Transportation

Engineering Qualifications

CONTACT:
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Rethinking Infrastructure®

ARORA®

Arora Engineers, Inc.
aroraengineers.com

P (610) 459-7900
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Dear Prospective Client,

Over our 32-year history, Arora Engineers, Inc. has worked with Transportation agencies across the country on a range of services covering the complete project life cycle. Arora's technical expertise lies in transportation stations as well as systems for bridges and tunnels. Our current customers include Amtrak, SEPTA, MBTA, WMATA, MTA, LIRR, NYCT, NJT, PennDOT, Santa Clara Valley Transportation Authority (VTA) and more.

Arora has done systems planning for large transportation facilities our Geospatial team works on asset management and safety management (SMS) programs.

Station design is at the core of Arora's technical expertise. Ranging from greenfield stations, to expansions and renovations, we can lead or support any of the design and engineering for building systems. We have dedicated disciplines in Mechanical, Electrical, Plumbing, Fire/Life Safety, and Special Systems (Security, Telecom, IT). We design stations with the future in mind and live our tagline of Rethinking Infrastructure as we approach each unique project.

Our Construction and Program Management group (PM/CM) experience ranges from serving as agency extension of staff and owners rep running capital projects and programs, to field inspections, to working with general contractors as master systems integrators, performing constructability reviews, and managing and overseeing the design and construction process.

No project is too big or too small, and we look forward to working with you and exceeding your expectations for quality and service.

Sincerely,

Manik Arora
President and CEO

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COMPANY OVERVIEW

Arora Engineers, Inc.

At Arora Engineers, 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

Throughout our history of more than 30 years, 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/ Electronic Video Information Display Systems (EVIDS)
+ Software and equipment evaluation and recommendations
+ FIDS/BIDS/GIDS/CUPPS/SUPPS
+ Multi-lingual/International traveler

ATLANTA

BALTIMORE

BOSTON

CHARLOTTE

CHICAGO

DALLAS

FT. LAUDERDALE

NASHVILLE

NEW YORK

PHILADELPHIA

SAN JOSE

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

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
+ Critical path review
+ Materials testing
+ Cost estimating
+ Claims analysis
+ Runway Incursion Mitigation
+ Airfield Lighting Vaults and Power Distribution
+ Pavement Surface Sensor Systems
+ Construction Safety and Phasing

RAIL EXPERIENCE

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Green Line Extension Project

East Cambridge, Somerville, and Medford, MA

PROJECT DETAILS

CLIENT

AECOM/HNTB GLX Joint Venture
Greg Yates, VP/Project Manager
66 Long Wharf
Boston, MA 02110
gregory.yates@aecom.com
617-996-0771 x211

CONSTRUCTION

$1,100,000,000

PROJECT START

2012

PROJECT COMPLETION

2017

HIGHLIGHTS

+ Design Responsibilities: MEP, Fire Protection and Fire Alarm
+ Design of 7 new Transit Stations along the Green Line in Boston
+ Design of a 15,000 SF Vehicle Maintenance Storage Facility

Arora is part of the AECOM/HNTB joint venture team responsible for design development for the Green Line Extension Project's advanced conceptual design. The project is an initiative of the Massachusetts Department of Transportation and the Massachusetts Bay Transportation Authority. The project will extend the existing Green Line service from a relocated Lechmere Station in East Cambridge to Union Square in Somerville, and College Avenue in Medford. Design for the project includes seven stations, nearly five miles of Green Line double track, the relocation of four miles of double track commuter rail, eight bridges, and a vehicle maintenance storage facility.

SCOPE OF WORK INCLUDED:

Arora is tasked with systems design and documentation for the stations, vehicle maintenance storage facility, and the transportation building. Arora is responsible for engineering design of the following: mechanical, electrical, plumbing, fire protection and life safety systems. Arora is also responsible for the development of the building information modeling (BIM) relative to each discipline. Arora is contributing to the development of both the BIM execution plan and BIM standards for the project.

A 15,000 SF Vehicle Maintenance Storage Facility is also included with the project. The facility features a seven-track car shop for the light rail vehicles used on the Green Line. This project aims to provide additional shop space for the larger number of vehicles that will provide service on the expanded system. The expanded car repair facilities will include inspection pits, a wheel lathe, and vehicle wash facilities. Building services will include compressed air systems in addition to conventional heating and plumbing systems. A radiant floor heating system will provide a >>

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Green Line Extension Project

East Cambridge, Somerville, and Medford, MA

<< comfortable working environment for shop personnel. The project also features office space for the maintenance facility's administrative support staff and a parking garage for employee cars and MBTA trucks will be located over the rail vehicle storage yard to maximize real estate utilization in a congested urban location.

This important project will greatly improve public transit service in some of the most densely-populated municipalities in Massachusetts. Among its many benefits, the Green Line Extension Project will: Provide new and better opportunities for residents and visitors to travel within their communities and within the region; provide environmental benefits by reducing the number of vehicles on the road; and support municipal plans for sustainable growth and development.

While the overall program ran into budget issues and as a result, corresponding schedule delays, the Design Team JV met the design and submittal schedules set by the MBTA's team. We did so within the allocated and authorized budgets. The MBTA temporarily halted the project to terminate the contracts of the PM/CM and construction team members, however, the Design Team JV was retained and is currently trusted by the MBTA to evaluate and redefine the program as a Design/Build project.

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

15th St. and City Hall Station Renovations

Philadelphia, PA

PROJECT DETAILS

CLIENT
Southeastern Pennsylvania Transportation Authority
Jack McElwee
Sr. Project Manager
1234 Market Street
Philadelphia, PA 19107
jmcelwee@septa.org
215-580-3787

CONSTRUCTION
$150,000,000

PROJECT START
2010

PROJECT COMPLETION
est. 2019

HIGHLIGHTS

+ New fare line design with SEPTA new payment technology
+ Expanded CCTV and video recording storage
+ Coordination of design and construction with the Center City District project for Dilworth Plaza
+ Expanded fire alarm station system

The Center City District (CCD) undertook a renovation of Dilworth Plaza, located at Philadelphia's City Hall, into Dilworth Park. The project aimed to make City Hall accessible and welcoming by eliminating walls, barriers, stairs, and changing elevations. One level surface was created for the entire plaza. Views of City Hall were enhanced and framed through landscaping and architecture. As a part of this project, SEPTA completed an approximately $16 million upgrade and improvement of the access to subways, trolleys, and rail lines at the City Hall and 15th Street Stations.

SCOPE OF WORK INCLUDED:

Arora assisted with the widening of one inter-station corridor and the addition of a new corridor, waterproofing, and the addition of new ventilation shafts up to the plaza level. The scope of work also included modifications for future elevators and renovation of the fare lines on the upper concourse level.

Arora performed mechanical, electrical, plumbing, fire protection/alarm, and special systems professional design engineering services. Fire protection design included the modification and relocation of the existing dry standpipe systems located within the City Hall and 15th St Stations and a new limited area wet sprinkler system for the associated mechanical spaces. Due to the location of the equipment, significant analysis was performed to define the scope of work to limit the potential for hazardous working conditions and the effect on train operations.

Special systems design and engineering services included an expansion of SEPTA's data network ring, CCTV systems, access control system, AV/PA systems and >>

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

15th St. and City Hall Station Renovations

Philadelphia, PA

<< integrated control consoles. Design included new network node equipment for new IP bases CCTV cameras as well as off site and local storage devices. Provisions were also designed into the system to allow other agencies access to recorded video as well as local viewing for booth agents. Access control included fare lane gates, maintenance gates and emergency exits. Integrated control consoles were designed for each agent booth to operate access control doors as well as make maintenance calls and initiate emergencies. Design for the Audio, Visual and Public Address systems were provided including speakers and VMS signs.

A comprehensive set of construction drawings, specifications, and an estimate of probable construction costs were created for third party construction. LEED requirements were also added to the scope of this project, and the team designed the project to achieve LEED Silver accreditation.

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

Susquehanna / Dauphin Station Upgrades

Philadelphia, PA

PROJECT DETAILS

CLIENT
Southeastern Pennsylvania Transportation Authority
c/o Pennoni
Brian M. Diehl, PE
3001 Market Street, Suite 200
Philadelphia, PA 19104
bdiehl@pennoni.com
215-254-7810

CONSTRUCTION
$9,800,000.00

PROJECT START
2016

PROJECT COMPLETION
Ongoing

HIGHLIGHTS

+ New MRL elevators
+ Improvements to Electrical and Lighting systems
+ HVAC, plumbing, drainage, ventilation, and life safety systems
+ Restroom ADA upgrades
+ Communications Systems Upgrades to AVPA, Emergency Call Boxes and HD Security Cameras
+ Transformer room evaluations and upgrades

This project included design and construction for the rehabilitation of the Susquehanna-Dauphin Station on the Broad Street Line. Station improvements included energy efficient lighting, wall, floor, and ceiling finishes, customer amenities, signage, passenger control and cashier facilities, platform tactile warning strips, an A/V public address system, and the installation of elevators. The results of this project, in concert with other proposed improvements, will make the station ADA accessible.

Arora provided mechanical, electrical, plumbing, fire alarm and fire suppression, and special systems engineering services for new, modified, and relocated systems. Design documents associated with the station upgrades included drawings and specifications from conceptual design through to construction documents and construction administration.

SCOPE OF WORK INCLUDED:

+ **Mechanical:** energy efficient designs for the heating, cooling, and exhaust equipment and distribution system
+ **Electrical:** the upgrade to the electrical system included power distribution, receptacles, elevator power, and lighting
+ **Plumbing:** as needed designs for ADA modifications, including hot and cold water as well as sanitary, drainage system at stations
+ **Fire Alarm/Suppression:** designs for Fire Alarm and Detection system consisted of a control panel, annunciators, wire and conduit for new elevators – Arora laid out all devices including smoke detectors, pull stations, monitor and relay modules, horn, and strobes, and recall devices
+ **Special Systems:** design for AVPA, emergency call boxes, and HD security cameras for the North and Southbound stations as well as the elevators

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

Substation Rehabilitation Project

Philadelphia, PA

PROJECT DETAILS

CLIENT
Southeastern Pennsylvania Transportation Authority
Dan Ferrante
Project Manager, Power
SEPTA EM&C Power Department
1234 Market Street
Philadelphia, PA 19107
DFerrante@septa.org
215-580-7625

CONSTRUCTION
$130.4 million

PROJECT START
2016

PROJECT COMPLETION
Ongoing

HIGHLIGHTS

+ Includes 16 substations to be rehabilitated
+ 1 new construction substation facility
+ Locations include catenary, under street, and stand-alone units
+ Complete systems assessment and upgrade recommendations
+ TPSS's will be completely overhauled and upgraded by the team
+ 21 month design schedule

Arora, as a subconsultant to HDR and HNTB, is providing mechanical/plumbing, fire/life safety, special systems, and electrical services for 16 substations and facilities. The overall objective of the project is to provide SEPTA with upgraded substations throughout the Regional Rail (RRD) and Center City Transit (CCT) divisions of SEPTA. There is a total of 16 existing substations that will get rehabilitated and one new substation will be built.

SCOPE OF WORK INCLUDED:

+ **Phase 1** of this project is site assessments of all systems and preparation of a conceptual report for each station detailing the condition of and recommendations for each individual system by site.
+ **Phase 2** consists of preparation of 30% and 50% design packages for recommended upgrades to be taken over by the awarded design builder at 50%. Woodbourne station is the exception, and this is a new greenfield site and design will be taken to 100%.
+ **Phase 3** is construction related services to review submittals and shop drawings, respond to RFIs, as-built/record documentation, and as needed technical assistance.

The mechanical services include design for the HVAC, ventilation, and exhaust systems in the buildings. The plumbing services include design for the bathrooms, as necessary, the eyewash stations and the rainwater conductor systems for each of the buildings. Design is in accordance with all applicable codes and standards.

The fire/life safety design includes fire alarm and detection systems for each building. Heat and smoke detection systems are required throughout and will communicate to SEPTA's operations center. Design is in accordance with all applicable codes and standards, including NFPA 70, 72 and 130.

The special systems design includes security, CCTV, and communications for each of the buildings. An intrusion detection and alarm system is provided for each building.

The electrical design is related to the non-TPSS systems and includes general convenience power and receptacles and lighting.

AMTRAK

New Carrollton Platform Reconstruction

New Carrollton, MD

PROJECT DETAILS

CLIENT
AECOM
Ulysses Koutsogiannis, PE
Project Manager, Transit,
Philadelphia
Metro
1700 Market Street
Suite 1600
Philadelphia, PA 19103
Ulysses.Koutsogiannis@aecom.com
(P) 215-789-2106
(C) 609-233-9579

PROJECT START
2017

PROJECT COMPLETION
TBD

HIGHLIGHTS
+ Existing Conditions Survey
+ Design Services
+ Full Construction Documentation and Service

Arora Engineers, Inc. (Arora) was chosen to join the team, led by AECOM, in the design and development of a new high level platform on Track 1 for the New Carrollton Station for Amtrak for design of a new 48" at top of rail center platform and platform head house, station signage, and modifications to the existing station. Arora's specific scope will include mechanical, plumbing, and electrical engineering services.

SCOPE OF WORK INCLUDED:

+ **Mechanical (HVAC)**
  + Existing HVAC: Replacing the existing Air Handling Unit and associated ductwork in the existing station.
  + New HVAC: Extend the existing ductwork system to provide conditioned air to the new upper platform and increase the capacity of the newly replaced Air Handling Unit to accommodate.
+ **Plumbing**
  + Existing Plumbing: Renovate the existing public restrooms.
  + New Plumbing: Implement new storm water management for the new upper platform and connect to the existing storm water management system.
+ **Electrical (Power)**
  + Existing Electrical Room: Renovate the existing electrical equipment located in electrical and mechanical spaces.
  + New Electric: Provide power and panel(s) to the new equipment as required.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

General Architectural and Engineering Consultant Services – Facilities IDIQ Contract No. FQ1519

Washington, D.C. Metropolitan Area

PROJECT DETAILS

CLIENT
GFP (Gannett Fleming/Parsons JV)
David Bur rows, PE, PMP, LEED AP
Task Manager
800 I Street NW, 6th Floor
Washington, DC 20001
dburrows@gfnet.com
(202) 969-3178

CONSTRUCTION
N/A

PROJECT START
2017

PROJECT COMPLETION
Ongoing

HIGHLIGHTS

- On-site data entry into a web-based portal containing the WMATA inventory
- Surveyed 280 Train, Bus, and Administrative facilities
- Complete Systems Design Packages and CA
- Staff Augmentation

Arora Engineers, Inc. (Arora) is part of the Gannet Fleming / Parson Joint Venture (GFP) team for the Washington Metropolitan Area Transit Authority (WMATA) General Architectural and Engineering Consultant Services – Facilities Indefinite Delivery Indefinite Quantity (IDIQ) contract No. FQ1519. Arora is providing GFP with Mechanical, Plumbing, Electrical, Fire Life Safety and Special Systems support on various Task Order contracts as the need arises.

SCOPE OF WORK INCLUDED:

Task 1 - Arora is performing an inventory assessment project for various facilities managed by the Washington Metropolitan Area Transit Authority (WMATA). Known as the Transit Asset Inventory and Condition Assessment (TAICA), the project features asset inventories and condition assessments to allow WMATA to determine current and future capital needs. The assessment is a continuation effort of previously surveyed Tier A & B facilities. The Tier C & D facilities consist of 280 freestanding traction power substations and tie breaker station passenger facilities encircling the WMATA metro lines.

The project's goal is to import the data collected into an Enterprise Assset Management System for critical asset lifecycle management. TAICA is intended to be the cornerstone in ensuring a complete, consistent, accurate, and centralized repository of relevant asset-related data to support compliance, capital investment prioritization, and data-driven maintenance.

Arora is providing assessors for surveying the 280 Tier C & D facilities for WMATA. Arora's scope includes mechanical, plumbing, electrical, lighting, fire protection, and fire alarm disciplines for survey. The assessors examine and identify the condition and remaining lifecycle of the various equipment categorized by the above listed disciplines into an online database. Arora also compared the results of the field survey with existing condition drawings >>

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

General Architectural and Engineering Consultant Services – Facilities IDIQ Contract No. FQ1519

Washington, D.C. Metropolitan Area

<< for completeness and accuracy to improve the on-going asset inventory database for WMATA. The results will enable WMATA to provide accurate data-driven maintenance procedures and determine prudent capital replacement activities.

Task 2 - A detailed design package was developed for the rehabilitation of station platforms along C and J Lines in Virginia and G and D lines in Maryland. This was accomplished through site inspections, followed development of a Design Report, then development of both a 50% and 100% submittals. Arora is currently scheduled for five (5) stations under Phase 1a and three (3) stations under Phase 2. Our specific disciplines include Electrical, Mechanical, Fire Alarm and Special Systems.

Task 3 - For this task order Arora is providing A/E services staff augmentation for a Project Controls Specialist. This position working with the contract support group, prepares cost estimates, performs cost analyses, develops prenegotiation positions, review claims and supports contract negotiations. This position is a minimum of a 1 year assignment.

Task 4 – For this task order Arora is providing A/E services staff augmentation for Yard 2 project. Our construction manager is providing support to WMATA in site surveys, scope development and future contract generation, as well as in field coordination and administrative support for the future rail yard facilities rehabilitation projects. Responsibilities include: maintains full familiarity with plans, specifications, construction schedules and contractor's plans on assigned contracts, distributes information to office and field staff and internal stakeholder offices, establishes and maintains job record files, reviews contractor's Critical Path Method or bar chart progress schedules, participates in engineering package reviews, and ensures all work is performed per plans and specifications via coordination with QA procedures.

MTA NEW YORK CITY TRANSIT

Willets Point-Mets Station Modernization

New York, NY

PROJECT DETAILS

CLIENT
VHB, Inc.
Tom Velleca
Senior Site/Civil Manager
Two Penn Plaza, Suite 2602
New York, NY 10121
TVelleca@VHB.com
212-857-7354

CONSTRUCTION
TBD

PROJECT START
2016

PROJECT COMPLETION
2020

HIGHLIGHTS
+ Reconstruction / modernization of train station
+ Coordination between NYCT, LIRR, and AirTrain
+ Design review
+ Construction administration

Arora has been retained as part of a team that is providing mechanical, electrical, plumbing, fire/life safety, and special systems engineering services and construction administration oversight for this project for the Station Reconstruction / Modernization Program at Willets Point being carried out by the Long Island Rail Road (LIRR) and New York City Transit (NYCT).

Specific goals of the Willets Point-Mets Station Reconstruction/Modernization Program include:

+ Coordination of plans to ensure a common "21st Century" station design vision, including design compatibility with a planned AirTrain terminal providing connectivity to LaGuardia Airport;
+ Design to meet the ever-increasing demand placed upon NYCT and LIRR stations; and
+ Development of underlying station aesthetics through design innovation design excellence.

SCOPE OF WORK INCLUDED:

1. Station Design Review: Provide review and act in an advisory capacity throughout the design process. Also will provide critique on program concepts ensuring the design focus on the passenger experience and the vision of an underlying station aesthetic.
2. Station Design Coordination: Provide critique on station design difference between NYCT and LIRR stations with respect to design goals for AirTran LaGuardia terminal.
3. Design/Build Concept Package Development: Provide review of the concept design bid package for the NYCT station to ensure the goals of the program are achieved.
4. Procurement Services Support: Provide review of the contract procurement process and advise on methods of procurement for the NYCT station to ensure design vision is communicated. Will also provide review of all procurement packages to ensure documents maintain original project intention.
5. Construction Phase Services: Provide on-call assistance to collaborate with Design/Build team through the development of the Contractor design. Facilitate resolution of design proposals that conflict with the original intent.

DELAWARE DEPARTMENT OF TRANSPORTATION

Newark Regional Transportation Center

Newark, DE

PROJECT DETAILS

CLIENT
Whitman, Requardt & Associates
801 South Caroline Street
Baltimore, MD 21231
Tim Duke, AIA, Associate
tduke@wrallp.com
410-246-3441

CONSTRUCTION
$20,000,000

PROJECT START
2016

PROJECT COMPLETION
2020

HIGHLIGHTS

+ MEP, Life Safety and Special Systems
+ 3 phased development reflected in the approach to documentation
+ Lighting for the Station Building, Pedestrian Bridge, access stairs from College Avenue
+ Security systems including CCTV, access control, surveillance and emergency call boxes
+ Life Safety Systems including detection, audible and voice announcement, fire protection system with stand pipe

The Delaware Department of Transportation has embarked on a significant upgrade to the Newark Regional Transportation Center. The project includes the replacement of a small station/security facility with a new, full service Station Building equipped with a Pedestrian Bridge leading to a 950' Platform constructed within a five-track Right-Of-Way. The existing parking area will be revitalized to accommodate 540 spaces and bus traffic operated by DART. The Southeast Pennsylvania Transit Authority (SEPTA) and Amtrak use the station. Arora, as part of the team led by Whitman, Requardt & Associates, is providing MEP, fire/life safety, and special systems design for the upgrades.

Due to the requirements of the funding vehicle(s) and the multiple entities involved in the project, including DelDOT, DTA, DART, SEPTA and Amtrak as owners/users and the City of Newark and the University of Delaware as most interested parties, the project has been divided into three phases. The first phase is the Parking Lot improvements, including lighting, security and electric car charging station. The Station Building is Phase 2 and the Pedestrian Bridge to the new Platform is Phase 3. Each phase will be constructed in sequence.

SCOPE OF WORK INCLUDED:

+ Mechanical systems for the Station Building and Platform support rooms
+ New electrical service augmented by whole-project emergency power
+ Telecommunication enhancements for the Station Building and Platform including Public Information Display in the Station Building and on the Platform coordinated with SEPTA and Amtrak
+ High efficiency lighting design and in-pavement lighting
+ Secondary power distribution for the new Platform
+ CCTV, access control, emergency call boxes, PA systems
+ Platform emergency egress pathway security and illumination
+ Lightning Arrestor and upgraded grounding systems
+ Standpipe system for the Station Building, Pedestrian Bridge and the Platform accessible from both sides of the tracks
+ Payphone design
+ Point of Sale and Ticket Machine voice and data design

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

Noble Station Upgrade

Jenkintown, PA

PROJECT DETAILS

CLIENT
Southeastern Pennsylvania Transportation Authority
c/o McCormick Taylor, Inc.
Lennox Hyman, ENV SP, Project Manager
2001 Market St, 10th Floor
Philadelphia, PA 19103
215-592-4200

CONSTRUCTION
$15,000,000

PROJECT START
2016

PROJECT COMPLETION
Ongoing

HIGHLIGHTS

+ New heating, cooling and exhaust equipment and distribution system
+ Power distribution, convenience receptacles, and lighting
+ Hot and cold water designs, as well as sanitary
+ Fire alarm and detection system
+ CCTV system for building

Arora provided professional mechanical, electrical, plumbing, fire alarm, lighting, and special system engineering services for the renovation of two buildings at SEPTA's Noble Station in Jenkintown, PA.

The primary building is 1,000 SF and features passenger shelter space, two restrooms, administrative area, and utility space. Design services were also provided to repurpose a 500 SF former freight house for use as an additional heated passenger shelter area.

The project's mechanical upgrades utilized energy efficient designs and equipment to reduce energy costs. Additionally, Arora selected LED lighting to reduce maintenance needs and conserve energy.

COMPLETE SCOPE OF WORK INCLUDED:

+ **Mechanical:** Energy efficient designs for heating, cooling, exhaust equipment, and distribution system
+ **Electrical:** Upgrades to electrical system included power distribution, convenience receptacles, and lighting for building interior and exterior
+ **Plumbing:** Designs that include hot and cold water, sanitary, rainwater conductors, and storm sewer tie-in.
+ **Fire Alarm:** Upgrades to fire alarm and detection system included control panel, annunciators, wire, conduit and all devices including smoke detectors, pull stations, monitor and relay modules, horn, and strobes.
+ **Special Systems:** Security measures included a CCTV system including interior and exterior cameras with network recording functionality to provide remote monitoring capability

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

PATH Fire Alarm Replacement Stage III and IV

Various Port Authority Trans Hudson (PATH) Facilities, NY and NJ

PROJECT DETAILS

CLIENT
Port Authority of New York and New Jersey
Atul Ragoowansi
Project Manager
aragoowa@panynj.gov
201-595-4039

ROLE ON PROJECT
Subconsultant

CONSTRUCTION
N/A

PROJECT START
2015

PROJECT COMPLETION
2017

HIGHLIGHTS

+ Design services for the upgrade of the entire PATH fire alarm network.
+ Campus type network composed of various fire alarm manufacturers interconnected via fiber optic cable.
+ Intelligible voice evacuation systems for public spaces
+ Preparation of a detailed construction cost estimate
+ Code consulting utilizing NFPA, NY, NYC, NJ and UL codes and standards

Arora has recently been awarded, as a sub-consultant, the Stage III and Stage IV design services for the upgrade of the Port Authority Trans Hudson (PATH) fire alarm systems. The scope includes the complete fire alarm upgrade and associated IP based communication between 50 plus light rail facilities. associated with the PATH system located in both New York and New Jersey. The project shall include the survey of existing systems, the development of design documents and construction support services.

SCOPE OF WORK INCLUDED:

The project objective is to upgrade and unify all of the fire alarm systems protecting the various PATH facilities. The scope includes the design of a code compliant dedicated fire alarm system for the entire PATH system and Fire Alarm network over the PATH SONET to enable IP digital alarm communicator transmitter (DACT) communications between the Fire Alarm Panels at each Facility and the Proprietary Supervising Stations. The system includes monitoring by designated external Central Monitoring Station (CMS) located outside the PATH premises and other monitoring stations located within the PATH facilities.

The design is based on the Stage I design criteria, survey of existing conditions of each facility, and includes the overall PATH fire alarm network and the fire alarm systems located at each of the facilities. The systems include fire alarm panels, power supplies, voice evacuation equipment, initiation devices (manual pull stations, smoke/heat detectors, duct, etc.), notification appliances (speakers, horns, strobes, etc.), network communication equipment and all other equipment required for a code compliant fire alarm system. The system design includes all interface to other systems required to be supervised or operated by the fire alarm system to provide ancillary fire/life safety functions.

The scope includes the development of detailed design drawings, specifications and cost estimates to be used for bidding purposes. The documents shall be developed through a progressive design process with multiple submittals. Upon completion of the design documents Arora shall provide support services throughout the duration of construction including review and response to RFI's, review of submittals, punchlist surveys and review of close out documentation.

MTA LONG ISLAND RAIL ROAD

East Side Access Project

New York, NY

PROJECT DETAILS

CLIENT
MTA East Side Access
William Connors, PE
Engineering Manager/Sr. Fire Protection Engineer
469 7th Avenue, 16th Floor
New York, NY 10018
WConnors@MTACC-ESA.INFO
212-695-5137

CONSTRUCTION
$9,000,000,000

PROJECT START
2010

PROJECT COMPLETION
2022 (construction)

HIGHLIGHTS

+ $9 billion effort spanning 10 city blocks
+ Project will bring the LIRR into a new station below historic Grand Central Terminal
+ Fire suppression systems included clean agent systems included clean agent systems for sensitive areas

Arora provided fire protection engineering service for the East Side Access (ESA) project, which will connect the LIRR's Main and Port Washington lines in Queens to a new LIRR terminal beneath Grand Central Terminal.

The ESA concourse project spans 10 city blocks, from 40th St. to 50th St. and the rest of the project consists of tunnels, caverns, rail yards and ventilation buildings. Once finished, it is expected to reduce commute times for thousands of riders from Long Island and Queens to the east side of Manhattan.

Arora's role included the fire protection design at Grand Central Terminal, its tunnels, and other highly sensitive areas.

SCOPE OF WORK INCLUDED:

+ Wet-pipe sprinklers systems (100 zones)
+ Manual standpipe systems (500 outlets, 100,000 feet of linear piping)
+ Clean agent fire extinguishing systems (80 systems)
+ Code consulting and analysis
+ Egress analyses
+ Utility coordination

Arora also provided onsite design staffing to support the ESA project.

MTA METRO-NORTH RAILROAD

Water Conveyance Utility Upgrades

Grand Central Terminal, New York, NY

PROJECT DETAILS

CLIENT
MTA Metro-North Railroad
Harry Hall, Jr., Senior Engineer
420 Lexington Avenue
New York, NY 10017
harry.hall@mnr.org
212-499-4469

CONSTRUCTION
$38,000,000

PROJECT START
2014

PROJECT COMPLETION
2017

HIGHLIGHTS

+ Upgrades to historic Grand Central Terminal's fire standpipe
+ Interfaced existing system infrastructure with new detection systems
+ Provided code consulting to ensure compliance with applicable standards

At the request of the MTA, Arora Engineers, Inc. (Arora) updated and repackaged the previously designed upgrades to Grand Central Terminal's existing fire standpipe system. In 2010, after approximately 3 years of design work, Arora and Louis Berger Group issued 100% design documents for the upgrade of the facilities water services and fire standpipe systems. In 2014, it was deemed by the client that the fire standpipe portion of the project would be more manageable from a budgetary, bidding and construction standpoint if it was broken into multiple packages.

SCOPE OF WORK INCLUDED:

Under this project, Arora reviewed the existing documentation, previously developed by Arora in 2010, and separated the existing design package into multiple bid packages. The specific design tasks included:

+ Review of existing design package.
+ Perform site survey to verify existing conditions and specific design issues.
+ Perform hydraulic analysis based on new design criteria.
+ Analyze primary and back-up fire pump sequence of operation.
+ Determine package delineations with respect to cost, constructability and phasing.
+ Revise system design in accordance with package delineations and develop temporary work scope to ensure continued functionality of entire systems during phased construction.
+ Present project scope of work to Grand Central Terminal's Fire Safety Department and the facility's Operations and Maintenance staff.
+ Coordinate with facility fire alarm vendor for expansion of existing system.
+ Develop revised cost estimates.
+ Develop estimated construction schedules.

Due to the size of the facility, this project required a significant amount of time to understand the systems' architecture and how best to divide the design package while minimizing downtime and temporary fixes to ensure continuous operations. This required an extensive review of the existing design documents and multiple site surveys. Through extensive research and meaningful interactions with facility staff the design re-package met the project goals.

MTA NEW YORK CITY TRANSIT

7 Line Extension Fire Alarm Design

New York, NY

PROJECT DETAILS

CLIENT
SimplexGrinnell
Ron Roemer
Contract Account Executive ESSR
519 8th Avenue, 17th Floor
New York, NY 10018
rroemer@simplexgrinnell.com
212-372-4200

CONSTRUCTION
$2.4 Billion

PROJECT START
2011

PROJECT COMPLETION
2015

HIGHLIGHTS
+ Analysis and Code Review
+ Review of design drawings and specs
+ Developed shop drawings and documentation
+ Assisted with O&M manuals

Arora assisted in the construction phase of the MTA 7 Line Extension project by providing expert fire alarm design services to the project's electrical and fire alarm contractors. The 7 Line Extension project extends the existing line approximately 1.5 miles from the Port Authority Bus Terminal and includes the construction of a new station located at 34th St. and 11th Ave as well as multiple ventilation buildings along the track extension.

The project required the design of multiple networked fire alarm panels to service each building and two way communication with the MTA operations command center through the existing SCADA network. The fire alarm systems provided smoke and heat detection in mission critical areas such as communication and electrical rooms as well as visual notification and voice evacuation throughout the public areas. The systems were designed in accordance with NFPA-72, NFPA-130 and additional requirements as detailed in the bid documents.

SCOPE OF WORK INCLUDED:

+ Review project design drawings and specifications
+ Code analysis
+ Develop shop drawings and documentation
+ Assistance in developing operational and maintenance manuals including sequence of operations and calculations
+ Assist in the selection of devices and equipment
+ Perform battery calculations
+ Attend construction coordination meetings
+ Attend design review meetings and incorporate comments

This project required a significant effort to maintain a coordinated design with multiple disciplines as the project continued to evolve as well as maintaining effective communication through the hierarchal structure of the project team as well as the client. In collaboration with the construction team, Arora successfully developed coordinated construction documentation based on the projects bid drawings and specifications.

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

PATH Harrison Car Maintenance Facility

Harrison, NJ

PROJECT DETAILS

CLIENT
HNTB
Raymond Sandiford, Vice President
5910 West Plano Parkway
Suite 200
Plano, TX 75093
rsandiford@HNTB.com
917-438-0921

CONSTRUCTION
TBD

PROJECT START
2015

PROJECT COMPLETION
2019

HIGHLIGHTS

+ Task order under Superstorm Sandy Repair & Resiliency Program
+ Flood protection for PATH vehicle maintenance facility
+ Electrical engineering for flood protection wall

Arora was tasked with electrical design for the installation of a permanent flood protection wall and deployable flood barriers for the PATH – Harrison Car Maintenance Facility (HCMF) and associated track areas. The flood protection wall is to be constructed between PATH Track "M" and the north bank of the Passaic River from a point approximately 600 feet east of the AMTRAK "Saw-Tooth" Bridge to the Conrail Overpass east of PATH Substation # 8. The permanent flood protection wall along the Passaic River will include one approximately 35 feet wide opening with removable flood barriers that will permit access for utility trucks to the strip of land between the permanent flood protection wall and the Passaic River.

During Hurricane Sandy, rail tracks G, H and M, Substation 8, and the Kearny West Signal Bungalow located along the north bank of Passaic River east of the HCMF were flooded by the storm surge. The storm surge flooding caused significant service outages and damage to the rail tracks, electrical equipment and signal equipment. Based on 2013 FEMA flood hazard maps and the inundation during Hurricane Sandy, this area is vulnerable to Passaic River and Hackensack River surge flooding. In 2013, a 2700-ft (+) HESCO floodwall was constructed along PATH tracks east of the HCMF. After construction of temporary HESCO flood wall, a Stage I Study was conducted in 2014 as part of the FTA program to support PATH's resiliency projects in order to address current and future vulnerabilities to the PATH system due to reoccurrence of major storms, such as Hurricane Sandy.

SCOPE OF WORK INCLUDED:

Arora prepared the electrical design and drawings for systems associated with the permanent flood protection wall for the HCMF. The electrical systems included power for the pumping facilities and associated systems. Arora provided line diagrams, specifications, equipment/panel schedules, and power plans. Arora will also provide construction administration services.

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

PATH Laser Intrusion Detection System (LIDS) Upgrades

Various Locations, NY and NJ

PROJECT DETAILS

CLIENT
Port Authority of New York and New Jersey
Vijay Revankar, Principal Engineer
Two Gateway Center, 16th Fl SW
Newark, NJ 07102
vrevankar@panynj.gov
973-792-4455

CONSTRUCTION
$1,800,000

PROJECT START
2007

PROJECT COMPLETION
2008

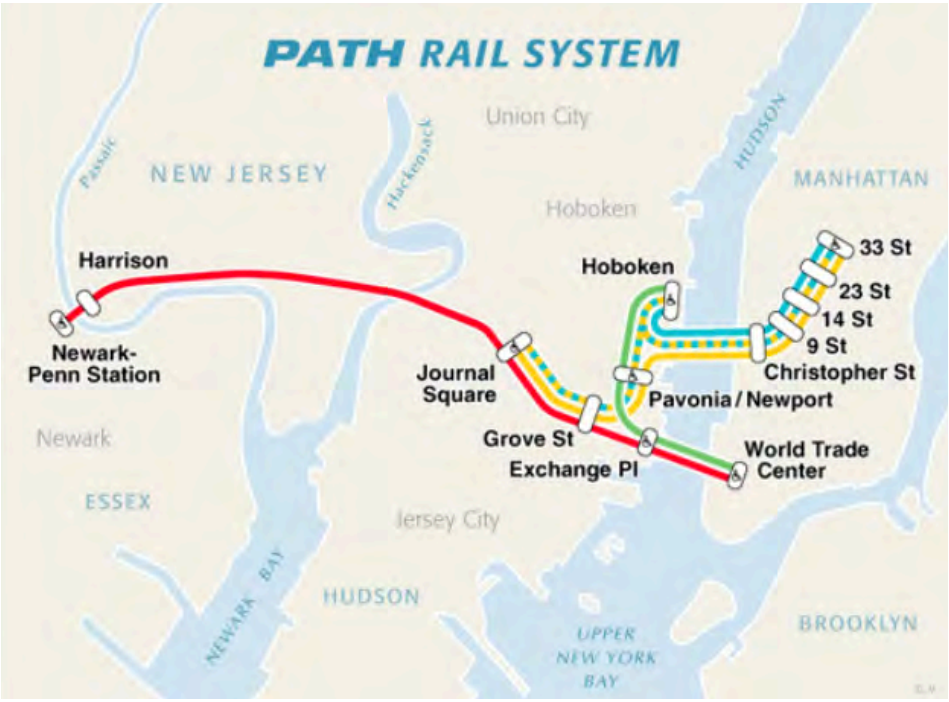
HIGHLIGHTS

+ Designed Laser Intrusion Detection Systems (LIDS) for three PATH stations
+ Upgraded CCTV systems interfaced with LIDS and existing access control systems

Arora performed electronic design for the laser intrusion detection system and CCTV upgrades at the following PATH stations:

+ Christopher Street
+ Pavonia/Newport
+ Hoboken

Arora's Team prepared design documents that reflected access control, intrusion alarm, and CCTV design that is deemed security sensitive information (SSI) by the Port Authority of New York and New Jersey. The design package included station plans, riser diagrams, mounting details, connections details and system integration plans.



SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

Control Center

Philadelphia, PA

PROJECT DETAILS

CLIENT
Southeastern Pennsylvania Transportation Authority
Robert Tangi
1234 Market Street
Philadelphia, PA 19107
rtangi@septa.org
215-580-7094

CONSTRUCTION
$2,000,000

PROJECT START
2002

PROJECT COMPLETION
2003

HIGHLIGHTS

- Mechanical and fire protection systems design for a control center at SEPTA's headquarters
- Use of redundant systems and creation of a secondary off-site control center to ensure continued operations
- Project completed on time and within budget to client's satisfaction

Arora provided design and construction phase services for the HVAC, plumbing and fire protection systems for SEPTA's new Control Center. This center is integral to the operations of the transit authority's many rail, trolley, subway, and bus lines.

Located in SEPTA's headquarter building at 1234 Market Street, Arora was involved in the mechanical and plumbing work necessary to fit-out the 19th Floor for the center. The nature of the building's existing structural system necessitated extensive structural coordination. Much of the ductwork had to be run through openings in existing structural steel. The HVAC design was optimized to use existing openings where possible, and minimize new openings.

SCOPE OF WORK INCLUDED:

The design criteria required fully redundant computer room air conditioning systems, including new air cooled chillers, pumps, and computer room units in order to support the new video projection screen based in centralized traffic control system panels also installed on this project. The project included an extensive telecommunications room. In addition, an electric boiler was installed to provide hot water heat for perimeter heating and humidity control (reheat) during periods when hot water is unavailable from the base building heating system.

An off-site emergency backup control center, located in the concourse of the Market East Station, was also created. Computer room air conditioning units and a pair of air cooled chillers were installed track level in the Market East Tunnel.

Other services included site visits to assess the existing conditions and preparation of design documents, including specifications and CAD drawings.

Rethinking Infrastructure®

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