Bridge and Tunnel

Engineering Qualifications

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ARORA®

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COMPANY OVERVIEW

Arora Engineers

At Arora Engineers (Arora), we believe infrastructure needs to do far more than provide a seamless, safe, sustainable and comfortable environment. Our goal is to maximize its role, impact and value through highly intelligent solutions that not only meet operational needs, but forward business objectives.

We meet the evolving needs of the world's most critical industries – aviation, transportation and education – through more intelligent, sustainable and connected infrastructure solutions that maximize value for our clients and partners.

Expertise

Since 1986 we have held ourselves to rethinking the role of the traditional MEP firm. As a result, we've evolved our practice to emphasize the technology and processes that connect systems infrastructure, improve operations and longevity and make life safer and easier for those who use it.

Arora specializes in providing engineering services tailored for clients in aviation, transportation, education, government and commercial sectors and has developed a unique understanding of the challenges and opportunities facing these critical industries.

Services

SPECIAL SYSTEMS / TECHNOLOGY

+ Mass Notification & Public Address
+ WiFi systems
+ Voice/data systems
+ Network architecture
+ Data centers
+ MDF/IDF room layouts
+ Network design via fiber or copper backbone
+ Plant cabling systems
+ Fiber optic and copper structured cabling systems
+ Communications system design
+ CCTV/MATV/CATV systems
+ Access control
+ Duress systems
+ Perimeter intrusion detection
+ Risk and needs assessments
+ Video walls
+ Security operations and procedures evaluation
+ Passenger/customer information display systems
+ Signage systems/Electronic video information display systems (EVIDS)
+ Software and equipment evaluation and recommendations
+ FIDS/BIDS/GIDS/CUPPS/SUPPS
+ Multi-lingual/International traveler

ELECTRICAL

+ Low and medium voltage power distribution
+ Emergency and standby power systems
+ Lighting design and photometrics
+ Substation/switchgear
+ Grounding and lightning protection
+ Single-line diagrams
+ Short circuit & coordination studies
+ Power and lighting equipment selection and specifications
+ Motor control centers
+ Electrical equipment sizing
+ Energy efficient systems
+ Electrical code analysis
+ Electrical plan review and master plan development

AIRFIELD ELECTRICAL

+ Airfield Lighting and Signage
+ Approach Lighting Systems
+ Instrument Landing Systems
+ Navigational Aids
+ Airfield Lighting and Control Systems
+ Runway Incursion Mitigation
+ Pavement Surface Sensor Systems

HVAC / PLUMBING

+ Sustainable/Green Building design
+ HVAC
+ Central plant design
+ Underfloor Air Systems design
+ Constant and variable air volume systems
+ Radiant heating systems
+ Geothermal system design
+ Building automation and digital controls
+ Domestic water systems
+ Storm and sanitary system design
+ Fuel system design
+ Lifecycle Costing, Energy Analyses

FIRE PROTECTION AND LIFE SAFETY

+ Fire alarm and detection system design
+ Standpipes and water-based sprinkler system design
+ Foam systems and special hazard suppression design
+ Fire pumps and fire protection water supply system design
+ Smoke management
+ Code analysis and consulting
+ Plan review
+ Due diligence reports
+ Performance based analysis
+ Risk/hazard assessment
+ Site conditions survey

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

+ Database setup and implementation plans
+ CAD to GIS conversion plans
+ FAA Airport GIS program compliance
+ Legacy data access integration
+ Web-based GIS portal development
+ Asset and utility data management
+ Field inspection and inventory
+ GPS data capture and attribution

PROGRAM MANAGEMENT

+ Project management
+ Procurement coordination
+ Information management
+ All-inclusive project control
+ Runway Incursion Mitigation
+ Pavement Surface Sensor Systems
+ Airfield Lighting Vaults and Power Distribution
+ Sustainable Solutions
+ Construction Safety and Phasing

CONSTRUCTION MANAGEMENT & INSPECTION

+ Project administration
+ Master systems integrator
+ Daily inspection
+ Project documentation
+ Submittal review/tenant permit reviews
+ Design support
+ Constructability reviews
+ Value engineering
+ Runway Incursion Mitigation
+ Airfield Lighting Vaults and Power Distribution
+ Pavement Surface Sensor Systems
+ Construction Safety and Phasing

BRIDGE EXPERIENCE

PROJECT DETAILS

Client

Delaware River Port Authority
Ed Montgomery, Sr. Engineer
One Port Center
2 Riverside Drive
PO Box 1949
Camden, NJ 08101
ermontgomery@drpa.org
856-968-2091

Project Start

2009

Project Completion

2011

Highlights

+ Fire standpipe system study for two historic DRPA bridges
+ Code consulting included existing conditions assessment and recommendations to meet current NFPA standards
+ Final report included test reports, recommendations, specifications, and detailed cost estimates for proposed upgrades

DELAWARE RIVER PORT AUTHORITY

INVESTIGATION OF FIRE STANDPIPE SYSTEMS AT BENJAMIN FRANKLIN BRIDGE AND WALT WHITMAN BRIDGE

Philadelphia, PA, Camden, NJ, and Gloucester City, NJ

Arora Engineers (Arora) investigated the fire standpipe systems on the Ben Franklin (BFB) and Walt Whitman (WWB) bridges for the Delaware River Port Authority (DRPA). The firm assessed existing conditions and recommended the best and most cost-effective protection options to meet NFPA codes.

The BFB and the WWB are vital connections between New Jersey and Pennsylvania. Each bridge has seven lanes of automobile traffic. The BFB has two additional lanes on which the PATCO High Speed Line operates (inbound and outbound). The BFB was opened for traffic in 1926. The suspension bridge measures 9,573 FT long and 128 FT wide. The WWB, also a suspension bridge, was opened in 1957. At 11,981 FT, the WWB is considerably longer than the BFB, but without the extra two lanes of PATCO service, the bridge measures only 92 FT wide.

Scope of work included:

When dealing with fire protection of any structure, the first consideration is the water supply. With a maximum clearance of 135 and 150 feet below the BFB and WWB respectively, leading water to a fire on the deck posed a challenge to fighting a fire. When a fire erupted on a bridge, first responders were limited in the amount of space they had to attack it. Water supply was even more limited. In most cases, by the time the fire department arrives to a bridge fire, traffic jams block through-way access.

The BFB and WWB had dry standpipe systems that were fed from a fire truck or fire boat. Most of the outlets on the deck were served from an independent riser at ground level. This reduced the need to have all of the fire trucks on the bridge and gave firefighters more flexibility in their approach to tackling a blaze. For this reason, a large enough pump was required for the necessary water flow with the right pressure at the hose outlet high above the ground.

Fire protection systems were not always a top priority in bridge design. Several reasons, such as the cost, feasibility, and age of the bridge, contributed to the lack of such systems. Hazards exist, and safety precautions are an integral part of renovations and upgrades. In the Final Report submitted to the DRPA, Arora included detailed descriptions of the existing standpipe system, recommendations, test reports, in-depth code analysis, sketches, specifications, and a cost estimate.

PROJECT DETAILS

Client

Delaware River Port Authority
Vijay Pandya, PE, Senior Engineer
One Port Center
2 Riverside Drive
PO Box 1949
Camden, NJ 08101
vrpandya@drpa.org
856-968-2077

Construction

$128,000,000

Project Start

2007

Project Completion

2016

Highlights

+ Preliminary engineering report analyzed impacts to electric, traffic, lighting, security, and communication systems
+ Performed utility system verification, impact analysis, and relocation/redesign
+ The Arora team ensured continued operation of bridge systems during deck reconstruction

DELAWARE RIVER PORT AUTHORITY

WALT WHITMAN BRIDGE – SUSPENSION SPAN DECK REPLACEMENT

Philadelphia, PA and Gloucester City, NJ

Arora Engineers, Inc. (Arora) evaluated the impact to existing electrical power, traffic control, lighting, security, and communication utilities based on different deck replacement alternatives for the Walt Whitman Bridge. Arora prepared a preliminary design report based on the impact findings, and subsequently prepared design drawings for the utility relocations to insure continuous operation for those systems at the Walt Whitman Bridge during and after construction. Project responsibilities included utility system verification and utility system impact and redesign to assist the construction of the new deck on the bridge.

Scope of work included:

The electrical design included relocating the 5kV medium voltage power service to the anchorages and tower sections of the bridge to provide continuous power to traffic control, security, and communication systems. Design for new street lighting was also included to ensure proper lighting levels were maintained in the driving lanes with bridge vibration taken into account for reliable lighting systems and improved lamp life. Navigation lighting power for under-bridge ship traffic was also maintained.

Special system design involved security camera surveillance and communication relocation for continuity, fiber optics to DRPA traffic lane signal gantry control, and interstate fiber optic communications including AboveNet systems to insure utility services are in continuous operation during the entire construction process.

PROJECT DETAILS

Client

STV Incorporated
Alexander (Sandy) Murphy, PE
Senior Project Manager
225 Park Avenue South, 4th Floor
New York, NY 10003-0440
alexander.murphy@stvinc.com
212-614-3470

Project Start

2017

Project Completion

2018

Highlights

+ Provided engineering design services for the design-build of new manual dry standpipes at the RFT Bridge and associated roadways.
+ Developed a fill time calculation and two hydraulic demand calculations for each standpipe.
+ Attended field surveys.
+ Provided technical support for mechanical and fire protection issues.

METROPOLITAN TRANSPORTATION AUTHORITY

BRIDGES AND TUNNELS

MTA/TBTA #RK-21 – INSTALLATION OF FIRE STANDPIPE AND UPGRADE OF FIRE PROTECTION SYSTEMS AT THE ROBERT F. KENNEDY BRIDGE

New York City, NY

Arora Engineers (Arora) was selected to provide engineering design services for the design-build of new manual dry standpipes at the Robert F. Kennedy (RFK) Bridge and associated roadways in New York City, NY. The manual dry standpipes were built for the following structures:

+ Northbound & Southbound Randall's Island Viaduct and Ward's Island Viaduct including exit ramp to Ward's Island
+ Randall's Island Junction Structure including Bronx to Manhattan interchange
+ Northbound & Southbound Bronx Kills Crossing
+ Eastbound & Westbound Harlem River Lift Span – East Tower to Manhattan Toll Plaza
+ Northbound & Southbound Queens Approach to the East River Suspension Bridge

Scope of work included:

+ Developing a fill time calculation and two hydraulic demand calculations (four hose valves at 100 psi and one pumper connection at 20 psi) for each standpipe.
+ Attending field surveys with the design team.
+ Performing a review of STV expansion joint, anchor, and guide locations.
+ Performing a code compliance review at each submission.
+ Performing a constructability review at each submission.

METROPOLITAN TRANSPORTATION AUTHORITY BRIDGES AND TUNNELS

MTA/TBTA #RK-21 – INSTALLATION OF FIRE STANDPIPE AND UPGRADE OF FIRE PROTECTION SYSTEMS AT THE ROBERT F. KENNEDY BRIDGE

New York City, NY

+ In conjunction with STV, attending TBTA & FDNY review meetings.
+ In conjunction with STV, addressing TBTA & FDNY submission and reviewing meeting comments.
+ Providing technical support to STV for mechanical and fire protection issues.
+ Supporting the construction effort by attending five construction coordination meetings
+ Obtaining hydrant flow test data through coordination with TBTA, DEP, etc.

PROJECT DETAILS

Client

AECOM

Lisa MacKay

Project Manager

605 Third Avenue, 2nd Floor

New York, NY 10158

(212) 896-0333

lisa.mackay@aecom.com

Project Start

2018

Project Completion

2019

Highlights

+ On-site engineering support
+ Design review
+ Contractor supervision

MTA TBTA

TASK 63 ELECTRICAL TECHNICAL ADVISORY ENGINEER

New York, NY

Arora Engineers (Arora) served as a subconsultant to AECOM for the Triborough Bridge and Tunnel Authority (TBTA). TBTA awarded the project to provide on-going engineering services. Arora selected a Senior Electrical Engineer with in-depth knowledge on a wide range of electrical/electronic systems to advise and provide technical expertise on this complex task order. Arora's Senior Electrical Engineer drew upon his 35+ years in the design of electrical systems including power, emergency generators, lighting, fire alarm, voice and data communications, and security systems to ensure high-quality technical advisory services were provided. He reviewed the consultant's design documents, contractor's submittals, shop drawings and provided technical support during design and construction. His skills were not limited to engineering services as he displayed exceptional abilities in construction supervision and continued on-site support.

Scope of work included:

Arora's Senior Electrical Engineer provided technical support during design and construction. The scope of work included the following locations and services:.

+ RK-65A-Bronx Toll Plaza Replacement
+ RK-65B -Manhattan Toll Plaza Replacements at RI
+ RK-58-Rehabilitation of RMB
+ BB-64 - HLC Service Building Electrical Upgrade
+ BB-30 -HLC Tunnel Fire Alarm System Upgrade
+ BB-39/RK-60-Integrated Electronic Security System (IESS) for BWB and RFK
+ QM-91 -QMT Fire Alarm Upgrade
+ QM-81 -QMT Control Room Rehabilitation
+ AW-66-New COCC (Central Operation Command Center) at RI
+ VN-MIT-01 -VN New Communication Room
+ In-house Design and Design Build project review at various TBT A facilities
+ Coordinated with Authority's Program Management and Program Support pressure at the hose outlet high above the ground.

PROJECT DETAILS

Client

COWI JV

Genaro Velez

VP US Eastern Region

276 5th Avenue

Suite 1006

New York, NY 10001

646-545-2125

917-834-5681

gevz@cowi.com

Construction

$180,000,000

Project Start

2018

Project Completion

2019

Highlights

+ Fire suppression
+ Electrical replacement
+ Value engineering
+ Construction management

MTA TBTA

THROGS NECK APPROACH VIADUCTS REHAB & SEISMIC

Throgs Neck Bridge, NY

Throgs Neck Bridge Ariel View

Arora Engineers (Arora) served as a subconsultant to the COWI JV team to provide value engineering and constructability review for Project TN-53 for the Rehabilitation and Seismic Retrofit of the Approach Viaducts at the Throgs Neck Bridge. The project was part of an original undertaking for the Triborough Bridge and Tunnel Authority (TBTA), which awarded multiple six-year contracts to provide engineering services, including design, scoping, engineering inspection, BCOR, value engineering, and other incidental engineering services on an as-needed basis for the aggregate amount of $60M for TBTA and an aggregate amount of $5M for MNR. The services included a broad range of engineering disciplines including structural, civil, traffic, environmental, landscape, surveying, electrical, mechanical, and architectural. Arora was selected for the team's versatility to perform services on bridge and tunnel facilities, equipment, buildings, and all ancillary structures.

Scope of work included:

Arora provided the electrical scope of work for the project and designed the electrical feeder replacement for lighting and 24-hour circuits. Arora performed the value engineering and constructability reviews under the guidelines of ECP 316 and ECP 308 respectively.

+ The Constructability Review complied with requirements of ECP 308 & 316
+ Collected information/investigation (VE & CR)
+ Analyzed, speculated, evaluated, and reviewed design specs and drawings
+ Reviewed bidders proposal, cost estimates, and construction schedules
+ Coordinated with TBT A and design consultants
+ Developed Primary Findings Report
+ Developed Draft VE Study Report / CR Recommendations
+ Presented to TBTA and Design Consultants on VE Study Recommendations
+ Provided Final VE Study Report / CR Recommendations Report

PROJECT DETAILS

Client

Hatch Mott MacDonald

Anthony McGinn, PMP

Vice President

111 Wood Avenue South

Iselin, NJ 08830

anthony.mcginn@mottmac.com

973-379-3400

Construction

Approx. $12,000,000

Project Start

2014

Project Completion

2018

Highlights

+ Arora provided quality assurance and quality control review of electrical drawings.

MTA TBTA BRIDGES & TUNNELS

BB-28 PHASE II ELECTRICAL QAQC SERVICES

Brooklyn, New York

Brooklyn Battery Tunnel Portal

Arora Engineers (Arora) served as a subconsultant to Hatch Mott MacDonald for Project BB-28 Phase II for the rehabilitation of the tunnel walls, roadway, drainage, ceiling, and fireline at the Brooklyn Battery Tunnel. Arora was responsible for quality assurance and quality control review of electrical drawings and specifications for the BB28 project.

Scope of work included:

Arora's scope of work included a comprehensive review of the final construction electrical drawings and specifications prepared by the prime consultant. The overall design project encompassed the rehabilitation of the tunnel and included structural elements, roadway drainage, and fire lines and associated elements of the tunnel.

Arora reviewed and provided comments on the approximately 300 electrical and special systems drawings and specifications including notes, plans, elevations, sections phasing/staging, and details. The team also provided RFI responses, attended meetings at the site, and performed site inspections

Brooklyn Battery Tunnel

PROJECT DETAILS

Client

Dewberry
Philip Swanton, PE
Sr. Project Manager
15 East 26th Street, 7th Floor
New York, NY 10010-1505
pswanton@dewberry.com
212-685-0900

Construction

$12M (Arora's scope - $2.5M)

Project Start

2013

Project Completion

2018

Highlights

+ New fire standpipe system design
+ Coordination and consultation with FDNY
+ Construction administration and support services

MTA TRIBOROUGH BRIDGE AND TUNNEL AUTHORITY

MARINE PARKWAY GIL HODGES MEMORIAL BRIDGE FIRE PROTECTION

Brooklyn and Queens, NY

Arora Engineers (Arora) was tasked with providing fire protection engineering services for the Marine Parkway Gil Hodges Memorial Bridge rehabilitation project. The project consisted of miscellaneous structural steel repairs, replacement of deck joints, painting, lighting upgrades, and installing a new fire standpipe system in compliance with NFPA 502 and NFPA 14. Arora's scope of work included comprehensive existing document, drawing, and code reviews to focus on NFPA standards and the NYC fire codes, initial site surveys and assessments, consultation with Fire Department of NY to accommodate and facilitate an adequate firefighting response, development of multiple design alternatives, hydraulic calculations, preparation of preliminary and final designs to 100% submission, constructability reviews, and the provision of support services during construction.

Scope of work included:

The bridge has a total length of 4,022 feet, and its longest span is the middle lift span at 540 feet. The arrangement of the cross-section as it affected piping layout was classified into two separate cases: the deck truss cross section, which was the section of the bridge nearest to land; and the through truss and lift section, which was near the middle of the bridge and contained the bridge superstructure. This section, normally 55 feet above water, could raise to 150 feet to allow passage of ships through the Rockaway Inlet.

The standpipe system designed and installed per MP-16 was coordinated with two other Authority projects (MP-03 and MP-06). Four fire standpipe risers were installed at the extents of the lift span under project MP-06, which was coordinated with the fire standpipe system design of MP-16. The new standpipe system consisted of

PROJECT DETAILS

Client

WSP
Marc L. Beningson
National Practice Lead
One Penn Plaza, 2nd Floor
250 W 34th Street
New York, NY 10119
beningsonml@pbworld.com
212-532-9600

Project Start

2019

Project Completion

2020

Highlights

+ Arora is an experienced inspector at Robert F. Kennedy (RFK) and/or Bronx-Whitestone Bridges.
+ Provide construction quality assurance and oversight inspection staff support for this project when directed by WSP.

METROPOLITAN TRANSPORTATION AUTHORITY
TRIBOROUGH BRIDGE AND TUNNEL AUTHORITY

ROBERT F. KENNEDY & BRONX-WHITESTONE BRIDGE INSPECTION

New York, NY

Arora Engineers (Arora), serving as a subconsultant to WSP provided inspection services at the Robert F. Kennedy (RFK) and Bronx-Whitestone (BW) bridges for the Metropolitan Transportation Authority (MTA) Triborough Bridge and Tunnel Authority (TBTA). Arora provided construction quality assurance and oversight inspection staff support for this project.

Scope of work included:

Arora provided quality oversight for the installation of facility-wide electronic monitoring and detection systems at the Bronx Whitestone Bridge and Robert F. Kennedy Bridge Facilities.

Arora provided a Senior Inspector and Inspector to assist WSP in performing construction inspection services for the project. The Senior Special Systems Inspector assisted WSP in performing construction inspection services for the project. Arora performed construction inspection of the contractor's work, kept contract records, reviewed shop drawings and submittals, and performed oversight of the testing of materials as assigned by WSP.

MTA TRIBOROUGH BRIDGE AND TUNNEL AUTHORITY

MARINE PARKWAY GIL HODGES MEMORIAL BRIDGE FIRE PROTECTION

Brooklyn and Queens, NY

four discrete segments of piping: Two segments on the east side, parallel to Two segments on the west side. As allowed by the FDNY, the lift span sections, which are approximately 540 feet in length, were not provided with standpipes due to the complexity of running piping over a movable bridge section. The north and south segments were provided with a large hose valve and pumper truck manifold at the threshold of the lift span to support emergency response on the lift span. The east and west segments could be cross connected through a valve located at the abutment. The four vertical standpipes designed under MP-06 could connect and supply each of the four north and south segments from each respective connection point. The segments were connected via fire hose and fire department hose connections.

The system was of the manual dry type with water supply coming from land-based hydrants (MP-03) and fireboat connections that fed the vertical standpipes at the four corners of the lift span (MP-06). The system met hydraulic pressure drop requirements and water transit/fill time requirements. The system featured a residual design pressure of 100 psi at the outlet of the most remote 2.5” hose connection per NFPA 14-10, a maximum water transit/fill time of ten minutes per NFPA 502-11, and was designed for a flow of 100 GPM assuming full FDNY hydraulic demand during the transit/fill period. UL listed flexible couplings, flexible expansion pipe joints and associated anchors, guides, and hangers were provided to accommodate the piping and bridge expansion.

PROJECT DETAILS

Client

WSP
Desmond Raffington
Lead Electrical Engineer
One Penn Plaza, 2nd Floor
New York, NY 10119
Raffington@wsp.com
(212) 631-3731

Construction

$500,000

Project Start

2015

Project Completion

2016

Highlights

+ Upgrade of existing fire alarm system
+ Provide voice evacuation due to critical nature of facility
+ Interconnect

MTA BRIDGES & TUNNELS

UPGRADE TO FIRE ALARM SYSTEM AT THROGS NECK BRIDGE

Bronx, NY

Arora Engineers (Arora) provided design and construction administration services to upgrade/replace the existing fire alarm system located in the Throgs Neck Bridge service building. The Throgs Neck Bridge facility's administrative, operations, and maintenance functions are housed in the service building, which was built in 1998. The building is two stories and approximately 31,500 SF with partial fire alarm and fire protection throughout the building. It also contained a garage/workshop space of 8,140 SF. When the service building was first constructed, it included partial smoke detection on the first floor, fire standpipe and hose valve stations in the emergency stairwell, and sprinklers in the garage flammable storage area. In 2005, smoke detectors, annunciation devices, and pull stations were installed on the second floor.

It was determined that the Throgs Neck Bridge service building's fire alarm system did not comply with NFPA guidelines and other local codes.

Scope of work included:

Arora provided design and engineering services to bring the fire alarm system into compliance:

+ Manual pull stations at each interior exit
+ Detection devices in all occupiable spaces
+ ADA-compliant visual strobe notification appliances throughout the building
+ Voice evacuation throughout the building
+ Integration of the fire alarm system to existing systems such as HVAC, elevator, and fire protection systems
+ Fiber optic networking with Throgs Neck out building fire alarm systems installed

MTA BRIDGES & TUNNELS

UPGRADE TO FIRE ALARM SYSTEM AT THROGS NECK BRIDGE

Bronx, NY

under previous projects;

+ Graphic annunciation workstation within the facility's security and operations room.

The design and engineering tasks included the following:

+ Performing a comprehensive inspection of the existing service building fire alarm system
+ Preparing a design brief for the fire alarm upgrades
+ Preparing design drawings and specifications for upgrading the existing fire alarm system for compliance with NFPA guidelines and other local codes.
+ Preparing a detailed estimate for upgrading the fire alarm system
+ Providing construction support including shop drawing review and approval, material review and approval, site visits, etc.
+ Preparing a single bid package for procurement

PROJECT DETAILS

Client

STV
William (Bill) Brooks
820 Bear Tavern Rd.
Suite 200
William.Brooks@stvinc.com
(609) 530-0300

Construction

$30,000,000

Project Start

2013

Project Completion

2015

Highlights

+ Provided design and construction phase services.
+ Performed bridge standpipe design and fire/life safety engineering services.
+ Provided electrical and lighting design engineering services.

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY (PANYNJ)

GEORGE WASHINGTON BRIDGE PIP HELIX RAMP REPLACEMENT

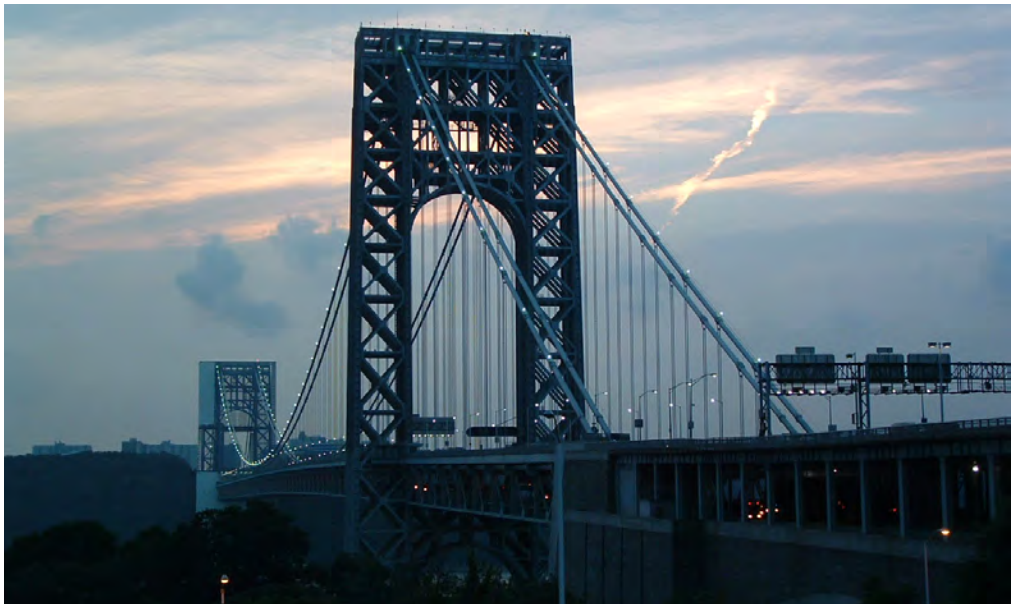
Fort Lee, NJ

Constructed in 1952, the Palisades Interstate Parkway (PIP) Helix bridges are critical to transportation in the New York/New Jersey region because of their location relative to the George Washington Bridge (GWB). Structural and seismic analyses of the bridges indicated that they were near the end of their useful life and not performing as designed.

Scope of work included:

Arora Engineers (Arora) provided design and construction phase services for temporary and new Helix ramps to replace the existing Helix ramp connecting the PIP to the Eastbound I-95 roadway and the GWB. The design included electrical and fire protection engineering services for both temporary and permanent new ramps, fire/life safety code review, coordination with Authorities Having Jurisdiction (AHJ), fire suppression dry stand-pipe system, and construction administration.

Arora's fire/life safety designers utilized state-of-the-art hydraulic calculation software to analyze pressure drop and fluid delivery time. The electrical team also used advanced software to analyze voltage drops, load calculations, and lighting photometrics for the project.



PROJECT DETAILS

Client

HDR Engineering, Inc.
Joseph P. LoBuono, PE
Vice President
One Riverfront Plaza
1037 Raymond Blvd., Suite 1400
Newark, NJ 07102-5418
joseph.lobuono@hdrinc.com
973-474-5010

Construction

$40,000,000

Project Start

2012

Project Completion

2019

Highlights

+ Project raised the Bayonne Bridge deck 64 feet above its existing position
+ Arora was tasked with electrical and fire protection engineering
+ Finished project featured wider travel lanes, shoulders, and median divider for improved safety

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

BAYONNE BRIDGE RAISING

Bayonne, NJ, and Staten Island, NY

To accommodate the larger Panamax ships due to pass under the Bayonne Bridge, efforts went underway to raise the bridge by approximately 64 feet above the height of the waterway.

Scope of work included:

+ The development of contract drawings for one-line diagrams
+ Final short circuit analysis and voltage drop calculations
+ Electrical equipment replacement staging and phasing drawings
+ Emergency generator system layout plans
+ Site plans with all electrical room locations
+ Electrical room equipment layouts

Arora Engineers (Arora) also provided power requirements, conduit routing, and design of the fire alarm system; routing for major conduit and cable runs at the site and in electrical rooms; bridge, roadway, security, navigation, and aviation lighting layout complete with lighting fixture schedules, control schemes, conduit, and cable routings; power and lighting for the new toll system; grounding plans; coordinated power supply, and conduit routing for SCADA equipment layout and interconnection diagrams prepared by others; and lightning protection system design and drawings.

PROJECT DETAILS

Client

STV, Inc.
Jeremy Witthauer
225 Park Avenue South
New York, NY 10003-1604
Jeremy.Witthauer@stvinc.com
212-614-3320

Construction

$50,000,000

Project Start

2013

Project Completion

2016

Highlights

+ Maintained open traffic lanes throughout construction
+ State-of-the-art LED roadway lighting technology
+ Temporary and permanent fire standpipes

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

PALISADES INTERNATIONAL PARKWAY HELIX RAMP REPLACEMENT

George Washington Bridge, Fort Lee, NJ and Manhattan, NY

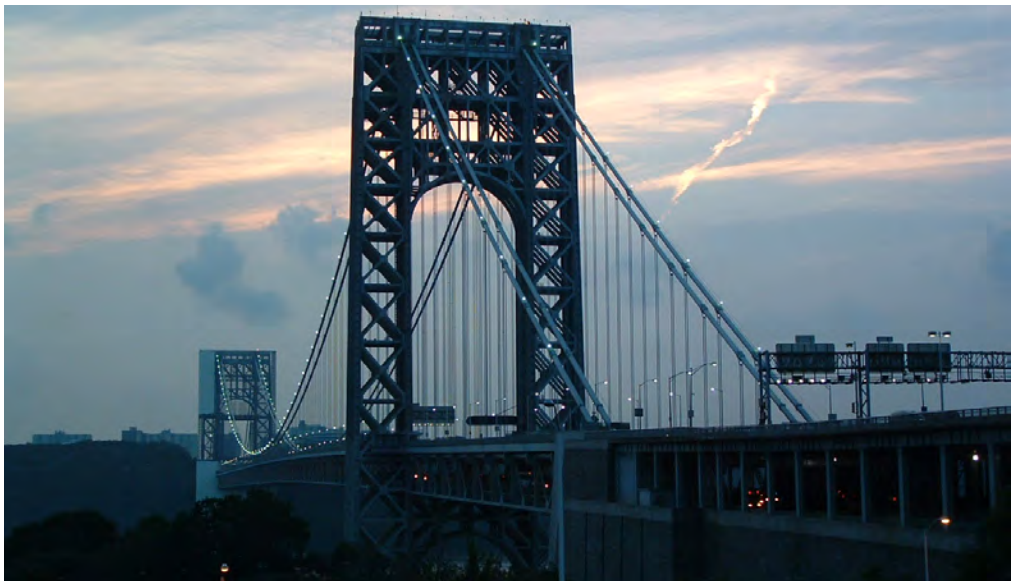
Arora Engineers (Arora) provided design and construction phase services for temporary and new Helix ramps to replace the existing Helix ramp connecting the Palisades Interstate Parkway (PIP) to the Eastbound I-95 roadway and the George Washington Bridge (GWB). Constructed in 1952, the PIP Helix bridges were critical to transportation in the region, based on their location relative to the GWB. Structural and seismic analyses of the bridges indicate that they were near the end of their useful life and not performing as designed. Arora was responsible for electrical and fire protection engineering as well as construction administration services

Scope of work included:

The electrical portion of the project required design of power distribution, lighting (pursuant to NJDOT and PANYNJ standards), controls, and power ductbanks. Sign lighting and power was provided for ITS devices for both the temporary and new permanent ramps.

The fire protection component included fire/life safety code reviews, extensive coordination with AHJs, and the development of design documents for a temporary and new manual dry standpipe systems to protect the two-lane bridge and associated helix approach connecting the Palisades Interstate Parkway to the George Washington Bridge while it was under rehabilitation.

Arora's design met the requirements of NFPA 502, NFPA 14, and the Fort Lee fire department and the PANYNJ's emergency response teams. The project required the careful coordination of the fire protection piping and valves with the structural elements to provide adequate support as well as protection from vehicular traffic. The bridge was relatively short, and the major design challenge was aligning the pipe with the 270-degree curved helix approach.



PROJECT DETAILS

Client

Parsons Corporation
Seth Condell, PE
Project Manager
100 Broadway
New York, NY 10005
seth.condell@parsons.com
212-266-8398

Construction

$1,500,000,000

Project Start

2014

Project Completion

2018

Highlights

+ Designed fire protection for new dual-span bridge and bridge utility and support structures
+ Bridge standpipe design featured a redundant dual fire pump system
+ Clean agent suppression for areas housing sensitive equipment

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

GOETHALS BRIDGE REPLACEMENT PROJECT

Elizabeth, NJ to Staten Island, NY

Arora Engineers (Arora) provided fire protection design services as a subconsultant to Parsons Corporation in connection with the Kiewit/Weeks/Massman (KWM) design/build team for the replacement of the historic Goethals bridge. The project replaced the existing structure spanning the Arthur Kill River on I-278 connecting Elizabeth, NJ with Staten Island, NY. The existing bridge was in service since the 1920s and replaced by new dual spans. The original bridge was demolished once construction was completed.

Scope of work included:

Arora's scope of work featured fire protection design services for the new Goethals Bridge communications systems, primary and secondary electrical systems, and fire pump rooms housed within the bridge utility structures and generator enclosures. These systems include the fire pumps to feed the bridge standpipe system and fire protection systems required to protect the utility and generator structures. Due to the critical nature of the equipment within these structures, the use of clean agent and pre-action sprinkler protection was for areas with water-sensitive equipment.

The scope of work also included the design of a dual fire pump system to provide redundant service to the bridge standpipe system. The project design met the requirements of NFPA 13, NFPA 14, and NFPA 20 as well as those of the emergency response agencies located in both New York and New Jersey. The fire pumps and supply piping were sized to meet the ten fill time requirement per NFPA 502.

The utility structure fire protection systems included both wet and pre-action sprinkler systems for the mechanical and electrical spaces as well as clean agent suppression systems for the sensitive communications rooms. Upon completion of the project design documents, Arora provided services during the construction phase in the form of submittal reviews and site surveys.

TUNNEL EXPERIENCE

PROJECT DETAILS

Client

WSP
Charles “Chuck” Reed - PSP, CAS
Supervising Security & Communications Engineer
One Penn Plaza
New York, NY 10119
212-465-5188
Chuck.reed@wsp.com

Project Start

2017

Project Completion

2017

Highlights

+ Performed survey and electrical design
+ Detailed VSS assessment report
+ Designed documents including value engineering propositions

AMTRAK

NEW YORK CITY PENN STATION TUNNELS AND PLATFORMS VIDEO SURVEILLANCE SYSTEM (VSS) AND ACCESS CONTROL SECURITY DESIGNS TASK ORDER

New York, NY

Arora Engineers (Arora) was selected to perform survey and electrical design services for AMTRAK at Penn Station in New York, NY. Arora, in conjunction with WSP and AMTRAK, incorporated industry standards and best practices to provide AMTRAK with a detailed assessment of Video Surveillance System (VSS) and access control requirements for the identified tunnels and platforms. Arora leveraged data from the risk assessment, conducted site visits, identified VSS and access control placement, type and operational challenges, documented requirements, and created designs for VSS and access control solutions for the tunnels.

Scope of work included:

+ Assessed operational functionalities of the site for AMTRAK and its rail partners.
+ Reviewed and analyzed AMTRAK’s most recent risk assessment as well as other site-specific data.
+ Utilized AMTRAK’s Tunnel Vulnerability Methodology to evaluate additional data and inputs for documenting VSS requirements.
+ Prepared preliminary cost estimates for security improvements. The cost estimates included all project costs, including but not limited to project design, construction, administration, in-house labor (AMTRAK Forces), projected life cycle costs in terms of continued maintenance and head count, and sustainment.
+ Attended regular task progress meetings with AMTRAK ’s EMCS team and other agencies as identified by AMTRAK.
+ Developed a detailed schedule document and submitted the same for AMTRAK EMCS approval within three weeks of the issuance of Notice to Proceed (NTP)

AMTRAK

NEW YORK CITY PENN STATION TUNNELS AND PLATFORMS VIDEO SURVEILLANCE SYSTEM (VSS) AND ACCESS CONTROL SECURITY DESIGNS TASK ORDER

New York, NY

date. The schedule clearly documented all intermediate milestones. The schedule was prepared using AMTRAK's standard scheduling software and presented in the style and format as approved by AMTRAK's EMCS, with necessary charts and reports as requested.

+ Presented all deliverables at the time of submission to AMTRAK's EMCS-designated project manager.

PROJECT DETAILS

Client

Gannett Fleming Inc.

John Purdy, Project Manager

250 West 34th Street

One Penn Plaza, Suite 630

New York, NY 10119-0101

212-967-9833 ext 514

jpurdy@gfnet.com

Project Start

May 2020

Project Completion

August 2021

Highlights

+ Electrical and lighting design
+ Preliminary and final design phase services
+ Site evaluation, inspection, and analysis
+ Safety training and certification
+ Technical specifications

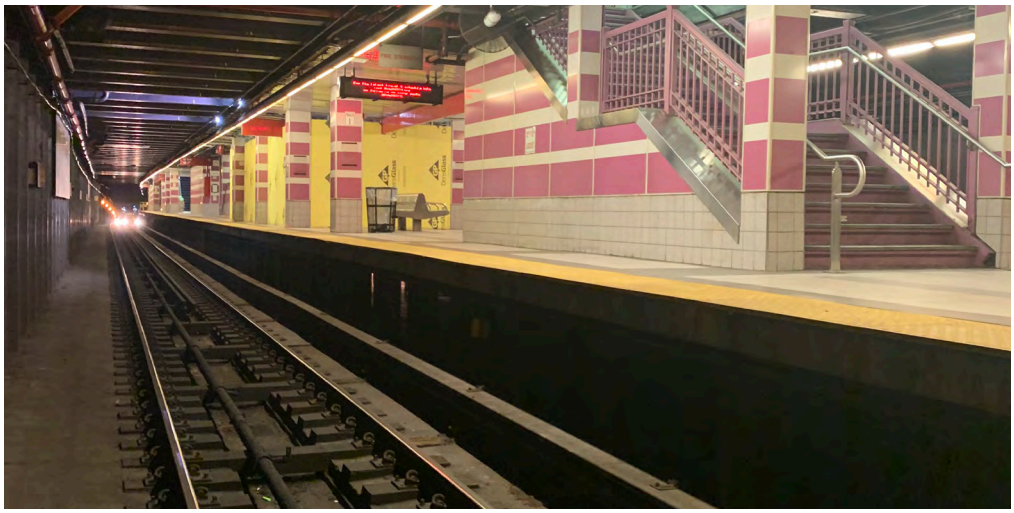
DELAWARE RIVER PORT AUTHORITY

PATCO SUBWAY TUNNEL RENOVATION

Philadelphia, PA

Arora Engineers (Arora) provided subconsultant engineering services under Gannett Fleming Inc. for the PATCO Subway Tunnel Renovation project in Philadelphia, PA.

The project included areas of the existing tunnel from the entrance, west of Ben Franklin Bridge and extended to the end of the tunnel, the intersection of Locust and 17th Street. The renovation work included four intermediate stations at Franklin Square in need of structural remediation.



SCOPE OF WORK:

Arora provided electrical power and lighting preliminary and final design phase services to support the renovation of PATCO subway. The project was completed in 15 months within schedule and budget. The Arora team obtained TWIC certification and completed all mandatory PATCO Safety Training for full compliance.

PRELIMINARY DESIGN PHASE:

+ Reviewed existing documents, including
  + Biennial inspection reports
  + Original subway construction drawings
  + Contract 302 and 303 drawings
+ Verified existing electrical conditions
  + Arora performed field reviews, surveys, inspections, and investigations of the existing electrical conditions
  + Arora identified overhead, surface-mounted, and underground electrical utilities impacted as part of the project
+ Identified electrical utilities requiring relocation, or temporary/permanent modifications

PROJECT DETAILS

Client

Hatch Mott MacDonald
David G. Newman, PE, CEng.
Principal Project Manager
400 Blue Hill Drive
Suite 100
Westwood, MA 02090
781-636-4124
David.Newman@hatchmott.com

Project Start

2013

Project Completion

2014

Highlights

+ Assisted HMM in survey work
+ Assisted HMM in preparing sketches for schematic level report
+ Supported the electrical design effort in the field verification of existing conditions
+ Assessed fire alarm/management panels for the inclusion of a ventilation system

DELAWARE RIVER PORT AUTHORITY

PATCO SUBWAY TUNNELS FORCED AIR VENTILATION STUDY

Philadelphia, PA

Arora Engineers (Arora) was selected to assist Hatch Mott MacDonald with survey work, cost estimates, and preparation of sketches for a schematic level report for the Subway Tunnels Forced Air Ventilation Study. Arora was tasked with handling the fire alarm and communications services, and supporting the electrical design effort, primarily in the form of field verification of existing conditions.

Scope of work included:

Arora's scope of work included the following phases:

+ Reviewing existing documents, including previous studies, existing drawings, and PATCO fleet details
+ Reviewing fire alarm/management panels and verifying the possibilities of inclusion of ventilation system
+ Verifying existing conditions, including field surveys to collect SES/CFD information, measurement of illuminance levels, and field activity coordination/scheduling
+ Reviewing regulations and other requirements
+ Preparing design-build & design-bid-build recommendations
+ Preparing a preliminary report
+ Formulating design criteria
+ Preparing the final report submission
+ Project management/meetings

PROJECT DETAILS

Client

Mott MacDonald
Norris Harvey, PE
Tunnel Fire/Life Safety Division
1400 Broadway
New York, NY 10018
Norris.Harvey@hatchmott.com
212-589-1127

Construction

$23,000,000

Project Start

2014

Project Completion

2016

Highlights

+ MEP for control, server and electronics rooms
+ Evaluated fiber optic cable capacity

MTA BRIDGES & TUNNELS

CONTROL ROOM RENOVATIONS, QUEENS MIDTOWN TUNNEL

New York, NY

Arora Engineers (Arora) assisted in the development of the design for the mechanical, electrical, and plumbing related systems for the control room renovations at the Queens Midtown Tunnel (QMT). This effort also included MEP support for back-up control rooms at the QMT and the Hugh L Carey Tunnel (formerly the Brooklyn Battery Tunnel). The project required the upgrade of existing electronic control systems to improve situational awareness, improve customer and employee safety, and increase operational efficiencies, reliability, and maintenance planning.

Scope of work included:

+ Support of the mechanical, electrical, plumbing, and fire protection/alarm systems on the renovations in the Queens Service Building for the conditioned spaces in the control, server, and electronics rooms. In addition, support was provided for the temporary control room while the upgrades occurred.
+ HVAC systems were designed to handle all anticipated loads and conditions. Calculations determined future loading conditions based on the upgraded systems and equipment as part of the project.
+ Electrical systems included reconfigurations of power supplies and cabling, the design of a new UPS system, cabling management system, access control devices, and relocation of CCTV cameras.
+ Plumbing system design included the relocation of pipes located above the control room.
+ Fire protection and alarm systems were designed for each of the rooms and their associated hazards in accordance with all applicable codes and NFPA standards.

In addition, Arora developed options for increasing fiber optic cable capacity through the QMT, including connecting the service building to the tunnel. Arora identified and evaluated installed fiber cable in the tunnel for current and future needs.

PROJECT DETAILS

Client

Mott MacDonald, LLC
Michael T. Kelly, PE
1400 Broadway
30th Floor
New York, NY 10018
212-589-1153
Michael.kelly@mottmac.com

Project Start

2016

Project Completion

2019

Highlights

+ Provided electrical engineering and design support for new roadway lighting
+ Assisted in tunnel inspections and site surveys
+ Assisted in cost and quantity estimation
+ Supported the preparation of detailed design specifications to replace the roadway lighting

PENNSYLVANIA TURNPIKE COMMISSION

LEHIGH TUNNEL ROADWAY TUNNEL LIGHTING & RACEWAY MILEPOST REPLACEMENTS

Lehigh and Carbon Counties, PA

Arora Engineers (Arora) provided electrical engineering and design support for the Lehigh Tunnel's new roadway tunnel lighting and related systems.

The Lehigh Tunnel, located on Interstate 476 between Lehigh and Carbon County, consists of two separate tubes, Northbound (NB) and Southbound (SB), and is approximately 4,380' in length. The NB tube was constructed in 1957; the SB tube was completed in 1991.

Water ingress in the Lehigh Tunnel, combined with regular freeze-thaw cycles and heavy traffic flow, led to a gradual deterioration in the appearance and condition of the tunnel wall tiles. As a result, the existing SB and NB luminaire housings and SB raceways were corroded and needed to be replaced.

The replacement project consisted of engineering design services, including field surveys, MEP design and specialized lighting design for long tunnels, electrical power distribution design, emergency power design, cost estimating for the replacement of the existing roadway and emergency lighting systems, and southbound raceway replacement. The tunnel lighting was designed in accordance with ANSI/IES RP-22-11 and NFPA502, understanding that some NFPA502 requirements were 'grandfathered' by PTC.

Scope of work included:

Arora's scope of work drew on the firm's expertise in the design of electrical systems and the provision of drafting and estimating services. These tasks included the following:

Photo courtesy of lehighvalley.com

PENNSYLVANIA TURNPIKE COMMISSION

LEHIGH TUNNEL ROADWAY TUNNEL LIGHTING & RACEWAY MILEPOST REPLACEMENTS

Lehigh and Carbon Counties, PA

+ Tunnel inspection and site surveys
+ Contribution to project reports
+ Cost estimation
+ Quantity estimation
+ Preliminary design
+ Preparation of detailed engineering design specifications

PROJECT DETAILS

Client

Port Authority of New York and New Jersey
Sergio Martinez, PE, PMP
Program Manager – Security Project Management
221 Erie Street, Room 220
Jersey City, NJ 07310
smartinez@panynj.gov
201-595-4738

Construction

$2,400,000

Project Start

2009

Project Completion

2011

Highlights

+ Security engineering for the Lincoln Tunnel
+ Design tasks included access control, intrusion detection, and CCTV systems

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

ACCESS CONTROL SYSTEMS (ACS)

Lincoln Tunnel, Weehawken, NJ and New York, NY

Arora Engineers (Arora) provided special systems engineering design services to the Port Authority of New York and New Jersey for the expansion of the access control system and CCTV expansions and upgrades for the Lincoln Tunnel. The access control package included power, special systems, and architectural design work to secure doors at the Lincoln Tunnel vent, administration, and river buildings.

Scope of work included:

Access control design included new door control panels and panel details, sonnet node expansions, power, door elevations, and programming requirements. The CCTV system upgrade and expansion included sonet ring connections and CCTV camera design including camera views, lens sizing, copper and fiber optic communications, encoding, and storage. CCTV design also included the conversion of existing head end analog equipment to IP-based storage and video management equipment. In general, the package included the following:

+ Station plans
+ Riser diagrams
+ Mounting details
+ Connections details
+ System integration plans

This package is deemed confidential and privileged under the PANYNJ Security Handbook. No further information can be disclosed about this project.

Rethinking Infrastructure®

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