because the existing bridges, sloping over the Belt Parkway, achieve their maximum height only at the apex of their spans, they are repeatedly impacted by errant trucks coming from the Verrazano Narrows Bridge and the Brooklyn-Queens Expressway, thereby causing significant damage to the existing superstructures. The 17th Avenue Bridge has a vertical clearance of 11'-2", at its lowest point, and the 27th Avenue Bridge a 12'5" vertical clearance at its lowest point. Both bridges have an overall span length of approximately 130 feet, and a bridge deck width of 15 feet. In addition, these structures are not in compliance with American Disability Act (ADA) requirements.

Location Map. Historic Views - July 21, 1941 - Looking West from 17th Avenue Bridge, and December 14, 1940 - Looking West at 27th Avenue Bridge. (Credit: NYC Department of Parks and Recreation)

The 17th Avenue Bridge provides the only pedestrian access to the shoreline promenade from the surrounding Bath Beach and Bensonhurst communities. The 27th Avenue Bridge provides the

main pedestrian access from the community to Dreier Offerman-Calvert Vaux Park.

17th Avenue Bridge – October 2016: Beginning Approach, Left Side – Extensive Corrosion on the Guide Railing. 17th Avenue Bridge: September 2017 - End Approach Pavement has Cracks and Extensive Scaling. Corroded Guide Railing. Wearing Surface Exhibits Cracks and & Extensive Scaling With Exposed Aggregates. Spalled Area Under Deck With Timber Planks And Wire Mesh. Span 1 Left and Right Side -Damaged Girders, due to Previous Impacts.

27th Avenue Bridge – Existing Conditions. March 2016 - Underside of Deck has Several Areas of Spalling Concrete With Wire Mesh Shielding. February 2017. Missing Mortar on Beginning Approach Wall in September 2017.

In this project, the overpasses at 17th and 27th Avenues will be completely replaced to meet the primary goals of increasing the vertical clearance and providing ADA compliant access for the community. The structures will be designed to current codes and standards and all substandard features will be eliminated. Additionally, as the existing bridges were constructed under the Robert Moses-era Master Plan for NYC, the proposed bridge designs will follow the Shore (Belt) Parkway Design Guidelines which were developed in November 2006, in order to preserve and reestablish the historic character of the parkway for drivers and pedestrians while enhancing and strengthening the visual cohesiveness of the greenspace connected to the adjacent park and recreation land. Construction is anticipated to begin in 2019, and is expected to be complete in 2021.

17th Avenue Bridge – Proposed Bridge and Perspectives.

27th Avenue Bridge – Proposed Bridge and Perspectives.

Roadway Bridges

MANHATTAN BRIDGES

FDR DRIVE NORTHBOUND FROM EAST 42ND STREET TO EAST 49TH STREET OVER EAST RIVER SHORE (MANHATTAN)

The FDR Drive, as the only north-south limited-access highway on Manhattan's East Side, is one of the critical arterial highways in New York City. The FDR Drive consists of three lanes of non-commercial traffic in both directions and provides connections to neighborhoods on Manhattan's East Side, East River crossings from the Brooklyn Bridge to the south to 125th Street and the Harlem River Drive to the north.

The portion of the FDR Drive between East 42nd and East 49th Street is heavily used, with recorded volumes approaching 4,300 vehicles per hour (in the peak direction) across the three lanes.

Project Site Map.

The bridge on the FDR Drive northbound starting near East 42nd Street and ending near East 49th Street was built in 1985. It is 2,093 feet long and varies in width from 5' 9" to 17' 3", and has 119 spans with a total deck area of around 32,025 square feet. This structure carries only the right shoulder lane of the FDR Drive northbound and it has only a 1.6 foot sidewalk on the right. There is no traffic on this section of the roadway. The structure consists of a reinforced concrete deck on cantilever steel beams continuously supported by reinforced concrete bulkhead wall resting on a relieving platform.

October 2016: Right Elevations. (Credit: NYSDOT)

This structure needs rehabilitation: the stringers exhibit moderate to severe corrosion and section loss, the metal stay-in-place forms under the deck are corroded, the asphalt pavement surface exhibits longitudinal cracking, there are missing and/or cracked granite cladding panels in the concrete bulkhead, and concrete wall above the granite cladding is deteriorated. The pavement of the northbound FDR Drive in the project area last underwent milling and overlay in 1997.

January 2017: Preparing for Inspection. Shoulder Lane. Waterside Investigation of the Bridge Structure Spans 5 – 7. Parapet, Steel Beams and Concrete Seawall (Span 5 and Parapet Credit: Sikdar Latif) Seawall Investigation – Spans 75 – 77, and 79 – 81. Granite Panels in Seawall Fascia – Spans 89 – 91. November 2017: Technicians Conducting a Coring Investigation at the Shoulder Lane.

This project is currently in design. Construction is anticipated to begin in 2020, and be completed in approximately five years. Construction on the FDR Drive will be limited to non-peak and nighttime-only lane closure hours and will be subject to other restrictions such as the holiday embargo from mid-November to early-January, the annual United Nations “heads of state” conclave in the end of September, and other events.

HENRY HUDSON PARKWAY VIADUCT FROM WEST 72ND STREET TO WEST 82ND STREET AND FROM WEST 94TH STREET TO WEST 98TH STREET (MANHATTAN)

The viaduct was originally constructed in 1937. Since then, several rehabilitation projects were performed, including deck replacement and structural steel repair at various locations. This rehabilitation project will consist of partial repairs of the deck and steel elements of the viaduct superstructure in 145 spans from West 72nd Street to West 82nd Street, and 55 spans from West 94th Street to West 98th Street. The concrete repairs will include underdeck spall repairs, retaining wall spall repairs, concrete barrier repairs, deck joints replacement, and concrete column base repairs. The steel repairs will include installation of reinforcements to the deteriorated girders, floorbeams, stringers, columns, connections and bearings. Some of the stringers will be replaced. All of the superstructure and substructure steel will be painted. The top of deck work will be performed in stages to minimize the parkway closures.

West 72nd Street Viaduct Left Elevation Spans #1 -5, and Span #107. Piers #3 – 10. (Credit: NYSDOT)

2016: Pier 102, Deck Joint at Southbound Roadway – Missing Joint Sealer Material. Span 143, Underside of Deck – Deep Spall. (Credit: NYSDOT)

West 94th Street Viaduct – 2015: Span 34 Left Lane. Span 12 Right Railing and Left Side Concrete Parapet. Span 31 Top of Deck. 2016: Span 4 – Spall With Exposed Rebar. Pier # 3, Deck Joint, Northbound Henry Hudson Parkway, Left Lane – Joint Missing Metal Plate. (Credit: NYSDOT)

A Notice to Proceed for this project was issued to the contractor with a start date of July 10, 2017. By late 2017, the contractor had established the engineering field office, mobilized to the project

site, began field measuring for the steel repairs, and surveying for the substructure concrete repairs.

Field Measuring for Steel Repairs in September 2017.

Aerial View of the Viaduct.

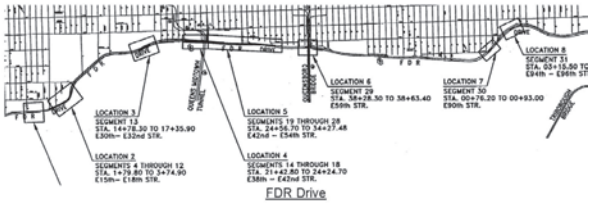
MARINE BORER REMEDIATION (MANHATTAN & BROOKLYN)

Marine borers pose an immediate and serious danger to the thousands of piles and other structures of timber built in the marine environment. In New York Harbor, as the water quality improved due to many years of clean-up efforts, marine borer (limnoria, teredo, etc.) activity has increased significantly in recent years. The recent inspections of timber structures by various local agencies (such as The Port Authority of NY & NJ, NYS Department of Transportation, NYC Department of Sanitation, and NYC Economic Development Corporation) indicate increasing damage to their structures resulting from marine borer activity. These agencies are implementing measures to protect the structures against marine borers.

Marine Borer – Limnoria Species (the Common "Gribble," a Genus of Crustacea Borers). Marine Borer – Teredo Species (a Genus of Molluscan Borers, Commonly Called the "Shipworm"). Teredo Damage (Holes up to ¼" Diameter).

From Study of the FDR Drive: Location #2 – Damaged Seawall at Segment #5. Sinkhole at Location #6 at East 59th Street. From Study of Carroll Street Bridge: General View of the Southwest Crib Wall With the Delamination of the Timber Stretchers in the Tidal Zone.

In October 1999, the Department began a study to assess the existing damage caused by marine borers as well as the potential for future damage at several waterfront DOT structures, including the supporting structures of the relieving platforms along the FDR (from East 15th to East 96th Street) Drive, and the timber piles and structures of the Carroll Street and Ocean Avenue bridges in Brooklyn. The underwater inspection of timber piles supporting the FDR Drive began on May 8, 2000. Inspection of the Brooklyn sites was conducted during the week of October 23, 2000. The inspections were completed in October 2000, and the Marine Borer Evaluation Report was published in June 2001. Using the results of the underwater inspections, preliminary plans were developed for the implementation of repairs and remediation measures to protect the structures from attack. These preliminary plans were completed in December 2001. An updated underwater inspection was performed within the limits of the proposed contract in 2009. Final design was completed in June 2011.



FDR Drive

Carroll St

Ocean Ave

Project Locations.

Severe Marine Borer Infestation in Timber Cribbing of Carroll Street Bridge and Moderate Marine Growth Below Waterline on the Ocean Avenue Pedestrian Bridge in 2009. (Credit: NYSDOT) FDR Drive. Location #4 on FDR Drive. Work Barges. Diver Applying Petrolatum Tape. 2013 : Lower Wrap Section Applied. January 2014.

The construction project was performed almost entirely underwater and included barrier wrapping (placement of plastic barrier wrap around a timber pile to prevent marine borers from settling on and penetration into exposed wood); pile encasement (concrete encasement of selected severely damaged piles to reinforce and protect them from marine borers); pile posting (cutting off deteriorated upper portion of pile and replacing it with a new treated timber post); pile cap encapsulation (encapsulation of submerged timber pile caps and timber fascia with plastic lumber and synthetic mastic); bracing replacement (replacement of structural timber bracing with new treated lumber); timber removal (removing timber stays, bracing and formwork located at the top of the piles); installation of additional two-way bracing (installation of two-way bracing using tread lumber to upgrade the strength of piles by reducing the unbraced length); placement of light weight concrete fill (filling in locations where the distance from underside of the platform deck to the top of the mudline is less than one meter creating insufficient headroom for divers to wrap or jacket piles); and superstructure timber replacement (timber pile caps, railing members and other timber superstructure elements along with severely corroded steel correction hardware located above the high water line were replaced in kind).

These repairs include dredging of inshore areas to allow access for divers to affect the repairs; timber and debris removal and disposal of 239 metric tons; PVC wrapping of 10,726 timber piles; epoxy filled fiberglass reinforced plastic (FRP) jackets installation on 1,327 timber piles; structural concrete encasements on 3,066 timber piles; placement of light weight concrete fill along inshore areas adjacent to the existing bulkheads; concrete encasement of 151 pairs of timber plumb-batter piles; and timber pile cap repairs.

The Marine Borer Remediation project affected water quality and required offsite mitigation. NYC Parks and NYS DEC have identified Sunset Cove Salt Marsh (Sunset Cove), located in Queens, as the mitigation site. The Sunset Cove Project will enhance the resiliency of the natural systems within Jamaica Bay by restoring wetland in the project site. Up to three acres of salt marsh will be created, with up to seven acres of maritime scrubland and forest restored, and the existing hardened shoreline rehabilitated. Funds received from NYCDOT will be applied to the

construction of .99 acres of wetland at Sunset Cove as mitigation for the Marine Borers project. The Sunset Cove project provides opportunities to remove concrete, debris and other fill material; create and enhance salt marsh; and establish a maritime forest buffer. Altogether, the project will restore vital coastal ecosystem at Sunset Cove Park and promote greater resiliency in the Broad Channel and Jamaica Bay communities.

A Notice to Proceed was issued to the contractor with a start date of April 2, 2012.

In July 2016, the Division deleted all repair work relating to the Carroll Street Bridge from the project. This was due to the Gowanus Canal's designation as a United States EPA clean-up site, necessitating additional requirements not envisioned when this contract was originally out for bid.

The construction work was expected to be complete in August 2016. However, the construction activities were extended to March 2017, due to site condition and change in scope. A heavy granite fascia stone fell off of the bulkhead into the East River from a location South of FDR Drive Location 5 Bent 260. These granite panels were secured by 2 iron hangers into the concrete bulkhead back in the 1940's when the FDR Drive was first constructed. As the divers must swim under them to perform the wooden pile repair work, overhead loose granite stonework is a safety hazard. As the granite panels North of Bent 260 are more secure, the Contractor was ordered to cease concrete fill operations south of that Bent and move his barge north to a safer location.

Due to a unforeseen field condition at FDR Drive Location # 5 (42nd to 54th Streets) with very steep rip-rap filled hard-bottom slope, 1.5 meters of Epoxy-filled FRP Jacket were added to the bottom of the PVC Wrapped wooden piles. This repair mitigated the loss of bottom material when backfilling on the steep hard bottom slopes, thus preventing exposure of the bottom of the wooden piles to the marine borers.

During the design inspections over ten years ago, wooden pile repairs recommended were based upon the amount of deterioration of each pile. Most piles were determined to need to only be cleaned and then wrapped with PVC while those with more deterioration were determined to be needed to be encased with stronger epoxy-filled FRP Jackets. However, due to the extended amount of time passed since the initial design inspections and the present rehabilitation/repair, the hungry wood boring worms and crustaceans have been further compromising the strength of the wooden piles. Piles that were originally scheduled for PVC Wraps were now requiring the stronger, more time-consuming, epoxy-filled FRP Jackets.

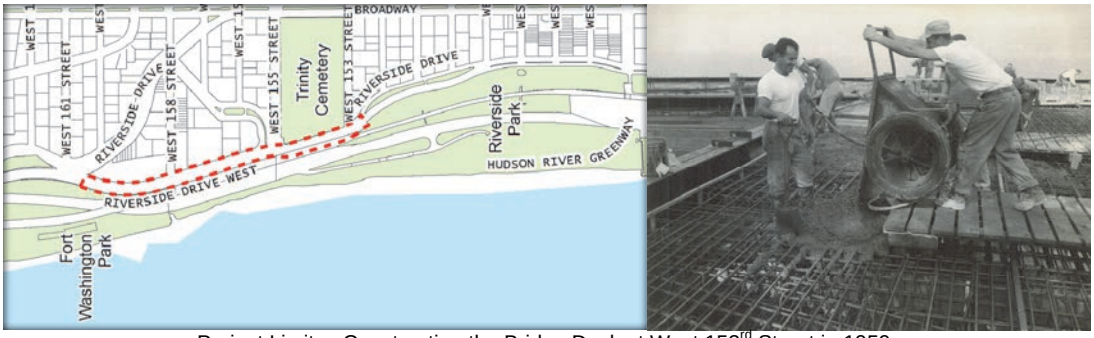
As of November 2016, in locations 2, 4, 5, 6, 8 of the FDR Drive and Ocean Avenue, the contractor had completed approximately 7,333 pile barrier wrappings out of 10,301 piles, 1,045 epoxy jackets out of 1,255 piles, 91 epoxy jacket notched piles out of 121 units, 18 bench caps out of 91 units, and 372 lightweight concrete fill out of 3,228 piles. Excavation and backfill items for soft and hard bottom work were being completed concurrently. This project was expected to end in March 2017.

The contract was terminated for convenience by the City on March 21, 2017 with only 73% of the contract (by amount) completed. Only 10,440 piles out of 14,905 piles were repaired. Between March 27 and May 11, 2017, the consultant then performed a diving inspection of the accessible unrepaired piles, and issued a final report.

RIVERSIDE DRIVE BRIDGE OVER WEST 158TH STREET (MANHATTAN)

The Riverside Drive Viaduct is located between West 153rd Street and West 161st Street. It also crosses the end of West 155th Street and provides access to the NYCDOT maintenance garage and the pedestrian bridge over Amtrak. Riverside Drive is an arterial roadway which travels north-south, parallel to the Henry Hudson Parkway, connecting the Hamilton Heights and Washington Heights neighborhoods of Manhattan Community Boards 9 and 12. It is approximately 1,871 feet long, 97 feet wide, and has 77 spans. This viaduct consists of intermittent straight portions, and six curves of different radii. It was constructed in two sections.

The south cantilever section, from West 153rd Street to West 155th Street, was completed in 1908 and a portion of it spans over the Amtrak right of way. The north bent type section, from West 155th Street to south of West 161st Street, was completed in 1928. The bent type portion of the viaduct includes a windowed enclosure under the bridge that houses NYCDOT and NYPD facilities. The building structure to the north of West 158th Street is used by NYPD for a vehicle repair garage. The building structure to the south of West 158th Street is used by NYCDOT for storage of vehicles, roadway maintenance materials and is also a NYCDOT Maintenance and Repair Facility. Some of the oldest sections of the existing bridge deck were installed in 1959 and the newest sections of the existing deck were placed in 1985. In recent years, the deterioration of the deck has become evident and sections of crumbling concrete under the existing deck have been netted to catch debris. Many of the concrete cores taken as part of the deck evaluation during preliminary design broke early and/or crumbled during extraction. The bridge carries four travel lanes (two each way), and two parking lanes (one each way).



Project Limits. Constructing the Bridge Deck at West 153rd Street in 1959.

Aerial View.

Project work will include the repair of deteriorated structural steel members; replacement of the existing deck; abutment and retaining wall repair; repairs and replacement of concrete barriers and bridge rails; complete expansion joint replacement; approach slabs and pavement replacement; cleaning and necessary repairs of the drainage system (replacement of catch basins and grates within the bridge and at all approaches to the bridge in accordance with NYCDEP standards), as well as encasement removal, paint removal, lead abatement and recoating of steel. The scope also includes the replacement in-kind of the existing period lighting and the restoration of the historic parapet at deck level. The project will neither change the roadway configuration within the Riverside Drive Mainline nor impact the Viaduct facades. However, the Riverside Drive West branch alignment at the intersection of Riverside Drive West and Riverside Drive will be slightly altered to create a 12 foot radius at the northeast corner and the median will be re-aligned. As a result, the catch basins and catch basin connections will be relocated at this intersection.

The bridge will remain open to traffic throughout field work and construction. The superstructure rehabilitation will be performed in four primary stages and a pre-stage, with a minimum of three travel lanes open all times, two in the peak direction and one in the off-peak direction through the use of a reversible lane. Work Zone Traffic Control to maintain traffic in both directions throughout the duration of construction will be implemented to replace the existing concrete deck, one third at a time, in three main stages. The majority of construction will occur during weekday

daytime hours. Some weekend work is anticipated for the intersection with West 155th Street and limited nighttime work will be required for the portion of the Viaduct between West 153rd Street and West 155th Street that cantilevers over the Amtrak tracks. Construction is expected to begin in mid-2018, and is expected to be complete by the end of 2021.

2015: Left Elevation Span 14, Spans 15 – 20. Right Elevation Span 14, Spans 13 – 1, 15 – 77, 41 – 77, and 43 – 13 (Section over NYCDOT Maintenance Garage Area). (Credit: NYSDOT)

2015: Spans 19-21, East Fascia Overhang, Looking Southwest - Large Edge Spalls with Numerous Cracks and Heavy Efflorescence Throughout Overhang. Span 52 Looking South - General View of Underside of Deck Showing Extensive Dampness and Cracks with Efflorescence.

2015: Underside of Span 30, Looking Southwest (NYCDOT Maintenance Garage Area). 2017: Span 5 Underside of Deck Bays 16 and 17 - Spalls With Exposed Rebars. (Credit: NYSDOT) Current and Proposed Bridge Railing.

TRANS-MANHATTAN EXPRESSWAY CONNECTOR RAMP FROM THE HARLEM RIVER DRIVE (HARLEM RIVER DRIVE RAMP TO GEORGE WASHINGTON BRIDGE OVER HARLEM RIVER DRIVE SOUTHBOUND) (MANHATTAN)

The Trans-Manhattan Expressway Connector Ramp is an elevated viaduct that consists of a multi-span steel superstructure supporting a concrete deck. The ramp connects the Trans-Manhattan Expressway to the Harlem River Drive and it was built in 1939. It is a 2,080 foot long and 57 foot wide structure, consisting of 14 steel spans and 41 reinforced concrete spans,

carrying two lanes of traffic in each direction, northbound and southbound. In 2008, New York State DOT completed an approximately $4.5 million "top-side" repair project of the wearing surface, joints, median, parapets, and other above-deck elements. The scope of work included rehabilitation of the bridge steel and concrete components; repairing outstanding structural flags on the ramp; repairing existing spalls and removing existing protective netting; and restoration of adjacent parkland including placement of a gravel base within the footprint of the bridge structure, construction of a paved access roadway, and landscape restoration including grass seeding. A Notice to Proceed for the $10 million project was issued to the contractor with a start date of August 10, 2015.

Aerial View. Trans-Manhattan Expressway Connector Ramp in 2014: Elevation Right Spans 1 – 25, 33 – 40. (Credit: NYSDOT) March 2015 Field Inspection. September 2015 - Span 42, Northbound Roadway, Looking Back. (Credit: NYSDOT) November 2015: Netting at Deck Underside. Repairing the Punch Through Holes on Top of the Deck.

During the winter of 2015, existing deck spalls developed into through holes at seven locations on both the south and north bound roadways. This situation was temporally rectified in September 2015 by Division personnel placing a number of steel road plates on the top of the holes to maintain traffic flow and keep the ramp open for the public. The repairs were then added to the contractor's work scope. The revised total contract value was approximately $15 million.

January 2016: Spans 42 and 43 Northbound Rebar Installation. Underside View. March 2016: Pier 3 Concrete Repairs. July 2016. August 2016: Shotcrete Application at Span 36. Chipping at Span 45. September 2016.

October 2016: Span 51, Underside of Right Arch - Concrete Repairs. Pier 49, at Center Column - Concrete Repairs. (Shielding and Repair Credit: NYSDOT)

Upon recent inspection of the holes and the anchoring steel plates, it was noted that the holes were increasing in size and the plates were exhibiting excessive movement under normal traffic. This presented a public safety hazard and emergency repair procedures were developed immediately to remedy the situation and make it safe for the public. In October 2016, the emergency repairs were performed on the southbound side using full weekend closures of the ramp. The northbound emergency repairs were conducted in March 2017 with another full weekend ramp closure.

March 2017. Deck Removal During Northbound Repairs. Concrete Placement for Full-Depth Deck. Asphalt Placement Over Cured Deck. April 2017: Newly Installed Steel Angles Under Span 38, and Steel Installed Above the Harlem River Drive.

May 2017: Spans 36 to 25. Shotcrete Arch Repairs on Spans 34-32. Fence Restoration. Shotcrete Deck Repairs. Rebuilt Parapet.

Over the course of 2016 and half of 2017, the contractor applied over 16,000 square feet of shotcrete, and erected over 80 tons of steel. In addition, repairs/replacements were made to the curtain wall along the Harlem River Drive, steel beams were grouted, bearings were restored, and drainage repaired.

The project was substantially completed on May 15, 2017.

WEST 31ST STREET BRIDGE OVER AMTRAK LAYUP TRACKS (MANHATTAN)

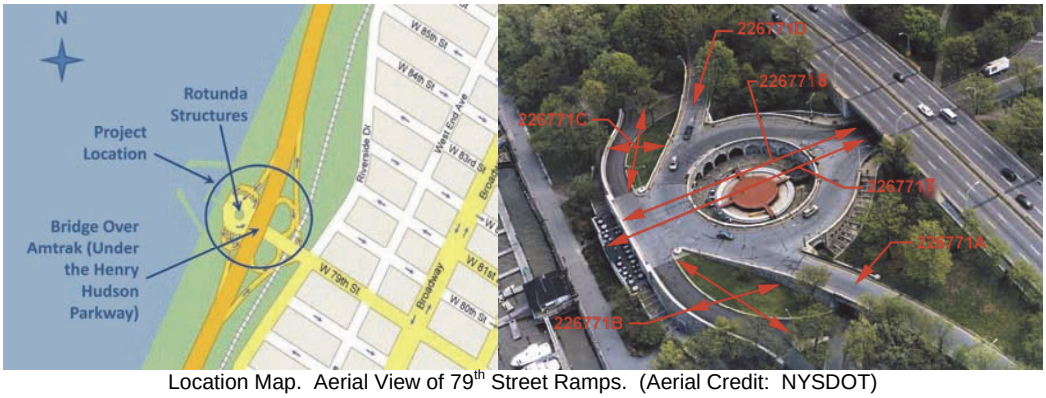
This bridge between Ninth Avenue and Dyer Street, is a nine span multi-girder jack arch encased in concrete, and was built in 1909. The bridge carries two of three lanes of westbound passenger and commercial vehicular traffic as well as the north sidewalk of West 31st Street over a portion of Rail Yard "E" adjacent to Penn Station. The south lane of West 31st Street is not on structure. The bridge structure was apparently built during a widening/extension of the rail yard and spans over two catenary electric tracks which run longitudinally under the bridge and end at the west abutment. The rail yard is nearly 50 feet below street grade in this area and is in an extensive rock cut. The bridge does not appear to have had any major reconstruction. The superstructure is supported by the west abutment, the south retaining wall, and steel columns resting on spread footings. The project will involve installation of new floorbeams and steel stringers with a reinforced concrete deck slab, as well as the bridge seats and steel pier columns. Traffic will be maintained during the relocation of the utilities, but the bridge will be closed during the bridge replacement. Construction of this $34 million project, which will be performed by a private developer on behalf of the City, is expected to begin in April 2018, and is expected to be complete in August 2019.

2016: Elevation Right. Piers 1-3. (Credit: NYSDOT)

2016: Piers and 4-9. Span 1 – Underside of Deck. (Credit: NYSDOT)

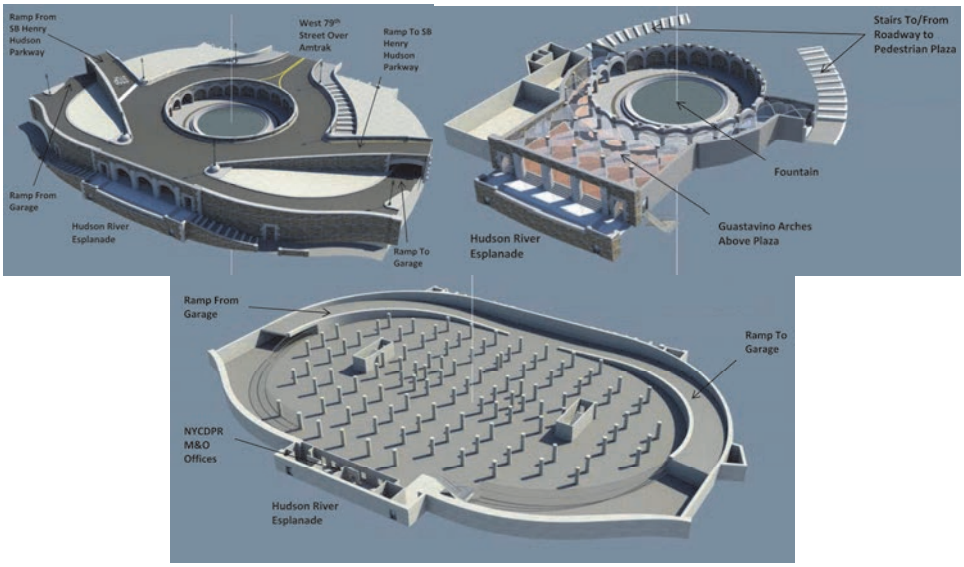
WEST 79TH STREET BRIDGE OVER AMTRAK, 79TH STREET PEDESTRIAN PLAZA OVER 79TH STREET BOAT BASIN GARAGE, 79TH STREET TRAFFIC CIRCLE OVER 79TH STREET PEDESTRIAN PLAZA, 79TH STREET RAMP TO HENRY HUDSON PARKWAY OVER 79TH STREET BOAT BASIN GARAGE, 79TH STREET RAMP TO GARAGE OVER 79TH STREET BOAT BASIN GARAGE, GARAGE RAMP TO 79TH STREET OVER 79TH STREET BOAT BASIN GARAGE, AND SOUTHBOUND HENRY HUDSON PARKWAY RAMP TO 79TH STREET OVER 79TH STREET BOAT BASIN GARAGE (MANHATTAN)

The centerpiece of Riverside Park is the West 79th Street Rotunda Complex. Accessible by stepped ramps from the park and Riverside Drive, the concourse level of the Rotunda and the adjoining large terrace offer dramatic views of the Hudson River and the boats of the marina. The Rotunda Complex consists of six structures including the West 79th Street traffic circle, the ramps to and from the southbound Henry Hudson Parkway, the ramps to and from the boat basin garage, and the pedestrian plaza (concourse) level. By nature of this configuration, the rotunda is structurally part of the bridges, and the rotunda and appurtenant bridge structures, lie within the limits of Riverside Park. Because of this, NYC Parks and Recreation has jurisdiction over the architectural features of the structure, as well as the non-vehicular operational features of the structures, including restrooms, concessionaire operations (food service), and boat basin elements, as well as an office, storage space, workshops, and garage facilities. The structure is listed in State and National Registers for Historic Places.



Location Map. Aerial View of 79th Street Ramps. (Aerial Credit: NYSDOT)

The three-level Rotunda Complex is a structure with common foundations consisting of pile caps, foundation walls, and steel framing, which support the garage level, fountain level and street level. While these levels, along with their interconnected ramps have been assigned separate Bridge Identification Numbers, they actually act as an integrated structure with similar issues and needs.

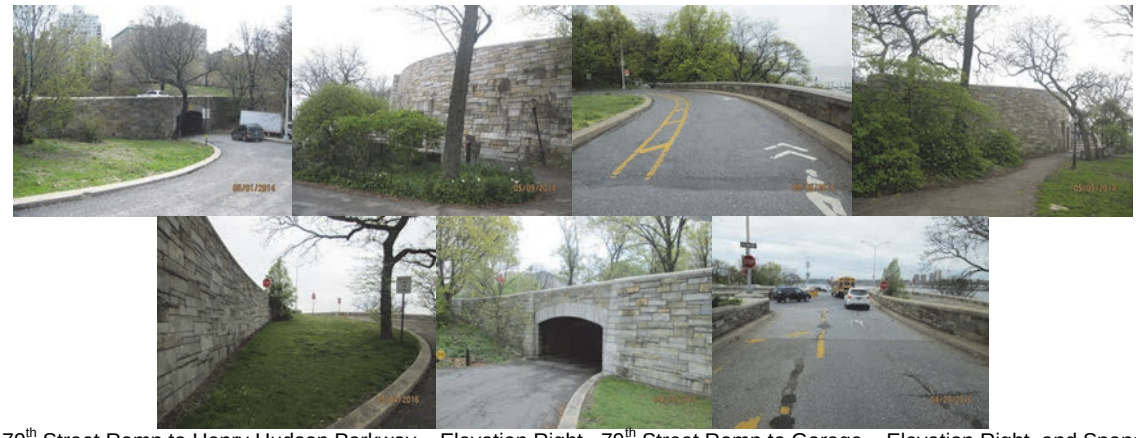


The Three Levels of the Rotunda: Traffic Circle, Pedestrian Plaza, and Garage.

West 79th Street Bridge Over Amtrak in 2014 – Beginning Abutment Joint – Top of Deck. June 2016: Left Elevation. Underside of Deck, Bay 7 – Timber Shielding. (Credit: NYSDOT)

Traffic Circle Level – Spans 32, 14, and 15 Wearing Surface. (Credit: NYSDOT) Span 3, Traffic Signal at End-Center of Span.

Plaza Level.



79th Street Ramp to Henry Hudson Parkway – Elevation Right. 79th Street Ramp to Garage – Elevation Right, and Spans 1-5. Garage Ramp to 79th Street – Elevation Left, and Spans 9-13. Southbound Henry Hudson Parkway Ramp to 79th Street – Elevation Left of Spans 3-4, and Spans 1-2. (Credit: NYSDOT)

West 79th Street accesses the West 79th Street traffic circle from the east, while ramps from and to the southbound Henry Hudson Parkway access the traffic circle from the north and south, respectively. Furthermore, the traffic circle forms the top level of the rotunda structure, which has a pedestrian plaza level below, followed by a garage level on the ground floor. The garage is accessed from the rotunda structure's west end via ramps to and from the traffic circle.

The West 79th Street Traffic Circle structure consists of 34 steel spans over the Pedestrian Plaza which carries two traffic lanes. The proposed project work for this structure will include the removal of the existing roadway, concrete slab, and steel superstructure. A new steel superstructure and roadway slab will be provided along with new approach roadways, and the existing stone masonry will be rehabilitated.

The West 79th Street Pedestrian Plaza is below the Traffic Circle and over the Boat Basin Garage. It consists of ten simply supported spans. Access to the pedestrian plaza is from stepped ramps from West 79th Street to passageways that lead into the plaza from the north and south, or from the west end of the rotunda, where a terrace and stairs lead to the Hudson River esplanade in Riverside Park. The Rotunda Complex is located within the Riverside Park and Riverside Drive Scenic Landmark area, and includes a Gustavino cohesive tile-vaulted ceiling, a promenade, a fountain and a restaurant built in 1939 as part of the Riverside Drive Park improvements.

The project work will include the structural rehabilitation and architectural restoration of impacted portions of the plaza, as well as restoration of the fountain. The existing fieldstone flooring of the pedestrian plaza level, as well as the fieldstone steps will be salvaged and reinstalled (as applicable) to provide an ADA-compliant surface. The missing stone work in these locations will be replaced with historically sensitive, matching material. The ceiling vaults will be documented and replaced in accordance with the plans and requirements from the New York State Historic Preservation Office and the New York City Landmarks Preservation Commission. The restrooms will be upgraded and restored, and a Parks Department office with public access will be incorporated into the structure. Accessibility to the facility will also be improved by the addition of four ADA-compliant ramps as a part of the rehabilitation project. At the garage level, the connector ramps will be repaired, and stone masonry restored. As with the other areas of the structure, lighting and drainage will be replaced. In addition, the Parks Department operations office will be expanded and upgraded.

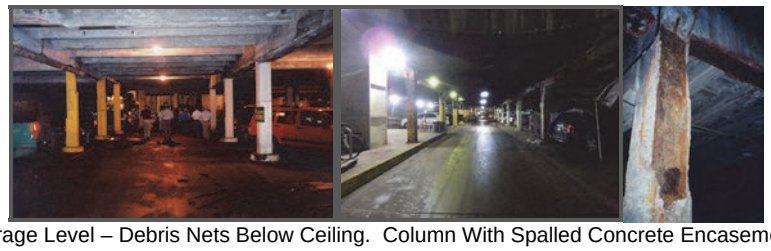
The West 79th Street Bridge over Amtrak, built in 1937, is a single span structure, with steel, non-composite girders and a reinforced concrete slab. The bridge carries two lanes of traffic in each direction and has a sidewalk on each side. The last major rehabilitation of this structure was in 1975. The project work will include the removal of the existing concrete deck, sidewalks and the pedestrian safety barrier. The deck will be replaced with a NYSDOT standard 9.5 inch concrete

slab with integral wearing surface, a new sidewalk and safety barriers on a rehabilitated superstructure.

View of Rotunda and Fountain in 1937 and 2018. (2018 Credit: Malcolm Pinckney – NYCDPR)

Traffic Circle Level: South Sidewalk Area - Extensive Water Ponding. Pavement - Widespread Cracking.
Pedestrian Plaza Level: North Stairway - Timber Delivery Ramp. Closed Fountain.

Pedestrian Plaza Level: South Stairway - Deterioration and Missing Stone Steps. Stone Clad Columns - Extensive Efflorescence and Staining. Guastavino Arch - Ponding Water and Efflorescence. Fountain Trench Drain - Deteriorated Grating and Clogged Drain. Extensive Water Ponding.



Garage Level – Debris Nets Below Ceiling. Column With Spalled Concrete Encasement.

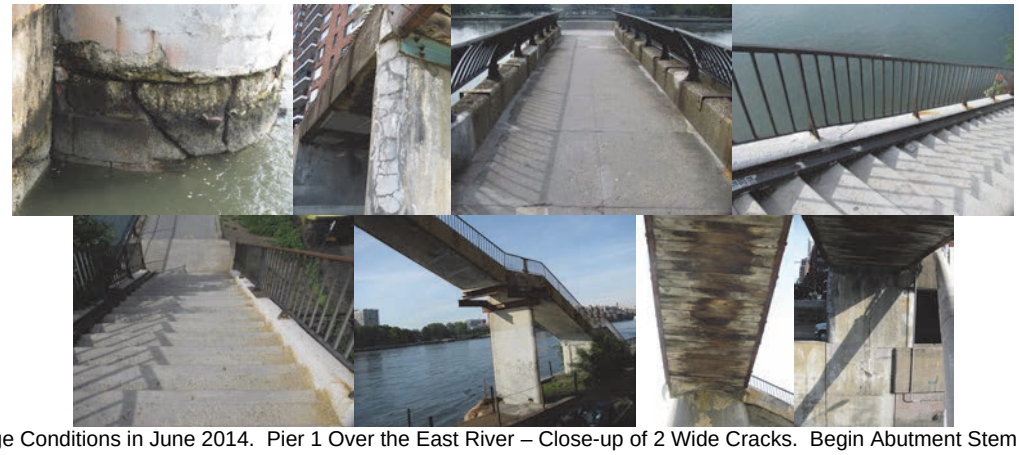
The work is expected to proceed in three stages. Vehicular traffic will be maintained at the traffic circle and on the Henry Hudson Parkway ramps during Phase 1 and Phase 2. One 2-month phase, Phase 3, of the project will require the traffic circle to be closed. A Work Zone Traffic Plan is being developed for the·period of this closure. Pedestrian access will be maintained throughout the project. Construction on this rehabilitation project is anticipated to begin in 2019, and is expected to be complete in 2022.

Final Configuration Rendering.

EAST 81ST STREET PEDESTRIAN BRIDGE OVER FDR DRIVE NORTHBOUND (MANHATTAN) (DDC PROJECT)

The old East 81st Street Bridge was built in 1942. The bridge provides a link to and from the East River Esplanade. The structural steel and concrete were severely deteriorated, and the structure was not American Disability Act (ADA) compliant.

East 81st Street Bridge Left and Right Elevations in 2014.

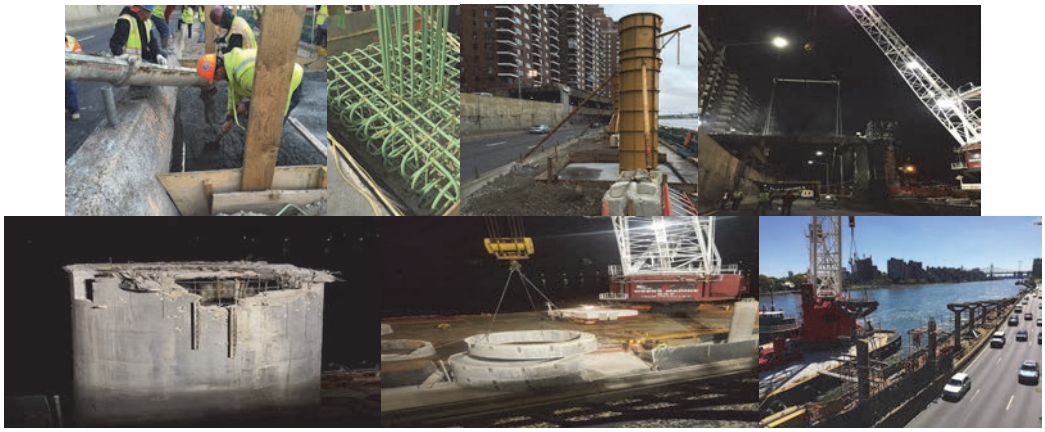


Bridge Conditions in June 2014. Pier 1 Over the East River – Close-up of 2 Wide Cracks. Begin Abutment Stem Right Side - Failing Patch and Map Cracking. Span 1 Deck Wearing Surface. Span 2 Railing. Span 3 Concrete Steps. Pier 2, Under Span 2, Looking Southwest – Spalled Concrete Area With Exposed Rebar at Bottom of Pier. Underdeck of Span 1. Begin Abutment Stem.

The new bridge complies with current standards and provides barrier free access. The reconstruction of the bridge was managed by the New York City Department of Design and Construction in partnership with the Department of Parks and Recreation and DOT.

The scope of work consisted of the demolition of the existing pedestrian bridge over the northbound FDR Drive along with the connecting stairway on the esplanade; the installation of a new pedestrian bridge over the northbound FDR Drive along with an ADA-compliant ramp; the installation of new lighting, railings, and ornamental fencing, along with new landscaping – boulders, shrubs, trees, and asphalt pavers on the promenade. A Notice to Proceed was issued to the contractor with a start date of November 24, 2014. Construction began on May 4, 2015.

Demolition of the Existing Stairway. Removing Sections of the Seawall. Preparing the Seawall for the Installation of 100 Micropiles. Excavating Pile Caps. (Credit: NYCDDC)



Installing Rebar Cages and Pouring Concrete for Pile Caps. Installing Pier Caps and Removing the Old Bridge. Demolishing the Concrete Tower. Installing the Hub and Arms. (Credit: NYCDDC)

Installing the New Spans and Bridge. (Credit: NYCDDC)

The construction project was nearly three years in the making, but was initially expected to be completed in 18 months. Three major factors prolonged the project: the north abutment retrofit, design changes, and stainless-steel fabrication. The initial survey of the north abutment (the column supporting the southeast corner of the John Finley Walk, between the north and southbound FDR Drive) indicated that a repair was needed and the contract included that repair work. After the project started and the column was further evaluated, it was clear that it would not be prudent to install a bridge on the north abutment without a more significant retrofit. It took approximately 8 months to design a repair, have the design approved by various agencies invested in the project, coordinate with the other projects working on the FDR, and execute the repair.

Responding to the community and the Public Design Commission's request, the scope of the project changed in three significant ways: to address lighting concerns, to consider installing a

set of viewing windows on the southern part of the John Finley Walk, and to reconsider the design of the access ramp on East 81st Street. The initial response to address the lighting concern was rather simple. The wattage of the light bulbs was reduced to 14W and five light fixtures were removed from the design. However, DOT directed the project to further change the light fixtures and reduce the temperature of the bulb from 4,000K to 3,000K, making the glow of the bulb softer and warmer. The bulb requested was not a standard bulb and had to be manufactured specifically for this project, which delayed the project another three months. Overall, the design changes pushed back the project by about five months.

One of the benefits of this pedestrian bridge is that the fence is made of stainless steel, a high quality material that is incredibly durable and aesthetically appealing. However, the fence was custom made for the pedestrian bridge and the fabricator was unable to deliver the fence panels within the time initially projected.

Twenty 3-foot-by-3-foot windows will be installed along portions of the bridge fencing to attempt to give the space a more open feel. In addition, the plan to construct wheelchair-accessible ramps leading from the East 81st Street cul-de-sac to the East 81st Street pedestrian bridge was eliminated from the project scope.

Retrofitting the North Abutment (8 Months). Rendering of the Viewing Window at the Southern Terminus of the John Finley Walk. (Credit: NYCDDC)

Work completed as of late fall 2017 included the following: stairway removal; bridge removal; micropile installation; excavation of the esplanade; retrofit of the north abutment; demolition of the concrete tower (Pier 9); foundation work for Piers 1 – 9; column, hub and arm, and span installation for Piers 1 – 9; bridge installation; and fence installation and landscaping on the esplanade.

The new bridge was opened to the public on December 28, 2017. The Department of Design and Construction will install glass panels along the bridge in early 2018.

New East 81st Street Bridge in December 2017. (Credit: NYCDDC)

BRONX, QUEENS, AND STATEN ISLAND BRIDGES

EIGHT CULVERTS: GALLOWAY AVENUE OVER MARIANNE STREET, FOREST AVENUE OVER CRYSTAL AVENUE, MIDLAND AVENUE OVER HYLAN BOULVARD, ROCKLAND AVENUE OVER BRIELLE AVENUE, FOREST AVENUE OVER RANDALL AVENUE, GREGG PLACE OVER RANDALL AVENUE, ARTHUR KILL ROAD OVER MULDOON AVENUE, AND ARTHUR KILL ROAD OVER RIDGEWOOD AVENUE (STATEN ISLAND)

Location Map.

A Notice to Proceed for the project was issued to the contractor with a start date of July 18, 2016.


2016: Galloway Avenue over Marianne Street – Wearing Surface, Looking Northwest. Forest Avenue over Crystal Avenue (2 Views). Midland Avenue over Hylan Boulevard (3 Views) – New Asphalt Wearing Surface. Culvert Top – Fence and Sidewalk. Rockland Avenue over Brielle Avenue. Forest Avenue over Randall Avenue. Gregg Place over Randall Avenue. Arthur Kill Road over Muldoon Avenue (2 Views). Arthur Kill Road over Ridgewood Avenue.

The Galloway Avenue culvert crosses under a single span timber pedestrian bridge supported on a concrete abutment. It is located approximately 262.4' east of the intersection of Galloway Avenue and Crystal Avenue. The channel beneath the culvert bisects Galloway Avenue, thereby making the bridge the only means of carrying pedestrians from one side of the channel to the other. The existing timber bridge was removed and a new timber bridge was constructed with a new abutment and retaining wall. There was no MPT required as this is a pedestrian culvert and a dead end street. Construction was completed on May 12, and an inspection was performed on November 6, 2017.

Galloway Avenue Culvert in December 2017.

The Forest Avenue culvert over Crystal Avenue is a single span reinforced concrete box culvert. It is located approximately 230' east of the intersection of Forest Avenue with Crystal Avenue. The reconstruction will consist of the demolition of the existing culvert, clearance of debris from the channel, and replacement of the culvert with a concrete deck slab supported on steel beams on reinforced concrete abutment and wingwalls. The construction work is planned to be performed in four stages with proposed four traffic lanes being maintained at all times. Construction is expected to begin in spring 2018.

Forest Avenue Culvert over Crystal Avenue in July (Left Sidewalk Looking West) and December 2017.

The Midland Avenue culvert consists of a single span reinforced concrete box, which will be replaced with a new pre-cast box culvert. It is located on Midland Avenue between Boundary Avenue and Mason Avenue. The rehabilitation will include replacing the existing concrete box structure with a new concrete box structure, new sidewalk, curb, pipe railing, chain link fence and asphalt wearing surface. The work will be performed in three stages, with one lane of traffic maintained in each direction at all times. Construction began on August 25, 2017. Installation of new culvert, sidewalks and moment slabs was completed in 2017. The new bridge railing will be installed in spring 2018.

Midland Avenue Culvert in September 2017 – Precast Sections. Looking East - Precast Box Culvert Section Installation Complete. Looking North – Completed Installation of Waterproofing Membrane on the Outside of all Joints. Excavating. Assistant Civil Engineer Tatyana Krushelnitskaya (on Left) Inspecting the Waterproofing of the Culvert Box.

October 2017 – West Walls and Wingwalls Formwork. Looking West - Formwork and Rebar for the Roof Slab. Placing Concrete for the Roof Slab. Sidewalk.

The Rockland Avenue reinforced concrete culvert project will include concrete repair and a lined and stabilized north embankment. It is located approximately 361' west of the intersection of Rockland and Manor Avenue. The rehabilitation work includes clearing the debris and vegetation from the channel and installing a structural lining. There are no sidewalks on this culvert. The construction is planned to be performed in one stage and no street closures will be required during construction. Construction is expected to begin in spring 2018.

The Forest Avenue culvert over Randall Avenue is a single span concrete box culvert, located at Forest Avenue between Randall Avenue and University Place. It will be replaced with a new precast concrete box culver with new sidewalks and asphalt pavement. The work will take place in three stages while maintaining one traffic lane in each direction during construction. Construction began on April 3, 2017, was completed in the fall, and an inspection was performed on November 6, 2017.

Forest Avenue Culvert over Randall Avenue in May 2017 - Looking West. Backfilling the Trench Over the New 20 Inch Iron Pipe Water Main. Looking South - Placing Rebar for Wingwall Footing. Looking West - Excavating and Removing the Old Culvert. Looking Northwest. Placing Concrete Into Formwork for the Wingwalls.

May 2017 - Looking West - Installing Shoring Around Excavation. Looking North - Placing Concrete for Footing. June 2017 - . Looking Down and Northwest Along Forest Avenue - Installing the New 12 Inch Water Main. Looking Northwest - Placing Temporary Asphalt Over 12 Inch Water Main Trench on Forest Avenue.

August 2017 - Looking Northwest - Constructing Falsework to Support the Culvert Roof Slab. Pouring Concrete for the Stage 2 Roof Slab. Contractor Excavated and Demolished the Existing Culvert for the Final Stage Along the South Side of Forest Avenue. September 2017 - Concrete Placement at Culvert Walls. Construction of Culvert Opening. Temporary Barrier. Looking West - Contractor Placed Concrete for the Sidewalk, and Seed and Topsoil at Unpaved Areas.

The Gregg Place culvert is a single span reinforced concrete box culvert, located approximately 98.4' west of the intersection of Gregg Place and Randall Avenue. The rehabilitation includes replacing the southern portion with a new precast box culvert with new pavement. The construction is planned to be performed in one stage and the north side of the road will remain open to through traffic. Construction began on February 23, 2017, was completed in the fall, and an inspection was performed on November 6, 2017.

Gregg Place Culvert in February 2017. Looking Northeast - Installation of 30 Inch Pipe for Water Diversion Structure. March 2017 - Looking South - Forming up Footings for the Headwall.

July 2017 - Looking East – Installing Rip Rap. Placing Asphalt. September 2017.

The Arthur Kill Road culvert over Muldoon Avenue consists of a reinforced concrete pipe at north and a reinforced box culvert at south. It is located on Arthur Kill Road between Muldoon Avenue and Arden Avenue. The box culvert will be replaced with a new box culvert, and a structural lining will be installed in the pipe culvert. The construction will be performed in one stage with one lane of traffic maintained in each direction. Construction began on April 10, 2017.

Arthur Kill Road Culvert over Muldoon Avenue in March 2017 - Looking Northwest at the North Side. Looking North at the South Headwall and Wingwall, and Looking South at the North Headwall and Wingwall.

June 2017 – Pouring Manhole Walls. July 2017 – Placement of Low Strength Concrete Complete. Placement of Concrete Curb Along the South Gutter Line. Placing Roadway Base. Excavation of Material on Top and in Front of the Apron Slab. Placement of River Bed Stones, Medium Stones, and Boulders Adjacent to the Culvert Walls and Apron Slab.

November 2017 – Half of the Culvert is Rehabilitated – Beginning and Ending Approach Right Side Embankments are Repaired. New Guide Railing, Bridge Railing, Curb and New Asphalt Pavement.

The Arthur Kill Road culvert over Ridgewood Avenue consists of a non-reinforced concrete pipe at south and a corrugated metal pipe at north. It is located approximately 100' west of the intersection of Arthur Kill Road and Ridgewood Avenue. The rehabilitation work will include installing a structural lining inside the concrete pipe and repairing the concrete at the head walls and catch basins. There will be one stage of construction and one lane of traffic will be maintained in each direction. The project was well advanced by the fall of 2017.

Arthur Kill Road Culvert over Ridgewood Avenue in August 2017 - Cut Back Asphalt Wearing Surface. Placing Concrete Base. Plates Installed Over Trench for the New 20 Inch Diameter Iron Pipe.

September 2017 – Right Sidewalk and Roadway Wearing Surface.

The overall project is expected to be substantially complete in fall 2018.

CITY ISLAND ROAD BRIDGE OVER EASTCHESTER BAY (BRONX)

The original City Island Road Bridge was built in 1901 and was the only vehicular, bicycle and pedestrian access between the mainland Bronx and City Island. In 2015, the bridge carried 15,292 vehicles per day. The bridge is part of City Island Road, which is located within Pelham Bay Park and crosses over Eastchester Bay. With seven spans and six piers in the water, the bridge outlived its useful life and required extensive continuous maintenance. Spans two and three were supported by an overhead truss that originally functioned as a movable swing span but was permanently fixed in 1963.

View of Old City Island Bridge From the Esplanade. Aerial View of Old Bridge. Welcome Sign on the Old Bridge.

The bridge was replaced along the same alignment with a new three span bridge with two piers in the water. The new bridge is approximately 17 feet wider than the old one to accommodate three standard 12-foot wide traffic lanes, a 6-foot wide bicycle lane and a 6-foot wide pedestrian walkway on each side. The new bridge is a multi-girder continuous bridge with an integral deck. Galvanized steel stay-in-place forms were used for the deck to both facilitate deck placement and shield the concrete from the corrosive environment of the saltwater bay below. The stainless steel rebar will also not be vulnerable to the deicing salt in the same way that epoxy coated rebar is. Therefore, the deck will have a much longer life expectancy since rebar corrosion is a primary factor in the deterioration of concrete. The new bridge was designed to current standards and with its wider roadway width, will allow future repair and rehabilitation to be carried out while maintaining one 12-foot lane in each direction. It also eliminates the vehicle height restriction caused by the previous overhead truss. In order to maintain traffic during the demolition of the existing bridge and construction of the new bridge, a temporary bridge was constructed on the south side of the existing bridge. Marine traffic remained undisturbed beneath the bridge during peak boating season.

Side View Rendering of New Bridge.

The contractor's Value Engineering proposal was accepted to utilize a prefabricated steel bridge system for the temporary bridge with an asphalt riding surface on a steel-plated deck instead of a steel grid system and utilities located on the outside of the roadway between the riding surface and the sidewalk. Pedestrians and bicyclists were separated with a steel truss system and fence from vehicular traffic. The temporary bridge sections were fabricated off-site while the foundation work was performed. Therefore, the bridge was erected on a complete per span system rather than "stick" built. This minimized the amount of time the contractor was in Eastchester Bay erecting the temporary bridge. The schedule advantage allowed traffic to be shifted off the existing bridge sooner, reducing the required maintenance of the aging bridge. Removal of the bridge will be done similar to the erection reducing the time required to be in the bay.

As part of the bridge replacement project, the Legion Triangle at the intersection of City Island Avenue, City Island Road and Bridge Street will be modified.

Current Legion Triangle and Rendering. The Design is Slightly Larger Than the Existing Triangle, Features a Wide Variety of Flora, and Will Provide Ample Space for Visitors who Come to Pay Homage to the Veteran's Memorial.

At the City Island side there is a seawall along the shore which is about 500 feet in length starting from the bridge and heading in a southerly direction. This seawall will be rehabilitated and turned over to the Department of Parks and Recreation along with the esplanade which it is supporting. The rehabilitation of the existing concrete seawall will include a steel rod tieback system as a precaution against loss of stability due to overturning or sliding. In addition, all unsound concrete will be removed from the face of the wall and a new reinforced concrete facing will be cast along the entire length. The esplanade will receive landscape improvements such as a new railing above the wall, new plantings, trees, grass, and paver blocks.

Existing Seawall. Proposed Treatment.

Turtle Cove Culvert is located under City Island Road approximately half a mile west of the existing bridge. As part of the wetland impact mitigation activities for the project, this culvert will be replaced with a larger one that will allow for greater tidal flooding from Eastchester Bay to the upland portions of Turtle Cove.

Turtle Cove. Existing Culvert – South Side.

City Island Road Bridge in 2010. (Credit: Bojidar Yanev) Span 4, Right Sidewalk Near Pier 4 in October 2013. Vertical Clearance Posting. (Credit: NYSDOT) 9 Foot Tall Ornamental Finial.

A Notice to Proceed for the project was issued to the contractor with a start date of September 30, 2013. At the end of 2013, the contractor started mobilizing the project activities. During 2014, the contractor surveyed the area, set up temporary work zone traffic control devices, installed temporary signals, relocated the 16 inch water main on the existing bridge, and started and installed most of the foundation work for the temporary bridge. Stage 1 of the Turtle Cove culvert replacement also began in 2014.

August 2014: Excavating on the West Side of the Bridge in the Presence of an Archeologist. Approximately 300 Linear Feet of a Turbidity Curtain was Installed on the Southwest Side of the Bridge to Protect the Shore During Construction. A Turbidity Curtain is a Floating Barrier Designed to Contain and Control the Dispersion of Sediment. October 2014: Drilled Shafts – Installing Rebar Cage at Pier 6.

October 2014: The Contractor Airlifted Drilled Shaft Casings Into Position on a Platform Constructed Beside a Construction Barge. The Contractor Assembled the Temporary Bridge Segments at the Brooklyn Navy Yard. The Pieces Were Transported to City Island by Barge.

During 2015, the contractor constructed the remainder of the substructure and superstructure for the temporary bridge. Temporary water mains, gas main and other utilities were installed on the temporary bridge. Opening of the temporary bridge to traffic and closure of the existing bridge for demolition was expected in early 2016. On December 16, the Division conducted strength testing of the temporary bridge roadway. Heavily equipped vehicles from the FDNY's Engine 70 Ladder 53 station crossed the temporary bridge to demonstrate the structural integrity of the roadway. The larger of the two vehicles weighed approximately 80,000 pounds, and the smaller vehicle weighed closer to 60,000 pounds. On December 18, all City Island Bridge traffic (vehicular and pedestrian) was transferred onto the temporary bridge. Stage I work of the Turtle Cove culvert replacement was completed and Stage II work was in progress at the end of 2015.

January 2015: Drilling Rig Construction Vehicle Used to Install Land-Based Drilled Shaft Casing for the Temporary Bridge. The Bucket Drills Carve Out the Casings With Teeth Capable of Tearing Through Rock. April 2015: Turtle Cove Culvert Replacement. Installing Culvert Under the Utilities. May 2015: Waterproofing the Joint.

2015: Completed Stage 1. Water Flow Inside the Culvert was Restored on May 18. The New Culvert is an 8 Foot by 7 Foot Concrete Box - About a 3x Larger Capacity. April 2015: - Installation of the Pedestrian Walkways for the Temporary Bridge. The contractor Constructed 2 Cantilevered Sidewalks - Approximately 5.5' Wide With a Chain-Link Fence. July 2015: Installing Decking for Span 15. November 2015: New Culvert Boxes to Replace the Aging Conduit that Connects the Bay with Turtle Cove, Located Beneath City Island Road. December 2015: Temporary Bridge at Left. (Temporary Bridge Credit: NYSDOT)

In 2016, Stage II work of this contract began with the demolition of the existing spans 7, 6, 5, 4, and 1, as well as the east and west abutments. At the same time, the contractor constructed the pier 1 and 2 footing of the proposed structure. On July 6, 2016, the contractor installed the cofferdam sheeting around the east abutment and began excavating behind the sheeting. All of the excavated material was stockpiled in the southwest quadrant at the site. On July 18, 2016, the drill shaft operation started at the proposed east abutment and retaining walls and was followed by the installation of the steel cages and the pouring of the concrete for the drilled shafts. The contractor also began the demolition of the span 2 and 3 deck and then removed the truss, girders and floor beams.

On July 27, 2016, the contractor began installing the reinforcing steel for the pier 1 and 2 piercaps, and completed the work on August 23, 2016. Immediately after this operation, the concrete was poured. On August 3, 2016, the contractor began demolishing the existing west abutment and began installing the cofferdam sheeting around the abutment.

February 2016: Rehabilitation of the Catherine Scott Promenade Seawall - Crew Removing Broken Elements of the Façade in Preparation for a Complete Renovation. A Protective Netting is Installed Along the Seawall to Prevent Debris From Falling Into the Bay. March 2016: Deck Demolition - Saw-Cutting the Asphalt – the Crew Slices Block-Shaped Sections in the Asphalt and Then Uses a Core Drill to Carve Out "Pick Holes." These Holes are Support Mechanisms Which Allow the Contractor's Crane to Grab the Asphalt Block and Lift it Off the Deck. Once the Top Layer of Asphalt is Removed, the Contractor's Excavator Grabs Excess Debris. July 2016: Pier 2 Drilled Shaft Casings. September 2016: Forming Pier 2 Pedestals. East Abutment Dewatering and Excavation. November 2016: View of Piers 5-6 of the Old Bridge. End Abutment and Beginning Approach Under Construction. (November Credit: NYSDOT)

On August 8, 2016, the contractor installed a valve on an existing 12" subaqueous water main and reinstalled the tie-in from the temporary 12" water main to the 12" subaqueous water main, thus fulfilling the DEP request. On August 15, 2016, the contractor completed the work successfully and restored the roadway safely. Also on August 15, 2016, the contractor removed the existing signs and finials of the bridge truss and stored them at his yard as directed by the Community Board.

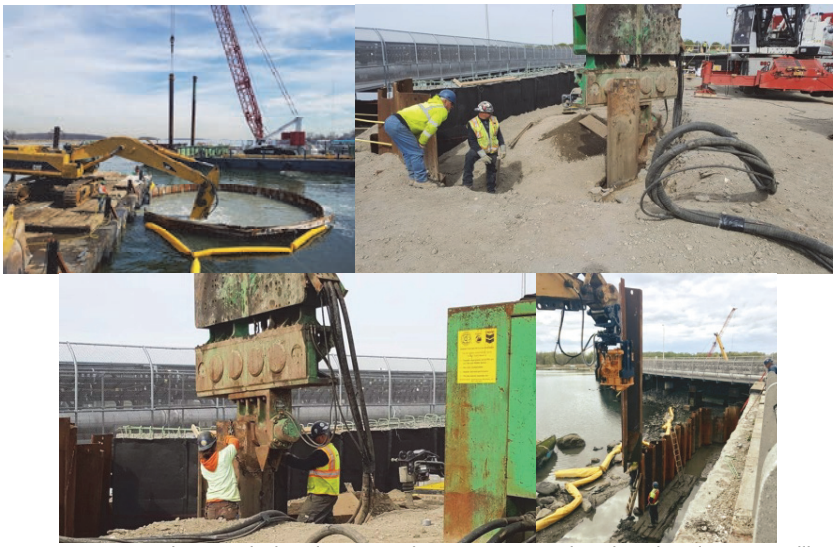
On September 17, 2016, the contractor completed excavation of the proposed east abutment footing, placed the concrete mud mat, and began installing re-bars. On November 4, 2016, the contractor poured the east abutment footing and then formed and installed re-bars for the stem wall. On December 2, 2016, the contractor completed pouring concrete for the stem wall, and then formed and poured the pedestals. Immediately after, the back wall was formed and poured by December 22, 2016. On December 27, 2016, the contractor started backfilling behind the east abutment.

During 2016, the contractor maintained the watering of the sod and seed at the Turtle Cove site. Remaining work at this location included the installation of pipe rail fence and chain link fence. There were no activities at the esplanade site (east side park area) in 2016.

On January 17, 2017, the contractor started installing the west abutment cofferdam sheeting and performing the remediation measures for the walers, braces and treated rods, and continued with the demolition of the existing bridge and the removal of the excavated material to the stockpile in the south west quadrant of the bridge. On February 7, 2017, the steel to build the new bridge arrived by barge. On February 11, 2017, the contractor started erecting the "G" series girders of span 3. During the ongoing steel erection activity, the "F" series girders were spliced in the field to the in-place "G" series girders in order to complete the erection of the new steel girders of span 3. On March 17, 2017, the contractor completed the erection of the structural steel girders ("F&G") section of span 3 and started erecting the structural steel girders along span 2 and installing the cross frames (diaphragms) between girders.

January 2017: Most of the Superstructure of the Old Bridge Removed. New Bridge Abutment Seat That Will Support the New Bridge Deck. Two Girders are Attached With a Diaphragm. A Worker Installs Bolts at the Splice Location Prior to Shipment to the Site. The Bridge Steel Beams Were Installed at the Footprint of the Original Structure. The American Steel was Fabricated in Southfield, New Jersey and Sent to Elizabeth, New Jersey, Where it was Loaded on Barges and Sent to City Island. Upon Arrival, Construction Workers Offloaded the Steel and set it in its Final Place. February 2017. Steel Fabrication. March 2017.

On April 14, 2017, the contractor started installing the utilities along the bridge and drilling micropiles at the west abutment. On April 24, 2017, the contractor completed the erection of the structural steel girders ("D&E") section of span 2 and started installing the cross frames (diaphragms) between girders. In the spring, the contractor continued building the bridge and removing the previous structure's center pivot pier. On the City Island side, the structural steel was installed ahead of the pouring of the concrete deck. The Bronx side abutment continued construction and the esplanade rehabilitation was underway. Traffic agents were assigned through September. On July 15, 2017, the erection of the steel girders ("B&A") was completed. On May 4, 2017, the drilling and grouting of the micropiles at the west abutment was completed.



April 2017. May 2017: Removing Steel Sheeting From the East Approach. The Sheeting was Utilized to Create a Protective Cofferdam in the Area. A Wall of Steel Sheeting was Also Installed Ahead of the Reconstruction of the Esplanade.

On July 10, 2017, the contractor began installing the utilities, stay-in-place forms, shear studs, and re-bars along the bridge deck. On June 14, 2017, the contractor placed concrete for the footing of west abutment and on June 30, 2017, the concrete placement for the abutment stem wall was completed. On July 12, 2017, the backfilling of the abutment started. On July 25, 2017, the contractor placed concrete along the northwest and southwest wingwalls of the west abutment and started the backfilling operation.

June 2017: Bridge Deck Under Construction Looking West. Rebars at the North Retaining Wall at the West Abutment. (Rebar Credit: Charly Ayoub) July 2017: The Temporary Bridge. Site Visit: Civil Engineer Anthony Walpole, Deputy Director of Bronx, Queens, and Staten Island Roadway Bridges Mohammad Arain, Deputy Chief Engineer Bridge Capital Design & Construction David Dunn, Resident Consultant Engineer Dhiaa Shubber, Director of Bronx/Queens/Staten Island Roadway Bridges Nazim Khan, and Engineer-in-Charge Charly Ayoub. (Site Visit Credit: Russell Holcomb)

On August 9, 2017, the contractor placed concrete along span 3 (pour #1 of 3); on August 24, they placed concrete along span 1 (pour #2 of 3); and on August 28, the placement of the concrete along span 2 (pour #3 out of 3) was completed.

August 2017: Placing Concrete on the Deck Portion Near the East Abutment. A Finishing Machine Smoothing the Concrete Surface. A Wet Burlap and Soaking Hoses are Placed to Properly Cure the Deck.

On September 2, 2017 the contractor began saw cutting the bridge deck, installing the steel faced curb, and installing the electrical conduits. On September 22, 2017, the concrete along the west approach was placed. On October 14, 2017, the contractor completed installing the steel-faced curb along the sidewalk, began and completed the installation of the modular joints at the east and west abutment and completed installing the sub-base and placing the PCC concrete foundation for the roadway.

On October 27, 2017, the contractor completed installing the electrical conduits for the street lighting along the entire north and south sides of the roadway, the light poles, and the control cabinet. In addition, the contractor completed installing the fence posts and the railing from the east abutment to the west abutment along the bridge. On October 28, 2017, the contractor began and completed the asphalt placement and the striping of the road as required, diverting the traffic from the temporary bridge to the permanent bridge.

October 2017: West Approach Roadway – Placing Concrete at the North Approach. Installing Fencing Along the South Sidewalk. Bridge Deck – Completing the Installation of the Modular Joints.

On October 29, 2017, the permanent bridge was opened to vehicular, bicycle, and pedestrian traffic at noon.

City Island Bridge Opening Ceremony: Community Coordinator Jameson Mitchell and Director of Community Affairs Huascar Robles Preparing the Ribbon. Deputy Director of Bronx/Queens/Staten Island Roadway Bridges Mohammad Arain, Chief Operations Officer Margaret Forgione, Chief Staff Manager Joannene Kidder, Director of Bronx/Queens/Staten Island Roadway Bridges Nazim Khan, and Deputy Chief Engineer Bridge Capital Design & Construction David Dunn.

Chamber of Commerce Vehicle. Bronx Borough President Rubén Díaz Jr. and Bronx Borough Commissioner Nivardo Lopez. Chief Bridge Officer Robert Collyer. Commissioner Polly Trottenberg. Assistant Civil Engineer Syed Naqvi, Director of Bronx/Queens/Staten Island Roadway Bridges Nazim Khan (Obscured), Deputy Director of Bronx/Queens/Staten Island Roadway Bridges Mohammad Arain, and Engineer-in-Charge Charly Ayoub. Elements of Old Bridge.

Immediately after the opening of the new bridge to traffic, the temporary bridge was decommissioned. The removal of the temporary bridge is expected to commence in mid-April 2018, and is to continue for approximately four months. On October 30, 2017, the contractor started removing the asphalt at the east approach slab, the box beam-guide rail, the temporary light poles, and the fence along the north sidewalk. The contractor started prepping for the demolition of the piers of the old bridge. Con Edison began pulling the electrical cables across the permanent bridge in order to transfer the electricity from the temporary bridge to the new bridge.

November 2017: Approach Beginning, Elevation Left and Right. (Credit: NYSDOT)

On June 28, 2017, the contractor installed the four-foot chain link fence at the Turtle Cove site. The remaining work is the installation of the pipe rail fence.

From June 28 to July 26, 2017, the contractor drove sheeting along the sea wall at the Esplanade for the concrete chipping and tieback work.

July 2017.

As of late fall 2017, the reconstruction of the Legion Triangle adjacent to the new bridge was underway. On November 29, 2017, the contractor started prepping the Legion Triangle Area to construct new curbs and sidewalks. On December 6, placing of concrete along the curb began, and on December 11, the contractor began placing concrete along the sidewalk around the Legion Triangle. The new island will be larger to better present the monuments and flagpole to the community and to accommodate additional visitors, especially during veteran-related events. All existing traffic movements around the island, including turns into and out of Bridge Street, will continue after completion of construction.

Remaining work to be completed includes the installation of the water and gas mains; the installation of the fence and guiderail along the south side of both approaches; removing the overhang brackets along the bridge fascia; the installation of the scupper downspout on the bridge; the excavation of the existing roadway (westbound and center lanes) for PCC pavement work along the City Island Avenue; the concrete placement along the curb and the PCC pavement, placing asphalt and stripping the road of the City Island Avenue; the installation of the curb and sidewalk along the west approach; the installation of the rip rap along the east retaining wall; the removal of the existing bridge piers; the excavation in front of the sea wall; chipping the concrete along the sea wall face and then drilling and installing dowels in the wall face; the restoration of the sea wall face; the removal of the temporary sheet piles along the sea wall; the restoration of the Esplanade area and installing benches in the park area; and the removal of the superstructure (truss) and substructure (piers) of the temporary bridge.

The construction of the new bridge is expected to be substantially completed by fall 2018.

GRAND CONCOURSE BRIDGE OVER METRO NORTH (BRONX)

The bridge was originally built in 1906 by the New York Central & Hudson River Railroad. The last major reconstruction project was in 1982. It is a single span bridge consisting of a concrete deck supported on five steel plate girders, one truss, and a steel truss subway structure located in the center of the bridge. The bridge carries three northbound and three southbound vehicular travel lanes separated by a concrete median, and two shoulder lanes, one on each side of the roadway, as well as NYCT subway traffic underneath the Grand Concourse Boulevard and above the Metro North railroad right of way. There are two sidewalks on the bridge. The roadway is lit from above by street lighting fixtures mounted on double arm poles located on the medians, and single arm poles located on the sidewalks. The upper portion of the bridge carrying the roadway is now structurally supported by the lower portion carrying the subway. The two portions of the bridge are dependent upon each other for support and stability but are being maintained

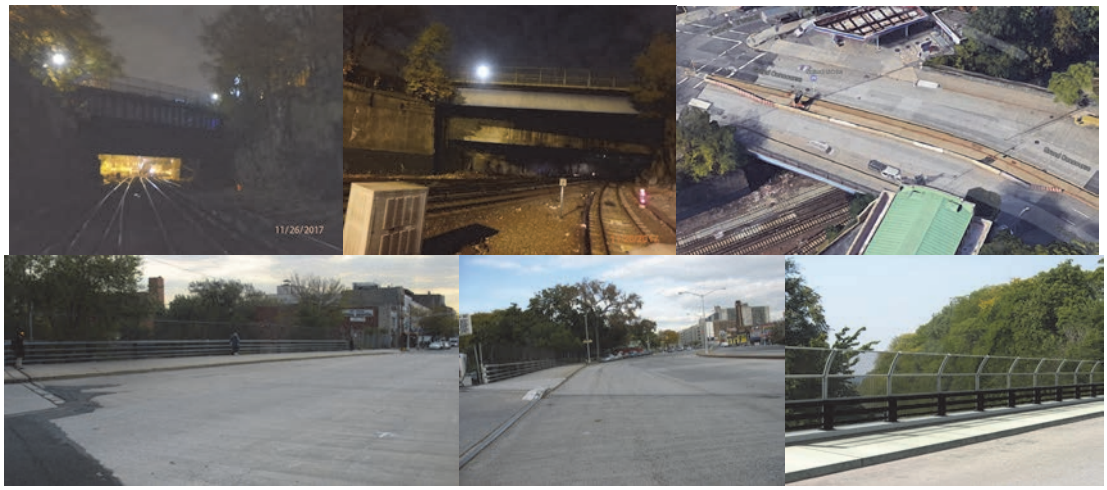
individually by two separate agencies, the NYC Department of Transportation, and NYC Transit Subways respectively. The subway portion of the structure, comprised of four warren trusses, is stabilized by the roadway portion floor beams and the roadway portion is supported by the subway trusses.

Location Map.

In the current rehabilitation scheme, the roadway will be supported independently from the subway structure: the structures will be physically separated by removing the roadway and supporting it on a new framing system of girders and floorbeams independent of the truss system. The remaining existing truss bridge will only be supporting NYCT tracks. The end result will be two separate bridges, one for the roadway maintained and operated by NYCDOT and the other maintained and operated by NYCT for the subway line. The bridges will share the same abutment and will be in close proximity to each other.

Steel members will be added to the subway trusses to provide the stability previously provided by the roadway portion floor beams. The substructure consists of two concrete abutments bearing on rock ledges. The tops of these abutments lie at two levels, an upper level which supports the bridge stringers and a lower level which supports the subway trusses. The bridge stringers over the subway tracks bear on a composite steel beam/concrete backwall which will be replaced as part of this project. The foundation for the new trusses being installed to carry the roadway superstructure will bear on the rock behind the existing abutments.

The reconstruction project will also include building new sidewalks, as well as bridge railings with protective fencing, electrical conduits and fixtures, and the relocation of the existing water main under the sidewalk. The new roadway deck will be made of reinforced concrete with superpave type paving. A jointless deck will be installed to reduce or eliminate the corrosive effects of dripping water on both the existing steel members to remain as well as the new steel bridge members to be installed. Two lanes of vehicular traffic and the pedestrian walkway will be maintained in each direction on the Grand Concourse. Deterioration was discovered during a final design inspection to assess the structural condition of the bridge, and the consultant has been instructed to prepare an interim load rating to establish the structural capacity.



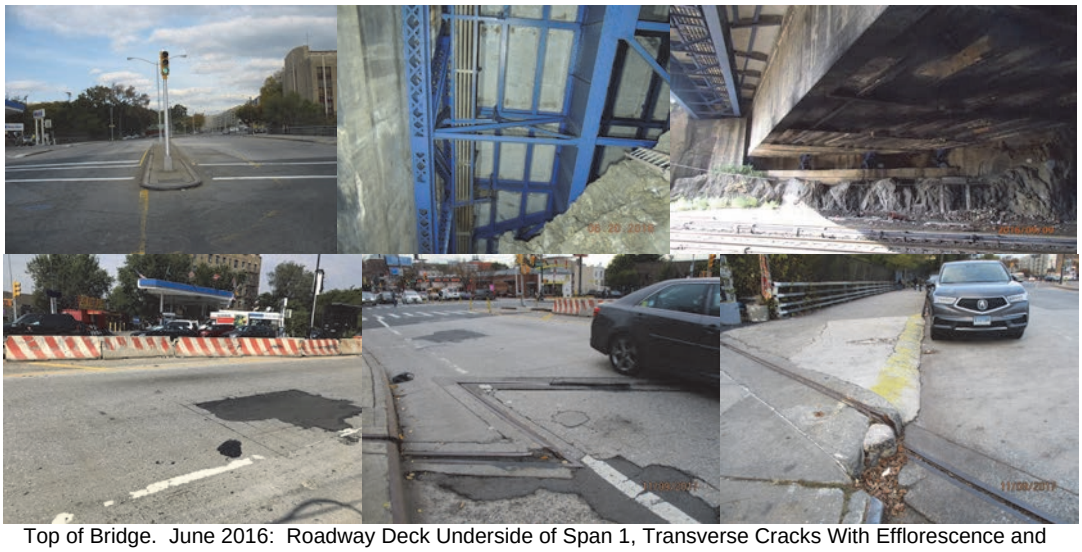
Grand Concourse Bridge over Metro North in 2017 – Left and Right Elevation of Span 1. (Credit: NYSDOT)
Aerial View. East and West Sides of the Bridge. Proposed Fence and Bridge Railing.

A value engineering workshop was held in August 2014 with the goal of developing recommendations to be considered by the project design team, construction and construction support personnel and the Agency to improve all aspects of the project. The resulting report is under review and discussion by the design consultant and the Agency.

DOT and NYC Transit are in negotiations to resolve the jurisdictional issues arising from the separation of the existing jointly-operated bridge. NYC Transit's consultant conducted an inspection of the portions of the bridge to be transferred to NYCT's jurisdiction and prepared a report of their findings from which NYCT developed a scope of work. The NYCT scope of work will now be included in the final design.

In addition to the bridge work, the project will also incorporate pedestrian improvements which are consistent with NYC's Vision Zero and OneNYC objectives. Curb extensions will be added at street corners to reduce the pedestrian crossing distance at both 151st and 153rd Streets and sidewalk limits will be generally be expanded throughout the project limits. The raised concrete median in the center of the Grand Concourse will be widened, which will reduce pedestrian crossing distance while also creating space for a future bicycle lane. ADA-compliant pedestrian ramps will be installed at all pedestrian crossings within the project limits along with high-visibility crosswalks. The Grand Concourse northbound 153rd Street MTA bus stop's concrete island will be expanded while maintaining existing bush and tree plantings. The proposed street lights will use historic Type M poles and luminaires to match the aesthetics of the Grand Concourse Historic District.

This project, currently in the final design phase, is expected to begin construction in early 2019. The construction duration will be approximately 32 months with a significant amount of night/weekend work due to track outages that will be required to perform work over NYC Transit and Metro-North Railroad tracks.



Top of Bridge. June 2016: Roadway Deck Underside of Span 1, Transverse Cracks With Efflorescence and Hollow Sections. (Credit: NYSDOT) September 2016: Southeast Portion of the South Abutment - Underside Framing. September 2017: Jersey Barriers on Beginning Approach. November 2017: Beginning Abutment Joint Northbound Roadway (Right Side) - Depressed Sealant, Missing Armor and Concrete Header. Left Curb Adjacent to Beginning Joint - Missing Steel Face. (November Credit: NYSDOT)

HIGHLAND PARK PEDESTRIAN BRIDGE OVER PEDESTRIAN PATH (QUEENS)

The Highland Park Pedestrian Bridge, built in 1902, is a single span arch structure with a clear opening of 59 feet under the bridge. Unlike a conventional steel or concrete bridge structure, the main structure is a brick masonry arch, with wing walls and parapet walls consisting of stacks of rounded river stones set in mortar. The roadway on its top has a 2 inch thick asphalt-concrete wearing surface. The height of the parapet walls from the roadway surface varies from two to four feet. The bridge carries lighting utilities and has lampposts located on either side of the approach roadways. The bridge, located inside Highland Park, spans a hiking trail, and carries pedestrian and bicycle traffic. The only motorized vehicles permitted on the bridge are emergency vehicles and Parks Department's maintenance vehicles. It is 27 feet wide with neither sidewalks nor shoulders.

June 2016.

The bridge is under the jurisdiction of the New York City Parks Department and the DOT conducted this rehabilitation project on their behalf. The existing stone and brick arch bridge displayed deficiencies in the form of cracking, missing mortar, spalled and missing masonry units and dissimilar grouting. The rehabilitation work corrected these defects while preserving the original elements of the structure to the greatest extent possible. The masonry was cleaned and repointed in place. The asphalt roadway was completely removed and the top of the arch was excavated. This allowed for any necessary repairs on the top side of the arch and for the application of a reinforced concrete saddle with a waterproofing membrane. The arch was then backfilled and the roadway repaved. In addition, new lamp posts and under deck lighting were

added. An eight foot wide gravel path was installed below the bridge, and the landscape was restored with trees and shrubs. The bridge was completely closed to traffic during the construction which was detoured to other parts of the park. A Notice to Proceed for the project was issued to the contractor with a start date of April 25, 2016.

August 2016: Temporary Support Structure Under the Arch. Chipping Out Existing Mortar. Top of Arch - Layout of Epoxy-Coated Mesh Reinforcement and Dowels. South Fascia – Cleaning the Existing Stone. South Fascia Parapet - Finished area – Cleaning, Chipping, and Repointing. September 2016: Wet Burlap Placed Over Previously Finished Zones. September 2016: Center of the Bridge - After Backfilling, the Concrete Base for the Roadway was Placed. Following the Curing of the Concrete Base, Asphalt was Placed.

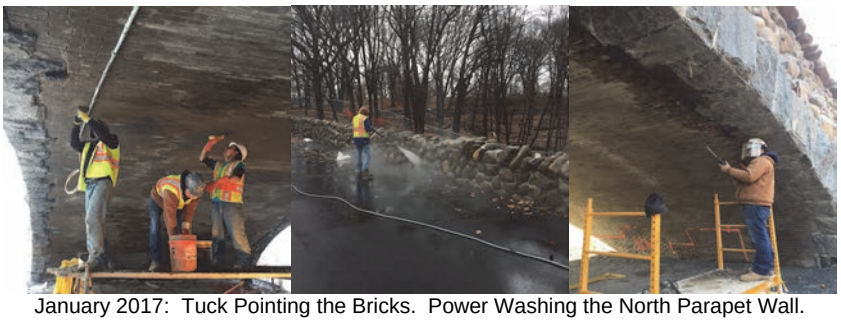
In 2016, the entirety of the stone masonry walls were cleared of graffiti, thoroughly cleaned, repaired, and repointed. The interior of the bridge was completely excavated to reveal the top of the arch, which was found to be in good condition. A reinforced concrete saddle was placed over the arch to bolster its strength, and a waterproofing membrane was installed over the arch and on the interior walls. The bridge was backfilled and a high performance paving material was placed for the roadway. The underside of the brick arch had all graffiti and paint removed. Final cleaning of the arch was ongoing at the end of 2016, as was the removal of old mortar.

October 2016: Concrete Curb Layout. November 2016: Cleaning the Bricks Under the Bridge Arch. December 2016: Cleaning the Historic Stone Masonry and Removing Graffiti.

Beyond the bridge itself, much landscaping work was completed in 2016. The area directly surrounding the bridge was cleared and grubbed and the trees were pruned. A large tree near the bridge was identified as unsafe and in danger of falling and was cut down. Five lamp posts were removed (to be replaced later), and another post on the bridge was completely refurbished in place. The gravel path was installed everywhere except directly under the bridge, where work is ongoing. Subsequently, all of the landscape was restored with trees and shrubs.

August 2016: North and South of Bridge – Clearing and Grubbing. November 2016Placing Granular Fill Material (Crushed Stone) on the Bridge Pathway Under the Bridge Arch.

In 2017, the deteriorated brick on the underside of the arch was successfully removed and replaced. New light poles were installed on the bridge as well. The project was substantially completed on April 24, 2017.



January 2017: Tuck Pointing the Bricks. Power Washing the North Parapet Wall.
February 2017: Underdeck Brick Removal - the Extent of the Deteriorated Bricks was Not Known Until Multiple Layers of Existing Paint Were Removed From the Underside Surface of the Bridge Arch.

April 2017: Installing the New Underside Bricks - Matching Bricks in Color and Dimensions. Power Washing Under the Arch. Erosion Control Material Placed Over the Bridge Slope.

April 2017 - at Substantial Completion. New Light Pole on Bridge. May 2017 – Power Washing the Road Surface.

METROPOLITAN AVENUE (FRESH POND) BRIDGE OVER LIRR -NY&ATL (QUEENS)

This bridge is a two span structure built between 1914 and 1915. It spans over the Long Island Railroad (LIRR) Montauk Branch and carries the roadway that is part of the intersection of Metropolitan Avenue with Fresh Pond Road and the adjoining property of the former Mobil gasoline station which was acquired by the City. The bridge originally crossed two railroad tracks located in each span and oriented in the east-west direction. One of the southern railroad tracks was abandoned and the remaining track is used by freight trains. The two northern railroad tracks are also used only by freight trains. All of the tracks are owned by the LIRR but there is no passenger service on any of the three tracks. The Fresh Pond Road portion of the bridge carried two trolley tracks located in two central bays oriented in the northbound and southbound direction. The Metropolitan Avenue portion of the bridge carried two trolley tracks located 4 feet nine inches from the original bridge centerline.

Location Map. Metropolitan Avenue Bridge in 2015.

The superstructure consists of concrete encased steel beams with a concrete deck and varying depths of asphalt wearing surface. The substructure consists of a reinforced concrete pier and gravity type plain concrete abutments and wing walls.

There is a hole in the deck on the northeast sidewalk of the intersection which has been covered with a small transition barrier. The underside of the concrete deck displays typical water leakage, efflorescence and stalactites. The east fascia girder concrete encasement is severely deteriorated. There are medium to wide cracks, aggregate exposures, heavy spalls and exposed reinforcing throughout the length of the bridge. The concrete parapet of the utility bay and its west end is in poor condition. There are severe spalls in the bridge seat causing a loss of bearing area of the east fascia girder at the north abutment. The central pier is also severely deteriorated with cracks, spalls, exposed reinforcement and water leakage.

The existing vertical clearance over LIRR tracks is 15 feet 9 inches. Per New York State Railroad Law Section 51-a (7), a minimum clearance of 22 feet is required over a railroad whenever a structure built prior to 1959 is to be reconstructed unless a waiver is granted by NYSDOT. Since a 22 foot clearance was not achievable due to the existing grades of the bridge being restricted by adjacent buildings and the constraint from an existing sewer line under the tracks, the waiver request was not granted by NYSDOT. However, NYSDOT agreed to a clearance of 20 feet 6 inches. In May 2012, NYCDEP conceptually accepted the modification of the existing sewer to achieve the requisite clearance of 20 feet 6 inches.

One alternative to achieve the required 20 feet 6 inches clearance is to lower the railroad tracks. The primary obstruction to lowering the railroad tracks is the existing 60” diameter combined sewer which runs along the centerline of Fresh Pond Road. The sewer crosses beneath the tracks and is approximately 3 feet below the top of rail. To lower the tracks, the combined sewer must be rerouted or reconfigured (or both).

In September 2012, the LIRR and NY Atlantic Railways agreed to have 17 feet 6 inches clearance as an immediate goal and 20 feet 6 inches as a future goal. In response to the LIRR waiver request made in December 2012, NYSDOT accepted LIRR waiver request of railroad 17 feet 6 inches above the top of rail, incorporating provisions for lowering the track to a clearance of

20 feet 6 inches in the future. In 2015, bridge design progressed from a two span bridge to a single span bridge in concurrence with the LIRR and NY Atlantic Railways. A new north abutment was to be constructed, filling the area between the existing central pier and the south abutment, and a new south abutment was to be constructed near the existing central pier. The immediate goal was to design a bridge with 17.5 feet clearance and to make provision for achieving the 20.5 feet clearance in the future by lowering the railroad tracks and modifying the existing sewer. The proposed intersection geometry would have provided improvements to turning movements for buses and trucks. New roadway pavement, sidewalks, curbs, American Disability Act (ADA) compliant accessible ramps, approach slabs, drainage, and lighting would have been provided. A new utility bridge would have been constructed on the southeast side of the new bridge parallel to Metropolitan Avenue for the relocation of water and gas mains. All private utilities would have been relocated under the new bridge deck between girders. A new traffic signal would have been provided at the intersection of Metropolitan Avenue and Fresh Pond Road. The work was proposed to be done in seven construction stages. The bridge was to be open to vehicular, pedestrian and railroad traffic during construction. Construction was expected to begin in early 2017 and was expected to be complete in late 2019. However, by the end of 2015, the Agency was not able to gain support from community for this reconstruction project, and began to discuss the possibility of declaring that an emergency existed.

2010 Inspection - Hands-On Inspection of a Pier. Obtaining a Steel Coupon Sample From a Stringer. March 2015: Looking West, South, and East Across Bridge Deck. April 2015. October 2015: Elevation Right. Span 2 Right Parapet - The Outer Face Exhibits Spalls With Exposed Rebars. Spans 1 and 2 New Right Side Sidewalk. (Credit: NYSDOT)

On February 16, 2016, in the interest of public safety, pursuant to Section 103(4) of the General Municipal Law and Section 315 of the New York City Charter, the Department declared that an emergency existed relative to the bridge: the concrete deck slab was failing and the rapid deterioration at several locations was jeopardizing its structural integrity. The surface of the deck had developed significant multiple full-depth holes, some over 3 feet wide. Several areas were already plated over with steel plates in order to maintain vehicular traffic and protect the LIRR below. The underside of the deck had several spalled areas with exposed and corroded steel reinforcing bars ranging in sizes to a maximum of 13 square feet and up to 3 inches deep. Cracks and efflorescence affected 40% of the deck and water seepage was evident through many of the cracks. The poor condition of the deck resulted in the bridge being "R-Posted," which prevents trucks with overweight permits from traversing it due to insufficient strength in the structure. The Department does not have the available personnel or equipment to perform the necessary work. Therefore, the deck needed to be replaced immediately as there is potential for

more damage to occur in the near future. Due to the potentially serious danger to life and public safety posed by the current condition, it was critical that the repair work be performed as expeditiously as possible.

The scope of work includes the installation of a temporary vertical protective shielding between the railroad track and substructure elements (abutments/pier) to be repaired; the installation of a temporary horizontal protective shielding under the bridge superstructure for deck removal and replacement; removal of the existing deck; the construction of a new cast-in-place concrete deck with integral wearing surface; the removal of the approach pavement; the construction of a concrete approach slab and steel faced concrete sidewalk and driveway aprons; the removal and replacement of curbs; and the installation of a new traffic signal at north-east corner of Metropolitan Ave-Fresh Pond Road intersection.

A Letter of Intent for the emergency repairs of the bridge was issued to the contractor with a start date of April 17, 2016. The contractor began Stage 1 construction in late 2016.

August 2016: Span 2 Left Sidewalk Looking South - Location of the Through Hole. Span 1 Right Sidewalk Looking North. Spalled and Cracked Areas on Top of Span 2 Parapet.
(Parapet Credit: NYSDOT)

The project is significantly behind schedule due to the installation of the temporary traffic signal at the intersection of Metropolitan Avenue and 60th Lane, the discovery of petroleum contaminated soil in the abandoned Mobil gasoline station lot, and a moratorium of work on Metropolitan Avenue in the summer of 2017 accommodate NYCT subway outages and the subsequent shuttle bus operations on Metropolitan Avenue.

January 2017: Shielding Installation Below the Bridge Deck and Above the Railroad Tracks. Debris Removal Through Protective Shielding. February 2017: Stage 1 Demolition of Pavement and Concrete Overlays. March and May 2017: Stage 1 Demolition of Concrete Bridge Deck and Beam Encasements. May 2017: Site Visit – Assistant Civil Engineer Daniel Smith, Deputy Commissioner Robert Collyer, Community Liaison Nancy Catapano, and Resident Engineer Joe Catapano.

May 2017: Installing 2" Thick Steel Plates to Prepare for a Temporary Road Surface, Under Observation by Assistant Civil Engineer Daniel Smith. June 2017: Temporary Road Surface Paving to Open all Lanes on Metropolitan Avenue for Increased Bus Traffic During the M Subway Shutdown - Construction Superintendent Domingo Rodriguez, Assistant Civil Engineer Daniel Smith, and Resident Engineer Joe Catapano Observing. Pulling Back the Concrete Barriers Into a Modified Stage 1 Work Zone and Steel Inspection Survey - Assistant Civil Engineer Daniel Smith, Contractor Jeff Mazur, and Resident Engineer Joe Catapano. October 2017: Concrete Deck and Beam Encasement Demolition Progress for Stage 1. Spalled and Cracked Concrete Repairs on the Center Pier Below the Bridge at LIRR Track Level.

As of late 2017, both the installation of protective safety shielding and the bridge deck demolition for Stage 1 were incomplete. The contractor made little effort to complete this project. The contractor was issued a default letter on December 15, 2017, and no contract work has been performed since then. The Agency is now working closely with the bonding company to get the project completed as quickly as possible. A new schedule will be submitted after the new firm is under contract. The project is tentatively estimated to be substantially completed at the end of 2018.

Span 2, Underside of Deck- Spalled Concrete Encasement and Deck. Exposed Rebar. Span 2, Top of Deck - Spalled and Missing Sections of Curb With Vegetation Growth. (Credit: NYSDOT)

ROOSEVELT AVENUE BRIDGE OVER VAN WYCK EXPRESSWAY (QUEENS)

The existing bridge is a two level dual-use steel viaduct consisting of 27 spans. The first level, which carries Roosevelt Avenue, consists of a plate girder floor beam system supported by steel columns, intermediate piers supporting a bascule span spanning over the Van Wyck Expressway and Flushing River, and end abutments. This level carries two lanes of vehicular traffic in each direction and pedestrian sidewalks on each side. In 2016, the bridge carried 15,964 vehicles per

day. The second level of the viaduct supports and carries the overhead NYC Transit Authority's #7 – Flushing line three track subway structure, with two local tracks on the outside and one bi-directional express track in the middle. The bridge is oriented in the east-west direction. The bridge structure is divided into four sections: the west approach cellular structure, the west viaduct, the bascule span, and the east viaduct. It is an essential regional facility and truck route that links communities east and west over the Van Wyck Expressway and provides access to Flushing Meadows Park, the National Tennis Center, and Citifield, home of the New York Mets.

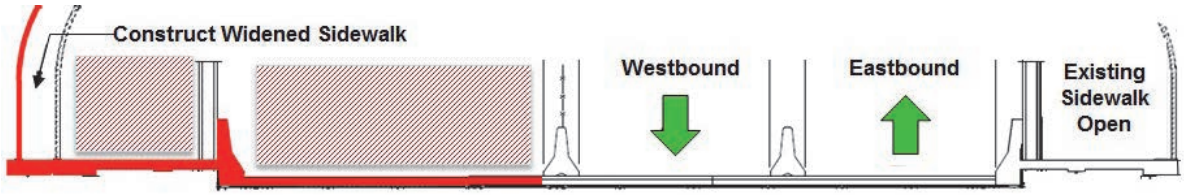
Roosevelt Avenue Bridge (#2240507) in 2010. (Credit: NYSDOT) Aerial View.

The viaduct structure consists of 22 steel bents supporting longitudinal steel girders at the roadway and track level. The length of the east viaduct is approximately 284 feet and the length of the west viaduct is 809 feet. The overall length of the bascule and viaduct structures is 1400 feet. The bridge was originally built between 1925 and 1927. The original bridge had a double leaf bascule span, which was used as a draw bridge, providing clearance for boat traffic passing beneath. When the Van Wyck Expressway (Interstate 678) portion between Grand Central Parkway and Northern Boulevard was built in the late 1950's and the river was no longer navigable, the bridge was permanently set in a closed position, and the operating machinery and controls were removed. The Long Island Railroad tracks that run under the western viaduct were abandoned in the 1930's. The last major modification to the bridge was performed in 1982 when the original deck, which consisted of brick paving atop steel floor plates riveted to the top flanges of the steel stringers/floor beams was removed, and replaced with a new concrete-filled steel grid deck in the viaduct and truss spans.

The project will include the replacement of the existing viaduct and bascule deck with a concrete-filled galvanized steel grid deck system on new steel stringers. The grid deck will be fixed to the steel stringers and floor beams to form a composite system. The new bridge deck will receive a separate asphalt wearing surface. The sidewalks will be replaced and widened from 7.9 to 10 feet to accommodate one-way bicycle lanes plus pedestrian paths in each direction. Also included will be the removal and replacement of the steel deck joints; installation of new fencing; repair and strengthening of the existing steel superstructure; repair and reinforcement of the damaged bottom chords of the steel truss in the bascule span; repair of the concrete substructure; modifications to the abutment walls, as required to allow sidewalk widening; demolition of the bascule control houses to allow construction of the new bikeway; restoration of stairways within the piers; re-pointing the deteriorated and missing mortar of the stone masonry of the east and west bascule piers at the waterline and tidal zones and restoration of masonry cladding on the piers; grit blasting, lead paint removal and painting of steel structural elements of the lower level viaduct and bascule structure; cleaning and sealing the concrete substructure; improvements to the existing deck drainage; and replacement of the bridge lighting.

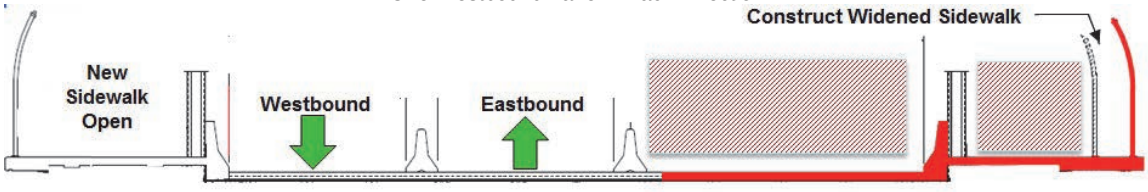
Roosevelt Avenue Bridge – In 1927. (Credit: NYC Records). Looking East. Existing and Proposed Bicycle/Pedestrian Path. 2014: Right Wingwall at the End Abutment. The Top Exhibits an area of Diagonal Cracks With Efflorescence and Spalls. The Deteriorated Concrete Areas are in Safe and Stable Condition. 2015: Spans 26and 27 – Examples of Uneven Asphalt Patches and Broken Concrete Areas. (Credit: NYSDOT)

The lower level carrying Roosevelt Avenue will be reconstructed in three stages. Both vehicular and pedestrian traffic will be maintained throughout the construction of the bridge, with one lane in each direction.



Stage 1 - Corona-Bound - 12 Months. The Two Westbound Lanes and Walkway Will be Closed. All Traffic Shifts Into Eastbound Lanes, One Lane in Each Direction.

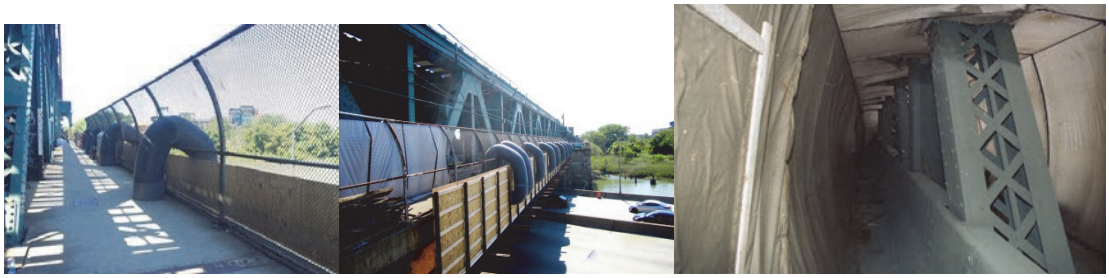
Stage 2 - Center Roadway - 12 Months. The Center Roadway will be Closed. All Traffic Shifts to One Eastbound and One Westbound Lane in Each Direction.



Stage 3 - Flushing-Bound - 12 Months. The Two Eastbound Lanes and Walkway will be Closed. All Traffic Shifts Into Westbound Lanes, One Lane in Each Direction.

A Notice to Proceed for this federally-funded project was issued to the contractor with a start date of August 10, 2015.

Abrasive blasting and protective coating operations began in early 2016, and were substantially completed in late 2016. The first stage of the work consisted of lead paint removal by abrasive blasting. Since the existing paint contained lead, the work was performed within a sealed Class 1A Containment under negative pressure. Abrasive blasting involves use of compressed air to propel abrasive particles against the surface to be cleaned. Negative pressure maintained within the containment during blasting operations prevented paint dust from being released into the environment. The air in the area surrounding the containment enclosure was monitored and tested during the work. All lead paint waste was packaged and shipped from the site to a treatment and disposal facility, meeting all applicable local, state and federal guidelines, regulations and laws.



September 2016: - The Contractor Employs a Vacuum System to Capture Lead Particles During the Lead-Abatement Process. This is Done Using Negative Air Pressure to Prevent Emissions From the Abrasive Blasting Process Used to Remove Lead Paint. All Blasting is Done Within Negative Air Containment Units to Protect the Public From Emissions. View Inside the Containment – Bascule Span, Looking East.

Stage 1 construction began in early 2016. It is expected to be complete by June of 2018. Major activities for Stage 1 include demolition and replacement of the two westbound traffic lanes, traffic barrier and North sidewalk. Included in this work will be substructure concrete repairs, bridge bearing replacement, and steel repairs. Other work including filling in the original bascule counterweight pits with lightweight concrete and demolition of the north operator house were completed in 2016.

June 2016: Contractor Installs Shield Under the Bascule Span to Prevent any Debris From Falling onto the Van Wyck Expressway or Into the Flushing Creek During the Demolition Process. The Contractor Poured Lightweight Concrete on the Bridge's Counterweight Pits. These Pits, Located on the East and West Sides of the Flushing River, Were Necessary When the Bridge was a Drawbridge. Now That the Bridge is Locked in Place, the Agency Decided to Fill Them with Lightweight Concrete. This Will Prevent Them From Accumulating Water, Reducing a Potential Health Hazard. July 2016: Contractor Using a Robot to Break Through the Existing Sidewalk on the North Side of the Bridge. Using This Technology Reduces the Risk of Injury to Personnel During Demolition and Gives the Operator a Better View of the Actual Demolition. August 2016: Span 6 - Temporary Steel Shoring in Front of Pier 6. Span 20 Left Side - Encased Underside of the Span. Span 20 Elevation Right. (Spans 6 and 20 Credit: NYSDOT) October 2016: West Viaduct – Stage 1 Removing the Original Bridge Deck.

October 2016: Installing the New North Sidewalk – West Viaduct, Looking East. November 2016: Contractor Demolishes the Sidewalk over Van Wyck Expressway. East Viaduct – Stage 1 Installing the North Sidewalk Steel. December 2016: Installed North Sidewalk Stringers. West Viaduct – Roadway Deck Removed.

Stage 2 construction will start after Stage 1 is completed and opened to traffic. It will involve reconstruction of the middle portion of the bridge while maintaining traffic lanes on each side. During this stage, the new north sidewalk will be open. Stage 2 is expected to start in June of 2018 and be completed in May of 2019.

January 2017: Disconnecting the Existing Steel Grid Deck in the Bascule Span, Using a Torch, so That it can be Removed in Panel Sections. The Existing Grid Deck was Removed Entirely on the West Viaduct; the Existing Floor Beams Were Being Prepared for the Installation of New Stringers and Grid Deck Panels. On the Opposite Side of the NYC Transit Columns, New Sidewalk Steel was Being Installed. West Viaduct – Installation of Roadway Stringers for Stage 1. Inspecting the NYCT Columns and Removing Concrete Fill. February 2017: West Viaduct – Stage 1- Installing New Steel Under the Roadway Deck.

March 2017: Bascule Span - Installing Grid Deck for the Roadway. April 2017: West Viaduct – Formwork for the North Sidewalk. May 2017: Bascule Span Deck. West Viaduct – Stage 1 Sidewalk Test Panel Concrete Placement. West Approach – Stage 1 Sidewalk Preparation. East Viaduct – Stage 1 – Removing the Original Roadway Deck.

June 2017: West Viaduct – Stage 1 Placing the Sidewalk. August 2017: East Approach – Stage 1 – Placing Sidewalk Concrete. October 2017: West Viaduct – Stage 1 Filling the New Roadway Grid Deck With Concrete. Span 22. Span 20, Left Side, Impact Damage Location. (Spans 20 and 22 Credit: NYSDOT)

Stage 3 construction will start upon completion of Stage 2 in June of 2019 and will be a mirror image of the Stage 1 reconstruction, except for the lead abatement work, which was completed in Stage 1. During this time, traffic will be riding on a new bridge deck and the new widened north sidewalk will remain open to bicyclists and pedestrians. Once Stage 3 starts, the final painting for intermediate and top coats will begin. The entire reconstruction project is expected to be complete in May 2020.

WESTCHESTER AVENUE BRIDGE OVER THE HUTCHINSON RIVER PARKWAY (BRONX)

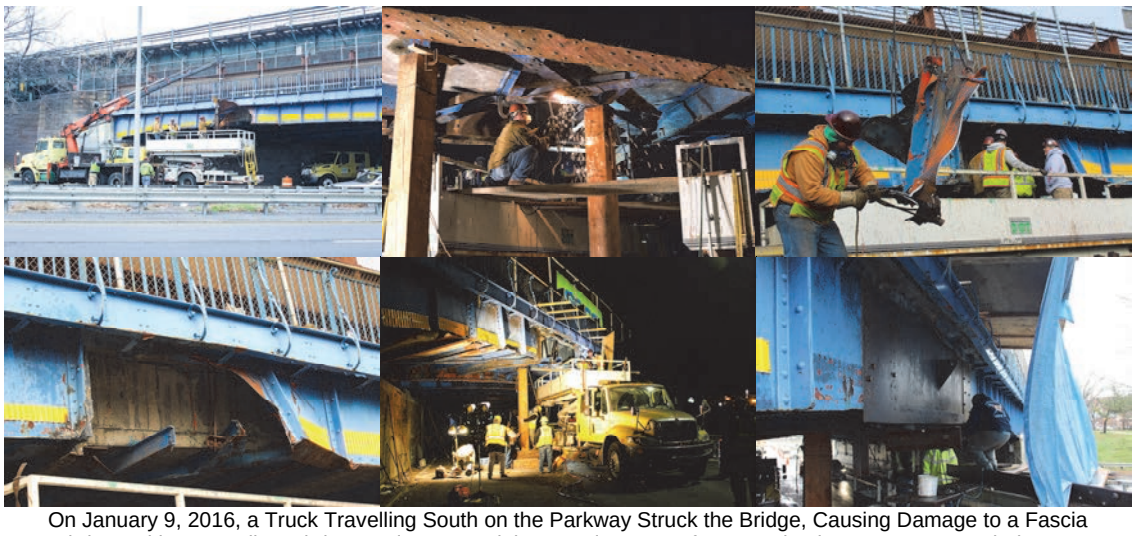
The bridge spans over the Hutchinson River Parkway and it supports the NYCT elevated subway structure of the Pelham Bay Line. Six of the transit columns are supported by the bridge girders. The bridge is located between Waters Place and Middletown Avenue. It has four travel lanes with parking lanes and sidewalks on both sides. This two span continuous multi-stringer bridge is supported by reinforced piers and abutments. It was built in 1940 by the Triborough Bridge and Tunnel Authority in conjunction with the construction of the Bronx-Whitestone Bridge approach. No major modifications to the bridge are recorded except for minor repairs at the south approach sidewalk and temporary flag repairs to bridge girders damaged by vehicle impacts in the southbound and northbound roadway. The underdeck at both spans is currently covered by approximately 154 square feet of timber planking. In addition, the underdeck at span 1 is covered with approximately 18 square feet of steel wire mesh netting.

Westchester Avenue Bridge in 2015. June 2016: Underdeck of Span #1 - Deteriorated Deck is Shielded With Timber Planks and Wire Mesh. Bent Stiffener at Span #1.

2016: Span 1 Right Sidewalk Near Beginning Abutment – Steel Plates. Girder Reinforced With New Steel Plate and Angles. Strongback Girder at Right Side of Span 1. Right and Left Fascia. (Credit: NYSDOT)

The Westchester Avenue Bridge's vertical clearance over the Hutchinson River Parkway is sub-standard. The existing posted vertical clearance of 10'-2" is far less than the 12'-6" minimum vertical clearance required per AASHTO standards for parkways with passenger cars only. Due to the number of truck and bus vehicles that mistakenly enter the Hutchinson River Parkway, where commercial vehicles are not allowed, the fascia steel girders of the bridge have been severely impacted and damaged numerous times. Between 2009 and October 2014, 32 freight vehicles struck this bridge at the southern approach. After a bridge strike, up to a four hour delay may occur before traffic can resume a normal pattern. Due to frequent impacts of the southwest

fascia girder, a section of the respective girder was removed by Division personnel to improve the clearance at that location. A strongback girder was placed on the south sidewalk above the damaged girder to provide additional support.



On January 9, 2016, a Truck Travelling South on the Parkway Struck the Bridge, Causing Damage to a Fascia Girder and its Preceding Girders, Stringers, and the Hanging Bars of a Strongback. Crews Responded, Cut a Portion of the Sheared Girder and Spliced it With a New Section and Installed Shoring.

October 2016: Truck Debris Remaining at the South Side of the Bridge Along the Southbound Hutchinson River Parkway After a Bridge Strike. December 2016: Truck Tightly Wedged Under the Bridge.

The rehabilitation of the bridge will include the demolition and replacement of the bridge seat and back wall, existing bridge deck, and existing bridge parapets; the replacement of all girders and bearings; the reconstruction of the approach roadway, curb and sidewalk, and respective appurtenances; the relocation of two water mains and an addition of third water main; replacement of roadway lighting on Westchester Ave. and underdeck lighting on Hutchinson River Parkway; relocation of various utilities that are underground and between girders; and the rehabilitation of traffic signals at Waters Place and Ericson Place. The limits of the project will be from Waters Place just west of the bridge to Ericson Place, just east of the bridge.

In March 2011, a value engineering study was conducted in which it was recommended that further studies of alternative options be performed to raise the bridge clearance through a shallower bridge structure and/or by raising the roadway profile above the bridge.

Following the recommendation of the value engineering study, a hazardous material field investigation of the bridge was conducted in May 2013 and a hazardous material report was issued in June 2013. The report included the results of asbestos, lead and other hazardous materials field investigations, including laboratory testing results.

An alternative analysis/feasibility report was prepared in August 2013 to review the recommendation options by the value engineering team. A preferred option was then selected and incorporated into the February 2014 bridge conceptual design report. NYC Transit was receptive to the preferred option in the April 3, 2014 meeting.

This rehabilitation project is proceeding with the preferred option. Due to the complexity of the work, it was expanded from 3 years to 5 years and split into five stages. A Notice to Proceed for the project was issued to the contractor with a start date of August 15, 2016. The project will be completed in five stages. During construction at least one lane of traffic on the bridge will be maintained in each direction at all times. Traffic control agents will be provided. Intermittent full closures of the bridge and parkway will be required for up to 15 minutes to lift out old steel and lift in new structural steel during overnight hours only.

Night Work in August 2017. Stage 1 Deck Demolition in September. Stage 1 Steel Demolition Girder Removal in November 2017. December 2017 - Stage 1C Wire Saw Cutting at The West Abutment. Lifting Out the Cut Pieces.

The contractor set the staging area on-site, established the engineer's field office, and created the Stage-1 work zone on the south side of the bridge by making a traffic shift on Westchester Avenue. The Stage 1 B bridge steel removal operation was completed on the southbound Hutchinson River Parkway on November 5, and on the northbound side on November 12, 2017.

Construction is expected to be complete in September 2021.

WHITESTONE EXPRESSWAY/VAN WYCK EXPRESSWAY (SB) TO CROSS ISLAND PARKWAY EB) OVER ACCESS ROAD FROM WHITESTONE EXPRESSWAY/VAN WYCK EXPRESSWAY (QUEENS)

The bridge is a multi-girder, single span, simply supported structure with a span length of 77 feet and is 24 feet wide curb to curb. It was constructed in 1939. The roadway deck consists of an 8-inch thick concrete slab with a 2-inch thick bituminous wearing surface. The bridge has one 12-feet wide lane running in the eastbound direction and flanked with tapered concrete safety walkways. The substructure consists of two gravity type concrete abutments. The cantilever wing walls have stone masonry facing on one side of both abutments. The west and east abutments of the existing bridge are constructed integral with the abutments of the Whitestone Bridge access ramp overpass.

There are no records of any major rehabilitation work performed on this bridge since its construction. The structural deck is in poor condition with visible mapcracking, scaling, spalling,

and heavy efflorescence. Furthermore, the steel beams have deterioration at both the top and bottom flanges and there is deterioration of the expansion joints at the abutments. This reconstruction project will replace the structurally deficient roadway deck to provide a useful life of 75 years while also improving non-standard geometric features of the bridge.

Location Map. (Credit: NYSDOT). Aerial View. Bridge (Lower Structure) in April 2017. Left and Right Elevations in August 2017. (Elevation Credit: NYSDOT) Underside of Span #1 in April 2017 – Bottom Flanges of Girders are Rusted due to Deteriorated Paint. Span 1 Girder With Impact Damage Above the Right Lane of the Cross Island Parkway Westbound. August 2017: Underside of Deck at Bay 3 Near the Beginning Abutment; the Deck Exhibits a Punch-Through Area That is Covered on Top With Steel Plates. Underside of Deck at Bays 2 and 3 Near the End Abutment; General View of Timber Shielding. (August Credit: NYSDOT) March 2014: Steel Plates on Wearing Surface.

The reconstruction project will involve removing the entire existing steel girders, bridge slab, bearings, and railings, and reconstructing the existing abutments with new bridge seats, pedestal and backwall. The reconstruction of the substructure will accommodate the new superstructure, which includes a new reinforced concrete deck, steel girders, and parapets. Additionally, new asphalt pavement will be installed on approaches, new expansion joints will be installed at both abutments, and new rolled shape steel beams on elastomeric bearings will be installed.

Final design of this project began in April 2017. Construction is expected to begin in May 2019, and is expected to be completed in January 2021. The project will be performed in two stages with one 10'-0" travel lane maintained at all times on the bridge. Additionally, two 11'-0" travel lanes in each direction will be maintained at all times on the Cross Island Parkway. No detours will be required for the construction.

South and North Fascia - Along the Fascias are Built-Up Riveted Steel Girders. The Steel Railing Posts are Welded at the Base to the Top Flange of the Fascia Steel Girders. Deterioration of Joint at Abutment. Underside of Deck with Scaling and Efflorescence.

51ST AVENUE PEDESTRIAN BRIDGE OVER LIRR MAIN LINE (QUEENS)

The 51st Avenue Bridge was built in 1941. It is a one span, 90' long, 7' 6" wide structural steel and concrete bridge with stairs and a 17' 8" clearance. This project, currently in its final design phase, will realign a new bridge over the tracks with ramp structures on either side of the bridge to meet ADA (American Disability Act) regulations.

Aerial View. South Stairs and Bridge – Looking North. General View – Looking West. General View. North Stairs and Ramp – Looking South.

The structural steel and concrete are severely deteriorated, and the structure is not (ADA) compliant.

Existing Conditions: Rusted Steps and Damaged Railing. Deteriorated Deck. Spalled Concrete Deck on Main Span. Spalled Concrete – Underside of Deck. Deteriorated Steel.

June 2017: Looking North at Spans 3-5, on Left Side - Staircase Stringers and Railing Exhibit Signs of Deteriorating Paint Throughout. End Approach, Looking Northeast – The Approach Wearing Surface Exhibits Spalls and Map Cracks Throughout. September 2017: Close-up View of Holes in Left Side Stringer, Steps and Risers.

Proposed Bridge.

The new bridge will comply with current standards and provide barrier free access. The reconstruction of the bridge will be managed by the New York City Department of Design and Construction in partnership with DOT. Construction is expected to begin in fiscal year 2019.

EAST 169TH, EAST 175TH STREET, and EAST 180TH STREET BRIDGES OVER METRO NORTH (BRONX)

The East 169th Street Bridge over Metro North was originally built in 1888. The structure is oriented west to east, and crosses over four tracks of the Metro-North Railroad. The project limit along East 169th Street extends from east of Webster Avenue to west of Washington Avenue.

The current bridge is a simple- span structure with an overall length of 61 feet. It consists of 12 concrete-encased steel plate girders, each in a jack arch configuration.

The upcoming rehabilitation of the East 169th Street Bridge will include replacing the existing bridge wearing surface, repairing the deteriorated/spalled areas of the existing bridge deck, rehabilitating the sidewalks, replacing the existing east and west deck joints, removing the existing approach pavement and constructing new approach slabs at both of the approaches, replacing the existing pavement of the intersection at the Park Avenue east approach, replacing the existing pavement in the vicinity of the west approach, replacing the existing bridge railing and fencing, restoring the existing bearings at both of the abutments, rehabilitating the spalled/hollow area of the bridge seats, the underside of the bridge and the concrete wing walls, applying an epoxy coating to the existing bridge seat and exposed surfaces of the back walls, cleaning and painting the bottom flanges of the existing stringers, and installing new pavement striping and traffic signs within the project limits.

The bridge rehabilitation will be done in stages. One 11 foot wide (minimum) traffic lane in the westbound direction and pedestrian access will be maintained at all times during construction.

East 169th Street Bridge: April 2016 - Left and Right Elevations. Beginning and End Approaches. Moderate Map Cracking With Efflorescence in the Reinforced Concrete at the Top of the Beginning Right Wingwall. (Credit: NYSDOT) February 2017: End Abutment, Joint with Deck. Full Length Cracks With Deteriorated Wearing Surface. November 2017: Left Sidewalk Near End Abutment - Temporary Jersey Barrier in Place.

The East 175th Street Bridge over Metro North was originally built in 1889 and it underwent reconstruction in 1938. The reconstruction work included a new steel superstructure, concrete deck slab and sidewalk in conjunction with repairs to the existing stone masonry substructure and relocation of various utilities. It is a single span multi-girder steel structure with a steel reinforced concrete deck, and it measures 61.68 feet long from abutment to abutment and 60 feet wide from parapet to parapet. The bridge carries two 12' lanes of one-way westbound traffic with 5' shoulders and an 11' sidewalk on each side. The asphalt wearing course on the bridge is in poor condition with many areas of rutting and pattern cracking. There are several potholes along the bridge. The sidewalk on the bridge is also in need of repair with many cracks and uneven asphalt patches. On the approaches, the existing metal beam guiderail is in poor to fair condition with several sections that have been impacted.

The upcoming major rehabilitation will include replacing the existing single span steel multi-girder superstructure with a single span pre-stressed concrete box beam bridge in conjunction with replacement of the concrete bridge seat, back walls, top of the wingwalls and approach slabs of the substructure, replacing the utilities including watermain, gas, electric, with two new water mains, removing the abandoned gas line, and 6 new electric conduits, as well as partial depth repairs of the existing stone masonry.

East 175th Street Bridge View Looking South and North. Top of Deck Looking East and West. Sidewalk and Road Conditions in 2016.

April 2016: Span 1, Wearing Surface at Mid-Span – Uneven Asphalt Patches on Approximately 40% of the Surface Area. Underdeck of Span 1- Through Hole and a Deep Spall With Exposed Rebar Near the End Abutment. There is a Steel Cover Plate Above. (April Credit: NYSDOT) February 2017: Beginning Abutment Masonry Stem Exhibits Missing Mortar Joint. September 2017: The 3 Steel Plates on the Left Sidewalk.

The East 180th Street Bridge over Metro North was originally built in 1889. The structure is oriented west to east, and crosses over four tracks of the Metro-North Railroad. The project limit along East 180th Street extends from east of Webster Avenue to west of Washington Avenue. The current bridge is a simple- span structure with an overall length of 61 feet. It consists of 17 concrete-encased steel plate girders, each in a jack arch configuration.

The upcoming major rehabilitation of the East 180th Street Bridge will include removing the entire bridge superstructure including the roadway, sidewalks, concrete encased stringers; removing the top portion of the existing substructure, including the bearings and top portion of the concrete abutments; reconstructing the top portion of the substructure and installing new bearings; repairing cracks, spalls and scaling at the surface of the existing abutments and wing walls that are to remain; installing new superstructure, deck, sidewalks, pedestrian fence and bridge railings; installing utilities as required; constructing a new approach slab and resurfacing the approach roadway; and installing new pavement striping and traffic signs within the project limits.

The bridge rehabilitation will be done in stages. One 11 foot wide traffic lane in in each direction and pedestrian access will be maintained at all times during construction.

East 180th Street Bridge: April 2016 - Left and Right Elevations. Beginning and End Approaches. May 2016: Diaphragms in Bay 2 Exhibit Underside Spalling With Exposed, Debonded Rebar. (Credit: NYSDOT) September 2016: The Left Side of the Roadway Looking Toward the Beginning Abutment - The Wearing Surface Exhibits an Uneven Surface, Map Cracking and Small Potholes. February 2017: End Abutment Looking Northeast. Water Leakage Stains on the Bottom Portion of the Stem. Night View.

Location Map of the Three Bridges.

Construction on these three bridges is expected to begin in summer 2019

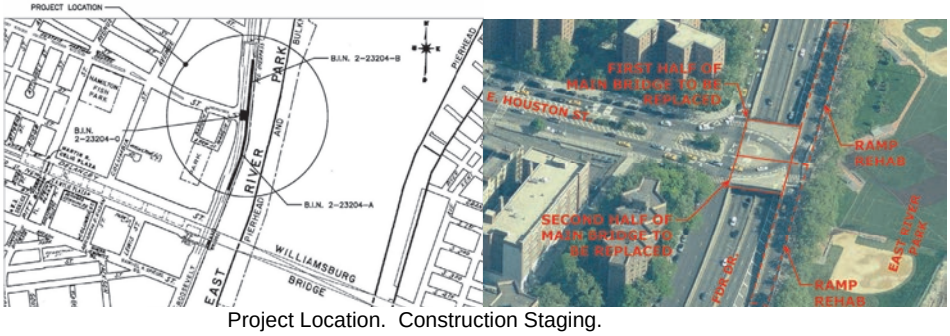
Design-Build

Design-Build contracts retain the same company for both design and construction on selected projects. It is evident that there are many advantages to the Design-Build program, including the use of one consolidated procurement rather than two or more, resulting in significant time savings; the ability to commence construction before design completion; the avoidance of project escalation costs as construction commences two or three years earlier than with the conventional design-bid-build method; minimization of design change orders; and better coordination between design and construction, as critical field issues are addressed expeditiously. In addition, the design is custom made and reflects the capabilities and strength of the specific contractor; the Department establishes a single point of contact for communicating its goals and objectives; and overall costs are reduced substantially.

NYCDOT is currently progressing these projects on a Design-Bid-Build basis until the legislation is passed in Albany allowing unconstrained use of this procurement method. NYCDOT may pursue projects utilizing Design-Build if a special case determination can be justified for a specific project.

FDR DRIVE AT HOUSTON STREET OVERPASS (MANHATTAN)

The overpass consists of three bridge structures. The main bridge is a two-span reinforced concrete slab structure spanning over the FDR Drive's northbound and southbound roadways. Two approach ramp structures provide access to and from the FDR Drive northbound roadway and the main bridge. Each of these structures is also a reinforced concrete slab structure supported on longitudinal concrete walls that run adjacent to the FDR Drive's northbound roadway. These bridges were constructed circa 1953, and are over 63 years old. On the main bridge, the superstructure slab is supported on bearing wall abutments continuously founded on piles, and on one pier at the center of the FDR Drive that consists of a steel cap beam supported on multi-steel columns continuously founded on piles. The existing structural slabs have asphalt overlays, and the main bridge has three sections of concrete sidewalks.



Project Location. Construction Staging.

On the main bridge, the asphalt wearing surface was worn and uneven, with many patches. The top of the concrete sidewalks and the median was scaled throughout with localized areas of spalling. Water had infiltrated into the structural slab below, resulting in delamination and spalling along the bottom of the slabs, and exposed corroded bar reinforcement for some of the slab area, with leaching and dampness observed much of the slab area. The entire underside of the bridge structure has wire mesh installed to prevent loose concrete from falling onto the roadway traffic below. On the approach ramp bridges, the curbs and sidewalks were in poor condition.

The Three Structures of the FDR Drive at Houston Street Overpass. 2016: Main Bridge – Span 2, Underside of Deck Slab. Partly Removed Deck Slab. Temporary Pedestrian Walkway. Left and Right Elevations in August.

January 2016: South Approach Ramp - Span 2, Left Side Safety Walk and Curb. End Approach, Left Parapet. Span 4, Left Cantilever Sidewalk. North Approach Ramp – Span 2, Right Parapet and Safety Walk. Span 3, Right Cantilever Sidewalk. Elevation Right. 2016: Main Bridge – Spans 1 and 2 at Left Side. South and North Approach Ramps, Span 1 Top of Deck Wearing Surface.

The general scope of work for the main bridge structure included the demolition of the entire two-span, reinforced-concrete slab superstructure, and its replacement with new two-span pre-stressed concrete slab units, the demolition and replacement of the existing center pier cap and steel columns, and the reconstruction of the abutment walls for the substructure. The superstructure includes the deck slab, sidewalks, center median, parapets with fencing, lampposts, and signal posts.

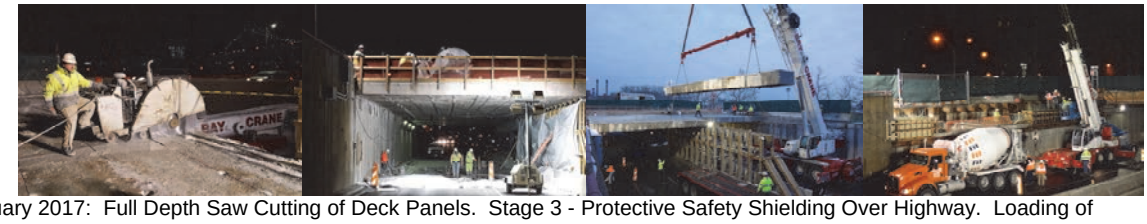
The rehabilitation of the two ramp structures (including the adjacent pedestrian ramp), included the repair of the existing concrete slab and wall structures, removal of asphalt overlay, installation of waterproofing, repair of joints, removal of safety walks, replacement of parapets with new concrete barriers, the placement of new asphalt overlay over the existing deck slab of the entrance ramp, the installation of concrete overlay over the existing deck slab of the exit ramp, and the removal and replacement of the ramps' expansion joint system.
The reconstruction of the main bridge was performed in two main stages, with half of the bridge being replaced at a time. A Notice to Proceed was issued to the contractor with a start date of January 4, 2016.

In 2016, the northern half of the main bridge was demolished, and pier columns and the pier cap were installed. Pre-cast concrete deck panels and concrete overlay were installed at the end of 2016. Vehicular traffic was switched over to the newly reconstructed northern half of the bridge by the end of 2016. Immediately thereafter, reconstruction of the southern half of the bridge began.

April 2016: Demolition of West Barrier Wall at Exit Ramp. May 2016: Saw Cutting the Existing Deck. Saw Cutting and Demolition of West Barrier Wall at Entrance Ramp. Erecting Forms for West Barrier Wall at Exit Ramp. July 2016: Saw Cutting and Demolition at West Abutment Wall.

October 2016. November 2016: Stage 2 - Final Bolting and Alignment of Precast Pier Cap Segment. December 2016: Placing and Finishing Concrete for Deck Slab.

In 2017, project activities included the removal and replacement of the southern half of the main bridge, then center pier columns and the cap; the removal and replacement of the ramps overlay and expansion joint system; the repair of the pedestrian ramp; and the installation of the new light and signal poles. The FDR Drive at Houston Street Overpass project was substantially completed on November 15, 2017.



February 2017: Full Depth Saw Cutting of Deck Panels. Stage 3 - Protective Safety Shielding Over Highway. Loading of Deck Slab Panels for Disposal Off-Site. March 2017: Concrete Placement at West Abutment Wall Seat.

April 2017: Stage 3 - Erection of New Steel Columns and Pier Caps at the Center Pier. Alignment of Final Hollow Slab Unit for Stage 3. May 2017: Concrete Placement for Stage 3 Bridge Deck. June 2017: Concrete Placement for South Sidewalk and Median.

July 2017: Pier 1New Columns of the Main Bridge. Elevation Right. (Credit: NYSDOT)

August 2017: Night Work. Overpass Open. September 2017: Installation of Overhead Roadway Signs on the North Parapet.

HARLEM RIVER DRIVE BRIDGE AT EAST 127TH STREET (MANHATTAN)

The Harlem River Drive Bridge over the ramp from East 127th Street was an eleven-span structure consisting of seven main spans of multiple steel stringers and concrete deck and four approach spans of reinforced concrete structural slabs supported by reinforced concrete girders and retaining walls. The bridge currently carries three traffic lanes in the southbound direction and

two lanes plus a wide striped shoulder in the northbound direction. The parkway is not subject to truck traffic with the exception of emergency vehicles and school buses.

The existing bridge was designed and built by the Department from 1955 to 1958 as part of the Harlem River Drive Improvement Project from East 125th Street to East 132nd Street. The bridge is owned and maintained by the Department; the rest of the Drive is owned by the New York State Department of Transportation.

Harlem River Drive Bridge at East 127th Street. Rendering of New Harlem River Drive Bridge. Project Location.

This project includes over $82 million in Federal funds. Construction will follow the on-line bridge replacement with auxiliary exit and entrance lanes and left-lane exit to Second Avenue. It involves the replacement of the existing 11 span bridge and the reconstruction of the Harlem River Drive between the Willis Avenue and Third Avenue Bridges, in addition to various highway improvements. The northbound and southbound structures will share a single south abutment, but will be supported by independent abutments at the north. The new bridge will carry two through lanes in the northbound direction, and three lanes in the southbound direction; each lane will have an average width of 11 feet. The new bridge will also include new fascia and median barriers. The abutments, wingwalls and piers will be replaced with new substructures that will conform to current seismic design criteria. The project length is approximately 3,280 feet.

June 2016: Approach Begin and End. Left Elevation. Right Elevation Spans 3 – 7. (Credit: NYSDOT) Looking East at the 127th Street Off-Ramp: Current and Proposed View. Looking East at 2nd Avenue: Current and Proposed View. Looking South From 3rd Avenue Bridge: Current Harlem River Drive and 2nd Avenue Exit and Proposed Harlem River Drive With Left Lane Exit to 2nd Avenue.

The viaduct currently serves approximately 79,000 vehicles per day. This area currently has 40 times the State average number of accidents. Two features of the viaduct contribute to the accidents. First, the hump as the Harlem River Drive passes over East 127th Street limits drivers' visibility; vehicles approach the hump at a higher speed only to find slow moving vehicles at the other side of the hump, and too often they are not successful in decelerating or stopping their vehicles on time to prevent an accident. Second, there are weaving movements as vehicles exiting the Third Avenue Bridge enter the southbound Harlem River Drive in the right but try to immediately pull to the left in order to continue their travel further south on the Harlem River Drive and the FDR Drive. At the same time and within the same stretch of highway, vehicles that are in the left lanes of the southbound Harlem River Drive immediately north of the Third Avenue Bridge try to pull to the right in order to exit at Second Avenue. The lack of an appropriate weaving distance is the root of many of the accidents in the area. The project will also allow at-grade access for a future Park/Promenade to be developed by the Department of Parks at 127th Street between the Harlem River Drive and the Harlem River. A Notice to Proceed for the reconstruction of this bridge was issued to the contractor with a start date of November 10, 2014.

June 2015: Locating and Removing Utilities. (Credit: Artemio Angeles) December 2015: Test Pit Pier 6. January 2016. June 2016: Span 1 Temporary Timber Shoring Under Slab. Span 3 – Timber Planking at Deck Underside. (June 2016 Credit: NYSDOT)

This project will be completed in five stages in order to maintain the traffic flow on the active highway throughout the duration of the project. Stage 1 included the closure of the 127th Street northbound exit, construction of a temporary roadway for the northbound traffic, and relocation of traffic onto the temporary roadway. Stage 2 will include the relocation of three southbound traffic lanes to the existing northbound structure, demolition of the existing southbound structure, construction of the future southbound structure, and relocation of two southbound traffic lanes onto new southbound structure. Stage 3 will include the construction of the remaining portion of the southbound structure and the relocation of the remaining southbound traffic. Stage 4 will include the closure of the 2nd Avenue southbound exit, the relocation of two northbound traffic lanes onto future southbound structure, and the construction of northbound structure. Finally, Stage 5 will include opening the northbound lanes and the southbound 2nd Avenue exit, relocating the two northbound traffic lanes to the new northbound structure, and removing all of the temporary pavement near the East 127th Street viaduct.

TBTA proposed construction of a new connecting ramp between the westbound Manhattan approach of the RFK Bridge and the northbound Harlem River Drive that would provide direct access to the northbound Harlem River Drive from the RFK Bridge via a "tie in" on the left of the northbound Harlem River Drive 127th Street viaduct structure. In February 2015, the Agency and TBTA agreed to have seven of the foundations for the RFK/HRD Connector Ramp constructed by the contractor in connection with its work under the HRD Contract. The foundations for each pier will consist of drilled shafts and reinforced concrete pile caps that will be built below grade to accommodate the pier columns required to support the RFK/HRD connector ramp superstructure.

September 2016: North Abutment Pier 8 Foundation. Epoxy Reinforcement Bars to be Installed at South Abutment are Covered. Removing Concrete With a Chipping Gun. Reinforcement for Pile Cap. North Abutment - Reinforcement for the Stem and Forms. October 2016: Contractor Continued Installing Reinforcement and Forms for the North Abutment. November 2016: Pier 3 of Southbound Roadway - Pier Cap Almost Ready for Concrete Placement. November 2016: South Abutment Stem Wall. (Credit: Artemio Angeles)

Exit 19 (East 125th Street) of the northbound Harlem River Drive was closed at 10:00 AM, February 23, 2015, and will remain closed for the duration of the contract. Motorists are using Exit 21 (East 135th Street) as an alternate exit.

Stage 1 was complete at the end of 2015. Stage 2 was completed in August 2017. At the end of 2017, construction was in Stage 3 and continuing the drilled shaft work for the TBTA foundations. Stage 3 is expected to be complete during the summer of 2018. Construction is expected to be complete in October 2019 due to delays in the drilled shaft work and the supplier's beam fabrication during Stage 2.

January 2017 – Mini Piles. February 2017 - Erection of the Concrete Beam – Timber Planks Over the Relieving Platform. Concrete Beams on Barge. (Credit: Artemio Angeles) Span 2.

March 2017. Installing Stringers at Location #12. Through-Hole Repair.

May 2017: Associate Project Manager Richard Solomon Observing the Placing of Concrete for the Southbound Bridge Deck Spans 6-7. (Credit: Salome Stulberg) May 2017: Associate Project Manager Artemio Angeles (in foreground), Division Quality Assurance Assistant Civil Engineer Syed Naqvi Bridges, and NYSDOT Representative Yogesh Chokshi. (Credit: Richard Solomon) PCC Pavement at Southbound South Approach. June 2017: Contractors Utilizing a Bidwell Bridge Paver for the Southbound Bridge Deck. (Credit: Richard Solomon)

September 2017. October 2017: Enclosure to Protect the "Crack is Wack" Mural in the Park. Site View. Drainage Work at North Approach - Along Future Ramp D. November 2017: Last of the Pre-Stressed NEBT Girders for the Southbound Structure. (Credit: Artemio Angeles)

Drone Views: View North Along the Harlem River Drive – the Southbound Bridge Deck is Halfway Constructed. View South Down 2nd Avenue.

Drone Views: View South - Maintaining all Travel Lanes During Construction. View South From Above Bridge – Willis Avenue Bridge at Upper Left. View of Temporary Roadway for Northbound Traffic.

FDR DRIVE OVER 18TH TO 25TH STREET (MANHATTAN)

This viaduct was built in 1947. It extends from approximately 18th Street to 25th Street and is immediately adjacent to the East River. It has 46 spans with a total length of 2,452 feet and a structural system consisting of steel girders and floorbeams with a concrete deck superstructure on abutments and steel columns. The structure has six lanes, with three lanes in each direction.

The viaduct was hit by Superstorm Sandy on October 29 and 30, 2012. This section of the FDR Drive lies below the 100-year flood plain elevation. The water level at this location reached 6 feet during the storm peak event as documented by FEMA maps and the NYC OEM Surge Map.

Project Location Map.

Given the proximity of the FDR Drive to the East River it is exposed to hazardous flooding during coastal storm events. This condition places the facility at risk of damage due to erosion and scour as well as loss of function while inundated by brackish flood waters. As a result, the first 6 spans of the bridge are presenting significant loss of retained soil fill material with exposed foundation elements which will require remediation and implementation of scour countermeasures.

The overall intent of this project is to repair existing conditions that may have resulted from previous storms and to implement measures that will help monitor, prevent, manage, and minimize future damage to this segment of the FDR Drive due to flooding. Enhanced coastal resiliency is a key goal for the project.

This project, currently in the final design phase, is expected to begin construction in spring 2019.

Scour Hole at Pier #3 in 2014. 2015: Span 5 – Right side. Span 46 – Left Side. Downspout Near North Abutment. (Credit: NYSDOT) Typical Clogged Scupper Inlet.

Component Rehabilitation

MOSHULU PARKWAY BRIDGE OVER CONRAIL (ABANDONED), LEGGETT AVENUE BRIDGE OVER AMTRAK, EAST 162ND STREET BRIDGE OVER METRO NORTH RR HAR, EAST 165TH STREET BRIDGE OVER METRO NORTH RR HAR, EAST 187TH STREET BRIDGE OVER METRO NORTH RR HAR, SOUTHERN BOULEVARD BRIDGE OVER EAST FORDHAM ROAD, GRAND CONCOURSE BRIDGE OVER EAST 167TH STREET, EAST 180TH STREET BRIDGE OVER BRONX RIVER, RIVERSIDE DRIVE BRIDGE OVER WEST 138TH STREET, RIVERSIDE DRIVE BRIDGE OVER WEST 145TH STREET, AND THE PULASKI BRIDGE BICYCLE PATH (MCGUINESS BOULEVARD OVER NEWTOWN CREEK)

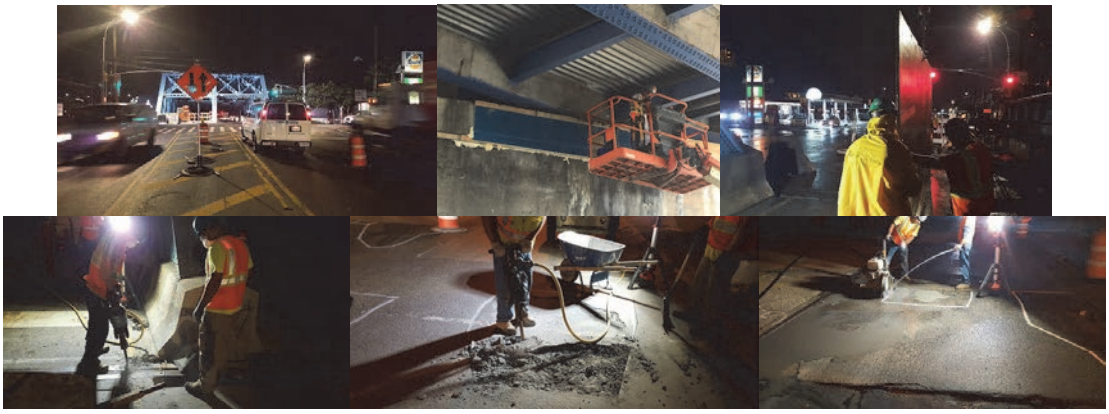
A Notice to Proceed for the component rehabilitation of these 10 bridges in the Bronx and Manhattan, as well as the creation of a protected bicycle path on the Pulaski Bridge was issued to the contractor with a start date of November 3, 2014.

The Mosholu Parkway Bridge over Conrail (Abandoned) was built in 1939. It is a single span concrete arch bridge. There is a concrete parapet along both the north and south fascia of the bridge. The existing bridge geometry consists of two travel lanes and a shoulder in each direction, divided by a 4'-0" wide concrete median barrier, as well as a 15'-wide asphalt path for golf carts and pedestrians on the south side of the bridge. Construction work began in June 2015. The scope of rehabilitation work included the following: removing and replacing the asphalt overlay, waterproofing, pavement striping, north fascia barrier replacement and median barrier repairs, corrugated guide rail transition, and wingwall joint filler; removing, storing and reinstalling lighting lampposts on north fascia barrier and replacing luminaires with new luminaires; installing a temporary lighting system; excavating, backfilling and paving the local depression in the asphalt golf cart path; repairing chain link fence section and concrete on the underdeck and abutment walls; installing weepholes in the abutments and preformed joint seal in the concrete parapet; cleaning and flushing catch basins; and removing graffiti by power wash and applying anti-graffiti protective coating. The Mosholu Parkway Bridge was substantially completed on December 23, 2016.

Elevation Left and Right, and Approach Begin and End in July 2016. (2016 Credit: NYSDOT) January 2017: Span 1 Under Girders Looking North.

The Leggett Avenue Bridge over Amtrak was built in 1906. It is a three span steel truss. There is a corrugated metal fence along both the east and west fascias of the bridge. The existing bridge geometry consists of two travel lanes and a sidewalk in each direction, divided by a 4'-10" wide concrete median barrier. The scope of rehabilitation work includes the following: removing and replacing deck joint, deck joint seals and portions of the concrete sidewalk; repairing concrete on the abutment and approach slab; repairing structural steel members and existing fuse box; installing pavement striping; and cleaning and painting steel surfaces and bottom of stay-in-place form. A bent column was discovered on this bridge after the initial contract scope was completed, and this repair work was then added through a change order. Vehicular and pedestrian access will be maintained during the rehabilitation period. Construction work began in February 2017.

Leggett Avenue Bridge over Amtrak Before Construction. October 2016: Begin and End Approaches. Span 1, Bottom Sway Strut Bracing Exhibits Severe Deformation and Several Upward Bent Sections due to Vehicular Impact. End Abutment Transverse Deck Joint Steel Armor is Cracked. Deck Joint Header Exhibits Shallow Spalls. (Credit: NYSDOT) Southeast View.



Leggett Avenue Bridge Under Construction. Bridge Joint and Approach Slab Repairs.

The East 162nd Street Bridge over Metro North was built in 1888. It is a single span steel jack arch bridge with built-up steel beams encased in concrete. There is a fence along both the north and south fascia of the bridge as well as a non-standard decorative bridge rail along the north fascia. The existing bridge geometry consists of one travel lane, a parking lane and a sidewalk in each direction. The scope of rehabilitation work included the following: locally removing and replacing the asphalt and concrete overlays and sidewalk; installing pavement striping; repairing guide railing, concrete on the underdeck and abutment, and cracks in the asphalt overlay and sidewalk; cleaning and painting steel surfaces locally; resealing sidewalk joints; and repointing stone masonry. Construction work began in April 2016. The East 162nd Street Bridge was substantially completed on June 21, 2017.

East 162nd Street Bridge over Metro North Before Construction. May 2016: Span 1, Underside of Deck Exhibits Longitudinal Cracks With Efflorescence. End Abutment Stem. (Credit: NYSDOT) Northeast Side. Southwest Pedestrian Crossing. North Sidewalk. East View.

East 162nd Street Bridge During Construction - Overlay Excavation. Concrete Overlay. Asphalt Placement.

East 162nd Street Bridge After Construction – New Concrete Overlay. New Southwest Pedestrian Crossing. Repaired Pedestals. Painted Fence and Railing. Sealed Underdeck Cracks.

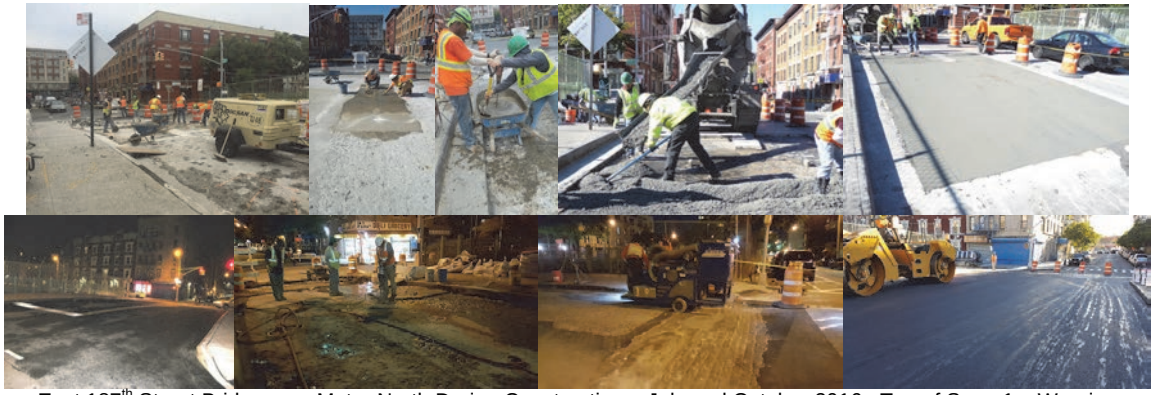
The East 165th Street Bridge over Metro North was built in 1897. It is a single span steel jack arch bridge with built-up steel beams encased in concrete. A chain link fence runs in front of steel railing atop both the west and east fascia of the bridge. The existing bridge geometry consists of one travel lane in each direction on East 165th Street, and one travel lane, a turning lane and a sidewalk in each direction on Melrose/Webster Avenue. The scope of rehabilitation work includes the following: locally removing and replacing the asphalt overlay and sidewalk; repairing the concrete underdeck; cleaning and painting steel surfaces; resealing sidewalk joints; installing new multi-rotational bearings at the south abutment; partially removing and replacing the bridge seat at the new bearing locations; installing a temporary support system; and performing jacking operations. Vehicular and pedestrian access will be maintained during the rehabilitation period. Construction work began in June 2016. Work on the top of the bridge is complete and underdeck work continues. The underdeck cracks will be sealed by pressure injection. The work was delayed due to a Con Edison gas leak, which required shutting off the gas line in order to carry out the contract work.

East 165th Street Bridge Over Metro North Before Construction.

East 165th Street Bridge Under Construction. Summer 2016. Asphalt Placement. New Pedestrian Ramp. Bridge Jacking. Bearing Replacement.

The East 187th Street Bridge over Metro North was built in 1889. It is a single span steel jack arch bridge with built-up steel beams encased in concrete. The bridge has a chain link fence and a non-standard decorative bridge rail along both the north and south fascia. The existing bridge geometry consists of one 17' travel lane and an 11' sidewalk in each direction. The scope of rehabilitation work included the following: removing and replacing concrete overlay and waterproofing membrane, concrete sidewalk, corrugated guide rail, bridge railing, chain link fence wire mesh, and steel faced curb and handicap ramp at sidewalk corners; sealing the deck overlay; repairing the concrete underdeck; and cleaning and painting the steel surfaces locally. Construction work began in August 2016. The East 187th Street Bridge was substantially completed on June 21, 2017.

East 187th Street Bridge over Metro North Before Construction - Southeast and North Views. Southwest Crosswalk. April 2016: Span 1, Underside of Deck Exhibited Minor Mapcracking and Efflorescence. (Credit: NYSDOT)



East 187th Street Bridge over Metro North During Construction – July and October 2016. Top of Span 1 – Wearing Surface Paved With New Asphalt. Deck Repair. Installing Waterproofing. Asphalt Placement.

East 187th Street Bridge over Metro North After Construction – Asphalt Overlay. Southwest Pedestrian Crosswalk. New Chainlink Fence. North View.

The Southern Boulevard Bridge over East Fordham Road was built in 1962. It is a two span concrete arch bridge with stone masonry facing on the abutments and spandrel walls. The bridge has a concrete parapet with stone facing topped with a non-standard decorative bridge rail at both the east and west fascia. The existing bridge geometry consists of two travel lanes, a turning lane and a sidewalk in each direction, divided by a 4'-3" wide concrete median. The scope of rehabilitation work included the following: removing and replacing asphalt overlay, waterproofing membrane and pavement striping; repairing bridge railing, light fixtures and concrete on the underdeck and sidewalk; resealing sidewalk joints and vertical fascia joint at abutment; repointing and repairing cracks in stone masonry; installing weep holes in the underdeck and guide railing; and cleaning fascia stone masonry and catch basins. Construction work began in June 2016. The Southern Boulevard Bridge was substantially completed on May 18, 2017.

Southern Boulevard Bridge over East Fordham Road Before Construction. West Side, East Side, Eastbound Roadway, and Missing Section of Fence. August 2016: Cracked Cap Stone at Right Wingwall. Repaired Joints on Right Parapet. Jersey Barriers and Fence Above the Deck on Span 1.

Southern Boulevard Bridge During Construction – Sidewalk Repair, Deck Repair, Weep Hole Installation, and Waterproofing.

Southern Boulevard Bridge After Construction - New Asphalt at West Side and at the Eastbound Roadway. New Guiderail and Fence. Section of Fence. Repaired Joints at Fascia. Sealed Crack and Installed Weep Holes at Westbound Fordham Road. September 2017: Barriers Removed After Construction – Top of Span 2 Looking East. Top of Deck at Beginning Approach Looking West.

The Grand Concourse Bridge over East 167th Street was built in 1923. It is a two span steel girder bridge. The bridge has a concrete sidewalk and concrete parapet topped with a chain link fence at each fascia. The existing bridge geometry consists of two travel lanes and a turning lane in each direction on the Grand Concourse, and one travel lane, a parking lane and a sidewalk in each direction on the Grand Concourse service road. The overall structure extends several blocks to the north and south of the Grand Concourse where it carries a two-aisle parking area between the eastbound and westbound ramp lanes of East 167th Street. There is an NYCTA subway station under the Grand Concourse. Both the subway station and the railroad tracks are above East 167th Street. The subway station structures were not included in the scope of the bridge project. Construction work began in January 2016. The Grand Concourse Bridge was substantially completed on December 23, 2016.

Grand Concourse Bridge over East 167th Street. June 2016: Span 1, Repaired Underdeck and Girder Concrete Encasement. (Credit: NYSDOT)

The East 180th Street Bridge over Bronx River was built in 1925. It is a single span concrete arch bridge with stone masonry facing. The bridge has a parapet at both the north and south fascia. The existing bridge geometry consists of one travel lane, a parking lane and a sidewalk in each direction; the sidewalks on both sides are protected from the roadway by a concrete barrier. The scope of rehabilitation work included the following: replacing pedestrian railing; repairing concrete underdeck, crack, spall and joint seal in concrete barrier, and the retaining wall at the northwest corner of the bridge; resealing sidewalk joints; repointing stone masonry and stone coping mortar joint; cleaning drain holes in the concrete barrier; removing a tree from the south fascia and northwest retaining wall; and removing graffiti by power wash and applying anti-graffiti protective coating. Construction work began in September 2016. The East 180th Street Bridge was substantially completed on October 31, 2017.

East 180th Street Bridge over Bronx River Before Construction. Elevation Right in September 2016. July 2014: Bent Railing at Side Approach. (Credit: NYSDOT) West View and the North and South Parapet Walls.

East 180th Street Bridge During Construction – South Parapet Wall, Working Platform, Crack Repairs, and Tuck Pointing. Sidewalk Repairs.

East 180th Street Bridge After Construction – South Wall, New Railing at South Sidewalk, North Parapet Wall, and Sealed Underdeck Cracks.

The Riverside Drive Bridge over West 138th Street was built in 1920. It is a single span concrete arch bridge with stone masonry facing on the abutments and spandrel walls. There is a stone parapet on the east and the west side of the bridge. The existing bridge geometry consists of two travel lanes and a parking lane in each direction; the bridge also contains a sidewalk on the east side and an entrance to Riverbank State Park on the west side. The scope of rehabilitation work included the following: removing and replacing the asphalt overlay; repairing granite and brick pavers and concrete on the underdeck and sidewalk; repointing and repairing cracks in stone masonry joints; resealing underdeck joints; installing weepholes in the concrete underdeck; installing pavement striping; removing graffiti by power wash and applying anti-graffiti protective

coating; cleaning and painting steel staircase railing and bollards; and replacing lighting fixture and refurbishing existing fuse box. Construction work began in September 2016. The Riverside Drive Bridge was substantially completed on October 31, 2017.

Riverside Drive Bridge over West 138th Street Before Construction. North and South View, Underdeck, and Stairway.

Riverside Drive Bridge over West 138th Street During Construction – Asphalt Milling, Power Washing, Asphalt Placement, and Weep Hole Drilling.

Riverside Drive Bridge over West 138th Street After Construction – Weep Holes Installed, Railing Painted. New Asphalt Overlay – North and South Views.

The Riverside Drive Bridge over West 145th Street was built in 1930. It is a single span concrete arch bridge with stone masonry facing on the abutments and west spandrel wall. There is only one fascia on this bridge; the east side of the arch bridge is a filled backwall. There is a stone parapet on the west side of the bridge. The existing bridge geometry consists of two travel lanes and a parking lane in each direction; the bridge also contains an entrance to Riverbank State Park on the west side. This bridge will not be rehabilitated, but will instead be converted into roadway by filling in the space under the bridge with lightweight concrete. Vehicular and pedestrian access will be maintained during the estimated 4-month rehabilitation period.

Riverside Drive Bridge over West 145th Street. April 2015: East Abutment Wingwall. April 2017: Top of Deck, at Entrance to Riverbank State Park. (Credit: NYSDOT)

Bicycle use grew at an unprecedented rate over the last several years in New York City. The Pulaski Bridge, which connects Greenpoint, Brooklyn with Long Island City, Queens, used to merge pedestrian and bicycle traffic into a shared travel lane creating dangerous conditions for both pedestrians and bicyclists. The Pulaski Bridge project converted one southbound car lane (between Jackson Avenue in Queens and Eagle Street) on the bridge into a protected bicycle lane, giving more room to pedestrians on what was a shared-use path and calming traffic headed

toward McGuinness Boulevard in Brooklyn. A $2.5 million Federal Transportation Enhancements grant awarded by the State covered some of the $4.2 million costs.

Opened in 1954 and rebuilt in 1994, the Pulaski Bridge is a 44 span bascule drawbridge that opens about 400 times a year, mostly for barges delivering heating oil to a facility on Newtown Creek. The opened drawbridge could not support the weight of an additional concrete barrier, so in the middle of the bridge, the project eliminated the barrier that separates the current bicycling and walking path from traffic. On this stretch, pedestrians and cyclists now have physical (metal) separation from traffic, but not between each other. Along other sections of the bridge, there are now two concrete barriers, separating the bikeway from both car traffic and pedestrians. The scope of work also included installing impact attenuation devices at breaks in barrier system; replacing the finger joint at the center break of the bridge with a bicycle friendly joint; balancing the bascule leaves to accommodate the load of the new barrier; and installing pavement markings and signs for the new bicycle path. Construction work began in September 2015.

By the end of 2015, all cast-in-place concrete barrier closure sections in Queens and Brooklyn were placed, the Brooklyn approach embedded precast concrete barriers were marked by the surveyor, reinforcement was completed for the cast-in-place concrete barrier on the turning lane to the bridge from Jackson Avenue, and the pedestrian/bicycle safety rails were fabricated off-site and delivered to the contractor. Both pre-cast and cast-in-place barriers were required because the cast-in-place sections are anchored to the bridge deck while the pre-cast sections are not. This enables the barriers to perform as a system, protecting all bridge users, by absorbing the energy if struck by a passing vehicle. The project involved nighttime and midday car lane closures, but bicycle and pedestrian access to the bridge were maintained at all times during construction. The new bicycle path opened on April 29, 2016. The contractor began nightly punch list work in October 2016. The project was substantially completed on February 22, 2017.

Pulaski Bridge - Precast Concrete Barrier in Place. Cast in Place Concrete Barrier Reinforcement. Cast in Place Concrete Placement. Two Rails Bicycle Railing. Five Rails Railing (Queens Flanking Span). Bridge Joint Seal Modification. Planting at Jackson Avenue Median. Layout for Roadway Striping.

RAMP TO ED KOCH - QUEENSBORO BRIDGE FROM EAST 58TH STREET OVER EAST 59TH STREET, RAMP TO 21ST STREET FROM NY OVER 22ND STREET, 80TH ROAD BRIDGE OVER LIRR MAIN LINE, 71ST AVENUE BRIDGE OVER COOPER AVENUE, HANNAH STREET BRIDGE OVER SIRT SOUTH SHORE, FOREST AVENUE BRIDGE OVER CLOVE LAKES PARK STREAM, DOUGLASTON PARKWAY BRIDGE NORTHBOUND OVER CROSS ISLAND PARKWAY, DOUGLASTON PARKWAY BRIDGE SOUTHBOUND OVER CROSS ISLAND PARKWAY, AND ROOSEVELT AVENUE BRIDGE OVER FLUSHING MEADOW PARK ROAD

A Notice to Proceed for the component rehabilitation of these 9 bridges in Manhattan, Queens, and Staten Island was issued to the contractor with a start date of July 13, 2015.

The Ramp to the Ed Koch – Queensboro Bridge from East 58th Street over East 59th Street was built in 1929. It is a twelve span ramp and carries two reversible travel lanes of traffic to (normal daily hours) and from (weekdays morning rush hours only) the Ed Koch - Queensboro Bridge south upper roadway. The bridge has a half jersey barrier running along both sides of the roadway and approaches. The scope of rehabilitation work included the following: removing the concrete wearing surface and replacing with a thin polymer concrete overlay; repairing the deteriorated sections of concrete deck slab; removing armored joints and replacing with armorless joint system; removing and repairing the concrete in piers, the underside of the deck and the curtain walls; repointing of the stone masonry joints; repairing traffic signs and providing new pavement striping; and applying anti-graffiti coating on the repaired concrete surfaces. Construction work began in December 2016, and was substantially completed on October 20, 2017.

Ramp to the Ed Koch – Queensboro Bridge from East 58th Street over East 59th Street Before Construction. June 2016: Westbound Span 11 Vertical Clearance Signs. Span 10 – Left Elevation. Spans 10 and 11 – Left and Right Elevations. Span 8, Underside of Deck at Bay 2. Steel. Stay-in-Place forms Installed as Shielding. Pier 11. (Credit: NYSDOT)

Ramp from East 58th Street During Construction.

Ramp from East 58th Street After Construction.

The Ramp to 21st Street from NY over 22nd Street was built in 1929. It is a 43 span bridge ramp and carries two reversible travel lanes of traffic to (weekdays morning rush hours only) and from (normal daily hours) the Ed Koch - Queensboro Bridge's south upper roadway in one direction. The width of the bridge varies throughout the spans. The bridge has a half jersey barrier running along both sides of the roadway and the approaches. The bridge superstructure consists of four different types of framing plans and the bridge deck consists of a galvanized stay in place form, concrete filled steel grating and a monolithic concrete overfill. The scope of rehabilitation work included the following: removing and replacing the concrete wearing surface with a thin polymer concrete overlay; repairing the deteriorated concrete deck slab locations; replacing armored joints with a new armorless joints system; repairing the concrete on the abutment; retrofitting the bearings; improving drainage by cleaning the scuppers; repairing the damaged traffic signs, and providing new pavement striping. Construction was substantially completed on October 20, 2017.

Ramp to 21st Street From NY Over 22nd Street. September 2016: Elevation Right Spans 37 to 39. (Credit: NYSDOT) Before Construction.

Ramp to 21st Street During Construction.

Ramp to 21st Street After Construction.

The 80th Road Bridge over LIRR Main Line was built in 1909. It is a three span bridge over four railroad tracks. It carries one travel lane, parking lanes on each side, and a bike lane. The bridge has a sidewalk and a concrete parapet with chain-link fence running along both sides of the roadway and approaches. The bridge superstructure mostly consists of concrete encased steel girders with two exposed steel girders at the south fascia of the bridge. The scope of rehabilitation work includes the following: removing and replacing the north sidewalk, curb, parapet, and removing the sand fill in north sidewalk bay; removing the deteriorated concrete in the girders' encasement, north fascia, and underside of the deck; removing and replacing the asphalt wearing surfaces on the bridge and at the approaches; removing and replacing the existing northeast and southeast approach sidewalks, and erecting a temporary support shield on railroad tracks. Construction work began in May 2017 and all of the above deck work was

completed in October 2017. Work on the underside of the deck, above the LIRR tracks, will commence as soon as track outages from the railroad are available. The estimated duration for the remaining underdeck work is two months.

80th Road Bridge over LIRR Main Line. September 2015: Elevation Left and Right. Begin Approach. Piers 1 and 2. (Credit: NYSDOT)

80th Road Bridge Under Construction. October 2017: End Approach Pavement and Spans 1 to 3 Wearing Surface Repaved With Asphalt Concrete. (October Credit: NYSDOT)

The 71st Avenue Bridge over Cooper Avenue was built in 1934. It is a single span bridge and carries one travel lane, a sidewalk and through girders (acting as a railing), running along both sides of the roadway. Construction work began in July 2016, and the project was substantially completed on December 12, 2016.

71st Avenue Bridge over Cooper Avenue. Before, During, and After Construction.

The Hannah Street Bridge over SIRT South Shore was built in 1935. It is a ten span bridge and carries one travel lane in each direction, a sidewalk, a railing and a steel mesh fence running along both sides of the roadway and approaches. The bridge deck has a steel bridge railing with a chain-link fence running alongside the roadway and approaches. The bridge deck consists of a

reinforced concrete slab with integral wearing surface and prestressed concrete beams. The scope of rehabilitation work included the following: removing and replacing the existing deck and approaches' wearing surface; waterproofing; repairing the concrete on the abutments, piers and the underside of the deck; removing existing armored joints and replacing with armorless joint systems; cleaning of the curbs; repairing the embankment on the north east approach, and providing new striping. Construction work began in October 2016, and was substantially completed on June 30, 2017.

Hannah Street Bridge Over SIRT South Shore. Spans 1-4 - Right Elevation. October 2015: Large Deep Spall on Right Corner of Beginning Abutment. (Credit: NYSDOT) Before Construction.

October 2016: Eroded Left Embankment at End Approach. (Credit: NYSDOT) November 2016. During Construction.

Hannah Street Bridge After Construction.

The Forest Avenue Bridge over Clove Lakes Park Stream was built in 1906. It is a single span concrete arch bridge and carries one travel lane in each direction, a sidewalk, and a small parapet and low railing running along the southern sidewalk. The bridge deck has an asphalt wearing surface. The scope of rehabilitation work includes the following: removing and replacing the existing nonstandard railing with a standard bridge railing; repairing the concrete on the deteriorated sections of sidewalk; cleaning and repointing of the mortared joints at the wing-walls; installing a new guide railing at the bridge approach; and providing tree and landscape protection within the park land during construction and restoration after construction. Vehicular and pedestrian access will be maintained during the estimated 3-month rehabilitation period. Construction is expected to begin in late spring 2018.

Forest Avenue Bridge Over Clove Lakes Park Stream. November 2017: Right Elevation at Upstream. Beginning Abutment Right Wingwall. End Abutment Stone Masonry Wingwall. Beginning and End Approaches. Right Side Parapet and Concrete Coping. (Credit: NYSDOT)

The Douglaston Parkway Bridge northbound over Cross Island Parkway was built in 1939. It is a single span bridge over three lanes on the northbound Cross Island Parkway and carries one travel lane, sidewalk, a wide shoulder, and a median. The bridge has a steel bridge railing with a chain-link fence running alongside of the roadway and approaches. The bridge superstructure consists of reinforced concrete beams acting as a rigid frame. The deck consists of a reinforced concrete slab with a concrete fill course and asphalt wearing surface. The scope of rehabilitation work included the following: removing and replacing the bridge and approaches' asphalt wearing surfaces, repairing of concrete on abutments and the underside of the deck; cleaning and re-pointing of the mortared joints in the masonry wing walls; removing and replacing the concrete curbs at the approaches, improving lighting on the underside of the deck; providing new pavement striping, saw cutting the bridge joints on the roadway, and sealing with a sealant. Construction work began in April 2016, and was substantially completed on April 26, 2017.

Douglaston Parkway Bridge Northbound Over Cross Island Parkway. March 2016: Top of Bridge, Asphalt Wearing Surface Above Beginning Abutment - Spalls and Uneven Wearing Surface. Span 1 - Deteriorated Concrete Covered With Wire Mesh. Abutment End. Approach Begin and End. (Credit: NYSDOT)

Douglaston Parkway Bridge Southbound Over Cross Island Parkway. March 2016: Right Elevation. Span 1 Concrete Beams Exhibit Spalls With Exposed Rebar Which Are Covered by Wire-Mesh Netting. (Credit: NYSDOT)

The Douglaston Parkway Bridge southbound over Cross Island Parkway was built in 1939. It is a single span bridge over three lanes on the southbound Cross Island Parkway and carries one travel lane, sidewalk, wide shoulder, and a median. The bridge has a steel bridge railing with a chain-link fence running alongside of the roadway and approaches. The bridge superstructure consists of reinforced concrete beams acting as a rigid frame. The deck consists of a reinforced concrete slab with a concrete fill course and an asphalt wearing surface. The scope of rehabilitation work included the following: removing and replacing the bridge and approaches' asphalt wearing surfaces; repairing the concrete on the abutments and the underside of the deck; cleaning and re-pointing of the mortared joints in the masonry wing walls; removing and replacing the concrete curbs at the approaches; improving the lighting on the underside of the deck; providing new pavement striping, saw cutting bridge joints on roadway, and sealing with a sealant. Tree and landscape protection will be provided during the construction. Construction work began in April 2016, and was substantially completed on April 26, 2017.

Douglaston Parkway Bridges Before Construction.

Douglaston Parkway Bridges During Construction.

Douglaston Parkway Bridges After Construction.

The Roosevelt Avenue Bridge over Flushing Meadow Park Road was built in 1936. It is a four span bridge and carries two travel lanes in each direction, a wide sidewalk, and a railing running along both sides of the roadway and approaches. The bridge deck has a steel bridge railing with a chain-link fence running alongside the roadway and approaches. The bridge consists of a reinforced concrete slab. Construction work began in June 2016, and the project was substantially completed on December 19, 2016.

Roosevelt Avenue Bridge in July 2015: Elevation Right. (Credit: NYSDOT) Before, During (Stone Masonry Preparation, Underdeck Concrete Repair), and After Construction.

EAST 97TH STREET BRIDGE OVER METRO NORTH MAIN LINE, WEST 57TH STREET BRIDGE OVER AMTRAK, MATTHEWSON ROAD BRIDGE OVER MACCRACKEN AVENUE,

MOSHULU PARKWAY BRIDGE OVER EQUESTRIAN PATH, EAST FORDHAM ROAD BRIDGE OVER GRAND CONCOURSE, AND EAST DRIVE BRIDGE OVER BRIDLE PATH NEAR ZOO.

A Notice to Proceed for the component rehabilitation of these 6 bridges in Brooklyn, the Bronx, and Manhattan was issued to the contractor with a start date of February 22, 2016.

The East 97th Street Bridge over Metro North Railroad was built in 1873. The structure is a one-span bridge and carries two westbound traffic lanes over the Metro North Railroad tracks. There are no parking lanes on the bridge. There are wide concrete sidewalks on each side of the bridge. The bridge superstructure consists of pre-stressed concrete box beam system with a reinforced concrete slab. The scope of rehabilitation work includes the following: sealing cracks in the concrete overlay on top of the bridge; replacing the expansion joint sealer at the roadway joints; repairing the concrete deterioration of the abutment stems, backwall, and bridge seats; providing an anti-graffiti protection coating at the concrete parapet; cleaning and painting the utility support beams and chain link fence posts, railings; removing and replacing the steel angle plates at the south sidewalk; and miscellaneous repairs of utility conduit supports. Vehicular and emergency access will be maintained during the estimated 5-month rehabilitation period.

East 97th Street Bridge over Metro North. 2016: Beginning and Ending Approaches. Beginning Abutment Joint - Deteriorated Sealer Material. (Credit: NYSDOT)

The West 57th Street Bridge over Amtrak Railroad was built in 1934. The structure is a three-span bridge that carries 3 westbound and 2 eastbound traffic lanes and wide concrete sidewalks on each side of the bridge. There are buildings adjacent to the bridge on the north and south fascia. The bridge superstructure consists of 22 concrete-encased steel stringers. The scope of rehabilitation work includes the following: localized repairs to the concrete sidewalk and curbs; removal of the stringer bottom flange encasement; cleaning and painting of the exposed bottom flange; providing a protective shielding over the railroad; repairing of the concrete at the abutments, stem, piers, crashwalls and underside of deck; cleaning and painting the seating angles at the piers and at the steel columns; and anti-graffiti protective coating at the abutment and fascia. Vehicular and emergency access will be maintained during the estimated 5-month rehabilitation period.

West 57th Street Bridge over Amtrak. 2016: Beginning and Ending Approaches. (2016 Credit: NYSDOT)

The Matthewson Road Bridge over MacCracken Avenue was built in 1975. The structure is a 15 continuous-span bridge that carries one lane in each direction, a sidewalk on the east side and a safety walk on the east side. There are unmarked parking lanes on each side of the bridge. There is a concrete parapet with a chain link fence on the west sidewalk, including planters at several locations. A building used as a public school is located adjacent to the east fascia. The

building spans over the Metro North railroad tracks running from north to south under the structure. The Roberto Clemente Park is in the vicinity of the project along the west fascia of the bridge. The superstructure consists of a concrete girder and floorbeam system with an integral concrete wearing surface. The scope of rehabilitation work included the following: repairing the deteriorated areas of concrete at columns, top of deck and underside of deck; removing the safety netting at the location of underdeck areas to be repaired; repairing the underside of the concrete deck; reinstalling the safety netting; cleaning joints and replacing the sealing material; repairing the deteriorated areas of concrete at sidewalks, parapets, and curbs; and miscellaneous drainage repairs and installation of box beam pier protection. Construction work began in spring 2017, and was substantially completed on November 3, 2017.

Matthewson Road Bridge over MacCracken Avenue Before Construction.

Matthewson Road Bridge During Construction.

Matthewson Road Bridge After Construction.

The Mosholu Parkway Bridge over Equestrian Path was built in 1951. The structure is a one-span reinforced concrete rigid frame arch. The bridge carries two travel lanes and a right shoulder lane in each direction of the Parkway. The roadways are divided by a concrete median. The roadway surface consists of an asphalt wearing surface on a concrete deck supported by subbase material on top of the arch. A stone masonry parapet was provided on the south fascia, and a concrete half-section barrier with a stone masonry parapet on the north fascia. Construction work began in June 2016, and the project was substantially completed on December 19, 2016.

Mosholu Parkway Bridge over Equestrian Path. (Credit: NYSDOT) Bridge Before, During (Removing Stones and Stone Masonry, Removal and Repair of Deteriorated and Unsound Concrete, Repairing the Underdeck Lighting), and After Construction.

The East Fordham Road Bridge over Grand Concourse was built in 1923. The structure is a one-span reinforced concrete rigid frame arch with a filled spandrel. The bridge carries two travel lanes and a bus lane in each direction. There is a concrete pavement slab on top of the fill beneath the asphalt wearing surface. There are no parking lanes on the bridge. Wide trapezoidal shape concrete sidewalks and concrete curbs with steel face were provided on each side of the bridge. The bridge railings consist of reinforced concrete parapets and balustrades with no protective screening. The scope of rehabilitation work included the following: removing the asphalt wearing surface on the bridge area; repairing the top of the concrete slab with a waterproofing membrane and two layers of asphalt; repairing the deteriorated areas of concrete at the abutments and the underside of the arch; removing the safety netting to repair the concrete; installing safety netting; repairing or replacing the concrete sidewalk; restoring the mortar joints at the spandrel stone copings; replacing sections of the steel faced concrete curbs and the roadway interface sealer; repairing the deteriorated concrete of the balustrades and parapets; and performing miscellaneous repairs to the underdeck lighting. Construction work on this bridge began in April 20, 2016, and was substantially completed on April 25, 2017.

East Fordham Bridge Before Construction.

East Fordham Bridge During Construction.

East Fordham Bridge After Construction.

The East Drive Bridge over the Bridle Path in Prospect Park was built in 1910. The structure is a single span bridge that carries predominantly pedestrians and cyclists and two lanes of one-way vehicular traffic during restricted hours only. There is a safety walk along the left side of the bridge and a wide sidewalk along the right side, each with concrete parapets. The scope of rehabilitation work included the following: removing and replacing the asphalt wearing surface; installing a waterproofing membrane and two layers of asphalt; installing new bollards for the north sidewalk; repairing deteriorated areas of concrete at the underside of the deck, encasement and curbs; cleaning and painting the exposed structural steel members; and performing miscellaneous repairs to the underdeck lighting. The construction work on this bridge began in December 2016, and was substantially completed on May 24, 2017.

East Drive Bridge over Bridle Path Before Construction.

East Drive Bridge over Bridle Path During Construction.

April 2017: Superstructure Framing – Repaired Concrete-Encased Steel Stringers and Concrete Underdeck. Begin Approach, Left Curb - New Segment of Concrete Curb. (Credit: NYSDOT)

East Drive Bridge over Bridle Path After Construction.

SOUTHERN BOULEVARD BRIDGE OVER CSX TRANS-PORT MORRIS, SACKETT STREET BRIDGE OVER BROOKLYN-QUEENS EXPRESSWAY, 49TH STREET BRIDGE OVER GRAND CENTRAL PARKWAY, EAST 149TH STREET BRIDGE OVER AMTRAK-CSX, UNIONPORT ROAD BRIDGE OVER AMTRAK-CSX, BRONX BOULEVARD SOUTHBOUND OVER BRONX RIVER, BRONX BOULEVARD BRIDGE NORTHBOUND OVER BRONX BRIDGE RIVER, AND ARTHUR KILL ROAD BRIDGE OVER SIRT SOUTH SHORE.

A Notice to Proceed for the component rehabilitation of these 8 bridges in the Bronx, Brooklyn, Queens, and Staten Island was issued to the contractor with a start date of July 10, 2017.

The Southern Boulevard Bridge over CSX Trans-Port Morris was built in 1916. It is a single span, simply supported bridge, crossing over abandoned rail road tracks. The bridge carries two lanes of traffic and a parking lane in each direction and two sidewalks for Southern Boulevard. The superstructure to support the bridge deck and sidewalk slab consists of concrete-encased steel girders. Underneath the abutments, there is a subway tunnel currently used by the #6 Line subway. The scope of rehabilitation work includes the following: removing the existing asphalt concrete wearing surface; installing a waterproof asphalt overlay; rehabilitating the concrete for the abutments and underdeck (cracks, spalls, delaminations); reconstructing the northwest wingwall; cleaning and painting all of the exposed steel; rehabilitating the stone and brick retaining walls; installing a new pedestrian chain link fence; minor clearing and grubbing, and abatement of asbestos containing materials, as required. Vehicular and pedestrian access will be maintained during the estimated 10-month rehabilitation period.

Southern Boulevard Bridge Over CSX. July 2016: Elevation Left and Right. Begin Abutment Stem Exhibits Vertical and Horizontal Cracks With Efflorescence, and Isolated Areas of Hollow-Sounding Concrete. Left Sidewalk at End Abutment. (Credit: NYSDOT) September 2016: Right Side Under Deck of span #1 – Mold is Present and the Bottom Flanges are Corroded.

The Sackett Street Bridge over the Brooklyn-Queens Expressway was built in 1952. It is a two span bridge oriented towards the northwest with a one-way westbound direction traffic flow. The bridge carries two lanes of traffic in westbound direction and a sidewalk on each side. Typically cars are parked adjacent to both curb lines. Span 1 crosses over the Brooklyn Queens Expressway eastbound lanes, and Span 2 crosses over Brooklyn Queens Expressway westbound lanes. The scope of rehabilitation work includes the following: replacing the seals in the armored joints; removing 2" of concrete overlay on deck and replacing with waterproofing and a hotmix asphalt overlay; rehabilitating the concrete for the cracks, delaminations, and spalls on the abutments, wingwalls, and underdeck; replacing the missing granite facing on the abutment; repointing the granite joints; replacing the underdeck lighting; restriping the roadway; rehabilitating the pedestrian fence; replacing the deteriorated signs; reconstructing or replacing the railing post base plates at the four 4 corners of bridge; painting the bridge steel; and

abatement of asbestos containing materials, as required. Vehicular and pedestrian access will be maintained during the estimated 8-month rehabilitation period.

Sackett Street Bridge Over Brooklyn-Queens Expressway. March 2012: Elevation Left and Right. April 2016: Span 1 Wearing Surface. Span 2, Underside of Reinforced Concrete Deck Near the End Abutment - Exhibits a Spalled Area With Exposed and Corroded Rebars. This Location is Protected by Wire Mesh Netting. (Credit: NYSDOT)

The 49th Street Bridge over the Grand Central Parkway was built in 1937. It is a two span continuous bridge. The bridge crosses over six lanes of traffic and two emergency lanes of the Grand Central Parkway. It carries a single lane of traffic traveling in each direction and two sidewalks. The scope of rehabilitation work includes the following: replacing the armored joints with armorless joints; rehabilitating the concrete median barrier and the southwest quadrant of the sidewalk, the concrete encasement at the girders, abutments, bridge seats, and pedestals, as well as the cracks, delaminations and spalls of the backwalls and wingwalls; replacing all of the bearings on the abutments and pier with elastomeric bearings; rehabilitating the abutment bridge seats; replacing the underdeck lighting and electric junction box; restriping the roadway; covering the gaps between the sidewalk and the cheek walls with steel plates, and abatement of asbestos containing materials, as required. Vehicular and pedestrian access will be maintained during the estimated 9-month rehabilitation period. Construction work began in October 2017.

49th Street Bridge Over Grand Central Parkway. May 2016: Elevation Left and Right. Beginning Approach. Begin Abutment at Bays 9 to 14 - Spalls With Exposed Corroded and Debonded Rebars and Hollow-Sounding Concrete Areas. (Credit: NYSDOT) December 2017: Snow Removal. Erecting Scaffolding at the Abutment.

The East 149th Street Bridge over Amtrak and CSXT was built in 1907. It is a two span truss bridge. The bridge is oriented in the north direction, and crosses over ten rail road tracks operated by Amtrak and CSX Transportation. The bridge carries two lanes of traffic traveling in each direction and two sidewalks. There are two separate railing systems on this bridge: a concrete barrier/median bridge rail that encases the three trusses, and a steel plate, steel pipe rail and steel corrugated sheet metal combination used as a pedestrian fence on the outside edge of the sidewalks. The scope of rehabilitation work includes the following: abatement of asbestos containing materials, as required; replacing armored joints with armorless joints; bearing restoration for the south abutment middle truss bearing; steel rehabilitation/replacement for the deteriorated and damaged members; surface preparation and protective coating of steel; concrete rehabilitation of the abutments, bridge seats, wingwalls, pier and pier cap; replacing the concrete barrier end sections; reconstructing the northwest approach pavement and sidewalk; replacing the chain link fencing at the northwest corner; replacing all of the "live wire" signs; replacing the roadway lighting; miscellaneous electrical repairs; replacing the deteriorated rivets with high strength bolts; and surface preparation and protective coating of the local areas of the truss members. Vehicular and pedestrian access will be maintained during the estimated 10-month rehabilitation period.

East 149th Street Bridge over Amtrak – CSX. November 2016: Elevation Left and Right. Beginning Approach. (Credit: NYSDOT)

Span 2, Truss T2 - Left Face of the Gusset Plate and Adjacent Diagonal Member Exhibit Scrape Marks and Paint Loss With Minor Surface Corrosion Due to Vehicular Impact. Span 1, Sway Strut Bracing Between Truss T2 and T3 - Brace Bottom Flange Exhibits Bending Toward Span 2 due to Vehicular Impact. Pier 1. (Credit: NYSDOT)

The Unionport Road Bridge over Amtrak and CSXT was built in 1906. It is a single span truss bridge. The bridge is oriented in the northwest direction, and crosses over three rail road tracks used by Amtrak and CSX Transportation. The bridge carries a single lane of traffic traveling in each direction and two sidewalks. There is a 4-rail steel railing with an 8' high steel protective fence running along both sides of the bridge. The scope of rehabilitation work includes the following: abatement of asbestos containing materials, as required; minor clearing and grubbing; replacing armored joints with armorless joints; replacing the steel fascia girder pedestals in kind; replacing the bottom cover plates of the two floorbeams; steel rehabilitation/replacement of the deteriorated bottom plates at the northwest powerline tower on the top chord; surface preparation and protective coating of the steel; concrete rehabilitation of the south abutment bridge seat and the southwest wingwall; partial-depth reconstruction of the north approach slab over the westbound lane; replacement of the damaged approach guide railing; utility coordination of repairs.; and replacing the deteriorated rivets with high strength bolts. Vehicular and pedestrian access will be maintained during the estimated 10-month rehabilitation period. A full closure of the bridge will occur, however, during the replacement of the floor beam bottom cover plates and the fascia girder steel pedestals. There is a detour plan in place to accommodate this closing.

Unionport Road Bridge Over Amtrak – CSX. October 2016: Elevation Left and Right. Beginning Approach. End Approach, Top of Roadway at Right Truss- Exhibits a Spall and Joint Exhibits Torn Sealant. (Credit: NYSDOT)

The Bronx Boulevard Bridge Southbound over the Bronx River was built in 1920. It is a single span concrete arch. The bridge is oriented in the north direction, and carries a single lane of traffic traveling southbound, a parking lane, and a concrete sidewalk.

The Bronx Boulevard Bridge Northbound over the Bronx River was built in 1920. It is a single span concrete arch. The bridge is oriented in the north direction, and carries a single lane of traffic traveling northbound, a parking lane, and a concrete sidewalk.

The scope of rehabilitation work for both bridges includes the following: clearing and grubbing to be done upstream, downstream and under the bridges; concrete rehabilitation of the cracks, delaminations and spalls at the underside of the arch and the east wingwalls; cleaning the stone parapets and wingwalls (including removing graffiti); repointing of all of the loose mortar; replacing the missing ashlar stones on the east parapet with Belgian blocks; removing and replacing the asphalt concrete overlay on the structure and south approach; placing a waterproofing membrane on the structure; removing silt and sand; and replacing damaged curb and sidewalk. Vehicular and pedestrian access will be maintained during the estimated 8-month rehabilitation period.

Bronx Boulevard Southbound Bridge Over Bronx River. March 2012: Elevation Left Span. March 2016: Span 1, Right Parapet - Exhibits Spall With a Full Height Vertical Crack. Span 1 – Efflorescence on Underside of Stone Masonry. (Credit: NYSDOT)

Bronx Boulevard Northbound Bridge Over Bronx River. March 2012: Elevation Right. End Approach. March 2016: Span 1, Left Stone Parapet - Spall Near Beginning Abutment. Span 1, Upstream Channel Looking Left - The Upstream Enters the Underside of the Bridge at a 45 Degree Angle Causing Erosion Along the Left Embankment. (Credit: NYSDOT)

The Arthur Kill Road Bridge over SIRT South Shore was built in 1939. It is a single span simply supported bridge. The bridge is oriented in the north-northwest direction, and crosses over two rail road tracks used by the Staten Island Rapid Transit. The bridge carries a single lane of traffic traveling in each direction and two sidewalks for Arthur Kill Road. There is a 4'-0" high concrete parapet with a 6' high steel protective fence running along both sides of the bridge. The scope of rehabilitation work includes the following: removing the existing superstructure and approach slabs; removing and reconstructing the top of the abutments; installing new elastomeric bearings;

reconstruction of the existing remaining abutments and wingwalls (cracks, spalls, and delaminations); installing new steel framing; constructing a new approach slab and approach roadway; installing new guide railing on the approaches; replacing the water main; and abatement of asbestos containing materials, as required. Vehicular and pedestrian access will be maintained during the estimated 20-month rehabilitation period.

Arthur Kill Road Bridge Over SIRT South Shore. October 2016: Left Sidewalk. Repairing the Wearing Surface at the Beginning Right Side Near the Beginning Abutment. The Wearing Surface has Widespread Cracks and Uneven Asphalt Concrete Patches. Span 1 Underdeck General View of Timber and Wire Mesh Shielding. Stable Hollow-Sounding Areas and Shallow Spalls With Scaling and Efflorescence. (Credit: NYSDOT)

Engineering Review and Support

IN-HOUSE DESIGN

In-House Design staff prepare plans, specifications, and cost estimates for bridge replacement/rehabilitation projects that enable the Division to restore bridges considered "structurally deficient" to a "very good" condition rating. This unit handles urgent Division projects, as well as special projects under construction by the Bureau of Bridge Maintenance, Inspections and Operations.

The unit completed the design for the rehabilitation of the Henry Hudson Parkway Viaduct from West 72nd Street to West 82nd Street and the Henry Hudson Parkway Viaduct from West 94th Street to West 98th Street. The rehabilitation work will include the repair or replacement of various deteriorated structural steel members, and repair of the concrete deck, abutments, and retaining walls, as well as the painting of the substructure and superstructure steel. Construction work on these viaducts began in July 2017.

The unit continued the preliminary design for the rehabilitation of the East 169th Street Bridge and the East 180th Street Bridge, both over Metro North Railroad in the Bronx. Both are single span bridges built in 1889. The scope of work for the East 180th Street Bridge includes the removal and replacement of the superstructure and partial rehabilitation of the substructure; the removal and replacement of the bridge railing and fencing; and the reconstruction the of approach slabs and pavements. The scope of work for the East 169th Street Bridge includes the resurfacing of the bridge deck and sidewalks; the removal and replacement of the bridge railing and fencing; and the reconstruction of the approaches slabs and pavements. Construction of these two bridges will be combined with the reconstruction of the East 175th Street Bridge over Metro North Railroad, which is being designed by the Roadway Bridges Group of the Bureau of Capital Design and Construction. It is anticipated that the construction will start in mid-2019 and will continue for three years.

January 2017: Inspecting the East 180th Street Bridge over Metro North – Assistant Civil Engineer Arif Hussain, and Civil Engineers Vishal Jariwala and Ruchit Patel. (Credit: Scott Alnwick) June 2017: Inspecting the Boston Road Bridge over Hutchinson River – Civil Engineering Intern Edward Shao, Civil Engineer Vishal Jariwala, and Assistant Civil Engineer Olga Goranova-Rouyne. (Credit: Krzysztof Lamczak)

The unit is currently preparing the preliminary plans for the rehabilitation of the Boston Road Bridge over Hutchinson River in the Bronx. The current scope of work for this contract will include removal and replacement of the concrete deck, sidewalks, median, bridge railing, and pedestrian fencing and lighting; the rehabilitation of the concrete substructure and steel superstructure; and the reconstruction of the approach roadways within the project limits. It is anticipated that the construction will start in mid-2021 and continue for three years.

In-House Design's Electrical Group reviews and/or prepares contract documents for all electrical and street lighting work for all projects on the Division's Capital Program. Some of the contracts reviewed during 2017 include the rehabilitation of the electrical and mechanical systems of the Madison Avenue Bridge over Harlem River; and the rehabilitation of the East 169th and East 180th Street Bridges over Metro North Railroad.

ENGINEERING SUPPORT

BRIDGE PROJECT SPECIFICATIONS

In 2017, the Specifications Unit of the Engineering Support Section prepared and/or reviewed contract proposal books and/or specifications for 21 contracts, including 18 bridge rehabilitation and new construction/reconstruction contracts, 1 component rehabilitation contract, and 2 demolition contracts. The Unit also approved 218 new specifications for 7 on-going construction projects. Seven of the above contracts totaling approximately $654 million in construction costs were approved by the Law Department and advertised for bid, and 7 are awaiting approval. Four contracts were awarded for construction in 2017, and another 2 were awaiting award.

Notable among the construction contracts prepared and/or reviewed, advertised, sent for bid, and/or awarded were: the Bruckner Expressway over Westchester Creek (Unionport Bridge), the Brooklyn Bridge - Rehabilitation of Stone Masonry at Bridge Approaches and Ramps project, the component rehabilitation of ten bridges, and the Atlantic Avenue Bridge over LIRR.

The unit also maintains the City and federal boiler plate received from DOT Legal and updates R-pages (revisions to NYSDOT Standard Specifications) as required by the Guidelines for Preparation of Bridge Construction Contract Proposal Book and advises Agency Divisions and consultants on the preparation of contract proposal books and construction contract related issues.

RECORD MANAGEMENT UNIT

The Records Management Unit converted 175,219 TIFF (Tag Image File Format) drawings to PDF (Portable Document Format) format and completed the indexing of 155,471 drawings. Some 200,000 TIFF drawings will be converted to PDF format.

The switch to electronic media and server-based archiving will save money on drawing submissions, and will lead to the establishment of a unified electronic database for bridge archives. Digitizing documents and storing them online, where they are easy to access and print, will simplify contract submission process and cut project costs in the long run.

The Records Management unit reviewed and issued comments on as-built drawings and contract drawings for 35 contracts in 2017, including Contract #15 on the Manhattan Bridge (structure and component rehabilitation), replacement of the upper roadways on the Ed Koch – Queensboro Bridge, Brooklyn Bridge (rehabilitation of the spans and ramps and painting of the entire bridge), replacement of the Willis Avenue Bridge over the Harlem River, Marine Borer remediation (FDR Drive, Harlem River Drive, Carroll Street Bridge and Ocean Avenue Bridge), replacement of the Belt Parkway Bridge over Paerdegat Basin, rehabilitation of the Riverside Drive Viaduct over West 158th Street, reconstruction of the Highland Park Pedestrian Bridge, replacement of the Bruckner Expressway Service Road over Westchester Creek (Unionport Bridge), and the rehabilitation of the Grand Concourse Bridge over Metro-North Railroad Hudson Line.

The Unit also received, reviewed, and responded to 283 requests from numerous NYCDOT units, City and State Agencies, and private consultant companies for information regarding records drawings of City-owned bridges.

SURVEYING

The Surveying Unit staff monitored seven bridges and several retaining walls in 2017: Stone Arch Bridge in Central Park, Ninth Street Bridge over Gowanus Canal, the Footbridge over Clove Lake, Eliot Avenue Bridge over Queens Boulevard, 17th Avenue Pedestrian Bridge over the Belt Parkway, Pelham Parkway Bridge, and Depot Place Bridge over the Conrail Yard, and the

retaining walls at Douglas Road, 1620, 1622, and 1624 Adams Street, and along Pratt Avenue.

ENGINEERING REVIEW

2017 MACY'S THANKSGIVING DAY PARADE

As in past years, the staff of the Engineering Review Section actively participated in the 2017 (91st Anniversary) Macy's Thanksgiving Day Parade. The parade started at 77th Street and Central Park West, made its way to Columbus Circle, turned onto Central Park South and proceeded down the Avenue of the Americas to 34th Street, at which point, it made its' final turn west and ended at 7th Avenue in front of Macy's Herald Square.

Months before the parade, the engineers reviewed the balloon specifications and flight analyses. A balloon is classified as large if it is larger than 5,000 cubic feet. However, the balloons in the parade cannot be taller than 70 feet, wider than 40 feet, or longer than 78 feet. This project was coordinated with Macy's and various City agencies such as City Hall, NYPD, NYCDPR, NYCDOB, and NYCOEM.

Division engineers reviewed and approved the design specifications of Jett, Grinch, Chase, and Olaf, four new character large balloons to be introduced in the parade. Director of Engineering Review Uday Dommaraju, Construction Project Manager George Jarvis, and two consultant engineers attended the Balloonfest (test flights of the balloons) at the Meadowlands Sports Complex Parking Lot P in East Rutherford, New Jersey on November 4, 2017, with NYPD and other agencies. A wireless anemometer station was set up to give real time wind speed, and cones were placed out simulating the street envelope. Macy's performed test flights on each new balloon according to the current wind gust, and flew the balloons to the required flying height.

On November 23, 2017, wind speeds were relatively low and all 17 large balloons flew in the parade without incident. The wind gusts varied between 9 to 16 miles per hour and the weather was mostly cloudy with a temperature around 33^0F. Chief Bridge Officer Robert O. Collyer, Director of Engineering Review Uday Dommaraju, Construction Project Manager George Jarvis, Civil Engineer Jiangong Xu, Assistant Civil Engineers Delin Bixha and Michael Almeida, and three consultant engineers were positioned at various locations along the parade route to observe compliance with the approved procedures. Seven anemometers were mounted on top of light poles along the route between 77th Street and 34th Street to measure the wind speed during the parade. Division and consultant engineers were assigned to the anemometer locations to monitor the wind gusts.

New Balloons Olaf, Jett, Chase, and Grinch in Level Flight in East Rutherford, New Jersey on November 4.

Parade 2017: Director of Engineering Review Udayakumar Dommaraju and Mayor Bill de Blasio. Jett, Grinch, Olaf, and Chase Balloons at the Parade. Assistant Civil Engineer Delin Bixha , Construction Project Manager George Jarvis, Assistant Civil Engineer Michael Almeida, Director of Engineering Review Udayakumar Dommaraju, Chief Bridge Officer Robert O. Collyer, and Consultant Engineers Leslyn Prasad, Larry Taylor, and Debra Moolin. (Group Credit: Jiangong Xu)

CRP/EXTELL PARCEL H PROJECT

The CRP/Extell Parcel H, LP project (Riverside Drive between 59th and 72nd Streets) includes the construction of nine bridges, a ramp, four relieving platforms, and connector roads along Riverside Drive as a part of the residential and commercial development over the former Penn Central Rail Yard. The project also includes the Miller Highway Tunnel. When completed, the infrastructure network will be transferred to DOT for maintenance. The Division is providing engineering review of the design drawings, as well as quality assurance inspections, to ensure the developer's compliance with DOT's construction and design standards. The bridges are substantially completed and open to traffic, except one bridge, which is currently under construction. The construction of only the northbound Miller Highway Tunnel has been completed to date.

WEST SIDE DEVELOPMENT PROJECTS (MANHATTAN)

The John D. Caemmerer West Side Yard, completed in 1987, was built to store and maintain commuter rail cars, but it was designed to accommodate air rights development. The Yard is bounded by West 30th and West 33rd Streets, Tenth and Twelfth Avenues. The rail yard is owned by the Metropolitan Transportation Authority and used by the Long Island Rail Road.

AMTRAK TUNNEL BOX

Amtrak is building a tunnel box through the project areas to preserve the space for the rail right-of-way known as the Gateway Project. This is the possibility of future expansion of rail service between New Jersey and New York and supports Amtrak's efforts to improve resiliency in response to future disasters in Amtrak's Northeast Corridor. The construction of this concrete

casing under the 11th Avenue Viaduct is now complete. Division staff were actively involved in reviewing the design and construction of the casing to ensure that the structural integrity of the viaduct is not compromised in any way. The construction was substantially complete by the end of 2017.

Hudson Yards Concrete Casing Project Location Map (Credit: Amtrak and Federal Railroad Administration)

RELATED COMPANIES/OXFORD PROPERTIES HUDSON YARDS

The Hudson Yards Project is a mixed-use development of residential, commercial, and civic uses and open space being constructed on a platform over the Yards. Two 72-story residential buildings, 15 Hudson Yards and 35 Hudson Yards, previously known as the D and E Towers, are under construction bordering Eleventh Avenue. The platform and the buildings will connect to the 11th Avenue Viaduct by constructing an expansion joint between the bridge and the new development. Division staff are actively involved reviewing the design and construction to ensure that the structural integrity of the viaduct is not compromised in any way. The construction is expected to be completed by 2018.

Eastern Rail Yard Map. (Credit: Related Companies/Oxford Properties)

WEST 33RD STREET – PHASE II

The Hudson Yard project is opening the area above the Hudson Yard's rail tracks to building development. As part of this project, several new buildings will be constructed abutting West 33rd Street. The street is a partial viaduct that needs to be replaced and re-graded in order to accommodate the new buildings. The adjacent block of West 33rd Street between 10th and 11th Avenues is currently being rebuilt. This project is for the block of West 33rd Street between 11th and 12th Avenue. This project will include the replacement of the entire street as well as the sewers and watermains below. The project could also include the extension of retaining walls towards 11th Avenue and replacement of parts of the viaduct superstructure.

EAST MIDTOWN GREENWAY PROJECT (MANHATTAN)

The Manhattan Waterfront Greenway is a 32-mile route that circumnavigates the island of Manhattan. The greenway is intended to transform underutilized waterfront into public space for both recreational and commuting use. Despite much important progress in recent years on new waterfront public space in New York City, a major gap exists in the Manhattan Waterfront Greenway between East 38th Street and East 60th Street on the East River. The communities of East Midtown have few connections to the waterfront and are disconnected from the water by the FDR Drive and the United Nations campus.

NYCEDC, working in partnership with the NYC Department of Parks & Recreation, the NYC Department of Transportation, elected officials, and local communities, is engaged in planning for the East Midtown Waterfront Project to improve access to the East River, enhance bicycle and pedestrian connectivity, and create waterfront amenities for public use and enjoyment in accordance with Vision 2020: New York City Comprehensive Waterfront Plan and OneNYC. The new waterfront esplanade would stretch for 22 blocks and fill a major gap in the 32-mile Manhattan Waterfront Greenway.

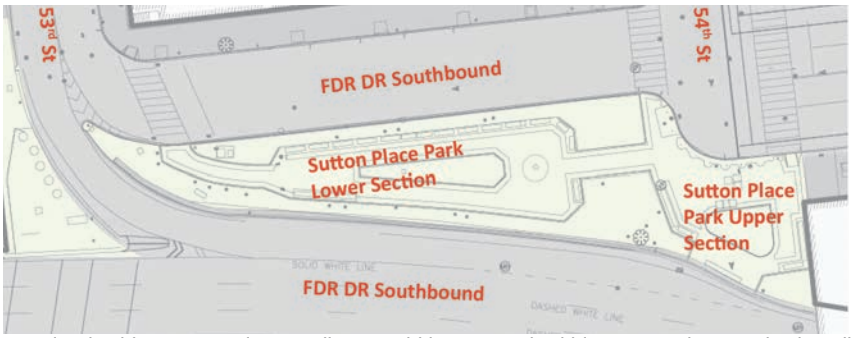
East Midtown Waterfront Esplanade and Greenway Project Map. (Credit: NYCEDC)

Division staff are involved reviewing the projects and the proposed new bridges to be constructed along the way. The project includes: the United Nations Esplanade ("UN Esplanade") located along the waterfront adjacent to the United Nations Headquarters and other high-rise developments from East 41st to 53rd Streets; the Outboard Detour Roadway Esplanade ("ODR

Esplanade") located along the waterfront from East 53rd to 60th Streets, where the portions of the proposed esplanade would be placed over existing ODR caissons; and two new upland pedestrian bridge connections ("Upland Bridge Connections") are to connect the landside west of the FDR Drive to the esplanades at East 48th Street and at East 54th Street. The Upland Bridge Connections will land at the two proposed 150-foot long esplanade nodes.

The 48th Street Upland Bridge Connection would run east-west along East 48th Street. The clear width of the connection would be 12 feet to allow for bi-directional pedestrian traffic and cyclists to comfortably walk their bicycles across to the proposed esplanade. Minor intersection improvements would be required at the East 48th Street and First Avenue intersection to allow pedestrians and cyclists to safely enter/exit the proposed Upland Bridge Connection. Portions of the existing sidewalk along East 48th Street would be utilized to transition into the new bridge structure to be placed adjacent to the existing FDR Drive Entrance Ramp and UN Campus gardens. This structure would be supported on piles placed in the medians across the FDR Drive.

The 54th Street Upland Bridge Connection would run east-west along East 54th Street at the Sutton Place terminus. The clear width of the connection would be 12 feet to allow for bi-directional pedestrian traffic and cyclists to comfortably walk their bicycles across to the proposed esplanade. Modifications to limited areas of Sutton Parks would be required to construct the Upland Bridge Connection. This structure would be supported on a retaining wall to be placed in the Sutton Parks, which would then transition to a bridge structure to get across the FDR Drive.



The 54th Street Upland Bridge Connection Landing Would be Located Within Sutton Place Park. (Credit: NYCEDC)

In April 2017, the Mayor announced a commitment of capital funding for design and construction for the Outboard Detour Roadway (ODR) Esplanade portion now referred to as the East Midtown Greenway – 53rd to 61st Streets and an upland 'flyover' connection at 54th Street. In summer 2017, NYCEDC released a publicly advertised RFP for a designer. The design commenced in October 2017. It is anticipated that the construction of the Greenway will be complete in 2022.

MTA EAST SIDE ACCESS PROJECT (QUEENS - MANHATTAN)

MTACC 's East Side Access Project (Bored Tunnel and Structures) is bringing new service from the LIRR lines to the East Side of Manhattan into a new terminal beneath the Grand Central Terminal. The project started more than 10 years ago and is still ongoing in various stages, which has significant impact on DOT's Honeywell and 39th Street (North) Bridges over Sunnyside Yard in Queens. Division engineers are engaged in performing design review and construction oversight for the various contracts related to this project for their impact on the bridges due to the proposed tunnel conflicts with the bridges. Work includes bridge pier reconstruction, pier modification and re-support on top of the new MTA tunnel wall, temporary structure framing for supporting the bridge decks and girders, bridge retrofits, excavation, piles, support of the excavation system, retaining walls, utility support, and lighting and work zone protection on, or

near the bridge structures. The review includes design drawings, structural calculations, specifications, reports, MOUs, geotechnical reports, and other related documents.

Honeywell Street Bridge in 2015: Left Elevation Spans 6-16. 39th Street (North) Bridge in 2017: Left Elevation Spans 10-14. Right Elevation Spans 10-12. (Credit: NYSDOT)

PACIFIC PARK PROJECT (BROOKLYN)

In the summer of 2014, as part of the Pacific Park Project, previously known as the Atlantic Yards, Greenland Forest City Partners began major civil engineering and track work in the LIRR train yard east of the 6th Avenue Bridge. This work will facilitate the future construction of a platform over the yard between 6th Avenue and Vanderbilt Avenue. The project also involves construction of the west portal, which is a new tunnel that will connect the rail yard to the LIRR tracks running under Atlantic Avenue, north of the 6th Avenue Bridge. The west portal will allow empty trains to go directly from the terminal to the yard, rather than backtracking and making a large loop to enter the yard from the east. As a result, track time will be freed up for trains carrying passengers. The project also includes a ramp structure from the 6th Avenue Bridge to the rail yard below. Division staff are involved in reviewing the design of the underpinning of the south abutment, the support of excavation drawings behind the north abutment, and the temporary supporting system below the north approach slabs, and the review of the monitoring reports. The work in proximity of the 6th Avenue Bridge and the project are slated to run through 2018.

Pacific Park Site Map. (Credit: Greenland Forest City Partners) 6/7/16 6th Avenue Bridge over LIRR Atlantic Avenue. Begin Abutment Right Edge and Right Wingwall – a Large Part of the Wingwall was Saw Cut and Removed During the Ongoing Pacific Park Project. Beginning Approach - Left Sidewalk is Closed due to Ongoing Construction Next to the Bridge. Right Elevation. (Credit: NYSDOT)

RETAINING WALLS

In May 2005, the Department started a program for the periodic inspection of City-owned retaining walls. The City currently owns 635 retaining walls. Those retaining walls were built during the interstate construction program between the 1940's and 1970's and are an important part of the city's street infrastructure. However, some of them are approaching the end of their service lives and are falling into poor condition due to various factors such as spalling/cracking of concrete, loosened mortar joints, broken stone masonry, falling coping stones, deteriorated joints, leakage through the walls due to improper drainage arrangements (clogged weep holes), bulging of walls due to hydrostatic pressure build-up on the back of the walls, and many other problems. In order to protect the infrastructure they support, the retaining walls require regular inspections and monitoring, and depending upon the condition of the walls, rehabilitation/replacement is required. Since 2005, 31 retaining walls have completed rehabilitation/replacement, and 5 retaining walls are in various stages of design and construction. The retaining walls which are in fair to poor condition will be in a capital program for future rehabilitation.

Retaining Walls: Irwin Avenue. Cross Island Parkway Southbound Before 100th Avenue. Cooper Avenue. Douglas Road. 2016: West 155th Street (Lower Level) Between Riverside Drive and Broadway During and After Rehabilitation by DDC. Riverside Drive (Northbound) to George Washington Bridge (West 168th to 171st Streets) During Rehabilitation. Riverside Drive Under George Washington Bridge Ramps (West 176th to 177th Streets). (2016 Credit: Jacob Ayman)

OVERWEIGHT TRUCK PERMIT REVIEWS

The Overweight Truck Permit Unit receives an average of 100 permit applications per week for overweight/over-dimensional trucks, self-propelled cranes, and occasional superload moves from utility companies crossing City-owned bridges, including critical bridges such as the Manhattan and Ed Koch Queensboro Bridges. Most of the permit requests must be reviewed and approved on the same day.

ENVIRONMENTAL ENGINEERING

In 2017, the Environmental Engineering staff of the Quality Assurance section continued to provide expertise and oversight of the various environmental issues of the reconstruction of the Mill Basin and Gerritsen Inlet Bridges in the Belt Parkway Project, the reconstruction of the Harlem River Drive over 127th Street, the City Island Bridge project, the Unionport Bridge over Westchester Creek, and the Macombs Dam fender rehabilitation project. This work has included monitoring and oversight of wetland restorations, management of storm water erosion and run off controls, asbestos and lead paint abatement, hazardous waste management, spill control/management, management of waste water, and groundwater/soil management. Additionally the unit was involved during the design review of these and other projects to ensure that all environmental issues are included in the project specifications and contract documents. The unit also works closely with project management and resident engineering staff through periodic meetings and site visits to ensure that environmental permits, work procedures and construction operations are in compliance with NYSDEC, US EPA and NYCDEP. The unit continues to provide environmental management on the Brooklyn Bridge, Macombs Dam Bridge, Mill Basin and Gerritsen Inlet Bridges over the Belt Parkway, Harlem River Drive Bridge over the 127th Street Viaduct, City Island Bridge, Component Rehabilitation projects, roadway bridges projects, and emergency work over water projects.

In addition, the unit provides technical services and expertise for the East Side Coastal Resiliency Project, which will consist of the construction of flood walls, levees and gates to protect lower Manhattan in the event of future flooding from storm events such as Superstorm Sandy. Unit staff also work with other NYCDOT divisions and City agencies in the development of guidelines and standards for the implementation of the NYC MS4 permit system, which addresses the discharge of stormwater to NYC water ways.

Bridge Maintenance, Inspections and Operations

EAST RIVER BRIDGES ANTI-ICING PROGRAM

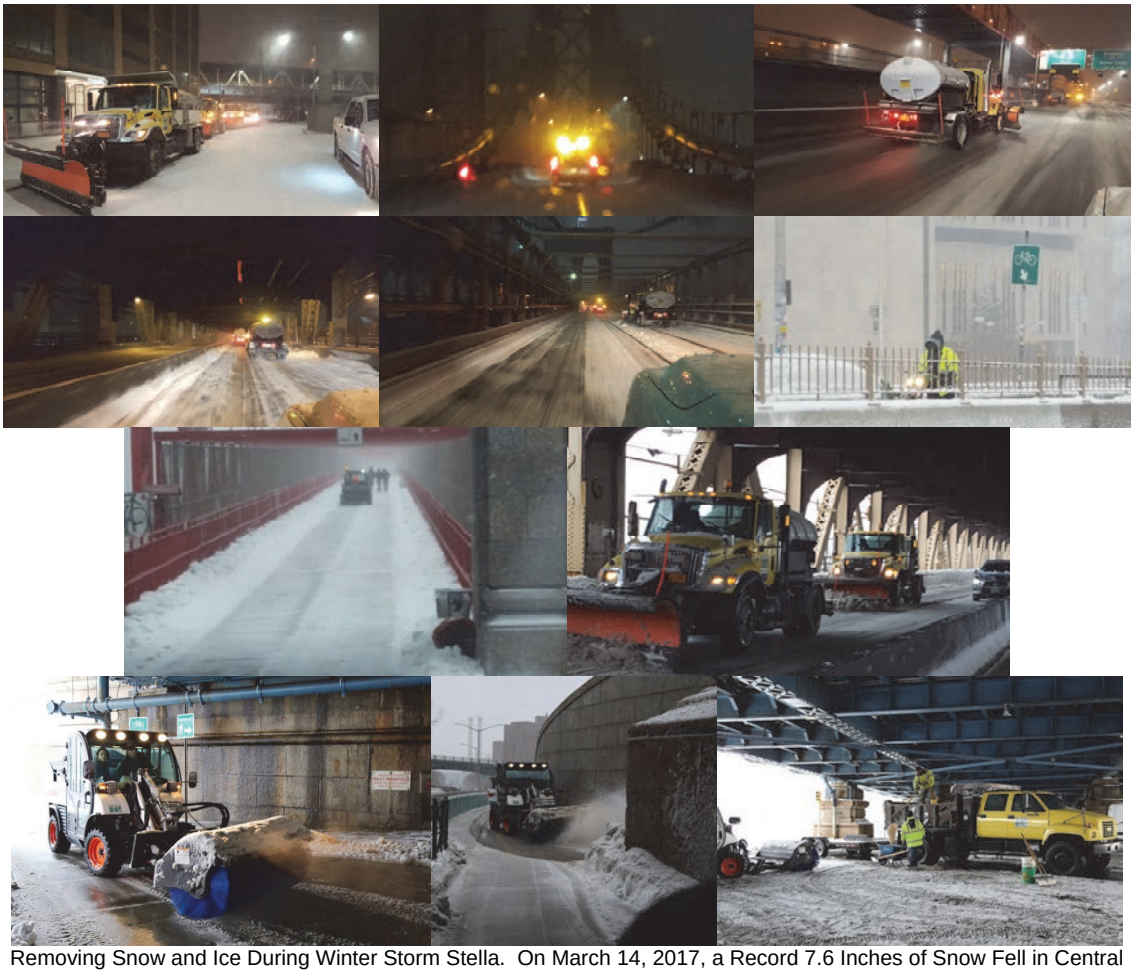
Traditional snow and ice control practices rely heavily on the use of salt, a material known to corrode steel and accelerate the deterioration of concrete and asphalt surfaces. An improved method of snow and ice control was needed to protect the City's $4.3 billion investment in the rehabilitated East River Bridges. This method, known as anti-icing, involves the application of a chemical freezing point depressant to the roadway surface to prevent snow and ice from bonding to the roadway. Frequent plowing removes any accumulation of unbonded snow or ice before traffic is affected.

The Division's Anti-Icing Program uses the liquid chemical potassium acetate and aggregate chemical sodium acetate. The anti-icing fleet consists of twenty-two application trucks, five plow trucks and several smaller plows. Ten of the spray trucks are combination spray/plow trucks with a 1,000 gallon tank capacity, and five are spray-spreader/plow trucks with a 360 gallon spray capacity, and a nine cubic yard spreader capacity. There are twenty chemical storage tanks, with a total storage capacity of 114,250 gallons.

There are anti-icing yards storing both chemicals under all four East River bridges. Supervisors monitor the bridge decks during storm events by traversing them and using thermal instrumentation installed in their vehicles to make informed decisions as to when to apply chemicals. GPS capabilities are installed in key vehicles to assist supervisors with the decision making process.

In the winter of 2016 - 2017, a total of 19,448 gallons of potassium acetate and 157 tons of sodium acetate were applied on the roadways of all four East River Bridges.

Winter Storm Nico. On February 9, 2017, 9.4 Inches of Snow Fell in Central Park. Bridge Paths. Commissioner Polly Trottenberg Thanking Division Staff – With Cement Mason Lawrence Marks; With Supervisor Bridge Painter William Budge, Assistant Chief Engineer – Flags and Operations Paul Schwartz, Area Supervisor Highway Maintenance Edward Pedersen, and Supervisor Highway Repairer Anita Ramos-Colon; With . Cement Mason Lawrence Marks, Bricklayer Stephen Daniel III, Supervisor Bricklayer Edward Alfano, and Cement Mason Mike Biancaniello.



Removing Snow and Ice During Winter Storm Stella. On March 14, 2017, a Record 7.6 Inches of Snow Fell in Central Park. Ready for the Storm. Plowing and Applying Chemicals on the Manhattan, Williamsburg, Ed Koch – Queensboro, and Brooklyn Bridges. The Plow Truck has a Large Round Container on the Back of the Truck Carrying and Spraying De-icing Liquid on the Bridge's Roadway. Brooklyn and Williamsburg Bridge Walkways. Ed Koch – Queensboro Bridge Lower Level. (Credit: Paul Schwartz) Commissioner Polly Trottenberg Inspecting One of the New Bobcats with a Broom Attachment at the Base of the Manhattan Bridge. Other Preparation.

Clearing the Pedestrian/Bicycle Path on the Brooklyn Bridge on December 14, 2017. (Credit: Hayes Lord)

INSPECTIONS

In 2017, Inspections covered 93 bridges and 510 spans. Emphasis was placed on ensuring public safety through the monitoring of potentially hazardous conditions and temporary repairs. The unit performed 1,176 monitoring inspections, including special winter monitoring inspections of cellular structures, shorings, and potential fire hazards. In addition, 173 emergency inspections were conducted in response to hot line calls, in-house requests, or citizen complaints.

2017: Inspecting Sunrise Highway (Westbound) over Laurelton Parkway (Westbound) in January. Belt Parkway Bridge over Sheepshead Bay Road in February. East 128th Street Pedestrian Bridge over 3rd Avenue Bridge Approach, Queens Boulevard Bridge over Jackie Robinson Parkway, and Brooklyn-Queens Expressway over Adams Street in March.
2017: Inspecting Battery Park Underpass, East Drive (Willowdell Arch) over Pedestrian Path Opposite East 67th Street, and Hempstead Avenue Bridge over Cross Island Parkway Ramp (Northbound) in April. 14th Avenue Bridge over Cross Island Parkway, and Congress Street Bridge over Brooklyn-Queens Expressway in May.

2017: Inspecting 149th Street Bridge over Cross Island Parkway, East 111th Street Pedestrian Bridge over FDR Drive, West Alley Road Bridge over Cross Island Parkway, East 51st Street Pedestrian Bridges over FDR Drive, and Boston Road Bridge over Hutchinson River in June.
2017: Inspecting Northern Boulevard (Eastbound) over Flushing River, West 181st Street Pedestrian Bridge over Henry Hudson Parkway (Northbound), Van Cortlandt Equestrian Bridge over Henry Hudson Parkway, 31st Street Bridge over Brooklyn-Queens Expressway/NYCTA, and Andrews Avenue Bridge over LIRR in August.

2017: Inspecting Brooklyn Promenade over Brooklyn-Queens Expressway (Eastbound), Bruckner Expressway (Northbound) over the Bronx River, and 60th Street over LIRR Montauk Division in September.
2017: Inspecting Park Lane South Bridge over LIRR Montauk Division, Hempstead Avenue Bridge over Cross Island Parkway Ramp (Northbound), 69th Street Bridge over Brooklyn-Queens Expressway, and Astoria Boulevard Eastbound Bridge over Brooklyn-Queens Expressway West Leg in October.

2017: Inspecting Van Name Avenue and Granite Avenue Bridges over B&O Railroad (Abandoned) in November, and Long Island Expressway over Woodhaven Boulevard and Margaret Corbin Drive over Pedestrian Path Near Northern Entrance in December. The Aerial Landscaping Unit of the Agency's Roadway Repair and Maintenance Division Pruning the Trees from the Van Name Avenue Bridge to Enable the Inspection of the Structure.

Winter Monitoring Locations: Manhattan, Williamsburg, and West 155th Street Pedestrian Bridge. Fire Hazard Locations: Glenmore Avenue and Ocean Parkway Bridges Over LIRR Bay Ridge, and 51st Avenue Pedestrian Bridge Over LIRR.

Winter Monitoring Locations: Cellular Structure Locations: Ed Koch – Queensboro Bridge, 163rd Avenue Pedestrian Bridge Over Hawtree Basin, and Crocheron Park Pedestrian Bridge Over Cross Island Parkway.

Winter 2017: Thomson Avenue Ramp of Ed Koch – Queensboro Bridge, Wards Island Pedestrian Bridge. 145th Street Bridge. West 181st Street Bridge over Ramp to Washington Bridge.

The Bridge Data System (BDS) allows inspection reports to be generated and transmitted electronically. It provides access to data from the latest inspection reports on all bridges to all Division units. In addition, when an emergency arises, our inspectors are able to send photographs and other information to the main office via a wireless connection. This feature enables bridge repair engineers to assess the condition and dispatch repair crews with the appropriate equipment in a timely manner. The updated version of the system was field tested by the contractor and the Bridge Management Unit in 2012 and was fully implemented the following year.

A future contract is anticipated to expand the BDS capabilities by incorporating data from capital reconstruction projects. Additional features will include in-depth inspection reports by consultants as well as GPS data.

Since 2002, the Division stores all bridge inspection reports in electronic format. Flag reports are now also transmitted electronically. As of September 2003, standard inspection work is funded by a federal grant. Emergency response inspections and administrative support remain city funded.

The Bridge Management Unit developed a map of truck routes and bridges under capital contracts for the purposes of the Truck Permits Unit. This unit also provided Bridge Maintenance with estimates of the life-cycle benefits of various maintenance tasks, obtained by the software package designed for that purpose.

In 2017, the unit joined the financial analysts of the Commissioner's Office in the effort to quantify the losses of bridge capacity due to overweight trucks. A related study of New Jersey bridges by Rutgers University researchers (the Rutgers Infrastructure Monitoring and Evaluation Group) is modified at no cost to the City for that purpose with data provided by Traffic and Bridge Management. It examines the impact of truck loads on bridges through the utilization of bridge inspection reports, truck weight-in-motion (WIM) data, and the bridge inventory database.

STRUCTURAL HEALTH MONITORING

The Bridge Inspection and Management Units have pioneered the use of various nondestructive tests on City bridges, including X-ray diffraction, fiber optics, strain-gauging, ground penetrating radar, and ultrasonic testing. Future applications of such technologies are under consideration. For demonstration purposes, the Manhattan Bridge was surveyed with a radar scanner. The results indicated that the stiffening of the bridge has reduced its torsional motion under subway traffic very significantly. The results matched independent measurements by Global Positioning Systems (GPS).

In November 2010, the cable research project moved to its final phase as sensors were installed on Cable "D" of the Manhattan Bridge with the help of bridge maintenance personnel. The data collection from the instruments in the cable was concluded in October 2011. As part of the project, a unique magnetic flux field test was conducted on the cable. The method was developed by Japanese researchers specifically for this test. Its purpose is to estimate the amount of healthy steel in the cable without exposing the wires. The findings were presented at the Agency by the researchers in February 2011. This capability will be considered for future inspections of suspension cables. The final report, published by the Federal Highway Administration, advanced the state of the art of suspension bridge cables. Further tests of the effects of dehumidification and heat on cables are in progress.

Since 2014, a remote monitoring system has operated on selected spans of the Manhattan approach to the Brooklyn Bridge. Select locations were instrumented with fiber optic sensors that allow for real time, on-line monitoring of existing flagged conditions. Crack sensors, displacement sensors, temperature sensors, and tilt meters were utilized to monitor changes of crack widths, foundation settlement, temperature fluctuation, and wall rotation, respectively. The system was also designed to send out alert messages to Division personnel should certain conditions arise

during the monitoring of these flags. The sensors have demonstrated which flagged conditions are the most active and will need to be watched carefully. In 2017, the sub-consultant was asked to help improve the security of the computer stored at the bridge and to provide additional protection against hacking and virus protection. The data for the current system is stored in a cloud-based storage solution under the control of the Agency's information technology department. The forthcoming rehabilitation of the approach spans will benefit from the information collected through this monitoring.

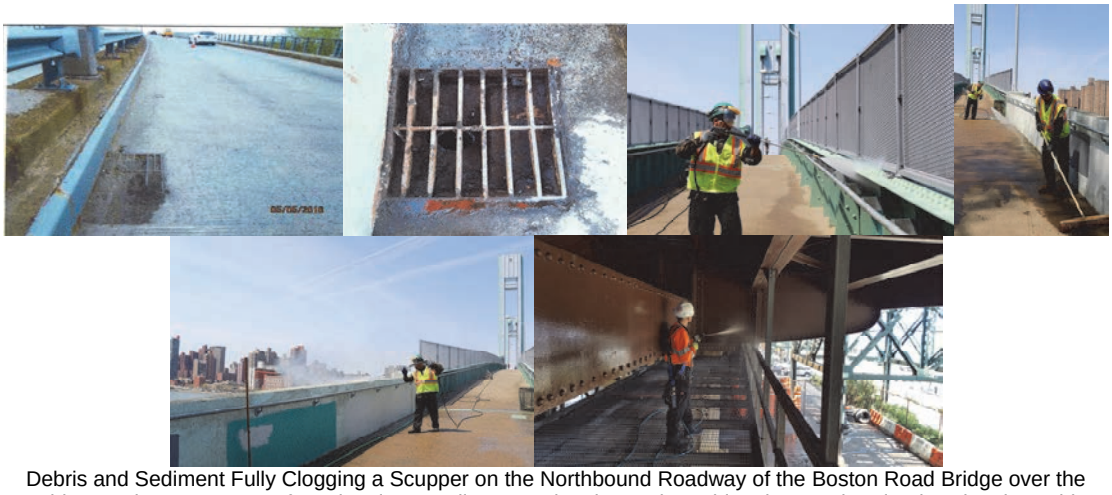
November 2017: Assistant Civil Engineers Sarah Jurado and Nahed Yaaqoub Utilizing a Borescope at the Van Name Avenue Bridge Over B&O Railroad (Abandoned) in Staten Island. The Snooper was Operated by Assistant City Highway Repairer Derrick Butler.

In 2014, the Bridge Management Unit finalized the installation of a real-time on-line system for monitoring the abutments and piers of three bridges in the Bronx identified as vulnerable to scour. Solar panels were installed at each location to supply power to the various instruments and computers installed at each bridge. The computers then send the information that was gathered from the monitoring equipment wirelessly to a remote web server where bridges personnel can monitor conditions in real time. In 2015, the server was turned over to the Agency and our IT department is now managing the hardware. Recommendations were also made to the NYC Parks and Recreation Department for the permanent repairs to the scour conditions at the Magnolia Way Bridge. In 2017, the system was upgraded after large trees and other damaging debris caused the sensors at Magnolia Way to stop transmitting data. The new equipment is more robust and includes a night vision camera, easily-replaceable sensors that can accurately determine the current riverbed level, and upgraded computer hardware and software. An evaluation will be made in 2018 about whether to expand the new system to the adjacent bridge at the Mosholu Parkway.

CLEANING

In 2017, 10,083 cubic yards of debris were removed from bridges and their surrounding areas, and 978 drains were cleaned.

Water Spraying the 9th Street Bridge over Gowanus Canal in July 2012. July 2013: Power Washing the Battery Park Underpass. (Credit: Earlene Powell) October and December 2015: Highway Repairer Abibi Ocampo Guevara Removing Debris Collected by Vagrants Under the Willis Avenue Bridge.



Debris and Sediment Fully Clogging a Scupper on the Northbound Roadway of the Boston Road Bridge over the Hutchinson River. Scupper After Cleaning. April 2016: Cleaning and Washing the Ward's Island Pedestrian Bridge. (Credit: Alaina Yuresko) May 2016: Washing the Underdeck of the Ed Koch – Queensboro Bridge. (Credit: Bojidar Yanev)

PIGEON DETERRENCE

Excessive numbers of pigeons cause property deterioration, unsafe working conditions and health hazards. Besides being unsightly, accumulation of pigeon droppings and feathers is corrosive to steel structures and raises concerns about health hazards. Many disease organisms have been associated with pigeons. They harbor ectoparasites which can infest or bite humans. Pigeon droppings also harbor fungi that can trigger serious, even fatal, lung diseases such as Histoplasmosis, Cryptococosis and Toxoplasmosis, when the spores are transmitted to humans who breathe in the harmful dust.

The Division utilizes a relatively low tech, and passive, approach to deterring pigeons: netting, which is supported by steel cables that are clipped to the beams. This method is currently in use under the Brooklyn Queens Expressway (over Prospect Street), at the Pulaski Bridge, under the Brooklyn Bridge at "Ash Alley," and at the anti-icing tank storage area under the Brooklyn Bridge at Dover Street.

We continue to use a new method on the flanges over the north sidewalk at the Brooklyn-Queens Expressway over Atlantic Avenue: a gel, whose active ingredient is capsaicin, that is applied to the spots where unwanted birds would normally perch. The burning sensation caused by the capsaicin irritates the birds' feet and results in them roosting elsewhere. Evaluation in 2017 found that this method was still effective.

In 2017, pigeon dropping removal and/or pigeon proofing were performed on the Grand Concourse at 174th Street, 204th Street, and Bedford Park Boulevard as well as on the Third Avenue Bridge and the Williamsburg Bridge.

Installing Pigeon Netting at Old Slip (FDR Drive at the South Street Viaduct) in June 2012: Carpenters Stephen Buckley, William Sic, and Joseph Moschella, and Supervisor Carpenter Joseph Vaccaro. (Credit: Thomas Whitehouse) Summer 2016: Repairing Pigeon Netting at Span #9 of the Pulaski Bridge, Damaged by a Truck Strike.

Nature's Pigeon Deterrent— Falcons on the Brooklyn Bridge South Side Tower, Manhattan Tower Top, and Cables. Falcons Have Lived on the Brooklyn Bridge Since 1995. According to the New York State Department of Environmental Conservation, New York State now has the largest population of peregrines in the eastern United States. There Were 20 Active Nesting Falcon Pairs in New York City in 2013.

Falcon Family on the Williamsburg Bridge. (Family Credit: Russell Holcomb) "Owl" Guarding the Machinery Room of the Broadway Bridge. A Hawk on the Broadway Bridge. (Owl and Hawk Credit: Albert Hong)

BRIDGE CLASSIFICATION

The Coast Guard regulations, which govern the operation of the City's movable bridges, define the owner's responsibility to the mariner by classifying a bridge as "open on demand" or "open on advance notice." An "on demand" bridge provides an immediate opening to any vessel wishing to pass the bridge. An "advance notice" bridge opens after the mariner requests an opening several hours in advance. "On demand" bridges must be staffed at all times. "Advance notice" bridges are staffed only when necessary. DOT redesigned the work process in order to reduce personnel costs to the City and improve the delivery of services to the maritime community.

Third Street Bridge Opening in June 2012. (Credit: Nikita Gupta) 145th Street Bridge Open in June 2013. (Credit: Ting Yu Huang) Ninth Street Bridge Open in September 2013. (Credit: Vera Ovetskaya) Unionport Bridge Open for Tugboat in 2014. Union Street and Greenpoint Avenue Bridges Opening in July 2015. (Credit: Litcy Barreto) Sequence of the Willis Avenue Bridge Span Opening as Seen From the Bridge in 2015.

Old Mill Basin Bridge Opening During Construction of the New Bridge in June 2017. Hamilton Avenue Bridge Open in May 2017. Metropolitan Avenue Bridge Over English Kills Open in July 2017. (July Credit: NYSDOT)

In October 2000, the Department implemented the United States Coast Guard-approved changes, establishing a four-hour notice for the Harlem River bridges, and a two-hour notice for the remaining “advance notice” bridges. The “on demand” classification remains for three bridges. The revised advance notice requirements allowed the formation of mobile crews with overlapping responsibilities, meeting the mariners’ needs and, in some instances, improving service by providing two mobile crews to expedite a vessel’s travel along a waterway. In addition, bridge operational capabilities, general maintenance, and debris and snow removal have been enhanced through the more efficient utilization of existing personnel.

Ward's Island, Willis Avenue and 145th Street 4-Hour Notice Posting. Bridge Operator Kenneth Crandell Operating the Broadway Bridge. (Credit: Vera Ovetskaya)

The reconstruction of the Mill Basin Bridge (part of the second Belt Parkway Group) began in June 2015. The new bridge will be a fixed structure with a 60-foot clearance over Mean High Water, obviating the need for opening and closing the structure to accommodate tall vessels. All vehicular, pedestrian and bicycle traffic was shifted onto the newly constructed eastbound part of the bridge on December 4, 2017. The old movable span was then locked into the upright position on December 8.

The Shore Road Bridge over Hutchinson River will be replaced with a new bridge built with a higher clearance, thereby reducing the number of times the bridge must be opened. At that time, we can determine if advance notice is justified.

Summary of Vessel Openings 2003 - 2017

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Borden Avenue (Q)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Broadway (B/M)	49	16	2	18	42	58	57	15	11	44	0	6	4	8	6
Bruckner Expressway (Unionport Bridge) (B)	300	309	253	250	281	323	349	308	198	143	143	218	130	144	96
Carroll Street (K)	186	49	22	28	13	38	91	146	29	95	2	12	0	11	19
Grand Street (K/Q)	10	8	5	2	5	0	0	0	3	3	0	0	0	0	1
Greenpoint Avenue (J. J. Byrne Memorial Bridge) (K/Q)	738	1093	1045	905	641	485	428	388	667	733	609	723	862	921	1040
Hamilton Avenue (K)	824	757	677	1077	354	0	150	905	1060	965	651	760	1061	885	588
Hunters Point Avenue (Q)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Hutchinson River Parkway (B)	5	37	10	2	51	61	170	224	169	197	275	204	311	330	118
Macombs Dam (B/M)	0	0	0	0	4	2	0	3	1	22	0	0	0	0	0
Madison Avenue (B/M)	0	7	0	9	35	8	0	3	1	6	0	0	0	10	11
Metropolitan Avenue (K)	342	153	0	104	329	245	240	254	413	468	378	360	133	243	302
*Mill Basin (K) **Permanently removed from service on 12/8/2017.*	173	164	162	174	182	190	183	197	236	277	246	210	181	127	190
Pulaski (K/Q)	599	694	734	433	489	639	611	467	591	476	484	693	598	462	452
Roosevelt Island (M/Q)	63	669	150	54	48	0	62	0	0	55	55	43	60	60	30
Shore Road (Pelham Parkway) (B)	1910	2011	1683	1704	1645	1446	806	1197	811	613	697	724	638	836	809
Union Street (K)	24	21	11	9	5	10	28	32	4	36	0	0	25	11	5
Ward's Island Pedestrian (M)	0	7	2	8	4	6	3	5	0	0	0	3	4	2	1
Willis Avenue (B/M)	7	25	2	41	67	17	9	1	1	0	0	0	0	11	28
3rd Avenue (B/M)	0	0	0	6	60	7	0	3	3	4	2	6	8	10	9
3rd Street (K)	152	99	43	31	39	49	89	74	27	68	0	0	77	11	31
9th Street (K)	547	457	360	480	333	287	387	475	670	585	270	427	711	545	405
145th Street (B/M)	0	9	0	0	0	0	0	0	1	6	0	0	1	9	7
West 207th Street (University Heights) (B/M)	6	10	1	12	24	2	3	7	5	23	0	0	0	0	0
TOTAL	5935	6595	5163	5347	4652	3873	3666	4704	4901	4819	3812	4389	4804	4636	4148

When and Where Unit

The work under these contracts includes the repair of flag conditions by performing structural rehabilitation, maintenance and replacement of components, primarily on bridges. Steel work may include: removing existing rivets and/or bolts and replacing with new high strength bolts; welding sections of steel plates to existing steel members, when necessary, as part of the rehabilitation work; reconstructing connections between steel members, when necessary, as part of the rehabilitation work; replacing or reconstructing steel members and bearings including beams, webs and flanges, column angles, channels and stiffeners; replacing deck expansion joints; replacing guard, bridge and hand railings of various types, in kind; rebuilding staircase; and replacing bridge deck gratings and support steel. Concrete work may include: removing and replacing sections of concrete retaining or abutment wall and foundation, including bearing pedestals, where required; removing spalling concrete surfaces (including shotcrete or gunite) and replacing with mortar or structural concrete; resetting masonry facing on pier walls; removing areas of deteriorated sidewalk and/or roadway deck, and replacing with new concrete sections; removing existing curbs and pouring new steel faced curbs in place; drilling weepholes in retaining walls; installing piles under water; modifying staircase; placing specialized concrete overlays on structural slabs; and replacing/rehabilitating masonry parapets. Miscellaneous work may include: providing temporary shoring of beams, stringers and columns; cleaning clogged catch basins and drainage systems; removing and replacing existing drainage systems; rebuilding areas of erosion and provide slope control (Rip-Rap); paving roadway surfaces; cleaning and removing debris on or under structures; installing and removing traffic barricades; repairing and replacing fencing; excavating and disposing of all materials encountered where required; painting existing metal surfaces and coat concrete surfaces with waterproofing material; furnishing and driving sheeting and piles; repair of existing piles; and demolition of highway and bridge structures, whole or in part.

In 2017, the following structures were worked on under the Division's When and Where contracts: Boston Road over Hutchinson River, East 175th Street Bridge over Metro North, Pulaski Bridge over Newtown Creek, West 155th Street Bridge over Amtrak, East 156th Street Bridge/Access to Housing, East 149th Street Bridge over Metro North, West 225th Street Bridge over CSX Trans-Putnam, East 188th Street Bridge over Metro North, Rockaway Boulevard Bridge over Hook Creek, 92nd Street Pedestrian Bridge over Belt Parkway, 28th Avenue Pedestrian Bridge over Cross Island Parkway, Manhattan Promenade over FDR Drive (81st Street to 92nd Street) over FDR North and South bound direction, Delancey Street Pedestrian Bridge over FDR Drive, 44th Street Bridge over Grand Central Parkway, Brooklyn-Queens Expressway Eastbound over Brooklyn-Queens Expressway Westbound, East 120th Street Pedestrian Bridge over FDR Drive, East 129th Street Pedestrian Bridge over FDR Drive, Braddock Avenue over Cross Island Parkway, West 73rd Street Pedestrian Bridge over Amtrak, Northern Boulevard Bridge Eastbound over Flushing River, Northern Boulevard Bridge Westbound over Flushing River, Riverside Drive Bridge over Amtrak, West 158th Street Bridge (DOT Parking Garage), Crocheron Park Pedestrian Bridge over Cross Island Parkway, Inwood Hills Footbridge over Amtrak 30th Street Branch, Isham Park Pedestrian Bridge over Harlem River Inlet, Motor Parkway (Pedestrian) Bridge over Springfield Boulevard, Arthur Kill Road Bridge over SIRT, West Footbridge over Clove Lake, East Footbridge over Clove Lake, Tompkins Avenue Bridge over Greenfield Avenue, Hempstead Avenue Bridge over Cross Island Parkway, 79th Street Pedestrian Plaza over 79th Street Boat Basin Garage, 79th Street Traffic Circle over 79th Street Pedestrian Plaza, 79th Street Ramp to Garage over 79th Street Boat Basin Garage, Garage Ramp to 79th Street over 79th Street Boat Basin Garage, and Southbound Henry Hudson Parkway Ramp to 79th Street over 79th Street Boat Basin Garage.

Difficult emergency red structural flag repairs were conducted within the NYCTA-owned chambers at the Brooklyn-Queens Expressway Eastbound over Brooklyn-Queens Expressway Westbound – Promenade. The reinforced concrete bearing support column at Span# 34, inside the enclosed center chamber under the deck (down the manhole), exhibited a large crack and a deep spall on the column faces, and the main vertical rebars and column stirrups were severely

corroded. The scope of work also included the installation of fire-retardant protective wood shielding around the cables and planking over the pit.

The urgent repair at this location necessitated the application of rapid expertise from the three contributing organizations to the success of the repair. Not only were the construction contractor's supervisor and workers committed to the work, but so were the NYCDOT When & Where Engineers supervising the repair work. Access to this location required; a right and center lane closure at the Brooklyn-Queens Expressway Eastbound during night time; a NYCTA flagger; a NYCTA maintenance crew, DOT inspectors and engineers, and contractor workers with confined space entry training qualifications; an air test conducted by the NYCTA crew prior to entering; and a full body harness for all personnel accessing the chamber (in case of emergency). The NYCTA staff continued monitoring the air quality in the chamber during the work. The condition was addressed by installing steel shorings on both sides of the deteriorated concrete column.

Entrance to the Confined Space. Span 34, Spalled Support Column with Exposed Main Rebars and Broken Stirrups. (Condition Credit: NYSDOT) Repairing the Flagged Conditions.

MARINE WHEN AND WHERE

New York State DOT conducts the underwater inspections of our waterway structures. A contract was needed to facilitate the performance of marine repairs and to maintain structures in need. The objective is to perform marine structural repairs and maintenance together with other appurtenant work, which constitutes repairs of defective and deteriorated parts of bridge structures due to, and in a water environment. The Department has neither the in-house staffing nor the equipment to handle this type of special work. These repairs could not be handled under the usual time and materials When and Where contract. This work is unique, in that it requires a

consultant with licensed underwater capability to supervise and inspect the work for compliance and adequacy. Furthermore, detailed note taking is necessary by the inspectors to check and approve payments for the contractor's work.

The work under these contracts includes the repair of flag conditions by performing structural rehabilitation, maintenance and replacement of components, primarily on bridges and fender systems, either performed on land or with the use of a barge. The work may include: Filling in spalled concrete areas in abutment faces below the water line with grout or marine epoxy mortar; replacing/repairing timber fenders that have missing or rotting boards, as needed; replacing or providing additional cribbing timber and backfill where gaps allow backfill to wash out underwater; pumping grout and adding scouring protection where concrete abutments, piles, and columns exhibit undermining and/or timber piles are exposed at the mud line; replacing or repairing dolphin piles and steel cables that are damaged or need replacement; repairing columns and piers underwater or at water level, as necessary; installing piles under water where required; drilling weep holes in retaining walls where required; furnishing and driving sheeting and piles where needed; removing and replacing sections of concrete retaining or abutment wall and foundation where required; rebuilding areas of erosion and providing slope control; removing spalled concrete surfaces, and resetting masonry facing in pier walls; repairing and replacing fencing; removing and replacing existing drainage system components; cleaning and removing debris on or under structures; installing or removing traffic barricades; excavating and disposing of all material encountered where required; demolition of bridge components whole or in part; cleaning clogged catch basins and drainage systems; priming existing metal surfaces with a non-corrosive coating and coating concrete surfaces with waterproofing material; furnishing and driving sheeting and piles; repairing existing piles; and demolition of highway and bridge structures, whole or in part.

Marine bridge repairs addressed in 2017 include the Roosevelt Island Bridge over the East Channel of the East River, the FDR Drive Cantilever Structure (under the United Nations Building) over the East River, and the West 207th Street Bridge over Harlem River.

Some of these locations experience rapid marine borer activity, causing accelerated deterioration, steel material corrosion due to weather and water elements, as well as repeated damage due to heavy marine traffic and/or a narrow channel. The issuance of new flags occasionally necessitates new visits to even recently completed projects. Timber fender systems especially susceptible to recurring hits by barge traffic, and consequently require periodic restoration in relatively short time periods.

2017: Timber Fender Wall Repairs at the Roosevelt Island Bridge. (Credit: Thomas Leung)

2017: Steel Repairs at the FDR Drive Cantilever Structure. (Credit: Thomas Leung)

The West 207th Street (University Heights) Bridge over the Harlem River connects West 207th Street in the Inwood section of Manhattan and West Fordham Road in the University Heights section of the Bronx. It is a swing type bridge that opens to allow marine traffic to pass along the Harlem River. The fender system is required to protect the Bridge and the marine traffic when the Bridge is in the open position.

During the construction phase of the project to replace the north and south fender system, further issues were found beneath the center pier system. Although a full-length timber pile was not feasible, the unit and its contractor determined a way to conduct a difficult but attainable repair. A change in design was initiated to introduce steel H-piles spliced together. This method made it feasible to install a full pile length under the bridge.

During the demolition of the north end of the existing fender, marine borers were discovered in the southern yellow pine piles. To help guard against future marine borer attacks, the new fender piles, wales, bracing, and sheathing will all be made out of greenheart lumber, species *chlorocardum rodiei*. Greenheart lumber is being used increasingly throughout the New York harbor for its resistance to marine borers. An added benefit of greenheart lumber is that is stronger and stiffer than other species of wood traditionally used in marine construction. For example, greenheart is approximately three times as strong and three times as stiff as southern yellow pine.

The replacement fender will replace the existing fender system largely “in-kind” in the sense that the fender will maintain the same footprint as the existing fender and will employ timber framing. The existing Western annex, added in the late 1980’s will not be demolished and will be incorporated into the replacement fender system.

The salvage and restoration operations commenced in October 2015, utilizing barge-mounted cranes and associated salvage equipment situated in the East Channel. To date, all dislodged piles and bracing elements have been removed from the East Channel river bed, and the contractor installed 436 new timber piles, an interior timber frame structure, and walkway decking. In addition, an intricate steel frame structure was installed (driving 70 feet length of timber piles) under the bridge to address clearance height issues in 2017. The project is scheduled to be completed in spring 2018.

May 2015 – University Heights Collapsed Fender System. Collapsed Fender System in East Channel. December 2015: Loosening the Existing Wooden Pile to Facilitate its Easy Removal From the River (Mud) Bed. The Vibrating Hammer is Attached to the Crane Initially to Vibrate it and Ultimately Loosen the Existing Piles. . April 2016: Pile Driving Operation.

University Heights Bridge in July 2016: Pier 3, Left Side, Repaired Wooden Catwalk. (July Credit: NYSDOT) September 2016: Installing and Securing the Whaler Timbers at the South and East Faces of the Fender.

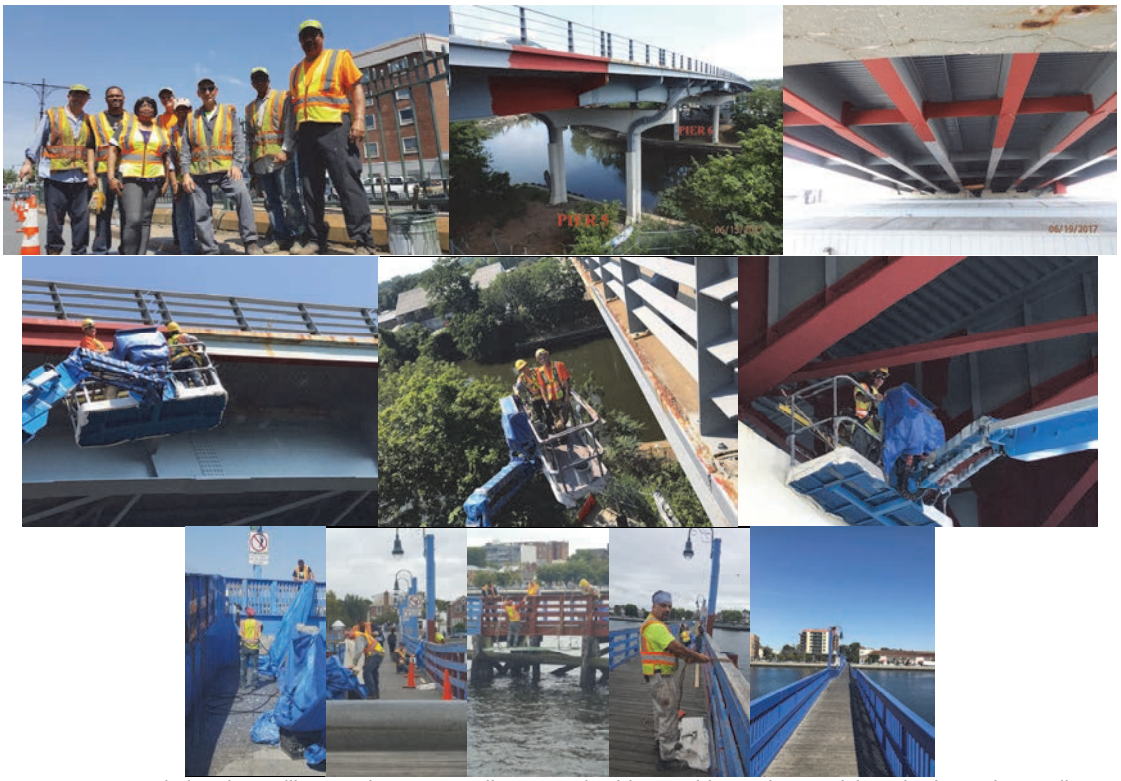
University Heights Bridge in May 2017: East Channel Closed Sign. Repairs in November 2017. Executive Director of Bridge Repair and Preventive Maintenance Roly Parroco and – Senior Director of When & Where /ERBPM Sunil Desai.

PAINTING

In 2017 the following bridges were painted as part of the in-house maintenance program: Brooklyn-Queens Expressway East Leg over 32nd Avenue, Grand Concourse over East 170th Street, Boston Road Bridge over the Hutchinson River, Brooklyn-Queens Expressway Eastbound over Washington Street, Brooklyn-Queens Expressway Westbound over Washington Street, Brooklyn-Queens Expressway over Prospect Street, Brooklyn-Queens Expressway over Sands Street, Brooklyn-Queens Expressway Westbound over Joralemon Street, Brooklyn-Queens Expressway Eastbound over Joralemon Street, Brooklyn-Queens Expressway Westbound over Cadman Plaza, Brooklyn-Queens Expressway Eastbound over Cadman Plaza, Bruckner Expressway over Bruckner Boulevard, 150th Street over Cross Island Parkway, 149th Street over Cross Island Parkway , East Fordham Road over Bronx River, Southern Boulevard over East Fordham Road, Crotona Avenue over Bronx Pelham Parkway, Park Road (204th Street) over Bronx River, East Tremont Avenue over Bronx River, Grand Concourse over East 167th Street, Hylan Boulevard over Lemon Creek, Chelsea Road over Sawmill Creek, Hempstead Avenue over Cross Island Parkway, Ocean Avenue Pedestrian Bridge over Sheepshead Bay, and Belt Parkway over Bay Parkway.

March 2017: Bridge Painters Elisangela Oliveira and Elcio Zaharko Removing Snow From Job Site. Painting the Bruckner Expressway - Bridge Painter Richard Mocciaro in September, and Bridge Painter Elisangela Oliveira in October.

Grand Concourse over East 170th Street Bridge in March, and the East Tremont Avenue and East Fordham Road Bridges in April 2017. (Credit: Arlindo Lima)



May 2017: Painting the Railings at the East Fordham Road Bridge: Bridge Painters Elcio Zaharko and Juscelino Andrade, Deputy Director of In-House Painting Earlene Powell, Bridge Painters Elisangela Oliveira, Rodrigo Villavicencio, Konstantinos Issidoridis, and Suraj Ramnanan, and Supervisor Bridge Painter Arlindo Lima. June and July 2017: Boston Road – Painting Underway at Spans #6 and 2. Bridge Painters John Gallagher, Joice White, and Reinaldo Leal. (June Credit: NYSDOT. July Credit: Goncalo Lima) August 2017: Ocean Avenue Pedestrian Bridge – Bridge Painters Victor Rodriguez and Vlatko Zic. Supervisor Bridge Painter Frank Duic and Bridge Painters Vlatko Zic and Sean Gabler. Bridge Painters Vlatko Zic and Wayne George, Supervisor Bridge Painter Frank Duic, and Bridge Painter Richard Plaza (with Hardhat). Bridge Painter Nicholas Krevatas (With Bridge Painter Victor Rodriguez in Background). Completed Job. (Completion Credit: Frank Duic)

Bridge Painters Reinaldo Leal and Kermin Delarosa. (Credit: Goncalo Lima) Bridge Painters John Gallagher and Joice White at the Boston Road Bridge. Bridge Painter Vlatko Zic in the Manlift at the Brooklyn-Queens Expressway Over Cadman Plaza. Bay Parkway Bridge. (BQE and Bay Parkway Credit: Frank Duic) Painting of Brooklyn-Queens Expressway Over Nassau Street in Progress. (Credit: Goncalo Lima)

In March 2017, Bridge Painter Elisangela Oliveira was Featured in Deanne Fitzmaurice's "Women Can Build: Re-envisioning Rosie" Photograph Exhibit in the DOT Art Display Case Near the Agency Headquarters on Water Street. The Exhibit Revealed the Contributions of the Skilled and Hard-Working Women Building 21st Century Transportation. Bridge Painter Elisangela Oliveira and Commissioner Polly Trottenberg. Photographer Deanne Fitzmaurice with Elisangela Oliveira and Deputy Director of In-House Painting Earlene Powell. July 2017: Bridge Painter Joice White Atop the Brooklyn Bridge.

In 2017 the following bridges were painted as part of the capital program: Sunrise Highway Westbound over Belt Laurelton Parkway Eastbound, Sunrise Highway Westbound over Belt Laurelton Parkway Westbound, Riverside Drive Viaduct over West 125th to West 134th Streets, Hutchinson River Parkway over Hutchinson River, Northern Boulevard over Cross Island Parkway, 160th Street over Cross Island Parkway, 71st Avenue over Cooper Avenue, Roosevelt Avenue over Shea Road, Cross Island Parkway over Dutch Broadway – 115th Avenue, Whitelaw Pedestrian Bridge over North and South Conduit Avenue, and East 12th Street Bridge over Belt Parkway.

160th Street Bridge over Cross Island Parkway in August 2017. Roosevelt Avenue Bridge over Shea Road in September and November 2017. (Credit: Vadim Sokolovsky) Right Elevation of Whitelaw Pedestrian Bridge Over North and South Conduit Avenue. Underside of Spans 1-3.

In 2017, the following structures and/or facilities were also painted: 55 Water Street (offices), Greenpoint Yard, 424 Wythe Avenue (offices), 372 Kent Avenue (offices), West 206th Street Yard, North 6th Street at Kent Avenue, Kent Avenue Carpenter Shop (moveable bridge components),

Harper Street Maintenance and Repair Shops (garages), Maspeth Sign Shops (offices and shop areas), 59th Street Ironworker Shop, Hamilton Avenue Asphalt Plant, East 59th Street (offices), Vernon Boulevard Yard, Flatbush Yard, Eastern Boulevard Bridge House, Metropolitan Avenue Bridge House, Hutchinson Parkway Bridge House, Berry Street Yard, 9th Street Bridge House, and 17 South 6th Street garage.

During 2017, the following structures were also painted during the winter: Department of Environmental Protection facilities at Metropolitan Avenue, 24 Ontario Avenue over Richmond Avenue North, 242 Van Cortlandt Park, Pike Street, 930 Zerega Avenue, 79th Street and Central Park, and North 15th Street.

Bridge Painters Painting A DEP Crane in January and February 2017. (Credit: Arlindo Lima)

The following locations were also worked on in support of the DOT Iron Worker Shop: Grand Street Bridge, Manhattan Bridge, 59 Adams Street Ironworker Shop, Williamsburg Bridge, Unionport Bridge, and the Pulaski Bridge.

The American flags on the Brooklyn Bridge were lowered to half-mast by Division painters in 2017 in tribute to NYPD Detective Steven McDonald, former NYC Councilmember Priscilla Wooten, former Queens Borough President and Councilmember Helen Marshall, FDNY EMT Yadira Arroyo, NYPD Detective Shaniqua Osborne, Senator and Mercury Seven Astronaut John Glenn, Judge Sheila Abdus-Salaam (the first Muslim woman appointed to the bench in the United States and the first African-American woman and Muslim appointed to the New York Court of Appeals), FDNY Fifrefighter William Tolley, Peace Officers Memorial Day (May 15), Peter Wertheim, Memorial Day, Navy SEAL Special Warfare Officer First Class Remington J. Peters, NYPD Detective Miosotis Familia, former City Councilwoman Julia Harrison, Sergeant Roshain Euvince Brooks, the anniversary of the September 11, 2001 attacks, the victims of the shooting in Las Vegas, Nevada, the victims of the truck attack in New York City, the victims of the shooting in Sutherland Springs, Texas, National Pearl Harbor Remembrance Day, and former Commissioner and First Deputy Commissioner of the Office of Labor Relations James Hanley.

American Flag Atop the Brooklyn Bridge's Tower at Half Mast on September 11, 2017.

GRAFFITI REMOVAL

In 2017, 3,423,181 square feet of graffiti were eliminated. This program focuses its primary attention on the four East River bridges, as well as the following 24 arterial highways: Clearview

Expressway, Gowanus Expressway, Belt Parkway, Major Deegan Expressway, Harlem River Drive, Van Wyck Expressway, Whitestone Expressway, Brooklyn-Queens Expressway, Jackie Robinson Parkway, Sheridan Expressway, Hutchinson River Parkway/Throgs Neck Expressway, Henry Hudson Parkway, West Shore Expressway, Korean War Veterans Parkway, Martin Luther King Jr. Expressway, Staten Island Expressway, Bruckner Expressway, Prospect Expressway, Grand Central Parkway, Long Island Expressway, Cross Bronx Expressway, Nassau Expressway, Bronx River Parkway, and the Mosholu Parkway.

May 2017: Bridge Painter Matthew Somers Removing Graffiti on the Manhattan Bridge. Before and After. (Credit: Herbert Rodriguez)

Bridge Painter Carlos Mata - Brooklyn Bridge Line Striping in July 2017. (Credit: Earlene Powell) Supervisor Bridge Painter Cesar Pazmino, Bridge Painters Carlos Mata, Matthew Somers, Russell Newme, and Steven Walsh, Deputy Director of In-House Painting Earlene Powell, and Bridge Painters Chad Eberle, Tony Villafuerte, and Junior Garica Herrera.

During 2017, graffiti was also removed from the following structures and/or facilities: Furman Street and Brooklyn-Queens Expressway, the Five Boro Bike Tour Route (Brooklyn, Manhattan and Queens portions), Willis Avenue Bridge, 78th Street and Woodhaven Boulevard, Summer Streets locations, Cross Island Parkway, FDR Drive, U.S. Open (Flushing Meadows), Greenpoint Avenue Bridge, Grand Concourse and East 167th Street, First Avenue at the 59th Street Bridge, Belt Parkway Bridge over Nostrand Avenue, Madison Avenue Bridge, the NYC Marathon Route, Havermayer Street at South 4th Street, Delancey Street at the Williamsburg Bridge, Wards Island Pedestrian Bridge over Harlem River, Pearl Street at Brooklyn Bridge, 91st Street at Corona Avenue, Seeley Street, Third Street Bridge over Gowanus Canal, Smith Street at 9th Street, Vernon Boulevard, Van Wyck Expressway, Queens Boulevard (Jackson and Skillman Avenues), Union Turnpike over Austin Street, Brooklyn-Queens Expressway over (Prospect Street, Sand Street, Joralemon Street, and Cadman Plaza), Gowanus Expressway at 84th Street Pedestrian Bridge, 672 West 158th Street, Pulaski Bridge, East 189th Street over Metro North, 59 Adams Street, Miller Highway over 72nd Street, St. Nicholas Avenue, East 222nd Street and Bruner Avenue, Pike Street and Cherry Street, South 5th Street, 125th Street at Harlem River Parkway, South Street at Brooklyn Bridge, Andrews Avenue Bridge over LIRR, Bedford Avenue at Avenue I, 3 Avenue at East Shore Parkway , 163rd Avenue Pedestrian Bridge over Hawtree Basin, Crossbay Boulevard Bridge over Belt Parkway, Hampstead Avenue over Cross Island Parkway, Hunter Street at 43rd Avenue, and Edge Combe Avenue at St. Nicholas Ave.

RESEARCH AND PRESENTATIONS

In 2017 research work and/or case histories of the Division were presented in the following proceedings:

American Society of Civil Engineers Met Section Construction Institute Chapter, New York City, 26 January 2017. Jameson, Jesse. *Mill Basin Bridge Replacement on Belt Parkway*.

American Society of Civil Engineers Met Section Construction Institute Chapter, New York City, 16 February 2017. Collyer, Robert O. *Trans-Manhattan Expressway Connector Ramp*.

Hitchen, Russell. *Diamond Cutter Provides Access for Critical Inspections of Aging Roadway.* Concrete Openings, Volume 26, No. 2, March 2017.

11th Annual International Bridge and Structure Management Conference, Mesa, Arizona, 26 – 27 April 2017. Hernandez, Ed. *Developing a Program to Rank New York City Bridges by Benefit-Cost Ratio: Lessons Learned From New York City DOT*.

American Society of Civil Engineers Met Section Structures Group Spring Seminar Series, New York City, 16 – 24 May 2017. Navalurkar, Rajendra. *Accelerated Deck Construction Challenges for the Brooklyn Bridge and Other Bridges*.

34th International Bridge Conference, 5 – 8 June 2017, National Harbor, Maryland. Valenti, James, and Mallick, Ali. *A Walk Above the Harlem River: The Revitalization of New York City's High Bridge.*

2017 American Society of Highway Engineers National Conference, New York City, 14 – 18 June 2017. Pandya, Tanvi. *Brooklyn-Queens Expressway Triple Cantilever*.

9th New York City Bridge Conference: Asset Management of Bridges, New York City, 21 – 22 August 2017. Collyer, Robert O. *Maintenance on New York City Bridges*.

9th New York City Bridge Conference: Asset Management of Bridges, New York City, 21 – 22 August 2017. Gjelsvik, Atle, and Yanev, Bojidar. *Bending Stresses in Parallel Wire Suspension Bridge Cables*.

9th New York City Bridge Conference: Asset Management of Bridges, New York City, 21 – 22 August 2017. Hom, Daniel, Ferdinandsen, William, and Dombrowski, Paul. *Five Mile Belt Parkway Reconstruction Project*: Six Bridges Between Pennsylvania Avenue and Knapp Street, Brooklyn, New York.

9th New York City Bridge Conference: Asset Management of Bridges, New York City, 21 – 22 August 2017. Kelly, E., and Gusani, B. *Repairs to 13 Movable Bridges in New York City After Hurricane Sandy.*

University of Wisconsin - Geological, Mining, and Geotechnical Engineering 2nd Technical Conference, Madison Wisconsin, 13 – 15 September 2017. Petersen, Lee. *Brooklyn Bridge Pushover Analysis.*

TRB - 11th University Transportation Centers Spotlight Conference: Rebuilding and Retrofitting the Transportation Infrastructure, Washington, DC, 26 – 27 September 2017. Yanev, Bojidar. *Condition of Our Bridges and of Their "Conditions": An Owner's Perspective.*

2017 American Society of Civil Engineers Convention, New Orleans, Louisiana, 8 – 11 October, 2017. Giroux, Raymond Paul. Conference Session. *Timeless Lessons From the Builders of the Great Projects: The Brooklyn Bridge, the Hoover Dam, the Golden Gate Bridge, and the Panama Canal.*

American Society of Civil Engineers Met Section Infrastructure Group, New York City, 18 October 2017. Navalurkar, Rajendra. *Precast Bridge Deck Construction Challenges.*

In addition, the Division sponsors an in-house lecture series, inviting speakers from industry and academia several times a month. Highlight topics of the presentations in 2017 included: infrared scanning, data automation and management, development, specifications and applications of

polyester polymer concrete for bridge deck overlays, DensiCrete, bridge bearings and joint sealing systems, and bridge inspection by drone, and demonstration of two new videoscopes (borescopes).

January 2017: New Toolcat With Front Brush Attachment Clearing Snow From the Brooklyn Bridge Bicycle/Pedestrian Path. Shoveling Snow by Hand. Bobcat Vehicle With Broom Attachment Raised up High and Lowered. There Are Some Narrow Passages Along The Pathway That Cannot be Accessed by the Broom, so These Areas are Cleared by Hand. The Bobcat Passes These Areas With the Broom Raised. (Credit: Paul Schwartz) March 2017: Assistant Mechanical Engineer Nazariy Davydovych Checking the Temperature of the Hydraulic Fluid on the 145th Street Bridge. (Credit: Vera Ovetskaya)

March 2017: Division Ironworkers Performed Emergency Nighttime Repairs on the Grand Street Bridge – Bridge Repair and Riveters Dominick Santo, Daniel Jederlinic, Claudio Fontana, Mario Russo, Salvatore Dimaria, and Alfred Benecke. Six Plates of Various Sizes Were Installed on Span #2.

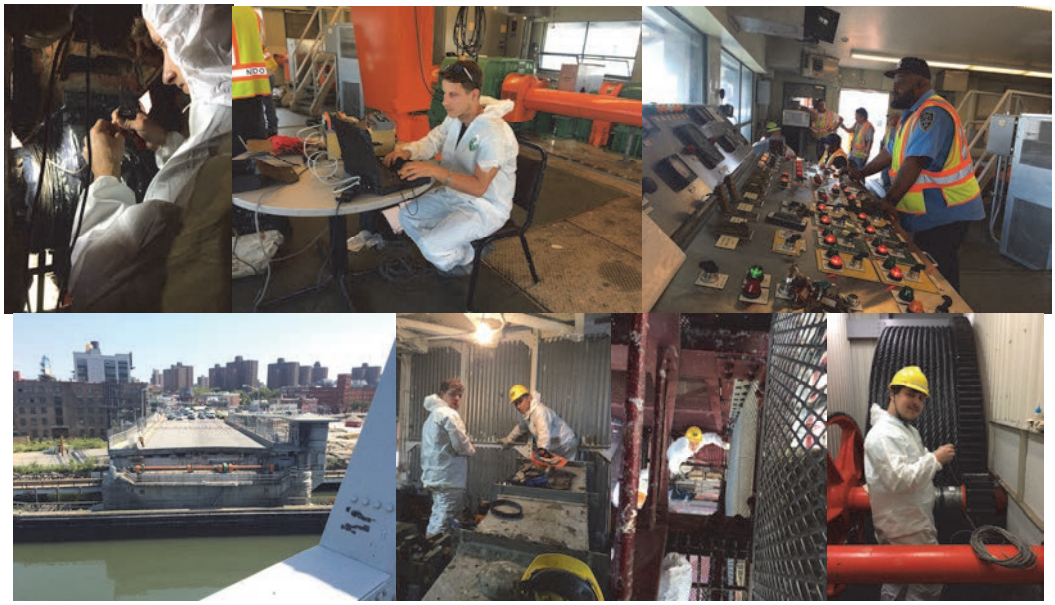
April 2017 National Work Zone Awareness Week Press Event. Supervisor Carpenter Joseph Vaccaro (Back to Camera), Lift Truck Foreground: Carpenters Brian Dunn and Joseph Moschella, Background: Carpenter William Sic. Area Supervisor Highway Maintenance Edward Pedersen, Supervisor Highway Repairer Joseph Brucculeri, and Assistant City Highway Repairers James Kelleher and Luz Orlando. Supervisor Carpenter Joseph Vaccaro and Area Supervisor Highway Maintenance Edward Pedersen. Assistant Civil Engineer Clara Medina was the Subject of the "Staff Spotlight" Feature in the April 2017 Edition of "Byways," the Official Agency Newsletter.

Carpenters Brian Dunn, Michael Nallen, Joseph Moschella, and William Sic (in Background). Supervisor Carpenter Joseph Vaccaro, Carpenters Michael Nallen, Joseph Moschella, William Sic, and Brian Dunn.

May 2017: Bridge Repairer and Riveters Daniel Wynne, Charlie Zhao, and Randall Palmenta Demonstrating Welding Steel and Cutting With a Plasma Machine. (Credit: Samuel Teaw)

May 2017: Women in Transportation is an International Organization Dedicated to Building the Future of Transportation Through the Global Advancement of Women. During Their 2017 Annual Conference in New York City, a Delegation Toured the Brooklyn Bridge and Visited the Division Shops at 59 Adams Street With Deputy Director of In-House Painting Earlene Powell and Assistant Civil Engineer Clara Medina.

July 2017: Summer College Intern Chun Kit Peng Soldering Wire Connections for a Data Acquisition System. (Credit: Vera Ovetskaya) Agency Summer Interns on the Brooklyn Bridge With Deputy Director of In-House Painting Earlene Powell and Assistant Civil Engineer Clara Medina.



August 2017: Assistant Mechanical Engineer Nazariy Davydovych Conducting a Strain Gauge Investigation on the Pulaski Bridge. Assistant Mechanical Engineer Nazariy Davydovych Setting up the Data Acquisition System and Equipment at the Third Avenue Bridge. Bridge Operator Kenneth Crandell Operating the Third Avenue Bridge. Open Third Avenue Bridge. College Aide Philipp Zagika and Summer College Intern Chun Kit Peng Installing Strain Gauges on the Pulaski Bridge, and Transporting the Strain Gauge Testing Equipment on the Roosevelt Island Bridge. College Aide Philipp Zagika Connecting the Strain Gauge Lead Wires to the Extension Wires During the Roosevelt Island Bridge Stress Test. (Credit: Vera Ovetskaya)

September 2017: Highway Repairer Dushawn Davis in the Bucket Practicing Deploying the Snooper Outside the Greenpoint Avenue Bridge Yard. (Credit: Mitul Patel)

October 2017: Maintenance Crew Riding on the Wards Island Pedestrian Bridge Counterweight to Reach the Top of the Tower and the Machinery Room. Oilers Steven Marxhausen and Rene Francis and Assistant Mechanical Engineer Nazariy Davydovych. Oiler Rene Francis and Assistant Mechanical Engineer Nazariy Davydovych on the Bridge Counterweight and Secured to the Railing. Counterweight Rising.

October 2017: Repairing the Timber Deck Planks of Span #1 of the Carroll Street Bridge over the Gowanus Canal.

November 2017: Division Crews Addressed Multiple Red PIA Flags on the Grand Street Bridge. Work Included the Repair, Replacement, and Reinforcement of Stringers on Spans #1 and #2 as Well as Repairs to the Deck Grating and Roadway Plates. (Credit: Earlene Powell)

December 2017: Maintenance Workers Adding Mortar to the Joints on the Beginning and Ending Right Side Wing Walls of the Margaret Corbin Drive Bridge over Pedestrian Path Near the North Entrance.