Original

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

STATEMENT OF QUALIFICATIONS

IS-695 from IS-70 to MD 43 Transportation Systems Management and Operations Design-Build

Baltimore County

Contract No. BA0065172

CORMAN KOKOSING

In association with

WSP

M.C. DEAN BUILDING INTELLIGENCE

July 8, 2019

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A. Design-Builder Capability

MARYLAND DEPARTMENT OF TRANSPORTATION™

STATE HIGHWAY ADMINISTRATION

A. DESIGN-BUILDER CAPABILITY

i. KEY STAFF

SCOTT SZYMPRUCH, PE | DESIGN-BUILD PROJECT MANAGER

Education
BS, Civil Engineering

Years of Experience
23 (18 with Corman)

Professional Registration
Maryland PE #25502

2007-2011| MDOT SHA | Design-Build Intercounty Connector Contract A, Montgomery County, MD-$483.4M-Construction Manager. 7.2 mile controlled-access tri-lane divided highway project to ease congestion on Maryland highways/local roads while improving mobility/safety including ***lighting/signalization, lane use signals, overhead/cantilever signs, and integrating ITS and Electronic Toll System into MDOT SHA's network. New software was developed to meet their needs, training provided, and was tested. Integrated toll facilities into the Intercounty Connector toll network by onsite MDOT SHA integration contractors***. Progress/coordination meetings with Toll System Integrator and adjacent design-build teams discussed scheduling, safety, quality, MOT, access, and design. Widened/constructed a new I-370 interchange to replace the partial interchange in phases to accommodate the two traffic lanes in each direction while widening road to inside/outside, making three lanes in each direction. Coordinated with 10 utility companies to complete 106 utility relocations including water, sewer, power/electrical, cable and fiber optic.

Scott led design, coordination, and risk analysis/mitigation, authored the schedule and was the conceptual design development leader. He participated in design development task force meetings and provided constructability reviews. Scott directed design team on sequence of construction, access requirements and construction techniques. He provided professional engineering designs (support of excavation/temporary work) and supervised field layout, QC, and safety management. Scott oversaw construction of the entire project and coordinated with field engineering for subcontractor scheduling/supplier logistics to maintain schedule/budget. He oversaw field design change requests and coordination of team's QC operations. Scott oversaw construction field engineer takeoff/cost comparisons to provide feedback/direction to design team, contributed to partnering/progress meetings, attended public outreach meetings/answered questions, worked with environmental teams, and coordinated inspections/resolutions with our independent QC team. He worked with design-build coordinators and construction project engineers leading roadway, bridge, drainage, environmental, utility and subcontracting. Scott participated in geotechnical task force team efforts, was involved in the CPM schedule, oversaw construction quality manager, coordinated with adjacent projects and quality assurance manager regarding quality compliance, and scheduled/allocated resources for materials, equipment, services, labor.

Relevancy: MDOT SHA Design-Build, MOT, ATCs, ITS, Lane Use Signals, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Reforestation, Utility Relocations, Permitting

2013-2017 | FHWA/EFLHD | Design-Build Dualization of Route 1 at Ft. Belvoir, Lorton, VA-$82.1M-Design-Build Project Manager | Project Executive for this project that dualized/widened Route 1 to relieve heavy traffic near Ft. Belvoir military installation. This 3.5-mile stretch had some of the region's worst rush hour traffic where 80,000 vehicles pass through Ft. Belvoir's gates daily. Constructed/widened Route 1 from four to six lanes, added a median for future rapid bus transit, intersection improvements, ITS, utility relocations (water, sanitary sewer, electric, gas, communication fiber), and historical house relocation. Construction was adjacent to wetlands/natural resource area. Realigned shared-use path to avoid the wetlands. Eliminated two stormwater management ponds which avoided work in wetland areas.

Scott managed project from preconstruction, design, construction, and utility relocations, to close out. He led discipline task forces performing constructability reviews and cost comparisons while maintaining the project schedule. He led coordinating utility relocations for the entire project. Scott met with the designer weekly for design reviews and held over-the-shoulder reviews with the owner/stakeholders. He and design team coordinated *Pardon our Dust* meetings where Scott spoke/answered questions, was main point of communication to the project team, managed the team, equipment, material, and labor procurement, objectives/goals, work plans, and budgets/resources, procured/coordinated subcontractors, monitored schedules, conducted progress meetings, minimized exposures/risks, mitigated issues, reviewed/approved deliverables, RFIs, and change orders, administered contracts, oversaw budget, safety, and quality compliance and steered the project to successful completion per contract.

Relevancy: Design-Build, MOT, ITS, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Utility Relocations, Permitting, Historical/Archeological Sites

DEREK PIPER, PE, AICP, DBIA | DESIGN MANAGER

With overseeing highway infrastructure project design experience, Derek has been Design Manager and Project Manager on many design-builds. As a Professional Engineer and Certified Planner, he has the expertise to see the concept development stage through the NEPA process, while developing a constructible project based on proven transportation engineering principles. He is a Designated Design-Build Professional who knows the intricacies in delivering a design-build project and has completed graduate studies in Public Affairs to better grasp and address public and governmental issues that surround a project.

Education
BS, Civil Engineering, Graduate Studies, School of Public & International Affairs,

Years of Experience
34 (23 with WSP)

Professional Registration
Maryland PE Pending
Virginia PE #046886

Designated Design Build Professional

Certified Planner: American Institute of Certified Planners

2009-2017 | VDOT | Elizabeth River Tunnels Project, Norfolk & Portsmouth, VA | $2.1B | Design Manager: Derek led design which included a new midtown tunnel, rehabilitating the Midtown Tunnel and two downtown tunnels, and extending Martin Luther King (MLK) Expressway including a new I-264 interchange. Constructed 1 mile new roadway, widened 1 mile of I-264; constructed/widened/rehabilitated 10 bridges, 24 retaining walls, and 2,500 LF of noise walls; relocated 4,000 LF of 36" water line; and significant ITS for the new tunnel, three rehabilitated tunnels, expressway and tunnel approach roadways. Project was completed one year ahead of schedule.

Derek managed design and construction document/technical report preparation for civil, roadways, ROW, utility relocation, stormwater, drainage, E&SC, structures, geotechnical, pavement, landscape architecture, MOT, traffic signals, ITS components, lighting, Dynamic Lane Use control signage and pavement markings. Permits (reforestation, stormwater/E&SC, wetland/waterway), design approvals, QA/QC reviews, and NEPA studies/re-evaluation/approvals including noise evaluations and 4f mitigation fell under his purview. Managed subconsultants and allocated resources, including maintaining design schedule/budget and assigning staffing to deliver design submissions and obtain owner approvals in advance to maintain construction milestones.

ITS work included Dynamic Lane Use control CCTV coverage and equipment including video-based automatic incident detection, traffic monitoring sensors which monitored real-time traffic volume, lane occupancy and speed data, DMS signs spaced in locations to support motorist decision making, emergency telephone and radio rebroadcasting systems, Highways Advisory Radio, and over height detection. Equipment conformed to NTCIP communications/other industry protocol and was tested/commissioned.

Derek interfaced daily with contractor for constructability and optimize engineering and prioritization of the design work. He led design coordination with owner to develop the design per technical requirements, assisted in public outreach, and used engineering judgement to weigh tradeoffs between alternatives which sometimes required design exceptions/waivers to use elements of practical design.

Relevancy: Design-Build, MOT, ATCs, ITS, Dynamic Lane Use Controls, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Reforestation, Utility Relocations, Permitting

2017 – Present | GDOT | I-285@I-20W Interchange Reconstruction and I-20W Widening, Atlanta, GA | $490M | Design Manager: Derek is leading a multi-disciplined team preparing surveys/mapping, environmental documentation, stakeholder engagement, utility coordination, and 30% concept design plans for a design-build solicitation. Project includes reconstructing interchange ramp, adding a CD lane on I-20W, utility coordination for power and transmission lines, and ***major communications facilities and ITS upgrades including CCTV cameras, DMS, vehicle detention systems, supporting fiber optics infrastructure, and coordinating/planning for an adjacent managed lane project.*** Project included mitigation of significant noise, ecology, historic, and environmental justice impacts, as well as widening the bridges carrying I-20 over Chattahoochee River.

Relevancy: Design-Build, MOT, ATC Reviews, ITS, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Utility Relocations, Permitting

KYLE KERN | CONSTRUCTION MANAGER

2007-2011 | MDOT SHA | Design-Build Intercounty Connector Contract A, Montgomery County, MD-$483.4M-Construction Manager-Structures 7.2 mile controlled-access tri-lane divided highway project to ease congestion on Maryland highways/local roads while improving mobility/safety including ***lighting/ signalization, Lane Use Signals, overhead/cantilever signs, and integrating ITS and Electronic Toll Collection system into MDOT SHA's network. New software was developed to meet their needs, training provided, and was tested. Integrated toll facilities into the Intercounty Connector toll network by onsite MDOT SHA integration contractors.*** Progress/coordination meetings with Toll System Integrator and adjacent design-build teams discussed scheduling, safety, quality, MOT, access, and design. Widened/constructed a new I-370 interchange to replace the partial interchange in phases to accommodate two traffic lanes in each direction while widening road to inside/outside, making three lanes in each direction. Coordinated with 10 utility companies to complete 106 utility relocations including water, sewer, power/electrical, cable and fiber optic.

Years of Experience
29 (29 with Corman)

Certifications
MDOT-SHA E&S Control Yellow Card #17-349
MDE Certification #RPC010790
MDOT-SHA Temporary Traffic Control Manager

Awards
MTBMA Commitment to Safety | Distinguished Supervisor Safety Awards

Kyle supervised field operations, oversaw up to 14 crews and reviewed quality control check point procedures with QA/QC team for specification compliance, ensured construction was complete per project requirements, evaluated safety exposures/risks, participated in developing work plans and Job Hazard Analyses, reviewed Toolbox Talks, Take Fives, Morning Huddles, and Site Inspections weekly, conducted weekly safety inspections, submitted weekly Safety Inspection Reports, reviewed/maintained schedules for his area of responsibility, coordinated labor, equipment, and subcontractors, and oversaw quality control compliance.

Relevancy: MDOT SHA Design-Build, MOT, ATCs, ITS, Lane Use Signals, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Reforestation, Utility Relocations, Permitting

2012-2013 | MDOT SHA | Design-Build I-70, Phase 2D, Frederick, MD-$37.5M-Construction Manager. I-70 is a major highway connecting Baltimore to western Maryland through Frederick where 80,000 vehicles use this stretch daily and demand for added capacity had grown. Designed/reconstructed/widened a 2-mile section of dual-divided I-70 where the road was widened one lane in each direction to eliminate traffic backups from merging lanes. Reconfigured on- and off-ramps as dedicated lanes to maintain flow from exiting/merging traffic. There were utility relocations (sanitary, CCTV, gas), new intersection traffic signals, five cantilever and two overhead signs, lighting, retrofitted/expanded a stormwater management pond and relocated an ITS line due to a conflict with new roadway alignment. Maintained two traffic lanes in each direction during construction. With crews of 40 to 50 during its peak, ***outer lanes were widened first and then reconstructed the interstate median to accommodate the additional lanes***. Most work was during the day, except for traffic switches, which were at night. This project eliminated merging traffic on this part of the interstate with the new dedicated through-lane and the auxiliary lane in each direction and improved safety, congestion, and traffic flow between MD 144 and the MD 85/East Street interchanges.

Kyle supervised field operations, including interstate widening, bridge construction, utility relocations, stormwater management, traffic signals, traffic switches, and lane closures, conducted pre-construction staff meetings establishing goals/responsibilities, evaluated safety exposures/risks, participated in developing the project-specific safety program, work plans, and Job Hazard Analyses, reviewed scope to identify any specialized safety training needs, reviewed Toolbox Talks, Take Fives, Morning Huddles, and Site Inspections weekly, conducted weekly safety inspections with the project manager/project engineer, submitted weekly Safety Inspection Reports, coordinated labor, equipment, and subcontractors, schedules, and oversaw construction was completed per project requirements, quality control compliance and project close out.

Relevancy: MDOT SHA Design-Build, MOT, ATCs, ITS, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Utility Relocations, Permitting

JONATHAN LUKAWSKI, PE | HIGHWAY ENGINEER

Jonathan is a civil engineer with over 12 of experience in the design, coordination, and management of roadway/transit projects. He is skilled in geometric design for freeways, urban arterials, intersections and interchanges, as well as 3D digital terrain modeling, construction staging, traffic control, ROW and utility coordination, and construction support. He is responsible for preparation of plans, reports, cost estimates, and specifications, including coordination and project management. His experience as a PE leading the highway discipline on large-scale design-build projects on the interstate system with heavy ITS focus/components empowers him to deliver highway design aspects for the IS-695 TSMO project.

Education
BS, Civil Engineering

Years of Experience
12 (7 with Louis Berger -A WSP Company)

Professional Registration
Maryland PE Pending
Virginia PE #0402057304
Pennsylvania PE

2016-Present | VDOT | Transform I-66–Design-Build Outside the Beltway, Segment 2, Fairfax County, VA-$735M-Lead Highway Engineer. Jonathan led highway and civil design services for preliminary and final design of Segment 2 (Route 28 to US 50), including over 6 miles of interstate reconstruction/widening, new CD roads, 27 new bridges, over 130 new retaining and noise walls, and ***ITS improvements, including relocating the fiber backbone and power distribution duct bank, CCTV, Vehicle Detection System, DMS/Lane Use Signals, video monitoring system, and connected vehicle equipment***. He is responsible for roadway geometric design including 3D modeling, horizontal/vertical alignments, grading, ADA and bike improvements along the state/county road overpasses, roadside design, and performed utility conflict analysis. Jonathan performed alternatives analysis to reduce costs/impacts including ROW, utility, and environmental (noise, waterways, wetland, tree, historical/archeological). Technical Reports were prepared so that he could develop and implement ATCs. He used engineering judgement to evaluate the improvements and pros/cons of each ATC, including design tradeoffs/waivers, and assisted in determining which should proceed into design.

Jonathan is supervising design teams in preparing construction ready plans, specifications, and developing quantities/ cost estimates. He coordinated across disciplines ensuring the highway discipline was coordinated with drainage, stormwater management, E&SC, structures, geotechnical, signing/marking/lighting/signalization, ITS, landscape architecture, environmental permitting, NEPA specialists, and utilities. Jonathan implemented QA/QC procedures, reviewed the designs to meet AASHTO, FHWA, State, ADA, and other relevant design guidance/requirements, and coordinated with subcontractors in addition to the client to ensure design met project technical requirements.

Relevancy: Design-Build, MOT, ATCs, ITS, Lane Use Signals, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Utility Relocations, Permitting, Historical / Archeological Sites

2012-2016 | PennDOT | SR 0202 Section 330, Chester County, PA-$83M-Lead Highway Engineer. Widened 2.5 miles of limited access highway along US 202 from 4 to 6 lanes, which required bridge replacements over Chester Valley Trail and SR 0401, a widened bridge over Planebrook Road, 5 new stormwater management facilities, 12 design-build noise walls, ***and ITS upgrades including implementing a new fiber optic backbone, DMS signs, traffic monitoring cameras, and equipment.*** Duties included geometric design including horizontal/vertical alignments, 3D modeling, grading, roadside design, utility coordination, and preparing the final design plan, specification and estimate (PS&E). Jonathan oversaw a design team and coordinated across disciplines including drainage, stormwater management, E&SC, traffic, MOT, structures, geotechnical/pavement, borings, environmental permitting, and ITS. Noise analyses were performed and required noise barriers designed/constructed. He implemented his discipline QA/QC Plan and reviewed the design to meet AASHTO, FHWA, and State design requirements/guidance.

Relevancy: Design-Build Component, MOT, ITS, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Utility Relocations, Permitting

TIM RAYNER, PE, PTOE | TRAFFIC ENGINEER

Tim is experienced in traffic/transportation planning services, including transportation system congestion analysis, system performance measurement, micro/macro-modeling, traffic impact analysis, travel demand forecasting, multi-modal, and operational/safety analysis. Experienced in traffic/transportation design services, he uses his expertise/engineering judgement to perform traffic signal/ITS design, sequence of construction and maintenance of traffic (MOT) analysis/ design, signing and pavement marking design, and roadway geometrics. Tim worked in government agencies and in consulting and knows CORSIM (Traffic Software Integration System), Highway Capacity Software, Synchro, VISSIM, AutoCAD, ArcMap, and Cube Voyager.

Education
MS, Engineering Professional Practice

BS, Engineering

Years of Experience
22 (12 with WSP)

Professional Registration
Professional Traffic Operations Engineer #2409

Maryland PE Pending
Virginia PE #0402041012

2010-2016 | VDOT | Design-Build I-264 / MLK Interchange, Portsmouth, VA - $300M–Traffic Engineer. Tim oversaw preliminary/final design of traffic elements, including signs/pavement markings, lighting, traffic control devices/ signals, MOT Plans and Transportation Management Plan (TMP) to maintain 70,000+ vehicles per day on I-264 through four construction phases, ITS plans and their integration with VDOT's Traffic Management System. ITS components included DMS, CCTV, Lane Control Signals (LCS), Lane Use Signals (LUS) and traffic sensors to determine real-time traffic volume, speed, and pavement condition. I-264 includes tunnel crossing under Elizabeth River and designed/constructed ITS to support tunnel operations, including over height vehicle detection systems on both approaches. Installed LCS using 3-section traffic signals to stop traffic for incidents on each approach before entering the tunnel. Installed bi-directional LUS on the interstate tunnel approaches and through the tunnel to close a lane in the event of an incident. Because LUS were not part of the original contract, ***Tim developed a basis of design as an application guide to this project. CCTV and DMS are installed throughout the project, however, inside the tunnel is Automatic Inside Detection (AID) through fixed CCTV cameras and surveillance of tunnel operation through PTZ CCTV cameras. One-line DMS is installed through the tunnel. ITS communicates with a primary and backup control room, which communicated to the local Traffic Operations Center.***

Tim led local/regional traffic analyses to determine local/parallel interstate facility impacts during construction using engineering judgement to determine what lane use adjustments could resolve them. Local facility analyses included Synchro/SimTraffic for arterials and signalized intersections to accommodate ramp closures which were coordinated with local agencies. For faster/safer construction, conducted regional analyses for weekend closures, which were not initially part of the project including impacts to 5 parallel, critical water crossings to determine if they should be allowed. Gathered/compiled/distributed local traffic data among parallel crossings in the model. Analyzed each via Highway Capacity Manual methodology to determine anticipated additional delays. This contributed to construction finishing ahead of schedule.

Relevancy: Design-Build, MOT, Traffic Operation/Flow Analysis, TMP Development, Work Zone Traffic Analysis/Design, Traffic Control Devices/ITS Design, Signing/Marking Design, Lighting Design, MOT Design

2015-2019 | FDOT | Design-Build I-95 Express Lanes Phase 3A2, Broward County, FL-$143M-Lead Traffic Engineer. Tim oversaw traffic component design to implement toll lanes along 7.25 miles of I-95. Improvements included milling, resurfacing, widening/reconstructing I-95 travel lanes/shoulders; installing roadside barrier, drainage improvements, installing sign structure, constructing noise wall, and design/implementation/integration of ITS improvements including ramp metering/tolling gantries. Traffic design included signing, marking, lighting, signalization, MOT, TMP, ITS. ***He oversaw ITS design/implementation/integration including CCTV, vehicle detection and count stations, DMS, fiber communications, and ramp metering including traffic analyses to determine the need for 2-lane vs. 1-lane ramps at the metering site. He performed a 3D review of camera viewsheds for the CCTV, confirming blind spots were eliminated.***

Relevancy: Design-Build, MOT, ITS Design, Ramp Metering, Noise Analysis

DANIEL JOHNSON, PE | INTELLIGENT TRANSPORTATION SYSTEMS (ITS) SPECIALIST

Education
BS, Electrical Engineering

Years of Experience
15 (1 with WSP)

Professional Registration
Maryland PE Pending
Virginia PE #402053506
Florida PE #84388
Georgia PE #040729
North Carolina PE #03437
Pennsylvania PE #086801

Daniel has 15 years combined public service and private consulting experience. He is an Electrical Engineer within the transportation industry, experienced in the design, construction, operation, and maintenance of arterial traffic signal and intelligent transportation systems (ITS). Specialized experience in advanced applications of traffic signal controllers and cabinet hardware, Signal Timing and Optimization, detection systems, fiber optic and wireless communication systems, and IP network switching and devices. Works directly with state, county, and local government staff providing technical knowledge, support, and direction in the selection, coordination, design, concept of operations, implementation, integration, maintenance and utilization of traffic signal and ITS solutions.

2018-Present | NCDOT | Design-Build I-485 Express Lanes, Charlotte, NC-$347M-ITS Specialist. Project team member for addition of 17 miles of median express lanes along I-485 around Charlotte, between I-77 and US 74, Daniel is responsible for final design of construction ready ***ITS and Toll facility plans/specifications for the installation/coordination of all components including fiber optic communication cable, CCTV cameras, DMS, microwave vehicle detection, toll gantries, Lane Use Signals, and toll equipment locations. Selected and located equipment to best meet project requirements and for adaptability and maintainability***. Will be responsible for integrating the equipment into the existing NCDOT ITS System and is overseeing the construction/implementation ensuring compliance to the contract's technical requirements and design standards. Arterial systems design for temporary and new traffic signals and fiber optic communications.

Relevancy: Design-Build, ATCs, ITS, Lane Use Signals, CCTV, DMS, Vehicle Detection, Fiber Optic, Traffic Signals

2018 – Present | NCDOT | Design-Build I-77/I-40 System-to-System Turbine Interchange, Statesville, NC-$260M-ITS Specialist. Project team member for design/construction of an innovative system-to-system turbine interchange at the I-40 and I-77 intersection. ***Daniel had to develop ITS plans/specifications that met design standards and technical requirements for relocating CCTV cameras along the freeway corridors for adequate coverage and the new locations are accessible/maintainable. He performed design for arterial-based systems including temporary/new traffic signals, wireless communications, and signal timing. Daniel oversaw selection, coordination and implementation of new equipment and integrated the system.***

Relevancy: Design-Build, ATCs, ITS, CCTV, Signal Design and Timing, Wireless Communications

2018-Present | NCDOT | Design-Build I-540 Expressway, Raleigh, NC-$403M-ITS Specialist. Project team member for new construction of 9 miles of 4-lane divided expressway toll facility along I-540 around Raleigh, between I-40 and US 401. Daniel selected equipment that best met the project goals and requirements and used good engineering judgement to meet design and technical requirements. ***He is leading development of ITS and toll facility plans/specifications to install fiber optic communication cable, CCTV cameras, DMS, microwave vehicle detection, full span toll gantries, and tolling vaults.*** He will oversee the construction, implementation and integration with owner's ITS system. Arterial systems design included temporary and new traffic signals and fiber optic communications. Daniel developed MOT Plans for the temporary traffic signals and coordinated timing with traffic modelers for proper signal phasing.

Relevancy: Design-Build, ATCs, ITS, System Integration, Equipment Selection, Microwave Vehicle Detection, DMS, CCTV, Fiber Optic, Toll Gantries

MICHAEL T. RECTANUS, PE | INDEPENDENT DESIGN QUALITY MANAGEMENT (IDQM) MANAGER

Education
BS, Civil Engineering

Years of Experience
20 (10 with Dewberry)

Professional Registration
Maryland PE #31191

2016-Present | MDOT SHA | Design-Build US 219 from I-68 to Old Salisbury Road, Garrett County, MD-$45M-Quality Manager/Lead Highway. Michael assisted in overseeing design/development of Concept Plans and RFP package for this project which included a 4-lane divided highway bypass from I-68 to Old Salisbury Rd. including new parallel bridges over US 40 Alt and I-68 Interchange modifications. He oversaw preliminary engineering design for horizontal/vertical geometrics, drainage, concept SWM and bridge design, environmental permits, cost estimates, and specifications using MDOT SHA standards/relevant guidelines. ***Managing construction phase services including performing/coordinating design reviews on behalf of MDOT SHA for roadway/drainage, bridge, retaining wall, stormwater management, E&SC, shop drawing and design exception packages***. QA/QC reviews include checking plans, calculations and reports for compliance with RFP, MDOT SHA standards, AASHTO and other relevant guidelines and providing comments. Maintain a design construction package matrix for RFP compliance, address backcheck comments, and confirm comment close out. Coordinated with MDOT SHA/Design Builder to resolve comments to be ready for construction.

Relevancy: MDOT SHA Design-Build, Roadway and Paving, Drainage, Stormwater Management, Erosion & Sediment Controls, Utility Relocations, Permitting

2014-2018 | MDOT SHA | Design-Build MD 4 from Forestville Road to MD 458 Community Safety & Enhancement, Prince George's County, MD-$21M-Quality Manager/Lead Highway Engineer. Michael oversaw highway design and construction phase services for this 2.2-mile community safety/enhancement project which narrowed vehicular travel lanes/shoulders, intersection upgrades with signalization, ADA and lighting improvements. Responsible for highway and drainage design including geometric design (horizontal/vertical alignments), typical sections and pavement details, super-elevation, intersection details, construction plans and cross sections. Coordinated with disciplines including SWM, E&SC, MOT, signing, marking, landscape architecture, reforestation, lighting, pavement rehabilitation, environmental compliance and final permitting. Assisted in developing ATCs. ***Reviewed QC on highway packages and interdisciplinary reviews on other design discipline/ permitting packages. Checked for RFP compliance, backchecked comment responses, and ensured projects were stamped for QA/QC by reviewers prior to releasing to stakeholders***. Michael coordinated/responded to Design QA comments to release packages for construction and managed construction phase services including shop drawing reviews, RFIs and as-built plan submissions through MDOT SHA's tool kit.

Relevancy: MDOT SHA Design-Build, MOT, ATCs, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Reforestation, Utility Relocations, Permitting

2012-2014 | MDOT SHA | Design-Build Intercounty Connector Contract D/E, Prince George's County, MD-$110M-Quality Manager/Lead Highway Engineer. Michael oversaw highway design for 1.25 miles of new 6-lane divided highway, 4 miles of new CD roads, a continuous flow intersection, and 1 noise wall. Responsible for highway design elements including typical sections and pavement details, super-elevation, intersection details, construction plans and cross sections, access roads, and storm drain design. Coordinated with structures (bridge, retaining/noise walls and culverts), SWM, utilities, lighting, signing and marking, signals, ITS and adjacent projects. Assisted in developing ATCs. ***Reviewed QC on highway packages and interdisciplinary reviews on other design discipline packages. Checked for RFP compliance, backchecked comment responses, and ensured projects were stamped for QA/QC by reviewers prior to releasing to stakeholders.*** Michael ensured QA/QC was performed and stamped before submitting to MDE/permitting agencies, coordinated/responded to Design QA comments to release packages for construction. During construction, he attended weekly design coordination and progress meetings, answered RFIs, reviewed shop drawings and produced as-built plans.

Relevancy: MDOT SHA Design-Build, MOT, ATCs, ITS, Roadway and Paving, Stormwater Management, Erosion & Sediment Controls, Reforestation, Utility Relocations, Permitting

ii. PAST PERFORMANCE

PROJECT #1 | DESIGN-BUILD INTERCOUNTY CONNECTOR CONTRACT A (ICC-A), MONTGOMERY COUNTY, MD

CORMAN – LEAD DESIGN-BUILD CONTRACTOR PARTNER IN A JOINT VENTURE (INTERCOUNTY CONSTRUCTORS JV)

OWNER/POINT OF CONTACT NAME AND TELEPHONE NUMBER	PROJECT DELIVERY METHOD	INITIAL CONTRACT VALUE	FINAL CONTRACT VALUE
Maryland Dept. of Transportation/State Highway Administration (MDOT SHA) Rob Shreeve (Retired; now with AECOM) 410-785-7220 | robert.shreeve@aecom.com	Design-Build	$463,885,499.00	$483,409,033.00 *Due to changes in scope, price adjustments and incentive payments*

INITIAL COMPLETION DATE: 8/1/10	FINAL COMPLETION DATE: 2/22/11 *Due to changes in scope*

New 7.2 mile controlled-access tri-lane divided highway beginning at the I-270/I-370 Interchange in Rockville to the MD 97 Interchange in Olney to ease congestion on Maryland's highways/local roads while improving mobility/safety. Widened/constructed a new I-370 interchange to replace the partial interchange in phases to accommodate the two lanes of traffic in each direction while widening the road to the inside/outside, making three lanes in each direction.

Lane use signals

Traffic Engineering | ITS: ***Installed lighting/signalization, overhead/ cantilever signs, including ITS signs on I-270, and integrated ITS and Electronic Toll Collection system into MDOT SHA's network. New software was developed to meet their needs, training provided, and was thoroughly tested. Integrated toll facilities into the overall Intercounty Connector toll network*** by MDOT SHA hired contractors. Progress/coordination meetings with Toll System Integrator and adjacent design-build teams discussed scheduling, safety, quality, MOT, access, and design.

Maintenance of Traffic: Maintained traffic on mainline I-370 and I-270 as bridges were widened and ITS sign structures were installed.

Environmental: Developed environmental strategies to reduce impacts, including reforestation, water quality monitoring, thermal reductions to stormwater runoff, air quality management, construction noise mitigation, spill prevention and storm water pollution countermeasures, review of design/construction for regulatory compliance and comprehensive employee training on environmental stewardship.

Meeting Project Goals: Project finished with a 92% *A* rating for environmental compliance and averaged *A* Ratings for erosion & sediment control.

Awards: 2012 AGC of America Alliant Build America Award –Design-Build Highway & Transportation; ENR (NE Division) Best Project –Transportation

DISCUSSION OF WHAT WORK, INCLUDING ANY SUCCESSFUL METHODS, APPROACHES, AND INNOVATIONS ON THE PROJECT IS RELEVANT TO THIS CONTRACT AND WHY: Redesigned the MAR interchange from a 3-level to a 2-level eliminating retaining walls and saving the owner millions of dollars long term. **WHY RELEVANT:** With roadway and interchange construction on this project, we will look for ways to reduce cost by implementing innovative design and construction to maximize project components for the fixed price.

PROPOSED DESIGN-BUILD TEAM MEMBERS ON THIS PROJECT: Scott Szympruch, PE was the Construction Manager and Kyle Kern was the Construction Manager-Structures. M.C. Dean, Inc. performed the Lane Use Signals and electrical work on the tunnel.

PROJECT #2 | DESIGN-BUILD I-395 THIRD ST. TUNNEL LANE USE SYSTEM, WASHINGTON, DC

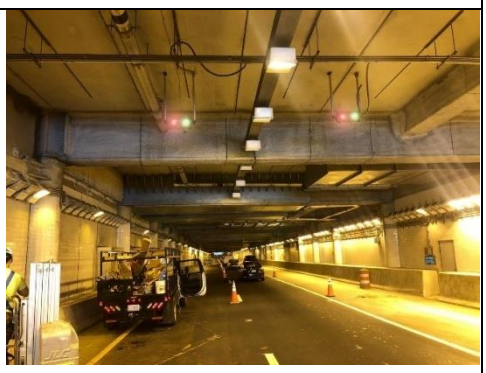
M.C. DEAN –DESIGN-BUILD TEAM MEMBER

OWNER/POINT OF CONTACT NAME AND TELEPHONE NUMBER	PROJECT DELIVERY METHOD	INITIAL CONTRACT VALUE	FINAL CONTRACT VALUE
DC Dept. of Transportation (DDOT) Gregory Marshall 202-299-3986	Design-Build	$4,080,195.00 M.C. Dean $250,000,000.00 Overall Project Value	$5,626,254.00 Est. M.C. Dean *Due to owner-directed changes*

INITIAL COMPLETION DATE: 8/2019	FINAL COMPLETION DATE: Ongoing. *Due to owner-accept changes. Open for beneficial use of traffic.*

As part of the Capitol Crossing project, the northern section of this system's functionality was interrupted as no clear radio frequency signal could be extended through the newly built building/tunnel. The initial design provided by the developer would not integrate with the existing system or function as DDOT desired.

Meeting Project Goals: Solved design flaws within the original contract documents and deployed a complete, functional, and expandable Lane Use System.



Installing a new design-built system to control Lane Use System lights

DISCUSSION OF WHAT WORK, INCLUDING ANY SUCCESSFUL METHODS, APPROACHES, AND INNOVATIONS ON THE PROJECT IS RELEVANT TO THIS CONTRACT AND WHY: The northern section of this system's functionality was interrupted as no clear radio frequency signal could be extended through the newly built building/tunnel. The initial design provided by the developer would not integrate with the existing system or function as owner desired.

M.C. Dean designed and built the system (including Lane Use Signals) with future expansion and scalability in mind. Design is complete and M.C. Dean is currently installing the new system which uses Programmable Logic Controllers (PLCs) to control the lights from two centrally located work stations (Dept. of Labor Building and the Tunnel Fan Control Room), along with M.C. Dean's own developed software, will add functionality to the original deployment, such as full lane closures to promote safety. The components are readily available from the manufacturers and are a fraction of the cost of the original selected components which can be used for other systems within the tunnel and cuts down on the number of required spare parts. **WHY RELEVANT:** M.C. Dean's experience on this project pairs well with IS-695 due to the complexity and need to maintain highway operability. ***This project required a Lane Use System similar to the shoulder-use system that will be implemented for IS-695 from IS-70 to MD-43.*** M.C. Dean knows the best method to designing/installing programmable lighting for traffic control measures and delivering a Part-Time Shoulder Use system that safely provides a way for MDOT SHA to change traffic patterns as needed with seamless connectivity from road to traffic command center.

Throughout this project, M.C. Dean had to minimize traffic impacts as IS-395 is a major thruway in and out of the southeastern section of Washington, DC. This is comparable to the size and traffic volume to IS-695, and with planning ahead, M.C. Dean will deliver the same high level of operability/adaptability for MDOT SHA. Our work matches well the size/scope of MDOT SHA's IS-695 Active Traffic Management effort and are prepared to mobilize on day one with the right technology and infrastructure to meet needs of IS-695 and Maryland citizens/commuters.

PROPOSED KEY STAFF MEMBERS IN SIMILAR ROLES: Steven Bartynski was the Design-Build Project Manager

PROJECT #3 | DESIGN-BUILD I-66 ACTIVE TRAFFIC MANAGEMENT, ARLINGTON, VA

WSP USA INC. – DESIGNER, ITS TECHNICAL LEAD, QA/QC MANAGER

OWNER/POINT OF CONTACT NAME AND TELEPHONE NUMBER	PROJECT DELIVERY METHOD	INITIAL CONTRACT VALUE	FINAL CONTRACT VALUE
VDOT Northern Virginia District/TransCore ITS Timothy Fischer, Vice President | 954-342-0690	Design-Build	$34,000,000.00	$34,000,000.00

INITIAL COMPLETION DATE: 4/2014	FINAL COMPLETION DATE: 5/2016 *Design was completed as per schedule; construction delayed due to utility relocation and foundation construction issues*

First implementation of a fully integrated Active Traffic Management (ATM) System on the east coast along one of the most congested corridors (167,000 AADT) in Northern Virginia, covering 34 miles of I-66 from the Washington, DC line on the east to Gainesville, VA on the west. The ATM portion covered 7.2 miles of the most congested and crash prone part of the system. ***It improves mobility, safety and incident management and includes dynamic, Part-Time Shoulder Use, new overhead sign gantries, shoulder and lane control sign; speed displays, incident and queue detection, and increased traffic camera coverage.***

I-66 ATM System designed by WSP

WSP led technology selection and included implementing adaptive ramp metering requiring detection placement to support the Alinea algorithm, signing, and roadway geometrics.

Incident management in the corridor is supported through the design's expansion of owner's CCTV coverage, addition of Dynamic Message Signs (DMSs), implementation of main line microwave radar detectors, queue detection and a video-based automated hard shoulder lane monitoring system. The dynamic Part-Time Shoulder Use monitoring system provided 100% video coverage of the hard shoulder running area using sophisticated video analytics to detect stopped vehicles, slow traffic, pedestrians/bicycles, and debris in the shoulder lane area. The system eliminated owner's need to manually sweep the shoulder before opening it to traffic.

An ATM system is intended to manage traffic on a per lane basis. Design of this ATM system solution included gantry placement, design and technology selection for lane and speed control DMSs. Communications leveraged dark fiber owned by VDOT with WSP designing the lateral connections, selection of the network gear and provision of power including auxiliary power generator sites serving all ITS devices.

Operability/Maintainability/Adaptability/Safety: Our design incorporated operational and maintainability concepts into the plans. The overhead lane use signs have specially-designed mounting hardware and cabling disconnects that allows VDOT maintenance to replace the signs in less than 15 minutes – ***Benefits: Reduced traffic***

impacts and maintenance costs. The material cover over the signs was designed for minimum cleaning, support for ice melting, and energy efficient operation.

Our team incorporated a *roadway design for safety* philosophy as a part of our plan development. This project addressed safety associated with post-construction maintenance activities, signing pollution and clutter, pavement markings and roadway lighting.

DISCUSSION OF WHAT WORK, INCLUDING ANY SUCCESSFUL METHODS, APPROACHES, AND INNOVATIONS ON THE PROJECT IS RELEVANT TO THIS CONTRACT AND WHY: This system is directly applicable to meeting the goals of the IS-695 TSMO project: it implemented safe, dynamic Part-Time Shoulder Use, improved mobility through shoulder use, as well as other ATM solutions, improved safety and incident management, and performed design in consideration of operability/maintainability/adaptability. WSP performed relevant disciplines including Highway, Structural, Traffic, MOT, ITS, Lighting, Permitting, Traffic Modeling, Drainage/ SWM, Geotechnical/Pavement design services from concept development through construction administration.

PROJECT #4 | DESIGN-BUILD HORSESHOE, DALLAS, TX

WSP USA INC. -LEAD DESIGNER

OWNER/POINT OF CONTACT NAME AND TELEPHONE NUMBER	PROJECT DELIVERY METHOD	INITIAL CONTRACT VALUE	FINAL CONTRACT VALUE
Texas Dept. of Transportation Tony Hartzel | 214-320-4481	Design-Build	$798,000.000.00	$798,000.000.00
INITIAL COMPLETION DATE: 2017		FINAL COMPLETION DATE: 2017	

Project included I-30 from Sylvan Ave. to I-35E and I-35E from north of Eighth St. to the I-30/I-35E interchange and was completed in 2017, five years ahead of the conventional design-bid-build process. It improves mobility, safety and traffic flow in downtown Dallas.

DISCUSSION OF WHAT WORK, INCLUDING ANY SUCCESSFUL METHODS, APPROACHES, AND INNOVATIONS ON THE PROJECT IS RELEVANT TO THIS CONTRACT AND WHY:

Shoulder Use: ***WSP designed the Lane Use Control system using lane and shoulder use signals to clearly indicate which lane or shoulder to use depending on designation. Installed Lane Use Control signals on gantries throughout the project to indicate closed lanes due to construction or for lane and shoulder use control during an incident.*** **WHY RELEVANT:** This Lane Use Control system is similar to what would be implemented on the IS-695 TSMO project, with lane control systems spaced regularly throughout the limits of shoulder use on gantries and the ability to dynamically adjust lane use due to construction activities or incidents.

Mobility: WSP designed the ATM to inform motorists of lane and shoulder availability, reduce speed limits and incidents in advance. It allows them to make early lane decisions and avoid congestion, influencing the reliability of the corridor. ATM enables lane and shoulder designation, route confirmation, and safe speed to be communicated to motorists in real time over the travel lanes and shoulders, using 5’ x 5’ dynamic message signs mounted over each lane for Lane Control Signals (LCS), using existing bridges, overhead sign structures or standalone gantry structures. **WHY RELEVANT:** The ATM will reduce potential motorist error, support incident management, reduce potential for secondary incidents, and smooth traffic flow within the work zone and approaching it from each leg of the Horseshoe, enhancing safety. Identifying incidents early allows adjusting and communicating variable speed limits to motorists upstream, enabling them to slow down and reduce the risk of secondary crashes.

Operability/Maintainability/Adaptability: Field components are controlled locally through a Type 336S field cabinet; each was designed to provide maintenance access during construction. LCS are controlled through a wireless network connection to a temporary traffic management center within the project limits using vendor software. By using a wireless system, it is less likely that adjacent construction could disrupt the communication and network due to a cable or conduit being cut. The system is adaptable to the Texas Traffic Management System so that upon project completion, the owner had the option to take permanent ownership of the ATM system to incorporate into their

regional freeway management system. The color LCS provide flexibility in displaying graphics for traffic management, including color-coded lane control arrows or interstate shields for route confirmation. System design was reviewed for ease of maintenance prior to implementation. **WHY RELEVANT:** The same philosophy of a maintainable, operable, and adaptable system will be used on IS-695 TSMO.

PROJECT #5 | MANAGED USE LANE (MUL) PHASE III -LONG ISLAND EXPRESSWAY (LIE) HOV EXTENSION, NEW YORK, NY

WSP USA INC. -DESIGNER

OWNER/POINT OF CONTACT NAME AND TELEPHONE NUMBER	PROJECT DELIVERY METHOD	INITIAL CONTRACT VALUE	FINAL CONTRACT VALUE
New York State Dept. of Transportation (NYSDOT) Uchenna Madu | 718-482-4559	Design-Bid-Build	$5,050,000.00	$5,050,000.00

INITIAL COMPLETION DATE: 2/28/19	FINAL COMPLETION DATE: 9/28/19 *WSP's design is complete but still under contract to assess utility impacts*

WSP prepared plans, cost estimates and a design approval document for the selected preferred alternative of Managed Use Lane along the Long Island Expressway (LIE) between Queens Midtown Tunnel and Main Street. Scope extended the westbound HOV lane three miles east which will function/operate as a Managed Use Lane and included design of dynamic Part-Time Shoulder Use eastbound to account for the takeaway lane from eastbound for the HOV extension.

WSP is leading a team of national/international experts in the planning, design, and implementation of Managed Use Lane facilities. WSP developed engineering plans, evaluated Active Transportation and Demand Management (ATDM)/Intelligent Transportation Systems (ITS) and designed supporting equipment range from overhead and ground-mounted variable speed, travel time, queue warning and lane control signs. Conducted long range New York Best Practices Model forecast to assess modal shift and regional impact of the Managed Use Lane extension, performed microsimulation of concepts including Part-Time Shoulder Use eastbound to alleviate traffic congestion due to the takeaway lane for the extension.

WSP prepared comprehensive engineering plan sheets for the Managed Use Lane extension and Part-Time Shoulder Use on selected segments. Forecasted travel demand using modeling software to estimate transit and HOV volumes and conducted microsimulation to assess performance of concepts in terms of mobility improvements. ATDM strategies were developed for Managed Use Lane implementation, including Lane Use Control, dynamic speed displays, queue warning, travel time technologies (advisory for eastbound travel time comparing mainline to CD road), CCTVs for CD road and Part-Time Shoulder Use and detection technologies.

DISCUSSION OF WHAT WORK, INCLUDING ANY SUCCESSFUL METHODS, APPROACHES, AND INNOVATIONS ON THE PROJECT IS RELEVANT TO THIS CONTRACT AND WHY: **Part-Time Shoulder Use and Mobility:** Projected results demonstrate mobility improvement can be achieved via capacity improvements complemented with ATDM/ITS strategies. For example, the Lane Use Control signs complemented with dynamic advisory speeds and variable message signs to prepare motorists in advance to merge in and exiting from the Managed Use Lane and Part-Time Shoulder Use segments.

Safety: Additional safety improvement analysis assessed added benefits anticipated from ATDM/ITS, such as lane closure warning during incidents to encourage merging out of closed lanes-This was supported by emergency responders. WSP conducted an ATDM Benefit analysis that included estimated cost savings associated with improved travel time, collision reduction as a result of queue warning and speed harmonization. Developed cost estimates for construction, implementation and maintenance of the ITS/ATDM system. **WHY RELEVANT:** Lessons learned on this innovative state of the art project will be used on the IS-695 TSMO project.

PROJECT #6 | OAKLAND COUNTY HARD SHOULDER RUNNING AND ACTIVE TRAFFIC MANAGEMENT ASSESSMENT, OAKLAND COUNTY, MI

WSP USA INC. – LEAD DESIGNER

OWNER/POINT OF CONTACT NAME AND TELEPHONE NUMBER	PROJECT DELIVERY METHOD	INITIAL CONTRACT VALUE	FINAL CONTRACT VALUE
Michigan Dept. of Transportation Sue Datta, AICP | 248-388-0730	Design-Bid-Build	$287,000.00 Design	$283,000.00 Design *WSP performed a more efficient design which saved client time/ money.*

INITIAL COMPLETION DATE: 12/2014	FINAL COMPLETION DATE: 12/2014

As part of a larger Engineering Report project, WSP evaluated feasibility of Hard Shoulder Running (HSR) and other Active Traffic Management (ATM) strategies along I-75 between 8 Mile Road to Square Lake Road and along I-96 between US 23 and I-275.

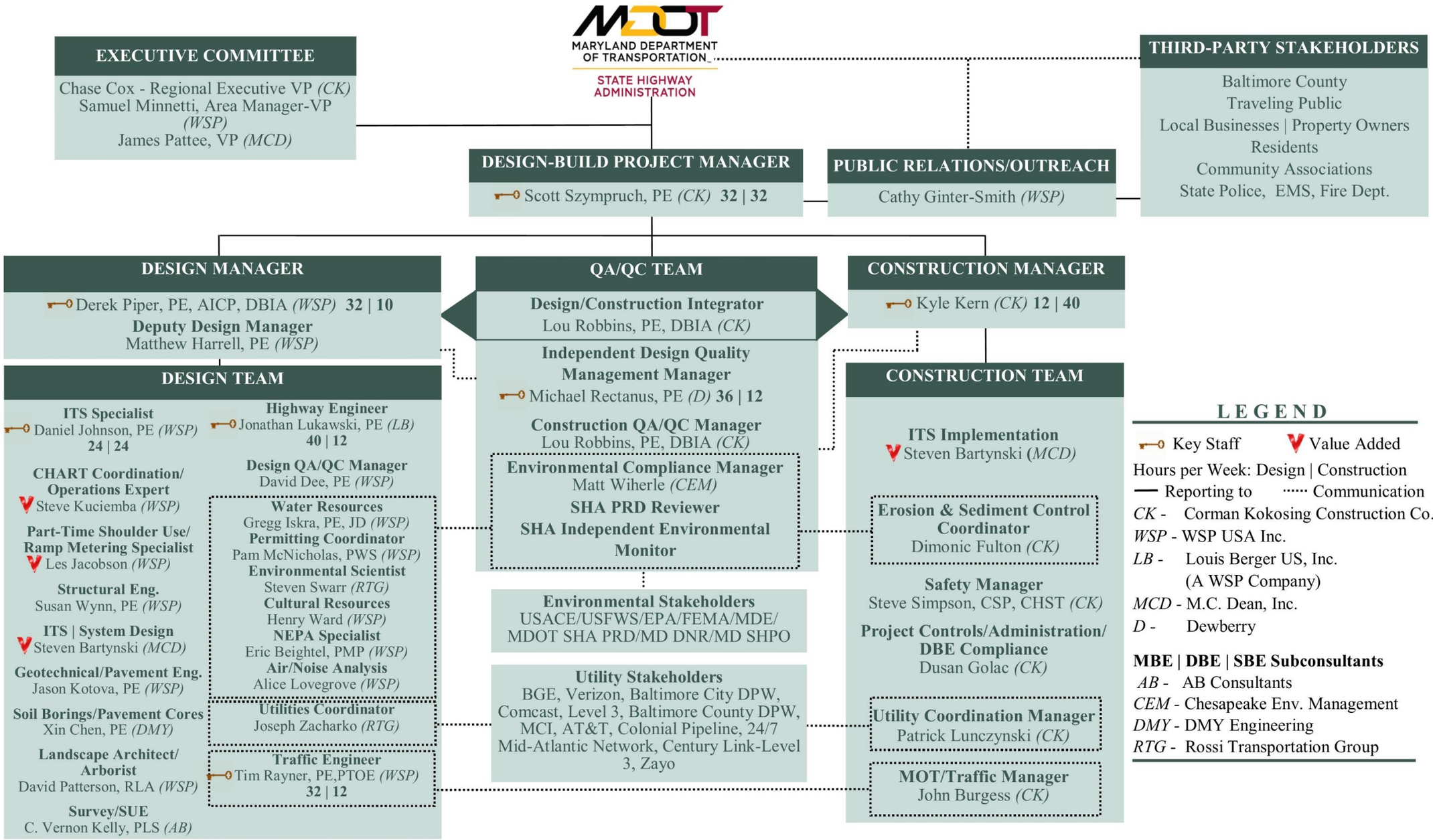
DISCUSSION OF WHAT WORK, INCLUDING ANY SUCCESSFUL METHODS, APPROACHES, AND INNOVATIONS ON THE PROJECT IS RELEVANT TO THIS CONTRACT AND WHY: **Part-Time Shoulder Use:** I-75 section included assessment of Part-Time Shoulder Use and found to be feasible for a 13-mile-long corridor with some additional modifications at critical pinch points to maximize limits of the Part-Time Shoulder facility which is exactly the assessment needed to be successful on the IS-695 TSMO project. It was recommended to advance the study to further review, and is estimated to save approximately $60M. Included were an evaluation of purpose and need, alternatives assessment, environmental/physical/ROW constraints, noise analysis, H&H, operational and safety feasibility, cost evaluation and geometric concerns including pavement widths/pinch points, super-elevation, sight distance, pavement thickness, and other evaluations.

Mobility: WSP conducted an operational analysis in the VISSIM microsimulation software for the I-96 corridor to estimate Part-Time Shoulder Use mobility impacts. This allowed many alternatives to be screened quickly for selecting the optimal termination points for the Part-Time Shoulder Use, as well as dial in on the hours of operation for the new system that would greatly reduce congestion and improve travel time reliability. Exported the microsimulation data to a high-end visualization software to communicate the operations at stakeholder meetings, as well as explain complex operational strategies, such as using the Part-Time Shoulder Use system during incident management or maintenance. ***ATM strategies including dynamic Lane Use Control, ramp metering, and dynamic speed management.***

Safety: A safety and crash analysis estimated the effectiveness of solutions on safety throughout the corridor. Stakeholder meetings were held with owner, state police, FHWA, and the County Roads Commission to advise of proposed work and address concerns.

Operability/Maintainability/Adaptability: WSP prepared a concept of operations (ConOps) for Part-Time Shoulder Use for the I-96 corridor to determine system operability/maintainability/adaptability. Cost estimates were included in the ConOps for design/construction of the system itself, and included annual operations and maintenance costs, including adding new operators to the operations center responsible for the system. **WHY RELEVANT:** Lessons learned on this innovative state-of-the-art project will be utilized on the IS-695 TSMO project.

iii. ORGANIZATIONAL CHART



B. Project Understanding and Design-Build Approach

MARYLAND DEPARTMENT OF TRANSPORTATION™

STATE HIGHWAY ADMINISTRATION

B. PROJECT UNDERSTANDING | DESIGN-BUILD APPROACH

i. STRATEGIC APPROACH TO EVALUATION/ENSURING PROJECT GOALS ARE MET

The Corman | WSP | MC Dean DB Team brings national experts and expertise with current relative expertise in Active Traffic Management (ATM) implementation, ITS design, and Concept of Operations development unmatched across the industry. Our experts will collaborate through a Design Charrette, and then regularly throughout concept development and design, evaluate the project constraints and develop the best implementation of operable Part-Time Shoulder Use, adaptable ATM solutions, and maintainable geometric improvements that maximize mobility and safety benefits. We will partner with MDOT SHA and stakeholders to exceed the following project goals:

GOAL #1	**Part-Time Shoulder Use:** Maximize amount of dynamic median Part-Time Shoulder Use to maximize an increase in vehicle throughput and minimize travel times/delay along inner/outer loops of IS-695 from IS-70 to MD 43.

To maximize amount of dynamic Part-Time Shoulder Use on IS-695, the Corman | WSP | MC Dean DB Team will perform: **1) A Geometric Feasibility Review, 2) An Environmental Review, 3) Design and Operations Concept Development.** Conducting these steps allows us to zero in on where we can implement Part-Time Shoulder Use and maximize this ATM strategy that increases vehicle throughput and minimizes delay along IS-695. WSP implemented this approach to maximize Part-Time Shoulder Use on the I-75 and I-96 in Michigan, Long Island Expressway in New York, and on the I-66 ATMS project in Virginia.

GEOMETRIC FEASIBILITY REVIEW: Our Part-Time Shoulder Use feasibility assessment will be based on design guidance provided for a standard interstate lane in MDOT's Practical Design Implementation Guide, AASHTO's Interstate Design Guidelines, and FHWA's Use of Freeway Shoulders for Travel guide. Geometric considerations that will be investigated to maximize dynamic Part-Time Shoulder Use limits include:

- **Pavement Width:** Review project limits to gather shoulder and pavement widths and determine where additional width is required to accommodate Part-Time Shoulder Use along the median shoulder. Identify and eliminate pinch points, such as bridge piers/abutments/parapets, sign structure foundations, light poles/foundations, roadside and noise barriers, retaining walls, etc. All options will be considered, including shifting lanes, narrowing lanes/shoulders, widening, and removing/relocating obstacles.
- **Controlling Criteria:** Since IS-695 is on the National Highway System, any design element that does not meet the minimum criteria requires a design exception. In addition to the lane and shoulder widths noted above, the following will be reviewed to determine preferred mitigation: Design Speed (if lowered), Horizontal Curve Radius, Super-elevation, Stopping Sight Distance, Cross Slope, and Vertical Clearance.
- **Other Design Considerations:** Other elements affecting Part-Time Shoulder Use feasibility will be considered including drainage compatibility (spread requirements, inlet rideability), pavement section (is reconstruction/ strengthening necessary), length of shoulder or auxiliary lane use provide congestion/safety relief, safety concerns (can substandard geometry be mitigated), utility impacts, and potential for turnout/refuge locations.

TEAM MEMBER EXPERTISE: Geometric Feasibility Review will be conducted by WSP's most innovative and knowledgeable highway, ITS and traffic engineers. Larry Sutherland, PE, WSP's Technical Director of Highways and a leader on the Transportation Research Board's committee on Operational Effects of Geometrics, will lead this team to ensure proposed geometrics are feasible and safe. ***BENEFIT:*** Larry's understanding of AASHTO flexibility will position our team to know how to take full advantage and maximize shoulder use.

ENVIRONMENTAL REVIEW: Depending on the improvements needed to implement dynamic Part-Time Shoulder Use, there may be environmental impacts, including air/noise, cultural/historical, tree, wetland/waterway, and SWM/E&SC. Any of these may, if above impacts documented in the Categorical Exclusion NEPA document, could trigger a re-evaluation. In addition, mitigation may be required to obtain a permit. Air/noise evaluations will be needed, and if a new or existing noise barrier is required or reconstructed, they may require additional avoidance or mitigation. This analysis will be built into the first steps of the environmental review. Minimizing these impacts and the limits of noise abatement is critical to maximizing the limits of Part-Time Shoulder Use. ***TEAM MEMBER EXPERTISE:*** Environmental Review will be led by Permitting Coordinator Pam McNicholas, PWS who currently oversees MDOT MDTA's permitting program and encompasses over 25 years of Maryland permitting and NEPA experience. ***BENEFIT:*** Her team will include archaeologists/historians, water resources engineers, air/noise experts

and other environmental scientists to ensure we take the best approach to minimizing impacts and maximizing the limits of Part-Time Shoulder Use.

DEVELOP DESIGN AND OPERATIONS CONCEPTS: Based on the outcome of the Geometric Feasibility and Environmental Reviews, we will prepare concepts that maximize the length of Part-Time Shoulder Use which will be evaluated with a cost-benefit analysis comparing the benefits of travel time, throughput, and safety against cost, environmental and utility impacts. After receiving feedback from MDOT SHA, the optimum scenario offering the best benefit, most mobility, longest shoulder use, and maximum short and long-term cost effectiveness, with least impacts, will continue through design. ***TEAM MEMBER EXPERTISE:*** Part-Time Shoulder Use/Ramp Metering Specialist Les Jacobson, a national leader in Part-Time Shoulder Use, will lead this effort with direct involvement from Yousuf Taufiq, PE who led the preliminary design of 13 miles of Part-Time Shoulder Use along I-75 in Michigan. ***BENEFIT:*** These team members have firsthand knowledge of best practices and lessons learned from recent projects that went through a full feasibility assessment and concept development of Part-Time Shoulder Use.

GOAL #2	**Mobility:** Provide improvements that maximize vehicle throughput, minimize vehicle travel times, and/or create a more reliable commuter trip along IS-695 from north of IS-70 to MD-43.

To maximize vehicle throughput and travel time reliability, and minimize travel times, the Corman | WSP | MC Dean DB Team will investigate and propose solutions that systematically address the project limits along IS-695 from north of IS-70 to MD-43. We will propose the optimum combination of strategies that provide the most cumulative benefit **WITHOUT** sacrificing ***safety, maintainability, operability, or adaptability.*** We will conduct operational modeling of the corridor to pinpoint existing operational deficiencies. Next, we will develop/test ATM and other more localized capacity improvement alternatives through the modeling platform for the current and future year scenario. The optimal set of improvements that maximize vehicle throughput and travel time reliability along the corridor while minimizing travel time will be determined in coordination with MDOT SHA.

In addition to Part-Time Shoulder Use, strategies, and solutions, we will investigate to address IS-695 mobility including other innovative ATM solutions, such as dynamic Lane Use Control, queue warning, speed harmonization, variable speed advisories, and ramp metering. Other ITS solutions, such as real-time travel information, enhanced incident detection and response tools using video analytics, road weather information systems, and connected vehicle applications will be reviewed for applicability and mobility improvement throughout the corridor. Localized interchange improvements including acceleration/deceleration and merge lengths, mainline/ramp capacity, sight distance, signal timing, ramp improvements to support ramp metering and removing/reducing weaving movements. Widening and lane addition will also be evaluated. Proposed improvements will be within existing MDOT SHA ROW and an IAPA will be prepared if modifying access points.

A key issue affecting mobility along the corridor is unanticipated traffic incidents. Whether it is a car crash, flat tire, police activity or a sudden change in weather, they severely impact mobility and travel time reliability. Coordinated Highways Action Response Team (CHART) is charged with maintaining/improving real-time operations of Maryland's highway system. Any strategy the Corman | WSP | MC Dean DB Team proposes will align with CHART principals, operational practices, and technological operating systems.

Once concepts that improve mobility are identified, including limits of Part-Time Shoulder Use, the following steps will be taken to ensure our solutions maximizes throughput and minimizes travel time:

1. **Identify Concept:** Review congestion and crash hot spots and evaluate concepts that can relieve them.
2. **Develop Concept:** Rough layout of potential concepts.
3. **Evaluate Improvement:** Run VISSIM model, quantify mobility benefit, assess safety improvements.
4. **Evaluate Risks/Impacts/Constraints/Schedule:** Assess environmental impacts (cultural/historical, air/noise, tree, wetland/waterway, SWM/E&SC, NEPA), utility impacts, ROW constraints, public/political perception, schedule for permitting, NEPA, utility design/relocation, design and construction, etc.
5. **Develop Cost Estimate:** Include construction, design, utility, and MDOT SHA expenses.
6. **Perform Benefit/Cost Analysis:** Do the benefits outweigh the impacts? Is there enough improvement for the cost?

7. **Screen Alternatives:** Request MDOT SHA feedback. Eliminate concepts unacceptable to MDOT SHA, are too costly and/or too risky (i.e., ROW needs, not permittable).
8. **Compare Remaining Concepts:** Which offer the most improvement/lowest cost? How do they work together?
9. **Continue Optimization:** Continue investigating alternatives until the best concepts has been developed, can be delivered at the contract's fixed price, and provides the best value to MDOT SHA.

TEAM MEMBER EXPERTISE/BENEFITS: ITS Specialist Daniel Johnson, PE will lead this effort as he has designed ITS from concept development through final design and integration to existing systems on many design-build projects and has lessons learned that will be invaluable. His work will be supported by Traffic Engineer Tim Rayner, PE, PTOE who will oversee modeling of concepts to ensure we have optimum mobility benefits.

GOAL #3	**Safety:** Provide for a safer IS-695 corridor between IS-70 and MD-43, increasing the ability of MDOT SHA to reduce, detect, verify, respond to, and manage non-recurring congestion causes.

The Corman | WSP | MC Dean DB Team institutes a three-step safety approach, evaluating the safety of the existing roadway infrastructure, and our proposed improvements and MOT. Evaluating existing crash patterns reveals areas that need to be focused on during project design and execution. Mitigation measures can then be designed into the project to reduce crashes, minimize severity, and aid MDOT SHA, CHART and first responders in quickly identifying and responding to incidents.

STEP 1: ANALYZE CRASH DATA: Perform a crash data analysis to uncover hotspots and trends in terms of crash types, as well as contributing factors. We will look at distribution of crashes throughout the day to pinpoint trends relating to lighting, sun glare, congestion, weather and speeds. Plotting them graphically allows us to identify what may be leading to crashes, such as pinch points, narrow shoulders and/or fixed objects along the roadside. It also indicates where heavy congestion may be leading to crashes, highlighting where the Part-Time Shoulder Use and other mobility improvements may be most beneficial. Known hotspots are also important places to consider using technology to quickly identify an incident and determine the right response. Crash data may indicate other contributing factors that will be coordinated with the project design and construction. Once identified, Highway Safety Manual (HSM) Crash Modification Factors (CMFs) will guide us in determining what mitigation measures to incorporate in our design.

STEP 2: MITIGATION MEASURES: Once the Corman | WSP | MC Dean DB Team identifies existing factors contributing to crashes, measures will be incorporated to mitigate them. The primary goal is to safely add capacity to the corridor using Part-Time Shoulder Use and other mobility improvements, reducing congestion/crashes. However, our Step 1 crash analysis will be used in the concept development of our mobility strategies to mitigate hotspots and ensure new ones are not created, thereby, getting the full benefit of all improvements. In addition to hotspots, it is important to provide Part-Time Shoulder Use motorists with clear/concise direction as to when the lanes are available, where to safely enter/exit the shoulder, and consistent direction throughout implementation. Deploying technology, like dynamic lane and shoulder use signals, DMS, dynamic speed control, complete CCTV coverage of the shoulder use, automatic incident and shoulder blockage detection, and sensors, is critical for MDOT SHA to reduce, detect, verify, respond to, and manage incidents.

STEP 3: DESIGN TRAFFIC CONTROLS/WORK ZONES WITH WORKER/MOTORIST SAFETY IN MIND: The Corman | WSP | MC Dean DB Team will prepare a Traffic Management Plan, Construction Staging/ Sequencing Plans, and MOT Plans to strike the right balance between the need for efficient and safe construction and user safety/mobility. Analyzing alternatives for sequencing and MOT will determine that balance, including any needed alternative routes that may increase in traffic due to closures or users avoiding construction. Lane shifts and reductions and their durations will be developed using Maryland Manual on Uniform Traffic Control Devices (MdMUTCD), as well as MDOT SHA standards/specifications, but will be minimized to the extent possible, promoting safety and smooth traffic flow during construction. ITS will also be used during construction to quickly identify and assess a response if there is an incident. As critical as incident detection is in managing operation of the permanent roadway, work zone tight spaces potentially make ITS more critical during construction. Providing ITS is a step toward minimizing crashes within the work zone, increase worker safety and disseminating incident information before the work zone can minimize secondary crashes. ***TEAM MEMBER EXPERTISE/BENEFITS:***

Traffic Engineer Tim Rayner, PE, PTOE has led the design and implementation of construction phasing, MOT, and Traffic Management Plans for design-builds and other complex construction projects for over 20 years. He is an instructor in Work Zone Traffic Control and is certified by Virginia Dept. of Transportation in Advanced Work Zone Design. Tim completed many Transportation Management Plans for similar sized projects, including lane closure, detour route, and regional impact analyses using analysis methodologies and software packages. He designed ITS systems for similarly size projects and leverages that experience to enhance roadway and work zone safety, coordinating with the team to implement ITS to enhance safety.

GOAL #4	**Operability/Maintainability/Adaptability:** Provide improvements that minimize MDOT SHA operations and/or maintenance activities while being adaptable to future transportation technological advancements

The Corman | WSP | MC Dean DB Team know the importance of achieving MDOT SHA's goal to optimize transportation systems management and operations along the IS-695 corridor and avoid creating new maintenance complexities while ensuring adaptability for future technology advancements. Our approach is based on the basic systems engineering tenets of taking a holistic view from the beginning, engaging key stakeholders in the offices of Maintenance, CHART and ITS, and Traffic & Safety to ensure we are considering all intended/unintended impacts before implementing any devices or operational scenarios.

OPERABILITY: Our IS-695 corridor improvements will enhance operability by allowing MDOT SHA to continuously monitor real-time conditions and change from simply informing motorists of issues to actively managing traffic patterns during periods of heavier traffic/incidents. The goal with any new technology/equipment installation is to integrate seamlessly with CHART's ATMS so that MDOT SHA operators can use these tools from within their existing interface. CHART operations personnel will be trained on these new tools and strategies, and our team will work with CHART staff and ATMS system consultants/vendors to minimize any disruption to their software upgrade schedule which is determined far in advance. Dynamic Part-Time Shoulder Use and other ATM strategies represent a new paradigm within CHART operations but have tremendous potential to alleviate recurring/non-recurring congestion and to improve response times and efficiency of incident response. It is our expectation that Part-Time Shoulder Use locations will be monitored by CCTV with automatic blockage and incident detection software (video analytics) so operators will know immediately if the shoulder can be opened, and if already in operation, when incidents occur. The system will be automated as much as possible to minimize impact on daily CHART operator activities and will allow them to modify conditions as traffic conditions change. Our approach will also consider temporary strategies that minimize impacts during project work, relying on years of experience from subject matter expert team members.

MAINTAINABILITY: As new technology and strategies are employed; it is important to do it in a way that does not significantly add new burdens to the ITS device maintenance regimens or schedules. Our goal is to make decisions on locations, designs of specific installations, types of equipment specified, and vendor selection so they do not require high future maintenance costs, and that easily integrate into the existing MDOT SHA maintenance regimen. By employing the approach of multi-disciplinary exploration early, we can ensure the system design incorporates simple considerations, such as software/firmware upgrades and potential impacts to the CHART ATMS software platform; existing detection, surveillance, and signage standards; considers device locations that minimize MOT complexities; and even proactively monitors device health and can alert CHART ITS maintenance staff when it is nearing the end of its functioning life cycle.

ADAPTABILITY: The Corman | WSP | MC Dean DB Team is constantly creating new ways to address complex transportation and mobility dilemmas, while ensuring implementation of new strategies can be easily compatible with existing infrastructure technology and structures. During the project's life span, we anticipate significant developments in connected and automated vehicle technology and will remain vigilant as to potential impacts on systems we are deploying. There are steps that can be taken now to prepare for potential technology changes: **1) a robust and well documented fiber optic backbone for any ITS devices installed; 2) ITS cabinets that allow for future device installations; 3) Outlining considerations for Part-Time Shoulder Use being dedicated for specific vehicle types or automation levels at some point in the future.** Any solution provided to MDOT SHA will include long-term considerations that will prioritize the ability to adapt to new operations, technology, and maintenance standards and techniques. ***TEAM MEMBER EXPERTISE/BENEFITS:*** WSP's Steve Kuciemba and KR Marshall

bring decades of experience assisting agencies to ***future-proof*** their ITS implementation programs. Their understanding of MDOT SHA's CHART program and how the operations, systems, and TSMO focus areas align, will guide this project in maximizing operational efficiencies and minimizing maintenance headaches. Steve started his career creating the CHART program and to this day remains actively engaged in planning future components of it. They bring experience from other parts of the country on Part-Time Shoulder operations, as well as countless other ATM strategies that may be explored and/or implemented. From an implementation standpoint, M.C. Dean's Transportation Systems Group has experience working with ATM systems and creating an environment conducive to maintaining regular operations and adapting to changing technology. As a systems integrator specialist, M.C. Dean knows how best to make complex systems into a modular and manageable intelligent design. They also maintain a simulation lab in Washington, DC so they can test and determine the best solution to integrate into this project. They have a world-class safety record (0.58 | 2019 EMR), an Operational Risk Management program, a well-designed QA/QC program, and is ISO9001:2015 certified which will benefit MDOT SHA and our team.

ii. MOST RELEVANT | CRITICAL RISKS ASSOCIATED WITH ACHIEVING EACH PROJECT GOAL

We will employ the Construction Management Association of America (CMAA) endorsed approach to risk management through a *Risk Register*, which includes a list of identified risks, potential impacts, and mitigation for each. A robust risk management process considers risks throughout the project's life and delivery processes. The Corman | WSP | MC Dean DB Team will employ a five-step risk management approach to balance risks including:

1. **Identify** – name risks facing the project, determine cause/effect, and categorize them.
2. **Assess** – assign probability of occurrence, severity of impact, and determine response.
3. **Analyze** – quantify risk severity, determine risk exposure, establish risk tolerance level, evaluate interrelationship between risks and how best to balance them, and determine risk contingency (applicable during preliminary design/pricing).
4. **Manage** – define response plans and actions, establish ownership of risk, and manage response (after NTP).
5. **Monitor/Review** – monitor/review/update risks, monitor response plans, update risk exposure, analyze trends, and produce reports (after NTP, during design, during construction).

The most relevant and critical risks associated with achieving these project goals and our proposed mitigations are:

GOAL #1 | PART-TIME SHOULDER USE	
RISKS | IMPACTS	**MITIGATION | TEAM MEMBER EXPERTISE**
Risk: Air/Noise Mitigation | Environmental Impacts **Impact:** Increased capacity may trigger noise analysis requiring added noise abatement walls.	**Mitigation:** Coordinate with environmental agencies early to determine if abatement is reasonable/feasible. Confirm within ROW and identify any additional environmental impacts while avoiding/minimizing impacts. **Team Member Expertise: Alice Lovegrove (Air/Noise Analysis)** will oversee air/noise evaluation in coordination with **Permitting Coordinator Pam McNicholas, PWS** who is currently leading MDTA's permitting program working with local environmental agencies (MDE/DNR/ USACE).
Risk: Shoulder Geometry and Pinch Points **Impacts:** Part-time shoulders design based on travel lane design requirements and pinch points within the limits may be prohibitive. Shoulders may not meet MDOT SHA, AASHTO,	**Mitigation:** Design exceptions/design waivers if required for design speed, horizontal/ vertical curvature, sight distance, super-elevation, cross slope, clear zone/ offset to obstructions, shoulder width, barrier condition, lane width or vertical clearance, MASH requirements. For substandard design elements and eliminating pinch points: Advance warning signage, additional lighting, enhanced striping, additional widening, delineation, obstruction removal, shifting lanes, and reducing lane/shoulder widths. **Team Member Expertise: Part-Time Shoulder Use/Ramp Metering Specialist Les Jacobson** and **Matt Hill, PE** have led evaluating dynamic Part-Time Shoulder Use implementation on over 10 access-controlled highways in six states. **Examples:**

or MDOT Practical Design Guidance for geometrics or strength.	Implementation/ assessments along I-66 ATM System in Northern Virginia, and I-75 and I-96 Part-Time Shoulder Use assessments in Michigan.
Risk: Shoulder Pavement Structure **Impacts:** Inside shoulder strength is not adequate to support Part-Time Shoulder Use. Additional pavement reconstruction may be required, triggering stormwater management and erosion & sediment control, and permitting.	**Mitigation:** Review as-builts, GPR data, and borings/corings. Develop Pavement Investigation Plan to supplement available data. Investigate eliminating trucks using part-time shoulder and stormwater management locations. Coordinate with PRD early. Evaluate innovative pavement materials to strengthen the structure. **Team Member Expertise: Geotechnical/Pavement Engineer Jason Kotova, PE,** with assistance from **Xin Chen, PE (Soil Borings/Pavement Cores)** will oversee Pavement Program evaluation. They know MDOT SHA's pavement design procedures and have experience designing innovative pavement structures for mega projects, such as MDOT SHA's Intercounty Connector and Virginia's Nice Bridge Replacement.
Risk: Shoulder Use Operations **Impact:** Operating the shoulder as a lane may cause safety concerns.	**Mitigation:** Develop an educational and public outreach program to educate motorists on how to use Part-Time Shoulder Use. Monitor shoulders via CCTV with automatic incident detection to alert CHART when blocked and/or other incidents to close the shoulder, prevent it from opening, or, if applicable, open the shoulder for additional capacity. **Team Member Expertise: Traffic Engineer Tim Rayner, PE, PTOE** and **ITS Specialist Daniel Johnson, PE** have evaluated, designed, implemented, and integrated ITS solutions on over five similarly scoped design-build interstate projects which will assist in safely operating the Part-Time Shoulder Use.
Risk: Drainage Requirements **Impact:** Substandard inlet grates that do not match the pavement surface or improvements cause additional spread.	**Mitigation:** Evaluate drainage, spread, and inlet rideability during design and modify the shoulder cross slope, shoulder geometry, replace the inlet grate, and upgrade the inlet to accommodate the spread or add more inlets. **Team Member Expertise: Gregg Iskra, PE, JD (Water Resources)** will lead evaluating the drainage and stormwater management improvements. He has extensive knowledge of MDOT SHA's PRD and MDE requirements to streamline approval process.

GOAL #2 | MOBILITY

RISKS | IMPACTS	MITIGATION | TEAM MEMBER EXPERTISE
Risk: Air/Noise Mitigation | Environmental Impacts	**See Goal #1 (Page 22)**
Risk: Local Roadway Network Impacts **Impact:** Improvements may impact local roadway network.	**Mitigation:** Model concepts to minimize impacts. If negative impact, evaluate mitigation measures to eliminate resultant delay, such as additional storage to ramps. Develop a Traffic Management Plan to evaluate and address impacts during construction. **Team Member Expertise: Traffic Engineer Tim Rayner, PE, PTOE** used modeling software to determine local network impacts and suggested mitigation to resolve negative impacts on the Elizabeth River Tunnels design-build project.
Risk: Utility Impacts	**Mitigation:** Coordinate with utility companies as early as possible. Perform SUE, including test holes for potential impacted underground utilities.

Impact: Utility coordination can be a challenge.	**Team Member Expertise: Utilities Coordinator Joseph Zacharko** has assisted in utility coordination across Maryland and has reputable relationships with utility companies in Baltimore County.

GOAL #3 | SAFETY

RISKS | IMPACTS	MITIGATION | TEAM MEMBER EXPERTISE
Risk: Existing Traffic Safety Concerns **Impact:** If not addressed as part of the project, these concerns may create a more significant problem when speeds are increased.	**Mitigation:** Look at locations with above average crash statistics. Evaluate/ mitigate existing deficiencies, i.e., short merge lengths, sight distance issues, short weaves, and safety or operational issues within project limits. **Team Member Expertise:** John Hendrickson, PE oversaw the safety analysis, development of crash reduction strategies and estimated the impact of improvement measures by using the HSM for 50 miles of critical highway segments in Virginia. Included safety improvements on critical freeway segments and interchanges on I-264, I-64 and Powhite Parkway and will apply the same analysis to I-695.
Risk: Construction - Motorists **Impact:** Potential safety and congestion if not handled properly.	**Mitigation:** Design MOT to be compliant with MDOT SHA | MdMUTCD requirements. Minimize narrow lanes, lane shifts, lane closures, additional merging, narrowing/removal of shoulders, and distractions. **Team Member Expertise: Design-Build Project Manager Scott Szympruch** and **Construction Manager Kyle Kern** have delivered many similar projects. Corman and M.C. Dean have an enviable safety EMR below the industry standard.
Risk: Construction - Workers **Impact:** Construction that requires night work, lane closures, or other activities can put workers at risk.	**Mitigation:** Develop/implement/enforce an all-inclusive Safety Plan and train workers on site specific issues. Provide physical separation between workers and motorists. **Team Member Expertise: Design-Build Project Manager Scott Szympruch** and **Construction Manager Kyle Kern** have delivered similar projects. Corman and M.C. Dean have an enviable safety EMR below the industry standard.
Risk: Motorist Unfamiliarity with Part-Time Shoulder Use **Impact:** Safety issues as users are not familiar with Part-Time Shoulder Use.	**Mitigation:** Establish public outreach and driver education, including renderings and videos that demonstrates what it will be like to drive on the shoulder. **Team Member Expertise: Cathy Ginter-Smith (Public Relations/ Outreach)** has assisted in implementing innovative and effective public outreach and educational programs on mega-projects including MDOT SHA's Intercounty Connector and the Corridor Cities Transitway.

GOAL #4 | OPERABILITY | MAINTAINABILITY | ADAPTABILITY

RISKS | IMPACTS	MITIGATION | TEAM MEMBER EXPERTISE
Risk: Operating Procedures/ Systems Management **Impact:** Current CHART system does not manage specific devices needed for this deployment and functionality will need to be added for full operation.	**Mitigation:** Develop software to be compatible with existing SHA and CHART software - Bench test prior to deployment. **Team Member Expertise: CHART Coordination/Operations Expert Steve Kuciemba** from WSP started his career creating the CHART program and remains engaged in planning future components of it. His leadership will be essential in coordinating integration of these new systems and will initiate integration in the design phase. WSP developed functioning software for Virginia's I-66 AMT System.

Risk: Maintenance **Impact:** Isolated, Outdated or non-compatible equipment/systems will cause high maintenance/ overhead costs. Stand-alone or older ITS devices and systems require more MDOT SHA personnel oversight and maintenance.	**Mitigation:** Implement more integrated ATM systems that do not require high future maintenance costs by having a pre-determined run schedule which can be manipulated from a single location. Should the connection between the devices workstation be severed, the pre-determined run schedule would continue to operate, eliminating MDOT SHA maintenance personnel having to reset the system. Select products for their reliability/ simplicity in overall set up that can be easily modified and scaled to meet corridor objectives. **Team Member Expertise:** M.C. Dean currently maintains several regional DOT systems and will provide the same approach from the maintenance of those systems to the foresight during the I-695 TSMO deployment. This will allow the Operability, Maintainability, and Adaptability to be cost effective.
Risk: Cyber Security **Impact:** Deliver a product suite that ultimately fails to meet the Risk Management Framework (RMF) assessment putting it at risk of being compromised.	**Mitigation:** Rely on M.C. Dean's in-house, hands-on systems engineers with in-depth knowledge of IT and proposed technology components to fully integrate IA-related activities with our system development lifecycle. Rigors checks in design and deployment to confirm integrated system meets RMF requirements and receive an Authority to Operate (ATO) certification. **Team Member Expertise:** WSP and MC Dean have personnel familiar with the CHART ATMS System and have experience developing ATMS solutions, separately. By working with the CHART team to develop RMF and the software during design, cyber security threat will be reduced.
Risk: Existing Utilities/Fiber Capacity **Impact:** Availability/ capacity of existing MDOT fiber (owned by Network Maryland) may limit interconnecting deployed systems efficiently. Existing utilities and fiber will not always be present and/or cannot be relocated/ expanded.	**Mitigation:** Coordinate with MDOT SHA to determine what available fiber pairs can be used for these ITS systems. If required, use separate communication mediums to decrease the bandwidth to operate the deployed systems. Identify the marked utilities and incorporate them into the design to minimize conflicts and re-design. **Team Member Expertise: Utilities Coordinator Joseph Zacharko** has contacts with the utility stakeholders within project limits and will work to identify high risk locations and capacity early on during design.

iii. PROCESS WE WILL IMPLEMENT FROM DESIGN INITIATION THROUGH CONSTRUCTION COMPLETION TO ENSURE COMPLIANCE WITH CONTRACT DOCUMENTS AND PRODUCE COMPLETE, COORDINATED, ECONOMICAL, TIMELY, FULLY FUNCTIONAL QUALITY DESIGN AND CONSTRUCTION PRODUCTS.

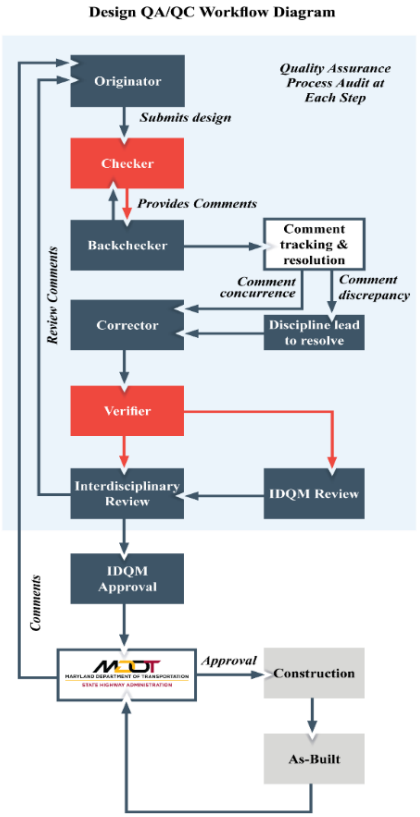
Project Quality Plan (PQP) development and acceptance is one of our first work items broken into three sections:

1. Overall Project Quality approach and responsibilities
2. Design Quality approach and responsibilies to include the IDQM
3. Construction Quality approach and responsibilities

The plan includes proposed auditing of the plan's implementation and coordination of construction inspection and quality assurance to be performed by MDOT SHA. There will be auditing of plan conformance audits during the project's lifespan based upon ISO 9001 format and requirements. As ISO 9001 certified companies, WSP and M.C. Dean will designate independent responsibilities between the QA and QC staff and provide means to maintain this independence of operations. Our Quality Plan will be submitted within 10 days of Notice to Proceed. The following describes the PQP format, what is included, and our approach to qualify:

PROJECT QUALITY: Lists the plan's intent/goals, quality organization chart, proposed interaction between design and construction quality teams, as well as MDOT SHA. Also included are executive oversight and audit requirements.

DESIGN QUALITY MANAGEMENT: Highlights WSP's quality approach to project design. Our strategic plan weaves quality into our daily operations to provide excellent project management and to be recognized for our sustainable/innovative technical solutions. Each team member will adopt a responsible attitude towards quality.



We will share our PQP with our design subconsultants to be followed from design initiation through construction ready documents and will include design revisions during construction. Our Design Manager oversees the quality process and our Independent Design Quality Management firm will take an over-the-shoulder approach to ensure the process is being followed and deliverables meet expectations. Deliverables go through IDQM technical, constructability, and interdisciplinary reviews. Design QA/QC procedures will include the IDQM and:

- → Provide a design that is safe and meets contract documents and design standards/guidelines. If it differs from design manual standards, identify design waivers/exceptions.
- → Ensure designs fulfill the original project scope and are constructible, durable, economical, inspectable, and minimize maintenance.
- → Assist in meeting design schedule, construction budgets, and construction staging requirements.
- → Provide organized and indexed set of design calculations including design criteria and assumptions.
- → Minimize MDOT SHA staff review effort.

CONSTRUCTION QUALITY MANAGEMENT: Describes our approach to ensure finished product meets requirements of the approved Released for Construction documents – from a material conformance and installation perspective. It details quality team organization/responsibilities during construction, what internal checklists will be used and what internal hold points are required. There are quality requirements for subcontractors/suppliers/vendors. Procedures for plan and field changes will be spelled out to include design team and Engineer of Record participation on all field changes.

Subcontractors must sign acknowledgement and receipt of the quality requirements pertaining to their work; vendors will be provided product requirements and certifications to sign off prior to onsite product/material delivery. Suppliers, such as for concrete or asphalt, must provide certifications showing their plant, testing laboratory and staff have the prerequisite certifications/approvals. Should special training, experience or certifications be required for specific tradesmen, such as a certified welder or MOT flagman, it will include in the Quality Plan and our Construction Manager ensures their training, certification or experience. Once construction starts, onsite staff will be provided standard checklists MDOT SHA construction inspectors will be using for the work they will be performing.

At morning Take Five meetings, the foreman and superintendents review quality issues for the day, what inspectors will be looking for, what hold points are expected that day, and if material to be used has any special installation requirements. Plans are reviewed to confirm details of the product to be installed and any weather constraints.