

Program Management and Construction Management Qualifications

CONTACT:

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Dear Prospective Client,

Since 1986 Arora Engineers, Inc. has worked at nearly 100 airports across the country from California, to Maine, to Florida and has grown into an Aviation centric firm. Arora's aviation expertise includes a range of services for the complete project life cycle. Our Geospatial team participates in Data Management for Airports and aviation planning projects ranging from master plans and eALP's to creating data standards and complete enterprise GIS programs.

Our Program and Construction Management (PM/CM) group experience ranges from serving as airport 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.

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

Outside of the terminal, Arora's Airfield Electrical group has designed over a billion dollars of airfield projects. Our capabilities in this area range from airfield lighting, signage, and NAVAIDS, to field lighting vaults and Runway Incursion Mitigation (RIM).

We look forward to working with you and exceeding your expectations for quality and service.

Sincerely,

Manik Arora

President and CEO

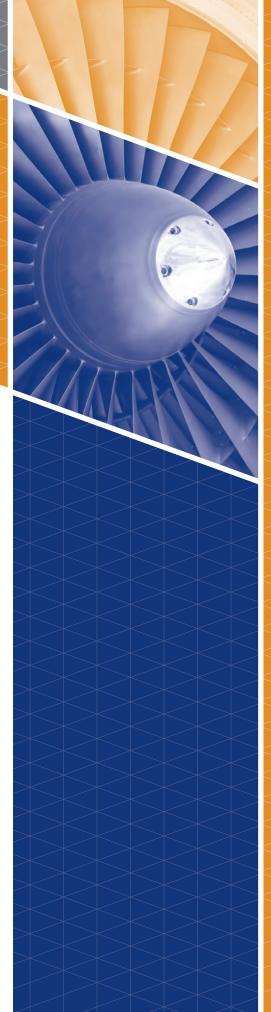
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Management
& Construction
Management
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+ Construction
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Arora's Program Management/Construction Management team has the know-how and capability to provide resident engineer services, scheduling and inspection services for all types of building projects. Our staff works 24/7 and can support daytime or nighttime shifts.

Key Services

PROGRAM MANAGEMENT

- + Program Planning and Management
- + Master Scheduling/Schedule Analysis
- + Master Budget Development
- + Design Management
- + Cost Management

CONSTRUCTION MANAGEMENT

- + Pre-Construction Phase
- + Master Systems Integration (MSI)
- + Project administration
- + Daily inspection
- + Project documentation
- + Submittal review/tenant permit reviews
- + Design support

Representative Clients

- + Philadelphia International Airport
- + Port Authority of NY and NJ
- + Boston Logan International Airport

- + Delivery and Contracting Strategies
- + Cost Estimating
- + Change Order Management
- + Value Engineering
- + Facility Condition/Life Cycle Assessments
- + Constructability reviews
- + Construction & Delivery Phase
- + Value engineering
- + Reports
- + Commissioning Results
- + Data Collection Information
- + Atlantic City International Airport
- + Lehigh Valley International Airport
- + Washington Metropolitan Area Transit Authority













Client

Five Star Electric Corp. Allen Hirsch 350 West 31st St., 6th Floor New York, NY, 10001 AHirsch@fivestartelectric.net 718-641-5000 ext. 48003

Construction

\$1,200,000,000

Project Start

2018

Project Completion

2022

Highlights

- + Providing TSE Expert construction phase services
- + Verifying all airport systems and integrations are tested and function in accordance with design phase documentation
- Assisting in all testing, commissioning and operationalization of airport systems

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

EWR TERMINAL A REDEVELOPMENT PROGRAM - TECHNICAL SUPPORT EXPERT **SERVICES**

Newark International Airport, Newark, NJ

The Port Authority of New York and New Jersey (PANYNJ) is currently undertaking the Newark Liberty International Airport (EWR) Terminal A Redevelopment Program. The new Terminal One will replace Terminal A and is estimated to be three (3) stories high and approximately 1.2 million square feet (SF) in area. Terminal One will include a centralized arrivals/departures hub, passenger and baggage processing systems, and 3 radiating concourses to service thirty-three (33) aircraft gates. Arora Engineers, Inc. (Arora) is providing Master Systems Integrator (MSI) and Technical Systems Expert (TSE) services under the electrical contractor Five Star Electric.

Scope of work included:

Arora is providing Technical Systems Expert Services (TSE) to the Functional Systems Expert (FSE) to guide the FSE through construction phase services for the successful integration of airport systems. Key activities include:

- + Reviewing RFC drawings, and Identifying Performance Criteria vs. Out of Scope Items (Assessment)
- + Reviewing Vendor Shop Drawings, and Coordinating Vendor Interfaces and Shop Drawings with one another
- + Coordinating and Scheduling Third-Party Testing Agencies
- + Developing Special Systems Delivery and Construction Schedule
- + Developing Testing and Commissioning Plan(s)
- + Developing Tracking Mechanisms for Systems Tests and Requests
- + Reviewing Disparate Systems Product Data and Shop Drawing Submittals,



Photo Credit: Grimshaw Architects

PORT AUTHORITY OF NEW YORK AND NEW JERSEY

EWR TERMINAL A REDEVELOPMENT PROGRAM -**TECHNICAL SUPPORT EXPERT SERVICES**

Newark International Airport, Newark, NJ

Reviewing and Consolidating Shop Drawings

+ Generating Integration Shop Drawings containing Detailed Schematics, Data, Programming and Software, and Process Information for the Integrations between Access Control, CCTV and Fire Alarm Systems

Together with FSE, Arora is verifying that all airport systems and integrations are tested and function in accordance with the design phase documentation, and is assisting in all testing, commissioning and operationalizing of airport systems.

Client

Michael Baker International Andre Szumvlo, PE **Project Manager** International Plaza I Suite 200 Philadelphia, PA 19153 aszumylo@mbakercorp.com 215-937-5449

Construction

\$3,400,000

Project Start

2016

Project Completion

2017

Highlights

- + Provided overall project management support during the planning, design, construction, and closeout for the Gate V01 Upgrades.
- + Coordinated the design review & delivery process.
- + Prepared progress charts. construction schedules, and reports.
- + Provided a project closeout.

CITY OF PHILADELPHIA, DIVISION OF AVIATION

PHL ON-CALL PM/CM SERVICES - GATE V01 **UPGRADES**

Philadelphia International Airport (PHL), Philadelphia, PA

As part of an on-call project management/construction management contract with Michael Baker International, Arora Engineers, Inc. (Arora) provided overall project management support to the Engineering Manager during the planning, design, construction, and closeout for the Gate V01 Upgrades at the Philadelphia International Airport (PHL).

Project upgrades included demolition and removal of existing gate/barrier equipment, hardware, and temporary Jersey barrier mounted fencing. The project also included the provision of new vehicle gates/barriers for traffic control, reconfiguration and expansion of roadways and parking areas to accommodate larger vehicles, construction of a new Operations Booth and Security Booth, installation of new lighting poles and fixtures throughout the work site, and installation of new security system and CCTV to control and monitor the new gates/barriers and booths. Work was done in phases to minimize impact to gate operations. The phasing plan was prepared to allow only one Gate V01 lane to be shut down for new upgrades at a time, while allowing vehicles to be screened and access through another lane.

Scope of work included:

Arora's scope of work focused on reviewing, inspecting, and coordinating the Gate V01 Upgrades with the Division of Aviation (DOA). The team's tasks included:

- + Providing guidance to the consulting engineer regarding design and implementation characteristics respective to the DOA's requirements.
- + Coordinating to verify and validate, through design review and construction review, that the DOA's requirements and expectations were being met.
- + Coordinating the design review & delivery process with DOA Engineering, IT, and other departments.



CITY OF PHILADELPHIA, **DIVISION OF AVIATION**

PHL ON-CALL PM/CM **SERVICES - GATE V01 UPGRADES**

Philadelphia International Airport (PHL), Philadelphia, PA

- + Providing support during the project bid opening, evaluation, and procurement process.
- + Coordinating with the City of Philadelphia, Tinicum Township, etc.
- + Interfacing with different departments at PHL, including Security, Engineering, CBP, TSA, and construction groups.
- + Reviewing shop drawings to ensure compliance with project specifications and the DOA's security requirements.
- + Conducting project coordination meetings.
- + Preparing progress charts, construction schedules, and reports.
- + Monthly billing reviews.
- + Testing and commencing systems as a PHL representative.
- + Generating all testing and certification paperwork to be given to the DOA.
- + Measuring the quantities of work and certifying estimates and payments to the contractors.
- + Generating weekly status reports.
- + Providing documentation for payment requisitions.
- + Collecting and validating as-built drawings from the contractor.
- + Providing a project closeout.



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

Construction

N/A

Project Start

2019

Project Completion

2020

Highlights

- + Arora will be 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 **BRIDGES & TUNNELS**

ROBERT F. KENNEDY (RFK)/ BW BRIDGE **INSPECTOR**

New York, NY

Arora Engineers, Inc. (Arora) serving as a subconsultant to WSP, was selected as an experienced inspector at Robert F. Kennedy (RFK) and/or Bronx-Whitestone bridges for the Metropolitan Transportation Authority (MTA) Triborough Bridge and Tunnel Authorly (TBTA). Arora shall provide construction quality assurance and oversight inspection staff support for this project when directed by WSP.

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, keeping contract records, review of shop drawings and submittals, and performing oversight of the testing of materials as assigned by WSP.



Client

GFP (Gannett Fleming/ Parsons JV) Brad Mason, P.E., P.M.P. Program Manager 100 M St SE, 9th Floor Washington, DC 20003 bmason@gfnet.com 202.969.3164

Construction

N/A

Project Start

2017

Project Completion

2021

Highlights

- + Provided support for site surveys, scope development, and future contract generation for WMATA's Yard 2 project.
- + Collected scope requirements, defined scope, and identified stakeholders.
- Provided administrative and technical support activities in the construction management field office.
- + Prepared cost estimates and analyses.
- + Developed pre-negotiation positions.
- Supported contract negotiations.

WASHINGTON METROPOLITAN AREA TRANSIT **AUTHORITY**

A/E SERVICE STAFF AUGMENTATION FOR YARD 2 PROJECT

Washington, D.C. Metropolitan Area

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.

The WMATA is currently working on a multi-year program for the rehabilitation of several rail yard facilities. Arora provided A/E service staff augmentation for the Yard 2 project. This included providing support to WMATA for 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.

Arora recently provided staff augmentation for contract support services, specifically providing a Project Controls Specialist and a Construction Manager.

Scope of work included:

Arora's Project Controls Specialist provided the following:

- + Worked with the contract support group. + Developed pre-negotiation positions.
- + Prepared cost estimates.
- + Performed cost analyses.
- + Reviewed claims.
- + Supported contract negotiations.

Arora's Construction Manager scope of work:

- + Maintained full familiarity with plans, specifications, construction schedules, and contractor's plans on assigned contracts, Adjacent Construction Project Manual, JDAC Procedures, and current safety regulations relative to assigned projects to be knowledgeable of the contractor's obligations and Project Manager's responsibilities.
- + Disseminated information to office and field staff and internal stakeholder offices as required to keep all pertinent WMATA personnel accurately informed of relevant matters.
- + Established and maintained job record files for assigned projects per instructions contained in the Project Implementation Manual.
- + Reviewed contractor's Critical Path Method or bar chart progress schedules as applicable, and maintained current, marked-up copies of such schedules.
- + Collected scope requirements, defined scope, and identified stakeholders.
- + Participated in engineering package reviews during the select, define, and execute phases of projects and provided constructive input to the design team.
- + Provided administrative and technical support activities in the construction management field office.
- + Ensured work was performed per plans and specifications via coordination with Quality Assurance (QA).
- + Performed various administrative office functions and work under the direction of the Project Manager, who reviewed the work based on the daily informal contacts, reports, and conferences

Client

Lehigh Northampton Airport Authority Ryan Meyer Director of Planning & **Programming** 3311 Airport Road Allentown, PA 18109 rmeyer@Inaa.com 610-231-5230

Construction

\$6,000,000

Project Start

2015

Project Completion

2017

Highlights

- + Assisted with Airport obtaining \$2.5MM PennDOT grant.
- + Stakeholder Coordination
- + MEP Design
- + Roadway Improvements
- + Rental Car Maintenance **Building Demolition**
- + Terminal Expansion
- + Rental Car Consolidation
- + Construction Safety and Phasing
- + Full time On-Site Construction Management

LEHIGH – NORTHAMPTON AIRPORT AUTHORITY (LNAA)

MULTIMODAL GROUND TRANSPORTATION HUB

Lehigh Valley International Airport (ABE), Allentown, PA

In August 2017, the Lehigh Valley International Airport (ABE) opened its new Multimodal Ground Transportation Hub. Funding for this project included a \$1.75 million dollar grant from the Multi-modal Transportation Fund through the PennDOT Bureau of Aviation. The new facility provides a modern and convenient location for regional bus transportation companies (Lanta and Transbridge) and improves on previous operational deficiencies for the existing rental car operations.

The completed facility improves the walking distances to the rental cars from the terminal by 700 feet, provides adequate weather protection to the traveling customer, eliminates vehicle conflict points, improved area lighting, signage and wayfinding, and nearly doubles the amount of taxi stands and designated areas for bus service.

Scope of work included:

The project entailed the demolition of the existing fire house/rental car maintenance facility (Building 10) and construction/erection of a new multimodal ground transportation hub within the footprint of the existing rental car lot. Arora provided overall program and construction management services including professional engineering services for the mechanical, electrical, plumbing, fire alarm/fire protection and special systems.

Arora utilized teaming partners for the architectural, civil, structural, HAZMAT and regulatory aspects of this project. The construction team managed a fast-tracked construction schedule and completed the facility on time and within the allocated program budget.

Arora also provided full time, on site construction management services which ensured that the project remained on schedule and within budget.



Client

Lehigh Northampton Airport Authority Thomas Stoudt Lehigh Valley International Airport Director of Operations & Safety 3311 Airport Road Allentown, PA 18109-3040 tstoudt@lnaa.com (610) 266-6001

Construction

\$80,000,000

Project Start

2016

Project Completion

2022

Highlights

+ Multi-Year FAA Funding

LEHIGH NORTHAMPTON AIRPORT AUTHORITY

LNAA TASK 21 – REHABILITATION OF RUNWAY 6-24

Lehigh Valley International Airport, Allentown, PA

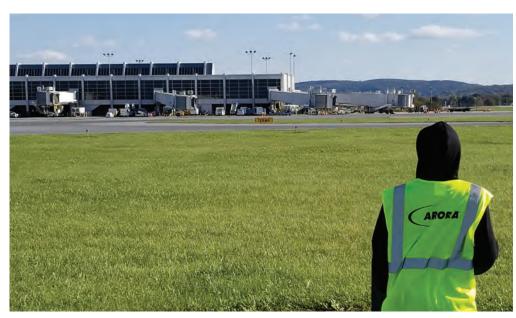
Arora Engineers, Inc. (Arora), serving as the Prime Consultant, was selected to provide On-Call Planning, Architectural, and Engineering services for the Lehigh-Northampton Airport Authority (LNAA). Under this contract, Arora was issued a Task for Professional Engineering and Construction Phase services for the Rehabilitation of Runway 6-24 at Lehigh Valley International Airport (ABE). Arora ensured that the Staging and Phasing Plan for the project minimized impacts to flight operations at the airport and to adjacent construction projects.

Scope of work included:

Arora began by conducting a field investigation within the anticipated limit of work and existing electrical vault to review and record site and equipment conditions. Existing airfield electrical equipment, including airfield lighting infrastructure, signage, manhole/handholes, constant current regulators, Precision Approach Path Indicators (PAPI), Airfield lighting and Control System (ALCS), and underground distribution systems were evaluated to confirm equipment and circuits affected by the project.

The Arora team then prepared detailed drawings and specifications in compliance with current FAA Advisory Circulars and design standards. Specific Design elements are as follows:

- + Runway Edge Lights Design and layout of the removal and replacement of existing elevated / in-pavement lights and associated infrastructure (base cans, series lighting cable, isolation transformers, etc.) to finished grade. New lights are LED type with isolation transformers adequately sized to the VA requirements of the fixture. Fixture spacing and lens color was designed to comply with FAA AC 150/5340-30.
- + Runway Centerline Design and layout of the removal and replacement of existing runway centerline lights on existing bases. Base can and conduit were replaced in areas where pavement was reconstructed. New lights are LED type

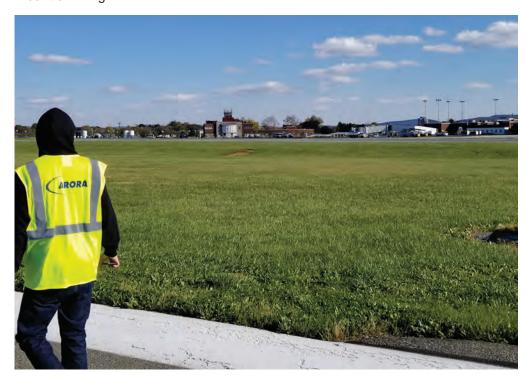


LEHIGH NORTHAMPTON AIRPORT AUTHORITY

LNAA TASK 21 -REHABILITATION OF RUNWAY 6-24

Lehigh Valley International Airport, Allentown, PA

- with isolation transformers adequately sized to the VA requirements of the fixture. Fixture spacing and lens color was designed to comply with FAA AC 150/5340-30.
- + Taxiway Edge Lights -The existing taxiway edge lights and associated circuits located within the work limits were removed and replaced, including adjustment of the edge light assembly to finished grade with new LED type fixtures for areas requiring paved shoulders. The isolation transformer and series lighting cable were removed and replaced.
- + Airfield Signage Services included design and layout of the removal of existing airfield guidance sign, transformers, base cans, interconnecting conduit and associated equipment, and installation of new LED type airfield guidance sign, transformers, base cans, and interconnecting conduit within project limits. Signage was reviewed and verified for conformance to the FAA AC 5340-18 and Engineering Brief 89.
- + Underground Electrical and Communications Distribution Systems -Responsibilities included design and layout of modified underground distribution for airfield lighting systems, including manholes, handholes, ductbank, conduit and associated cabling.
- + Lightning Protection (counterpoise) Design for Underground Cables Design and layout of lightning protection for airfield lighting circuits in accordance with FAA AC 150-5340-30 for base cans, conduit and ductbank installed.
- + Airfield Lighting Vault and Control System Modifications Arora evaluated the loads of the circuits to ensure the constant current regulators powering the airfield lighting fixtures and signage were operating within the recommended design loads.
- + Pavement Surface Sensors Provided design and layout of removal and replacement of pavement surface sensors as necessary within pavement limits.
- + Precision Approach Path Indicators (PAPI) Provided design and layout of the removal and replacement of the existing Precision Approach Path Indicators (PAPI) for Runway 6 and Runway 24 with new LED type PAPI units including new power/ control wiring.



LEHIGH NORTHAMPTON AIRPORT AUTHORITY

LNAA TASK 21 -**REHABILITATION OF RUNWAY 6-24**

Lehigh Valley International Airport, Allentown, PA

+ FAA Equipment Coordination - Coordinated with final pavement grades for modification to existing ILS systems and associated underground distribution. Arora facilitated FAA coordination and reimbursable agreements.

Upon completion and acceptance of construction documents for the rehabilitation of Runway 6-24, Arora as then responsible for construction management and inspection services associated with the related runway intersection rehabilitation and safety area restoration project. Arora's construction phase support services included overseeing the relocation of Runway 6 and Runway 24 vehicle service road relocation, earthwork and regrading, drainage structure/pip installation, adjustment of junction structures, stormwater management installation and liner repairs, pavement markings, temporary stabilization and permanent turfing, sinkhole mitigation and repair, and runway intersection rehabilitation. To ensure the contractor's installation conformed to FAA requirements, the Arora team provided the following efforts:

- + Construction Management Overall coordination of construction activities, coordination with the LNAA, FAA Harrisburg Airports District Office (HADO), airlines, tenants, local regulatory agencies and all other project stakeholders from the start of construction through project closeout.
- + Resident Engineering/Inspection Full-time Resident Inspector to inspect and monitor the Contractor's work on a nightly basis for compliance with the Contract Documents.
- + Construction Administration Construction Administration efforts include those for airfield electrical, electrical engineering and overall construction administration, services included:
 - + Arora and appropriate project designee's attended progress meetings on a weekly basis including pre-construction meetings.
 - + Specialty checklist inspections were performed as needed to determine conformity with the contract plans, specifications, FAA standards, advisory circulars, and local codes having jurisdiction. Checklist inspections were completed for major construction milestones including Substantial, Pre-final and Final Inspections prior to project closeout.
 - + Arora reviewed shop drawing submittals from the Contractor and maintained a submittal log to track the status.
 - + Arora reviewed and responded to clarification requests from the Contractor. An internal log was maintained to track the status of each RFI.
 - + Preparation of design changes required by differing field conditions and unforeseen items.



Client

City of Philadelphia Division of Aviation Imad Haq, PE Airport Engineering Manager Capital Development Group Philadelphia International Airport 1 International Plaza, Suite 200 Philadelphia, PA 19113 imad.haq@phl.org 215-937-7878

Construction

N/A

Project Start

2019

Project Completion

2019

Highlights

- + Arora provided Construction Management/ Project Management inspection support services.
- Arora conducted a field investigation within the anticipated limit of work, including the existing electrical vault, to review and record site and equipment conditions.
- Reviewed shop drawing submittals from the Contractor and maintained a submittal log to track the status of each submittal.

CITY OF PHILADELPHIA DIVISION OF AVIATION

EAST AIRFIELD REHABILITATION **INSPECTION SUPPORT**

Philadelphia International Airport, Philadelphia, PA

Arora Engineers, Inc. (Arora) working as a subconsultant to Johnson, Mirmiran & Thompson (JMT) provided Construction Management/ Project Management inspection support services for the North Apron Reconstruction and Rehabilitation of Taxiways D, E and K at Philadelphia International Airport (PHL). This project is a task order under the City of Philadelphia Department of Aviation On-Call Civil Engineering project for PHL and Philadelphia Northeast Airport (PNE) to aid with planning, design and construction inspection services in the discipline of civil engineering at the Airport on an as needed basis.

The East Airfield rehabilitation project will receive the 2021 Philadelphia Aviation Project Award from the March of Dimes. The honor will be presented at the organization's annual Transportation, Building and Construction awards ceremony in November of 2021.

Scope of work included:

Arora provided CM/PM inspection support services for the North Apron Reconstruction and Rehabilitation of Taxiways D, E and K at Philadelphia International Airport. Scope of services included:

Field Investigations & Equipment Analysis - Arora conducted a field investigation within the anticipated limit of work, including the existing electrical vault, to review and record site and equipment conditions. Existing airfield electrical equipment, including airfield lighting infrastructure, signage, manhole/handholes, constant current regulators, Airfield lighting and Control Monitoring System (ALCMS), and underground distribution systems, were evaluated to confirm equipment and circuits affected by the project. Ideally the field investigation was scheduled in coordination

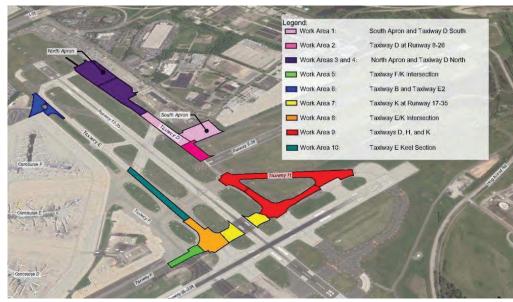


Photo provided by Philadelphia International Airport

CITY OF PHILADELPHIA **DIVISION OF AVIATION**

EAST AIRFIELD REHABILITATION **INSPECTION SUPPORT**

Philadelphia International Airport, Philadelphia, PA

with the project initiation meeting. The following was required to verify circuitry:

- + Manhole survey to verify circuit routing of underground distribution.
- + Toggling on/off of circuits within project limits to confirm circuit connections for lights and signage.
- + Verify utilities located within area by circuit tracing.

Shop Drawing/Submittal Review - Arora reviewed shop drawing submittals from the Contractor and maintained a submittal log to track the status of each submittal. Arora ensured the timely processing of submittals were a high priority.

Responses to Requests for Information/ Construction Clarifications (RFI's) - Arora reviewed and responded to clarification requests from PHL and the Construction Manager. An internal log tracked the status of each RFI and ensured each one was completed in a timely manner.

As built drawings - As-built drawings were completed of "as-built" conditions from the Contractor furnished redline prints regarding electrical installations. A hard copy and electronic version were submitted to JMT at the conclusion of construction.



Client

City of Philadelphia Division of Aviation Jim Jones, PE Proiect Manager International Plaza II, Suite 540 Philadelphia, PA 19113 james_t.jones@phl.org 215-937-6229

Construction

\$4,000,000

Project Start

2014

Project Completion

2015

Highlights

- + Project provides more accurate information to the traveling public
- + Prepared bid documents
- Managed overall project
- + Coordinated with PHL Operations, IT, properties, Airlines, and tenants

CITY OF PHILADELPHIA, DIVISION OF AVIATION

MULTI-USER FLIGHT INFORMATION DISPLAY (MUFID) UPGRADE

Philadelphia International Airport, Philadelphia, PA

Aora provided planning, managed the design process, and provided project and construction management for this multi-prime contract project to upgrade MUFIDS throughout Terminal A-East, A- West and F. The main elements of the contract included demolition of existing MUFIDS enclosures and construction/installation of both new and temporary enclosures, and respective structure support assemblies within Terminal A-West. This included MUFIDS banks in the ticket lobby and at gate A-14. A total of 27 small and large MUFIDS banks were ungraded along with 13 gate podium monitors including mini MACs and new LED monitors.

Scope of work included:

Arora prepared project bid documents for the city procurement process. We were also responsible for managing the overall project. Responsibilities included:

- + Support contractor procurement process, project budget and schedule;
- + Review and process shop drawings;
- + Coordination of drawings for installation suitability;
- + Submittals;
- + RFIs;

- + Field directives:
- + Letters of correspondence;
- + Estimates for payments;
- + Pay applications;
- + Change orders; and
- Utilize construction management software.

Arora was responsible for the coordination of over 30 MUFIDS location upgrades around PHL terminals with PHL Operations, IT, Properties, Airlines, and Tenant.



Client

Massachusetts Port Authority-Logan International Airport Luciana Burdi, AIA **Deputy Director of Capital** Programs and Env Affair One Harborside Drive Suite 200S East Boston, MA 02128 LBurdi@massport.com 617-568-5902

Construction

\$90,000,000 (Est.)

Project Start

2014

Project Completion

2018

Highlights

- + Modernization to accommodate 3 new A380 aircraft gates
- + Sustainable design to help achieve LEED Gold
- + Project using LEAN **Planning**
- + On-Site Construction Management

MASSACHUSETTS PORT AUTHORITY

TERMINAL E ENHANCEMENTS

Boston Logan International Airport, Boston, MA

Arora provided full MEP, fire/life safety, and special systems engineering as well as on-site construction management services for the addition of approximately 95,000 SF within Terminal E as well as the modernization of existing areas of the terminal. The completed renovation provides three new A380 Gates with dual passenger boarding bridges for expedited two-level boarding, automated aircraft docking guidance systems (ADGS) with an integrated ramp information display system (RIDS), full capacity 400Hz and pre-conditioned air ground support systems, addition of departure level holding rooms and arrivals level de-boarding areas, new concession spaces, and other support spaces. The existing terminal modifications include modernization upgrades to the GSE equipment at the 10 existing gates to accommodate an expanded aircraft fleet mix and optimized operations with the addition of ADGS and RIDS, a security checkpoint expansion as well as modernization of the arrivals area. The project has been charged with including design for technology expected to echo the spirit of innovation in the City of Boston and surrounding areas...

Scope of work included:

In addition to our complete systems design services Arora provided on-site construction management services under the design contract to coordinate with the separate Construction Management at Risk (CM@R) contract and installation contractors.

Mechanical systems included new HVAC systems and modifications to the existing HVAC systems to accommodate the new loads. To serve the cooling and heating needs of the building addition chilled and high temperature hot water were supplied by the existing central plant. A new mechanical pump room was installed in the mechanical crawl space and the existing 10-inch CHW and 6-inch HTHW taps provided were extended. The new pump room was equipped with HTHW to GHW heat exchangers for the pre-heat coils and HTHW to HW heat exchangers were



Rendering courtesy of AECOM

MASSACHUSETTS PORT AUTHORITY

TERMINAL E ENHANCEMENTS

Boston Logan International Airport, Boston, MA

provided for the heating water system. The pump room will also be provided with GHW and HW circulation pumps controlled by variable frequency drives (VFDs), in addition to the heating system pumps CHW supply pumps equipped with VFDs will also be provided for serving the cooling loads. The pumps were provided in an N+1 arrangement for redundancy.

Plumbing systems consisted of new rain leaders, multiple new men's and women's restroom groups, and extensions of sanitary, sanitary vent, and domestic water services for future connection by Club level tenants. . The project includes Smart Restroom systems for six new concourse restroom groups. The restrooms will be fully integrated with the existing TRAX system at BOS and includes stall occupancy systems, throughout counters, customer survey tablets, and BLE beacons to interact with TRAX-enabled custodial tablets that will support cleaning alerts/acknowledgements, location reporting, checklist/cleaning status reporting, dashboards for cleaning status, etc.

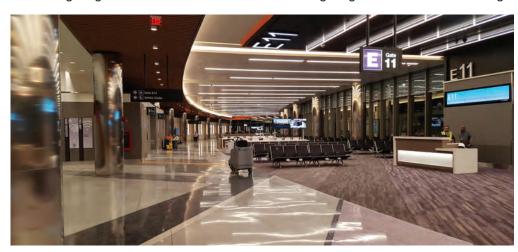
Electrical design consisted of a new substation as well as new electrical rooms, new redundant utility feeds, and all electrical power panels, feeders, and lighting loads.

Special systems engineering services included: public address system, universal cabling distribution system, voice/data network, passenger information systems. RIDS / gate docking systems, master clock, infrastructure for boarding, and infrastructure for tenant spaces.

Fire protection/life safety systems included: sprinkler systems, fire pumps, incoming fire service/available water supply, standpipes, critical asset protection, fire alarms, mass notification systems, smoke management, fire/smoke dampers, passive and active fire/smoke barriers, and egress paths, illumination, and signage.

In order to meet the sustainability goals of MASSPORT and the goal of LEED Gold certification, the HVAC, plumbing and electrical systems were designed with high efficiency equipment. The HVAC system was modeled to use district heating and cooling system that will serve high efficiency air handling equipment. The plumbing systems for the new building addition was designed to minimize the use of domestic water and reduce the energy used for generating domestic hot water.

Low flow plumbing fixtures were used in restrooms to reduce the domestic water usage. Electrical systems employed lighting fixtures such as light emitting diode (LED) and lighting control systems to reduce the energy usage. The lighting control system used day lighting strategies that reduce the output of lighting fixtures if the outdoor lighting is sufficient to maintain the desired lighting levels inside the building.



Client

City of Philadelphia Division of Aviation Imad Haq, PE Airport Engineering Manager Capital Development Group Philadelphia International Airport 1 International Plaza, Suite 200 Philadelphia, PA 19113 imad.haq@phl.org 215-937-7878

Construction

\$300,000,000

Project Start

2007-2008

Project Completion

2015

Highlights

- + Program management
- + Construction management and inspection
- + Project cost estimating and coordination

CITY OF PHILADELPHIA, DIVISION OF AVIATION

TERMINAL D - E EXPANSION AND MODERNIZATION, PHASE I, II, III

Philadelphia International Airport

Arora provided construction management for Phase I, II, & III of the Terminal D-E Expansion and Modernization at the Philadelphia International Airport. The project consisted of a new multi-level connector building between Terminals D and E, a 50,000 SF addition to the Terminal E concourse, and various renovations within the two terminals and the adjacent Thermal Plant. The project included a new 14-lane checkpoint, ticket lobby, in-line baggage system with eight EDS, deployment of 290 new VOIP phones, and the relocation of two main server rooms.

Arora provided onsite inspection, design, and design review services. Tasks entailed construction management (CM) and contractor quality control (C.Q.C.) services to ensure that electrical, plumbing and mechanical construction is being completed in accordance with the requirements of construction documents and applicable codes/ standards on various projects.

Scope of work included:

- + Program management
- + Construction management and inspection
- + Project logistics
- + Cost estimating
- + Project coordination
- + Representation at stakeholder meetings
- + Project close out
- + Assistance in the management of tenant projects



Client

Philadelphia International **Airport** Mr. Imad Haq, PE Airport Engineering Manager Capital Development Group 1 International Plaza Suite 200 Philadelphia, PA 19113 imad.haq@phl.org 215-937-7878

Construction

\$40,000,000

Project Start

2007

Project Completion

2014

Highlights

- + Program management
- + Construction management and inspection
- + Project cost estimating and coordination

CITY OF PHILADELPHIA, DIVISION OF AVIATION

CONSTRUCTION / PROGRAM MANAGEMENT SERVICES

Philadelphia International Airport, Philadelphia, PA

Arora performed construction management for the new Checked Baggage Screening System (CBIS) in Sector 23 and Terminal A-East baggage areas at the Philadelphia International Airport. The project includes a new CBIS in Terminal A-East and an upgrade of the existing CBIS serving the east half of Terminal A-West to comply with the latest TSA standards.

Scope of work included:

Arora services consisted of on-site inspection, design, and design review services. The tasks entailed construction management (CM) and contractor quality control (C.Q.C.) services to ensure that electrical, plumbing and mechanical construction was being completed in accordance with the requirements of construction documents and applicable codes/standards on various projects.

Scope of work included:

- + Program management
- + Construction management and inspection
- + Project logistics
- + Cost estimating
- + Project coordination
- + Representation at stakeholder meetings
- + Project close out
- + Assistance in the management of tenant project



Client

STA Joint Venture C/O STV Incorporated Anthony G. Cracchiolo, P.E. 225 Park Avenue South New York, NY 10003 Anthony.Cracchiolo@stvinc. (212) 777-4400

Construction

\$160,000,000,000

Project Start

2012

Project Completion

2021

Highlights

- + Arora provided Fire/ Life Safety engineering services and Document Control services for the new Moynihan Station Program project.
- + The new Moynihan Train Hall will relieve current station crowding and improve passenger comfort and security.

AMTRAK, MOYNIHAN STATION DEVELOPMENT CORPORATION

MOYNIHAN STATION PROGRAM PROJECT

New York, NY

Arora Engineers, Inc. (Arora) served as a subconsultant to AECOM and Tishman Construction and provided Fire/Life Safety engineering services as well as Document Control services for the new Moynihan Station Program project. The \$1.6 B project transformed the 100-year-old James A. Farley Post Office building into a state-ofthe-art transit hub. The 225,000 SF Moynihan Train Hall nearly doubles the existing Penn Station rail complex's concourse space. The expansion of Amtrak's passenger services into the new Moynihan Train Hall relieves previous station crowding and improves passenger comfort and security.

This project is owned by Amtrak, in partnership with the New York Empire State Development Corporation (ESD) and its subsidiary Moynihan Station Development Corporation (MSDC). The Moynihan Station Program project included enhanced passenger facilities for Amtrak's Northeast Corridor (NEC) and long-distance travelers, including accessibility for passengers with disabilities, all within a new, grand Train Hall.

The project was constructed into two phases. Phase I created the "West End Concourse". The new concourse provides new stairs and elevators to boarding platforms, passenger circulation space and a new entrance across 8th Avenue from Penn Station. Arora provided construction management and controls support for this phase, maintaining document control and shop drawings, construction monitoring, and providing cost estimating support by performing quantity take-offs.



Rendering Courtesy of SOM | Volley

AMTRAK, MOYNIHAN STATION **DEVELOPMENT** CORPORATION

MOYNIHAN STATION PROGRAM PROJECT

New York, NY

Phase II entailed the Moynihan Train Hall, a new, enhanced intercity and commuter passenger boarding concourse for Amtrak and MTA-Long Island Railroad passengers. The Moynihan Train Hall includes a sunlit atrium boarding concourse, a combined ticketing and baggage unit, a new Metropolitan Lounge, a new reserved customer waiting room, casual waiting space features retail and food shops. Arora provided full-time, on-site project controls including the preparation of monthly cost reports for CM services, assembly and update of the project management plan, construction management plan, and financial management plan, as well as preparation of monthly project progress reports and creation of project progress tracking drawings in AutoCAD to demonstrate project development. In addition, Arora performed QAQC of submittals and RFIs, attended design and construction management coordination meetings, and supported the construction field office.

Moynihan Train Hall opened to the public in January, 2021.

Client

City of Philadelphia Division of Aviation Jim Jones, PE Proiect Manager International Plaza II Suite 540 Philadelphia, PA 19113 james_t.jones@phl.org 215-937-6229

Construction

\$750,000,000

Project Start

1998

Project Completion

2004

Highlights

- + 850,000 SF facility with 13 new international gates
- + Arora tasked with project management oversight of special systems construction
- Systems included access control, surveillance, fire protection, terminal announcement, flight information displays, and baggage screening

CITY OF PHILADELPHIA, DIVISION OF AVIATION

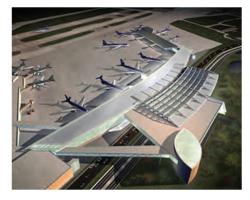
TERMINAL A WEST PROJECT/CONSTRUCTION **MANAGEMENT**

Philadelphia International Airport, Philadelphia, PA

The impressive \$750 million terminal is a four-level, 850,000 SF facility with 13 new international gates, 26,000 SF of concession space, expanded federal inspection facilities, and exciting original artwork. Arora's project responsibilities included oversight and project management for new special systems construction involving security access and surveillance, universal cabling distribution system, fire alarm, specialty hazard systems, terminal announcement control systems (TACS), multiuser flight information display systems (MUFIDS), specialty power distribution systems, baggage information display systems, and home land security.

Scope of work included:

- + CM of supply and return modifications affected by new baggage belt mainline locations
- + CM of HVAC needed to provide optimum temperature for EDS machines as required
- + PLC logic coordination and shutdown of baggage doors based on addressable smoke
- + Coordination with Tinicum, TSA, and DOA SST
- + Access control and intrusion will be designed for all AOA boundary doors in accordance with TSA 49CFR and the DOA SST department
- + Integration of access control and baggage PLC'S start circuit
- + Modifications to existing access control doors affected by location of baggage belt
- + Integration with EDS lockout panel in Sector 23 Control Room
- + Access control back of house and public carousel coordination with baggage PLC
- + Assess multiplexer assignments and door hardware requirements
- + Designed of new and relocated CCTV equipment with DOA SST standard
- + Provided digital recording details for TSA reconciliation
- + Designed BIDS inputs Burr Brown Tugnamn Keypads and BIDS/MUFIDS network architecture
- + Updated BPS 8600; core and 2000 distribution switches in accordance with the MUFIDS Phase II design
- + Designed structured cabling and horizontal station cabling for both voice and data





Client

C&S Engineers, Inc. Jon P. Donahue, PE Aviation Department Manager 499 Col. Eileen Collins Blvd Svracuse, NY 13212 jdonahue@cscos.com 315-455-2000

Construction

\$3,000,000.00

Project Start

2014

Project Completion

2015

Highlights

- Construction Observation Services for the Reconstruct Taxiways "B" & "E" - Phase I at New Castle Airport.
- + Observe testing and inspection.
- + Mill and overlay on the perimeter of the proposed pavement to tie-in to existing pavements.
- Prepare and submit daily inspection reports of construction activity and problems encountered.

DELAWARE RIVER AND BAY AUTHORITY (DRBA)

RECONSTRUCT TAXIWAY B & E-PHASE 1 -CONSTRUCTION MANAGEMENT

New Castle Airport, New Castle, DE

Arora Engineers, Inc. (Arora) serving as a subconsultant to C&S Engineers. Inc. (C&S) provided Construction Management and Observation Services for the Reconstruct Taxiways "B" & "E" - Phase I at New Castle Airport. The work for this project included a full-depth removal of Taxiway B south of Runway 9-27, Taxiway "C" east of Taxiway "B" to Runway 1-19, Taxiway "D" east of Taxiway "B" to Runway 1-19, and reconstruction of Taxiway "B" 400 feet east of Runway 1-19 from centerline to centerline between Runway 9-27 to Taxiway "A".

This project also included a mill and overlay on the perimeter of the proposed pavement to tie-in to existing pavements, and a connector taxiway will be constructed perpendicular to the parallel taxiway onto Runway 1-19. In addition, re-grading was conducted on all new construction and rehabilitation completed, the Storm Water Removal System within the work limits was upgraded to conform to the current standards, and electrical work associated with the reconstruction, including replacing and/or re-adjusting light cans along the taxiway system.

Scope of work included:

The construction observation phase consisted of construction observation with the following scope of work:

- + Observed the work to determine general conformity with the Contract Documents and to ascertain the need for correction or rejection of the Work.
- + Attended pre-construction, pre-paving, and pre-installation conferences; weekly progress meetings; and final inspection of the completed Project.
- + Observed testing and inspection. Arrange for, conduct, or witness field, laboratory, or shop tests of construction materials as required by the plans and specifications



Photo Credit Dave Sheehy

DELAWARE RIVER AND BAY AUTHORITY (DRBA)

RECONSTRUCT TAXIWAY B & E-PHASE 1 -CONSTRUCTION **MANAGEMENT**

New Castle Airport, New Castle, DE

- for the Project; monitor the suitability of materials on the Project site or brought to the Project site to be used in construction; interpret the contract plans and specifications and check the construction activities for general compliance with the design intent; measure, compute, or check quantities of Work performed and quantities of materials in-place for partial and final payments to the Contractor.
- + Prepared and submitted daily inspection reports of construction activity and problems encountered.
- + Prepared and implemented a Quality Control and Assurance Plan as required by the FAA for monitoring material requirements and properties throughout the course of construction.

Client

Susquehanna Area Regional Airport Authority Harrisburg International Airport **David Spaulding** One Terminal Drive, Suite 300 Middletown, PA 17057 dspaulding@saraa.org 717-948-3900

Construction

\$500,000

Project Start

2012

Project Completion

2013

Highlights

- + Electrical Aeronautical Construction Administration & Construction Management services for the Rehabilitate Runway 8-26 Lights construction project CXY.
- Arora developed and submitted to SARAA a construction and safety phasing plan.
- Arora provided general management of construction activity.

SUSQUEHANNA AREA REGIONAL AIRPORT **AUTHORITY**

CONSTRUCTION SERVICES FOR REHAB **RUNWAY 8-26 LIGHTS**

Capital City Airport, Harrisburg, PA

Arora Engineers, Inc. (Arora) as a subconsultant to Urban Engineers, provided Susquehanna Area Regional Airport Authority (SARAA) Electrical Aeronautical Construction Administration & Construction Management services for the Rehabilitate Runway 8-26 Lights construction project at Capital City Airport (CXY).

Scope of work included:

Arora provided construction administration tasks to the following scope items:

Project construction meeting attendance and site visits - Arora attended progress meetings via tele-conference and other specialty meetings as necessary during Construction.

Shop Drawing/Submittal Review - Arora reviewed shop drawing submittals from the Contractor and maintain a submittal log to track the status. Arora made the timely processing of submittals a high priority.

Responses to Requests for Information/ Construction clarifications (RFI's)

- Arora reviewed and responded to clarification requests from the Contractor. An internal log tracked the status of each RFI, and Arora made the timely processing of RFI a high priority.



SUSQUEHANNA AREA REGIONAL AIRPORT **AUTHORITY**

CONSTRUCTION **SERVICES FOR REHAB RUNWAY 8-26 LIGHTS**

Capital City Airport, Harrisburg, PA

As built drawings - As-built drawings were completed of as-built conditions from the Contractor furnished redline prints.

Construction Safety and Phasing Plan- Arora developed and submitted to SARAA a construction and safety phasing plan which is conformance with FAA advisory circular FAA advisory circular 150/5370-2F "Operational Safety on Airports During Construction" to supplement contract drawings.

Construction Management

Urban Engineers, located in Mechanicsburg, PA was utilized as a subconsultant for this task to supplement Arora's Construction Management responsibilities. Arora's construction management tasks included the following scope items:

Construction Oversight- Arora provided general management of construction activity as an extension of SARAA staff including review of contractor payment requests, installed quantity verification, daily inspection reports, weekly FAA reports, and DBE compliance.

Construction Inspection- Specialized site inspection was provided to support Urban's construction management efforts, including on-site support for CCR switchover and ALCS related work to determine conformity with the contract plans, specifications, FAA standards, advisory circulars and local codes having jurisdiction.

Checklist Inspection - Checklist inspections were completed for major construction milestones including Substantial, Pre-final and Final Inspections prior to project closeout.



Client

Lehigh Northampton Airport Authority **Thomas Stoudt** Lehigh Valley International Airport Director of Operations & Safety 3311 Airport Road Allentown, PA 18109-3040 tstoudt@Inaa.com (610) 266-6001

Construction

\$26,320,958

Project Start

2020

Project Completion

2021

Highlights

+ Multi-Prime Delivery

LEHIGH NORTHAMPTON AIRPORT AUTHORITY

LNAA TASK 38 – PROGRAM, CONSTRUCTION, AND INSPECTION MANAGEMENT SERVICES

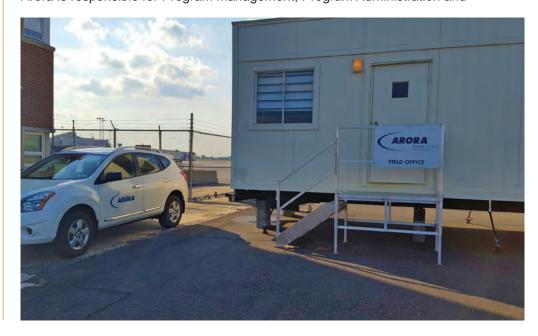
Lehigh Valley International Airport, Allentown, PA

Arora Engineers, Inc. (Arora), serving as the Prime Consultant, was selected to provide On-Call Planning, Architectural, and Engineering services for the Lehigh-Northampton Airport Authority (LNAA). Under this contract, Arora issued a Task for Program Management, Program Administration and Construction Management) related to the implementation of the Security Checkpoint (Connector) Improvements project located at Lehigh Valley International Airport (ABE). The critical elements of this project include:

- + Improved Departing (Outbound) PAX Flow via an Elevated Connector
- + New PAX Security Screening Checkpoint (SSCP)
- + New Vertical Circulation Core located at the Wiley Terminal
- + Improved Arriving (Inbound) PAX Flow via a new below grade tunnel
- + LifeAire purification system evaluation and improvements
- + COVID-19 evaluation of potential modifications to design
- + Financial coordination assistance for the program funding
- + Township Coordination and response to comments
- + Haul route Rehabilitation
- + Utility Coordination
- + Stand-by Emergency Generator
- + Renderings and Animation Preparation
- + Art coordination

Scope of work included:

Arora is responsible for Program Management, Program Administration and



LEHIGH NORTHAMPTON AIRPORT AUTHORITY

LNAA TASK 38 - PROGRAM, CONSTRUCTION, AND INSPECTION **MANAGEMENT SERVICES**

Lehigh Valley International Airport, Allentown, PA

Construction Administration and includes the following services:

Project Management with tasks including:

- + Owner's Representative
- + Project Schedule Management LNAA Stakeholders
- + Stakeholder Coordination
- + Request for Proposal (RFP) Development & Management
- + Management of hours and review of documentation.
- + Conflict Resolution
- + Day-to-Day Project Management
- + Project Partnering
- + Financial Review & Coordination with LNAA Stakeholders
- + Project Partnering

Project Administration with tasks including:

- + Owner's Representative Services.
- + Financial Review & Coordination with Project Primes.
- + Request for Proposal (RFP) Development & Management.

Project Schedule Management services includes:

- + Contract Document Peer Reviews, including Design Change Control and Value Engineering Management & Coordination.
- + Preparation of Funding Request Applications, including Federal Applications (i.e. FAA) and State Applications.
- + Document Control & Management.

On-Site *Construction Management* support services provided by Arora include:

- + Owner's Representative Services.
- + Providing LNAA Stakeholder Updates.
- + Bid Phases Project Procurement Support.
- + Monitoring MBE/DBE Program Compliance.
- + Reviewing and approving Contractor's Request for Payment.



Client

South Jersey Transportation Authority Jeff Sabla, Project Manager Route 54 and Trooper Lane Hammonton, NJ 08037 jsabla@sjta.com 609-561-6643

Construction

Varied by project

Project Start

2008

Project Completion

2013

Highlights

- + On-Call General **Engineering Consultant** agreement with SJTA
- + Project responsibilities range from construction and program management to engineering design
- Arora's on-site personnel serve as Owner's Representative for a number of projects

SOUTH JERSEY TRANSPORTATION AUTHORITY

GENERAL ENGINEERING CONSULTANT

Egg Harbor Township, NJ

As a General Engineering Consultant to the South Jersey Transportation Authority (SJTA), Arora Engineers, Inc. (Arora) was responsible for the following scope of services. For the duration of this five year contract Arora had a minimum of 1 full time construction manager on-site at Atlantic City International Airport.

Scope of work included:

Construction Management: As the owner's representative, performed all aspects pertaining to construction management including quality assurance, quality control, cost control, schedule control, requests for information (RFI), submittals, invoice reviews and approval, daily reports, and safety compliance monitoring. Monitored contractor performance to verify contractual specifications and designs are being followed. Conducted construction meetings and maintain contract documents. Prepared and finalized commissioning documents including as-built drawings, warranties, maintenance bonds, and release of liens. A sample of tasks included:

- + Operations Center Renovation
- + HVAC roof top units upgrades and controls
- + Access control system upgrades to airport
- Security camera upgrades to airport
- + MUFIDS and Common Use Information Project
- + Air Force National Guard Runway 31 Arm/Disarm Apron
- + Terminal Entrance Door Replacement
- + Installation of runway lighting main power and controls with fire alarms
- + Installation of multiple generator systems.
- + Installation of concrete pads at jet bridges
- + Replacement of HVAC system at Farley Plaza.



SOUTH JERSEY TRANSPORTATION AUTHORITY

GENERAL ENGINEERING CONSULTANT

Egg Harbor Township, NJ Administration: Attended meetings; take minutes; interface with SJTA's Chief Engineer and other designated representatives; flagged action items; tracked issues; scheduled follow-ups; hired to supplement staff resources; etc.

Program Scheduling and Monitoring: Track/control project and budget progress; used Primavera Scheduling Software and submitted weekly status updates including actual vs. scheduled completion; review, prioritize, and adjust the Ten-Year Capital Plan and an Annual Maintenance Program on a periodic basic; advised and provided assistance on funding and cash flow matters; and prepared multi-year Capital Program Budget; etc.



CONTACT:

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