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 (including 5 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 elected officials, community boards, community groups, and civic/neighborhood associations. The Unit takes a pro-active approach in addressing design issues, roadway closures, and detours by reaching out to communities prior to the onset of construction. This enables the Division to proceed with its rehabilitation program with community input, and allows the Agency and its contractors to co-exist in a more harmonious manner with the community surrounding the project. Issues and problems of concern to the communities are brought to the attention of the appropriate Division personnel and addressed.

The **Bureau of Bridge Maintenance, Inspections and Operations** employs over 500 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 six major 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 (including 5 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.

The ***Bridge Repair and Preventive Maintenance*** section is composed of three 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.

Preventive Maintenance is a vital part of the overall bridge program. This section is responsible for functions including debris removal; mechanical sweeping; drain cleaning; and emergency

response, such as snow removal, oil/cargo spills, and overpass hits. 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 *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 ***Bridge Inspections and Bridge Management*** section performs three essential functions: *Bridge 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; conducts acoustic emission monitoring; and inspects non-structural cladding.

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.

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 2015, Bridge Operations effected a total of 5,320 openings, 4,804 of which allowed 8,336 vessels to pass beneath the bridges. The remaining 516 openings were for operational and maintenance testing. The section also operates the city's five mechanically-ventilated tunnels, performing electrical maintenance and arranging for roadway cleaning.

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 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 new 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, providing on-site inspection to verify field conditions, taking measurements for repairs and providing emergency lane closures. The section also supervises the repair work performed during night hours to reduce the impact on traffic and on public safety.

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 four major groups:

The **East River and 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 four East River Bridges, as well as all 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 four East River Bridges and all Movable Bridges, as well as overseeing and supervising contractors, Resident Engineers and Inspection Consultants, and Construction Support Services Consultants during the construction phase.

This Group consists of two major sections: ***East River Bridges***, and ***Movable Bridges***. Each of these areas 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 **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, with the exception of the four 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.

This Group covers two major geographic areas; ***Brooklyn and Manhattan Bridges***, and ***Bronx, Queens and Staten Island Bridges***. In each geographic area, the workload is divided by Community Board. Engineers-In-Charge report to the Directors of each major area, 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 2018, the program will obligate approximately $167.6 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 25 years, In-House Design has completed contract documents for over 30 major replacement/rehabilitation projects. Some of these projects were in highly environmentally sensitive areas, such as the Hylan Boulevard Bridge over Lemon Creek, Chelsea Road Bridge over Sawmill Creek, Cropsey Avenue Bridge over Coney Island Creek, the Exterior Street Ramp, Belt Parkway Bridge over Paerdegat Basin, 145th Street Bridge over Harlem River, and the Greenpoint Avenue Bridge over Newtown Creek. The staff also provided plans, working drawings, and shop drawings for in-house built projects such as the temporary Pedestrian Bridge for PS-5, Ferry Terminals at 34th Street, the Hamilton Avenue Asphalt Plant conveyor supports, the Yankee Stadium Ferry Access, the concrete barrier at Cross Bay Boulevard, the fencing at Navy Street Pedestrian Bridge, and the bridge railing at Van Name Street Bridge.

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 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 for contract plans and digital media standards for the archiving of bridge records. It reviews design, as-built and shop drawings prepared by consulting firms, as well as CDs and DVDs containing pdf and CAD files. This unit maintains original plan files, upgrades the records database and converts original drawings into electronic media in retrievable formats. It also responds to requests received from private, public and other agencies for information regarding records of City-owned bridges.

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.

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 new 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 Brooklyn Bridge, Belt Parkway Bridge

over Gerritsen Basin, Belt Parkway Bridge over Bay Ridge Avenue, Belt Parkway Bridge over Mill Basin, Protection Against Marine Borers, Ocean Avenue Bridge over NY Atlantic Railroad, City Island Bridge over Eastchester Bay, Bryant Avenue Bridge over Amtrak and CSXT, Harlem River Bridge over East 127th Street, Macombs Dam Bridge, Roosevelt Ave Bridge over Van Wyck Expressway, Trans-Manhattan Expressway Connector Ramp, Restoration of the Electrical and Mechanical Systems for 12 Movable Bridges, 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.

The Section is currently involved in extending its services for inspection of concrete at batching plants for the Sidewalk and Inspection Management Citywide Concrete Program via its contract with a City-contracted inspection firm.

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 Belt Parkway Bridges project 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 Manhattan Bridge, Williamsburg Bridge, Brooklyn Bridge, and Belt Parkway Bridges, as well as Component Rehabilitation, Roadway Bridges, and the Harlem River Drive over 127th Street Viaduct.

The unit is currently coordinating 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 are also on going at Turtle Cove in the Bronx as part of the City Island Bridge Reconstruction project.

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 six primary sections: ***Office of the Executive Director, Administration and Finance, Project Delivery, Capital Procurement, 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 ***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 Procurement 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, 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; preparing status reports; processing of the Division's change orders through registration, and coordinating Railroad Force Account Agreements and railroad invoice payments for Division construction projects.

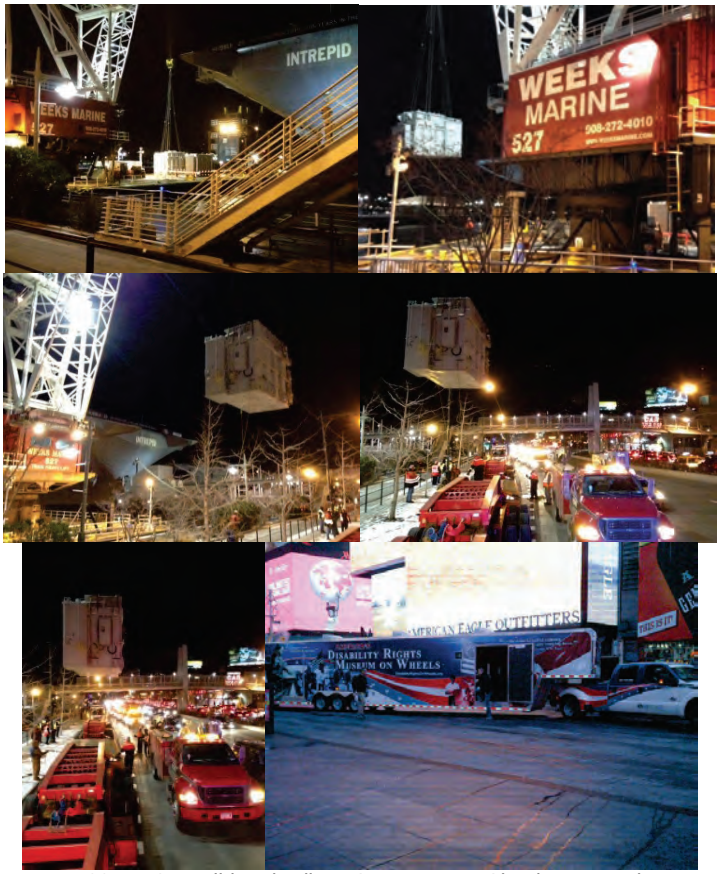
Railroad Force Account Agreements are a vital component in the rehabilitation/reconstruction program since train traffic affects 327 (41.4%) of City-owned bridges. Careful cooperation between the NYCDOT and the various railroad agencies that service the metropolitan area is required. The Railroad Coordinator provides a single point of contact for all railroad issues. This coordination includes the use of railroad personnel for track safety, approval of reconstruction design drawings, track shutdowns and reductions in train service for bridge construction work. 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.

NYCDOT bridge designers make every effort to prepare accurate and complete contract documents. Unfortunately, in many instances, the original design drawings for the deteriorating bridges no longer exist, and previous records of modifications and repairs are not available. When the contract documents for the bridge reconstruction projects do not accurately address conditions found in the field, Contract Change Requests (CCR) are needed. Change order work can not proceed until the CCR is registered. 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.

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 the Capital Procurement Unit.

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 $4.5 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 ***Truck Permit Section*** issues approximately 1000 Annual Overweight Load Permits (mostly renewals), and approximately 40,350 other permits, including Annual Self-Propelled Crane Permits, Daily Oversize/Overdimensional/Supersize Truck Permits, and Bulk Milk 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.



January 2015: Consolidated Edison Super Move. Shutting Down the West Side Highway on a Saturday Night to Unload a Transformer From a Barge Crane on the Hudson River (Over the Linear Park) to a Waiting Super-Load Trailer Sitting on the West Side Highway. (Credit: Scott Davis – Peak Engineering) Times Square in October 2015: 48-Foot Long Interactive Traveling Museum Touring America, the "Disability Rights Museum on Wheels" Tells the Story of the Fight for Equal Rights by People with Disabilities in the United States.

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.

Testing the William Feehan Fireboat Near the Bridge in November 2015. Brooklyn Bridge. (2nd Credit: Earlene Powell)

The bridge has a 1595.5-foot long main span and 933-foot long side spans. The Brooklyn Bridge carries some 99,986 vehicles and 2,566 commuter bicyclists daily. The $936 million reconstruction commenced in 1980 with Contract #1, and continues with Contract #6, scheduled for completion in 2016. This contract includes 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.

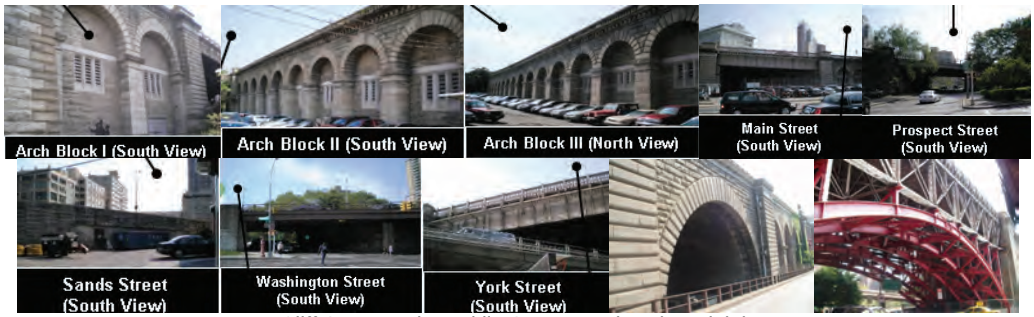
Work completed on the bridge to date includes reconditioning of the main cables, replacement of the suspenders and cable stays, rehabilitation of the stiffening trusses, and the replacement of the suspended spans deck and the four travelers.

Contract #6

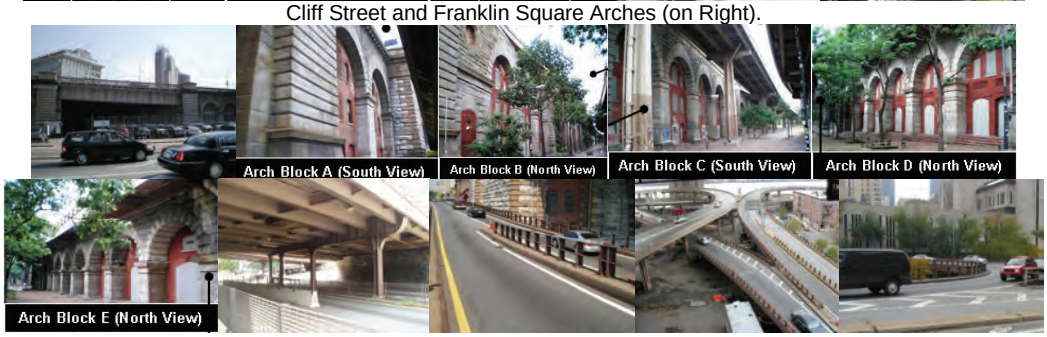
A Notice to Proceed for this $508 million project was issued to the contractor with a start date of January 19, 2010. The ramps and approaches to the Brooklyn Bridge were in need of rehabilitation and repair, to improve safety and reduce congestion along both the Brooklyn-side and Manhattan-side approaches, particularly from the FDR Drive. With stimulus money from the federal government's American Recovery and Reinvestment Act, the ramps in Brooklyn and Manhattan are being rehabilitated and widened and the entire bridge is being repainted to prevent steel corrosion on the structure.

The approach roadway to the Brooklyn Bridge was aging, with a failed membrane system and deteriorated closure walls. The existing roadway pavement above the historic arch blocks and masonry structures was rehabilitated. A precast concrete roadway slab was installed in segments, over sprayed-on waterproofing membrane. Rusted historic railings at Franklin Square, York, and Main Street structures, some from the original bridge construction, were refurbished and reinstalled. The existing ramp from the FDR southbound roadway was widened from one to two lanes to reduce bottlenecks and pinch points in traffic flow. All steel structures, including the ramp structures and the main span, are being painted, restoring them to the Brooklyn Bridge Tan color, as chosen by the Landmarks Preservation Commission.

On all the bridge approach structures on both the Manhattan and Brooklyn sides, the existing deck was removed by lifting out sections and replacing them panel by panel with precast concrete-filled steel grid deck panels. This approach greatly reduced noise from drilling and jackhammers, and also increased the reliability of the start and end times of construction activities every night.



Cliff Street and Franklin Square Arches (on Right).



Main Street Structure (on Left). Park Row Structure and Ramp A (on Right).

Ramp F. Rose Street Structure. Vandewater Street Arch. York Street over Brooklyn-Queens Expressway.

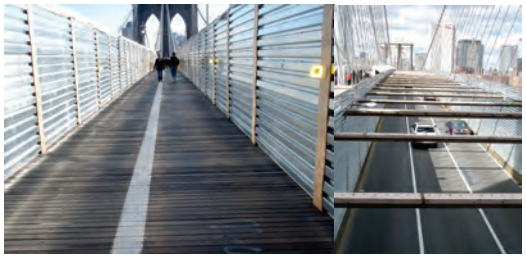
Painting work, to prevent steel corrosion and improve aesthetics, occurred in negative-pressure containment units that progressed along the bridge structure. All three Brooklyn-bound travel lanes were maintained during the course of this work, and painting took approximately six years to complete. Equipment was placed underneath the FDR Drive, and on land abutting the Brooklyn tower. Dust collection, vacuum and recycle units were employed to minimize environmental air quality risks, and there has been continuous air and noise monitoring during operations. All painting work has been conducted in accordance to the US Environmental Protection Act and NYS Department of Environmental Conservation requirements. Noise generated by these units conformed to the NYC Noise Code standards adopted in 2007.

In order to facilitate the reconstruction and associated painting work, the contractor mobilized in the area known as the Brooklyn Banks and Red Brick Park, between Pearl Street and Park Row on the north side of the Manhattan approach of the Brooklyn Bridge. The area was closed to the public starting June 2, 2010. The security plan for this area required that the Red Brick area be completely closed to the public for the duration of adjacent work. Pedestrian access between Pearl Street and the Rose Street/City Hall area was maintained through a walkway adjacent to the banks along Avenue of the Finest.

On the Brooklyn side, two lanes of free-flowing traffic were created at the Cadman Plaza exit, and approach roadways were rehabilitated to replace the membrane system and deteriorated closure walls. On the Manhattan side, rusted railings and safety barriers were replaced, and two lanes of free-flowing traffic were created from the southbound FDR Drive onto the Brooklyn Bridge.

The contract allowed for 24 full weekend closures over the duration of the contract; however, the contract also contains clauses that encourage fewer weekend closures with monetary compensation. Although the promenade remained open, there were sections immediately over the painting area, which were narrowed by a foot on each side to facilitate work.

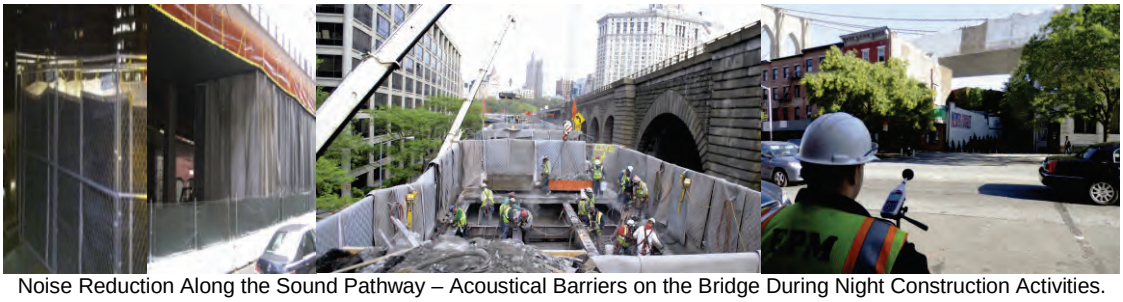
In 2010, after mobilization, the contractor started work on the ramp foundation; installed protective shielding under the Brooklyn main and Brooklyn side spans, the Franklin Square structure, and some of the Manhattan ramps; installed vertical walls at both sides of the Brooklyn and Manhattan-bound roadways at the Brooklyn main and Brooklyn side spans; began the set-up of the containment for the lead paint removal at all of these locations; and proceeded with blasting and painting activities. Other activities included detailed surveying, installation of super slabs and the fabrication of precast members.



Bicycle/Pedestrian Path with Protective Shielding in November 2010. Roadway Shielding in October 2010.

Lead paint removal operations were conducted in a Class 1A containment unit. Rigid containment walls, HEPA filters, and negative air pressure were used to prevent material release. Ambient air quality readings were conducted during lead paint abatement work. Airborne lead levels were continuously monitored using high-volume total suspended particulate samplers at multiple locations in Brooklyn and Manhattan. Additional in-depth testing for volatile organic compounds was conducted at five locations in the summer of 2011.

In March 2012, airborne particulate samples were collected in accordance with regulatory guidelines, at locations where dust was most likely to be deposited during dust-generating activities. Additional tests were replicated in June 2012 for respirable silica, suspended particulates and asbestos. All results were acceptable according to standards set by the Occupational Safety and Health Administration, the National Institute for Occupational Safety and Health, and the American Conference of Industrial Hygienists.



Noise Reduction Along the Sound Pathway – Acoustical Barriers on the Bridge During Night Construction Activities. Acoustical Curtains Along Frankfort Street. Two Crews Work Along Frankfort Street in April 2012. Cranes (On Left) Lift Material In And Out of Walled Enclosures of Sound Blankets. Inspector Taking Noise Measurements.

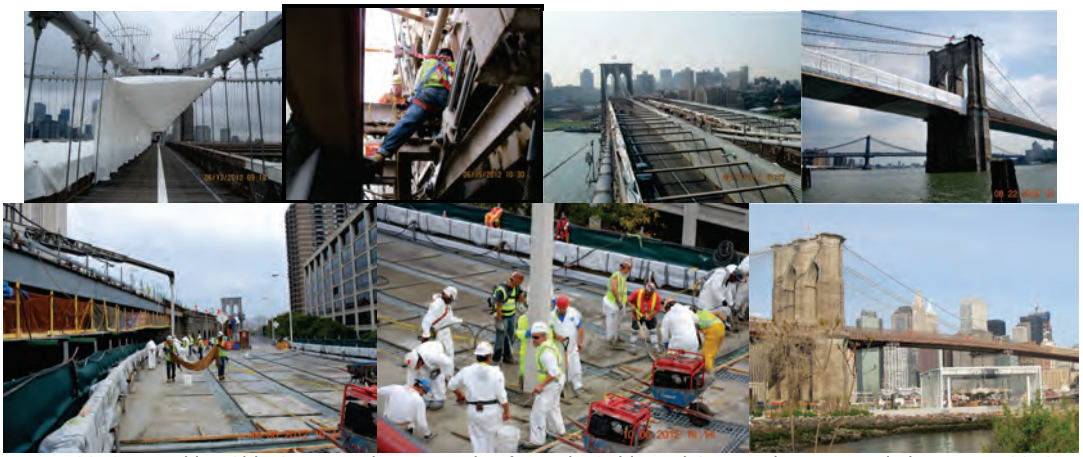
In 2011, painting was completed at the Franklin Square structure and continued at the Manhattan ramps and Brooklyn main and Brooklyn side spans with continuous installation of protective shielding and containment. Painting of the truss top struts was also started at the Brooklyn-bound Manhattan side span. The following construction work was started in 2011: on the Manhattan approach, activities included Brooklyn-bound roadway removal, waterproofing and super slab installation, Franklin Square floor beam replacement, south cantilever beam excavation and repair, and arch block strengthening. On the Manhattan ramps, work included bearing replacement, widening, and deck replacement, and fascia removal. Asbestos abatement work took place in the Brooklyn maintenance shop. Electrical work was also in progress with activities that included light pole and abandoned equipment removal, temporary lightning installation, and temporary power provisions. Other activities included detailed surveying, testing and repairing of dry-standpipe system, fabrication of precast and steel members.

December 2011: Painted Top Struts of the Brooklyn-Bound Manhattan Side Span. Summer 2011: Manhattan Approach - Ramp C Deck Replacement. December 2011: Ramp C.

In 2012, work continued on the Manhattan side of the bridge, including deck replacement on ramps and the south cantilever, super-slab installation and arch block strengthening. Painting under the Brooklyn main and side spans was completed, as well as the top struts along the Brooklyn-bound roadway. Painting of the Manhattan main and side spans started in 2012 and continued through 2013.

In Brooklyn, new shielding was installed under the Prospect and Washington Street structure in anticipation of deck removal. In addition, preparatory work was ongoing for superstructure replacement of the York and Main Street structures.

Asbestos abatement was completed in the Brooklyn maintenance shop and was in progress in the Manhattan arch blocks. By the end of 2012, 321 bearings were replaced under the Manhattan ramps and the flag repairs on the suspended spans were in progress.



June 2012: Brooklyn Side Span Netting Protection for Main Cable and Suspender Rope Painting. June 2012: Structural Steel Repairs. 2012: Manhattan Main Span Vertical Wall. August 2012: Manhattan Side Span Containment at Manhattan Tower. First Full Roadway Closure: Ramp A Concrete Placement. Second Full Roadway Closure: Brooklyn Approach. December 2012: Brooklyn Main Span in Finish Coat.

In 2013, lead-based paint removal and new coating applications were completed on the Manhattan main and side spans including all four stiffening trusses, the under-deck system, and the promenade. The main bridge vertical protective shield systems were removed. Painting of the main cables, suspender cables and overhead struts continued and was approximately 60% complete. In addition to the Main Bridge painting, paint removal and coating application continues on the Manhattan side ramps and was also approximately 70% complete.

May 2013: Painter Applying Primer Stripe Coat on the Manhattan Main Span. June 2013: Painter on Sway Bracing on the Brooklyn Side Span. (View Credit: Earlene Powell) November 2013: Painting Fascia Steel on Ramp C.

2013 saw significant progress for structural rehabilitation work, which included: completion of the Brooklyn-bound orthotropic deck panel installation at the Franklin Square Structure; the installation of the new concrete-filled grid deck systems at the outbound York Street, Main Street and Park Row structures as well as Prospect Street, Washington Street and the maintenance shop deck systems for both inbound and outbound directions. Concrete-filled grid deck installation for the inbound York Street, Main Street, North Cantilever and Franklin Square structures was begun. The approach super slab installation was completed in the outbound direction and was about 20% complete inbound. The main bridge structural steel flag repairs continued to be identified by biennial and special inspections.

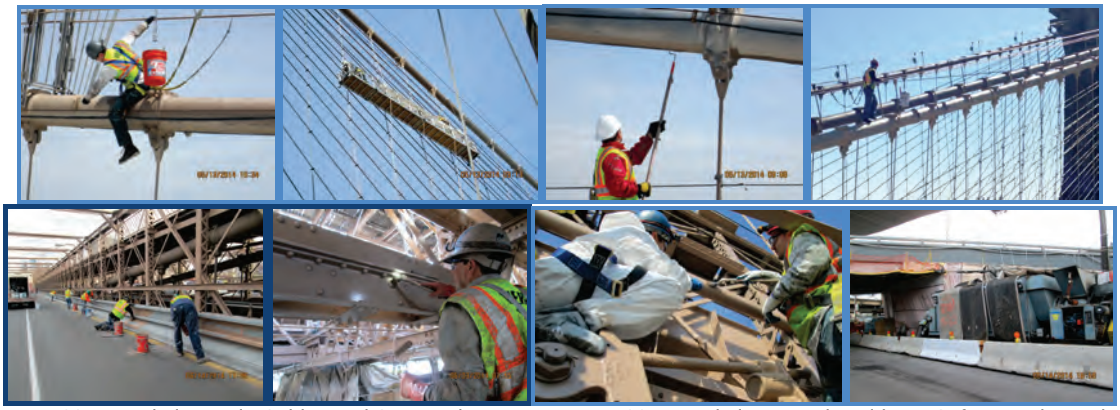
In 2013 three significant traffic improvements were implemented that changed exits from one-lane exit to two-lane exits, thereby reducing queuing-related congestion. In May 2013, key access ramps to and from the Brooklyn Bridge and the FDR Drive were expanded. Each of the two enhanced ramps now accommodates two traffic lanes and simplifies traffic patterns, easing notorious traffic bottlenecks for many of the 99,986 vehicles that cross the bridge daily as the bridge rehabilitation continues. The first ramp, connecting the exit from the bridge's Manhattan-bound lanes with the FDR Drive, was expanded from one to two lanes, easing backups that often extend across the bridge. The second ramp, connecting the southbound FDR Drive with the approach to the bridge's Brooklyn-bound lanes, was also expanded from one to two lanes, easing congestion and reducing the impact of cars that aggressively cut into the queue of cars at the entrance to the ramp. The work on a third ramp, connecting the bridge's Brooklyn-bound lanes to Cadman Plaza West and Old Fulton Street in Brooklyn Heights, which was also expanded to two travel lanes, was completed in September 2013.

Noise monitoring and mitigation efforts continue for all night-time project operations with ongoing community and sensitive receptor coordination.

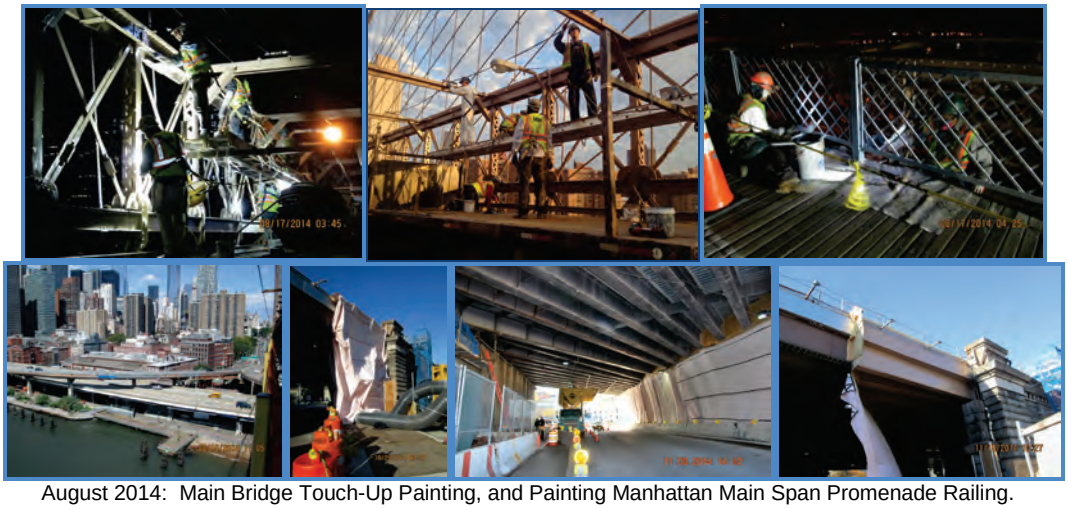
April 2013: Installation of Temporary Deck Units at the York Street Structure Over Brooklyn-Queens Expressway. July 2013: Removal of the Existing Concrete Slab on the Eastbound Main Street Structure. August 2013: Ironworker Replacing Cable Clamp Assemblies on the Suspended Span. October 2013: Grid Deck Panel Installation at the Eastbound Park Row Structure.

October 2013: Eastbound Brooklyn-Queens Expressway Traffic Flowing Under the Exposed Steel of the Eastbound York Street Structure. Removing the Fascia Steel From the Eastbound York Street Structure. November 2013: Concrete Placement at the Eastbound York Street Structure.

In 2014, lead-based paint removal and new coating applications were completed at the Manhattan ramps and approach structures. Subsequently, primary protective shield removal commenced at the Manhattan ramps and is in progress. Painting of the overhead struts and promenade approach railing was completed, while painting of the main cables and suspender cables continues and is at approximately 80% complete. Additionally, abrasive blast cleaning and painting began at the Brooklyn approach structures, with a portion of the Prospect Street structure completed.



May 2014: Painting Main Cables and Suspension Ropes. June 2014: Painting at Main Bridge – Safety Barrier and Touchup. Containment at Ramp A, Span 4.



August 2014: Main Bridge Touch-Up Painting, and Painting Manhattan Main Span Promenade Railing. August 2014: Painted Manhattan Ramps. October and November 2014: Blasting and Painting – Brooklyn Approach Structures.

In response to residents' concerns about airborne silica, a type of dust that is emitted during concrete demolition operations, the project team conducted a series of tests to monitor the levels of this substance in the air in January 2014. In addition to three types of silica, the tests also monitored for general respirable dust. Monitors were placed in four locations near concrete demolition operations occurring at the Main Street and York Street structures on the Brooklyn approach. Two monitors were placed within 50 feet of the construction activities themselves, one was placed at ground level north of the activity, and another placed directly in front of a residential building just south of the work. Analysis was undertaken by the project's environmental experts using procedures established by the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety & Health (NIOSH). All results were well below the permissible exposure levels as established by the NYS Department of Labor Public Employee Safety and Health and threshold limit values established by the American Conference of Governmental Industrial Hygenists.

Respirable Dust & Airborne Silica Monitoring.

2015 saw the completion of the majority of the painting portion of Contract #6. The contractor finished the abrasive blast cleaning and painting of all the structural steel at the Prospect Street, Washington Street, and Sands Street Structures, as well as the promenade support steel at the York Street and Main Street Structures at the Brooklyn Approach, in addition to completing the coat application at the main cables and suspender ropes throughout the suspended spans. Steel repair painting, both for contract repairs and incidental and flag repairs, progressed systematically throughout the suspended spans as well as the Franklin Square and Park Row Structures at the Manhattan Approach. Touch-up painting of the completed suspended spans and approach ramps and structures continued to the end of the painting season, and are expected to be completed in 2016.

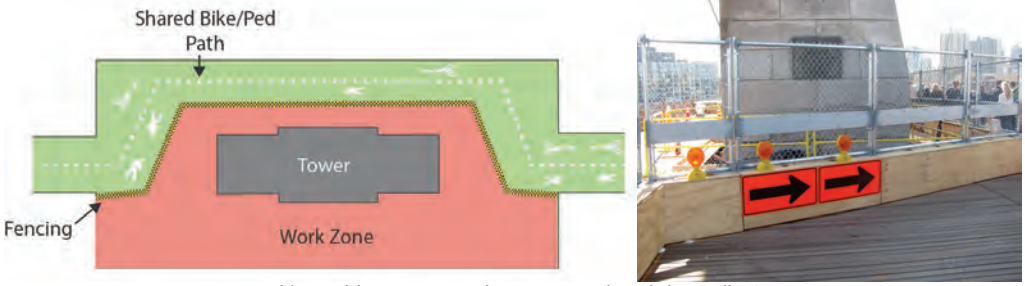
May 2015: Class 1A Abrasive Blast Containment System for the Main Street Structure Promenade Steel. Power-Tool Cleaning on Steel Repairs at the Suspended Spans. June 2015: Brooklyn Approach Structures.

Significant portions of the structural rehabilitation of the bridge were completed during 2014. Orthotropic deck panels were installed at the inbound Franklin Square Structure, and were aligned and welded in place. Replacement of the superstructure and installation of concrete-filled grid deck panels was completed for the inbound York Street and Main Street structures. New concrete-filled grid-deck panel installation was completed for the Sands Street structure in both directions as well as at the inbound Park Row structure. Approach SuperSlab installation is complete at both inbound approaches. Asphalt paving and road striping is complete at both inbound and outbound approaches, leaving only the outbound Cadman Plaza exit. Bearing replacement continues at the Brooklyn approach structures, with 652 of 666 bearings replaced by the end of 2015. Several operations still remain in Manhattan: these include the remaining installation of super slabs on the Manhattan-bound roadway, grid deck installation at the Park Row structure, and pier replacement at Ramp C. The latter two operations continued through the end of 2015.

April 2014: York Street Structure Deck Replacement During Full Weekend Closure. May 2014: Main Street Structure – Abutment Concrete Placement. May 2014: Ascending the Cable. July 2014: Preparation for Closure Pour at Main Street Structure.

September 2014: Franklin Square Structure – New Orthotropic Deck. November 2014: Manhattan-Bound Brooklyn Approach Paving. December 2014: Super Slab Installation in Manhattan-Bound Lanes.

Beginning on March 26, 2015, and lasting through December, 2015 the Brooklyn Bridge promenade was reduced in width for pedestrians and cyclists at various locations. This closure was necessary to perform steel improvements at tower locations as well as structural joint repair on the Brooklyn and Manhattan Approaches. At the towers, the work zone was in effect continuously during this period. Pedestrians and cyclists were directed to cautiously share the narrowed pathway.



Brooklyn Bridge Promenade. Narrowed Path in April 2015.

Structural repairs continue to be identified by biennial inspections and the construction consultants, and the repair work in ongoing. Over 4,150 incidental steel defects were identified that could not be anticipated prior to the removal of the existing paint. Approximately 3,000 of them have been corrected to date.

Steel Repair Process: Although Deteriorated Steel is Often Apparent Right Away, Many More Instances are Encountered Only After Removing the Paint. In Some Cases the Location of Deterioration is Painted Along With the Healthy Steel and its Location is Documented for Later Repair. Iron Workers Then Return to Those Locations and Replace the Deteriorated Sections With New Steel. The New Steel is Then Painted Over Again for the Final Protective Coating.

Drumgoole Park, a public park located on Frankfort Street between Park Row and Gold Street was reopened to the public as of October 6, 2015. The park was closed because of its proximity to rehabilitation work being performed on the Brooklyn Bridge.

Substantial completion of the project is now expected at the end of 2016. Multiple unforeseen factors have served as major obstacles, including the discovery of additional deterioration of bridge elements, discovery of a former trolley structure thought to be removed over 50 years ago,

the cancellation of full weekend closures due to additional citywide events, and the Superstorm Sandy construction embargo. There will be steel repair work that carries over into 2016 due to staging of the work over the river, as only one half of the channel can be closed.

January 2015: Welding on the Bridge above Pearl Street (Franklin Square Structure). Replacing the First Column Supporting the Exit Ramp From the Northbound FDR Drive. Ramp C Steel Column Erection. Cast-in-Place Concrete Barrier Installation. Commissioner Polly Trottenberg Visited the Summit Street Pedestrian Overpass to Thank Division Staff for Clearing the Snow and De-icing the Walkway. March 2015: New Flag. April 2015: Containment System at Prospect Street.

April 2015: Division Crews Removed another 450 (75 pounds) of "Love Locks" in One Day. The Locks Pose a Danger to the Infrastructure and the Cars on the Brooklyn Bridge - 9,363 Locks Were Removed From January 1 to September 25 in 2015. (Warning Sign Credit: Eugene Parker). Cleaning at Drumgoole Park. Working on the Stone Balustrade at Arch Block II. After Removing it in Sections, the Granite was Either Repaired and Reinstalled or Replaced With Completely New Granite. Sand Street Structure Curtain Wall Installation.

May 2015: Manhattan-Bound Approach SuperSlabs. New Curb Mall and Barrier on Adams Street Access Road. Brooklyn Approach Concrete Headers.

May 2015: Brooklyn Arch Blocks Steel-Faced Curb. June 2015: Division Quality Assurance Personnel Observe Closure Pour Concrete Placement at Westbound Park Row Structure. Asphalt Paving of Brooklyn Approach. Division Quality Assurance Personnel Observe Testing on the Newly-Applied Asphalt Overlay at the Westbound Brooklyn Approach. Manhattan-Bound Approach North Cantilever. Paving of the Manhattan-Bound Brooklyn Approach, Demolition at Ramp D in Manhattan, and Super Slab Installation During the Full Weekend Closure in June.

July 2015: Franklin Square Structure Seismic Retrofitting. Ironworkers Install New Railings and Toe Boards for the Inspection Catwalk Under the Promenade. New Steel Beams Installed Across the North Cantilever. This allowed for a New Grid Deck to be Set on the Manhattan Approach. Additional Deck Work was Added During a Full Weekend Closure in July to Ensure a Seamless Transition to the Two Lane Off Ramp to the FDR Drive and Pearl Street. August 2015: Concrete Closure Pours on the Manhattan Approach During a Full Weekend Closure. Diver Inspects the Fender System at the Brooklyn Tower. September 2015: Park Row Bridge – Westbound Stage II Deck Replacement.

October 2015: Brooklyn Bridge Site Visit by FHWA and Agency Executive Management. Deputy Chief Engineer - Bridge Capital Design & Construction David B. Dunn, Deputy Commissioner for Finance, Contracting, and Program Management Joseph H. Jarrin, Brooklyn Bridge Engineer-in-Charge Ohene Duodu, Federal Highway Administration - NYC Federal Aid Liaison John Formosa, and Resident Engineer Douglas Reese. FHWA John Formosa and Director of East River Bridges Hasan Ahmed. Manhattan Approach Westbound Paving. Brooklyn Tower Fender System.

Contract #7

Contract #7's construction costs are estimated at $250 million with an estimated construction start date of November 2018. The scope includes the rehabilitation of approach arches, towers and ramp structures on the Brooklyn Bridge and the maintenance and protection of traffic.

MANHATTAN BRIDGE

The youngest of the three NYCDOT suspension bridges that traverse the East River, the Manhattan Bridge carries some 478,476 commuters – 84,048 vehicles, 4,428 bicyclists, and 390,000 mass transit riders - between Manhattan and Brooklyn daily. 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. 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.

The $1152.52 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 structural and component rehabilitation of the bridge will include: maintenance painting of the south side approaches and suspended spans to include Trusses A and B, replacement of the south fascia railing and fencing; removal and replacement of the tower ornamental cornices, globes, cable collars and brackets; replacement of the finger joints with modular joints; rehabilitation of the drainage troughs under the south upper roadway and the roadway trench drain grating on the south upper roadway in the suspended span; 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; replacement of the work platform at the anchorages; rehabilitation of the joints in the south upper roadway approach spans and the existing standpipe system; and strengthening of the subway floorbeam connections in the approach spans. Construction is anticipated to start in summer 2017.

Manhattan Bridge in 2014. (Credit: NYSDOT)

NECKLACE LIGHTS

In the fall of 2008, to compare options for energy efficiency, we replaced 20 100-watt mercury vapor lamps of the necklace lights on the Brooklyn and Manhattan Bridges with 10 LED fixtures and 10 induction fixtures. The test was completed in spring 2009; we chose an LED fixture in a dish style and will obtain them for the Ed Koch Queensboro, Williamsburg and Brooklyn Bridges. The test fixtures were removed on April 24, 2009. The replacement of the existing mercury vapor lights on the Williamsburg Bridge was completed in summer 2012. The replacement of those on the Ed Koch Queensboro and the Manhattan Bridges was completed in June 2013. The replacement of the Brooklyn Bridge necklace lights will not be scheduled until the completion of Contract #6. Approximately 80% of the old fixtures from the Ed Koch Queensboro and Williamsburg Bridges have been sold at auction.

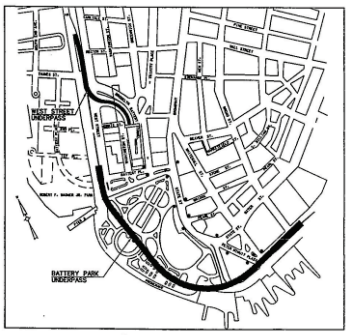
Installing New LED Necklace Lights on the Williamsburg Bridge in April 2012: Electrician Thomas Cipriano, Supervisor Bridge Repairer and Riveter Gean Pilipiak (in Front). (Credit: Thomas Whitehouse) May 2012: Electricians Thomas Cipriano and Robert Stackpole on the Williamsburg Bridge. Bridge Repairer and Riveter Neil Dalton. (Credit: Hany Soliman). Installing New LED Necklace Lights Along D Cable on the Manhattan Bridge in May 2012. New LED Necklace Light on Cable D of Williamsburg Bridge. (Credit: NYSDOT)

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).



PROJECT LOCATION MAP

Battery Park and West Street Underpasses.

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.

Salt water penetrated the electrical and mechanical equipment in both underpasses, including but not limited to, motors, lighting and pumps. It is therefore, necessary to solicit the services of a specialty contractor to perform all necessary repairs.

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.

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

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

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 exists relative to the Battery Park Underpass and West Street Underpass on Route 9A in Manhattan.

October 2013 – Battery Park Underpass – Elevation Right Span 1 and Left Span 1. (Credit: NYSDOT) September 2013 - Span 2 Looking Westbound (FDR Drive to West Street). June 2014 – The Underside of the Tunnel is Completely Covered With Tiles. October 2013 - West Street Underpass - Elevation Right Span. (Credit: NYSDOT)

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 project will be constructed in four phases and was already in the second phase in Fall 2015. The scope of work also includes providing temporary fan control systems to operate based on CO levels, install permanent CO monitoring system and sump pumps and tunnel lighting at the West Street Underpass. Construction is expected to be complete in January 2018.

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

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. The bridge was subject to heavy flooding.

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 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,

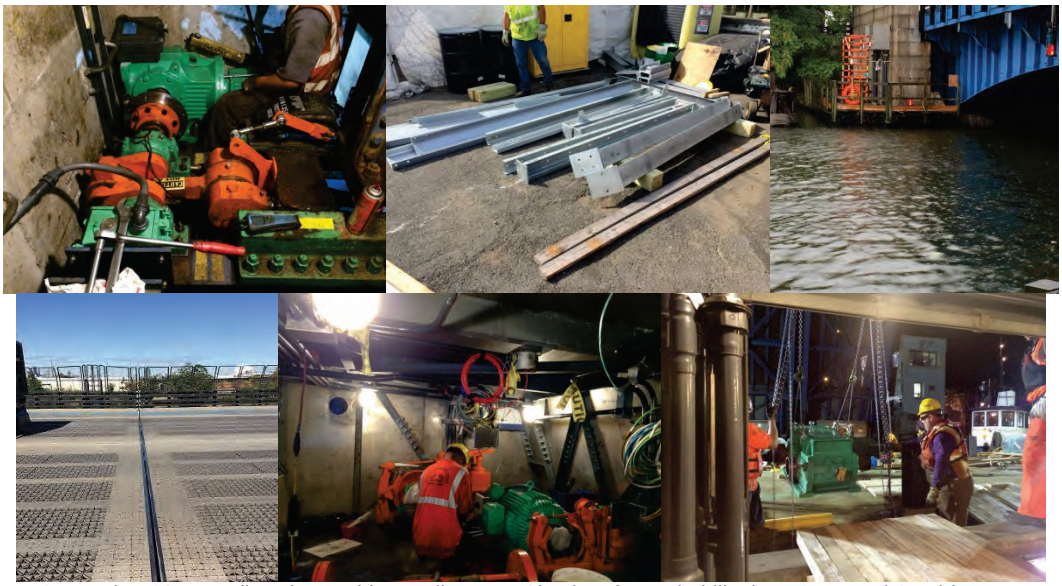
abatement will be done before repairs occur to the mechanical and electrical systems.

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 will now be 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 in 2015: 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.



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.

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.

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 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 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.

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 will be eliminated from the second group of bridges.

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 with an overall contract duration of 36 months.

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: Grand Street Bridge – Standing Water in the Access Light Fixture at the East Wedge Walkway. 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)

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 is 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 2015, the number of openings declined further to a total of only 214 openings.

In addition, significant and costly traffic congestion results from the operation of this outmoded drawbridge. In 2014, the Mill Basin Bridge carried 141,150 vehicles per day. The average opening and closing time for the bridge (and others like it) is ten minutes. Thus, this structure's operation has a negative and significant effect on the efficiency of New York City's vehicular traffic flow.

Mill Basin Bridge. (Credit: NYSDOT)

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 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 existing Mill Basin Bridge is 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 start in summer 2015, and 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.

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 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 2014, the bridge carried 34,239 vehicles per day. Three tracks of the IRT subway are carried on its upper deck and a five-lane two-way roadway with sidewalks on either side is carried on its lower deck. The two roadways each measure 34 feet and the sidewalks are 7 feet wide.

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 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 deck swing span to carry the subway line on the upper deck and highway traffic on the lower deck. The current structure, a double deck vertical lift bridge to carry the subway and vehicular traffic, was built in 1960.

Broadway Bridge – West and East Elevations. (Credit: Bhaskar Gusani)

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 October 2003 at a cost of approximately $8.7 million.

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 new median barrier at an approximate cost of $2.14 million. This project was completed in May 2004.

Currently in its final design phase, the reconstruction of the bridge is scheduled to start in July

2017. 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. It will also include the replacement and rehabilitation of the electrical and mechanical components of the vertical lift span, as well as replacement of the existing timber fender system with a new concrete one. The existing fender system will be reconstructed such that the navigable channel width will be reduced from 288 feet to 260 feet. Location and alignment of the bridge will not be altered. The vertical navigable channel width will remain unchanged. Construction is expected to be complete in July 2020.

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. 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.

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. 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 2014, the bridge carried 62,715 vehicles per day.


Unionport Bridge in 1953 and 2009. Existing Bridge North Sidewalk and Movable Span Looking West. Looking east at the south sidewalk.

Existing Bridge - Looking North. Looking South.

The project is in its final design phase for the replacement of the existing bridge with a new wider 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; replacement of the existing mechanical and electrical systems for the bascule span; reconstruction of the bridge operator and control houses, and replacement of the existing fender system, drainage system, street lighting, traffic signal facilities, and gates. Construction is anticipated to start in spring 2017.

Proposed Twin Single Leaf Bascule (Looking North). Proposed Control House.

Looking West – Towards Current And Proposed Bridge.

Looking East – Towards Current And Proposed Bridge.

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

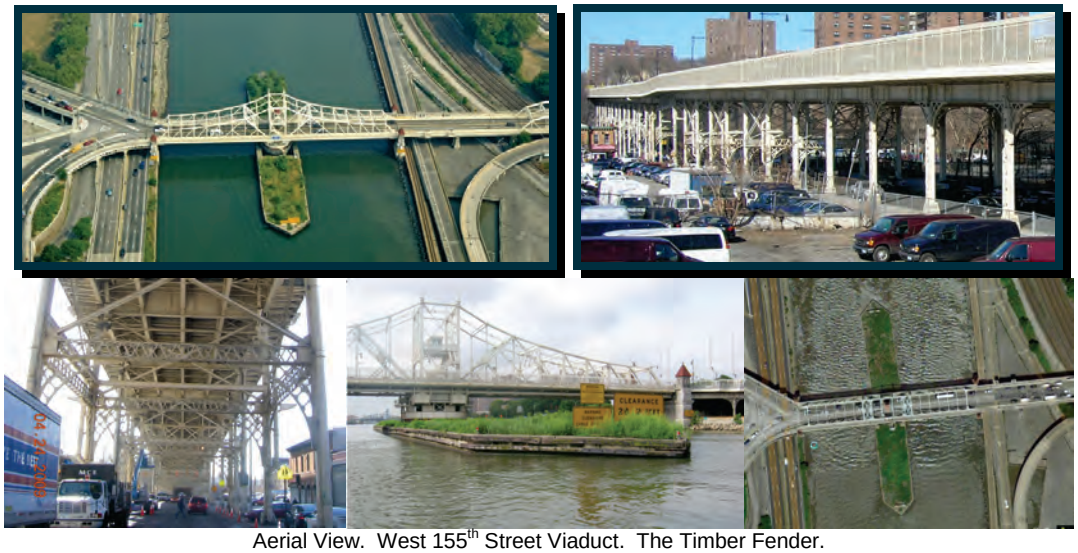
The Macombs Dam Bridge, which has one of the longest swing spans in the world, was opened in 1895, and was designated a City landmark in 1992. The bridge and the West 155th Street

Viaduct carry two lanes of traffic in each direction. In 2014, the bridge carried 38,417 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.

As part of this project, the historic John Hooper Fountain, which dates from 1894, was fully rehabilitated in 2000. After studying detailed old photographs, the globe and weather vane were recast and replicated. Cast aluminum was used with high impact glazing similar to the lanterns installed in Central Park in the 1980's. Just east of the fountain, a garden of rose bushes was added for the community's pleasure. Other additions included a new paved island, new curbs, and a steel fence. Bollards were installed at the western end of the island to protect the fountain from vehicular traffic.

Bridge With View of Yankee Stadium. Close-up of the 1894 Dedication Plaque. (Credit: Hani Faouri) West Approach to Bridge.

A new project will rehabilitate the West 155th Street Viaduct and the fender system. The 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 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. 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. The project's scope of work includes installing formwork around the perimeter of the existing fender, filling the voids in the fender sand-cement grout, bonding the existing timber and rock into one solid mass, and constructing 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. A Notice to Proceed for this rehabilitation project was issued to the contractor with a start date of July 27, 2015. The currently expected construction duration is 30 months.



Aerial View. West 155th Street Viaduct. The Timber Fender.

MADISON AVENUE BRIDGE OVER HARLEM RIVER (BRONX/MANHATTAN)

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 is expected to be complete in early 2016. Construction is anticipated to begin around July 2017. In 2014, the bridge carried 41,340 vehicles per day.

Madison Avenue Bridge Sign in 2007. (Credit: Duane Bailey-Castro) Bridge in 2009. (Credit: Bernard Ente) General View of Truss Swinging in 2010 and Right Elevation of Span 15 in 2012. (Credit: NYSDOT) North Elevation View.

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. On August 3, 2008, the traffic in the tunnel was restricted to only a single northbound lane.

Some rehabilitation work was completed on the tunnel in November 2005. That contract included the rehabilitation of the fans and the ventilation system. The new project is currently in its final engineering design phase. 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 start around July 2016 and be complete in July 2018.

Two Views of Park Avenue Tunnel in 2010. (Credit: NYSDOT)

Abutment Beginning. Underside of South Arch. 2014: Framing of South Portal. (Credit: NYSDOT)

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 consists of a double leaf, rolling lift bascule span, flanked on each end by three earth filled concrete spandrel arch approach spans. The bridge is 864 feet in length. It 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. The existing bascule leaves at mid-span consist of steel grating deck which is concrete filled over the machinery portion of the structure. In 2014, the bridge carried 18,117 vehicles per day. A $5 million interim rehabilitation of the existing bridge superstructure and substructure, completed in 2002, enables the Department to keep it operational while a new bridge is being designed and built adjacent to the existing bridge. The existing bridge will be demolished once the new bridge is in service.

Shore Bridge in 2007. (Credit: Peter Basich)

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 about 13 feet of vertical clearance above the mean high water level, and the channel between the bridge's fenders is only about 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.

A new mid-level movable bridge will be designed. It will be constructed on an offline alignment parallel to the existing bridge, with a wider navigation channel, and incorporate a raised profile to

effectively increase the vertical clearance above the navigation channel of the main span. In its closed position, the main span will have a vertical clearance above mean high water of approximately 35 feet. This clearance will accommodate 83% of marine vessels passing beneath. For taller vessels, the bridge will be drawn to its open position providing the required vertical clearance. With a longer main span than the existing structure, the mid-level bridge will offer a widened navigation channel as well as improved lateral clearance to the structure. These improvements are expected to lessen the likelihood of vessel damage to the fender system and the substructure when compared to the existing structure configuration. The increased vertical clearance above the navigation channel would also reduce wear on the bridge's mechanical and electrical components by decreasing the frequency of bascule openings and closings. The scope of work will include a complete replacement of the bascule, flanking and approach spans (superstructures and substructures) with a new widened structure that provides two lanes and standard shoulders in each direction, and a dedicated bike path and pedestrian path. There will be a new control house, new utilities, new machinery and electrical system, new fender system and dolphins, and new street lighting. In 2015, a detailed scope of work for procuring the design services was prepared and a request for proposals will be solicited in 2016. The design is anticipated to begin in early 2017 and the construction is anticipated to begin in 2020. The new bridge is anticipated to be in service in 2025.

Open Bridge in 2007. (Open Credit: Peter Basich) Bridge Closing in 2010. (Credit: NYSDOT) General View of Bridge Operator House #3 in 2011. 2014 - Span 2 Left Fascia (Credit: NYSDOT) Bridge Operator House Exterior Wall in 2015.

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.

In its current configuration, the bridge is a double-leaf Scherzer type (rolling lift) bascule bridge, which was opened in 1905. The bridge carries two lanes of eastbound traffic, a delineated bike lane and a sidewalk. It has a vertical clearance of 12 feet 9 1/2 inches at mean low water and 8 feet 10 inches at mean high water in the closed position. In 2014, the bridge carried 4,777 vehicles per day.

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. These alternates will be presented to the community and OMB in 2016 before finalizing the preliminary design. The construction is anticipated to begin around April 2019.

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

Union Street Bridge - Schoolchildren Crossing in 2012. (Credit: NYSDOT) 2014: Eleven Steel Plates Covering the Steel Grid Deck.

WILLIS AVENUE BRIDGE OVER THE HARLEM RIVER (BRONX/MANHATTAN)

Measuring 3,212 feet in length and opened to traffic on August 23, 1901, the old Willis Avenue Bridge was one of New York City's most heavily traveled bridges. The bridge was a bowstring truss swing bridge which spanned the Harlem River, and connected Manhattan's First Avenue and 125th Street to Willis Avenue and Bruckner Boulevard in the Bronx. Engineered by Thomas C. Clarke, the bridge was designed to relieve traffic congestion on the Third Avenue Bridge.

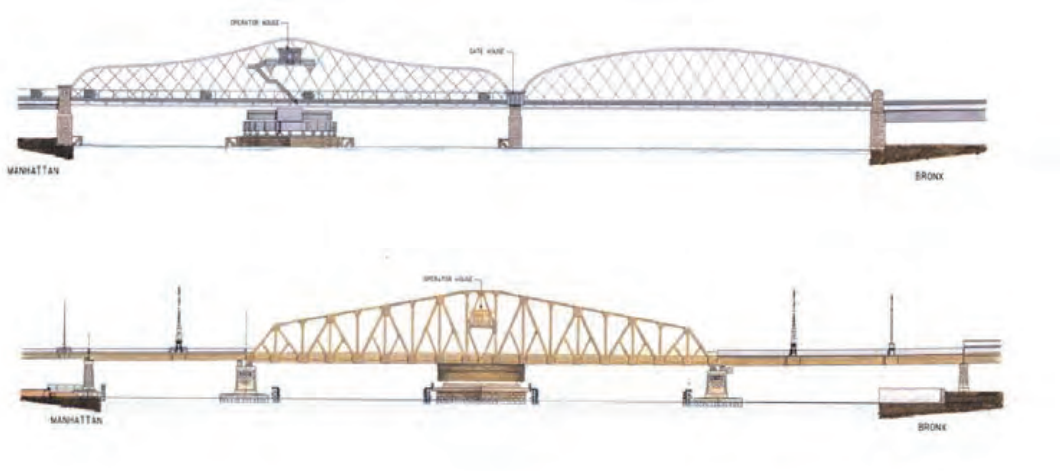
A major hub between the FDR Drive in Manhattan, the Major Deegan Expressway and the Bruckner Boulevard in the Bronx, the Willis Avenue Bridge carried approximately 67,951 vehicles per day in 2014. Ten local and interstate bus lines use the bridge as a principal route from New York City to points throughout the northeastern United States.

Because of substandard curves that were present on the structure's approaches, the Willis Avenue Bridge was one of the City's most accident-prone crossings. Between 1992 and 1994, there were 809 vehicular accidents on the bridge, for an average of 269 per year.

Because of the advanced age and condition of the Willis Avenue Bridge, the City of New York decided to replace the existing bowstring truss swing bridge with a new swing span bridge constructed just to the south of the existing bridge. The project also replaced the FDR Drive approach ramp and the ramp onto Bruckner Boulevard, and improved the alignment. NYCDOT

will also reconstruct Willis Avenue over the Major Deegan Expressway for the New York State Department of Transportation. It also included a direct connection to the northbound Major Deegan Expressway in the Bronx with wider travel lanes and shoulders, and a broader, combined pedestrian/bicycle pathway along the north side of the bridge.

The old swing bridge, which opened for tall vessels, had a vertical clearance of 24 feet above Mean High Water Level (MHWL) when closed. The new swing bridge when closed has a 25 foot clearance above the Mean High Water Line which makes it consistent with other bridges along the river. It also incorporated the placement of a solid riding surface on the swing span instead of the existing open grating deck. In addition, modern electrical, mechanical and communications systems are being installed.



Old and New Willis Avenue Bridge Span.

A Notice to Proceed for the replacement of this bridge was issued to the contractor with a start date of August 27, 2007. Foundation construction work was in progress by the end of 2007.

Traffic continued to use the current bridge until the new bridge opened, resulting in limited impact to motorists and nearby communities. The NYC Marathon was not impacted: runners continued to use the old bridge each year until the new swing span was completed.

Throughout the project, little impact to marine traffic was experienced. The new swing span was fabricated and assembled off site, and floated into place once the foundations, center pier and rest piers were ready to receive it.

On January 3, 2008, the East 125th Street exit ramp off the northbound FDR Drive was closed. This closure was necessary so that work on the construction of a temporary loop ramp, as well as construction of the new north-bound FDR Drive ramp to the Willis Avenue Bridge, could begin. The East 125th Street exit ramp, which typically carries only a low volume of traffic, was reopened after its reconstruction in June 2012.

In 2008, the project focused on foundation construction work, along with construction of a temporary ramp from the north-bound FDR Drive onto the bridge. At the end of 2008 the loop ramp was nearing completion. It went into service on January 24, 2009. This allowed the removal of the existing ramp and the construction of the new ramp to proceed. One half of the foundations for the new FDR Ramp were installed. Additionally one of the four piers in the river was in place, and work on a second had begun. The foundations in the Harlem River Rail Yard were more than 50 percent complete, and work had begun on the footings for the new Bruckner Boulevard Ramp.

In 2009, the project continued to focus on foundation construction work, with the installation of footings and piers for the new ramp from the FDR Drive as well as the one-half of the 1st Avenue Approach. The precast concrete pier box for River Pier 5 was transported in February 2009 by

oceangoing tug and barge from the fabrication yard in Virginia to the contractor's yard in Jersey City, New Jersey. Over 30 automobiles were removed from the Manhattan channel in spring 2009. At the end of 2009 the contractor began the installation of the steel superstructure over the FDR Drive. The work in the river consisted of the installation of the drilled shafts for the four river piers and the installation of three of the four precast pier boxes in the river. The assembly of the new swing span began in Coeymans, near Albany, New York in June 2009.

In the Bronx, a temporary pedestrian bridge was installed in May 2009 over the Major Deegan Expressway, just south of the existing bridge, to carry pedestrians until the new bridge is constructed. More than half of the paving and drainage work on the expressway was completed. One-half of the bridge over the Major Deegan was removed and work on the new abutment wall began. One-half of the abutment at Bruckner Boulevard was reconstructed and the piers to carry the south half of the new bridge were installed. The foundations in the Harlem River Rail Yard were completed and the first phase of the new Bruckner Boulevard exit ramp was also completed.

The contractor began 2010 with construction of the FDR Drive entrance ramp, and the First Avenue Approach on the Manhattan side of the bridge. On the Bronx side, the new Bruckner Boulevard exit ramp was partially opened to traffic on February 12, 2010. The work then proceeded with the demolition of the existing ramp. Assembly of the new swing span along with new machinery and electrical system was continued.

The swing span was floated down the river and towed to the bridge site on July 26, 2010. The new swing span was floated on to the new pier on August 9, 2010.

Voyage up the East River on July 26, 2010. New Willis Avenue Bridge Span Passing Under the Brooklyn Bridge. (Credit: Douglas Reese)

Work continued on the new bridge span in August 2010 with the placement of a new lightweight concrete deck surface, bridge machinery and electrical utility work. Demolition of the existing Willis Avenue Overpass over the Major Deegan Expressway was completed by September 2010.

On October 2, 2010, with the completion of the FDR Drive approach, partial First Avenue Approach, and the Willis Approach in Bronx, traffic was allowed over the new swing span and the existing bridge was closed to traffic. The old bridge was retired after 109 years of service.

New and Old Willis Avenue Bridges on October 2, 2010. Old Willis Avenue Spans in December 2010. (Credit: Duane Bailey-Castro) Aerial View in September 2011. (Credit: Hardesty and Hanover)

The float-out of the old existing swing span took place on October 21, 2010, and the adjacent, flanking bow-string arch span was floated out on November 3, 2010. Both spans remained on

site through November for the asbestos abatement process before being floated to the contractor yard in Jersey City. The first bridge test operation of the new swing span was conducted successfully during the early morning hours of December 23, 2010.

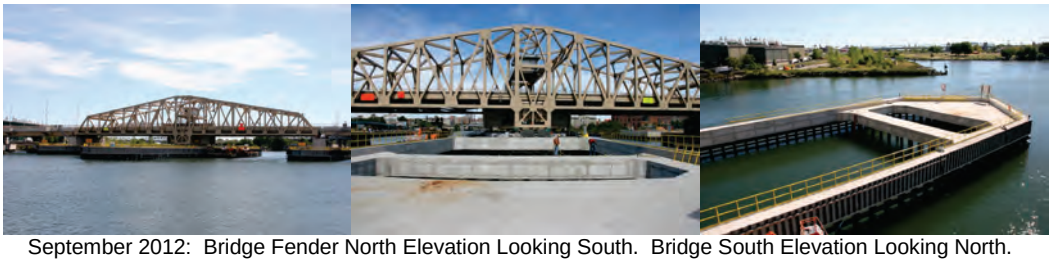
In 2011, the contractor completed work on the existing swing and flanking spans and towed them to the recycling facility in New Jersey. In Manhattan, work continued on the remaining half of the First Avenue approach roadway and spans, the demolition of the temporary loop ramp, and the reconstruction of the 125th Street exit and local streets. In the last quarter of 2011, work also continued on the Manhattan ramp and stairs and the auxiliary bridge operator's house.

In the river, the contractor started removal of the river piers and continues work to complete the demolition of center pier and the west rest pier by blasting. They also worked on the installation of the fender system for the new piers as well as the final alignment of the bridge machinery and testing of the electrical and mechanical system. In the last quarter of 2011, the contractor completed demolition work at pier 10 and carried out blasting of pier 9. Post-blasting excavation continued at Pier 9 for removal of the pier, and fender building work continued in the river. Work also continued for the construction of bridge machinery and testing of the electrical and mechanical systems. Installation of granite continued throughout the project.

In the Bronx, the contractor continued work on the relieving platforms, construction of the remaining superstructure and decks for the spans over the Harlem River Yard and mainline. They also worked on the construction of combined pedestrian/bicycle bridge over the Major Deegan Expressway as well as the new direct ramp to the northbound Major Deegan Expressway.

2012 started with the opening of the ramp to the northbound Major Deegan Expressway as well as the complete opening of the Bruckner Ramp and Bruckner Boulevard. Ramp C, which provides a direct connection to the Major Deegan Expressway, was opened on January 10. The contractor opened the sidewalk to the North Access Road on January 30. Most of the landscaping was done in the spring with some minor work left for the fall. Reconstruction of the 125th Street exit ramp and the 127th Street work was completed and opened to traffic. In the river, fenders for the new piers were completed and testing of electrical, machinery and control system continued. Reconstruction of Willis Avenue between 132nd Street and Bruckner Boulevard was completed and was opened to traffic on September 24, 2012.

Architectural work at the bridge operator house is near completion. By October 2012, all of the traffic lanes and shoulders throughout the project were completed with final pavement markings. The pedestrian bridge over the Major Deegan Expressway and the adjacent walkway/bikeway were opened to the public on November 1, 2012.



September 2012: Bridge Fender North Elevation Looking South. Bridge South Elevation Looking North. Pier 6 South Fender Looking South.

In 2013, the contractor completed granite masonry work in the Bronx, architectural work at the bridge, and landscaping, and began testing of the bridge's electrical and mechanical systems. In addition, all construction work on the Manhattan Ramp and stairs connecting to the waterfront area below was substantially completed in 2013, however, these structures will not be opened to the public until the waterfront area is developed for public use.

February 2013: Bridge Operator House. General View Taken From the West Side – Looking East. Pier 11- Continued installation of granite stone retrofit anchors. March 2013: Fenders of the River Piers. Pier 4 Picket Fence. Willis Avenue Bridge Plaque.

In 2014, the contractor continued working on the operating system of the new swing span, and successfully completed 150 test openings (5 openings per night for 30 days) in the Fall.

Willis Avenue Bridge in 2014.

The replacement and reconstruction project was substantially completed on September 24, 2015.

Sequence Showing the Span Opening as Seen From the Bridge.

May 2015: Beginning Abutment of C Ramp and the West End of the Pedestrian Bridge. Bruckner Boulevard and Willis Avenue at Grade. Bruckner Boulevard and B Ramp at Pulaski Park. Bronx Spans 9 – 13. Pier 7 Rest Pier – Supports the East End of the Swing Span. Swing Span. Control Operating House. A Ramp. Piers 8 – 11.

WILLIS AVENUE GRANITE IN PUBLIC PLAZAS

New York City has a program to encourage public plazas in neighborhoods lacking in open space. The program plays a key role in ensuring that all New Yorkers live within a 10-minute walk of quality open space, as proposed in the PlaNYC 2030. Public plazas improve the quality of life and transform the cityscape by providing spaces where people can sit, socialize, and enjoy public life. During the reconstruction of the Willis Avenue Bridge, more than 7,500 square yards of granite (approximately 5,000 blocks) were removed from the site, mostly excavated from the bridge piers, abutments and gate houses both in Manhattan and the Bronx. These granite slabs have been repurposed as seating in several of the plazas.

In 2015, the slabs were added to the Parkside and Osborn Street Plazas and Union Avenue in Brooklyn.

Parkside Plaza.

Roadway Bridges

INNOVATIONS

Innovations in the design and construction of Roadway Bridges continued in 2015. Where feasible, the continued use of accelerated bridge construction methods helped reduce construction duration and the resulting negative impacts on the traveling public. In addition, the use of Best Management Practices (BMP) in all applicable projects, most notably in stormwater drainage design, will mitigate the impact of bridge projects on the surrounding environment.

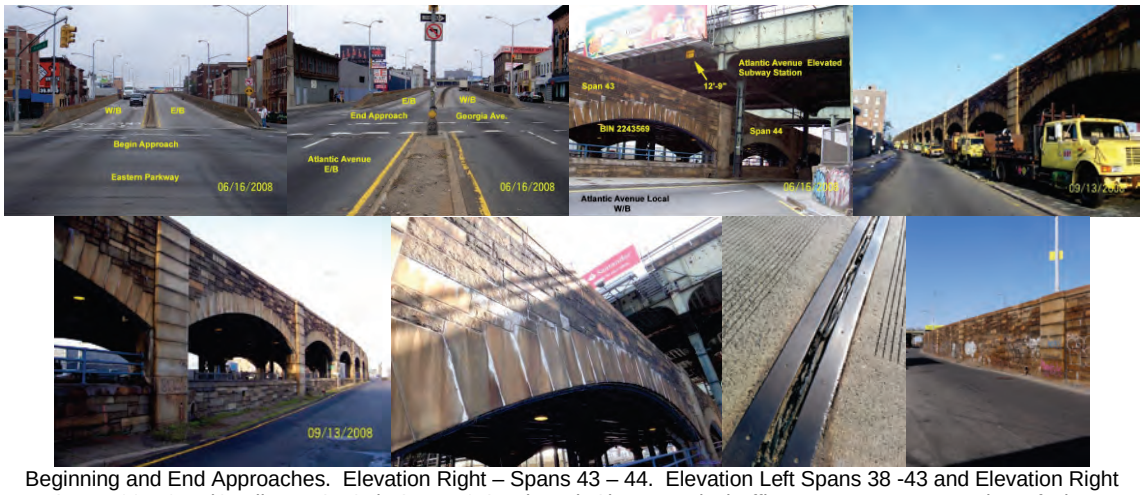
BROOKLYN AND MANHATTAN BRIDGES

ATLANTIC AVENUE BRIDGE OVER LIRR – ATLANTIC BRANCH (BROOKLYN)

The Atlantic Avenue Bridge is a 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. 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. 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 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.

The project will include rehabilitating the deteriorated steel members, concrete abutments and bearing walls; replacing the existing reinforced concrete bridge deck, including wearing surface, 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. Superstructure rehabilitation will be performed in stages with a minimum of one lane open in each direction. Construction is expected to begin in early 2017.

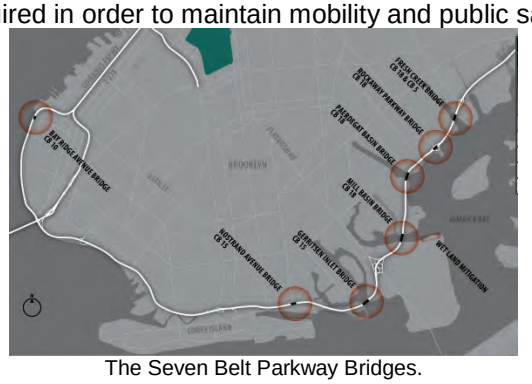
Aerial View in 2009. Location Map.



Beginning and End Approaches. Elevation Right – Spans 43 – 44. Elevation Left Spans 38 -43 and Elevation Right Spans 20 – 34. (Credit: NYSDOT) Span 43 South Arch Shows Typical Efflorescence at Mortar Joints of Ring Stones. Deteriorated and Leaking Seal at Expansion Joint. Stone Curtain Wall.

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; the Mill Basin Bridge was 3.209; and the Nostrand Avenue Bridge was 4.264. All are original structures, which were built beginning in 1939. While none of the bridges are in any immediate danger of structural failure, their 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. Gerritsen Inlet Bridge started in February 2013 and is expected to be complete in summer 2017. Mill Basin Bridge started in summer 2015, and is expected to be complete in winter 2021. Bay Ridge Avenue Bridge started in November 2013 and was substantially completed in November 2015. Nostrand Avenue Bridge is expected to start in Fiscal Year 2022.

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 current 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 include 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 is also working 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.

An upland mitigation project, to be administered by the New York City Department of Parks and Recreation, will include 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 will be determined in accordance with the caliper rule for tree replacement.

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 from the Floyd Bennett Field Mitigation site, has increased the functional value of the area. 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, is expected to be complete in 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 then adjusted to better fit the tidal contours. The plants were watered in June and July, and the site was monitored in September. The area will continue to be monitored through 2017.

In June 2011, the contractor was directed to perform Bergen Beach Wetland Mitigation of 1.4 acres for 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 will be used to offset future impacts on upcoming Belt Parkway bridge projects. 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 bridge and its 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.

January 2015: Paerdegat Basin Bridges. Eastbound Belt Parkway Bridge over Paerdegat Basin. Newly installed Pier Bumpers at Low tide Facing East. Navigation Lights Over Center of Channel. Barge-Mounted Back Hoe used to Complete Installation of Pier Bumpers.

The existing Gerritsen Inlet Bridge is 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 existing structure and immediate approaches will be demolished and replaced.

The replacement bridge will consist 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.

Gerritsen Inlet Bridge in 2013. Proposed Gerritsen Inlet Bridge.

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 & 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.

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 Operation of Pumping Concrete Into 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 painting was completed and the steel was moved to the yard for assembly. In addition, erection was completed of the Stage 1 west side structural steel.

January 2015: Saw Cutting the Westbound Roadway to Install a Temporary Pipe and Catch Basin to Mitigate Flooding Conditions at East Side of the Bridge. Stage I Belt Parkway Temporary Westbound Approach to Bridge over Gerritsen Inlet. Steel Sheeting Located Between Roadway and Golf Course - Facing East. Placing Temporary Concrete Barrier in Front of Steel Sheeting at Stage I Temporary Westbound Roadway - Facing West. March 2015: Unloading Structural Steel From a Barge to set on West Abutment and Pier #1 on North Side of Bridge – Facing West. Lowering Girder onto West Abutment and Pier #1. Existing Bridge at Right - Facing East. Lowering a Girder onto the North Side of Pier #1 - Facing Southwest. Attaching Intermediate Braces Between Girders set Between the West Abutment and Pier #1 - Facing East. Girders set Between Pier #1 and West Abutment. Existing Bridge at Right Side - Facing East.

Fabrication of 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, and an armorless joint system was installed for the bridge.

April 2015: Erecting Work Platform Supported by Brackets at Fascia Girder – Facing East. Lowering the Third of Five Gerritsen Bridge Girders Between the East Abutment and Pier #2 - Facing West. Four Girders With Diagonal Braces Set Between the East Abutment and Pier #2. May 2015: Barge-Mounted Crane Setting Structural Steel for Westbound Roadway. Eastbound Traffic at Right. Jamaica Bay at Top. Turbidity Curtains in Place at Both Sides of the Channel. Setting Stay-in-Place Galvanized Steel Forms at West Side of Bridge. June 2015: Placing Epoxy-Coated Deck Reinforcement Steel - Facing West. Placing and Finishing Deck Concrete. July 2015: Pumping Deck Concrete for Stage 1. Setting Forms and Rebars for the Parapet Barrier at New Westbound Deck. 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 will be followed by all foundation and substructure concrete operations, as well as the installation of structural steel and the concrete bridge deck in 2016.

August 2015: Parapet Coating Operation at Westbound Bridge. Applying Sealing Compound to the Westbound Bridge Deck Prior to the Stage 2 Traffic Shift. Saw Cutting Deck of Bridge Prior to Removal. September 2015: Removing Saw-Cut Deck Panels. Deck Removed Prior to Steel Removal. Removing Stringers. October 2015: Removing Girder Over the Westbound Roadway With a Crane Mounted on a Barge on the North Side of the Bridge. Bridge After Removal of Steel Superstructure From North Side of Existing Bridge. South Half of Old Bridge at Right - Facing East. Partially Demolished Pier - Facing East. New Westbound Bridge at Left, Old East Bound Bridge at Right. 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. Barge-Mounted Hoe-Rams Demolishing Old Piers – Facing East.

Opened on June 29, 1940, the Mill Basin Bridge is adjacent to the Jamaica Bay Wildlife Refuge and the Gateway National Recreation Area. It is 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 2015, the number of openings declined further to a total of only 214 openings.

In addition, significant and costly traffic congestion results from the operation of this outmoded drawbridge. In 2014, the Mill Basin Bridge carried 141,150 vehicles per day. The average opening and closing time for the bridge (and others like it) is ten minutes. Thus, this structure's operation has a negative and significant effect on the efficiency of New York City's vehicular traffic flow.

The existing Mill Basin Bridge is 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. 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 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 contract will be completed in four stages of work (including two additional sub-stages) and will maintain 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.

Current Belt Parkway Bridge Over Mill Basin. Aerial Views. Proposed Bridge. Open Bridge. May 2013 – Inspecting the Bridge From a Barge.

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 in August. The contractor mobilized on the site, and completed all tree removal, guide rail repairs, and clearing and grubbing operations in September. Temporary, asphalt approach roadways were placed throughout the fall, and traffic was transitioned on to the temporary roadways in December.

Substructure work, including the installation of cofferdams, excavation of footings, and installation of piles, began in the fall, and the placement of the concrete piers and abutments are scheduled to begin in early 2016. The installation of drainage facilities also began in 2015.

July 2015: Eastbound Traffic on Right. Westbound Traffic at Left. August 2015: Span 3, Top of Deck, Westbound (Left) Sidewalk. Span 8, Top of Deck, Steel Grating Side. September 2015: Bascule Span Fully Lifted. Median Guide Rail Repair Operations on East Side of Bridge. October 2015: Removal of Existing Fender at North Side of Pier #6. Temporary Walkway on North Side of Bridge for Access to Pier #9. 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. Pier #9 – Driving "Pin Pile" for Support of the Cofferdam Steel Frame. Site After Completion of Tree Removal. December 2015: Outfall #2. Pressure Treated Wood Piles – Facing East. Hyrdroseeded Topsoil Stockpile to Prevent Erosion at Southwest Quadrant, Protected by a Silt Fence.

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. The only construction operations performed in fall 2013 were the survey and stake out of the project.

Bay Ridge Avenue Bridge in 2012. (Credit: NYSDOT) Proposed Bay Ridge Avenue Bridge. Current Aerial View.

During 2014, two of the five construction stages were completed and commencement of the third stage was underway as of November. Work completed during this time included temporary deck reconstruction and flag repairs. Permanent reconstruction included the new concrete bridge barriers along the westbound roadway and new pre-stressed concrete box beams, superstructure slab, pavements, pressure relief joints, approach slabs and upper abutment stem wall reconstruction for the westbound segment of the new bridge and approaches.

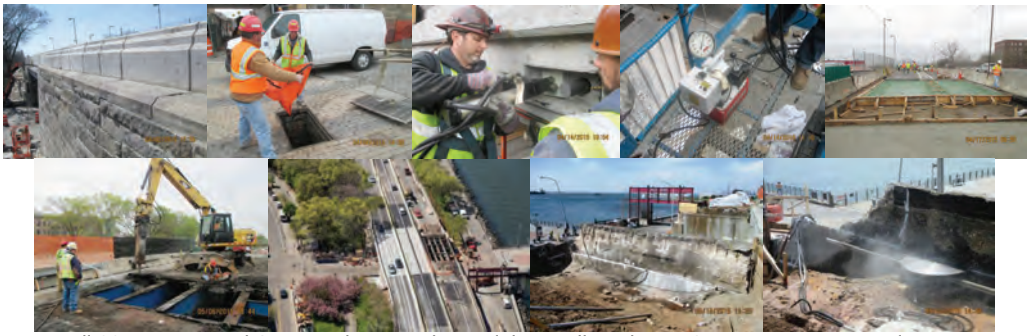
March 2014: Rebar Cage. May 2014: May 2014: Core Sampling. July 2014: Saw Cutting the Existing Northwest Abutment. August 2014: Lowering the Last of the Seven Pre-cast Concrete Box Beams on the North Side Abutments. September 2014: Placing Rebars for the North Parapet. October 2014: The Main Bridge Deck Undergoing Wet Cure. November 2014: Washing the New Westbound Concrete Deck Prior to the Placement of the Temporary Barrier at Left Side Before Stage III Traffic Shift. Facing East. Demolition of the Saw Cut Westbound Bridge Deck During Stage III.

In January 2015, the contractor received and set six precast pre-stressed deck beams on new bearings. In February and March, the Stage 3 deck surface was prepared and the deck was placed, rebars for the back walls were installed, and the wing wall stone panels began to be restored.

January 2015: Unloading Precast, Prestressed Concrete Box Beams During Stage III. Newly Placed Precast Box Beams in Median Area. Finished Deck From Stage II in Foreground. Existing Bridge Deck of Eastbound Roadway at Top - to be Removed in Future Stage. February 2015: Deteriorated Southwest Wingwall and Abutment of the Bridge After Dislodged Concrete Fell to the Sidewalk Below. Underdeck Timber Shielding at Right.

February 2015: Northwest Abutment and Wingwall Prior to Stonework Restoration. March 2015: Installation of Temporary Concrete Barrier on Eastbound Bridge in Response to a Red Structural Flag. Dumping Sub Base Soil for East Approach Slab. Placing and Finishing the Deck Wearing Surface for the Stage III Concrete Deck. Workers Resetting the Stone Facing on the Northwest Abutment and Retaining Wall.

In April 2015, the precast deck beams were post-tensioned, backfilling of abutments and roadway approaches for Stage III was completed, as was the installation of pressure relief joints, the longitudinal saw grooving of the deck and approaches, and the shifting of eastbound traffic into the Stage IV configuration on the new deck. In May, the contractor completed installation of stone panels on northeast wing walls, demolished the Stage IV deck and steel superstructure, drilled and grouted dowels for the abutment stem walls, and leaned and repointed the stone masonry.



April 2015: Restored Stonework on North Retaining Wall, and New Concrete Parapet Facing East. Placing a Silt Sack in a Catch Basin on the South Side of the Bridge. The Sack is Used to Catch Debris Entering the Catch Basin. Connecting Jacks to Transverse Tendons at the North Fascia. Hydraulic Jack Gauge Used to Measure Force in Post Tension Operation. Future Roadway Facing West. Foreground Formed Out Area for Pressure Relief Joint, Adjacent to Rebars for Approach Slab. Far Side is Precast Deck in Place for Future Stage IV Traffic Shift. Compaction Testing at Pressure Relief Joint on Bridge Approach. May 2015: Demolishing the Bridge Deck Prior to Removal of Structural Steel. Stage IV - Two Traffic Lanes Westbound at Left, Two Traffic Lanes Eastbound at Middle. All Four Lanes on New Precast Deck. Old Bridge at Right After Deck Removal, Prior to Removal of Structural Steel. Back of Southeast Abutment Wall After Removal of Structural Steel for the Eastbound Roadway. Note the Marked-Out Cut-Line at Back of the Southeast Abutment. Saw Cutting the East Abutment Wall. Drilling and Grouting Dowels Into Cut Down West Abutment Wall.

In June and July 2015, the Stage IV precast/prestressed concrete beams were erected, the Stage IV concrete deck was placed and cured, approach slab form work and railing were installed, south fascia barriers, rebars, and concrete were placed, and the final post-tensioning of the bridge deck beams was completed.

June 2015: Placing Concrete at Southeast Abutment - Veteran's Memorial Pier in Background. Erecting Precast Prestressed Concrete Beams at South Side of the Bridge Onto Elastomeric Bearing Pads. Placing Grout Between Recently Placed Precast Prestressed Beams - Facing Southeast. July 2015: Final Post-Tensioning of Precast Concrete Deck Beams From the North Fascia of the Bridge. Placing and Vibrating Concrete for the Parapet on the Eastbound Bridge. Compaction Testing of the Asphalt Pressure Relief Joint at the West Side of the Eastbound Roadway. Stage IV Existing Eastbound Bridge Deck Removed. Eastbound and Westbound Traffic on New Pre-Cast Pre-Stressed Beams. Westbound Traffic at Left. Veterans Pier at Right. Shore Road at Left. Stage IV - Preparing to Remove the Structural Steel From the South Side of the Existing Bridge.

In August 2015, the abutment fascia were repaired, and the bridge deck and approaches were saw cut and sealed. Eastbound traffic was shifted to the south side of the bridge for Stage V on August 13. In September and October, the contractor placed concrete for the median barriers, completed stone panel installation on the southeast wingwall, applied protective sealing and anti-graffiti coating to the bridge substructure, and made the final traffic switch. This concluded the three remaining construction stages. 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.

August 2015: Stage V Preparing Bridge Deck for Placement of Final Median Barrier. Placing Concrete for Final Median Barrier During Stage V – Facing East at East Approach. Epoxy Coated Reinforcing Mesh at Future Abutment Wall Repair. September 2015: Forming Operations at Final Median Barrier at East End of Bridge - Facing East.

October 2015: Post-Construction Drainage Cleaning and Inspection at Southwest Abutment. Applying Protective Sealant to the East Abutment Wall. Belt Parkway Roadway at West Side of Bridge. NYCDEP Owl's Head Waste Water Treatment Plant at Top. November 2015: Construction Complete.

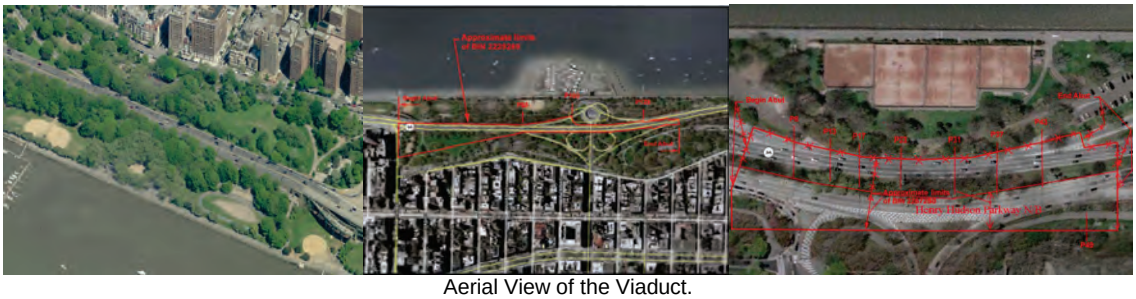
The existing Nostrand Avenue Bridge is a 140-foot long, 3-span, multi-girder superstructure, consisting of a concrete deck with an asphalt overlay over Nostrand Avenue. The superstructure is supported by concrete pier columns with a steel cap beam, and abutments on concrete filled steel pile foundations. The existing structure and immediate approaches will be demolished and replaced. Reconstruction is anticipated to start in 2021. 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 Right Girder in November 2012. Pier 1 and 2 Columns in December 2014. Left and Right Elevations in 2014. Span 1 Deck – Hollow Sounding Concrete Areas are Covered by Timber Planks That are in Good Condition. (2014 and 2015 Credit: NYSDOT)

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 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 repair, concrete barrier repairs, deck joints replacement, and concrete column base repairs. The steel repairs will include installation of reinforcements to the deteriorated girders, columns, connections and bearings. All of the steel will be painted. The top of deck work will be performed in stages to minimize the parkway closures. Construction is expected to begin in mid-2017.

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



Aerial View of the Viaduct.

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.

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.

The project to reconstruct the bridge has been suspended until such time as Parks funding is available. Repairs requiring immediate attention are performed by the When and Where contractor. This bridge is closed to vehicular traffic.

Hill Drive Bridge Span 2 Pier 1 End Face in 2013. View of Bridge in 2012. End Approach in May 2011: The Bridge is Closed to Vehicular Traffic. The Left Half of the Bridge is Closed to Pedestrians. (Credit: NYSDOT)

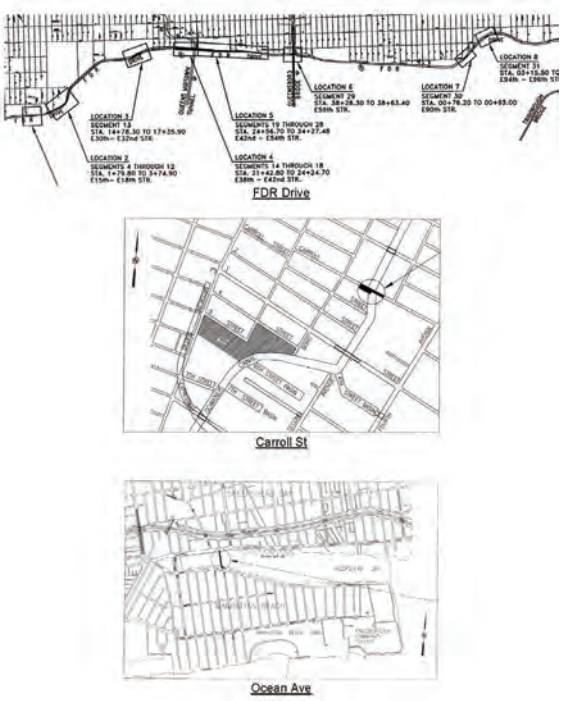
MARINE BORER REMEDIATION (MANHATTAN & BROOKLYN)

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 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.



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. Lower Wrap Section Applied.

The construction project is being performed almost entirely underwater and will include 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 will be replaced in kind).

The Marine Borer Remediation project will affect water quality and will require 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. The construction work was expected to be complete in August 2016. However, the construction activities will be extended to August 2017, due to site condition and change in scope.

RIVERSIDE DRIVE BRIDGE OVER WEST 158TH STREET (MANHATTAN)

The Riverside Drive Viaduct is located between West 153rd Street and West 161st Street. It is approximately 1,924 feet long 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. The bridge carries four lanes (two each way).

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 drainage system, and paint removal, lead abatement and recoating of steel. The bridge will remain open to traffic throughout field work and construction. Construction is expected to begin in 2018.

Riverside Drive Bridge in 2010. (Credit: NYSDOT) Vehicle Repair Facility.

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 includes 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. Construction is expected to be complete in February 2017.

Aerial View. Trans-Manhattan Expressway Connector Ramp in 2014: Elevation Right Spans 1 – 25, 33 – 40. (Credit: NYSDOT)

Span 42, Netting at Deck Underside, Looking Ahead. (Credit: NYSDOT) March 2015 Field Inspection.

On September 29, 2015, Division Personnel Conducted Emergency Repairs on Two Punch-Through Locations on the Top of the Deck. Steel Plates Were Installed. The Repairs Were Then Added to the Contractor's Work Scope. From Left: Bridge Repairer and Riveters Charlie Zhao and Ignazio Trapani, Carpenter Gregory Nolan, Supervisor Bricklayer Edward Alfano, Cement Mason Luigi Mula, Commissioner Polly Trottenberg, Assistant Civil Engineer Andrew Hoang, Carpenter Edward Alfano Jr., Assistant Civil Engineer Fouad Althaibani, Area Supervisor Highway Maintenance Edward Pedersen, Supervisor Highway Repairer Andrew Bondi, Supervisor Carpenter Joseph Diblasi, Bridge Repairer and Riveter David Fontanez, Assistant City Highway Repairers James Cummings, Anthony Connelly, and James Kelleher, Bricklayer Stephen Daniel, and Cement Masons Victor Porowski and Frank Finzio. Foreground: Bridge Repairer and Riveter Chris Mauldin.

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. These two pedestrian overpasses have deteriorated over time, and due to low vertical clearance, have suffered impact damage from oversize vehicle traffic on the Belt Parkway below. The 17th Avenue Bridge has a vertical clearance of 10'-8", at its lowest point, and the 27th Avenue Bridge a 12'4" vertical clearance at its lowest point. Both bridges have an overall span length of approximately 125 feet, and a bridge deck width of 15 feet. In addition, these structures are not in compliance with American Disability Act (ADA) requirements.

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 – Existing Conditions. Deteriorated Left Girder. Span 1 Left Girder over Belt Pkwy Eastbound Left Lane was Hit in September 2015.

27th Avenue Bridge – Existing Conditions.

In this project, the overpasses at 17th and 27th Avenues will be completely replaced. 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 2018, and is expected to be complete in 2020.

17th And 27th Avenue Bridges – Proposed Bridges.

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 Rotunda. 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 structure includes the West 79th Street traffic circle, the ramps to and from Henry Hudson Parkway southbound, and the ramps to and from the boat basin garage. By nature of this configuration, the rotunda is structurally part of the bridges. The rotunda and appurtenant bridge structures, however, 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), boat basin elements, including an office, storage space, workshops, and garage facilities. The structure is listed in State and National Registers for Historic Places.

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 project work will include the removal of the existing concrete deck, sidewalks and the pedestrian safety barrier. The deck will be replaced with a 9.5 inch concrete slab with integral wearing surface, a new sidewalk and safety barriers on a rehabilitated superstructure. Construction is expected to begin in 2018.

The three-level West 79th Street Rotunda 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. These levels, along with their interconnected ramps have been assigned separate Bridge Identification Numbers, but actually act as an integrated structure with similar issues and needs.

West 79th Street accesses the West 79th Street traffic circle from the east, while ramps from and to 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 Rotunda Complex consists of six bridges: the West 79th Street Traffic Circle consists of 34 steel spans over Pedestrian Plaza. There are two traffic lanes. The project work 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 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 steps 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. This Rotunda has landmark status and includes Gustavino type arches, 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 extensive architectural restoration of the plaza. This Rotunda complex also contains four ramps that will be part of the reconstruction project.

West 79th Street Bridge Over Amtrak in 2010. Underside of Bay 7. (Credit: NYSDOT) Traffic Circle Level. Plaza Level. Ramps and Façade. Aerial View of 79th Street Ramps. (Aerial Credit: NYSDOT)

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)

This eight culvert reconstruction project is in the final design stage.

The Galloway Avenue culvert is a single span timber pedestrian culvert 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 culvert the only means of carrying pedestrians from one side of the channel to the other. The existing culvert will be removed and a new culvert will be constructed. The culvert will be closed during construction.

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, 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.

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.

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. The construction is planned to be performed in one stage and no street closures will be required during construction.

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.

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.

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.

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.

This project to rehabilitate and/or replace the eight culverts is currently in the final design stage, and is expected to begin in December 2016 and to be complete in 2018.

Galloway Avenue over Marianne Street – Wearing Surface, Looking Northwest. Forest Avenue over Crystal Avenue. Midland Avenue over Hylan Boulevard – Looking South. Rockland Avenue over Brielle Avenue. Forest Avenue over Randall Avenue. Gregg Place over Randall Avenue. Arthur Kill Road over Muldoon Avenue. Arthur Kill Road over Ridgewood Avenue.

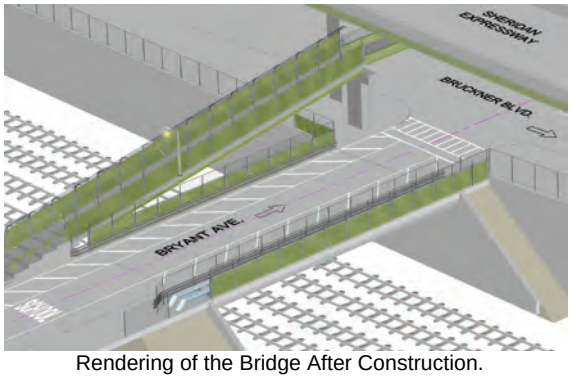
BRYANT AVENUE BRIDGE OVER AMTRAK AND CSX (BRONX)

The Bryant Avenue Bridge, oriented east to west between Buckner Boulevard and Garrison Avenue, is a one span structure constructed in 1908. It spans 90 feet over four railroad tracks. This project includes replacement of the steel superstructure, bearings, approaches, water mains and rehabilitation of the existing substructures by removing and replacing the top portion of the concrete abutments to accommodate the new superstructure. The abutments will be retrofitted to meet seismic criteria. The new superstructure consists of a reinforced concrete deck over pre-stressed concrete box beams. The two water mains were removed and replaced. Both water mains were installed on top of the north sidewalk in a fenced-off area. The Division's in-house design staff completed the design for this project. A Notice to Proceed for the project was issued to the contractor with a start date of August 18, 2014. The bridge is completely closed to vehicles during its construction; however, pedestrian access is being maintained.

Location Map. Bridge Views Looking North and South. 11/1/11 Approach Begin and End. (Credit: NYSDOT) Bridge View From the Pedestrian Overpass.

Construction of the water-mains, and demolition of the existing deck (superstructure) and upper portion of the abutments was completed in 2015. The construction of the abutment caps, installation of the pre-stressed box-beam girders, placement of the concrete deck, repairs to the substructure and the construction of curb, road base, sidewalks and asphalt pavement, including lane markings, were also completed. The installation of bridge fences and safety railing system were in progress at the end of 2015. This project is expected to be complete in February 2016.

March 2015: Chipping Out Roadway Deck Concrete and Removing Shielding Concrete. May 2015: Installing Overhang Brackets on South Side of Pedestrian Walkway. Removal of Sidewalk Stringer Panel. Summer 2015: Existing Structure Removed. September 2015: Placing the Concrete for the Bridge Deck. The Concrete Pump Placed 110 Cubic Yards of Concrete Into the Deck. Covering and Protecting the Fresh Concrete with Wet Burlap.



Rendering of the Bridge After Construction.

CITY ISLAND ROAD BRIDGE OVER EASTCHESTER BAY (BRONX)

The existing City Island Road Bridge was built in 1901 and is the only vehicular, bicycle and pedestrian access between the mainland Bronx and City Island. In 2014, the bridge carried 15,915 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 has outlived its useful life and requires extensive continuous maintenance. Spans two and three are supported by an overhead truss that originally functioned as a movable swing span but was permanently fixed in 1963.

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

The existing bridge will be replaced along the same alignment with a new three span bridge with two piers in the water. The new bridge will be approximately 17 feet wider than the existing 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 bridge will be a multi-girder continuous bridge with an integral deck. Galvanized steel stay-in-place forms will be 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 will be 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 will also eliminate the vehicle height restriction caused by the existing overhead truss. In order to maintain traffic during the demolition of the existing bridge and construction of the new bridge, a temporary bridge will be constructed on the south side of the existing bridge. Marine traffic will remain undisturbed beneath the bridge during peak boating season.

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 will be separated with a steel truss system and fence from vehicular traffic. The temporary bridge sections will be fabricated off-site while the foundation work is being performed. Therefore, the bridge will be erected on a complete per span system rather than "stick" built. This will minimize the amount of time the contractor will be in Eastchester Bay erecting the temporary bridge. The schedule advantage will allow 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 is 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: Drilled Shaft Operations on Snow-Covered Barges. 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. February 2015: Cap Beams Installed on 4 Piers of the Temporary Bridge. Construction Zone Amidst a Frozen Eastchester Bay. March 2015: Construction of Marine Span Began for the Temporary Bridge.

April 2015: Turtle Cove Culvert Replacement. Excavating. Installing Culvert Under Utilities. May 2015: Waterproofing the Joint. Backfilling. 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.

June 2015: Installing Marine Span 13 for the Temporary Bridge. July 2015: Installing Temporary Water Main on the Temporary Bridge. Installing Decking for Span 15. October 2015: Milling the Existing Asphalt Surface and Repaving at Both Approaches.

November 2015: New Culvert Boxes to Replace the Aging Conduit that Connects the Bay with Turtle Cove, Located Beneath City Island Road. December 18, 2015: Commissioner Polly Trottenberg Leading the Final Trip Over the Historic Bridge.

The construction of the new bridge is expected to start in early 2016, and it will be completed within the original contract schedule end date of December 30, 2016.

Existing and Proposed City Island Road Bridge Furnishings: Lighting, Fence, and Rail. Side View Rendering of New Bridge.

GRAND CONCOURSE BRIDGE OVER METRO NORTH (BRONX)

The bridge was originally built in 1906. 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 lanes of vehicular traffic in each northbound and southbound direction as well as NYCT subway traffic underneath the Grand Concourse Boulevard and above the Metro North railroad right of way. 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.

In the current rehabilitation scheme, the roadway will be supported independently from the subway structure: the structures will be physically separated. 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 made be of reinforced concrete with superpave type paving. A jointless deck will be installed to reduce or eliminated 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.

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.

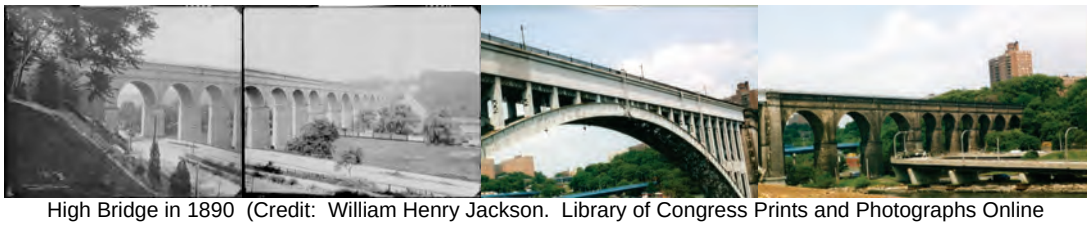
DOT and NYC Transit are in negotiations to resolve the jurisdictional issues arising from the separation of the existing jointly-operated bridge. NYC Transit will hire a consultant who will be conducting an inspection of this bridge in early 2016 to see the condition of their structure. This project, currently in the final design phase, is expected to begin construction in February 2018, and is expected to be complete in August 2020.

Grand Concourse Bridge over Metro North in 2010. (Credit: NYSDOT) Aerial View. Sidewalk and Top of Bridge.

HIGH BRIDGE PEDESTRIAN BRIDGE OVER THE HARLEM RIVER (BRONX/MANHATTAN)

This eleven span landmark structure is the oldest (circa 1848) bridge over the Harlem River. It is listed on the New York State and National Register of Historic Places. The bridge is under the Department of Parks and Recreation's (DPR) jurisdiction. It was erected to carry water from the Croton aqueduct, and had been closed since 1970. The bridge spans the Harlem River, connecting the neighborhoods of Highbridge in the Bronx and Washington Heights in Manhattan. The bridge was designated as a New York City landmark in 1970 and it was listed on the National Register of Historic Places in 1972.

Designed on principles of Roman aqueduct architecture, the granite bridge is about 116 feet in height, with the peak of its arches 100 feet above the Harlem River. The bridge is 1,450 feet long, measured from gatehouse to gatehouse, with a 1,200-foot-long brick walkway. The High Bridge was begun in 1839 and completed in 1848. Larger water pipes were added and the walkway was built in 1861-64. In 1927-28, after many years of calls for complete demolition of the bridge, the city replaced five of the original 15 arches with a central steel span to ease the passage of large ships. The rest of the majestic stone arches still stand, the majority on the Bronx side of the river. The bridge has never carried vehicles.

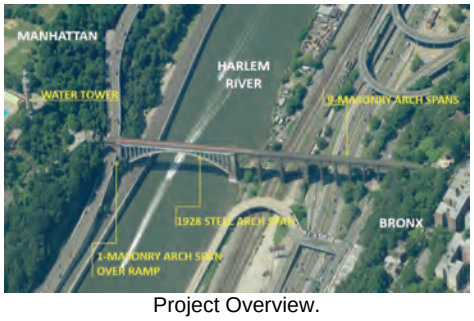


High Bridge in 1890 (Credit: William Henry Jackson. Library of Congress Prints and Photographs Online Catalogue) http://lcweb2.loc.gov/service/pnp/det/4a30000/4a32000/4a32600/4a32659v.jpg and http://lcweb2.loc.gov/service/pnp/det/4a30000/4a32000/4a32600/4a32660v.jpg (accessed September 9, 2014).
High Bridge Pedestrian Bridge in 2004. (Credit: Michele N. Vulcan)

In support of DPR, the Division prepared a detailed scope of work for the comprehensive in-depth inspection of the bridge. Engineering consultants conducted this inspection, which was completed in the summer of 2006, at an estimated cost of $2.5 million. The Division administered and supervised this work.

The $61.73 million restoration of the bridge was managed by the New York City Department of Design and Construction in partnership with DPR. The reopened High Bridge is an essential link in New York City's expanding waterfront Greenway. It allows Bronx residents to reach the Highbridge Pool and Recreation Center, and Manhattan residents to reach the Harlem River shoreline. The improvements make the bridge more accessible and safe. The rehabilitation followed historic preservation principles to restore the architectural details of this landmarked structure for public enjoyment.

Both the central steel span and the stone arches were cleaned and repaired; the steel span was repainted and the masonry structure were repointed and strengthened. Architectural lighting was installed beneath both spans. The brick paver walkway on top of the structure was removed and reconditioned, new waterproofing and concrete were installed, and then the historic brickwork was reinstalled. The aqueduct running beneath the structure was repaired and stabilized. New lampposts and safety fencing were installed and the original iron railing was repaired. Barrier-free access ramps were built on both sides of the bridge to allow access for the disabled. Three viewing platforms with bench seating were installed along the length of the bridge.



Project Overview.

The design of the restoration of the bridge was completed in December 2011. Construction began in August 2012. In March and April of 2013, the contractor began mobilization. Safety shield installation, and lead abatement and stone cleaning operations began. In May and June, brick paver removal and preservation operations and railing post restorations began. In July and August, safety fence and scaffolding installation, painting operations, and aqueduct pipe preservation were underway, along with repairing, repointing and cleaning of the masonry stone. Reconstruction of the brick walkway and ADA ramp excavation began. In September and October, installation of electrical lines and tie-rods were underway. In November and December, de-leading operations at the steep span were completed, bridge deck waterproofing operations and mast climber removal were in progress, and brick masonry work in the bridge attic began.

Northern View of High Bridge in 2013. Early Spring 2013: Temporary Work Platform on the Bridge. Temporary Work Platform on Sedgwick And Undercliff Avenues. Spring 2013: Mast Climber and Lead Abatement Containment on the Bridge. Summer 2013: Brick Paver Removal and Preservation. Fall 2013: Aqueduct Pipe Preservation. Reconstruction of the Walkway. (Credit: NYCDDC)

Late Fall 2013: Mast Climber Removal. Winter 2014: South View of the Bridge. (Credit: NYCDDC)

From January through April of 2014, brick and concrete spall repairs and steel repairs continued. Installation of underlayment pavers on bridge deck began in May and June, and the steel installation for the Manhattan and Bronx ADA ramps was completed. In July and August, waterproofing operations on the bridge and lead abatement and painting operations were completed. In November and December, paver installation on the bridge deck was completed. At the end of 2014, continuing work included: steel repairs, scaffold installation for masonry stone cleaning and repointing work on the bridge, Manhattan gatehouse rehabilitation, and historic railing and ADA ramp installation.

Winter 2014: Steel Stringer Installation. Spring 2014: Brick Repairs and Stone Cleaning. Summer 2014: Brick Installation. ADA Ramp Steel Installation. Summer 2014: Brick Installation. Winter 2015: LED Lighting on the Arch. Scaffolding. (Credit: NYCDDC)

In January and February 2015, the contractor continued steel repairs, scaffold installation for masonry stone cleaning and repointing work on the bridge, and installation of safety fence posts and historic railings. Construction was completed in late May 2015, and the bridge reopened to the public on June 6, 2015.

Masonry Arch Before and After Cleaning. Scaffolding and Containment. New Brick Pavers. (Credit: A.A. Mallick - NYCDDC)

In November 2015, *Roads & Bridges Magazine* selected the restoration of the High Bridge as one of North America's top 10 bridge projects for 2015. The bridge was restored with preservation and rehabilitation methods in accordance with the Secretary of the Interior's Standards for the Preservation of Historic Properties.

High Bridge Walkway in January 2004 and June 2015. The Brickwork Dating to the 1860's was Restored at Either End, With the Center Section was Completed With Replicas. (Credit: Gordon I. Goldberg)

HIGHLAND PARK PEDESTRIAN BRIDGE OVER PEDESTRIAN PATH (QUEENS)

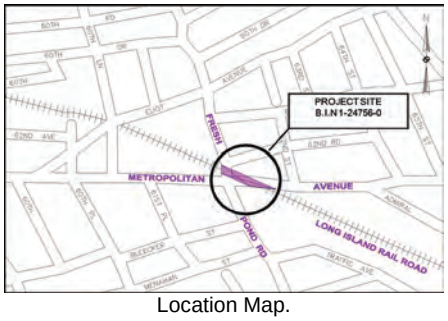
The Highland Park Pedestrian Bridge, built in 1902, is a single span arch structure with a clear opening of 59 feet under the bridge. Unlike a conventional steel or concrete bridge structure, the main structure is a brick masonry arch, with wing walls and parapet walls consisting of stacks of rounded 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.

The bridge is under the jurisdiction of the New York City Parks Department and the DOT is conducting this rehabilitation project on their behalf. The existing stone and brick arch bridge displays deficiencies in the form of cracking, missing mortar, spalled and missing masonry units and dissimilar grouting. The rehabilitation work will correct these defects while preserving the original elements of the structure to the greatest extent possible. The masonry will be cleaned and repointed in place. The asphalt roadway will be completely removed and the top of the arch will be excavated. This will allow 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 will then be backfilled and the roadway repaved. In addition, new lamp posts and under deck lighting will be added. An eight foot wide gravel path will be installed below the bridge, and the landscape will be restored with trees and shrubs. The bridge will be completely closed to traffic during the construction which will be detoured to other parts of the park. Construction is expected to begin in March 2016, and is expected to be complete in March 2017.

Highland Park Bridge. Dirt Pathway Under Bridge. Under-Deck Cracks and Missing Bricks - North-East Side. Under-Deck Arch Wall Showing Efflorescence Along the Cladding Stone and Brick Arch. Top of Bridge - Map Cracking, spalled, and Patched Areas. Inspecting the Bridge in December 2014.

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 still in service and are part of the Long Island Rail Road Montauk line. 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.

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.

The concrete deck is in very poor condition with several areas plated over with steel plates in order to maintain vehicular traffic and protect the LIRR below. The department does not have the available personnel or equipment to perform the necessary work. Therefore, the deck needs to be replaced immediately as there is potential for more damage to occur in the near future. The Agency is currently discussing the possibility of declaring that an emergency exists relative to the bridge. Due to the potentially serious danger to life and public safety posed by the current condition, it is critical that the repair work be performed as expeditiously as possible. The general proposed scope of work includes: replacement of the bridge deck, repair of the beam encasements, and necessary steel superstructure and substructure repairs.

Metropolitan Avenue Bridge in 2009. (Credit: NYSDOT) 2010 Inspection - Hands-On Inspection of A Pier. Obtaining a Steel Coupon Sample From a Stringer.

February 2014: View of Plates on Left Sidewalk (Fresh Pond Road). September 2014: Spans 1 and 2 Right Concrete Parapet. (Parapet Credit: NYSDOT) March 2015: Looking West, South, and East Across Bridge Deck.

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. 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 Grand Central Parkway and provides access to Flushing Meadows Park, the National Tennis Center, and Citifield, home of the New York Mets.

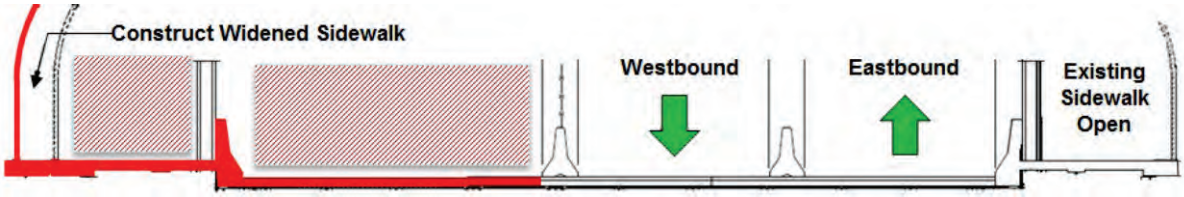
The viaduct structure consists of 22 steel bents supporting longitudinal steel girders at the roadway and track level. The length of the east viaduct is approximately 284 feet and the length of the west viaduct is 809 feet. The overall length of the bascule and viaduct structures is 1400 feet. The bridge 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. Subsequently, major roadway modifications were performed in the early 1980's. Concrete deck repairs were performed in July, August, and October of 2003, June and July of 2004, April, May, June, and July of 2005, and June and July of 2006. In the summer of 2005, the When and Where contractor repaired red and

yellow flag conditions caused by damage by over-sized trucks using the Van Wyck Expressway. Red-flagged steel shoring and yellow-flagged cracked stringer connection angles were repaired in the spring of 2008.

The project will include the construction of a new concrete-filled steel grid deck, rehabilitation of the existing east and west viaduct sections, bascule span, piers, abutments, removal of the operator houses, and painting of the entire bridge. In addition, a new bicycle/pedestrian path will be constructed on the north and south sides of the bridge.

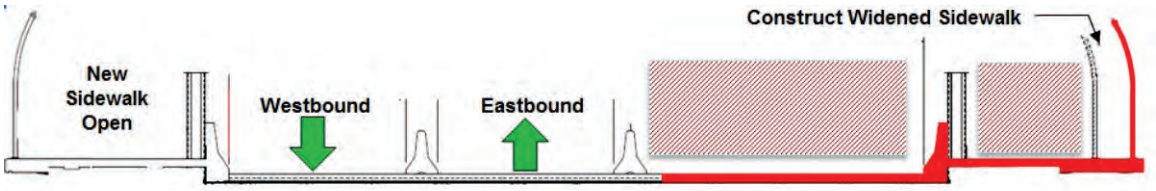
Roosevelt Avenue Bridge – In 1927. (Credit: NYC Records). Looking East. Existing and Proposed Bicycle/Pedestrian Path. 2014: Right Wingwall at the End Abutment. The Top Exhibits an area of Diagonal Cracks With Efflorescence and Spalls. The Deteriorated Concrete Areas are in Safe and Stable Condition. (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 late 2015. The first stage of the work will consist of paint removal by abrasive blasting. Since the existing paint is expected to contain lead, the work will be performed within an entirely sealed Class 1A Containment. Abrasive blasting involves use of compressed air to propel abrasive particles against the surface to be cleaned. The area to be cleaned will be entirely contained within impermeable walls with the sealed joints. Negative pressure maintained within the containment during blasting operations will prevent paint waste dust from being released. The air in the area surrounding the containment enclosure will be monitored and tested with scientific equipment, and the abrasive blasting will be stopped if there is any indication that the containment enclosure is not working as designed. In the unlikely event of emissions, they will be cleaned utilizing high-efficiency HEPA vacuums in accordance with approved methods. All paint wastes will be packaged and shipped from the site for disposal, meeting all applicable local, state and federal guidelines, regulations and laws.

All operations will be performed under the guidelines set forth in the Final Environmental Impact Statement. In addition, all safety requirements of the United States Environmental Protection Agency, the Occupational Safety and Health Administration, New York State Department of Health, New York State Department of Environmental Conservation, the New York City Department of Health and Mental Hygiene, and the New York City Department of Environmental Protection are strictly observed. The painting is scheduled to be completed by April 2019. Paint removal by abrasive blasting will not necessarily occur during the entire time period.

Stage 1 construction is expected to begin in early 2016. It is expected to be complete in August 2019.

Roosevelt Avenue Bridge (#2240507) in 2002, 2004, and 2010. (Credit: NYSDOT) Aerial View.

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 Elevation Left and Right in 2012. (Credit: NYSDOT) April 2014: Span 2 – Deteriorated Areas Shielded With Planks.

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.

Damaged Bridge, Cargo Container, and Contractor Truck After An Over-Height Trailer Struck the Bridge in January 2012.

The rehabilitation of the bridge will include the replacement of the existing reinforced concrete deck slab with a new reinforced concrete deck, steel faced curbs, a new parapet wall and protective screenings, concrete sidewalks, rehabilitation of the damaged steel fascia girders, and replacement of the diaphragms and other bridge elements, including a new steel water main. 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, and is currently in final design. Construction is expected to begin in June 2016, and is expected to be complete in February 2019.

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. There are two lanes (one way) on the bridge. The substructure consists of two gravity type concrete abutments. The west and east abutments of the existing bridge are constructed integral with the abutments of the Whitestone Bridge access ramp overpass. Construction is expected to begin in August 2018, and is expected to be completed in 2020.

Bridge (Lower Structure) in 2010. Left and Right Elevations. (Credit: NYSDOT) August 2013: Span 1 Underside of Deck from End Abutment, Looking Northwest - Areas of Spalled Concrete Deck Are Protected With Timber Planks. March 2014: Steel Plates on Wearing Surface. 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.

EAST 175TH STREET BRIDGE OVER METRO NORTH (BRONX)

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 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, and and partial depth repairs of the existing stone masonry. Construction is expected to begin in 2019.

2014: East 175th Street Bridge Left and Elevations. (Credit: NYSDOT) Sidewalk conditions.

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.

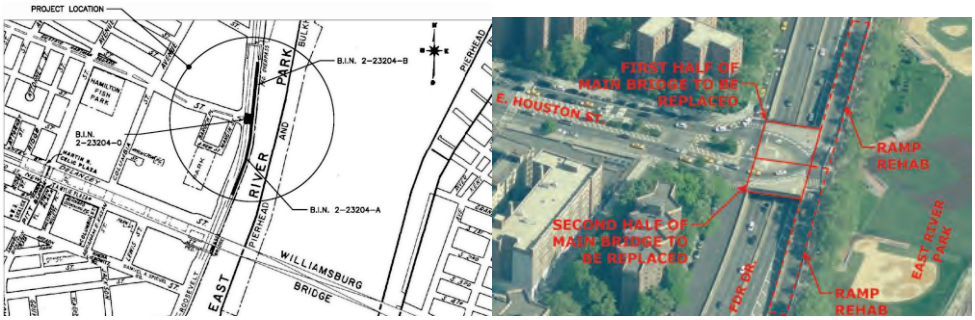
FDR DRIVE AT HOUSTON STREET OVERPASS (MANHATTAN)

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 thus almost 60 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 structural slabs have asphalt overlays, and the main bridge has three sections of concrete sidewalks.

The general scope of work for the main bridge structure includes 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), includes the repair of the existing concrete slab and wall structures, removal of asphalt overlay, installation of waterproofing, repair of joints, removal of safety walks, replacing parapets with new concrete barriers, and the placement of new asphalt overlay over the existing deck slabs.

The reconstruction of the main bridge will be 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.



Project Location. Construction Staging.

The Three Structures of the FDR Drive at Houston Street Overpass. 2014: Main Bridge – Left and Right Elevations. South Approach Ramp - Span 2, Left Side Safety Walk and Curb. North Approach Ramp - Span 2, Top of Cantilevered Pedestrian Walkway. (Credit: NYSDOT)

2011: Main Bridge – Top of Deck Looking West. South Approach Ramp – Top of Deck Looking South. North Approach Ramp – Top of Deck Looking North.

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

The Harlem River Drive Bridge over the ramp from East 127th Street is 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.

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.

Harlem River Drive Bridge at East 127th Street.

Rendering of New Harlem River Drive Bridge.

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.

Project Location. 2014: Left and Right Elevations. (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.

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 recently 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.

Exit 19 (East 125th Street) of the northbound Harlem River Drive was closed at 10:00 AM, February 23, 2015, and will remain closed through 2017. Motorists are using Exit 21 (East 135th Street) as an alternate exit.

Stage 1 is complete and the project was in Stage 2 at the end of 2015. Construction is expected to be complete in December 2018.

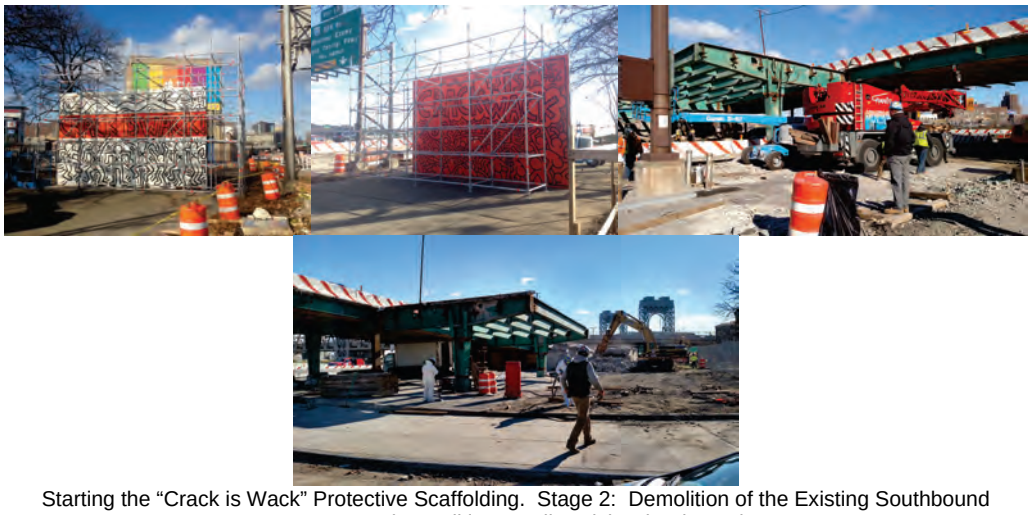
February 2015: Exit 19 Closed. June 2015: Locating and Removing Utilities.

February 2015: Removing the Massive Reinforced Concrete Substructure Near the Third Avenue Bridge. Excavating and Removing Big Rocks. (Credit: Artemio Angeles)

August 2015: Backfilling Utilities at Second Avenue. Contractor Working on the Temporary Roadway Placing the Sub-Base Second Layer. September 2015: Preparing New Concrete Crane Pads With Reinforcement. Painted Concrete Barriers Near Ramp C and Temporary Roadway. October 2015: Adjusting the Grading on the New Temporary Roadway. (Credit: Artemio Angeles)

On October 5, the Temporary Roadway was Opened on the Northbound Harlem River Drive. This will enable the Start of Construction of the New 2nd Avenue Exit Ramp.

December 2015: Ramp C Concrete Placement. (Credit: Artemio Angeles) Test Pit Pier 6.



Starting the "Crack is Wack" Protective Scaffolding. Stage 2: Demolition of the Existing Southbound Structure. (Demolition Credit: Richard Solomon)

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. The scope of rehabilitation work includes 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. Vehicular and pedestrian access will be maintained during the 5-month rehabilitation period. Construction work began in June 2015. The project involves nighttime closures.

Mosholu Parkway Bridge over Conrail (Abandoned). Conditions in June 2015. Asphalt Work in July.

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 shall include 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. Vehicular and pedestrian access will be maintained during the estimated 5-month rehabilitation period.

Leggett Avenue Bridge over Amtrak.

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 shall include 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. Vehicular and pedestrian access will be maintained during the estimated 4-month rehabilitation period.

East 162nd Street Bridge over MNRR.

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 shall include 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 estimated 8-month rehabilitation period.

East 165th Street Bridge over MNRR.

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 shall include 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. Vehicular and pedestrian access will be maintained during the estimated 5-month rehabilitation period.

East 187th Street Bridge over MNRR.

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 shall include 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. Vehicular and pedestrian access will be maintained during the estimated 5-month rehabilitation period.

Southern Boulevard Bridge over East Fordham Road.

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 are not included in the scope of the bridge project. The scope of rehabilitation work shall include the following: removal and replacement of asphalt overlay; repairing concrete on the underdeck, abutments, piers, wingwalls and sidewalks; repairing underdeck light fixtures and drain pipe; resealing sidewalk and parapet joints; grouting the gap below the parapet curb along the pavement; and removing graffiti by power wash and applying anti-graffiti protective coating. Vehicular and pedestrian access will be maintained during the estimated 4-month rehabilitation period.

Grand Concourse Bridge over East 167th Street.

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 shall include 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. Vehicular and pedestrian access will be maintained during the estimated 4-month rehabilitation period.

East 180th Street Bridge over Bronx River.

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 shall include 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. Vehicular and pedestrian access will be maintained during the estimated 4-month rehabilitation period.

Riverside Drive Bridge over West 138th Street.

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. The scope of rehabilitation work shall include the following: clearing and grubbing; removing and replacing the asphalt overlay, concrete overlay, waterproofing membrane and granite and brick pavers; repairing concrete on the underdeck; repointing and repairing cracks in stone masonry joints; resealing underdeck joints; installing pavement striping; removing graffiti by power wash and applying anti-graffiti protective coating; removing and resetting steel gate; and cleaning and painting bollards. Vehicular and pedestrian access will be maintained during the estimated 4-month rehabilitation period.

Riverside Drive Bridge over West 145th Street.

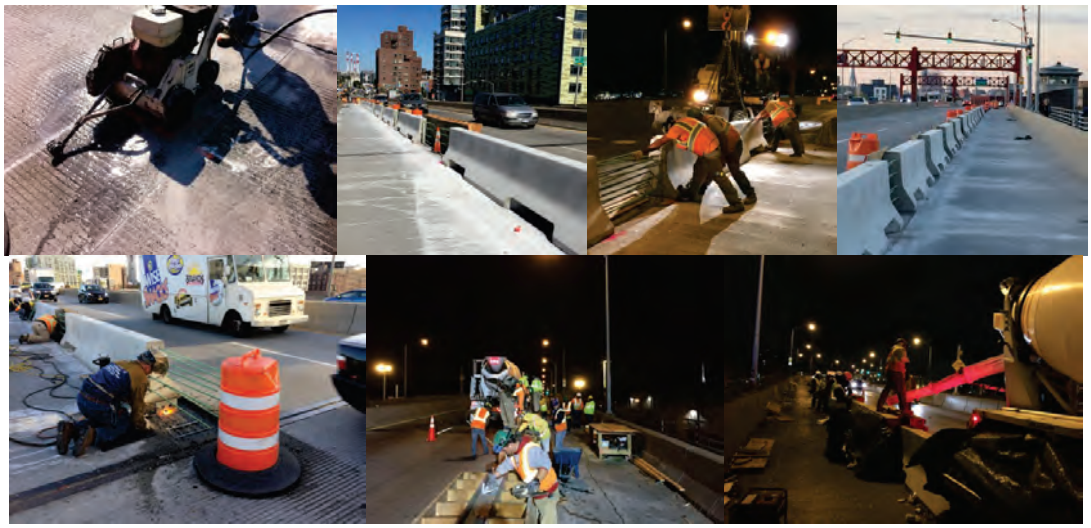
Bicycle use has grown at an unprecedented rate over the last five years in New York City. Currently, the Pulaski Bridge, which connects Greenpoint, Brooklyn with Long Island City, Queens, merges pedestrian and bicycle traffic into a shared travel lane creating dangerous conditions for both pedestrians and bicyclists. The Pulaski Bridge project will convert 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 is now 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 will cover some of the $4.2 million costs. The new pathway is expected to open in spring 2016.

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 cannot support the weight of an additional concrete barrier, so in the middle of the bridge, the project will eliminate the barrier that separates the current bicycling and walking path from traffic. On this stretch, pedestrians and cyclists will have physical (metal) separation from traffic, but not between each other. Along other sections of the bridge, there will be two concrete barriers, separating the bikeway from both car traffic and pedestrians. The scope of work will also include 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.

Existing and Planned Condition.

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 are 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 involves nighttime and midday car lane closures, but bicycle and pedestrian access to the bridge are being maintained at all times during construction.



September 2015: Saw Cutting the Existing Concrete Bridge Deck to Excavate for the Barrier. Precast Concrete Barriers in Place on the Queens Side of the Bridge. Nighttime Placement of the Barriers. October: Precast Concrete Barriers in Place Along the Brooklyn Side of Bridge Along the Elevated Spans. Welders Preheat the Weld Plate for the Barrier. Placing Concrete at the Cast-in-Place Barrier Closure Segments. December: Cast-in-Place Barrier Concrete Barrier Placement Along the Brooklyn Side of the Bridge.

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.

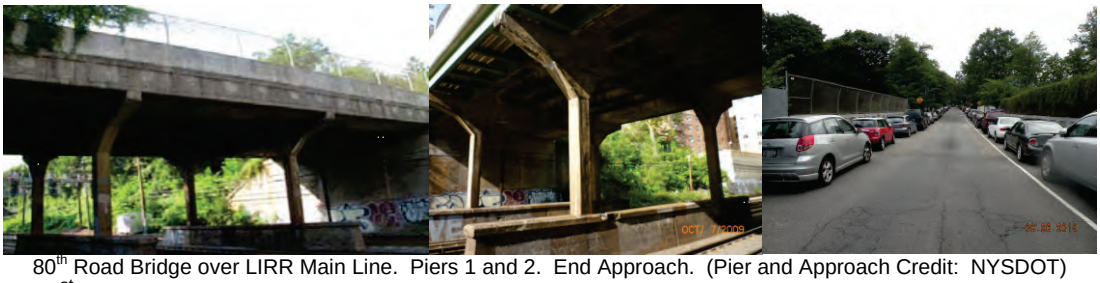
The Ramp to the Ed Koch – Queensboro Bridge from East 58th Street over East 59th Street was built in 1929. It is a twelve span ramp and carries two reversible travel lanes of traffic to (normal daily hours) and from (weekdays morning rush hours only) the Ed Koch - Queensboro Bridge south upper roadway. The bridge has a half jersey barrier running along both sides of the roadway and approaches. The scope of rehabilitation work includes 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. Vehicular and emergency access will be maintained during the estimated 5-month rehabilitation period.

Ramp to the Ed Koch – Queensboro Bridge from East 58th Street over East 59th Street. Span 10 – Left Elevation. Span 11 – Left Side of Structure. (Spans 10 and 11 Credit: NYSDOT)

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 includes 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. Vehicular and emergency access will be maintained during the estimated 8-month rehabilitation period.

Ramp to 21st Street From NY Over 22nd Street. Spans 16 to 21, and Spans 22 to 38 – Right Elevation. Piers 18 and 19. (Spans and Piers Credit: NYSDOT)

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. Vehicular and pedestrian access will be maintained during the estimated 7-month rehabilitation period.



80th Road Bridge over LIRR Main Line. Piers 1 and 2. End Approach. (Pier and Approach 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. The scope of rehabilitation work includes the following: removing and replacing the asphalt wearing surfaces on the bridge and approaches; repairing the concrete on the abutments, wing-walls, and underside of the deck; constructing a retaining wall at the south west corner; removing and reconstructing the concrete curb, sidewalk and driveway at the east approaches, and improving the existing under deck lighting. Vehicular and pedestrian access will be maintained during the estimated 3-month rehabilitation period.

71st Avenue Bridge over Cooper Avenue. Left Concrete Parapet/Guide Rail. Span 1 Bridge Framing. (Parapet and Span Credit: NYSDOT) Stairway at Right Side of Beginning Abutment.

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 includes 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. Vehicular and pedestrian access will be maintained during the estimated 3-month rehabilitation period.

Hannah Street Bridge Over SIRT South Shore. Spans 1-4 - Right Elevation. Pier 3.
(Span and Pier Credit: NYSDOT)

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.

Forest Avenue Bridge Over Clove Lakes Park Stream. End Right Wingwall.
(Wingwall 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 includes 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. Vehicular and pedestrian access will be maintained during the estimated 3 - month rehabilitation period.

Douglaston Parkway Bridge Northbound Over Cross Island Parkway.

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 includes 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. Vehicular and pedestrian access will be maintained during the estimated 2-month rehabilitation period.

Douglaston Parkway Bridge Southbound Over Cross Island Parkway.

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. The scope of rehabilitation work includes the following: removing and replacing the existing deck and approaches' asphalt overlay, waterproofing membrane, and sidewalks; repairing the concrete on the abutments and underside of the deck; improving the existing roadway lighting and drainage systems; repointing the mortared joints in the wing-walls and piers; and providing new pavement striping. Tree and landscape protection will be provided during the construction. Vehicular and pedestrian access will be maintained during the estimated 5-month rehabilitation period.

Roosevelt Avenue Bridge Over Flushing Meadow Park Road.
Left Side Span 2.

149TH STREET BRIDGE OVER LIRR

A Notice to Proceed for the structural deck replacement for this bridge was issued to the contractor with a start date of November 30, 2015.

The 149th Street Bridge over LIRR was built in 1924. It is a single-span steel stringer structure and carries one travel lane and one parking lane in each direction, a sidewalk, a railing and a steel mesh fence running along both sides of the roadway. The work to be performed under this project includes replacing the structurally deficient bridge deck constructed under Contract HBCR99B. The reconstruction of the bridge began in May 2010. In May 2012, an independent consultant determined that the deck was structurally deficient due to a shop drawing review error by the design and construction support services consultant. The City has filed a lawsuit against the consultant for this error. The scope of work includes the following: installing protective shielding over the railroad during nighttime operations; removing and storing the existing bridge railing and fence; removing and replacing the superstructure slab including the sidewalk and curbing; reconstructing the header on the south abutment and the sidewalks on the south approach to install an armorless joint; reinstalling the bridge railing and fencing along the fascia; sawcutting a groove finish on the bridge deck and applying a penetrating sealer to the top of concrete; and installing traffic striping across the bridge to match the existing striping on the approaches.

2014: Monitoring the Deck With Sensors. Taking Core Samples for Testing. Bridge is Closed to Traffic but Reopened for Pedestrians in June 2012.

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 Bryant Avenue Bridge over Amtrak and CSXT in the Bronx was designed by unit staff and is expected to remain under construction until early 2016. This is a one span structure with a span length of 90 feet. This project includes replacement of the steel superstructure, bearings, approaches, water mains, and rehabilitation of the abutments. The new superstructure consists of a reinforced concrete deck over prestressed concrete adjacent box beams. The two existing water mains will be replaced with two new pipes on top of the north sidewalk in a fenced-off area. As the designer of the bridge, In-House Design has also been involved in the construction support services for the duration of construction.

Design also continued 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, concrete deck, abutments, and retaining walls, as well as the complete painting of the substructure and superstructure steel. Construction work on these viaducts is expected to begin in mid-2017.

The unit also 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. Construction for both bridges is scheduled to start in fiscal year 2019. Both are single span bridges built in 1889. The superstructures will be removed and replaced, and the substructures will be partially rehabilitated.

September 2015: Inspecting the Preparations for the Bridge Deck Concrete Pour at the Bryant Avenue Bridge over AMTRAK and CSXT. Assistant Civil Engineer Evgenia Campbell, Assistant Electrical Engineer Satpaul Jaswal, Director of In-House Design Ferdinand John, and Civil Engineers Kirollos Dimian, Kamran Sikandar, and Lev Gold. (Credit: Ludner Charles)

In-House Design's Electrical Group reviews and/or prepares contract documents for all electrical and street lighting work on all projects on the Division's Capital Program. Some of the contracts reviewed during 2015 included the emergency contract for the restoration of tunnel systems at the Battery Park and West Street Underpasses; the replacement of the Bruckner Expressway over Unionport Bridge; the reconstruction of the bridge operating system 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 2015, the Specifications Unit of the Engineering Support Section prepared and/or reviewed contract proposal books and/or specifications for 20 contracts, including 17 bridge rehabilitation and new construction/reconstruction contracts and 3 component rehabilitation contracts, in addition to replying to specification requests for 10 on-going construction projects. Seven of the above contracts totaling approximately $422 million in construction costs were approved by the Law Department and advertised for bid, and 2 are awaiting approval. Nine contracts were awarded for construction in 2015 and one is waiting for award.

Notable among the construction contracts prepared and /or reviewed, advertised, sent for bid, and awarded were: the component rehabilitation of six bridges citywide, Belt Parkway Bridge over Mill Basin, the preventive maintenance of the four East River Bridges, the 8 Culverts Project in Staten Island, Emergency Contract for Battery Park Underpass and West Street Underpass, Roosevelt Avenue Bridge, Macombs Dam Bridge, the Trans-Manhattan Expressway Connector Ramp, and the Houston Street Overpass.

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 168,590 TIFF (Tag Image File Format) drawings to PDF (Portable Document Format) format and completed the indexing of 148,782 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 also reviewed and approved as-built drawings and contract drawings for 25 contracts in 2015, including Manhattan Bridge, Harlem River Drive over Ramp at East 127th Street, Belt Parkway Bridge over Mill Basin, Houston Street Bridge over DFR Drive, Bryant Avenue Bridge over Amtrak and CSX, component rehabilitation of twelve bridges citywide, St. George Ferry Terminal Ramp Project, component rehabilitation of ten Brooklyn bridges, Wards Island Pedestrian Bridge, Claremont Parkway Bridge, 149th Street Bridge, and the Roosevelt Avenue Bridge over the Van Wyck Expressway.

SURVEYING

The Surveying Unit staff monitored eight bridges and three retaining walls in 2015: Depot Place Bridge over Conrail Yard, Third Street Bridge over Gowanus Canal, Pelham Parkway Bridge, Stone Arch Bridge in Central Park, Ninth Street Bridge over Gowanus Canal, 17th Avenue Pedestrian Bridge over Belt Parkway, Footbridge over Clove Lake, City Island Bridge over Eastchester Bay, and the retaining walls at Douglas Road, along Pratt Avenue, and at the West 207th Street Bridge over the Harlem River.

ENGINEERING REVIEW

MACY'S THANKSGIVING DAY PARADE

As in past years, the staff of the Engineering Review Section actively participated in the 2015 Macy's Thanksgiving Day Parade. 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 Scrat, Ronald McDonald, Angry Bird, and Dino, four new 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 test flights of the balloons at the CitiField parking lot in Flushing on November 8, 2015, 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 26, 2015, wind speeds were relatively low and all 17 large balloons flew in the parade without incident. The wind gusts varied between 9 to 15 miles per hour. Chief Bridge Officer Robert O. Collyer, Director of Engineering Review Uday Dommaraju, Civil Engineers Ashok Chintakunta and Dilip Biswas, and College Aide Ediant Martinaj, and four 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.

Balloons in Flushing on November 8. Angry Bird in Level Flight. Anemometer Station and Crew.

Parade 2015: Director of Engineering Review Uday Dommaraju and Civil Engineer Ashok Chintakunta. Scrat, Ronald McDonald, Angry Bird, and Dino.

CRP/EXTELL PARCEL H PROJECT

The CRP/Extell Parcel H, LP project (Riverside Drive between 59th and 72nd Streets) includes the construction of seven new 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 a half tunnel section in what was formerly known as 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. The construction of the tunnel sections was recently completed.

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 underway. Division staff are 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 is scheduled to be completed by the end of June 2016.

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 2017.

Eastern Rail Yard Map. (Credit: Related Companies/Oxford Properties)

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. 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 will continue through the beginning of 2017. The project is slated to run through 2018.

Pacific Park Site Map. (Credit: Greenland Forest City Partners)

RETAINING WALLS

In May 2005, the Department started a program for the periodic inspection of City-owned retaining walls. The City currently owns 634 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, 18 retaining walls have completed rehabilitation/replacement, and 17 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: Southeast Corner of West 108th Street and Riverside Drive. Left Side of Ramp From Riverside Drive to George Washington Bridge. Irwin Avenue. Cross Island Parkway Southbound Before 100th Avenue. Cooper Avenue. Douglas Road.

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.

BRIDGE SEISMIC DESIGN AND RETROFITTING

The seismic retrofitting of bridges in New York City is part of the inspection and rehabilitation program mandated by Congress and administrated by the FHWA through the local authorities. During the period of 1993 to 1996, four major bridge owners in the New York City area (NYCDOT, NYSDOT, MTA, and the Port Authority of New York and New Jersey) retained seismologists to study hard rock seismic ground motions. The rock motions generated by these studies differed from each other and from the AASHTO spectrum as modified by NYSDOT. The differences were such that the resulting retrofit costs varied widely, depending upon which motions were adopted. To resolve this issue, NYCDOT, in association with NYSDOT and the FHWA, retained a consultant to assemble an expert panel to develop recommendations for rock motions that would be adopted uniformly by the New York City region. The panel consisted of a team of six internationally recognized experts in the fields of seismology, geology, earthquake engineering, ground motion, and geotechnical studies. There were several brainstorming workshops held in New York, where the senior officials from NYCDOT, NYSDOT, and the FHWA provided their input to the panel members.

The expert panel formulated recommendations regarding rock motions and corresponding time histories. Subsequently, the consultant derived soil generic response spectra, based on the hard rock motions and NEHRP amplification factors. The consultant also established bridge performance criteria to be used for critical, essential or other bridges undergoing structural analyses. The recommendations are described in the report entitled "New York City, Seismic Hazard Study and its Applications, Final Report, December 1998." This report is now extensively used by NYCDOT, NYSDOT, the FHWA, their consultants, and other agencies in the New York area for bridge projects. Thus, NYCDOT's leading role and efforts to establish ground motion standards have brought uniformity in seismic design to the New York City area.

In 2002, the consultant convened a second panel of seismologists to update the 1998 Hazard Study and associated rock motions. On June 3, 2004, after the USGS national hazard maps were adopted by NEHRP, in a meeting attended by NYCDOT, NYSDOT and FHWA, it was unanimously agreed to adopt the new hard rock ground motions recommended by the panel of seismologists.

Following the adoption of the very hard rock motions, the consultant started the preparation of a new edition of the NYCDOT Seismic Design Guidelines for Bridges. Data from geotechnical bridge studies performed within the five boroughs of NYC were compiled. A series of generalized subsurface soil and bedrock profiles were developed to be representative of the range of soil profiles, overburden thickness, and rock types found within NYC. A fully probabilistic approach, utilizing Random Vibration Theory (RVT) in conjunction with the new hard rock ground motions, (from the 2002 Hazard Study) and the generalized NYC subsurface profiles, was used to develop vertical and horizontal Uniform Hazard Spectra (UHS), which, in turn, served as the starting point to derive design rock and soil response spectra. The method allowed computation of soil UHS, while preserving the hazard level of the very hard rock UHS. It accounted, in a rigorous probabilistic manner, for variations and uncertainties in soil stiffness, stress-strain nonlinearity, and material damping; depth of soil to rock; and, stiffness of the rock under the soil.

Generic horizontal and vertical design spectra were derived using the calculated UHS as the starting point. Generic design V/H ratios to be used in site-specific studies to generate site specific vertical motions, were also produced. All the generic soil curves are presented as a function of three parameters: soil class; depth to rock; and, rock class under the soil.

The development of these parameters for the NYCDOT Guidelines represent a significant improvement to the previous guidelines and other codes, since it will result in better representation of the ground motions at a bridge site, bringing closer the generic ground motions to those that could be obtained from site-specific studies. The fact that the new guidelines better fit the specific characteristics of the NYC region, will permit the engineers to evaluate the need for retrofitting existing bridges or strengthening new ones at the right places.

Recommendations for liquefaction evaluation are also provided in the guidelines, including recommendations for earthquake magnitude and peak ground surface accelerations, which are critical parameters for evaluating liquefaction potential and which have not been included in previous guidelines. The new document also includes recommendations for site-specific studies, providing guidelines and minimum requirements that must be satisfied. These include: procedures to establish soil horizontal and vertical design motions; recommendations to evaluate the effects of the depth to the rock surface; recommendations to account for uncertainties in the soil properties; minimum requirements to establish lower bound horizontal design motions; recommendations for time history analysis of bridges; recommendations for the incorporation of spatial variation effects in the analysis; and different requirements for critical and non-critical bridges site-specific studies.

The final draft of the new NYCDOT Seismic Design Guidelines for Bridges was submitted to NYSDOT for peer review in September 2008. The peer review was completed and the final version of the blue pages submitted to NYSDOT in December 2015 for review and approval. Upon NYSDOT approval, these guidelines will be adopted for the seismic and retrofit design of bridges in the “Downstate Zone”: the counties of Bronx, Kings, New York, Queens, Richmond, Nassau, Rockland, and Westchester. The review is expected to be complete by the end of January 2016.

ENVIRONMENTAL ENGINEERING

In 2015, 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 Paerdegat Basin Bridge, Rockaway Parkway Bridge, Fresh Creek Bridge, Gerritsen Inlet Bridge,

and the Bay Ridge Avenue Bridge in the Belt Parkway Project. This includes 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 with the design review of the Mill Basin Bridge 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, Manhattan Bridge, Greenpoint Avenue Bridge, Belt Parkway bridges, City Island Bridge, Component Rehabilitation projects, and emergency work over water projects.

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. A new method of snow and ice control was needed to protect the City's $2.5 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.

New anti-icing yards storing both chemicals have been established 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 have been installed in key vehicles to assist supervisors with the decision making process.

In the winter of 2014-2015, a total of 79,100 gallons of potassium acetate and 285 tons of sodium acetate were applied on the roadways of all four East River Bridges.

Snow Removal on the Brooklyn Bridge in January 2015. (Credit: Russell Holcomb) Commissioner Polly Trottenberg Visiting Division Staff After the January 2015 Snowstorms: Carpenters Edward Alfano Jr. and Gregory Nolan, Supervisor Carpenter Joseph Vaccaro and Cement Mason Stephen Buckley.

INSPECTIONS

In 2015, Inspections covered 94 bridges and 502 spans. Emphasis was placed on ensuring public safety through the monitoring of potentially hazardous conditions and temporary repairs. The unit performed 1,020 monitoring inspections, including special winter monitoring inspections of cellular structures, shorings, and potential fire hazards. In addition, 147 emergency inspections were conducted in response to hot line calls, in-house requests, or citizen complaints.

2015: Inspecting East Drive (Inscope Arch) in March. Bethel Avenue Bridge and Footbridge over Brooks Lake Dam in Staten Island in April. Granite Avenue Bridge in May. Gapstow Bridge (East 62nd Pedestrian Bridge) (From a Boat) in July. Henry Hudson Parkway Northbound Ramp From West 96th Street in November. Motor Parkway Pedestrian Bridge over Hollis Court Boulevard and Battery Place Tunnel in December.

Winter Monitoring Locations: Manhattan, Williamsburg, Ed Koch – Queensboro Bridge, and West 155th Street Pedestrian 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 to the internet. 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 in March 2013.

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 2016, the New York State Department of Transportation (NYSDOT) will be transitioning their inventory and inspection system over to the new AASHTO Element Inspection System. This transition is necessary to meet the new requirements established by the Federal Government. This will be a radical transformation from the one the NYSDOT has used since the late 1970's and will require the City to make major changes to our operations. It will likely also require the re-training of existing personnel and the replacement of existing software applications.

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. The final report will recommend appropriate non-invasive technology for monitoring of suspension cables.

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.

In 2014, an existing engineering services agreement (ESA) contract was used to install a remote monitoring system on selected spans of the Manhattan approach to the Brooklyn Bridge. Under the ESA, 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. The sub-consultant is recently completed the migration of the web-based system from their own servers to a cloud-based storage solution under the control of the Agency's information technology department. With the delay in the upcoming rehabilitation contract, this system has taken on added importance.

The Brooklyn Bridge Manhattan Approach, Arch Block B Elevation.

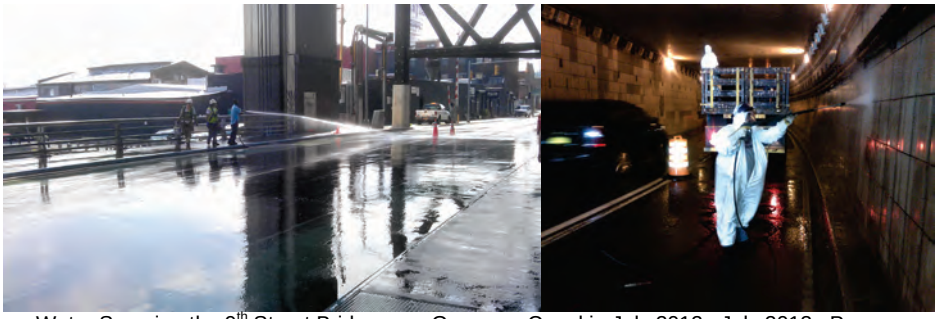
June 2015: Director of Bridge Management Kevin McAnulty Utilizing a Borescope.

June 2015: Director of Bridge Management Kevin McAnulty Inspecting the Brooklyn-Queens Expressway Between Cadman Plaza and Atlantic Avenue With a Borescope. (Credit: Bojidar Yanev)

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.

CLEANING

In 2015, 8,031 cubic yards of debris were removed from bridges and their surrounding areas, and 464 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.

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.

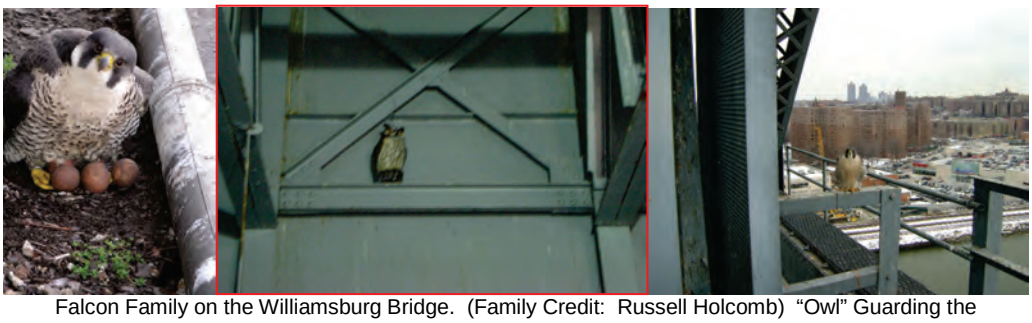
The Division utilizes a relatively low tech, and passive, approach to deterring pigeons. In 2006, the type of barrier used to cage out pigeons was changed from the drop ceiling method to netting. The netting is supported by steel cables that are clipped to the beams. This method is currently in use under 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. In addition, a pigeon deterrent system involving low voltage wires is in place at the Belt Parkway Bridge over Ocean Parkway. The wires are installed along the web of the girders and are hardly visible, yet highly effective. The system has been in operation for over nine years now and no pigeons have been observed under or by the bridge ever since. The community is pleased that we addressed one of their most serious and longstanding complaints. The system requires minimum maintenance and is extremely easy to operate.

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 unwanted birds would normally perch. The burning sensation caused by the capsaicin irritates the birds' feet and results in them roosting elsewhere.

In 2015, pigeon dropping removal and/or pigeon proofing were performed at the FDR Drive at 96th Street and on the Grand Concourse at 204th Street, Bedford Park Boulevard, and Kingsbridge Road.

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)

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.

Pulaski Bridge Opening in February 2010. (Credit: Bernard Ente) 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. Union Street and Greenpoint Avenue Bridges Opening in July 2015. (Credit: Litcy Barreto)

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.

The reduction in planned personnel saves approximately $1,074,068 annually. In addition, bridge operational capabilities, general maintenance, and debris and snow removal have been enhanced through the more efficient utilization of existing personnel.

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.

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 2001 - 2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Borden Avenue (Q)	28	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Broadway (B/M)	27	83	49	16	2	18	42	58	57	15	11	44	0	6	11
Bruckner Expressway (Unionport Bridge) (B)	420	332	300	309	253	250	281	323	349	308	198	143	143	218	146
Carroll Street (K)	80	124	186	49	22	28	13	38	91	146	29	95	2	12	2
Grand Street (K/Q)	50	19	10	8	5	2	5	0	0	0	3	3	0	0	0
Greenpoint Avenue (J. J. Byrne Memorial Bridge) (K/Q)	641	659	738	1093	1045	905	641	485	428	388	667	733	609	723	918
Hamilton Avenue (K)	832	946	824	757	677	1077	354	0	150	905	1060	965	651	760	1106
Hunters Point Avenue (Q)	36	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Hutchinson River Parkway (B)	120	30	5	37	10	2	51	61	170	224	169	197	275	204	339
Macombs Dam (B/M)	0	0	0	0	0	0	4	2	0	3	1	22	0	0	0
Madison Avenue (B/M)	0	0	0	7	0	9	35	8	0	3	1	6	0	0	4
Metropolitan Avenue (K)	366	339	342	153	0	104	329	245	240	254	413	468	378	360	133
Mill Basin (K)	317	142	173	164	162	174	182	190	183	197	236	277	246	210	214
Pulaski (K/Q)	208	308	599	694	734	433	489	639	611	467	591	476	484	693	643
Roosevelt Island (M/Q)	48	125	63	669	150	54	48	0	62	0	0	55	55	43	98
Shore Road (Pelham Parkway) (B)	2222	1897	1910	2011	1683	1704	1645	1446	806	1197	811	613	697	724	704
Union Street (K)	101	62	24	21	11	9	5	10	28	32	4	36	0	0	49
Ward's Island Pedestrian (M)	279	0	0	7	2	8	4	6	3	5	0	0	0	3	22
Willis Avenue (B/M)	40	0	7	25	2	41	67	17	9	1	1	0	0	0	1
3rd Avenue (B/M)	1	0	0	0	0	6	60	7	0	3	3	4	2	6	31
3rd Street (K)	117	212	152	99	43	31	39	49	89	74	27	68	0	0	125
9th Street (K)	808	733	547	457	360	480	333	287	387	475	670	585	270	427	758
145th Street (B/M)	6	0	0	9	0	0	0	0	0	0	1	6	0	0	16
West 207th Street (University Heights) (B/M)	14	4	6	10	1	12	24	2	3	7	5	23	0	0	0
TOTAL	**6761**	**6015**	**5935**	**6595**	**5163**	**5347**	**4652**	**3873**	**3666**	**4704**	**4901**	**4819**	**3812**	**4389**	**5320**

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, and repair of existing piles; and demolition of highway and bridge structures, whole or in part.

In 2015, the following structures were worked on under the Division's When and Where contracts:

East 179th Street Pedestrian Bridge over Metro North, West Tremont Avenue Bridge over Metro North, Boston Road Bridge over Hutchinson River; Trans Manhattan Expressway Connection (HRD Ramp to George Washington Bridge over HRD SB), Houston Street Bridge over FDR Drive, West 176th Street Pedestrian Bridge over Approach to George Washington Bridge), West 155th Street Pedestrian Bridge over Amtrak 30th Street Branch, Riverside Drive Bridge over West 158th Street – Amtrak, Henry Hudson Parkway over 79th Street, Depot Place Bridge over Metro North, East 149th Street Bridge over Metro North, East 188th Street Bridge over Metro North, Williamsburg Bridge, Hempstead Avenue Bridge over Cross Island Parkway, Pulaski Bridge over Newtown Creek, Northern Boulevard Bridge Eastbound over Flushing River; Fort Tryon Park Bridge over South Cloisters, 79th Street Ramp to Garage over 79th Street Boat Basin Garage, East 6th Street Pedestrian Bridge over FDR Drive, 204th Street Pedestrian Bridge over Metro North, East 51st Street Pedestrian Bridge over FDR Drive, Promenade over FDR Drive over FDR Drive – East 81st to East 90th Street, Transverse Road #1 Westbound over Pedestrian Path Opposite East 66th Street, Delancey Street Pedestrian Bridge over FDR Drive, Footbridge North of Route 1 over Bronx River, Southbound Henry Hudson Parkway Ramp to 79th Street over 79th Street Boat Basin Garage, East 111th Street Pedestrian Bridge over FDR Drive, West 173rd Street Pedestrian Bridge over Amtrak, Corlears Park Road Bridge over FDR Drive, West 181st Street Pedestrian Bridge over Henry Hudson Parkway Northbound, East 120th Street Pedestrian Bridge over FDR Drive, Brooklyn Promenade over Eastbound Brooklyn-Queens Expressway, Motor Parkway Pedestrian Bridge over Francis Lewis Boulevard, Crocheron Park Pedestrian Bridge over Cross Island Parkway, Motor Parkway Pedestrian Bridge over Hollis Court Boulevard, 28th Avenue Pedestrian Bridge over Cross Island Parkway, East Drive over Bridle Path Near Zoo, East Drive (East Wood Arch) over Pedestrian Path Near Center Drive, and Hill Drive (Terrace Bridge) over Prospect Park Lake.

At the 204th Street Pedestrian Bridge over Metro North, a series of existing stools that support the bridge girders at the abutments were found to be severely corroded and were labeled red flags because they were in danger of no longer being able to successfully continue their support

function. The When and Where contractor installed alternate stools close to the existing ones to guarantee the successful support of these girders.

28th Avenue Pedestrian Bridge over Cross Island Parkway in July 2015.

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.

Marine bridge repairs addressed in 2015 include Wards Island Pedestrian Bridge over Harlem River, Depot Place Bridge over Conrail, and the West 207th Street Bridge over Harlem River.

Some of these locations experience repeated damage due to heavy marine traffic and/or a narrow channel, such as the Shore Road (Pelham Parkway) Bridge over the Hutchinson River. 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. In addition to damage due to impact, timber elements are also replaced because of deterioration and attack by marine borers, whose activity has vastly increased as the water quality in the New York City area has improved.

Numerous barge hits at the Shore Road Bridge occur repeatedly. As a result, a continuation and completion of previously reported work of replacing timber planking and walers took place at this location, as well as installation of a special plastic material called "UltraPoly" at the top portion of the fender planking and at selected dolphin piles. So far, this material has been shown to protect against rubbing damage.

On the heavily traveled Hutchinson River Parkway Bridge over Hutchinson River, severe deterioration of key structural steel elements supporting the steel grid deck of the southeastern quadrant of the span forced urgent measures to be taken, first, by providing immediate temporary replacements to take over part of the lost support capability, and subsequently, by installing new steel replacement "sleeper" beams and heavy local support at deteriorated stringer sections.

Hutchinson River Parkway Bridge - Installation of Sleeper Steel Beams to Directly Support the Steel Grating.

The southwest fender system of the Wards Island Pedestrian Bridge was severely battered by an impact from a large barge, leaving its timber structure dislocated, damaged and incapable of providing the designed protection from future barge hits. It was immediately necessary to temporarily provide safety measures to warn off mariners from coming too close to the debris field created as a result of that impact. Construction of a complete replacement fender system commenced in 2014 after a series of temporary measures were taken to protect the west tower of the bridge. Installation of an entirely new southwest fender replacement was completed in 2015.

2014 - Wards Island Pedestrian Bridge – Collapsed Fender. July 2015 – Work Barge. November 2015. (2015 Credit: Jitendra Patel)

The Depot Place Bridge over Conrail location had two major flag areas. The rip-rap areas stabilizing several piers supporting the end landing span were severely dissembled, rendering those piers less able to carry their intended loading. Special barriers had been in place for years to prevent vehicles from using the outer edge of the roadway to ameliorate the situation. In 2015, the entire flag area received a new fill system that provided a permanent correction. At the south end of the landing span, the existing steel sheet piling supporting the fill beneath the grade slabs was so deteriorated that it could not perform its function. In the past few years, temporary supports were installed to support this roadway, but in 2015, a new steel soldier beam and lagging retaining wall constructed to provide a permanent solution.

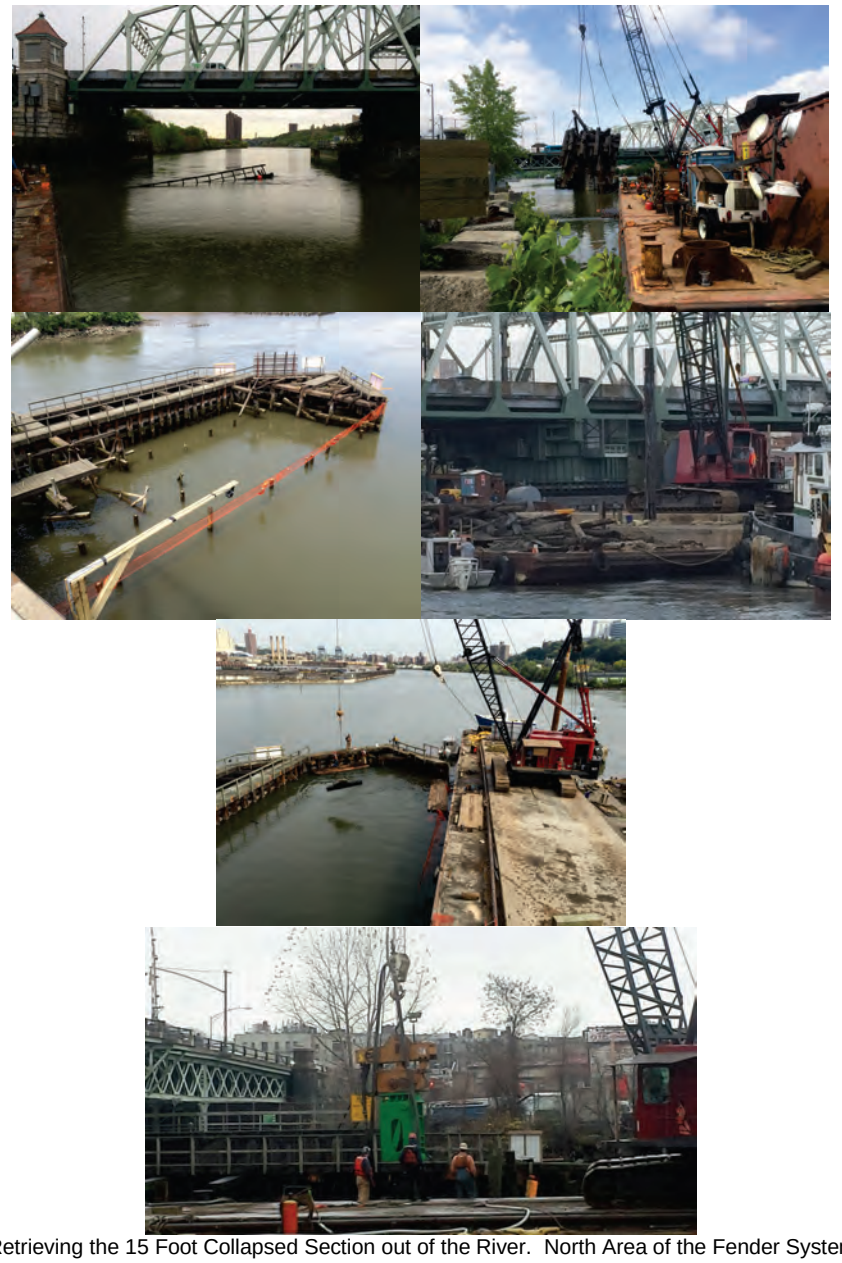
November 2015 - Depot Place over Conrail – Placing Piles to Build a Seawall.

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.

Due to severe deterioration and the impact of many years of wave action, a large portion of the fender system protecting the bridge collapsed into the east channel in May 2015. The entire eastern facing portion of the fender system at the bridge's center pier had collapsed (approximately 200 feet). The debris forced the closing of the east channel to marine traffic. In a partnership with the U.S. Coast Guard, immediate action was taken to clear the channel and temporarily restore it to marine traffic. A short time later the permanent replacement of the fender system was initiated and is presently under way.

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 will receive approximately 400+ new timber piles in early 2016. The project will be completed in 2016.

May 2015 – University Heights Collapsed Fender System. Collapsed Fender System in East Channel.



May 2015 –Retrieving the 15 Foot Collapsed Section out of the River. North Area of the Fender System Made Safe With Cables and Safety Fencing Installed. Contractor Removing all of the Interior Collapsed Timber Framing Out of the River Onto a Material Barge. Contractor Removing the Timber Frame From the River. 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.

PAINTING

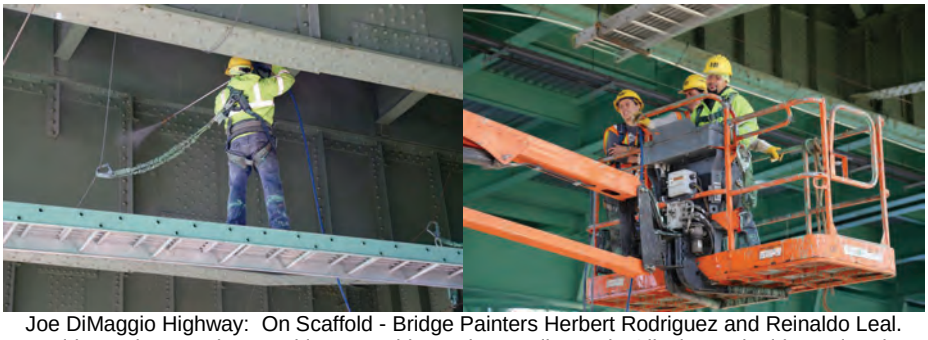
In 2015 the following bridges were painted as part of the in-house maintenance program: Cross Island Parkway Bridge over Totten Avenue, Coney Island Avenue Bridge over Belt Parkway, Erskine Street Bridge over Belt Parkway, 44th Street Bridge over Grand Central Parkway, Boston Road Bridge over the Hutchinson River, Markwood Road Bridge over Jackie Robinson Parkway, Cypress Hills Street Bridge over Jackie Robinson Parkway, Highland Boulevard Bridge over Jackie Robinson Parkway, Grand Concourse over East Tremont Avenue, Miller Highway (Joe DiMaggio Highway) over Terrain, and Northern Boulevard Bridge over Alley Creek.

Boston Post Road in August 2015: Bridge Painter Julio Perez, Supervisor Bridge Painter Albert Pappas, and Bridge Painters Louis Masucci, Safdar Ali, Samuel Martinez, and Branko Grzancic. (Credit: Earlene Powell) Deputy Director of In-House Painting Earlene Powell and Bridge Painter Branko Grzancic. (Credit: Albert Pappas)

In 2015 Division painters tackled ongoing maintenance along the remaining portion of the Joe DiMaggio Highway. This structure extends between West 59th Street and West 72nd Street along the West Side Highway (9A), and is all that remains of the elevated highway that was built between 1929 and 1951. The structure was originally named after former Manhattan Borough President, Julius Miller but the highway's name was changed in 1999 to Joe DiMaggio Highway after the New York Yankees player.

Painting began on this one million square foot stretch in late 2013, and has continued during warm weather. In order for the paint to properly adhere to the structure, the temperature of the steel must be above 50 degrees Fahrenheit. The five person bridge painting crew power washes all of the structure steel, then spot prime, followed by spraying a full coat of epoxy paint. The finished coat is a high gloss, durable urethane that will protect the structure from rust for 12 years.

Joe DiMaggio Highway: Deputy Director of In-House Painting Earlene Powell, Supervisor Bridge Painter Vincent Babajko, and Bridge Painters Elisangela Oliveira, Reinaldo Leal, Juscelino Andrade, Herbert Rodriguez, and Arlindo Lima. On Ground - Bridge Painters Juscelino Andrade and Arlindo Lima. (Credit: Jaclyn Jablkowski)



Joe DiMaggio Highway: On Scaffold - Bridge Painters Herbert Rodriguez and Reinaldo Leal. Bridge Painter Herbert Rodriguez. Bridge Painters Elisangela Oliveira, Reinaldo Leal and Herbert Rodriguez. (Credit: Jaclyn Jablkowski)

Joe DiMaggio Highway: Bridge Painter Juscelino Andrade. (Credit: Jaclyn Jablkowski)

In 2015 the following bridges were painted as part of the capital program: Cross Bay Boulevard Bridge over Belt Parkway, Union Turnpike over Jackie Robinson Parkway, Woodside Avenue over Brooklyn-Queens Expressway, Bulova Avenue Bridge over Brooklyn-Queens Expressway West Leg; Myrtle Avenue Bridge over Jackie Robinson Parkway, 49th Street Bridge over Brooklyn-Queens Expressway West Leg, 69th Street Bridge over Brooklyn-Queens Expressway, East Tremont Avenue Bridge over Hutchinson River Parkway, West 236th Street Pedestrian Bridge over Henry Hudson Parkway, Henry Hudson Parkway over Broadway, Grand Concourse over Burnside Avenue, Grand Concourse over East 204th Street; Woodhaven Boulevard Bridge over Atlantic Avenue (in progress), South Conduit Boulevard Bridge over BSOP (in progress), and Riverside Drive Viaduct over West 125th to West 134th Streets (in progress).

Woodhaven Boulevard Bridge over Atlantic Avenue. Associate Project Manager Vadim Sokolovsky Inspecting Site Conditions. (Credit: Vadim Sokolovsky and Sergey Parayev) Woodside Avenue over Brooklyn-Queens Expressway. West 236th Street Pedestrian Bridge over Henry Hudson Parkway. Henry Hudson Parkway over Broadway. (Credit: Vadim Sokolovsky)

Cross Bay Boulevard Bridge over Belt Parkway. Riverside Drive Viaduct over West 125th to West 134th Streets. (Credit: Vadim Sokolovsky) East Tremont Avenue Bridge over Hutchinson River Parkway.

In 2015, the following structures were also painted: 181st Street at Webster Avenue Maintenance and Repair Shop, Pulaski Yard at Clay Street, Slip #4 at the Staten Island Ferry Terminal (St. George), Union Street, Pelham Bay, Broadway, and Grand Street Bridges Operator Houses, Van Cortland Park Yard (garages), Conner Street Yard (offices), and Kent Avenue Carpenter Shop (moveable bridge components).

During 2015, the following structures were also painted during the winter: Department of Environmental Protection facilities at Bowery Bay, North River, and Oakwood Beach, Harper Street Maintenance and Repair Shops (garages), and the Maspeth Sign Shops (offices and shop areas).

The following locations were also worked on in support of the DOT Iron Worker Shop: Hamilton Avenue Asphalt Plant Yard, Vernon Boulevard Yard (salt shed), Grand Street Bridge; Manhattan Bridge; Cadman Plaza at the Brooklyn-Queens Expressway, Brooklyn-Queens Expressway at Furman Street, Westchester Avenue Bridge over Hutchinson River Parkway, East Tremont Avenue Bridge over Hutchinson River Parkway, Union Street Bridge, Unionport Bridge, Cross Island Parkway over Dutch Broadway/115th Avenue, Ed Koch - Queensboro Bridge; Bay Parkway under the Belt Parkway; Mill Basin Bridge; Pulaski Bridge; and the Department of Transportation South 6th Street facility.

GRAFFITI REMOVAL

In 2015, 4,599,454 square feet of graffiti were eliminated. This program focuses its primary attention on the four East River bridges, as well as the following 21 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, Henry Hudson Parkway, West Shore Expressway, Richmond Parkway, Martin Luther King Jr. Expressway, Staten Island Expressway, Bruckner Expressway, Prospect Expressway, Grand Central Parkway, Long Island Expressway, Cross Bronx Expressway, Nassau Expressway, and Bronx River Parkway.

August 2015: Brooklyn Bridge Line Striping. Bridge Painter Elisangela Oliveira. Bridge Painters Arlindo Lima and Carlos Mata. Bridge Painter Willie Tyler Checking the Striping. Bridge Painter Gerson Do Rosario and Supervisor Bridge Painter Cesar Pazmino. (Credit: Earlene Powell) March 2015: Supervisor Bridge Painter Goncalo Lima Removing Graffiti on the Manhattan Bridge Arch on Cherry Street. (Credit: Cesar Pazmino) July 2015: Bridge Painters Gerson Do Rosario and Carlos Mata Removing Graffiti on the FDR Drive.

During 2015, graffiti was also removed from the following structures: Throgs Neck Expressway, Cross Island Parkway, FDR Drive, Pike, Monroe, and Cherry Streets under the Manhattan Bridge, Kent Avenue between South 5th and South 6th Streets, 216th Street Pedestrian overpass, Wards Island Bridge, High Bridge, Third Avenue Bridge, Pulaski Bridge, Madison Avenue Bridge, Pelham Bay Bridge, Conduit Avenue at 230th Street, Burnside Avenue under the Grand Concourse, East 204th Street under the Grand Concourse, Whitelaw Pedestrian Bridge, Eastern Boulevard (Bruckner Expressway) bridge house, bridge at Parkwood Avenue and Wheeling Avenue in Staten Island, Linden Boulevard over South Conduit Avenue, Riverdale Avenue Pedestrian Bridge between West 236th Street and West 231st Streets, the NYC Marathon Route,

the Five Borough Bike Tour Route, the Pope's Visit Route, West 43rd Street between 10th and 11th Avenues, Flatlands Maintenance and Repair Shop, Woodhaven Boulevard over Atlantic Avenue, Hawtree Basin Pedestrian Bridge in Hamilton Beach, South Conduit Avenue, 59th Avenue at Seabury Street, 59th Street between First and Second Avenues, the Papal Visit Route, Nostrand Avenue under the Belt Parkway, 158th Street and Riverside Drive, East 14th St. over Belt Parkway, East 25th Street to 27th Street and the FDR Drive, East 35th Street to 37th Street and the FDR Drive, Mosel Avenue under the Staten Island Expressway, Havermayer Street at Williams Avenue, Borden Avenue Bridge, and Laurel Hill Boulevard at the Brooklyn-Queens Expressway.

Removing Graffiti from Wards Island in June 2015.

RESEARCH AND PRESENTATIONS

In 2015 research work and/or case histories of the Division were presented in the following proceedings:

Transportation Research Board 94th Annual Meeting, Washington D.C., 11 – 15 January 2015. Dr. Yanev chaired a workshop on the response of bridge owners to extreme events. He participated in the panel discussion on hot topics related to seismic design and performance of bridges, including performance-based seismic design, innovative seismic resisting systems, seismic aspects of accelerated bridge construction, geotechnical hazards, and tsunami threats. He chaired the meeting of the sub-committee on Bridge Security and Safety. He is a member of the Committees on Bridge Maintenance, Management, Seismic Design, and Non-Destructive Testing.

American Council of Engineering Companies of New York 2015 Winter Conference, Albany, 25 – 27 January 2015. Collyer, Robert O. *NYCDOT Response to Superstorm Sandy*.

SSPC 2015 – The Society for Protective Coating Conference, Las Vegas, 3 – 6 February, 2015. Vainblat, Guerman, and Kolchinskiy, Timur. *The Color of History: When the Brooklyn Bridge is Your Canvas.*

Yanev, Bojidar S. *Joints: the Weak Link in Bridge Structures and Lifecycles*. Smart Structures and Systems, Volume 15, No. 3, March 2015.

8th New York City Bridge Conference, New York City, 24 – 25 August, 2015. Mallick, A. A., and Valenti, J. *A Walk Above the Harlem River: The Revitalization of New York City's High Bridge*.

8th New York City Bridge Conference, New York City, 24 – 25 August, 2015. Ramakrishna, A., Mankbadi, R., and Schetelich, G. *Deep Foundations Case Histories in New York and New Jersey.*

2015 American Society of Civil Engineers Convention, New York City, 11 – 14 October, 2015. Giroux, Raymond Paul. Conference Session – History and Heritage. *Building Brooklyn Bridge*.

2015 American Society of Civil Engineers Convention, New York City, 11 – 14 October, 2015. Griggs, Francis, and Schexnayder, Clifford. Conference Session. *New York's East River Bridges and Massachusetts' Hoosac Tunnel*.

2015 American Society of Civil Engineers Convention, New York City, 11 – 14 October, 2015. Sayenga, Donald. Distinguished Lecture Series. *Some Things I Wish I Knew About the Brooklyn Bridge and the Roebling Family*.

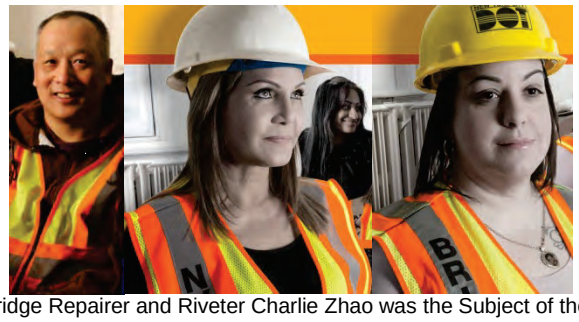
Structures Management Yesterday and Tomorrow, Toulouse, France, 14 – 15 October 2015. Dr. Yanev lectured on repairing bridge structures in the United States.

2015 National Accelerated Bridge Construction Conference, Miami, 6 – 7 December, 2015. Wang, Wei. *Reconstruction of the Willis Avenue Bridge with Implementation of ABC Technology*.

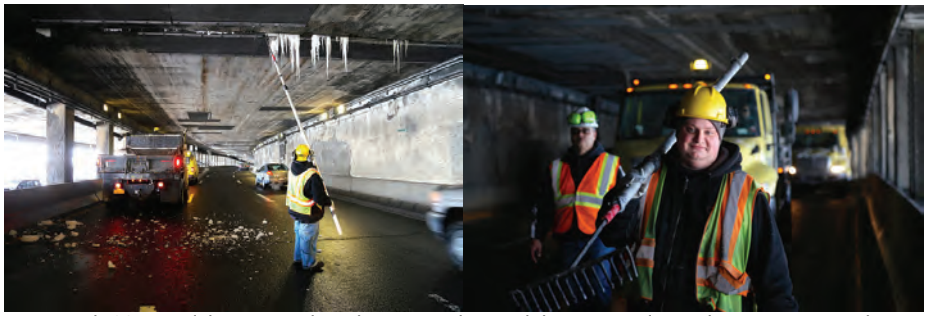
Csogi, Ralph D., *Reconstructing the Manhattan Bridge*. Civil Engineering, Volume 85, Issue 1, 2015.

In 2015 the National Science Foundation Project NCHRP 20-05/Topic 46-11 Post-Extreme Event Assessment of Infrastructure Damage to Highway Bridges proposed by Dr. Yanev advanced to review of the final report. His proposal for the analytic modeling and laboratory testing of bridge deck expansion joints was approved for funding.

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 2015 included: advanced traffic and bridge management solutions, the Kosciuszko Bridge project, real-time eddy-current crack monitoring sensor: a new tool for structural health monitoring in civil engineering, and the construction of the Hong Kong- Zhuhai-Macau Bridge.



Bridge Repairer and Riveter Charlie Zhao was the Subject of the "Staff Spotlight" Feature in the April 2015 Edition of "Byways," the Official Agency Newsletter. Mr. Zhao, along with Assistant Civil Engineer Clara Medina and Highway Repairer Anita Ramos-Colon, were Featured in the Agency's Campaign during the National Work Zone Awareness Week (March 23-27, 2015) - to Better Protect Crews Working to Improve Our Roadways.



March 2015: Icicle Removal on the FDR Drive – Highway Repairer John Tammaro and Supervisor Highway Repairer Anthony Irizarry. (Credit: Jaclyn Jablkowski)

June 2015: Summer College Intern Litcy Barreto on the Third Street Bridge During Strain Gauge Installation. (Credit: Vera Ovetskaya) July 2015: College Aide Nazariy Davydovych and Summer College Intern Kris Thomas on the Roosevelt Island Bridge. (Credit: Litcy Barreto) Bridge Operators Nestor Ortiz and Brian Brown Assisting the Engineers on the Roosevelt Island Bridge. (Credit: Vera Ovetskaya) August 2015: Summer College Intern Kris Thomas Checking the Results on the Pelham Parkway Bridge. (Credit: Vera Ovetskaya) Assistant Mechanical Engineer Vera Ovetskaya Checking the Strain Gauge Application at the 145th Street Bridge. (Credit: Litcy Barreto) In July 2015, our Bridge Repairer and Riveters Completed the Fabrication and Installation of all 16 New Suicide Gates on the Main Cables of the Manhattan Bridge.

August 2015: Preventive Maintenance Crew Installing Approximately 900 Feet of Fencing Including Glare Protection on the West Side of the Westbound Paerdegat Basin Bridge. Supervisor Highway Repairer Luis Soto, Highway Repairer Luis Baez, and Assistant City Highway Repairers Devon Cromarty, Marlon Doyle, Krishna Evans, Michael Marquez, and Anthony Connelly.

October 2015: Preparing for Hurricane Joaquin - Covering the Open Vents Over the Battery Park Underpass. The Hurricane Changed Course and Bypassed New York City. Supervisor Carpenter Joseph Vaccaro, Executive Director of Bridge Preventive Maintenance and Repair Thomas Whitehouse, and Carpenters Joseph Moschella, William Sic, Edward Alfano Jr., John Green, Gregory Nolan, and Stephen Buckley. (Credit: Thomas Whitehouse)

December 2015: Patching a Spall on the Beginning Abutment Stem of Brooklyn-Queens Expressway (Westbound) over Cadman Plaza.