



Statement of Qualifications

**Progressive Design-Build (PDB)
IS 270 - Innovative Congestion
Management Contract**

Montgomery and Frederick Counties

Contract No. M00695172

FAP No. N/A

July 25, 2016

Submitted to:



Submitted by:



**CONCRETE
GENERAL, INC.**

in association with



World Class Solutions with Local Leadership

Table of Contents

Section 1	Cover Letter	
Section 2	Key Staff Experience and Qualifications	1 – 18
	Design Key Staff	1 – 6
	Design Value-Added Staff	7 – 10
	Construction Key Staff	11 – 15
	Construction Value-Added Staff	16 – 17
	Executive Committee	18
Section 3	Project Understanding and Progressive Design-Build Approach	19 – 26
	Design-Builder’s Understanding of Projects Goals	19 – 22
	Design-Builder’s Approach to Progressive Design-Build	23 – 24
	Composition of the Design-Builder	25 – 26
Section 4	Design-Build Team Ability and/or Experience	27 – 42
	The CGI Team	27
	Mobility and Safety	27 – 29
	Operability, Maintainability, and Adaptability	29 – 30
	Implementing a Well-Managed Project	30 – 34
	Familiarity with IS 270 Corridor	34
	Ability on Similar Projects	35
	Planning Related Experience	36 – 38
	Design Related Experience	38 – 41
	Construction Related Experience	41 – 42

Submitted to:



Section 2



Key Staff Experience and Qualifications

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Design Key Staff

The **CGI Team** has the *regional, national, and international experience* to identify the best solution for this project and the *local experience to deliver it*.

Key Staff are shown below in **orange**. Value-Added Staff critical to the project are shown below in **bold**. Resumes for Key Staff and Value-Added Staff are shown on the following pages. Our organization chart and staff time commitments are provided in Section 3, Project Understanding and Progressive Design-Build Approach, Composition of the Design-Builder.

The CGI Team knows Well-Managed Projects

Our design executive leadership, **Melinda Peters** and **Bruce Gartner**, have a proven ability to deliver well-managed MDOT projects; will ensure sufficient resources for the design Team; and be personally engaged in developing solutions.

Project Design Manager, Eric Mellor, has the unique experience of providing leadership for both Design-Build Teams and Owners on major, groundbreaking projects such as Woodrow Wilson Bridge, Intercounty Connector (ICC) Design-Build, Monroe Bypass, and Purple Line P3. On this project, his ability to collaborate with stakeholders and lead a diverse range of engineering disciplines toward the common project goals will be critical.

The CGI Team knows Planning and Design for Mobility and Safety

Highway Engineer, Jeff Roberta, recently led the reconfiguration of 4-miles of I-95 in Baltimore to provide four continuous lanes in each direction *within the existing typical section* to provide better mobility. This *practical design* experience is directly applicable to the IS 270 project. He will be supported by **Mitch Scott**, who has performed geometric safety design for three of SHA's most recent Design-Build projects (US13 Salisbury Bypass, MD 404, and MD 32/Linden Church Lane).

Highway Safety Expert, Cynthia Juliano, who led the development of FHWA's Highway Safety Manual (HSM) Implementation Plan and has applied HSM for diverse clients, such as VDOT, PennDOT, and OhioDOT will ensure that safety is improved through application of HSM techniques.

Traffic Engineer, Barry Brandt, has applied VISSIM modeling for ATM/ITS applications on regional projects such as I-76, Greater Richmond Mobility, and Route 29 Solutions. He will be assisted by **Matt Snare**, who completed the IS 270 Freeway Congestion Management Studies. Using his traffic simulation experience on I-66 Corridor Improvements and I-15 Corridor Point, **Raj Paradkar** will ensure that no assumption is left unchecked.

ATM/ITS Manager, Louis Neudorff, co-authored FHWA's ATM Feasibility and Screening Guide. He will lead our development of technology-based project solutions. He recently completed similar work for large scale TSMO options statewide in NJ and for the I-95 corridor in PA. He will be supported by **Mahmood Shehata**, who has developed ITS/ATM solutions for I-95/I-276, I-76, and I-95/I-476. Following our Team's model of pairing national experts with local expertise, **Brian Grandizio** will supply the local perspective from his experience on SHA Statewide Traffic Engineering Design Services.

The CGI Team knows Project Implementation

Environmental Compliance Manager, Sheila Mahoney, AICP, will her experience on Baltimore Red Line to prepare documentation for the NEPA/MEPA process and ensure environmental compliance through design and construction similar to her role on TMDL. **Steve Phillips** with vast SHA ESC, SWM and TMDL experience will provide support.

Richard Foote has lead the design, integration, and deployment of technology-based congestion management systems nationally include Project Neon, MoPac Improvement Project, and I-70/I-71 Phase 6A Ramp Metering. Bringing an international perspective to the Team, **Keith McCabe** is a managed-motorways expert in the United Kingdom and co-author of the FHWA ATM Feasibility and Screening Guide.

TMP/MOT Manager **Scott Crumley**, managed the ICC's TMP for IS 270 and understands the unique MOT challenges on IS 270. **John Ney**, with more than 45 years of Utility Coordination experience for SHA projects will identify, coordinate, and mitigate utility conflicts.

Pat Martino, with 22 years of experience on SHA and regional projects, will ensure design excellence via robust QA/QC procedures including lessons-learned on Design-Build projects.

We expect this project will require not just public outreach, but also education regarding the project solutions. We've included industry leader, **Stokes Creative Group**, to assist SHA with this effort.

Clients Served

- ✓ Highways England
- ✓ Transport Scotland
- ✓ OMT Canada
- ✓ UK Highways Agency
- ✓ FHWA
- ✓ Colorado DOT
- ✓ DVRPC
- ✓ Illinois Tollway
- ✓ MD SHA
- ✓ MDTA
- ✓ N.C. DOT
- ✓ N.C. Turnpike
- ✓ Nevada DOT
- ✓ NJDOT
- ✓ Ohio DOT
- ✓ PennDOT
- ✓ Penn. Turnpike
- ✓ SEPTA
- ✓ TxDOT
- ✓ Utah DOT
- ✓ VDOT
- ✓ WVDOT

ERIC MELLOR, PE, DBIA
Project Design Manager | RK&K | Key Staff
20 Years' Experience
Maryland Registered Professional Engineer No. 27047
BS/Civil Engineering



Mr. Mellor's progressive engineering experience managing major **mobility** and **safety** improvement projects spans all phases of concept development, procurement, design, and construction for both Design-Bid-Build projects and Design-Build projects. He has the unique experience of providing leadership for both Design-Build Teams and Owners for major transportation projects such as Woodrow Wilson Bridge, Intercounty Connector Design-Build, Monroe Bypass, and Purple Line P3. He has a demonstrated ability to collaborate with stakeholders, lead a diverse range of engineering disciplines, and achieve project goals on-time and on-budget ensuring **well-managed projects**. Relevant experience includes:

Intercounty Connector Contract (ICC) A Design-Build, Montgomery and Prince George's Counties, MD: During project development, Mr. Mellor coordinated the concept development, IAPA, JPA, and procurement documents for the 7.2-mile-long ICC Contract A, including the improvements necessary on IS 270 to maintain **mobility**, **safety** and connectivity to I-370 and the ICC. As the Design Manager representing SHA for the \$476M Contract A, Mr. Mellor was co-located with the contractor and managed design quality assurance activities, resolved design conflicts, managed design-related change orders, cost estimating, facilitated the permitting processes, and coordinated with the stakeholders, Montgomery County, and local communities. He was an active participant in the development of design parameters and issue resolution for the signing, ITS, and ETC elements along the ICC and the IS 270 approaches to the ICC.

Monroe Connector Bypass Design-Build, Mecklenburg and Union Counties, NC: Mr. Mellor was the Design Manager responsible for one of four geographic sections of this \$367M, 19.7-mile new alignment electronic toll collection roadway. Mr. Mellor directly managed the development of highway concepts and final design and plans, including: incorporation of ITS and ETC, utilities, right-of-way (ROW), permitting, SWM, structures, geotechnical and ESC.

MD 404 – US 50 to East of Holly Road Design-Build, Caroline, Queen Anne's and Talbot Counties, MD: Mr. Mellor is the D-B Team's Highway Design Lead for this \$105M dualization of MD 404, which will increase both **mobility** and **safety**. He manages all aspects of RK&K's design effort, including schedule, permitting, conceptual and final design for highway design, MOT, SWM, drainage, ESC, and DBE compliance. He coordinates with stakeholders, MDE, SHA PRD; provides Quality Assurance/Quality Control (QA/QC); and ensures practical design is being implemented.

MD 32/Linden Church Road Interchange Design-Build, Howard County, MD: Mr. Mellor provided D-B execution guidance, QA/QC, compliance reviews, issue resolution and partnering for the CGI/RK&K Team to achieve efficient design, permitting, and project completion. This D-B project consolidated entrance points, improved **safety**, increased **mobility**, provided SWM, and facilitates the planned dualization of MD 32.

Rehabilitation of 11 Bridges on US 13 – Salisbury Bypass Design-Build, Wicomico County, MD: Mr. Mellor is the Project Design Manager overseeing the design of this project to rehabilitate 11 bridges on the US 13 Salisbury Bypass, which includes long-term road closures with construction of temporary crossovers. He oversees all aspects of RK&K's design effort, including: schedule, permitting, geotechnical, pavement, utility coordination, traffic signing/markings, ITS, highways, structures, MOT, SWM, drainage, landscape, reforestation, TMP, ESC, and DBE compliance.

MD 216 Design-Build, Howard County, MD: Mr. Mellor was the Deputy Design Manager for this 2-mile, \$21.1M boulevard on new location, including one interchange and three intersections. He coordinated all aspects of the project using a multiple design, construction, and permitting packages to achieve on-time completion of this award-winning project. This project included highways, surveys, geotechnical, pavement, noise walls, multi-phased ESC/SWM, ITS, permitting, stream restoration, box culverts, utility coordination, landscaping, reforestation, phased MOT, and stakeholder outreach.

Purple Line Light Rail Transit P3, Montgomery and Prince George's Counties, MD: Mr. Mellor was a key member of the leadership team for MTA on this new \$2.6B Light Rail P3 project. His responsibilities included delivery method analysis, interdisciplinary coordination, risk analysis and allocation, development of technical provisions using a collaborative process, **operations** and **maintenance** requirements, coordination with stakeholders, including Montgomery and Prince George's Counties, and local utilities. Led for development of all technical provisions for the P3 RFP and coordination of the technical provisions with the various stakeholders, agreements, legal team and financial team.

Key Relevant Experience: Design Management; Design-Build Project Management; Highway Design; Public Outreach; Permitting; Issue Resolution; Utility Coordination; Noise; Safety; Mobility; MOT/TMP; Stakeholder Coordination; ROW; SWM; ESC; Structures; Geotechnical; Cost Estimating; ITS; Risk Analysis; Partnering; Communication; DBE Compliance; IAPA; Specification Development; Maintainability; Collaboration

JEFFREY ROBERTA, PE
Highway Engineer | RK&K | Key Staff
15 Years' Experience
Maryland Registered Professional Engineer No. 27499
BS/Civil Engineering



Mr. Roberta's extensive highway engineering experience for major transportation projects related to **safety** upgrades and enhanced **mobility** includes lead highway engineering roles for feasibility studies, concept development, preliminary and final engineering contracts, and Design-Build projects. Mr. Roberta has direct experience with project planning documents, all phases of final design and development of geometric design, contract development and procurement, QA/QC, proposal development, design management, MOT, plan preparation, environmental requirements, utility coordination, issue resolution, cost estimating, and construction coordination. He has served in project management, requirements development and procurement support roles supporting MDTA in their Third Generation Electronic Toll Collection (ETC 3G) project, a best value procurement of Maryland's next toll collection system. Relevant experience includes:

I-95 from Moravia Road to the Fort McHenry Tunnel, Baltimore, MD: Mr. Roberta was the Project Manager for highway reconfiguration/capacity improvement in Baltimore City. His involvement extended from the initial feasibility/planning through final design and construction support. The project included geometric design including reconfiguring I-95 between the Fort McHenry Tunnel and the I-95 Express Toll Lanes to provide four continuous lanes in each direction, a distance of approximately 4-miles, half-on structure, and involved adding a lane within the existing highway typical section to enhance **mobility and safety**. Mr. Roberta was responsible for developing the concept and preliminary design, as well as overall project management for the final design effort, including: leading a large multi-disciplinary design team, full oversight of roadway design and MOT, coordinating environmental studies and permitting, providing coordination with MDTA and other stakeholders, coordination with FHWA, and researching/preparing design exceptions required for the narrowed lanes and shoulders.

West Side Mobility Study, Montgomery County, MD: As the Lead Engineer, Mr. Roberta was responsible for developing geometric highway improvement concepts along I-495 and IS 270 between the VDOT I-495 HOT Lanes and I-370/ICC. Concepts ranged from short-term bottleneck/congestion point improvements to system-wide improvements within the existing highway footprint to large-scale highway widening and interchange modifications to increase **mobility** and **operability**. The study included evaluation of innovative solutions, including peak period shoulder use and reversible lanes, and other ATM strategies. Developed concepts and preliminary engineering and cost estimates and assessed potential environmental impacts. Provided extensive coordination with the traffic analysis team to understand traffic patterns on IS 270 and I-495 and assess the potential benefits from the proposed concepts.

IS 270 Multi-Modal Corridor Study, Montgomery and Frederick Counties, MD: Mr. Roberta was the Engineer responsible for developing/evaluating highway/interchange improvement alternatives, to provide improve **mobility** and **adaptability** along IS 270, including managed lanes. Developed preliminary engineering concepts for the mainline and several interchanges.

Capital Beltway Study, Montgomery County, MD: As the Lead Engineer responsible for developing highway and interchange improvement alternatives along the full length of I-495, Mr. Roberta evaluated alternatives to provide additional capacity and **mobility** along the Capital Beltway. The study included evaluation of innovative managed lanes solutions and other TSM/TDM strategies. He developed the preliminary engineering concepts for the mainline and more than 20 interchanges and cost estimates, and assessed potential environmental impacts. Work involved an evaluation of managed-lane operations, including access to/from the managed lanes, managed-lanes signing, and other support infrastructure. Involved in extensive evaluation of condition of existing pavement and bridge to understand the overall system preservation needs.

US 40 Hatem Bridge All Electronic Tolling (AET) Conversion, Cecil County, MD: Mr. Roberta was the Project Manager responsible for developing the roadway and infrastructure design to convert the Hatem Bridge toll plaza to AET. This involved removal of the existing toll plaza infrastructure, new AET gantry location, new communications and electrical infrastructure, and coordination and **adaptability** to accommodate the needs of the electronic toll collection system.

Key Relevant Experience: Project Management; Design Coordination; Public Outreach; Practical Design Approaches; Highway Engineering Design; Permitting; Environmental Requirements; Safety; Mobility; MOT; Stakeholder Coordination; Drainage; SWM; ESC; Structures; Traffic Design; Cost Estimating; Design Exceptions; ITS; Corridor Knowledge; Innovative Concept Development; ATM Strategies; Interchange Design; IAPA; Specification Development; Frederick and Montgomery County Experience; Cost/Benefit Analysis

BARRY BRANDT, PE, PTOE

Traffic Engineer | RK&K | Key Staff

25 Years' Experience | Maryland Registered Professional Engineer No. 21454
Professional Traffic Operations Engineer No. 115
MS/Civil Engineering | BS/Civil Engineering



Mr. Brandt's extensive traffic engineering experience includes responsibility for leading efforts related to traffic design, traffic analysis; including computer traffic simulation and optimization models, forecasting, ITS planning and design, traffic control device design, and maintenance of traffic analysis and design. Mr. Brandt is experienced in the development of operational improvement concepts using VISSIM, traffic signal timing improvements using Synchro and SimTraffic, and developing plans for Design-Build contracts. In recognition of his service, he was awarded the *"Outstanding Public Service Award"* from SHA for his performance of ITS, signal and lighting design, and his development of traffic design training programs which enhance *mobility and safety*. Relevant experience includes:

Greater Richmond Mobility Study, Richmond, VA: Mr. Brandt was the Traffic Analysis Manager responsible for evaluating the development of lower-cost options to improve *safety* and reduce delay along the I-64/I-95 Corridor within metropolitan Richmond using traffic optimization models and ITS infrastructure. Options included an enhanced ITS device network, Variable Speed Limit deployment, and other ATM strategies. All options were tested in VISSIM, including Ramp Metering, Dynamic Lane Merge, Queue Warning, Variable Speed Limits, and Lane Control systems. These tests were performed using the scripting language in VISSIM to provide realistic simulation of each technology.

Traffic Engineering Design Services, SHA, Statewide, MD: Mr. Brandt was the Project Manager for the development of traffic engineering designs for more than 300 individual traffic engineering task assignments, including: CHART ITS/devices, traffic signals, highway signing, highway lighting, and pavement markings. ITS devices included: speed detectors, CCTV cameras, weather stations, dynamic message signs, and associated communications infrastructure. ITS designs included coordinating proposed communication and electrical utility service. Long lead letters and negotiable item requests letters were developed for quick turn-around projects. Developed and presented nine training sessions within the last five years for SHA, including development of the ITS training session and the revised ITS Design Manual.

Route 29 Solutions D-B, Albemarle County, VA: Lead Traffic Engineer responsible for developing designs that enhanced mobility including a grade-separated intersection between US 29 and Rio Road, widening of US 29 to 3-lanes and extension of Berkmar Drive. Lead traffic analysis efforts performed using Synchro and VISSIM to determine the operational performance of each intersection and the entire corridor. Based on the unique operation of the signals at the US 29/Rio Road, the National Electrical Manufacturers Association (NEMA) controller add-on feature was incorporated into the VISSIM model. Traffic signal timing plans were created for each intersection with the optimization model Synchro. Signal equipment included fiber optic communications and solar-powered signal ahead signs. Traffic analysis also included developing pedestrian clearance times and signal timings. Communications were provided through fiber optic cable and wireless radio. CCTV cameras were installed on existing signals and on a stand-alone pole with a lowering device. Temporary Traffic Control (TTC) plans were developed to facilitate a 103-day shutdown of Rio Road through movements, necessitating plans for a number of detour routes.

I-76 ITS Enhancements, Pennsylvania DOT, Montgomery County, PA: As the Traffic Engineer, who assisted in the Concept of Operations (CONOPS) development, Mr. Brandt evaluated next generation operational strategies for the I-76 corridor from the Pennsylvania Turnpike to US 1. The effort included traffic analysis evaluations of part-time shoulder lane use for the corridor and high-level traffic analysis for evaluation of strategies, such as hard shoulder running, queue warning, and dynamic late merge to address *mobility and safety* issues.

I-276/I-95 ITS, Bensalem, PA: Mr. Brandt was the Project Manager for the ITS, signing, and lighting portions of the \$500M project to provide a new I-276/I-95 interchange, modifications to the US 1 and US 13 interchanges, and widening of both I-276 and I-95 to improve *mobility and safety*. Directed the development of the ITS system for the project, including device location, communications methods, data sharing, integration into two traffic management centers, and development of a work zone ITS system. Implemented the Systems Engineering process, including development of a CONOPS to define the needs and requirements of the system. Directed development of the Work Zone ITS RFP for temporary ITS devices during MOT stages, communication to nearby permanent devices, and a project website. Directed the development of two stand-alone ITS contracts for construction and integration of devices for both PA Turnpike and PennDOT. Directed the development of plans for ITS infrastructure into six roadway contracts.

Key Relevant Experience: Traffic Analysis; Traffic Simulation Using VISSIM; ITS Planning; ITS Design; ATM Planning; Traffic Control Device Design; Plan and Specification Development; Traffic Optimization Models; MOT; CONOPS; Synchro; CHART; Design-Build; Dynamic Lane Control; Variable Speed Limits; ITS Integration; TTC Plans

SHEILA MAHONEY, AICP
Environmental Compliance Manager | RK&K | Key Staff

14 Years' Experience

MDE Erosion & Sediment Control Green Card | DNR State Forest Conservation Qualified Prof.
MS/Environmental Sciences and Policy | BA/English



Ms. Mahoney is a Senior Project Planner with expertise in natural, cultural and socioeconomic resource assessment, MEPA/NEPA environmental documentation and technical reports, permitting and regulatory compliance, environmental compliance management during design and construction, agency coordination, and public involvement for transportation projects. Ms. Mahoney's experience includes National Environmental Policy Act (NEPA) and Maryland Environmental Policy Act (MEPA) documentation; Section 4(f) and Section 106 compliance, Section 7 coordination, public outreach, agency coordination, environmental permitting, conducting wetland and forest stand delineations and threatened and endangered species surveys, environmental features mitigation design contract management, and construction support services. Relevant project experience includes:

Baltimore Red Line General Engineering Consultant, Baltimore, MD: Ms. Mahoney was the Primary Author of Section 4(f) Evaluation, Economic Activity and Parks, and Recreation Land and Open Space for the 14.5-mile transit line. Section 4(f) activities included: preliminary identification of Section 4(f) and 6(f) resources through GIS; consultation with Baltimore County and City Departments of Recreation and Parks, MD DNR, and MHT; and coordination with project cultural resources and design staff to avoid and minimize impacts to protected resources. Key Staff on compiling, reviewing, and editing all technical reports and the FEIS under tight time constraints and developing environmental commitment lists. *Final Design Phase* – Environmental Permitting and Compliance Discipline Lead, managed federal and state environmental permitting and agency approvals; hazmat activities; mitigation activities, including: Joint Permit Application (JPA), Forest Conservation Plan (FSD); Critical Area compliance; Section 106 compliance; and noise and vibration monitoring. Extensive coordination with USACE, MDE, DNR, CAC, MHT, and Consulting Parties, Baltimore City, and Baltimore County. Managed stream restoration and forest/street tree mitigation projects..

MD 404 from East of US 50 to Denton Bypass, Caroline County, Queen Anne's County, and Talbot County, MD: Ms. Mahoney was responsible for the preparation of the NEPA Re-evaluation on behalf of SHA for FHWA and approval of this 11-mile corridor that will increase **mobility** on Maryland's eastern shore. The document evaluated a single Design-Build alternative, in comparison to the 1991 FONSI/Section 4(f) Evaluation. Authored the Indirect and Cumulative Effects (ICE) Technical Memorandum, including identification of natural, cultural and socioeconomic resources, and development of geographic and timeframe boundaries to capture past, present, and future land use trends for analysis. Managed sub-consultant preparation of Hazardous Materials and Community Effect Analysis technical memos.

TMDL, Various Counties, Statewide MD: Ms. Mahoney is the Assistant Implementation Manager for SHA's Total Maximum Daily Load (TMDL) Tree Planting Program. She is responsible for ensuring a **well-managed** program and management of multiple consultant teams to select, design, and inspect TMDL tree-planting sites for compliance with SHA's National Pollutant Discharge Elimination System (NPDES) MS4 Permit. Manages design team's development of tree-planting plans and design support teams performing GIS inventories, wetland and field delineations, and utility clearances. Manages all phases of SHA's Plan Review Process from PI/Semi-Final Design through plan, specification, and estimate development, advertisement, and construction. Prepare and delivered of all aspects of IFB Books, including planting plans, specifications, and engineer's estimates. Closely coordinates with other TMDL strategies and the Districts, RIPD, LAD, ORE, and PSD to avoid conflicts with other SHA construction projects and maximize the planting opportunities within SHA ROW. Coordinates closely with the EPLD and the EPD to avoid impacts to RTEs, jurisdictional wetlands/waters and cultural resources, and HDD, ensuring ESC and SWM compliance. Ms. Mahoney also lead Phase V construction services to support LOD in construction management, and to ensure TMDL credits are captured accordingly.

MD 5 at Brandywine Road and MD 373, Prince George's County, MD: Ms. Mahoney was the Task Manager and Primary Author of a NEPA/MEPA Re-evaluation on behalf of SHA for FHWA review and approval of the Semi-Final Design. The re-evaluation reviewed the status of the original corridor project and changes in the study area since the FEIS. Semi-Final Design included construction of an overpass to enhance **mobility** and the relocation of Brandywine Road, removal of at-grade intersections to address **safety**, and construction of a park-and-ride lot. The task included oversight of sub-consultant preparation of the socioeconomic analysis, ICE analysis, and an addendum to the noise technical report.

Key Relevant Experience: Project Management; Section 106; Section 4(f) Evaluations; Environmental Features Mitigation Design and Permitting; Natural, Cultural and Socioeconomic Resources Inventories; GIS Desktop Inventories; Field Inventories/Delineations; NEPA/MEPA Documentation and Technical Reports Preparation including Air Quality and Noise/Vibration; Permit Application Package Preparation; Developing/Monitoring Environmental Commitments; Specification Preparation; Cost Estimating; IFB Preparation; Permitting/Approval Agencies Coordination; Stakeholder Coordination; Public Outreach

LOUIS NEUDORFF, PE
ATM/ITS Manager | CH2M | Key Staff
37 Years' Experience

New Jersey Registered Professional Engineer No. 24GE03516500 | Connecticut No. 12593
BS/Civil Engineering | MS/Transportation Engineering



Mr. Neudorff specializes in transportation systems management and operations (TSMO) and supporting ITS technologies, including strategic planning, technical, operational, and institutional issues associated with these systems. Other areas of expertise include various attributes of Active Transportation and Demand Management (ATDM); regional, the integration and operation of corridor, freeway, and arterial systems; the role of ITS in supporting *mobility*; and mileage-based road usage charging and congestion pricing. He has delivered project presentations and workshops on all these topics and is the Principle author of several FHWA publications, including: Active Traffic Management Feasibility and Screening Guide, Integrated Corridor Management (ICM) Implementation Guidance, Freeway Management and Operations Handbook, and Primer on the Use of Narrow Lanes. Relevant experience includes:

ATM Feasibility and Screening Guide, FHWA: Mr. Neudorff was the Principal Investigator for the development of the guidance document for agencies interested in conducting feasibility and high-level screening analyses for ATM. ATM strategies included: dynamic speed limits, dynamic lane use control, queue warning, dynamic shoulder lanes, dynamic junction control, dynamic merge control, dynamic lane reversal, adaptive ramp metering, adaptive traffic signal control and transit signal priority. The overall goal of the ATM Feasibility Guide is to enable agencies to make informed investment decisions by determining the feasibility of ATM prior to committing significant resources. The Guide includes processes for an agency to follow as they consider ATM deployment at the feasibility and screening analyses level.

ATM Feasibility, Statewide, NJ: As Project Manager, Mr. Neudorff analyzed all NJDOT limited access highways and prioritized segments/facilities for the initial implementation of ATM in New Jersey. Work included: preliminary screening and feasibility (using FHWA ATM Guidance) to identify and prioritize locations and strategies for *mobility*; developed estimates of benefits/costs; recommended ATM projects for implementation; developed a Concept of Operations (CONOPS) for ATM projects; and designed an Implementation Plan from which NJDOT can develop design RFPs.

I-95 Transportation Operations Innovative Strategy Group, PA: Served as the Leader for a group of representatives from PennDOT, DVRPC, the City of Philadelphia, SEPTA, and CH2M, which examined/recommended TSMO strategies and supporting ITS devices for the I-95 corridor in Pennsylvania. Responsible for preparing and leading several workshops and developing an Operational Concept Document and Implementation Plan identifying short, medium, and long-term TSMO recommendations, including ATM, junction control, ramp metering, multi-modal/integrated traveler information and enhancements to existing operations, *maintainability*, and ITS within District 6. Follow-on work is now underway to develop a detailed CONOPS for the deployment of ATM within the Philadelphia region.

Operations in Performance Based Practical Design and Guidance on Shoulder Use as Travel Lane, FHWA: Serving as Key Staff Member, Mr. Neudorff provided technical assistance and primary authoring of FHWA's soon-to-be-published document, "Use of Freeway Shoulders for Travel - Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy" (Publication No. FHWA-HOP-15-023). This document addresses the process for developing/implementing narrow lanes and shoulders in the context of Performance-Based Practical Design (PBPD), provides examples and case studies on the use of narrow lanes, discusses the design exception process, and describes approaches for analyzing *operational* and *safety* impacts of narrow lanes and shoulders. The potential role of TSMO strategies in the context of narrow lanes and shoulder use is also addressed. Prepared a case study of how ATM strategies and alternatives can be integrated into PBPD (as an alternative to geometric improvements) and how ATM can be used to support design exceptions for geometric improvements, which don't conform to current standards.

Colorado Department of Transportation ATM Program, CO: Serving as Lead Project Engineer, Mr. Neudorff led the development of the ATM CONOPS as the first step in the systems engineering process for this initiative. The program is being developed to address *safety* and congestion problems on several critical interstate highway segments. The scope of work is envisioned to include multiple projects, including "pilot" or demonstration projects to test out new technologies at key locations. The first deployment will be on the approaches and departures from the Eisenhower Tunnel on I-70 in Clear Creek and Summit counties.

Key Relevant Experience: ATM Design; ATM Implementation Plan; Costs; ATM Planning; ATM Feasibility Analysis; ITS; FHWA ATM Guidance; Screening Analysis; TSMP; CONOPS; Shoulder Usage; Design Exceptions; Ramp Metering; Performance-Based Practical Design; Dynamic Signing and Controls, Systems Engineering Process.

Design Value-Added Staff

Mr. McCabe brings international expertise related to TSMO and ATM/ITS to provide innovative thinking and solutions to our Team. He draws on more than 30 years of experience in the transport, energy and ICT sectors. During this time, he has been engaged in various roles across the supply chain as client, contractor, and consultant as well as all stages of projects from the early conception, through the installation and commissioning, to the whole life maintenance and operations. Mr. McCabe has a track record of providing innovative transport solutions by drawing on ideas and processes that emerge from academia and technological innovation. He draws on his strengths in divergent and convergent thinking alongside systems thinking techniques to identify appropriate solutions. Mr. McCabe has a good record in leading business development strategies in existing and new markets and taking responsibility for identifying and developing new products and service lines. **Relevant experience includes:** Technical Advisor and co-author on the FHWA Active Traffic Management (ATM) Feasibility and Screening Guide, FHWA; Technical Advisor for the New Jersey Active Traffic Management feasibility study, NJDOT; Project Manager and technical lead for UK Highways Agency successful pilot project on ramp metering; Project Director and technical lead on development of innovative control systems for managed motorways (including variable speed limits and hard shoulder running) in the UK.

KEITH MCCABE, IET

ATM Design Expert

30 Years' Experience

Chartered Engineer with IET

Advanced Certificate in Telecommunications

Diplomas in Environment and Economics

CYNTHIA JULIANO, PE

Highway Safety | CH2M

19 Years' Experience

OH PE No. 68380

BS/Civil Engineering

Ms. Juliano will be leading the efforts on developing PTCs related to Highway Safety, bringing expertise on the Highway Safety Manual and implementation to the project Team. She is a Senior Technologist and Project Manager with more than 19 years of progressive experience encompassing civil/traffic engineering, transportation project management, environmental and project development process management, and technical expertise in traffic engineering, transportations planning studies, traffic safety, and design. Her experience

includes managing transportation improvement projects, including interchange reconstruction, roadway improvements, and corridor studies. Her traffic and transportation study background includes transportation management plans, traffic operations analysis reports, multiple site impact analysis studies, interchange modification studies, HOV equivalency analyses, roadway capacity analysis, safety analysis using the HSM, and intersection/corridor safety studies with an emphasis on transportation planning, preliminary project development, operational analysis, and preliminary design. **Relevant experience includes:** Senior Technical Advisor for I-66 Corridor Improvements, VDOT; Highway Safety Technical Lead for I-95 HOT Lanes IMR, VDOT; Task Lead for HSM Implementation Plan for FHWA; Task Management Lead, Safety Innovations Team for I-95 Design Management and Review Project, PennDOT; Project Manager US 33 Safety Study, City of Dublin, OH; Task Lead HSM integration into PennDOT Manuals; Project Manager and Highway Safety Lead OhioDOT HSM Training and Calibration Factor Contract.

Mr. Scott will be providing highway engineering design support bringing SHA, FHWA, and AASHTO expertise on standards and specifications to the highway design Team. He will rely on his design and management experience and expertise for all aspects and phases of highway design, including: defining horizontal/vertical alignments, typical section preparation, developing cross sections and 3D modeling, site and highway geometrics, interchange and

MITCHELL SCOTT, PE

Highway Engineer | RK&K

21 Years' Experience

MD PE No. 24923

BS/Civil Engineering

intersection design, defining ROW limits, developing MOT phasing and plans, coordinating location and design of noise walls, analysis and barrier design, drainage and SWM coordination, lighting coordination, signing, pavement marking, traffic signal design and utility coordination. Representative examples of his experience include performing value engineering cost studies, preliminary engineering designs, final design, specifications, preparation of design exceptions, and constructability studies for construction of projects on interstate, interchanges, state highways and local streets.

Relevant experience includes: Highway Manager for I-95/MD 43 interchange final design contract, MDTA; Highway Manager for MD 32/Linden Church Road Interchange D-B, SHA; Highway Lead for RK&K portion of MD 404 D-B – US 50 to East of Holly Road, SHA; Highway Lead for the US 13 D-B project; Highway Lead for I-895 Patapsco Flats Reconstruction, MDTA.

MATT SNARE, PE, PTOE

Analysis/Modeling | RK&K

14 Years' Experience

MD PE No. 32604

PTOE No. 2076

MS/Civil Engineering | BS/Civil Engineering

Mr. Snare will support the traffic engineering modeling and analysis relying on his Congestion Management Studies experience from his on-site work with SHA. He provides the Team with expertise in highway capacity analysis, traffic simulation modeling, travel forecasting, reviewing crash data, and preparing traffic studies. He has worked on a variety of projects ranging from large-scale simulation networks of interstate corridors to isolated intersection improvement/safety studies.

Mr. Snare's experience includes working with various traffic analysis software programs, including HCS, Synchro/SimTraffic, VISSIM, and SIDRA. He has been involved in a variety of field data collection tasks, including travel time and delay studies, speed studies, origin-destination studies, and field observations of congested intersections and high-crash locations. Mr. Snare has extensive experience preparing technical reports, including IAPA requests, MOTAA's, and TMPs. Mr. Snare also assisted SHA with developing their standard operating procedures for conducting Benefit-Cost Analyses (BCA) and for calculating road user costs using a Loss of Public Benefit (LOPB) program. **Relevant experience includes:** Lead Traffic Engineer for Freeway Congestion Management Studies (FCMS) Program and the Arterial Congestion Management Studies (ACMS) Program, SHA Data Services Engineering Division, SHA; Lead Traffic Engineer for operational and safety studies for District 3, Traffic Engineering Services, SHA; Traffic analysis, TMP, and IAPA for I-695/Charles Street interchange reconstruction, SHA; Candidate Safety Improvement Section studies for I-495 at MD 185 and I-495 at US 1, SHA; Lead Traffic Engineer for I-95 widening and I-95/SR 1 interchange improvements, DelDOT; Operational analysis and MOTAA for I-95 widening from Moravia Road to Fort McHenry Tunnel, MDTA.

Mr. Paradkar will provide progressive experience in transportation planning, traffic operations and engineering to the traffic analysis Team, including more than 10 years of experience working within Maryland. He specializes in Project Management, Quality Control, IJR/IMR studies, Traffic Impact Studies, Corridor studies, Traffic Operational Analysis, ITS deployment analysis Traffic Forecast Modeling, Signal Warrant Analysis, ramp metering, Life-Cycle cost analysis, and various transportation analyses and simulation packages including Synchro/SimTraffic and VISSIM. His areas of expertise include providing traffic engineering and signal timing optimization services for state and local DOTs and using advanced micro-simulation to analyze complex intersections and corridors, including SPUI's, DDI's and CFI's. **Relevant experience includes:** Senior Engineer, I-66 Corridor Improvements IJR, VDOT; Lead Traffic Engineer for I-15 Corridor Point, UDOT; Task Lead SHA District 7 Traffic On-Call, Traffic Lead for I-95/Route 630 DDI IMR, VDOT; Traffic Lead for procurement of I-66/Route 15 Interchange D-B, VDOT; Traffic Lead for I-95 Express Lanes Southern Terminus Extension Traffic Operations and Safety Study, IMR-Lite, VDOT.

RAJ PARADKAR, PE

Analysis/Modeling | CH2M

16 Years' Experience

MD PE No.28913

MS/Civil Engineering

BS/Civil Engineering

MAHMOOD SHEHATA, PE, PTOE

ATM/ITS Engineer | RK&K

14 Years' Experience

PA PE No. 075598

PTOE No. 2717

BS/Civil Engineering

Mr. Shehata provides the design Team with traffic engineering experience related to ITS/ATM and systems engineering processes to implement solutions. He specializes in traffic operations, including traffic studies, simulation modeling, and ITS planning, to the preparation of preliminary and final design plans. Mr. Shehata's experience includes the *development of documents throughout the entire* Systems Engineering process, including Concept of

Operations, Systems Engineering, and detailed Traceability Matrices. Mr. Shehata is skilled in applying several tools, including HCM and advanced microsimulation (VISSIM) to analyze and assess the benefits of traditional and technological improvements for complex freeway systems. He has managed projects including ITS improvements, active traffic management techniques, incident management enhancements, and evaluations part-time shoulder lane use. **Relevant experience includes:** Deputy Project Manager for ITS and traffic design, I-95/I-276 interchange project, PTC; Sub-consultant project manager for CONOPS development, evaluating next generation strategies for the I-76 corridor, I-76 ITS Enhancements, PennDOT; Project Manager for Transportation Improvement Study, leading efforts to identify, evaluate, and prioritize lower cost safety and operational alternatives, MP 333-351 Transportation Improvement Study, PTC. Deputy Project Manager responsible for alternatives development and traffic/safety analyses, and prioritization rankings for interchange improvements, I-95/I-476 Interchange Improvements Feasibility Study, DVRPC.

Mr. Foote is a Senior-Level Systems Design/Integration and ITS/Tolling professional with extensive experience in project management, design, deployment, and operation of large, complex, systems integration projects. Mr. Foote has more than 24 years' experience specializing in design, development, operation, and implementation of video and electronic traffic monitoring and traveler information systems; DMS infrastructure; microwave traffic detectors; CCTV systems; ramp meters; traffic count stations; variable speed limit signs; and fiber optic communications. **Relevant experience**

includes: ITS Systems Engineer City of Centennial ITS Master Plan and CONOPS; ITS Technical lead for the development of the ITS technical provisions, including ATM for Project Neon D-B, Nevada DOT; ITS Design Task Lead for adding Managed Lanes for the MoPac Improvement Project, Texas DOT; ITS Systems Engineer for I-95 Corridor Active Traffic Management, PennDOT; Discipline lead for ITS design, coordination, and plan reviews for I-71/I-670 Interchange D-B Reconstruction, Ohio DOT; ITS Designer for I-70/I-71 Phase 6A ramp metering, OhioDOT; ITS Systems Engineer Rt. Hon. Herb Gray Parkway, Ontario, Canada; ITS Systems Engineer, Elgin O'Hare Western Access ETC project, Illinois Tollways Authority.

RICHARD FOOTE

ITS Systems Engineer | CH2M

24 Years' Experience

IMSA Fiber Optics for ITS Level 1 Certification, 2010

BS/Aeronautics and Astronautics

BRIAN GRANDIZIO, PE, PTOE

Traffic Design | RK&K

10 Years' Experience

MD PE No. 40794

PTOE No. 3423

BS/Civil Engineering

Mr. Grandizio brings his expertise in all aspects of traffic and ITS design to be able to successfully implement any traffic or ITS solutions for this innovative project. He will be performing and overseeing traffic engineering and ITS design including: preparation of plan design/milestone review packages; cost estimates; specifications; making provisions for utilities (existing/proposed); field investigations; redesign under construction; Redline revisions; coordinating with

adjoining projects; engineering computations; and review of shop drawings. He directs the preparation of traffic engineering design packages for: traffic signal, signing, lighting, pavement marking, MOT, CHART/ITS devices, telemetry systems, minor geometric improvements, ADA compliance, and TCD structures. Mr. Grandizio has presented eight training sessions to SHA OOTS, including the ITS Design training and authored the current SHA ITS Design Manual. He oversees all projects to ensure target design milestone schedule deadlines are met and has an understanding of TCD workflow for SHA contracts. **Relevant experience includes:** Project Manager for traffic engineering designs for Traffic Engineering Design Services (300+ traffic/ITS tasks), SHA; MD 32 at Linden Church Road, SHA; Tourism Signing Design Services, SHA; Traffic Design Standards & Research Development, SHA; Traffic Engineering Design Services, SHA; Preliminary & Final Engineering Design Services, SHA; Comprehensive Preliminary and Final Engineering Design Services, MDTA; Traffic Signals & ITS and Traffic Engineering On Call, Baltimore City; Bridge Design Services, SHA.

Mr. Martino brings significant highway engineering expertise for SHA projects and D-B projects to be able to provide thorough and independent QA/QC to all aspects of the proposed work packages. He has designed and managed simultaneous, multi-discipline, new construction, reconstruction/rehabilitation projects for multiple clients including extensive work for SHA. His design and management experience for highway design projects includes: typical section preparation, defining horizontal/vertical alignments, site and highway geometrics, interchange design, ROW, MOT,

PATRICK MARTINO, PE,

ASSOC. DBIA

Design QA/QC | RK&K

22 Years' Experience

MD PE No. 24923

BS/Civil Engineering

coordinating location and design of noise walls, analysis and barrier design, lighting coordination, signing, pavement marking, traffic signal design, and utility coordination. Representative examples of his experience include: performing value engineering cost studies, preliminary engineering designs, constructability studies, and project management and detail design for construction of projects on interstate, interchanges, state highways, and local streets. **Relevant experience**

includes: Project Manager for the I-81 project bridge replacement and widening project, SHA; Project Manager for MD 139 (Charles Street) at I-695 interchange reconstruction final design contract, SHA; Project Manager for MD 26/I-695 Interchange final design contract, SHA; QA/QC Lead for RK&K portion of MD 404 – US 50 to East of Holly Road D-B, SHA; Highway Segment Manager for Monroe Connector Bypass D-B, NCTA; Project Manager, I-795 rehabilitation between I-695 and Owings Mills Boulevard, SHA; Project Manager, MD 124 from MD 28 to Orchard Ridge Drive Safety and Resurfacing, SHA; Project Manager, MD 193 from I-495 to MD 320 Safety and Resurfacing, SHA.

SCOTT CRUMLEY, PE, PTOE

TMP/MOT | RK&K

23 Years' Experience

MD PE No. 29182

PTOE No. 1284

MS/Information and Telecommunication Systems

BS/Civil Engineering

Mr. Crumley, a Project Manager in RK&K's Transportation Department, has been responsible for managing the development, implementation and operation of highly visible, multi-billion-dollar highway and transit improvement projects, including all traffic design elements and MOT during construction. He has demonstrated a wide range of traffic engineering management expertise on multi-jurisdictional, mega-scale projects within SHA District 3. Mr. Crumley is a Certified SHA Traffic Control Manager and ATSSA Traffic Control Supervisor.

With more than 23 years' experience at the state and local government levels and the private sector, Mr. Crumley's engineering experience encompasses a diverse range of tasks, including development of MOTAA's, TMPs and red flag summaries; work zone temporary traffic control design, implementation and inspection; traffic operational reviews and capacity analyses; and stakeholder outreach. He has direct experience in public outreach and consensus building with elected officials and regional and local stakeholders. He has a working knowledge of the MD MUTCD and many other SHA traffic standards, the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals; the FHWA Standard Highway Signs manual; and the Highway Capacity Manual. **Relevant experience includes:** Lead Traffic Engineer for IS 270 at MD 187 and Rockledge Boulevard Interchange, SHA; MD 32/Linden Church Road Interchange D-B, SHA; Traffic Project Manager for ICC D-B, SHA; Traffic Engineer for US 29 at Cherry Hill Road/Randolph Road Interchange, SHA; Norbeck Road Extended from MD 28/MD 182 to MD198/MD 650, SHA; US 29 at Briggs Chaney Road Interchange, SHA.

Mr. Phillips provides the environmental Team with extensive experience in the inspection and design of civil engineering projects involving stream restoration, outfall stabilization, SWM, ESC, for roadway construction, and bridge replacement projects. Additionally, Mr. Phillips has considerable experience in the environmental permitting related to these projects along with watershed hydrology & hydraulic studies, physical & biological monitoring, wetland creation, and new/retrofit design for stormwater management BMP facilities. Mr. Phillips has worked as an on-site SHA-HHD Consultant assisting in determining appropriate project environmental permits and impacts and in the preparation and review of environmental permit applications for accuracy and necessity (SWM/ESC/GWCP/JPA). He has extensive working knowledge of the 2000 Maryland Guidelines to Waterway Construction, the 1994/2011 Maryland Standards and Specifications for Soil and Erosion Control, the 2000 Maryland Stormwater Design Manual (and subsequent updates), Sediment and Stormwater Guidelines and Procedures (SHA) Part A and B, ESD Design Guidance documents, SHA Stormwater Management Site Development Criteria, SHA Highway Drainage Manual, and SHA Phase I & II NPDES MS-4 permit requirements. **Relevant experience includes:** On-Site staff support and Liason for SHA Stormwater Management & Erosion Sediment Control Review Services, SHA; Design Team Lead for TMDL SWM Site Searches & Concept Design, SHA; Project Manager for Minebank Run Stream Restoration and Water Quality Improvements, SHA; SWM Lead for Capital Beltway and IS 270/US 15 Multi-Modal Corridor Study, SHA.

STEVE PHILLIPS, PE

SWM/ESC/H&H | RK&K

15 Years' Experience

MD PE No.33341

MDE Green Card #16786; SHA Yellow Card #11-536

BS/Civil Engineering

Mr. Phillips has worked as an on-site SHA-HHD Consultant assisting in determining appropriate project environmental permits and impacts and in the preparation and review of environmental permit applications for accuracy and necessity (SWM/ESC/GWCP/JPA). He has extensive working knowledge of the 2000 Maryland Guidelines to Waterway Construction, the 1994/2011 Maryland Standards and Specifications for Soil and Erosion Control, the 2000 Maryland Stormwater Design Manual (and subsequent updates), Sediment and Stormwater Guidelines and Procedures (SHA) Part A and B, ESD Design Guidance documents, SHA Stormwater Management Site Development Criteria, SHA Highway Drainage Manual, and SHA Phase I & II NPDES MS-4 permit requirements. **Relevant experience includes:** On-Site staff support and Liason for SHA Stormwater Management & Erosion Sediment Control Review Services, SHA; Design Team Lead for TMDL SWM Site Searches & Concept Design, SHA; Project Manager for Minebank Run Stream Restoration and Water Quality Improvements, SHA; SWM Lead for Capital Beltway and IS 270/US 15 Multi-Modal Corridor Study, SHA.

JOHN NEY

Utility Coordination | RK&K

45 Years' Experience

High School Graduate

Mr. Ney is a Senior Utility Coordinator with RK&K's environmental group and has more than 45 years of experience with SHA. His project experience has involved structural bridge widening, rehabilitation projects, major corridor roadway design projects and major transit projects. He has experience coordinating with utility owners and their approved design consultants to prepare utility relocation drawings and as-built utility drawings. He also brings experience related to 3rd party utility coordination and

agreement execution for utility owners in Montgomery County from his recent work on the Purple Line LRT. **Relevant experience includes:** Utility Coordinator for MD 355 at Cedar Lane, SHA; Utility Coordinator for ICC D-B, SHA; Utility Coordinator for MD 97 Randolph Road Intersection Improvement Advanced Utility Relocation, SHA; Project Manager/Utility Coordinator for MD 108 Widening Dr. Bird Road to Olney Road, SHA; Utility Coordinator for I-95 Contee Road Interchange, SHA; Utility Coordinator for PMC Team, Purple Line Light Rail Transit P3, MTA.

Construction Key Staff

The CGI Team has the *regional, national, and international experience* to identify the best solution for this project and the *local experience to deliver it*.

Key Staff are shown below in **orange**. Value-Added Staff critical to the project are shown below in **bold**. Resumes for Key Staff and Value-Added Staff are shown on the following pages. Our organization chart and staff time commitments are provided in Section 3, Project Understanding and Progressive Design-Build Approach, Composition of the Design-Builder.

The CGI Team knows Well-Managed Projects

Our construction executive leadership, **Butch Lundgren** and **Jay Bruce**, provide a combined 76 years of project delivery experience. They will ensure sufficient resources for the construction Team and will be personally engaged in providing construction expertise during the design phase to ensure fully integrated and constructible solutions.

Design-Build Project Manager Michael Higgins brings a proven track record of delivering well-managed, highly-complex Design-Build projects in Maryland and Virginia, on-time and on-budget. His leadership role overseeing CGI's current D-B projects combined with his experience serving as Design-Build Project Manager on projects such as Route 58 PPTA (VDOT) and Segment 1 of I-95 HOT Lanes (VDOT), will ensure his ability to lead a fully committed Team of design and construction professionals to meet the IS 270 project goals.

Cost Estimator Mark Miller will utilize his 24 years of experience in cost estimating major transportation projects, including design-build, to lead the development of Construction Agreed Price (CAPs) for work packages. Electrical Estimator **Kenneth Boyle** will provide assistance for the ITS/ATM infrastructure including development of life-cycle costs.

The CGI Team knows Project Implementation

Construction Manager Joseph Kirsch will be responsible for day-to-day management of the on-site construction Team, scheduling, project controls, value engineering, and constructability reviews. His experience on major construction programs, including I-95 Express Toll Lanes, MD 355 at Montrose Road Design-Build, and US 29 at MD198 Design-Build will be critical to successful completion of the project.

Based on his 20 years of experience with large scale heavy civil safety programs Safety Manager **Brian Colson** will be responsible for development and administration of the project safety program covering both the CGI Team and the public. **Armando Cruz** will rely on his experience as MOT/Traffic manager from the I-95/I-695 Inner Loop and MD 210 Design-Build projects to manage and coordinate all MOT requirements, including assisting in development of the TMP and implementation of MOT in the field.

On-site Environmental Manager **Joe Hall** will oversee environmental compliance during the construction phase, including permitting, approvals, compliance and field modifications. With previous design-build experience such as MD210, he understands the importance of continuous coordination with the design Team, SHA, and stakeholders (including MDE/PRD.)

Steve Beckley will be the Utilities Manager, coordinating with the design Team, SHA, and utility companies ensuring all utility conflicts are identified, mitigated, and managed as necessary to prevent delays to the project.

ITS Construction Manager Paul Barber will provide construction management for ITS/ATM devices based on his recent experience with PennDOT ITS/ATMS, Montgomery County Signals, and CHART deployments. He will oversee construction, testing, and integration of new facilities as well as integration with existing facilities such as CHART.

Joseph Washell will be the electrical superintendent. He brings 40 years of experience in electrical construction including ITS and TSMO assets for clients such as SHA, MDTA, MAA, PennDot, NYDOT and NJDOT. **Larry Herman** will be the ITS Device Manager for the CGI Team. He has managed the implementation of ITS devices for numerous owners including PennDOT, MNDOT, and NJDOT.

Roger Boothe will service as an ATM Construction Expert. His experience with the CHART ITS On-call contract as well as design and construction leadership of the I-495 HOT Lanes will provide a critical linkage between the design and construction Teams.

Clients Served

- ✓ SHA
- ✓ VDOT
- ✓ MDTA
- ✓ Montgomery County
- ✓ Baltimore City
- ✓ MD Port Administration
- ✓ MD Aviation Authority
- ✓ Administration
- ✓ SARAA
- ✓ Port Authority of Allegheny County
- ✓ PA Turnpike
- ✓ PennDOT
- ✓ NYDOT
- ✓ NJDOT

MICHAEL HIGGINS, PE
Design-Build Project Manager | CGI | Key Staff
30 Years' Experience

Pennsylvania Registered Professional Engineer No. PE044299E | BS/Civil Engineering



Mr. Higgins has experience as a Project Executive and Design-Build Project Manager for the construction of heavy/highway projects such as airports, roads, highways, and bridges, as well as utilities in the states of Maryland, Virginia, North Carolina, West Virginia, Pennsylvania, Texas, and Kentucky. With more than 30 years of experience in the construction industry managing preconstruction, roadway/highway construction, bridge and utility construction, cost controls, schedule compliance, procurement, and corporate resources, Mr. Higgins has a proven track record delivering highly-complex, traffic-intensive projects to clients on-time and on-budget. He has served a similar role as Design-Build Project Manager in delivering the following Design-Build projects: VDOT Route 58 PPTA, I-95 Express Lanes, Route 15 PPTA for Prince William County, VA, VDOT Route 3 Widening, VDOT Greenview Drive Widening, and Stafford County PPTA.

Maryland Projects, Leadership Role: Over the last year, Mr. Higgins has taken on a leadership role with CGI and is involved with all CGI's current MDOT/SHA projects, including the MD 210 Livingston Road/Kerby Hill Road Interchange Design-Build project, the I-95/I-695 Inner Loop Bridge Replacement project, and the I-95 Noise Wall Installation project. His management responsibilities include ensuring proper allocation of resources, both CGI's labor and equipment along with outside contractor forces; oversight of project management; scheduling; and financial and regulatory requirements to meet both contractual and corporate expectations. Mr. Higgins has been working alongside Mr. Butch Lundgren in conjunction with SHA leadership in evaluating and reviewing current SHA policies, procedures and specifications, and developing new guidelines to address industry concerns. Relevant experience includes:

Route 58 PPTA, VDOT, Hillsville and Stuart, VA: Serving as Design-Build Project Manager, Mr. Higgins was the authorized representative for the design-builder for the \$223M project and was responsible for all services required under the contract, including: design, ROW acquisition, utility relocation, permitting, construction, and QA/QC. The comprehensive agreement was for the development, design, and construction of 36 miles of Route 58 between Hillsville and Stuart, Virginia. One of the project benefits was to address **safety** and congestion concerns on both I-64 and I-81 by providing a safe alternate route for all vehicles. To date, two Design-Build segments have been completed ahead of schedule and on-budget and a third will be completed this year. Each Design-Build segment was developed as a construction package with a defined scope of work and a reconciled design/construction agreed-upon price.

Segment 1 of I-95 HOT Lanes, VDOT, Stafford County, VA: Serving as Design-Build Project Manager, Mr. Higgins represented the contractor responsible for building the 9-mile extension of the existing HOV lanes from Dumfries to Garrisonville Road, which enhanced **mobility** by alleviating the worst bottleneck in the region. The overall project cost was \$925M for 29 miles of high-occupancy toll lanes with new capacity, which included installation of all new electronic/dynamic tolling facilities, new sound wall protection, and new entry and exit points. Mr. Higgins worked with Transurban and Fluor-Lane to develop construction packages for the project, including quantities and cost estimates, submit proposals, and reconcile final value for this segment of the overall project.

Route 15 James Madison Highway, Prince William County, VA: Serving as Design-Build Project Manager, Mr. Higgins led the Design-Build Team for this \$52M, 22-lane-mile project, which included five distinct and separate sections to improve traffic **mobility** through a highly congested area. Mr. Higgins was the main lead during the pre-construction activities and his responsibilities included conceptual designs and negotiations with the client for a fixed-fee for design/construction/inspection and allowances for ROW, utility relocation, and permitting. Mr. Higgins was the authorized representative for the design-builder for the project and oversaw the design and construction, including five bridge structures and lighting and signalization for four major intersections, including coordination with VDOT traffic management systems. This project had geotechnical challenges from the existing soils and rock which required different approaches to mitigate these impacts.

Key Relevant Experience: Design-Build; Local Agency Coordination; Preconstruction Services; Value Engineering; Reconciliation of Cost/Price; Design Coordination; Roadway Alignment/Widening; Coordination with ROW Acquisition; Utility Coordination and Relocation; Public Involvement/Communication; Stakeholder Coordination; Partnering; Risk Management/Mitigation; Development of Contracting Plans, including DBE Goals; Design/Construction Scheduling; Permit Development and Acquisition; Environmental Permitting and Monitoring; Stream/Wetland Compensatory Mitigation; Geotechnical; Traffic Management Plan Development and Execution; QA/QC Coordination

JOSEPH KIRSCH

Construction Manager | CGI | Key Staff

33 Years' Experience | 2011/Adult CPR & First Aid Training | 2006/OSHA 30-Hour Course | 2011/MDOT Traffic Manager Course | 2009/Erosion Sediment Control Certification | OSHA 10-Hour Course-1999/High School Graduate



With more than 33 years in the construction industry, Mr. Kirsch has extensive experience in heavy highway construction and as a Construction Manager on other Design-Build projects, specifically for SHA to bring valuable construction management leadership skills to the project. He has participated in many roles, including Construction Manager, where he was responsible for managing and supervising large and complex highway construction projects, including several Design-Build projects. He has overseen numerous large highway projects involving bridge construction, major earthwork, and paving construction. His responsibilities include implementing safety programs and hazmat programs for work sites, as well as monitoring environmentally-sensitive areas to ensure contractual compliance. Relevant experience includes:

I-95/I-895 Interchange (I-95 Express Toll Lanes), MDTA, Baltimore City & County, MD: Mr. Kirsch was the Construction Manager for this \$90M project to relieve congestion and increase *mobility* along the I-95 corridor through Baltimore. The project consisted of two 1,900-LF curved bridges, retaining walls, multiple phases of MOT along a heavily traveled corridor, full-depth pavement construction, storm drainage construction, SWM facilities, landscaping, signing, marking, sign structures, lighting, ITS infrastructure, utility coordination and relocation. Mr. Kirsch was responsible for managing and coordinating trades with multiple crews, 22 suppliers, and 30 subcontractors (of which 15 were MBEs), and ensuring contract compliance. He also managed day-to-day construction activities and crew assignments, monitored the schedule, identified construction problems, and attended partnering meetings from which Mr. Kirsch prepared and maintained an Issues Resolution List. To avoid delays, Mr. Kirsch worked with the designers, owner, and MDE on plan changes and errors. Major realignment of the I-95/I-895 interchange was performed without significant traffic impacts by safely maintaining traffic and providing better *mobility* through the use of DMS during construction.

MD 355 at Montrose Road/Randolph Road from Old Georgetown Road to Maple/Chapman Avenue, Montgomery County, MD: As the Construction Manager of this \$30M Design-Build project right along the IS 270 corridor, Mr. Kirsch handled preconstruction services and construction of an interchange at MD 355 and Montrose/Randolph Road, construction of relocated Montrose Parkway on new alignment, new bridge and retaining walls, construction of three interchange ramps on new alignment, significant MOT phasing with temporary detours and ESC phasing, drainage construction, utility relocations, SWM facility construction, and traffic signalization bringing increased *safety* to this congested area.

US 29 at MD 198, SHA, Montgomery County, MD: Mr. Kirsch was the Construction Manager for this \$28M Design-Build Project, which included the design, preconstruction and construction services to convert an existing at-grade intersection to a grade-separated interchange and associated highway reconstruction work along US 29. The project involved complex MOT due to high traffic volumes on US 29 and MD 198, subgrade and pavement construction, retaining walls, ESC, utility coordination/relocation, SWM ponds, and stream restoration within the Patuxent River Critical Zone. Provided critical oversight to utility coordination efforts to eliminate delays for major utility companies.

Emergency 26th Street Repair & North Charles Street Reconstruction from 25th Street to University Parkway, BCDOT, Baltimore City, MD: As the Construction Manager, Mr. Kirsch managed this \$23M project, including reconstruction of approximately 5,300 feet of North Charles Street, a major *safety* reconstruction project in the heart of Baltimore City. In April 2014, the roadway collapsed along 26th Street closing both 26th Street along with the adjacent railroad. The City chose CGI to perform the work for several reasons, including CGI's competent resources; expertise working with the City; and their experience working with the local communities, business owners, and impacted stakeholders. Mr. Kirsch was responsible for managing all construction activities, including all subcontractors and 3rd party utility contractors, while also managing the overall construction schedule. He coordinated with Johns Hopkins University, Access to Student Health and Wellness Center, Charles Village, Verizon, Comcast, the Parking Authority of Baltimore City, Baltimore Museum of Art, and other stakeholders to minimize impacts and to deliver a quality project in as short as duration as possible.

Key Relevant Experience: Highway Construction; Construction Management; Design Coordination; Value Engineering; Environmental Sensitivity and Permit Monitoring/Compliance; Stakeholder Coordination; Minimization of Traffic Impacts During Construction; Minimization of Scope/Cost for Owner; Constructability Reviews; Scheduling; Design/Preconstruction and Construction/Partnering Coordination; Implementation of DBE Contracting Plan; Preconstruction Services

MARK MILLER
Cost Estimator | CGI | Key Staff
24 Years' Experience

NUCA Competent Person, ARTBA Transportation Builder Institute's Management
Crucible Academy | College Coursework in Construction



Mr. Miller brings more than 24 years of experience as a Cost Estimator for SHA projects, including experience with negotiating CAPs, to successfully prepare and negotiate OPCCs and CAPs for this \$100M project. His estimating experience includes construction of roads, highways, bridges, and utilities, as well as all of CGI's Design-Build projects throughout Maryland. Mr. Miller is responsible for the overall business procurement for the company. His responsibilities include: project identification and selection; oversight of detailed engineering requirements; detailed quantity take-offs; developing cost estimating and final pricing, DBE and Subcontractor plans, and project risk assessment and associated pricing, to ensure the proper contract documents with pricing are submitted to the owner. Mr. Miller has an extensive history of successful transportation design-build experience, including MD 32 at Linden Church Road, US 50 HOV Lanes from I-495 to MD 197, US 29 at MD 198, MD 124, MD 355 at Montrose Road/Randolph Road, Ramp 6 Widening from EB I-495 to SB MD 97, and the MD 210 at Livingston/Kerby project. He is responsible for the successful pursuit of more than 200 MDOT/SHA projects, including many on and along the I-495/IS 270/I-70 corridor. Mr. Miller is responsible for examining bid documents, identifying construction items, developing cost/price/risk strategies and assessing cost effectiveness, solving complex constructability issues, identifying/pricing/mitigating risk items, and negotiating contracts with various owners. Relevant experience includes:

MD 210 Livingston Road/Kerby Hill, SHA, Prince Georges County, MD: As the Design-Build Coordinator/Chief Estimator; Mr. Miller was responsible for leading the estimating team for this \$83M project which increases **safety and mobility** through the design and construction of a grade-separated interchange at the intersection of MD 210 with Livingston Road/Kerby Hill and a new service road to maintain access to residential and commercial properties. Mr. Miller led the estimating team in quantifying all components for all disciplines on the project and managed the collaboration, coordination, and communication between all team members during the planning/bid phase to construction.

I-95/I-895 Interchange (I-95 Express Toll Lanes), MDTA, Baltimore City and County, MD: Mr. Miller was the Chief Estimator; This \$90M project included the widening and reconstruction of I-95 and I-895 to provide ETLs in both northbound and southbound directions and managed lanes to increase **mobility and safety** through this congested corridor. Mr. Miller led the estimating team in quantifying all components, risk assessment and mitigation. A key feature and major risk item was the MOT and traffic phasing for the project. Since the project's access/work areas were limited, Mr. Miller coordinated with multiple contractors as several other projects were being constructed simultaneously.

Emergency 26th Street Repair & North Charles Street Reconstruction from 25th Street to University Parkway, BCDOT, Baltimore City, MD: In April 2014, North Charles Street collapsed along 26th Street closing both 26th Street along with the adjacent railroad. As the Chief Estimator and Project Controls Manager for the project, Mr. Miller managed CAP negotiations, subcontracting plans, risk management for this \$12M project, including reconstruction of approximately 5,300 feet of North Charles Street, a major **safety** reconstruction project with an aggressive schedule, in the heart of Baltimore City.

Mr. Miller has proven experience with negotiating CAPs with similar clients. The following list is the most recent projects where price, risk, and assumptions were discussed with the owner prior to final contract price execution.

- US 15 Shared-Use Path Connection, Bid#16-3, City of Frederick – \$1.8M BAFO was negotiated to fit with the limited budget of the City of Frederick.
- White Flint West Workaround, IFB#1048406, Donley, LLC for Montgomery County – negotiated a final cost of \$7.6M to construct the Site/Roadwork portion of "White Flint West" project.
- Emergency 26th St Repair – developed OPCCs ahead of negotiating a final lump sum CAP contract for +\$12M contract with the City of Baltimore to provide construction services.

Key Relevant Experience: Identify Project Risks and Mitigation Measures; Develop Risk Management Plan; Perform Risk Assessments and Maintain Project Risk Register; Develop OPCCs for Initial Designs; DBE and Subcontracting Plans; Quantities; Construction Cost Models; Partnering to Resolve Various Construction Issues; Risk Assessments to Minimize Impacts to Adjacent Projects; Led Internal Review Meetings to Reconcile Estimates; Negotiate CAPs; Develop/Provide All Bidding Documentation Required by Owner.

PAUL BARBER, PE
ITS Construction Manager | B&M | Key Staff
22 Years' Experience
Pennsylvania Registered Professional Engineer No. 061125
BS/Civil Engineering | BS/Physics, Minor Geology/Earth Science



Mr. Barber has 22 years of experience in construction management of electrical construction components of highway projects with a recent focus on management and implementation of TSMO, ITS, and ATM infrastructure including integration with software vendors and providing management oversight for operations and maintenance contracts. Mr. Barber has been directly responsible for multiple Design-Build ITS projects in the northeast region. Mr. Barber has managed and constructed numerous ITS projects for multiple clients during his career with B&M, including: SHA, MDTA, MPA, MAA, SARAA, Port Authority of Allegheny County, PA Turnpike, and PennDOT. Relevant experience includes:

CHART DMS Deployments, SHA, Statewide, MD: Project Manager, for prime contracts possessing a combined bid price of \$4.5M and managed as an Area-Wide project. The scope includes the installation of overhead, pedestal, and ground-mounted DMS signs within all seven Districts of SHA. The individual project responsibilities encompass the installation and commission of the DMS signs indicated by the released task. Work on these projects began in December 2014, and are currently ongoing.

Traffic Signal Modification/Reconstruction w/APS/CPS SHA, Statewide, MD: Project Manager, for prime contracts possessing a combined bid price of \$21.5M and managed as an Area-Wide Project. The scope includes the upgrade of ADA ramps, pedestrian signals, and traffic signals at 162 different locations within five Districts of SHA increasing *safety* for pedestrians and motorists at intersections. Seventy of these intersections are within Montgomery County. The project responsibilities encompass the installation and commission of complete traffic signal intersections and upgrades and modifications. Work on these projects began in April 2014 and will be completed in October 2016.

Wabash Tunnel HOV AB-7B D-B Project, Allegheny County, PA: As Project Manager; Mr. Barber was responsible for the design, construction, and operation of the \$8M Wabash Tunnel project. This project consisted of design and construction of a One-Way Reversible HOV Facility increasing *mobility* into and out of downtown Pittsburgh. The design and construction encompassed the following systems: Fiber Optic Network, installation of 5 CCTV Cameras, 2 CO/CO2 Detection Systems, 26 Access Gates, 24 Changeable Message Signs, and a Traffic Management Center. The Traffic Management Center was constructed and all systems were integrated into the ATMS. B&M *operated* and *maintained* this facility for two years and the Port Authority added an additional year of *operations* and *maintenance* through 2008.

SR0095 Section ITB, Bucks County, PA: As Senior Project Manager; Mr. Barber was responsible for the design, construction, and operation of the Bucks County \$21.7M I-95 Design-Build ITS Project. This project consisted of installation of 31 CCTV Cameras, 17 Dynamic Message Signs, VDS System, 51 Single VDS and Dual VDS, 54 TTS Detection, Remote Communication HUB, RTMC System Integration and Software, CCTV System, Sonet Communications Upgrade, EOC Video Sharing and Conferencing, and an Incident Management Plan. B&M *maintained* the system for two years after construction, performing periodic, scheduled preventative maintenance; troubleshooting problems; and providing emergency responses to all issues associated with the system.

SR 202 Section 7IT – PennDOT, Bucks and Montgomery Counties, PA: As Senior Project Manager responsible for the \$5.7M project to an upgrade and expansion of the existing PennDOT ITS network, which will facilitate better *mobility* through more efficient incident response and transportation management, and provide valuable information to travelers to improve the *safety* and efficiency of their experience on the 202 corridor. The devices and locations scoped for this project fit into PennDOT's overall Arterial ITS Completion Plan. The project enhanced PennDOT's cooperation and collaboration with regional stakeholders located in the area. This project construction includes an ITS along the US 202 Parkway and its parallel/intersecting routes to monitor traffic and inform motorists of traffic conditions. The project includes the following ITS elements: 21 CCTV Camera System; Nine Dynamic Message Sign System; 19 Travel Time System (18 Bluetooth readers and one TR); Communication Network; RTMC integration; RTMC Modification, including Installation of Two Smart Display Boards; Seven Video Sharing Systems; and 23 Traffic Signal Systems. B&M constructed, installed, integrated, trained, tested, and documented the system providing a complete and operational ITS expansion. B&M *maintained* the ATMS software and the field devices for a period of two years after construction.

Key Relevant Experience: Design-Build; Installation of ITS Elements: CCTV, DMS, VMS, Vehicle Detectors (microwave, tag readers, Bluetooth readers); Video Sharing Systems; Installation of Communication Systems; Integration of ITS Components into Existing Traffic Management Centers; Video Wall installation and Modifications; Fiber Optic Networks; Incident Response; Transportation Management; Signal Systems; Travel Time Systems; CHART

Construction Value-Added Staff

Mr. Boothe will use his expertise across the project lifecycle, which will help unite ATM design and construction elements into a cohesive effort. His specialized capabilities in ATM will help craft the project concept, and his experience in heavy highway construction will help drive the concept to practical reality. He brings extensive experience in managing large, complex highway projects with significant technology components, from initial concept through construction. He has specific expertise in Design-Build Procurement from both the public and private sector perspective. He helped negotiate the Comprehensive Agreement on behalf of VDOT for the I-495 HOT Lanes Project. Mr. Boothe has a long history of successfully serving SHA and a deep familiarity with the CHART program. **Relevant experience includes:** Project Manager in CH2M's sub-consultant role on the CHART ITS On-Call Contract, SHA; Project Manager and Deputy Project Manager final design and construction I-495 HOT Lanes Lanes, VDOT; Contract Manager Northern Virginia Megaprojects Program GEC, VDOT.

ROGER BOOTHE, PMP
ATM Construction Expert | CH2M
24 Years' Experience
MBA/Business
BS/Journalism

JOSEPH WASHHELL, JR.
Electrical Superintendent | B&M
40 Years' Experience

Mr. Washell brings 40 years of experience in electrical construction to oversee and implement all aspects of TSMO-type solutions for this project. Mr. Washell has first-hand expertise in all aspects of transportation electrical construction, and has safely executed projects for a wide variety of clients including: SHA, MDTA, MAA, SARAA, PA Turnpike, PennDOT, NYDOT, and NJDOT. His

detailed electrical construction responsibilities include: safety, quality management, manpower allocation, equipment management, pre-construction activities (pre-assembly, pre-kitting, and procurement), and coaching and mentorship of electrical field staff. Mr. Washell's ability to mentor and coach exponentially increases our Team's ability to consistently deliver safe, on schedule, with the highest level of quality projects to our clients. Specific technical experience includes: automated bridge anti-icing systems; 50+ interconnected Traffic Signals, Automated Fog Detection Projects; RWIS Sites; Wireless Communications for ITS Devices; Navigational Systems for Airports (NAVAIDS), which are composed of MALSR Systems, PAPI, Localizers, and Glideslopes. **Relevant experience includes:** SR0095 Section ITB, PennDOT; SR 202 Section 7IT, PennDOT, SR 202 Section 3IT, PennDOT.

Mr. Herman provides technical engineering expertise for implementing ITS/ATM solutions by using his engineering background and construction experience to provide crossover between design and construction. Mr. Herman has managed and constructed numerous traffic signals, ITS, highway lighting and anti-icing projects. He has managed our technicians group where his tasks involved troubleshooting, scheduling, maintenance activities, integrating, and estimating for many clients such as: PennDOT, PA Turnpike, MNDOT, NJDOT, MDT, and multiple Townships and Boroughs. **Relevant experience includes:** Project Manager for ITS Device Implementation including CCTV, DMS, HAR Beacon Signs and TMC integration, District 2 SR 80 ITS, PennDOT; Electrical manager for IP-based systems with communications established via T-1 MPLS or wireless cellular communications, District 3 SR 80/US 15/SR 220 ITS, PennDOT; Electrical Manager for upgrading 53 traffic signal intersections utilizing the InSync Adaptive Signal Control Systems, District 8 Carlisle Pike Signal Upgrade, PennDOT.

LARRY HERMAN
ITS Device Manager | B&M
12 Years' Experience
BS/Mechanical Engineering

KENNETH BOYLE
Electrical Estimator | B&M
28 Years' Experience

Mr. Boyle will support lead Cost Estimator, Mark Miller, in providing cost-estimate pricing for CAPs and OPCCs for all ITS/ATM infrastructures. During proposed technical solutions development, Mr. Boyle will provide valuable input on life-cycle costs as part of evaluating solutions. Mr. Boyle has had profit/loss responsibilities for transportation electrical/signing/ITS projects from \$100K-\$10M, including: submittals,

change orders, conflict resolution, billings, receivables, material buyouts, resource management, quality management, adherence to company safety program and other policies, enhancing client relationships, business development, and pursuit of new opportunities. Chief Estimator specialized in the Transportation electrical construction market. Mr. Boyle has value engineered numerous cost estimates on ITS projects and has successfully negotiated multiple projects in his role as Chief Estimator **Relevant experience includes:** CHART DMS Deployments, SHA; Wabash Tunnel HOV AB-7B D-B Project, Port Authority; SR0095 Section ITB, PennDOT; SR 202 Section 7IT, PennDOT.

ARMANDO CRUZ
MOT/Traffic Manager | CGI
25 Years' Experience

TMP as needed. During construction, he will ensure the proper implementation of traffic control devices in the field and will review their performance, quality, and location throughout construction. As needed, Mr. Cruz will work with traffic engineering staff on the design and construction teams to make improvements due to unanticipated driver and pedestrian behaviors, and authorize equipment replacement due to damage. **Relevant experience includes:** MOT/Traffic Manager, I-95/I-695 Inner Loop Bridge Replacement project, SHA; MOT/Traffic Manager, I-95/I-895 Interchange project, MDTA; Traffic Manager, North Charles Street Reconstruction, Baltimore City.

Mr. Cruz, our on-site MOT/Traffic Manager, will work closely with our traffic engineering staff during design and will review plans to ensure all MOT/traffic elements are coordinated and sequenced with construction activities, including ESC phasing and in conformance with ESC permits. He will offer construction insight into the development of the MOT phasing with the design staff and provide input on the

Mr. Colson will lead the CGI Team in maintaining a safe, healthful and productive work environment for our employees and the traveling public on our work sites as the Safety Director with CGI. Mr. Colson will report to the Design-Build Project Manager and knows that the protection of his employees, property, the public, and the environment is essential to the efficient and successful completion of every project.

He has held the position of Safety Manager at CGI for the last year, and has over 20 years of experience overall with large-scale, heavy civil safety program development and management. **Relevant experience includes:** Safety Manager for American Environmental Construction and Corporate Safety Director for United Construction Services.

BRIAN COLSON
Safety Manager | CGI
20 Years' Experience

JOE HALL
Environmental Manager | CGI
15 Years' Experience

packages. He will be on-site during construction to ensure the proper erosion control measures are installed and maintained to comply with all environment regulations, approved plans, and permits. Mr. Hall has more than 15 years of experience in the construction industry, including four years with CGI in similar roles. **Relevant experience includes:** Environmental and ESC Manager, MD 210 Livingston Road/Kerby Hill Road Interchange D-B project, SHA; Environmental and ESC Manager, I-95/I-695 Inner Loop Bridge Replacement project, SHA; Environmental and ESC Manager, North Charles Street Reconstruction, Baltimore City; Environmental and ESC Manager, Emergency 26th Street Repairs, Baltimore City.

Mr. Hall, our on-site Environmental Manager, will work closely with our designers and Design-Build Project Manager to ensure environmental requirements are being met through all phases of the project. Communicating regularly with the design Environmental Compliance Manager, he will oversee environmental permitting/approvals/compliance for the different work packages and mitigation

Mr. Beckley, our on-site Utilities Manager, will coordinate with the design utility coordinator to reduce utility impacts where possible and ensure all utility conflicts are managed in a timely manner and within budget. As Utilities Manager, his responsibilities are to ensure all utilities are identified, impacts are minimized, and necessary relocations are coordinated and effectively scheduled and sequenced prior to and during construction. Mr. Beckley will facilitate coordination with all 3rd party utilities as part of the stakeholder coordination during design, pre-construction, and construction phases. With more than 30 years of experience in the construction industry, including 14 years with CGI, Mr. Beckley is very familiar with the various types of roadway and bridge construction, which may be utilized on IS 270. **Relevant experience includes:** Utilities Manager, MD 32 at Linden Church Design-Build project, SHA; Utilities Manager, Montrose Parkway, Montgomery County; Utilities Manager, MD 355 at Montrose Road/Randolph Road Design-Build, SHA; Project Manager, MD 210 Livingston Road/Kerby Hill Road Interchange D-B project, SHA.

STEVE BECKLEY
Utility Coordinator | CGI
30 Years' Experience

Executive Committee

RAYMOND (BUTCH) LUNDGREN

Executive Team | CGI

52 Years' Experience

BS/Civil Engineering

roadway/highway construction, bridge and utility construction, cost controls, schedule compliance, procurement, and corporate resources, Mr. Lundgren has a proven track record delivering highly-complex, traffic-intensive projects to the SHA on-time and on-budget. **Relevant experience includes:** Design-Build Project Manager for the following: MD 32 at Linden Church Road D-B, SHA; US 50 HOV Lanes from I-495 to MD 197 D-B, SHA; US 29 at MD 198 D-B, SHA; MD 124 D-B, SHA; MD 355 at Montrose Road/Randolph Road D-B, SHA; and Ramp 6 Widening from EB I-495 to SB MD 97 D-B, SHA.

Mr. Bruce brings more than 24 years of corporate, project, and construction management experience to B&M. He has served in several management roles within the company and has been involved with various projects throughout the United States. As president of the company, Mr. Bruce monitors overall project planning and assures that performance goals for safety, quality control, customer service, schedule, and budget are all achieved. Prior to joining B&M, Mr. Bruce was involved in the heavy civil and environmental construction industry, and has served as project manager on several multi-million-dollar heavy civil and environmental remediation projects throughout the country. He has also performed many specialty projects, including tunnel installation, landfill development, landfill closure and deep soil mixing. He holds bachelor's degrees in civil engineering and business.

JAY BRUCE

Executive Team | B&M

24 Years' Experience

BA/Business Administration

BS/Civil Engineering

MELINDA PETERS, PE, DBIA, CCM

Executive Team | RK&K

22 Years' Experience

MBA/Business

MD PE No. 31460; CCM/6451; DBIA/52388

BS/Civil Engineering

employees, as well as management and design of traditional Design-Bid-Build projects and D-B projects; MOU's and agreements; contract development; procurement documents; risk management; design management; plan preparation; environmental requirements; utility coordination; issue resolution; and construction coordination.

Ms. Peters Ms. Peters has more than 22 years of experience for major transportation projects, including: executive leadership of SHA for more than three years; project director for the largest and most environmentally-sensitive D-B project in Maryland's history, the Intercounty Connector; and project manager for a major corridor in the Baltimore-Washington region, US 29. Ms. Peters experience is extensive, and includes: oversight of a large state agency with a \$1.4B program and more than 3,000

Mr. Gartner has more than 25 years of experience in transportation policy and management. Before joining CH2M in August of 2015, he served as Executive Director of the MDTA where he managed a diverse management team responsible for the planning, engineering, operations and financial management of an independently-funded toll authority. Responsibilities included: setting agency priorities, consistent with the direction of the Governor and Secretary of Transportation while working with a nine-member board; electing officials, civic leaders, and the media to explain the implementation of new tolling programs; and project completion and start-up operations of major new facilities including: the I-95 Travel Plazas, the I-95 Express Toll Lanes (ETLs), and the final portion of the Intercounty Connector (MD 200). Prior to Mr. Gartner's role as MDTA Executive Director, he served as Director of Policy and Government Affairs and as an Assistant Secretary at the Maryland Department of Transportation (MDOT), where he focused on multi-modal programs, governmental affairs, federal aid, and transportation funding policies. Between 2003 and 2007, he served at the MDTA as Deputy Director and Director of Strategic Development during the early development of both the ICC and I-95 Express Toll Lanes.

BRUCE GARTNER

Executive Team | CH2M

25 Years' Experience

MS/Public Policy Analysis

BA/Political Science

Submitted to:



Section 3



Project Understanding and Progressive Design-Build Approach

Project Understanding and
Progressive Design-Build Approach

3

Submitted by:



**CONCRETE
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Design-Builder's Understanding of Project Goals

The CGI Team's understanding of SHA's goals for the IS 270 Innovative Congestion Management Project are detailed below and accompanied by a listing of the regional, national and international projects which demonstrate our ability.

Goal: Mobility

With an ADT of nearly 240,000 vehicles, the IS 270 corridor is a primary commuter route and one of the most congested and unreliable corridors in the region based on the 2014 mobility report. However, it is the backbone for economic development for the region and the over-saturated conditions and strong directional peaks create extended peak periods and greatly impact reliability and economic development. IS 270 includes many of the top bottlenecks in the state. The CGI Team will provide innovative solutions to **maximize vehicle throughput, minimize vehicle travel times, and create a more predictable commuter trip along IS 270 between I-495 and I-70.** We will focus on reducing the recurring congestion and understanding the key locations for non-recurring congestion, in order to reduce overall travel time and increase vehicle throughput as well as density, intersection operations, queues and vehicle network performance for both IS 270 and the connecting ramps and arterial roadways. The time it will take for congestion levels to return to preconstruction levels will be an integral part of determining the mobility solution.

Goal: Safety

The CGI Team will **provide a safer IS 270 corridor** by developing project solutions including technologies and techniques that will reduce the number, duration and severity of incidents by analyzing the crash history and CHART data to better understand incident locations. We will consider management of incidents both during and after construction. Finally, we will evaluate how conditions not meeting typical design standards will impact safety and determine what mitigation measures are necessary to provide for a safer IS 270 corridor.

Goal: Operability/Maintainability/Adaptability

The CGI Team understands that SHA values solutions that will provide for ease of operations and maintenance while still addressing the mobility and safety goals. The CGI Team will **provide improvements that minimize SHA operations and maintenance activities while being adaptable to future transportation technological advancements.** Compatibility and integration of the proposed solutions with SHA's existing infrastructure including CHART will be considered. As well as the maintenance requirements of all elements of the solution.

Consideration will be given to the required personnel and equipment requirements post-construction. Focusing on the long term, the CGI Team will ensure the adaptability of technological solutions to future advancements.

Goal: Well-Managed Project

The CGI Team recognizes that ensuring proactive project management is key to the success for this project. We will **provide a Project Management and Work Plan that includes communications, coordination and risk management, highlights collaborative partnership with all members of the project Team and stakeholders, and successfully advances the project goals.** Responsibilities for design and construction services will be clearly identified, along with QA/QC processes. Environmental, ROW, utility, and permitting impacts will be minimized. Work packages will allow timely and efficient project implementation. The CGI Team will ensure that adjacent projects, such as the IS 270/Watkins Mill and IS 270/MD85 Interchanges will not adversely impact the IS 270 congestion management project.

The graphic on the following page identifies specific actions the CGI Team will take to achieve the project goals.

Demonstrated Experience

Mobility and Safety

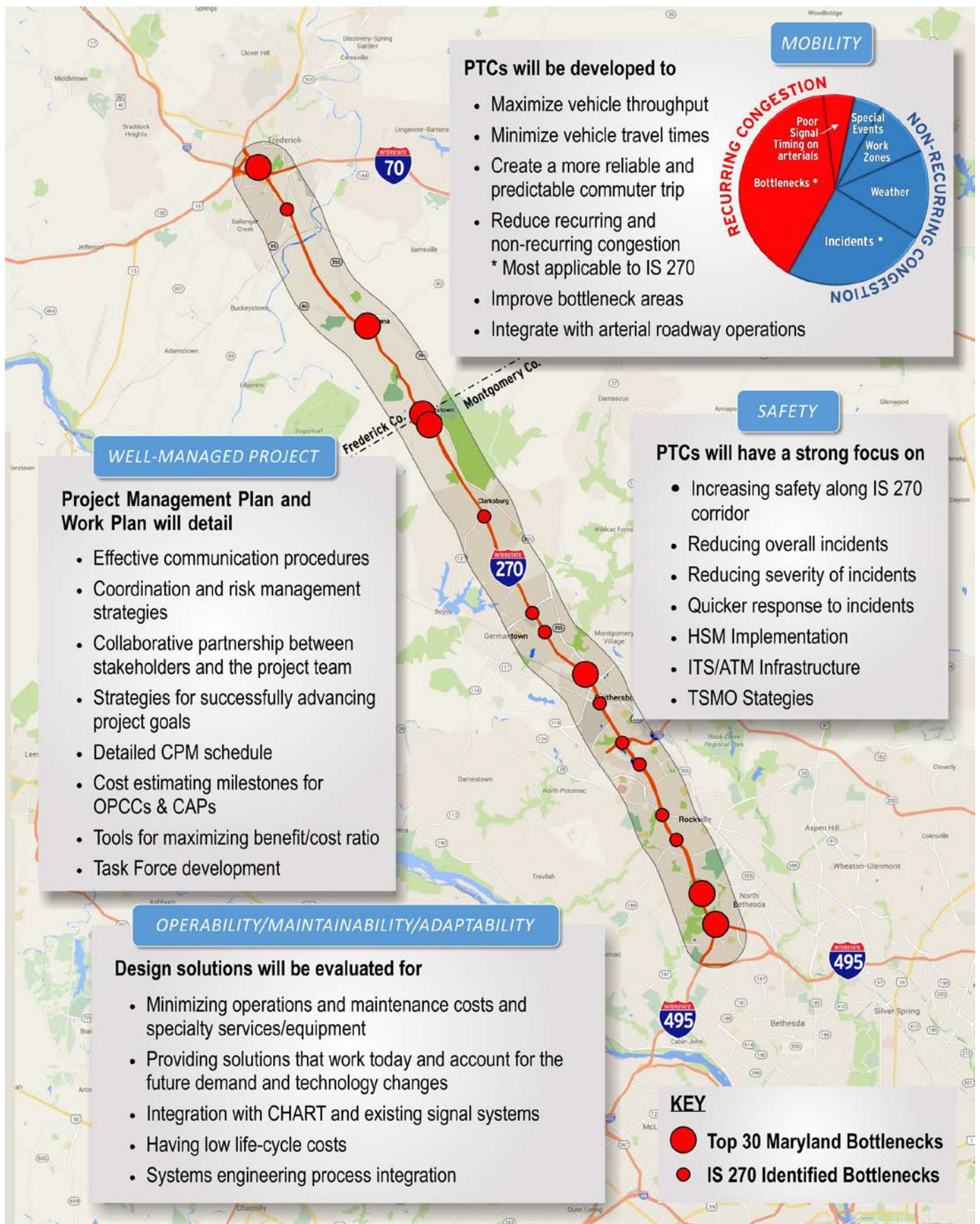
- ✓ I-66 HOT Lanes
- ✓ A14 Cambridge, England
- ✓ NJ ATM Deployment Program
- ✓ I-95 Fort McHenry to Moravia
- ✓ M4/M6 Smart Motorway, England
- ✓ I-276/I-95 Interchange
- ✓ FHWA HSM Implementation
- ✓ AWPR, Scotland
- ✓ I95/I-476 Interchange Study
- ✓ I-95 Fort McHenry to Moravia

Operability/ Maintainability/ Adaptability

- ✓ CHART Implementation
- ✓ Wabash HOV O&M

Well-Managed Projects

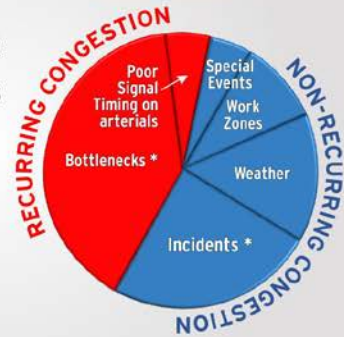
- ✓ ICC
- ✓ US 29 at MD 198
- ✓ I-95 ITS D-B
- ✓ I-66 Corridor Improvements
- ✓ I-66 HOT Lanes
- ✓ I-695/Charles Street Interchange
- ✓ PennDOT/PTC I-95
- ✓ MD 210



PTCs will be developed to

- Maximize vehicle throughput
- Minimize vehicle travel times
- Create a more reliable and predictable commuter trip
- Reduce recurring and non-recurring congestion
- * Most applicable to IS 270
- Improve bottleneck areas
- Integrate with arterial roadway operations

MOBILITY



WELL-MANAGED PROJECT

Project Management Plan and Work Plan will detail

- Effective communication procedures
- Coordination and risk management strategies
- Collaborative partnership between stakeholders and the project team
- Strategies for successfully advancing project goals
- Detailed CPM schedule
- Cost estimating milestones for OPCCs & CAPs
- Tools for maximizing benefit/cost ratio
- Task Force development

SAFETY

PTCs will have a strong focus on

- Increasing safety along IS 270 corridor
- Reducing overall incidents
- Reducing severity of incidents
- Quicker response to incidents
- HSM Implementation
- ITS/ATM Infrastructure
- TSMO Strategies

OPERABILITY/MAINTAINABILITY/ADAPTABILITY

Design solutions will be evaluated for

- Minimizing operations and maintenance costs and specialty services/equipment
- Providing solutions that work today and account for the future demand and technology changes
- Integration with CHART and existing signal systems
- Having low life-cycle costs
- Systems engineering process integration

KEY

- Top 30 Maryland Bottlenecks
- IS 270 Identified Bottlenecks

Significant Issues and Risks

Identifying and reducing risk is essential to the success of the IS 270 project. The CGI Team has developed a robust risk management identification and mitigation processes to enable successful delivery of this project for SHA. In partnership with SHA and all stakeholders, our Team will develop innovative PTC's using our local expertise and national experience while minimizing/managing the risks. The CGI Team's risk management plan will:

- Identify, and log on a risk register, the potential risks and issues for the project and for each PTC,
- Identify the appropriate party (CGI Team, SHA, Stakeholder) most appropriate to manage the risk,
- Develop approaches to minimize or eliminate the risk, and
- Develop the necessary mitigation and contingency plans for risks that cannot be eliminated.

Our team will minimize project risks through our demonstrated experience, ability to manage complex projects, collaboration with SHA and the stakeholders, and by ensuring that the PTCs, by their nature, avoid or minimize risk. A sample of project issues and risks, together with proposed mitigation, are provided below:

HOV Lanes: The existing HOV lanes, or a functional equivalent approved by FHWA, must be maintained in all Proposed Technical Concepts (PTCs). Our Team members have long history working with FHWA and we believe early and proactive discussions with SHA and FHWA will minimize the time needed for this process.

Maximize the Scope within the Budget: With a fixed budget of \$100M, our Team's will generate the best value for SHA by ensuring the solutions with the greatest cost/benefit ratio are provided. The CGI Team includes local and national experts who understand the IS 270 corridor and how technology has been applied in a cost effective manner to similar corridors nationally and internationally to improve reliability and safety while reducing delay. Our Team also recognizes that environmental resources, right-of-way, and utilities must be managed to minimize cost.

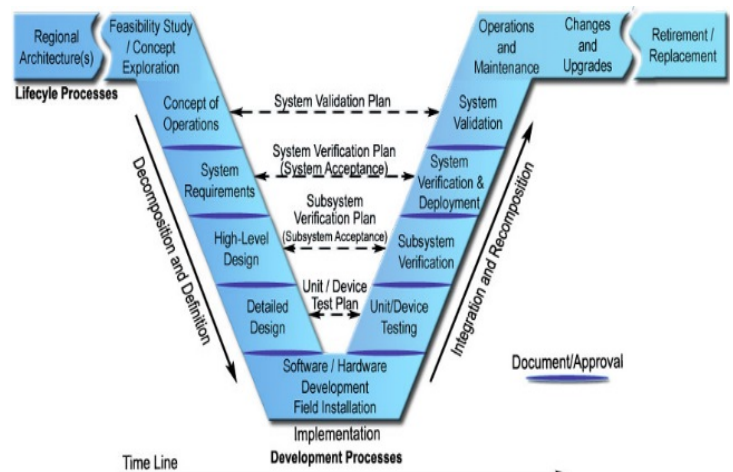
Coordination with Other Projects: SHA delayed planned interchange improvements at IS 270 / Watkins Mill Road to ensure compatibility with the innovative congestion management solutions. Improvements are also planned at IS 270 / I-85. The CGI Team will coordinate our PTCs with these and other planned improvements to ensure mutual compatibility and minimize impacts to these other projects. In addition, we recognize that our PTCs must be coordinated with SHA's existing infrastructure, including CHART, and other adjacent local systems. Significant collaboration between technical experts from the CGI Team, SHA, and stakeholders will be necessary to ensure the entire system will function properly.

ITS / ATM Software and Integration: Software identification, selection and integration is expected to be significant element of this project as some the ITS/ATM/TSMO strategies will use real-time information and include automatic changes to sign displays, signals, etc with minimal or no manual intervention. System projects, particularly those that involve software development/integration, have a history of being fraught with uncertainty and risk that can negatively impact projects cost and schedule. In addition, the potential integration of these modules into the existing CHART system represents a project risk.

To mitigate these risks, the CGI Team will utilize FHWA's Systems Engineering Process to guide and document the process. This proven, progressive process will ensure accomplishment of the key activities that ensure the PTCs achieve the project goals and address SHA and stakeholder concerns.

Rather than being limited by a specific vendor's capabilities, the CGI team will select a software vendor based on specific needs of the selected PTCs. Our Team's process will include:

- Interviewing and shortlisting vendors based on their capabilities vs. PTC requirements.
- Documentation of existing software capabilities using a requirements traceability matrix.
- Demonstration of how the proposed solution would meet the ConOps requirements.
- Cost of development and integration new or additional software features.
- Collaboration with SHA to identify the most appropriate vendor.



Data Collection > PTC > Design > CAP > Construction > SHA Operation

3 | Project Understanding and Progressive Design-Build Approach

NEPA/MEPA: While there is no NEPA decision document for improvements to the IS 270 corridor, there is a long history of draft environmental documents, a number of which were prepared by members of the CGI Team. Our Team’s NEPA/MEPA experts are familiar with IS 270, SHA and the local FHWA staff. As such, we have the ability to streamline the process to ensure swift approvals. Our Team will support SHA by recommending an appropriate purpose and need addressing logical termini, addressing critical elements such as noise analysis and Section 4(f)/park land coordination, and will ensure that all stakeholders are involved throughout the process.

Environmental Impacts: Environmental permits have not been obtained for this project. The CGI Team will work to stay within the existing footprint of IS 270 wherever possible. Wherever work is required our Team will seek to minimize or avoid impacts to environmental resources to the extent practical and as required by law. Our Team will partner with SHA and agencies to obtain necessary permits, perform mitigation, and verify compliance during construction.

Minimize Utility/Property Impacts and Relocations: The CGI Team will seek to avoid or minimize utility and right-of-way impacts. Based on our history of work along IS 270, we have a good understanding of the potential utility conflicts and the requirements to make new connections to existing systems. Our team will coordinate with utilities to ensure the information we are using is accurate, impacts are minimized, and necessary connections can be made in accordance with the project schedule. Similarly, for right of way we intend to avoid or minimize impacts. If right-of-way impacts are unavoidable our Team is prepared to (and experienced in) assisting SHA with the acquisition of property.

Additional Issues and Risks: Additional issues and risks identified by the CGI Team are summarized below.

RISK	SUMMARY OF RISK	MITIGATION MEASURES
Slip Ramps on IS 270	<ul style="list-style-type: none"> Safety issues (final & during MOT) Limited shoulders Access for emergency vehicles 	<ul style="list-style-type: none"> WZTC standards trained onsite staff Multiple successful corridor projects HSM & HCM utilization
ITS/Communications	<ul style="list-style-type: none"> Gaps in coverage along corridor Availability of data sources Limitation & condition of existing infrastructure 	<ul style="list-style-type: none"> Infrastructure familiarity – CGI Team understands SHA’s approach B&M has installed & maintained SHA infrastructure CHART / Radio Shop involvement, systems/devices development
IS 270 Lighting Systems	<ul style="list-style-type: none"> Age & Maintenance issues Major replacement costs 	<ul style="list-style-type: none"> Experience in design & construction lighting Corridor maintenance knowledge & field investigations
Barrier Embedded Conduit	<ul style="list-style-type: none"> Age and Condition Expensive to replace 	<ul style="list-style-type: none"> Existing barrier mounted conduit limits & verification (fishing through) New conduit installation where necessary
SWM/Drainage Issues	<ul style="list-style-type: none"> Pavement reconstruction requires SWM Limited Space Drainage in narrow shoulder 	<ul style="list-style-type: none"> Experts in MD process & requirements, PRD & MDE Drainage analysis of existing structures & spreads/revised drainage design
Incident Management/ Enforcement space	<ul style="list-style-type: none"> System in place relying on communication Limited shoulders 	<ul style="list-style-type: none"> Understand existing system CHART field staff involvement - concept development & MOT
Third Party Systems	<ul style="list-style-type: none"> Mont. County maintains signals in County Impacts to adjacent arterial systems 	<ul style="list-style-type: none"> Third Party involvement/who maintains Communicate system goals
Stakeholder Outreach (i.e., external groups)	<ul style="list-style-type: none"> Various groups (federal, state & local agencies, communities, businesses, etc.) 	<ul style="list-style-type: none"> Proactive & specific outreach
Scope Growth after CAP	<ul style="list-style-type: none"> Ensuring proper scope as CAP is developed 	<ul style="list-style-type: none"> Stakeholder involvement Vet scope questions/issues guarantee
Federal/State Standard Changes	<ul style="list-style-type: none"> Upgrade issues/costs impacts Aged facility needs standards upgrades 	<ul style="list-style-type: none"> SHA policies/agency standards knowledge Upgraded CAP requirements
Noise	<ul style="list-style-type: none"> Analysis and requirements based on improvements 	<ul style="list-style-type: none"> Understand and have experience in FHWA requirements analysis & coordination
Long Lead Time Materials	<ul style="list-style-type: none"> Sign structures/anchor bolts 	<ul style="list-style-type: none"> Early assessment needs & advanced design Early coordination of power for services

Design-Builder's Approach to Progressive Design-Build

A primary benefit of the Progressive D-B process is that the early selection of the D-B Team allows Proposed Technical Concepts (PTCs) to be developed and finalized in a professional and collaborative environment between the CGI Team, SHA, and other project stakeholders. The CGI Team will use this collaborative and integrated approach to maximize the work put into place to alleviate congestion on IS 270. The major elements of our approach to Progressive D-B are below.

Proposed Technical Concepts (pre-Bid)

Base Data Development: The CGI Team will validate and/or enhance the known information for the IS-270 corridor, including traffic models, safety, planned projects, and previous studies.

IS 270 Innovation Summit: The CGI team will gather our national and international Team members for an intense, multi-day, multi-discipline, solution driven collaboration session to identify any and all potential project solutions. This expert gathering will then further refine and screen potential PTCs for inclusion in the initial concept development phase.

Initial Concept Development: We will develop a matrix of potential ATM, ITS, TSMO, geometric, and operational PTCs. Traffic modeling will be performed to identify candidate solutions based on the project goals of safety, mobility, operations/maintenance and adaptability. We will present candidate PTCs to SHA and, as allowed, stakeholders for feedback at one-on-one meetings.

Intermediate Concept Development: Detailed modeling of retained PTCs will be used to validate combinations of PTCs and sequence of improvements. PTC's will be evaluated for physical constraints, utility impacts, NEPA/MEPA constraints, community/political considerations, safety implications, adaptability to future technology and other risks. We will present these findings to SHA and project stakeholders (as allowed) during one-on-one meetings to receive feedback. We will generate high level cost estimates, including operations/maintenance, and perform a cost/benefit analysis.

Final Concept Development: Our Team will perform layout and schematic design of the PTCs to allow bid level cost estimates to be developed. High level systems design for technological elements will be performed. Expected outcomes for mobility, reliability and safety will be finalized along with operational and maintenance requirements. PTCs providing maximum benefit within the contract budget will then be selected and included in the technical proposal.

Design and Preconstruction Services

Once awarded the fixed value contract for design and preconstruction services (as further defined by Section I.F. of the RFP) the CGI Team will immediately begin collaboration with SHA, Stakeholders and final development of the PTCs.

Scope Validation: During the 120-day Scope Validation Period we will verify any scope of work which could not be reasonably determined during procurement. We will document scope issues and meet with SHA to resolve.

Work Package Development: Work will be phased in multiple packages to enhance productivity and accelerate schedule. The work packages may include traditional plan sets, performance specifications for final design and construction, and technology/systems development and implementation. Construction staff will be integrated in the Task Forces to provide constructability review and means/methods input.

Interdisciplinary Collaboration: The Task Force leaders be responsible for coordination and collaboration between disciplines, including software vendor/integrator. In addition to the collaboration at the Task Force meetings, weekly progress meetings will include all Task Force leaders. Task force leaders will be empowered to resolve issues quickly and to involve SHA and stakeholders as required.

Well Managed Project: Task Force Approach

Members of the CGI Team have used the Task Force approach with great success on many previous projects. For the IS 270 project, discipline based Task Forces will be established during development of the PTCs (pre-bid). These same Task Forces will continue through the design and construction phases of the project. The designated leader of each Task Force will promote a collaborative, professional and innovative atmosphere and ensure that appropriate coordination amongst all discipline and Task Forces occurs on a continuous basis. Task Forces will include representatives from design, software, integrator, construction, cost estimating, SHA and stakeholders.

Partnering and Collaborating with Stakeholders

D-B Manager Michael Higgins and Design Manager Eric Mellor will ensure that SHA and all stakeholders are active, collaborative participants during all phases of the Project, including weekly progress meetings and Task Force meetings. We will identify desired stakeholder contacts, notification requirements, and use a stakeholder interaction log to regularly report all concerns, findings, commitments, and approvals.

Design QA/QC: The CGI Team will use proven Design and Construction Quality Management Plans, which includes reporting to the Executive Committee. A key component of this plan are cross-discipline coordination, checks and construction staff input.

NEPA/MEPA: Our Team will avoid or minimize impacts to environmental and cultural resources. We will provide all plans, analysis, details, background information and findings necessary, and collaborate with all stakeholders to allow SHA to obtain expedient approvals. Our schedule will include necessary time for this process.

Design Reviews: The project schedule will include time for both formal and over-the-shoulder design reviews by SHA and stakeholders. Our Team will also integrate the reviewing parties into the weekly Task Force and progress meetings.

Utilities/Permitting: The CGI Team will use a permit tracking log to identify and track all potential utility relocations and environmental permits, including schedule, for each work package.

Early Procurement or Construction Work: The CGI Team, together with SHA and the stakeholders, will identify long lead time materials, phased construction, or ROW needs for which early procurement would benefit the project. Early work will be independent and severable. If desired by SHA, the CGI Team will provide ROW acquisition services.

Construction Agreed Price (CAP)

To ensure our entire program of PTCs can be implemented within the fixed contract price, our cost estimators will be involved during all phases of the project. We will use a cost tracking log to continuously track and update the cost of individual PTCs and CAPs from inception through construction.

CAP Reconciliation: Once design is sufficient to price a work package, our Team and SHA's Independent Cost Engineer will independently develop pricing for the work package. If all parties cannot agree to a CAP price within three attempts, SHA may choose to deliver the work by other means and the CGI Team would be excluded from the procurement.

Risk: We will use a risk register to track and manage allocation of risks through all phases of the project. We will collaborate with SHA and the stakeholders to develop a risk sharing pool for items that are anticipated at the time of submitting the CAP but cannot be priced. As shown in our risk section, we have developed a list of potential risk and will use this information as well as any additional items to review and address risks on each work package.

Construction

Understanding that the final construction value is reduced by the sum of the Design and Preconstruction services fee, D-B Construction Management Fee, and Construction Services (which includes CAPs, ROW acquisition and utility relocations), SHA will issue NTP for Phase Two Construction Services and construction work may proceed for the approved CAP.

Quality: The CGI Team will use a proven quality control plan which includes easy access to the latest plans, plan revision logs, daily work plans, and best management practices for ensuring quality construction.

Systems: Systems installation, integration and testing will be completed with functionality traced back to requirements through the Systems Engineering Process.

Safety: Maintaining a safe environment for our Team's workers and the traveling public on the busy IS 270 is a commitment we take seriously as demonstrated by our safety record.

MOT: During the design phase our traffic control approach will include close collaboration with SHA and the stakeholders. We will implement our TMP and will continue collaboration during construction, making adjustments as necessary to accommodate changing conditions.

Well Managed Project: Schedule

The CGI Team will maintain a master CPM schedule using P6 showing design, review, stakeholder coordination and construction activities for our PTCs and CAPs. A four week look-ahead schedule will be distributed to inform all parties of upcoming activities.

Composition of the Design-Builder

The CGI Team – The Companies

The CGI Team includes Team members with expertise that match the project goals for this IS 270 project. **Concrete General, Inc. (CGI)** is the Major Participant and Lead Construction Firm and will assume overall leadership of the CGI Team. Founded in 1972 and located in Gaithersburg (just 4-miles from IS 270), the CGI name is synonymous with quality construction of heavy highway, roadways, structures and utilities in the mid-Atlantic region.

The CGI Team:
**WORLD CLASS SOLUTIONS
WITH LOCAL LEADERSHIP**

Bruce & Merrilees (B&M) is a major subcontractor dedicated to the Team for electrical, Intelligent Transportation Systems (ITS), and Active Traffic Management (ATM) design, construction and integration. Founded in 1948, Bruce and Merrilees provides professional project management and construction expertise for traffic management devices, ITS and ATM solutions across the United States.

Lead Design Firm **Rummel Klepper & Kahl, LLP (RK&K)** will be responsible for design and design management. Headquartered in Baltimore since 1923, RK&K serves public and private sector clients by providing multi-discipline project management, planning, engineering, environmental and construction phase services for major transportation projects in the mid-Atlantic region and southeastern United States.

CH2M will provide ITS, ATM, traffic modeling, highway safety and other services as an exclusive design subconsultant to the CGI Team. CH2M is an industry-leading transportation project delivery firm with worldwide expertise providing innovative ITS and ATM solutions to improve system efficiency, safety, mobility, and reliability.

The CGI Team – Philosophy

Past experience has proven that a cohesive and collaborative Team of design and construction professionals is critical to a successful D-B project. The CGI Team will use our national and international experience to identify the best solution for the IS 270 corridor and leverage our extensive local experience to deliver it successfully.

Communication and collaboration are fundamental elements of the CGI Team. The Team organizational chart identifies numerous lines of fixed reporting and enhanced communications, however all Team members will be empowered to collaborate within the Team and with SHA and stakeholders.

The CGI Team – Key Staff

Design-Build Project Manager, Michael Higgins, will be overall leader of the CGI Team from initiation through closeout and is the primary point of contact for SHA and stakeholders. Mr. Higgins will be assisted by Construction Key Staff **Construction Manager, Joseph Kirsch** and **Cost Estimator, Mark Miller**.

Design leadership will be provided by **Project Design Manager, Eric Mellor**. He will collaborate with SHA and the stakeholders while leading the full range of engineering disciplines toward the common project goals. Providing assistance will be Design Key Staff **Highway Engineer, Jeff Roberta**, **Traffic Engineer, Barry Brandt**, and **Environmental Compliance Manager, Sheila Mahoney**.

Given that ITS and ATM solutions will be a significant component of our project solutions, we have elected to designate our additional Key Staff positions to **ITS Construction Manager, Paul Barber** and **ATM/ITS Manager, Louis Neudorff**.

Full resumes for all Key Staff are available in Section 2, Key Staff Experience and Qualifications. An estimated time commitment is shown for all Key Staff on the organization chart; should the needs of the project differ based on the ultimately selected technical concepts, the CGI Team will commit staff as necessary to meet the project goals. We have also identified additional Value Added Staff that the CGI Team feels are critical to the success of the project. Each of these Value Added Staff are committed to the project.

The CGI Team – Value through Flexibility

To maintain flexibility and ensure that any software solution selected for the project is the right fit for the proposed technical solution. The CGI Team has elected not to identify a Systems Integrator or Software Vendor at this time. We believe significant value will be recognized by reviewing the products and capabilities of multiple System Integrators and Software Vendors in collaboration with SHA during development of the proposed technical solutions.

Firms

- ▲ Concrete General, Inc. (CGI)
- Bruce and Merrilees (BM)
- Rummel, Klepper & Kahl LLP (RK&K)
- ◆ CH2M (CH)

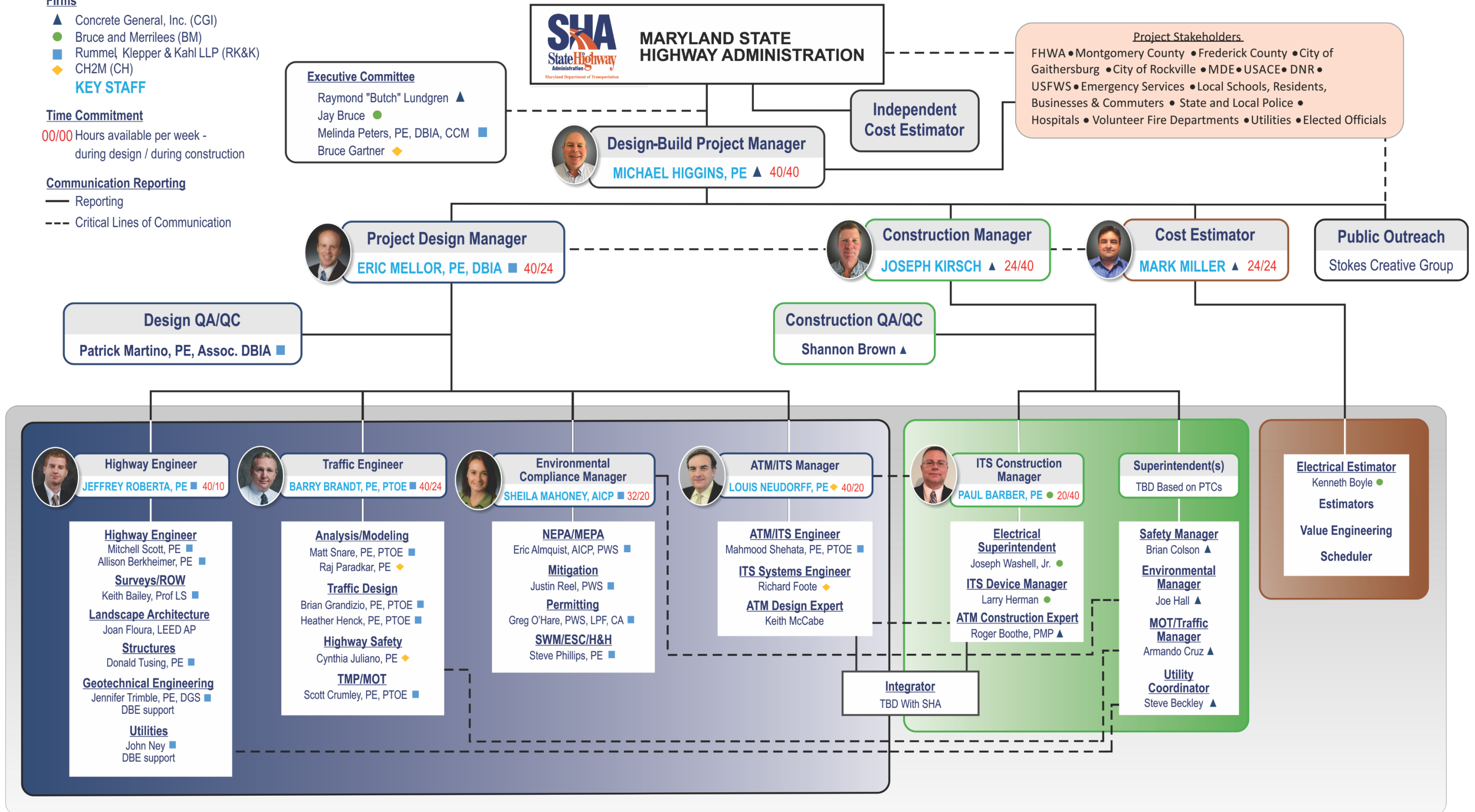
KEY STAFF

Time Commitment

00/00 Hours available per week -
during design / during construction

Communication Reporting

- Reporting
- - - Critical Lines of Communication



Submitted to:



Section 4



*Design-Build Team Ability
and/or Experience*

Design-Build Team Ability
and/or Experience

4

Submitted by:



**CONCRETE
GENERAL, INC.** *in association with*



World Class Solutions with Local Leadership

The CGI Team

The CGI Team combines **local presence with national strength and expertise**. Our Team understands the geometric, econometric and institutional realities of the IS 270 corridor and “what works” elsewhere in the US and across the globe.

Our Team's Key and Value Added Staff are committed to the IS 270 project. They have been carefully selected to combine the regional, national and international experience to **identify and develop the right solutions** with unsurpassed local design and construction know-how to **deliver the project**.

The CGI Team is excited by the opportunity to position SHA as an international leader for Innovative Congestion Management. The following sections and project profiles present The CGI Team's ability and experience to meet and exceed the four project goals identified in the RFP.

Mobility and Safety

The CGI Team recognizes that two of the major goals for the IS 270 Innovative Congestion Management contract, increasing mobility and safety, are linked very closely. Efforts to improve either one could, if not carefully considered, be detrimental to the other. Our Team recognizes that developing innovative solutions for IS 270 will require adaptations to traditional approaches and implementation of innovative technologies to best balance improving vehicular mobility and safety with project costs, impacts, and overall system needs.

Our Team has experience with numerous tools that can be used to identify, evaluate and select the most appropriate solutions for IS 270. Several of these tools are discussed below. We are prepared to explore numerous strategies for increasing mobility and safety including:

Transportation Systems Management and Operations (TSMO)

Our Team understands and promotes TSMO as an alternative approach to the addition of new capacity. The “operational” strategies and applications considered by TSMO, coupled with the supporting ITS technology, are an important aspect of delivering transportation services to customers. Our Team's experience has shown that aggressively applying TSMO can “take back” much of the capacity lost due to congestion and disruption thereby increasing mobility. Operational strategies enhance safety, maximize vehicle throughput, reduce emissions, and increase system reliability. Most importantly, actively managing the transportation network can improve travelers' experiences, providing them with real-time information and choices throughout the trip chain (origin to destination) leading to network performance optimization, minimization of vehicular travel times, and increased efficiency. Compared with traditional construction of new capacity, TSMO strategies are relatively low cost, significantly quicker to implement (2-3 years faster), and offer substantial benefits with very positive benefit-cost ratios. Moreover, TSMO strategies can support ‘practical design’ to increase capacity within the existing roadway footprint (i.e., use of narrow lanes and shoulders).

SHA has long been a major proponent and implementer of TSMO and ITS, most notably in the areas of incident management and traveler information through the CHART program. A relatively recent TSMO application, which could be an effective strategy is Active Traffic Management (ATM). There are numerous potential TSMO/ATM solutions – ranging from those that solely focus on system reliabilities to those improving reliability and capacity. When considering ATM options, we will use FHWA's *Active Traffic Management Feasibility and Screening Guide*, which was developed to assist transportation agencies and planning organizations with making informed investment decisions regarding ATM by determining the feasibility of ATM strategies before committing significant resources toward projects.

ATM: Blazing the Path

The CGI Team brings cutting edge, real world congestion management experience and best practices through ITS/ATM Manager Louis Neudorff the foremost ATM practitioner in the US, and ATM Design Expert Dr. Keith McCabe, a UK-based expert on the leading edge of ATM design and implementation internationally. They literally “wrote the book” on identifying appropriate ATM solutions by co-authoring FHWA's *Active Traffic Management Feasibility and Screening Guide*. The processes and analyses described in the Guide – addressing recurring and non-recurring congestion, safety, and other considerations – have been successfully used by both RK&K and CH2M to prioritize segments and ATM strategies for Pennsylvania DOT, New Jersey DOT, Colorado DOT, and Virginia DOT.

Practical Design/Planning

The CGI Team has substantial experience providing SHA and other clients with design and planning services for traditional highway design projects, including several projects along IS 270. A traditional approach to relieving congestion may have included full-scale widening to provide more capacity; however, innovative alternatives will be needed to meet the project goals, minimize impacts, and give SHA the best value for this project. Our Team will apply progressive practical design concepts to evaluate geometric and typical section alternatives for providing additional roadway capacity within the existing highway footprint. The use of narrowed lanes and shoulders and/or peak period shoulder use, for example, could maximize vehicle throughput, but not require full-scale roadway widening.

Alternatives requiring changes to interchanges, ramps, signals at ramp terminals, and other access changes will be reviewed against FHWA's Policy on Access to the Interstate System for guidance on necessity of preparing Interstate Access Point Approval (IAPA) or other documentation. Our Team members have supported SHA in the development of numerous IAPAs, including ICC, I-695/Charles Street, and I-95/Greenbelt Metro Station. In addition, our Team has experience with FHWA's requirements when impacting HOV lanes as we have performed the required equivalency studies.

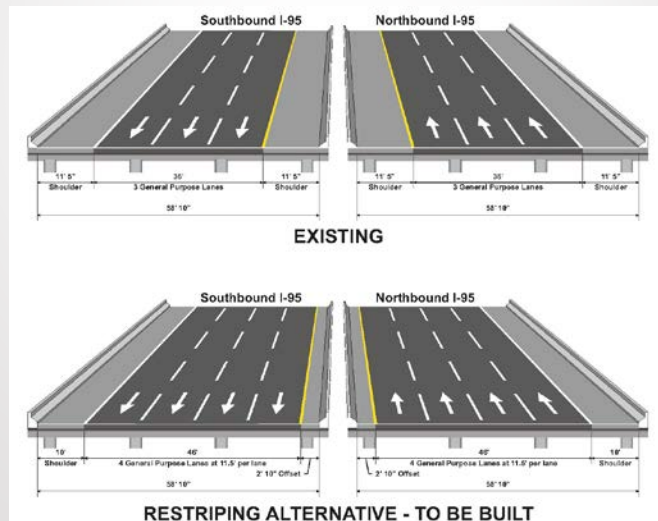
Traffic Operations

CGI Team members have developed and utilized a number of customized tools, innovative processes and advanced technologies in various projects similar to the IS 270 Innovative Congestion Management Project. Because traditional model output spreadsheets and databases are limited in handling the order of magnitude of information on projects this size, our Team members have pioneered a new automated analysis process employing tools for pre- and post-processing VISSIM results, which will be essential to this projects' success. Our Team has developed innovative software tools to handle the challenges in traffic forecast data processing and operations analysis.

Our Team has extensive experience using CHART data for modeling work in support of the Freeway Congestion Management Studies (FCMS) program. Team members have identified top bottlenecks in the state based on INRIX data provided by CHART and SHA's Annual Mobility Report. For select corridors, VISSIM was used to model existing conditions, and several short- to mid-term operational improvements for increasing travel time reliability. Operational improvements were evaluated using a benefit-cost framework. The customized tool developed for SHA incorporated travel time savings, travel time reliability, safety benefits and project cost. Our Team is adept and experienced in using other sources of real-time and historical data available to CHART, such as the information maintained in the RITIS system by the I-95 Corridor Coalition and Vehicle Probe Project suite of tools. Our Team understands FHWA's new Notice of Proposed Rulemaking for National Performance Management Measures and its impact on this project.

I-95: Mobility through Practical Design

CGI Team member RK&K, utilized a practical design approach for MDTA on I-95 in Baltimore City north of the Fort McHenry Tunnel. A feasibility study, NEPA documentation, and final design were completed to provide an additional lane of capacity on I-95 through modification of the existing typical section without major roadway widening. Similar to what will be required for IS 270, a detailed study of the existing roadway was performed to understand the tradeoffs between lane width, shoulder width, existing roadway geometry, roadside elements and necessary design exceptions to meet the goal of increasing mobility while satisfying design criteria and safety requirements.



Improving the Picture: "Big Data"

The CGI Team offers SHA a unique opportunity to get ahead of the curve in using "Big Data" for effective transportation management. Team member and ATM Expert Advisor, Dr. Keith McCabe is one of the foremost international experts in Big Data analytics. Dr. McCabe is the vanguard of Big Data applications for transportation internationally, such as the CityVerve "Platform of Platforms" in Manchester, UK. Creating a richer, more complete picture of what's happening on the highway is an emerging focus area for business analytics in the transportation sector, leveraging big data tools and predictive analytics to improve operations, reduce costs and better serve travelers. Dr. McCabe will bring these skills to bear on the IS 270 Project for the CGI Team.

Our Team has recent experience in analyzing impacts of ATM strategies for congestion and using FHWA's benefit/cost evaluation tools to evaluate benefits for reducing congestion. The Greater Richmond Mobility Study in Richmond, Virginia used VISSIM to evaluate ATM solutions for the entire interstate freeway network (I-95, I-64, I-195, and I-295) within the region, identifying the best low-cost, high-benefit solutions for certain areas. For the Pennsylvania Turnpike's Norristown to Bensalem Transportation Improvement Study, members of our Team combined VISSIM modeling with the use of the

FHWA ATM benefit-cost tools to evaluate ATM options, non-ATM options, and combinations of both.

Highway Safety

The CGI Team is uniquely qualified to support SHA in the analysis, planning and implementation of comprehensive transportation solutions to save lives and reduce the number and severity of incidents for the IS 270 corridor. Our Team is prepared to apply the principles and methods of the Highway Safety Manual (HSM), including safety management process, predictive methods, and crash modification factors to develop and evaluate solutions on IS 270. These solutions will be targeted at reducing incidents that increase nonrecurring delay through integrated, comprehensive approaches to transportation safety, operations and design. Team Member CH2M is a national leader in the research and development of the HSM, and in safety program development and implementation at both program and project levels. They participated in the research and were charter members of the Transportation Research Board (TRB) Task Force on the HSM and are engaged with AASHTO, NCHRP, and FHWA in implementing the HSM for multiple DOTs across the region. They are also a TowardsZeroDeath National Strategy partner committed to eliminating fatalities on the nation's roadways.

Leaders in Highway Safety

Highway Safety Expert Cynthia Juliano led the development of FHWA's Highway Safety Manual Implementation Plan and has applied HSM techniques for diverse range of clients throughout the United States.

Operability, Maintainability, and Adaptability

The CGI Team understands that project solutions must achieve the proper balance between maximizing performance and limiting future operational, maintenance, and technological expenditures. We will use FHWA's Systems Engineering Process to emphasize the operability of solutions.

Developing Functional Requirements

Through the systems engineering process, the functional requirements for any technological solutions developed will be identified. For example, a speed harmonization system could be used to slow traffic as it enters a queued area, reducing rear-end accidents and in turn, increased congestion. The functional requirements will identify if there are additional responsibilities needed of SHA operations (including CHART) and maintenance in operating the new system. Our design Team members have experience developing and implementing the entire systems engineering process, and understand how establishing functional requirements early can result in more efficient operations after deployment.

Minimizing ITS/ATM Maintenance

Our Team's ITS/ATM designers know that proper system design and component selection will be an important factor in minimizing ITS maintenance. This will contribute toward delivering a solution that increases reliability along IS 270. When selecting software and vendors associated with technology based solutions, we will consider the future costs of

ITS/ATM Maintenance Experience

CGI Team member B&M constructs, integrates and maintains ITS/ATM systems for DOTs, including recently completing a two-year support period for PennDOT deployments. During the design process, B&M will provide our design Team input regarding the maintainability of the system, and our Team's ATM experts will continually assess the operational needs of the system.

software and hardware maintenance, licensing, upgrade and replacement cycles.

Minimizing Highway Maintenance

The CGI Team understands that SHA will also be required to maintain highway elements included in the contract. The CGI Team has experience in designing and constructing the following measures to help reduce future maintenance: incorporating riprap to fill excavated areas around substructures and embankment slopes to minimize scour and erosion; minimizing inlets and selecting stormwater BMPs which require minimal maintenance; placing signs, traffic signals, and other traffic control equipment beyond the clear zone to minimize crashes; and using non-intrusive

technologies in lieu of more traditional technologies (in-pavement loops) that require more intrusive maintenance.

Future Technologies

Technology is constantly changing and our systems will be designed to adapt to these changes. Given the schedule for this effort, the mobility and safety benefits associated with Connected Vehicles (CV) and Automated Vehicles (AV) will likely not be immediately relevant. Nevertheless, the CGI Team believes that our project solution must allow for infrastructure which supports easy migration to accommodate future CV and AV usage. Members of our Team are taking the same approach on the ATM deployments in southeastern PA, where existing power and communications infrastructure (including conduits, cabinet space, power service) are being designed with additional capacity to accommodate future CV vehicle to infrastructure equipment.

Implementing a Well-Managed Project

The CGI Team recognizes that one of SHA's **major goals** for this project is to have a successful and well-managed project during all phases of the project including planning, design, and implementation. We believe our history of delivering well managed projects for both project owners and D-B teams in the region is unmatched. We bring to the IS 270 Innovative Congestion Management Project many of the same people that made our past projects successful. We look forward to working with SHA to add the IS 270 Innovative Congestion Management project to this list.

Our Team was developed to provide the diversity needed to deliver a well-managed project by focusing on three areas: project implementation of all elements of this project, stakeholder coordination with the numerous stakeholders included in this project, and successful completion of SHA's design process requirements.

Project Implementation – Project Management and Work Plans

Our Team will develop a Project Management Plan and Work Plan that will be implemented throughout all phases of this project, including planning, design, and deployment/construction. These plans will be developed to foster communication among all Team members and stakeholders; establish collaborative design workshops between the D-B Team and SHA and stakeholders; and provide for an overall partnering relationship between all Team members. A Risk Management Plan will be developed to clearly outline the risks of the project and assign the person/agency who is most equipped to manage the risk. Our Team will successfully collaborate with SHA adopting four basic tenets that lead to success:

Safety – implementing safety training to prevent injuries to workers and motorists.

Quality – proactively identifying issues and solution.

Cost – accurately monitoring progress and staying within the Construction Agreed Price (CAP) for each package.

Time – closely monitoring the critical path on the CPM schedule.

Managed to Success

Owner's Representative

- ✓ ICC
- ✓ Purple Line P3
- ✓ I-95 Improvements (PA)
- ✓ Woodrow Wilson Bridge

Design-Build Team

- ✓ Monroe Bypass (NC)
- ✓ MD 32/Linden Church
- ✓ Triangle Parkway (NC)
- ✓ US 29 Solutions (VA)
- ✓ Americas Interchange (TX)
- ✓ MD 216

Project Implementation - ITS/ATM Deployment

Team member B&M has the ability and experience to implement the IS 270 Congestion Management project as they have served as the general contractor on numerous D-B ITS contracts, deploying a wide variety of technologies, integrating them into existing traffic management centers and constructing a complete traffic management center. On these projects, B&M either operated and maintained the facilities or performed maintenance on the installed devices two to three years after acceptance.

ITS Device Deployment: On D-B projects, B&M has installed a wide variety of ITS device technologies to meet specialized needs and requirements for each individual project. Through their extensive pre-kitting and pre-assembly process, B&M reduces impacts to the travelling public during construction. This process allows for assembly of the device enclosures (CCTV enclosures), testing the communications between the camera and the enclosure, kitting the mounting hardware, and, in some cases, mounting the cameras and enclosures to the poles prior to impacting the travelling public. This type of extensive pre-planning results in an efficient installation, reduced punch list and reduced impact to the travelling public.

CGI Team ITS Expertise

- ✓ Device Functionality
- ✓ Performance Measures
- ✓ Design Parameters
- ✓ Communications Systems
- ✓ Software Requirements
- ✓ Maintenance Requirements

B&M has constructed D-B projects by breaking them into "buildable units", similar to the CAP packages for this project. These buildable units represent areas of work, which can be started very quickly or need on-time completion for the overall project success. B&M identifies the most challenging aspects of projects, such as those requiring action from an outside party, targets specific areas in the designs identified as challenges, and focuses efforts to start work on these areas immediately, such as obtaining power and communications service.

B&M is poised to deploy any technological elements to our solutions. B&M has built more than 50 signals in Montgomery County, has experience in very high traffic corridors (I-95), is currently working on two CHARTS DMS deployment contracts with SHA, and has a wide variety of contracts with various MDOT business units (SHA, MAA, MPA).

ITS Integration: B&M employs a number of techniques to facilitate device and system integration – having completed projects that incorporating DMS signs, Vehicle Detectors (microwave, tag readers, Bluetooth readers), CCTV cameras, new video controllers, new video walls and adaptive traffic signal systems into existing traffic management centers. Our Team understands it is critical to not impact the operability of the overall system and utilize a system of tests prior to device deployment in the field. B&M has experience bench testing and field testing individual devices and communications systems, including fiber optic cable, wireless, and copper, to allow integration of ITS devices into control software, such as CHART. Through this extensive method of checks and balances, we can ensure a positive result as the system goes live.

Innovation in ITS Deployment

To obtain accurate travel times on the I-95 ITB project, a 20-mile stretch of I-95 in Philadelphia, B&M deployed a combination of microwave vehicle detectors with an algorithm used to determine vehicle counts, traffic density and average travel times was created. On this same project, E-ZPass Tag readers were deployed by B&M to determine exact vehicle speed and travel times. On the US 202 7IT project, an arterial area, B&M utilized Bluetooth readers to obtain vehicle counts and other traffic data since more traditional data collection technologies would not obtain accurate results for the significant arterial roadways included in the project.

ITS Software: Traffic management software will be an important component of this project, particularly for newer and dynamic TSMO strategies. However, such specialty software development in the transportation industry has historically been both risky and costly. To mitigate this risk, our Team does not have an exclusive arrangement with any software vendor or system integrator. Rather, our approach is to maintain flexibility until the point where such capability is required. Our Team has the ability to employ the system engineering process to facilitate the selection of a particular software package, vendor and integrator, based on the project needs and requirements. Our experiences will help us avoid recommending a solution solely based on the capabilities of a specific vendor or software package. We recognize coordination with CHART is critical to the project's success and Team members have a long history working with CHART dating back to the early 1990s, both in software development and On-Call Systems Management.

Project Implementation - Roadway Improvements

CGI: Delivering Success

Design-Build

- ✓ US 29 at MD 198 (w/RK&K)
- ✓ MD 32 at Linden Church Lane (w/RK&K)
- ✓ US 50 HOV Lane Widening
- ✓ Widening of Ramp 6
- ✓ MD 355 at Montrose/Randolph Roads
- ✓ MD 124

High Volume Roadways

- ✓ I-95/I-895 Interchange
- ✓ I-695 Inner Loop

IS 270

- ✓ 20 Projects over 40 years

The IS 270 Congestion Management project is likely to include solutions which require roadway improvements. CGI is a leading Maryland-headquartered contractor providing quality transportation projects to SHA for more than 40 years, including 200+ projects delivered on-schedule and within budget, and is prepared to provide this experience for IS 270. Our success can be attributed to understanding SHA's policies and processes, such as the Material Management System (MMS) and the Office of Environmental Design Quality Assurance Toolkit. Based in Gaithersburg, CGI is intimately familiar with IS 270's traffic conditions and patterns having been involved in corridor projects since it was US 240, then I-70S and now IS 270. CGI is the most experienced constructor in the IS 270 corridor with more than 20 completed projects and several current maintenance contracts.

CGI has been working with SHA for many years on their MMS to help implement the system for material sourcing and approval. CGI is a leader in worker and public safety and maintains a strong internal safety

department to assist project Team in delivering projects safely throughout the state. CGI maintains a commitment to meet the DBE project goals on its projects. Over time, CGI has developed a strong risk management identification and mitigation process enabling the successful bidding, building, and delivering projects to SHA without issues. CGI's cost estimating system allows the development of estimated construction costs and construction cost models along with providing ability to negotiate fairly with SHA for mutually-agreeable construction costs.

Stakeholder Coordination

The IS 270 Corridor provides a challenging environment where transportation is a key issue for elected officials, the business community, and concerned citizens. County transportation departments have very strong transportation programs that interface with IS 270. We have successfully delivered projects in this corridor, such as the Intercounty Connector and the Purple Line LRT mega projects, allowing our Team to build on the strong respect we have developed with the key stakeholders. CGI Design Team members, RK&K and CH2M, work with the Montgomery County Department of Public Works and Transportation on a daily basis. The CGI Team has the experience to collaborate with the project stakeholders to produce a successful project.



Our Team understands this project will require a public outreach campaign that includes a marketing strategy and a public education plan. With assistance from Stokes Creative Group, we are prepared to develop a public outreach and educational campaign in collaboration with SHA.

Design Process Completion

The CGI Team has delivered countless final design projects for SHA, ranging from low complexity/low risk projects to some of the most complex mega-projects that SHA has completed. We will provide all services necessary to complete the project, including but not limited to the following:

Environmental Approvals and Permitting: The CGI Team understands delivering this progressive D-B will involve a partnership with SHA to obtain the required clearances and permits. Our Team has a long and successful history of delivering these approvals to keep the projects on schedule, including acquisition of PRD/MDE approvals on the US 13 Design-Build and MD 404 Design-Build projects to meet aggressive construction schedules.

Schedule Drivers

- ✓ Environmental Clearances
- ✓ Right of Way
- ✓ Permitting
- ✓ Utility Clearances
- ✓ New Power/Communications Service Drops

NEPA/MEPA Environmental Analysis: Our Team, led by Sheila Mahoney and assisted by Eric Almquist, will assist SHA by creating environmental documentation in accordance with all required regulations, including NEPA, MEPA, Section 4(f), Section 106, and Section 404. Many team members have worked on IS 270 pre-NEPA studies and are familiar with the corridor. Under the direction of Kevin Hughes, the CGI Team has more than 25 years of experience completing noise analyses and noise wall design, including hundreds of SHA tasks, on IS 270, and for D-B projects.

Permits/Environmental Compliance: The CGI Team are experts at obtaining JPA approvals, jurisdictional determinations, AMMR reports, Phase I and Phase II wetland mitigation plans, Section 401, and hazardous materials as evidenced by projects such as Woodrow Wilson Bridge, ICC, and MD 32 at Linden Church Road Design-Build.

Hydraulics and Hydrology (H&H): Our Team, including Steve Phillips, has experience with surface drainage conveyance, SWM, ESC, NPDES and MDE/PRD Approvals, CCTV inspections of drainage pipes, stream/outfall stabilization/restoration/relocation, and floodplain analysis.

Roadway and Structures Design: The CGI Team has decades of history completing the design of core roadway and bridge elements, which may be needed as part of the identified solutions. Our Team, led by Jeff Roberta, has successfully completed numerous SHA roadway designs, including roadway/Interstate design, interchange ramp design, roadside design, and design waiver preparation. Donald Tusing, with experience designing bridges, culverts, walls, sign structures, ITS device structures, traffic control device structures, and ancillary structures for SHA projects, will lead necessary structural design.

Pavement and Geotechnical: Our Team, led by Jen Trimble, will analyze pavement performance and subsurface geotechnical data to prepare flexible and rigid pavement design recommendations.

Landscape Architecture: Our Team, including Floura Teeter, has developed designs using low maintenance/native plants to coordinate with the project's SWM, roadway, structural, utility, pedestrian/ADA, bicycle and traffic elements.

Cost Estimating: Led by Mark Miller, the CGI Team will develop a construction cost model based on our knowledge of traditional highway elements, ITS devices, communication systems, software, utility relocation, and ROW.

Plats and Survey/ROW: The CGI Team's Keith Bailey has extensive experience providing topographic surveys, metes & bounds surveys, ROW mosaics, and plat development. Our Team has experience performing ROW acquisition for D-B contracts (US 29 Solutions, Monroe Bypass).

Utility Coordination and Design: Led by John Ney, the CGI Team has extensive experience identifying and coordinating utility impacts and relocations. We have designed aerial and underground utilities, including water, sanitary, gas, petroleum, electrical or telecommunications. We have performed design and coordination to secure power and communication service drops for hundreds of ITS and TCD devices.

Traffic Engineering and Intelligent Transportation Systems: The CGI Team is very familiar with the full range of traffic engineering services needed for this project through recent or ongoing contracts with SHA's Data Services Engineering Division, District 3 Traffic Office, Traffic Development and Support Division, Traffic Engineering Design Division, Traffic Operations Division, the Motor Carrier Division and the Office of CHART. Nationally, our Team has participated in the development of ATM projects in various states and developed ATM guidance documentation for FHWA.

Maintenance of Traffic (MOT): Our Team, led by Scott Crumley, has unparalleled experience in MOT as they have developed SHA's Work Zone Transportation Management Plan guidelines and prepared numerous *Maintenance of Traffic*

Traffic Engineering Services

- ✓ Traffic Counts
- ✓ Travel Forecasting
- ✓ IAPA Preparation
- ✓ Traffic Control Device Design
- ✓ ITS Device Design
- ✓ Traffic Operations Analyses
- ✓ Engineering Studies
- ✓ TMP Meetings
- ✓ Power/Communications Coordination

Alternatives Analyses (MOTAA). Our Team has developed *Work Zone Temporary Traffic Control Device* plans for numerous freeway construction projects, including the ICC and MD 32 Design-Build project.

Intelligent Transportation Systems (ITS): The CGI Design Team has extensive experience in the design of ITS. Our Team's lead traffic engineer, Barry Brandt, and a key support staff, Brian Grandizio, developed SHA's Intelligent Transportation Systems Design Manual. Our Team has completed numerous projects, which include the requisite elements including power and communications design, ITS device location design, data availability evaluations, data sharing/IT system design, multi-agency system integration, and ITS software selection.

Familiarity with IS 270 Corridor

Nobody knows IS 270 like the CGI Team. RK&K has planned it (IS 270 Multi-modal Corridor Study, West Side Mobility Study) and designed it (CD Road System, MD 27/Father Hurley Interchange). CGI has built it (25 projects in IS 270 corridor) and B&M has provided traffic control equipment along it (DMS, coordinated signals). We understand the nuances of the roadway configurations for the corridor and its effect on congestion, having developed the VISSIM models and short term improvements. We understand the bottlenecks and the impact that non-recurring congestion has on IS 270 daily. Lastly, we recognize the geometric, socioeconomic, and environmental conditions in which the solutions need to be implemented.

The CGI Team:
WORLD CLASS SOLUTIONS
WITH LOCAL LEADERSHIP

The southern portion of IS 270 is unlike any other highway in Maryland — it includes both CD roads and managed lanes (HOV). RK&K's previous work has given us insight about the existing infrastructure, such as how the existing shoulders are not full depth, which could impact solutions such as part-time shoulder use. This knowledge will aid us in quickly assessing the feasibility of potential solutions early in the progressive D-B process.

Bottleneck Identification

Daily recurring congestion along IS 270 occurs primarily in one direction during each peak (southbound AM, northbound PM); however, the duration of the congestion extends more than four hours for each peak. Additionally, seven of the top 30 bottlenecks in Maryland are along IS 270. We know there are typical bottleneck locations, which first experience congestion, such as the southbound spur approaching Westlake Drive (AM peak) or the northbound local lanes approaching MD 117 (PM peak). We understand how these bottlenecks are compounded by the lack of available capacity along the IS 270 corridor.

Non-recurring Congestion

IS 270 has seven of the top 30 most unreliable sections of highway in the state. This unreliability results in SHA customers budgeting more time out of their days to account for this unreliability, with a planning time index (PTI) of 1.4 for the entire length, and certain sections having PTI up to five during peak conditions. Traffic management continues to be a critical need along this corridor with an average of 400 events logged every month.

ITS/SOC Limitations

Our Team knows that the existing ITS infrastructure does not provide continuous camera coverage or large-scale field device detection in the corridor and largely relies on leased communication lines to connect to CHART/SOC. By overcoming the limitations of using real-time data effectively, solutions will be identified which increase automated responses and detect operational problems. This will more effectively allow for more accurate detection of operational problems thereby benefiting operations and increasing throughput.

Environmental Sustainability

The surrounding community and environmental context is crucial to understanding IS 270. For example, improvements which impact sensitive environmental features, like Monocacy Battlefield, will be unacceptable to regulatory agencies and the public. The arterials which interchange with IS 270 in Montgomery County are heavily utilized; both the County and residents will require improvements along IS 270 to consider and, to the greatest extent reasonable, mitigate the potential negative ripple effects to operations on these roads.

4 | Design-Build Team's Ability and/or Experience

Ability on Similar Projects

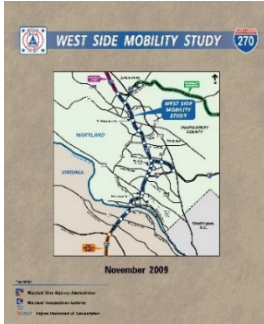
Each member of the CGI Team has substantial expertise and Design-Build project experience. Our Team's collective and individual records of accomplishment for quality, safety, environmental stewardship, cost-effectiveness and timely project delivery within the fast-paced Design-Build environment will allow our Team to deliver an award-winning project.

Project Examples	Planning				Design										Construction							
	NEPA/MEPA Environmental Analysis	Alternatives/Concept Development	Travel Forecasting/Traffic Analysis & Modeling including VISSIM	Public Outreach/Education	Active Traffic Management/ATM	Intelligent Transportation Systems/ITS	Transportation System Management & Operations (TSMO)	H&H/SWM/ESC/PRD/MDE	Safety Improvement/Hwy Safety Manual	Traffic Engineering/MOT	Capacity & Mobility Improvements	Highway Design	Utilities (Coordination & Relocation)	Structures	Geotechnical/Pavements	Life-Cycle Cost Estimate (Maintenance & Operations)	Design Build Contract	Project Management	Roadway Construction	ITS Device Installation	ITS Integration/Software	Well Managed, On-Time, On-Budget
SHA Engineering & Environ. Services	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
SHA Travel Forecasting/Traffic Analysis		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
Philadelphia Area Interstate Improv. Studies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
NJ Statewide ATM Deployment Program			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
PennDOT District 6 Philadelphia Area		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
NJ Statewide ITS Strategic Plan		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
Federal Guidance Documents		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
SHA Active D-B Contracts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MDTA I-95 from FMT to Moravia Road	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
I-66 Active Traffic Management ConOps			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
A14 Cambridge to Huntingdon, England			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
I-695/Charles Street Interchange		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
VDOT I-495 HOT Lanes GEC	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Aberdeen, Scotland Western Peripheral Rte			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
PennDOT I-276/I-95 Interchange		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
Intercounty Connector		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SHA Traffic Engineering Design Services		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
M4 J3 to J12 Smart Motorway and M6 J2 to J4 Smart Motorway, England			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
MD 210 Livingston Rd/Kerby Hill D-B																	✓	✓	✓	✓	✓	✓
US 29 at MD 198 D-B		✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I-95/I-895 Interchange																	✓	✓	✓	✓	✓	✓
CHART DMS Deployment Contracts						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
MD 32 D-B		✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SHA Traffic Signal Recon/Mod Contracts							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
I-695/Baltimore Beltway Signing & Lighting							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
PennDOT SR 202, Section 7IT & 3IT																		✓	✓	✓	✓	✓
PennDOT SR0095 Section ITB																		✓	✓	✓	✓	✓
Wabash Tunnel, HOV D-B Project																		✓	✓	✓	✓	✓

Planning Related Project Experience

Engineering and Environmental Services/SHA OPPE Project Management Division | RK&K

RK&K has provided comprehensive planning services to SHA for decades, supporting them across a full range of feasibility studies, alternatives development, and MEPA/NEPA studies. The following studies are of particular relevance: ***I-495/IS 270/West Side Mobility Study***: RK&K completed the West Side Mobility Study, led by SHA and supported by VDOT. The



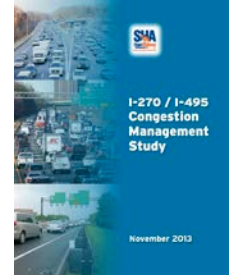
14-mile long project extended from SR 193 in VA, along the west side of the Capital Beltway and IS 270 to the IS 270/I-370 Interchange. The purpose was to evaluate short-, mid-, and long-term improvements to address congestion and provide system-wide approaches to connect the I-495 HOT Lanes in VA to the ICC. RK&K developed approaches to improve traffic flow, including targeted improvements to alleviate bottlenecks or congestion, such as extended accel/decel lanes, CD road slip ramp modifications, and signing/markings improvements; system-wide capacity improvements within the existing footprint, including restriping to add capacity, ATM and congestion management solutions such a peak period should use, and converting existing HOV lanes to HOT/toll lanes; and widening to provide additional capacity. RK&K completed traffic modeling and analysis to understand how vehicles enter and exit IS 270. We developed cost

estimates and impacts analyses. ***IS 270/US 15 Multi-Modal Corridor Study***: as a JV, RK&K completed the DEIS in 2002, an AA/EA in 2009 and preliminary engineering of seven alternatives for the IS 270/US 15 Multi-Modal Corridor. The 30+ mile corridor extended from the Shady Grove Metro Station (Montgomery County) to Biggs Ford Road (Frederick County). The purpose was to address increasing congestion and safety conflicts. RK&K was responsible for highway and traffic engineering for CD roadway and ETLs, NEPA documentation, public involvement, Section 4(f) coordination, SWM, wetland/stream mitigation, and project management. The alternatives included highway widening, CD roadways, interchange improvements, new roadway alignments, managed lanes, and park-and-rides. ***I-495/IS 270 Transportation Systems Management and Operations Assessment***: In 2015, RK&K assisted SHA in compiling and evaluating a range of approaches to improve I-495 and IS 270 traffic operations: improvements considered in previous studies and operational approaches not previously detailed, including contra-flow lanes, ramp metering with dynamic detection, and IT solutions.

Relevance: IS 270 Planning Studies; Practical Design and ATM Concepts; VISSIM Modeling; Mobility

Travel Forecasting/Traffic Engineering Analysis/SHA OPPE DSED | RK&K

RK&K has performed travel forecasting and traffic operational analyses services, using computer traffic simulation models, for more than 15 years and on-site support for more than 10 years. Most applicable to this contract is the operational highway modeling where we developed and calibrated simulation models for IS 270, I-95 and I-495. Major assignments include: ***IS 270/I-495 Congestion Management Study, Montgomery County***: identified short-term improvement concepts along IS 270 and the west side of I-495 to provide relief for recurring traffic congestion. Developed optimization models based on a balanced network of existing peak hour volumes, identified congestion "hot spots" within the study area based on field visits, travel time runs, INRIX speed data, review of SHA's Annual Mobility Report; developed VISSIM simulation model of the entire IS 270 corridor. The VISSIM model was calibrated to match existing conditions and the base model used to test operational benefits of 10 potential concepts, including extending the HOV lane, widening the loop ramp at IS 270/MD 117 interchange and extending the acceleration lanes at slip ramps. RK&K determined anticipated safety impacts by applying the appropriate crash modification factors (CMFs) from the AASHTO Highway Safety Manual and conducted benefit-cost analyses of options to assist in prioritizing improvements. ***2015 Freeway Congestion Management Studies Program, Statewide***: developed large VISSIM networks of several major MD freeways including I-95, MD 295 and I-495. Developed short-term improvements along each corridor and recommended 10 projects for implementation following cost-benefit analysis. Recommended solutions included minor geometric changes and ATM.



Relevance: IS 270 Traffic Studies; Practical Design and ATM Concepts; VISSIM Modeling; Traffic Simulation

Philadelphia Area Interstate Improvement Studies/PennDOT, PTC, DVRPC | RK&K

I-95/I-476 Interchange Study, PennDOT – RK&K is identifying, evaluating, and prioritizing lower cost safety and operational alternatives of this interchange. The study included feasibility-level evaluation of part-time shoulder use along 9-miles of I-476. The study was used as a basis for the development of the \$2.1 Million I-95 Section CCP which provided a two-lane exit from I-95 NB to I-476 NB and was opened earlier in 2016. ***Pennsylvania Turnpike (I-276) Norristown to Bensalem Transportation Improvement Study*** – RK&K developed and evaluated short and long-term safety and operational improvements for 18-miles of the PA Turnpike (Germantown Pike to US 1) which can be completed in advance

of total reconstruction efforts. The study identified 15 improvement concepts including geometric improvements using practical design; operational and technological (ITS) improvements, including active traffic management techniques; corridor-wide management techniques; and corridor-wide operational strategies. The benefit was evaluated using VISSIM modeling, Highway Safety Manual techniques and FHWA ATM benefit-cost calculators. A prioritization matrix (including annual capital and operational costs) completed. **I-76 ITS Enhancements** – Development of the next generation of ITS enhancements for 13-miles of I-76 which experiences the heaviest delays in PA, with congestion occurring along both directions extending with up to 15 hours per day. RK&K provided significant support for the Concept of Operations development, which evaluated next generation ITS and transportation management strategies. RK&K led the evaluation of part-time shoulder lane use and junction control concepts for the corridor to allow the shoulders to be used as travel lanes during peak periods. RK&K supported the stakeholder communication and outreach efforts.

Relevance: Practical Design and ATM Concepts; ITS/Communications Concepts; Mobility

New Jersey ATM Deployment Program/NJDOT, NJIT | CH2M

The NJIT, in association with the NJDOT, selected CH2M HILL to develop and document an ATM deployment program. Specific strategies included variable speed limits, dynamic lane assignment, queue warning, hard shoulder running and junction control. Completed in early 2015 and based on a benefit-cost analysis, this project identified ATM strategies and their priority locations along the NJDOT freeway network. All work was performed according to principles of systems engineering and included concept exploration; developing an ATM Concept of Operations and associated system requirements; developing a plan to move the recommended ATM concepts to design and implementation.



Relevance: ATM Network Concepts and Statewide Program

District 6 Philadelphia Area/PennDOT | CH2M

Beginning in 2011, CH2M staff were responsible for the TSMO elements of a program management activity for the planned reconstruction of a portion of I-95 in Pennsylvania. The stakeholders included PennDOT, DVRPC, City of Philadelphia, and SEPTA. Under the direction of CH2M, the group examined and recommended several TSMO strategies and supporting ITS devices, which resulted in an operational concept describing operational strategies, including traveler information, ATM, dynamic shoulder lanes, ramp management and junction control. From that, CH2M developed an implementation plan that included cost estimates, design concepts and preliminary ATM sign location plans. CH2M's role was increased to develop a Concept of Operations for the deployment of ATM strategies in an expanded project area. VISSIM was used to model the impacts and benefits from ATM strategies, permitting a prioritization of links and segments based on a B/C ratio. The ConOps (including diagrams) was developed in accordance with ANSI and FHWA guidelines.

Relevance: ATM/ITS Concepts and Program; ConOps for ATM

New Jersey Statewide ITS Strategic Plan/NJTPA | CH2M

The NJTPA selected CH2M to develop an implementable strategic deployment plan to accelerate development of the state-wide operations program and deploy supporting ITS technology. The project addressed all modes within New Jersey, including conducting stakeholder outreach; developing a vision (the "Connected Corridor"); operations goals and objectives; performing a "gap analysis"; identifying where New Jersey currently stands with respect to operations and the supporting ITS technologies; developing a strategy for integrating operations and technology projects into the capital investment planning and project selection processes; identifying performance measures; and updating and streamlining the 2005 versions of the state-wide and regional ITS architectures. Completed in early 2015, all potential TSMO strategies were addressed, including ATM; ramp, incident, arterial and transit management (including transit signal priority); traveler information, multi-modal and regional integration, including Integrated Corridor Management (ICM); and commercial vehicle operations.

Relevance: ITS Network Concepts and Statewide Program

Federal Guidance Documents | CH2M

CH2M has performed work for FHWA Office of Operations and AASHTO as a sub for the FHWA Operations IDIQ, where they have been the lead or co-authors on the following FHWA documents: **Active Traffic Management Feasibility and Screening Guide** - assist transportation agencies and planning organizations with making informed investment decisions regarding ATM by determining the feasibility of strategies before committing significant resources toward subsequent project development and design activities. **Use of Freeway Shoulders for Travel - Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy** - referred to as Hard Shoulder Running, part-time shoulder use is a TSMO strategy used to provide additional capacity when most needed. The shoulder may be open to all vehicles, only passenger cars or buses (BOS – Bus on Shoulders). Guide covers planning, design, implementation and day-to-day operation of shoulder use. It covers a variety of design and operational concepts for shoulder use and describes how a Performance Based Practical Design (PBPD) process guides the planning of facilities with shoulder use.

Use of Narrow Lanes and Narrow Shoulders on Freeways; Primer on Experiences, Current Practice, and Implementation Considerations - information on the use of narrow lanes and narrow shoulders to improve capacity within existing footprint, and give the reader a starting point for exploring narrow lanes and shoulders as a potential solution. Expected to be published in late 2016, much of the information in this primer is presented in the broader context of PBPD.

Relevance: State-of-the-Art Research for FHWA/AASHTO on ATM Feasibility and Strategies

Design Related Project Experience

Active D-B Contracts/SHA | RK&K

RK&K is currently completing design of two D-B projects with SHA: Rehabilitation of 11 Bridges on US 13 (\$23M) and the MD 404 Dualization (\$104.7M). RK&K, as part of JV, is serving as Lead Designer on this Allan Myers, Wagman JV led D-B Team for this 9-mile **Dualization of MD 404 from US 50 to East of Holly Road**. RK&K is responsible for permitting and final design of 4.5 miles of new highway, MOT, SWM, drainage, ESC, and DBE compliance. RK&K is also responsible for design schedule management, partnering, coordinating with stakeholders, MDE, SHA PRD, and QA/QC. We are ensuring practical design is implemented. SHA is requiring a very aggressive design and construction schedule, with all work to be substantially complete and open to traffic within 18 months of NTP.

RK&K is the Lead Designer on the Corman led D-B Team for the **Rehabilitation of 11 bridges on US 13 Salisbury Bypass**. The design and construction must be complete within 24 months of NTP. RK&K is responsible for all design aspects of the project including schedule, permitting, geotechnical, pavement, utility coordination, traffic signing/markings, ITS, highways, structures, MOT, SWM, drainage, landscape, reforestation, TMP, erosion and sediment control, PRD and MDE coordination, stakeholder outreach, and DBE compliance. To maintain existing mobility and enhance safety during construction, the D-B Team is using long term road closures with travel is maintained via temporary crossovers. The Team prepared and received final approval of E&SC and SWM plans from SHA-PRD in 2 months, and final approvals just 3 days after NTP for the contract. *Relevance: Mobility; Safety; D-B Project Delivery; Aggressive Project Schedule*



I-95 from Fort McHenry Tunnel to Moravia Road/MDTA | RK&K

This project included reconfiguration of I-95 to provide four continuous through lanes within the project limits. RK&K's efforts included developing the practical design approach to reconfigure the existing typical section to accommodate one additional lane per direction, which required narrowing existing travel lanes and shoulders, and incorporating mitigation approaches to maintain adequate sight distance and roadway superelevation/cross slopes. These changes required coordination with FHWA and documentation of design exceptions for the narrowed lanes and shoulders. Half of the project limits were on structure and RK&K completed the

structures design to reconfigure the existing bridge decks to accommodate the new typical section and provide new, higher parapets. RK&K completed the SWM, drainage, E&SC, signing, marking, lighting and ITS plans. ITS work included installation of approximately 5-miles of 48 strand backbone fiber optic cable to tie all CCTV cameras and DMS into the MDTA Area-wide Operations Center (AOC). The network architecture consisted of using Layer 2 and Layer 3 Ethernet switches, installed in device cabinets, to communicate with the AOC and SHA CHART's Statewide Operations Center (SOC). RK&K developed fiber optic cable plans, splice diagrams, cabinet schematics, conduit attachment details and ITS plans. The project included installation of 4 new CCTV cameras to provide complete camera coverage. The new fiber optic cable was designed to integrate into existing fiber rings located north of the project limit and provide system redundancy.

Relevance: Interstate Design; Practical Design Solutions; Mobility; Safety; ITS/Communication System Design

I-66 Active Traffic Management Concept of Operations/VDOT | CH2M

CH2M Hill developed a Concept of Operations for the I-66 Active Traffic Management System between the District of Columbia and Route 29 in Gainesville. The ATM, which was became active in 2015, allows for improved safety and incident management along one of the most congested interstate highways in Virginia and the nation. The ConOps was developed in the ANSI format. ATM components include: **Expanded use of the shoulder lanes between the Beltway and Rte 50** – the shoulder lanes, also known as red 'X' lanes, will routinely be opened to traffic when congestion builds, regardless of time of day or day of the week. Currently, shoulder lanes are used only during weekday peak periods. **New lane control signals on all lanes between Nutley and Rte 29 in Centreville** – motorists will be able to see which lanes are usable or blocked in advance of incidents. **Expanded camera and DMS coverage between DC line and Rte 29 in Gainesville** – cameras will improve monitoring of highway and thus enable transportation, safety and law enforcement personnel to respond more quickly and appropriately to incidents. DMS will advise drivers on incidents and delays. **Upgrades to ramp metering system inside Beltway** – ramp meters to help manage traffic merging onto I-66 will adapt to traffic conditions. *Relevance: ATM Concept of Operations; Mobility; Safety; Congested Urban Interstate*

A14 Cambridge to Huntingdon/Highways England | CH2M

The A14 Cambridge to Huntingdon scheme is situated within Cambridgeshire in the East of England. The A14 trunk road provides a vital road transport corridor between the West Midlands and East Anglia and is of local, regional, national and international significance. It connects the major port of Felixstowe to the M11, A1 (M), M1 and M6. To combat congestion and improve safety, ITS technology solutions were deployed throughout the corridor, including gantries with lane control signals and message signs; emergency roadside telephones; low light PTZ CCTV cameras; Meteorological Stations (fog and ice detection); MIDAS (incident detection) and Traffic Monitoring System; if required Speed Enforcement System; if required LED Traffic Management signs (ROTTM); ducted infrastructure design; Weigh-in-Motion detection (WIM); Automatic Number Plate recognition (ANPR).



Relevance: ATMS/ITS Systemwide Design

I-695/Charles Street Interchange and Bridge Replacement Project/SHA | RK&K

This \$40M project included replacement of the Charles Street Bridge over I-695 and reconfiguration of the I-695/Charles Street interchange. RK&K's initial activities included studies and traffic analysis to refine the original concept designs. RK&K developed final contract documents, including plans, cost estimates and specifications for realignment, intersection, streetscape and ped/bike improvements along Charles Street and Bellona Avenue; resurfacing and widening of I-695; reconstruction of the interchange ramps; and rehabilitation of I-695 Bridge over Light Rail. RK&K was responsible for the highway design, MOT, storm drainage, ESC and SWM; lighting, signals, signing, ITS and pavement markings; structural design of Light Rail bridge rehabilitation, retaining walls, and the new Charles Street bridge pier (superstructure and abutment design by SHA). RK&K prepared the IAPA, TMP, impact plates and wetland/waters permit, public meeting materials; provided project management assistance to SHA; conducted Design Partnering Meetings; coordinated project activities among SHA's support divisions, District 4, and utility agencies. RK&K performed Phase V Construction-Phase Services.



Relevance: Interstate Design; Practical Design Solutions; ITS/Communication System Design; Traffic Analysis

I-495 HOT Lanes, Northern VA Mega Projects GEC/VDOT | CH2M

CH2M Hill served as GEC for VDOT for this 14-mile, \$1.4 B project, and current CGI Team member Roger Boothe served as VDOT's Project Manager. The I-495 HOT Lanes project is a complex urban P3 project that included significant ITS and tolling support services for the construction of two new lanes on I-495 between Springfield Interchange and north of Dulles Toll Road. **ITS Design Coordination, Review and Approval:** On behalf of VDOT, CH2M led coordination between the Design-Builder's ITS and Tolling design and integration contractors, and VDOT Northern Region Operations. We reviewed and provided guidance on all designs submitted for tolling and ITS subsystems including telecommunications and power design, field device placement system architecture, Concept of Operations and integration, design of HOT Operations Center and integration of toll and ITS subsystems with the Northern Virginia PSTOC. **Transportation Improvements:** We oversaw traffic analysis modeling efforts, replaced more than 50 bridges and overpasses, upgraded 10 interchanges, and enhanced access for peds and cyclists. **Proactive Communications and Coordination:** The design-build program functioned similar to a design-bid-build project with multiple contractors, each performing different duties. We developed a GIS-based tracking system to monitor the status of the 130 utility relocations that allowed for quick identification of problem areas and prioritizing of coordination efforts. We developed preliminary plans to modify the HOT Lanes project to suit MWAA, the Dulles Toll Road owner.

Relevance: D-B; ATM/TSMO; Mobility; Safety; Traffic Modeling; Interstate MOT

Aberdeen Western Peripheral Route (AWPR)/Transport Scotland | CH2M

Scotland's largest Non-Profit Distributing (NPD) contract, the AWPR is under construction. This project is the heart of the Scottish Governments commitment to improve transport in Aberdeen and across the north east. It is one of the transport infrastructure projects in the pipeline for the area. The AWPR/B-t project will bring substantial benefits to the whole of the north east of Scotland, including reducing congestion, improving journey times, cutting pollution in the city center, boosting the economy, improving road safety and enhancing public transport. ITS technology design includes Verge mounted/cantilever and offset-T MS4 and MS3 message signs; Pan/Tilt/Zoom (PTZ) CCTV cameras; Meteorological Stations; Traffic Monitoring Systems; Journey Time Systems; Ducted infrastructure designs; Weigh-in-Motion detection (WIM).

Relevance: Mobility; Safety; ATMS/ITS Systemwide Design

I-276/I-95 Interchange/PennDOT & PTC | RK&K and B&M

RK&K completed the preliminary and final design of ITS, signing and lighting for the I-276/I-95 interchange completion project. RK&K completed the ITS planning and design elements for the entire project area, including full ITS deployments for 9 miles of Turnpike, 3 miles of I-95, and all roadways approaching both systems. RK&K followed FHWA's systems engineering process, and included fiber-optic communications, continuous CCTV camera coverage, DMS, microwave, EZPass and Bluetooth detection, and weather station. The preliminary ITS plans for I-95 approaching the region were used as a basis for I-95 Section ITB, which was ultimately constructed and maintained by B&M. RK&K is currently spearheading interagency data sharing efforts between PennDOT and PTC, as the camera, travel time, and incident notification systems will be integrated into both the PTC Traffic Operations Center and the PennDOT District 6-0 Traffic Management Center. Through this effort, consistent travel time messages will be displayed by both agencies, and both agencies will be permitted to view and control all cameras, regardless of location or ownership.

Relevance: Well Managed Project; ITS Planning and Design; ConOps Documents; B&M was Constructor

Intercounty Connector/SHA | RK&K

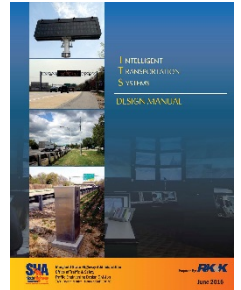
The Intercounty Connector (ICC) is a \$2.5B, 18.8-mile long multi-modal highway connecting IS 270 and I-95/U.S. 1. The project provided a new 6-lane highway with 60 mph design speed, open road tolling, and extensive environmental mitigation. RK&K was the lead of a joint venture named ICC Corridor Partners. We assisted SHA and MDTA in the D-B procurement of multiple contracts. We developed the requests for letters of interest, qualifications, and a proposal (RLOI, RFQ, RFP) from prospective bidders. We were responsible for overall management and oversight of the entire D-B program, including providing environmental managers, ESC control inspectors, engineering review staff and construction management services. During pre-construction, RK&K's engineers and construction management staff provided constructability reviews and evaluated contract segments as they were impacted by earthwork balance, haul roads, and access to bridge construction. RK&K staff coordinated the preliminary design process and assisted SHA with developing the procurement process. Staff wrote performance specifications and analyzed special provisions, such as price adjustments and incentive/disincentive clauses. RK&K developed the requirements for the onsite office complex, analyzed quality assurance programs, and developed the program for attracting bidder interest.

Relevance: Well Managed Project; D-B; Montgomery County; Mobility; Safety

Traffic Engineering Design Services/SHA OOTS TEDD | RK&K

These SHA open-end, traffic design contracts involve statewide assignments for traffic signal, ITS, signing, marking, lighting, MOT and on-site design services. RK&K has performed more than 300 tasks, including: **SHA ITS Design Manual and Training:** developed 2016 SHA ITS Design Manual, including design guidance and policy for CCTV cameras, DMS, traveler advisory radio, automated traffic recorders, side-fired vehicle detectors, roadway weather information systems, communication and power service design. Developed and presented two training sessions for SHA. **Statewide CHART ITS Device Deployment:** prepared ITS design plans for the CHART implementation of 15 DMS and over 15 CCTV cameras. Developed design plans for ATR, TAR, SFVD and RWIS as part of highway or bridge projects impacting those facilities. Developed MOT plans for installation of DMS signs with concrete median barrier supports. **Traffic Signal Design for On-Call Construction Contracts:** prepared traffic signal plans for more than 200 locations including new signals, signal reconstruction, interconnect, UPS battery backup, emergency vehicle and railroad pre-emption, lane-use control signal systems, Hazard Identification Beacons, Intersection Control Beacons, phasing modifications, APS and countdown pedestrian heads and ADA compliant curb ramps. **MOT:** developed MOT plans including detour plans, lane closure plans and sequence of construction. **Signing, Pavement Marking, Lighting Plans:** Developed plans for more than 100 projects, including overhead/cantilever sign structures, interstate signing, blank-out signs, hazard identification beacons, regulatory, warning, destination, guide signing, photometric analysis, lighting circuit design, voltage drop calculations, National Electric Code compliance, and light pole layouts.

Relevance: Well Managed Project; ITS Design; Traffic Control Device Design; MOT Design



M4 J3 to J12 Smart Motorway and M6 J2 to J4 Smart Motorway/Highways England | CH2M

These projects are located on 32-miles of the M4 motorway, between Junction 3/Hayes and Junction 12/Theale and 20 km portion of M6. Smart motorway (SM), previously known as Managed Motorways (MM), will be implemented to relieve congestion by using technology to vary speed limits and the hard shoulder as a running lane creating additional capacity. Operation of the smart motorway will be controlled via gantry mounted, light emitting diode (LED) signs and signals. Control equipment will be housed in roadside cabinets installed in the shoulder and integrated through power and data communication networks through technology infrastructure cables, ducts and transmission equipment. Pan, tilt and zoom (PTZ) CCTV cameras will be installed on 15m masts to ensure there is full coverage of all running lanes enabling the Regional Control Centre to confirm incidents and set the appropriate signs and signals. Above-ground traffic detection



radar units installed on posts and inductive loops will monitor traffic flows via Motorway Incident Detection Automatic System (MIDAS). The following ITS technologies will be implemented: Gantries with Lane Control signals and Message signs; Verge mounted/cantilever MS4 and MS3 Message Signs; Emergency Roadside Telephones; Infrared Low Light PTZ CCTV cameras; HADECS 3-speed enforcement cameras; incident detection; Traffic Monitoring System; LED Traffic Management signs; new/improved ducted infrastructure design; Site Fire Radar technology and traffic counting systems. *Relevance: Mobility; Safety; ATMS/ITS Systemwide Design*

Construction Related Project Experience

MD 210 Livingston Road/Kerby Hill Interchange D-B/SHA #XY51055177 | CGI

This \$83M project involved the design and construction of a grade separated interchange at the intersection of MD 210 (Indian Head Highway) with Livingston Road/Kerby Hill Road and a new service road to maintain access to residential and commercial properties. Located in Prince George's County, the roadway improvements include the realignment of Livingston Road and Kerby Hill Road approaching the interchange, new bridge structures, retaining walls, noise barriers, new pavement construction and repair of exiting roadways and shoulders, reforestation, closed/open drainage systems, SWM quality and quantity facilities, E&SC, stream restoration and relocation, signing, marking, lighting, signalization, culverts extension, water line relocation, sanitary sewer relocation, gas line relocation, power/phone/communication line relocation and coordination. The project goals are to provide for a safe facility and maintain mobility for all roadway users, provide access control while minimizing delay to roadway users, provide a facility able to adequately maintain and to minimize impacts to trees, floodplain elevations and noise receptors.

Relevance: D-B; Well Managed Project; Roadway and Traffic Control Device Construction

US 29 at MD 198 D-B - SHA #MO8675170 | CGI and RK&K

This \$28M D-B project involved design and construction of approximately 7,000' of US 29 with partial interchanges at MD 198, Dustin Road, and expansion of a MTA parking lot. Major construction components included 600,000 CY of excavation, sub grade and pavement construction, three grade separated bridges, four retaining walls, two MSE slopes, storm drain, E&SC in conjunction with SWM; signing, lighting, signals, marking and landscaping. Extensive utility coordination was required to eliminate delays for Verizon, Comcast, AT&T, WSSC and BG&E. WSSC water main and sanitary sewer relocation and construction were a part of the design builder's construction. Key MOT issues involved several tie-ins of relocated US 29, improvements on Route 198, overlay of existing roadways and maintenance of bike traffic. MOT design remained flexible to allow CGI to revise and improve the plan to reduce the number of phases and inconveniences to the public. A public involvement program was developed for local residents and the traveling public. Pro-active community meetings were held where flyers/leaflets were prepared and distributed, Advance Roadway Signage and Variable Message Signs were installed to alert and advise motorists, public service announcements and local newspaper articles were distributed.



Relevance: D-B; Extensive Utility Coordination; Complicated MOT; Public Outreach; RK&K was GEC

I-95/I-895 Interchange in Baltimore City/County/MDTA | CGI

This \$90M project involved widening and pavement reconstruction of I-95 to provide two ETLs from south of the I-895 interchange to south of Chesaco Avenue and the widening and reconstruction of I-895 to provide one ETL per direction from south of the Moravia Road to the I-95 interchange. As one of the projects within the I-95 ETL Section 100 project corridor, the work involved construction of two new 1,900 LF curved bridges, a new bridge carrying NB and SB I-895 managed lanes, a new bridge over stream, retaining walls, MOT planning and execution, full depth pavement construction and patching, structure demolition, grinding, open drainage systems, SWM quality and quantity facilities, E&SC, culvert extensions, landscaping, reforestation, signing, pavement marking, bearing pile, caissons, concrete pavement, sign structures, ITS devices, fiber optic communication cable, lighting (high mast, low level), utility relocation and coordination. Partnering was used to maintain open communication and teamwork, to share information, to identify issues, and achieve goals.

Relevance: Roadway Construction; Complicated MOT; Traffic Control/ITS Construction; Partnering

CHART DMS Deployment Contracts/SHA | B&M

These two \$4.5M prime contracts are managed in an area-wide style with no plans provided at the bid phase. Scope includes installation of overhead, pedestal, and ground mounted DMS signs within SHA's seven Districts. Project responsibilities encompass the installation and commission of the DMS Signs indicated by the released task.

Relevance: DMS/ITS Construction

MD 32 at Linden Church Road Interchange D-B/SHA | CGI and RK&K

This \$11M project consists of the design and construction of MD 32 at Linden Church Road in Clarksville, Howard County. The project's purpose was to enhance the safety and operations along this section of MD 32 and integrate with the ultimate MD 32 corridor improvements. The work included construction of a full diamond interchange at MD 32 and Linden Church Road, construction of a roundabout at the proposed intersection of Linden Church Road and the northbound ramp termini on the east side of the interchange, realignment of Linden Church Road west of MD 32, improvement of the sight distance along existing Ten Oaks Road, resurfacing of existing MD 32, realignment of the local roads and driveways, new closed drainage systems, new SWM facilities, ESC, landscaping, signing, marking, and utility relocation and construction.



Relevance: D-B; Safety; Roadway and Traffic Control Device Construction; RK&K was Designer

Traffic Signal Reconstruction/Modification Contracts/SHA | B&M

These three \$21.6M prime contracts include reconstruction or modification of 167 traffic signals. Many of the intersections are located in Montgomery County, requiring coordination to tie into the Montgomery County communication network and to schedule traffic signal turn-on.

Relevance: Signal & Communications Constr.; Coordination with Montgomery County; RK&K was Designer

I-695 Signing & Lighting/SHA | B&M

This \$6.3M prime contract encompasses installation of 52 ground mounted signs, 173 low level light poles, three high mast light poles, 18 cantilever sign structure, five overhead sign structure 524 wood post signs on 3-miles of I-695 and 6-miles of state roads from Chesaco Ave to Cove Rd. Work required constant coordination with several ongoing projects within the project limits and SHA District 4.

Relevance: Traffic Control Device Construction; RK&K was Designer

SR 202, Section 7IT & 3IT/PennDOT | B&M

This \$19.6M project was an upgrade and expansion of the existing PennDOT ITS network, which will facilitate more efficient incident response/transportation management and provide information to travelers to improve the safety and efficiency of SR 202. The devices and locations fit into PennDOT's overall Arterial ITS Completion Plan. Construction included ITS along the 202 Parkway and its parallel/intersecting routes to monitor traffic and inform motorists of traffic conditions using 21 CCTV Camera System; nine Dynamic Message Sign System; 19 Travel Time System; 18 Bluetooth readers and one TR; Communication Network; RTMC integration; RTMC modification, including the installation of two Smart Display Boards; seven Video Sharing Systems; 23 Traffic Signal Systems. B&M constructed, installed, integrated, trained, tested and documented the system providing a complete ITS expansion. They maintained the ATMS software and field devices for two years following construction. 3IT consists of 33 CCTV Cameras, 13 DMSs, 61 Incident Detection Systems, installation of Fiber Optic Backbone, SONET Network, Video Wall & Traffic Control Center modifications. All systems were integrated while existing TMC and ATMS software remained operational for a seamless integration.

Relevance: ITS/ATMS Construction; Well Managed Project; Comm. and Network Construction/Integration

SR0095 Section ITB/PennDOT | B&M

The devices and locations scoped for this project fit into PennDOT's overall I-95 Interstate ITS Completion Plan. All ITS devices provided and/or upgraded on this project were connected into PennDOT's fiber optic communications system and ultimately managed from PennDOT's Regional Transportation Management Center (RTMC), located in the District 6-0 offices in King of Prussia, Pennsylvania. The SR 0095, Section ITB work entails the installation of ITS devices, including 31 Closed Circuit Television (CCTV) Cameras (17 New and 14 retrofits and upgrades); 14 Dynamic Message Signs (DMS) (10 New and four retrofits and upgrades); three Portable Dynamic Message Signs (PDMS); 51 Vehicle Detection System (VDS) (39 New and 12 retrofits/upgrades); 54 E-ZPass Travel Time System (TTS) Tag Readers (TR); Communications Network; Regional Transportation Management Center (RTMC) integration/modification; five Video Sharing Systems; four Videoconferencing Systems; 2-Year Maintenance of System (ATMS and communications, and devices).

Relevance: ITS Construction; Communications and Network Construction

Wabash Tunnel, HOV Ab-7B D-B Project/Allegheny County, PA | B&M

This \$8M project consisted of design and construction of a One-Way Reversible HOV Facility encompassing the following systems: Fiber Optic Network, installation of five CCTV Cameras, two CO/CO2 Detection System, 26 Access Gates, 24 Changeable Message Signs and Traffic Management Center. The Traffic Management Center was constructed and all systems were integrated into the ATMS. B&M operated and maintained this facility for two years with the Port Authority adding an additional year of O&M through 2008.

Relevance: ITS/ATMS Construction; Communications and Network Construction