July 25, 2016

IS 270 - Innovative Congestion Management Contract
Montgomery and Frederick Counties, Maryland

Contract No. MO0695172

Statement of Qualifications

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Prepared by:

CORMAN CONSTRUCTION

WSP | PARSONS BRINCKERHOFF

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2. KEY STAFF EXPERIENCE AND QUALIFICATIONS

i. Design Key Staff

• Project Design Manager – Michael R. Holt, P.E., PTOE

Years of Experience: 26 (4 with Parsons Brinckerhoff, 22 with others)

Education: B.S., Civil Engineering, Clemson University, 1990

Registration/Certifications: Professional Engineer: Maryland (49518); Georgia (25821); Alabama (24265); Florida (63152); Louisiana (35451); Mississippi (19769); North Carolina (29666); South Carolina (25866); Tennessee (109010); Texas (106559); Virginia (047811)
Professional Traffic Operations Engineer: (1069)

Professional Affiliations
Intelligent Transportation Society of Georgia: President (2016-2017); Member (1998-present)
Institute of Transportation Engineers: President, Georgia Section (2011); Member (1990-present)

Key Qualifications
Mike has 26 years of progressive traffic engineering and intelligent transportations (ITS) project experience. His career spans all aspects of traffic/ITS engineering, as he has worked as a county traffic engineer, engineering consultant and contractor. He has a diverse traffic engineering background including experience in traffic studies, traffic signal design, communications design, ITS device design, signal timing, tolling and project management. He understands the design, installation and integration requirements of many ITS components, including dynamic message signs (DMS), closed-circuit television systems (CCTV), video detection systems (VDS), microwave vehicle detection systems (MVDS), highway advisory radio (HAR), roadway weather information systems (RWIS), automated vehicle identification (AVI) readers, Bluetooth readers and ramp meters. He also has a thorough understanding of how these ITS components are integrated into Traffic Management Centers (TMC). Mike has worked on several ITS Design-Build projects, serving as consultant design manager or contractor Design-Build coordinator.

Project Experience
DESIGN-BUILD - Dallas Horseshoe Active Traffic Management (ATM) Design, Dallas, Texas ($798 Mil): Project Design Manager for the ATM component of a Design-Build interchange project south of downtown Dallas. I-30 and I-35E are being widened along their approaches to the Trinity River bridges, with additional ramps, bridges and exit lanes added for safety and capacity improvements. The ATM deployment provides overhead lane control signals (LCS) mounted on gantries, existing bridges and an existing sign structure to provide real-time lane assignment throughout construction to provide safety and congestion management. Design included gantry structures, cabinets, conduit routing, power service, signing and related details, and wireless communications to a temporary Traffic Management Center housed in the construction office. *Mike led the design of all ATM components, including ITS devices, communications and electrical service; he coordinated the structural detail development for LCS installations. He facilitated coordination between Texas DOT and the contractor to provide the necessary solution for LCS implementation and its associated safety and congestion management benefits*.
Relevance: This Design-Build project made use of existing infrastructure (bridges, OH sign structure) where possible to minimize cost while providing safety enhancements to control traffic entering the work zone. The LCS are used for lane closures, merges and reduced speed zone implementation; all of these strategies may be implemented on I-270. Custom details were developed for structural attachments and site specific ITS component installations.

Fast Forward Intelligent Transportation System Design, Georgia DOT, Metro Atlanta, Georgia ($140 Mil): Project Design Manager for a program to expand the Georgia DOT (GDOT) NaviGAtor Freeway Management System (FMS) throughout metropolitan Atlanta. This task-order contract included 20 design task-orders which covered over 70 miles of FMS expansion and 160 ramp meter installations. The program provided increased mobility and congestion reduction through better incident detection, monitoring and motorist information, as well as the associated safety benefits. The scope included: CORSIM analysis of freeway corridors, concept report preparation, preliminary design and final construction plans and specifications development. FMS components included: fiber optic (FO) communications, CCTV, DMS, VDS, ramp meters and field hubs. Ramp meter design guidelines were developed in collaboration with GDOT and FHWA, then incorporated into a GDOT design manual. All ITS components were

integrated into GDOT's NaviGAtor ATMS. *Mike led all design teams, including six subconsultants, and provided technical direction for all ITS device, communications and ramp meter design and cost estimates. He coordinated with traffic analysis, survey and environmental teams to provide compliance with database and design documents. He oversaw the quality control review process to ensure all submittals complied with GDOT design, specifications and plans presentation requirements. He facilitated progress meetings with GDOT to ensure all projects remained on schedule for programmed letting dates, and coordinated with other state and local agencies for integration of FMS design with local ITS infrastructure.*

Relevance: This project deployed ITS devices and ramp meters along every interstate corridor in metro Atlanta, providing congestion management and safety improvements. Many of these corridors, including I-75, I-85 and I-285 carry similar volumes to the I-270 corridor; additionally, the ramp meter strategy implemented in Atlanta may be adapted to applications along I-270.

DESIGN-BUILD - I-75 Freeway Management System, Florida DOT (FDOT) District One, Sarasota, Florida ($20 Mil): Project Coordinator for design, construction and integration of 56 miles of FMS in Sarasota and Charlotte Counties. Project components include fiber communications, CCTV, DMS, MVDS, RWIS, HAR and redundant TMC integration into two facilities. All ITS components were integrated into FDOT's Sunguide ATMS to provide enhanced mobility, congestion management and safety implementation along this busy corridor. Mike was responsible for contract administration, design coordination, field reviews and constructability reviews. *Working for the contractor, Mike facilitated coordination with the design firm, including survey, geotechnical and environmental subconsultants, to ensure compliance with the RFP and Minimum Technical Requirements. This coordination involved field reviews all proposed device locations, poles, pull boxes, conduit routing, power services, hubs and cabinet locations. He also provided constructability reviews for all plan submittals and coordinated submittals and reviews with the F DOT. He participated in design and construction progress meetings to resolve any issues that arose while keeping the project on schedule*.

Relevance: This Design-Build project deployed ITS devices along a busy interstate corridor that carries commuter, commercial and vacation traffic; required overlapping CCTV coverage so there were no "blind spots" along any of the mainline or ramps, and all exit ramps had high definition radar detection to detect queue spillback onto the mainline. These surveillance, detection and safety strategies are relevant to the I-270 corridor.

DESIGN-BUILD - I-10/I-110 Freeway Management System, Florida DOT District Three, Pensacola, Florida ($10 Mil): Project Design Manager for a 40-mile freeway ITS deployment in Escambia and Santa Rosa Counties, including: fiber optic communications network, CCTV, DMS, MVDS, RWIS and TMC integration. Design packages included: conduit/underground plans, device/communications plans and structural plans. All ITS components were integrated into FDOT's Sunguide ATMS to provide enhanced mobility, congestion management and safety implementation along these busy corridors. Mike was responsible for project management, design team leadership, quality control reviews and construction coordination. *Mike led the design team and provided technical guidance for all ITS device and communications design. He coordinated with the survey, geotechnical and environmental teams to provide compliance with database and design documents. He oversaw the quality control review process to ensure all submittals complied with FDOT design, specifications and plans presentation requirements. He attended design progress meetings with FDOT and the contractor to keep the design process on schedule.*

Relevance: This Design-Build project was phased for staggered submittal packages in order to keep construction on schedule. A similar approach can be implemented for I-270, as some project segments may require more lead time for construction due to utility or right of way accommodations.

Memphis Smartway Freeway Management System, Tennessee DOT, Memphis, Tennessee ($40 Mil): Project Design Manager for a 30-mile segment of an 85-mile FMS deployment to provide mobility, congestion management and safety implementation throughout the Memphis metropolitan area in Tennessee and Arkansas. The design included FO communications network, CCTV, DMS, HAR, video detection and radar detection. Also provided quality control reviews for other sections of FMS network as part of a multiple team design approach. *Mike led the field review, design and plan production for a 30-mile corridor. He provided quality control reviews for other FMS segments, and coordinated with other design teams. He attended TDOT review meetings to keep the design on schedule*.

Relevance: In order to meet an aggressive design schedule, this project was broken into three segments using three design teams; this approach allowed each team to learn from the other and provide cross-team quality control reviews. This similar approach can be implemented for I-270 to provide an early release of designs for construction.

Highway Engineer – Carlos H. Brown, P.E.

Years of Experience: 22 (15 with Parsons Brinckerhoff, 7 with others)

Education: B.S., Civil Engineering, University of Maryland at College Park, 1994

Professional Affiliations: American Society of Civil Engineers; American Society of Highway Engineers

Registration/Certifications: Professional Engineer: Maryland (27917)

Key Qualifications: Carlos Brown is a professional civil engineer and Lead Engineer at Parsons Brinckerhoff with over 22 years of design and project management experience. His primary responsibility is managing a local team of transportation engineers and design professionals while partnering with clients to deliver their projects on time and within budget. Carlos is adept at identifying, communicating, coordinating, and ultimately resolving design and safety related issues in a multi-discipline project environment. Carlos also has extensive experience in the use of the latest engineering and design software packages such as Open Roads, InRoads, Autoturn, Projectwise, LIDAR Mapping, and 3D/4D modeling.

Since starting at Parsons Brinckerhoff, Carlos has served as either Project/Task Manager or Project Engineer on numerous transportation planning and highway engineering projects from inception to construction completion including Design-Build, interstate, and corridor related projects. Carlos's specific duties include preparation of construction contract documents (plans, specifications, and engineer estimates), highway and geometric design, grading and drainage design, utility design and coordination, Americans with Disability Act (ADA) and bicycle accessibility compliance, stormwater management and erosion/sediment control design, performing alternative assessments for NEPA/MEPA approvals, and construction administration services.

Project Experience

DESIGN-BUILD - Intercounty Connector (ICC) General Engineering Consultant Contract – Contracts D/E, Montgomery and Prince George's Counties, Maryland ($90 Mil): Task Manager and Engineer responsible for preconstruction services, analysis, and preparation of Design-Build advertisement documentation for Contracts D and E. Contract D/E consists of approximately 3 miles of I-95 reconstruction; 1 mile of ICC construction; new Collector-Distributor roadways between the ICC and MD 198 along I-95; roadway and ramp upgrades to the I-95/MD 198 interchange; the design and coordination of the interchange at Van Dusen/Contee Road at the ICC; the design of an at-grade intersections of Virginia Manor Road and US 1 with the ICC; utility relocations; retaining walls; noise walls; earth berms; drainage facilities; mining operation wash pond reclamation and relocation; landscaping; signing, signals and lighting; tolling infrastructure; maintenance of traffic; public relations support; and environmental compliance. ***His duties included Highway and Geometric Design of interstate and arterial roadways; Alternatives Analysis including operations, level of service, design constraints, impacts, safety assessment, costs and risks; Flyover ramp and collector-distributor roadway design; SWM design and coordination with MDE; Noise wall and retaining wall location and design; Design-Build procurement document preparation.***

Relevance: Performed preliminary geometric design for a major tolled freeway and Design-Build project including the construction of numerous highway interchanges and bridges to improve interregional traffic flow, mobility, and reliability; relieve traffic congestion on local roads; and spur economic development and new transit growth within the corridor.

I-270 at Watkins Mill Road Interchange, Montgomery County, Maryland ($95 Mil): Project Manager and Highway Engineer responsible for preparation of Preliminary and Semi-Final design documents for a complex access-controlled interchange at Interstate 270 and an extension of Watkins Mills Road in Montgomery County. The project design included a diamond type interchange with braided elevated ramps, new roadway, a 5-lane wide bridge structure and retaining walls, traffic signals at the ramp termini, and extensive SWM, drainage, and erosion and sediment control design. *His duties included Highway and Geometric Design of interstate and arterial roadways; Drainage and SWM Design; Maintenance of Traffic; Utility and Right of Way coordination; Structural Design Coordination.*

Relevance: New interchange construction project within the IS 270 Corridor, to help increase accessibility to planned economic development, increase roadway capacity, increase safety, and improve multi-modal connectivity between I-270 and the existing transportation network.

South Capitol Street (SCS) Interchange Modification Report (IMR), Washington, DC ($0.5 Mil fee): Highway Engineer for development of the highway design requirements and concept assessment for the South Capitol Street (SCS) Corridor Interchange Modification Report including interchanges at SCS/I-395, Suitland Parkway/I-295, and Martin Luther King, Jr Avenue/Suitland Parkway. Proposed interchange modifications triggered the need to prepare the IMR to address the Federal Highway Administration's (FHWA) eight policy points. Design criteria and functional plans (Line and Grade, Geometry, Sequence of Construction/Maintenance of Traffic, and Conceptual Signing), as well as, construction cost estimates were developed based on the SCS Final Environmental Impact Statement (FEIS) preferred alternative to facilitate the "handoff" from planning to engineering. Substandard design features were reviewed and analyzed to initiate the FHWA Design Exception approval process. Management responsibilities included assembling and managing a team which supported and completed the task within the scope, schedule, and budget. *His duties included Highway and Geometric Design of interstate roadways; Alternatives Analysis including operations, level of service, design constraints, impacts, safety assessment, costs and risks; IAPA Application Preparation; FHWA Policy Point responses, Design Criteria and Exceptions Development; Preliminary Horizontal and Vertical Design; and Construction Phasing.*

Relevance: Major operational analysis performed in conjunction with the Final Environmental Impact Statement (FEIS) development for the I-295 at South Capitol Street Interchange to improve safety, multi-modal mobility and operations, reliability, accessibility, and support economic development throughout the project area.

MD 32, Burntwoods Road Interchange, Howard County, Maryland ($20 Mil): Highway Engineer for detailed design from the concept development through construction for the MD 32 roadway improvements at Burntwoods Road in Howard County. The project design includes upgrades to the horizontal and vertical curves for safety, 3 roundabout designs, interchange ramp design, intersection design, five culvert crossings, stormwater management, signing and pavement markings, stream relocation, landscaping, public involvement, and significant maintenance of traffic (MOT) and erosion and sediment control phasing. Carlos's major focus on the project was highway and geometric design, development of plans, specifications, and construction estimates, and partnering in Design and Construction with SHA on the project. *His duties included Highway and Geometric Design of the major arterial; Vertical profile re-alignment to improve safety and sight distance; Roadway Dualization to improve capacity; Interchange ramp and Roundabout Design; Coordination of multi-phase Erosion/Sediment Control and Traffic Control Plans; Stakeholder and Third Party Coordination.*

Relevance: Major regional arterial and interchange "break-out" project to improve safety and capacity while minimizing right of way, utility, residential, business, and environmental impacts along the MD 32 corridor between MD 108 and I-70.

I-495 Capital Beltway Study, Montgomery and Prince George's Counties, Maryland ($2 Mil fee): Highway Engineer for this 45-mile (72-kilometer) multimodal transportation study. Alternatives considered include HOV with and without direct ramp access at four major interchanges, general-purpose lane additions, collector-distributor road systems, transportation systems management (TSM) improvements at ten interchanges, and transportation demand management (TDM) strategies. Carlos was responsible for developing preliminary designs and upgrades at ten major interchanges, providing major quantity cost estimates and impacts analysis for each of the aforementioned alternatives. *His duties included concept development and Highway and Geometric Design of interstate and arterial roadways for multiple alternatives; Alternatives Analysis including operations, level of service, design constraints, impacts, safety assessment, costs and risks; TSM Improvements (Intersection and Traffic Signal Improvements, Ramp Acceleration and Deceleration Lane analysis); TDM Improvements (BRT, Parking Analyses, Alternate Work Schedules); Right of Way Impact Analysis; Utility Research and Coordination.* (17907, 2004)

Relevance: Direct experience with developing mobility improvement options for the Capital Beltway system connecting with IS 270. The focus of this major regional transportation study to increase mobility, ease congestion, improve reliability, provide safer and more efficient travel, correct substandard roadway and interchange design, and expand access to mass transit to and from the Capital Beltway.

•	Traffic Engineer – Scott E. Shogan, PE, PTOE

Years of Experience: 20 (15 with Parsons Brinckerhoff, 5 with others)

Education: B.S., Civil Engineering, University of Michigan, 1996

Professional Affiliations: Institute of Transportation Engineers (ITE); Past President - ITE Michigan Section
Intelligent Transportation Society of America / Michigan

Registration/Certifications: Professional Engineer: Michigan (47045); California (C60120); Minnesota (43722), Indiana (PE10809796), Louisiana (36649)
Professional Traffic Operations Engineer (PTOE) Certification, 2002

Key Qualifications

Scott Shogan previously served as one of Parsons Brinckerhoff's regional traffic engineering and ITS leads. He is an experienced project manager with a wide range of traffic engineering/operations, ITS and transportation planning experience throughout the U.S. He has served in management and technical roles in areas such as traffic simulation and operations analysis, connected vehicle technologies, ITS planning and design, traffic signal optimization, maintenance of traffic plans, traffic impact analysis, and transportation corridor studies. He also has significant and recent expertise in Connected and Automated Vehicle technologies.

Project Experience

I-285 Strategic Plan, Atlanta, Georgia ($1 Mil fee): Modeling Team Leader for the development, application, and evaluation of a traffic simulation model for over 60 miles of the I-285 freeway around Atlanta, Georgia. Element I commenced with a review of large-scale simulation projects carried out elsewhere, in order to leverage the important lessons learned elsewhere on similar projects. This review was followed by a revision of the original goals and objectives of the program, to include the evaluation criteria used to select one or more traffic simulation packages. Following the goals and objectives assessment a review of existing data and modeling systems in the region was performed. A data development program was begun in parallel, driven by the criteria for success defined earlier and data requirements common to all simulation packages. These somewhat parallel tasks were followed by a preliminary screening of candidate simulation systems for both mesoscopic and microscopic models, and the models that passed the initial screening were carried forward for detailed testing. The results of the evaluation testing determined the final selection of software. Mainstream, emerging, and obscure mesoscopic and microscopic models were reviewed to assess their application potential with the project goals. Of the mesoscopic models, DynaSmart and VISTA were further evaluated for the project and VISTA met the goals and criteria of the project. The microscopic models (AIMSUN, Paramics, and VISSIM) were evaluated for complex interchange performance, as well as a 60-mile circular prototype freeway network "super loop". The assessment of the simulation models concluded that any of the three software platforms could be utilized, but VISSIM was chosen as the selected platform. Baseline traffic simulations of I-285 are being developed by four teams working in parallel, being directed by a team leader for conformity of coding, using the VISSIM software and products from the data development program. Element II was a process that led to a recommended 2030 Strategic Master Plan for I-285. Scott's responsibilities included developing the processes for extracting the traffic volumes from the regional model for use in microsimulation, and serving as a segment leader for the development of VISSIM modeling for a portion of the corridor.

Relevance: Performed Traffic Analysis using VISSIM, simulation, and optimization, of a longer interstate corridor segment than I-270, to assess traffic benefits of proposed improvements to increase mobility and reliability.

I-375 Alternatives Study, Detroit, Michigan ($300k fee): Project Manager for a feasibility study considering alternative treatments for I-375, a one-mile long freeway spur into downtown Detroit. The study examined multiple alternatives, ranging from operational and aesthetic improvements to the freeway, to replacement of the freeway with a surface roadway. The alternatives were evaluated based on a number of factors, including multi-modal transportation mobility, potential economic impact, reliability, safety, quality of life measures and capital and long-term operations and maintenance costs. VISSIM was used to evaluate project operational scenarios. The project included extensive public outreach, with a series of public open house meetings and advisory committee briefings to gain input and priorities. Scott's responsibilities were to oversee the project including extensive involvement in traffic analysis and modeling.

Relevance: Interstate Feasibility Study using VISSIM to reduce congestion, improve mobility, safety, and assess operability and maintainability of alternatives. Public Involvement required.

I-96 Active Traffic Management (ATM) Feasibility Study, Metropolitan Detroit, Michigan ($250k fee): Lead Traffic Engineer for a feasibility study for deployment of ATM techniques to mitigate peak directional congestion along a 15-mile section of the I-96 corridor in the western suburbs of Detroit. This project includes evaluation of peak period hard shoulder running in the corridor to increase capacity during peak congestion periods, as well as study of technology applications, such as lane control signage, dynamic speed limits, junction control and other techniques. Analysis of the corridor was conducted using VISSIM to evaluate the impact of hard shoulder running on operations, and to compare various lane transition scenarios. Scott's responsibilities were to develop the traffic management concepts to be evaluated, and to oversee the traffic operations analysis of each alternative.

Relevance: Evaluation for use of ATM techniques and technologies to improve mobility, operations, reduce congestion, and increase safety along a similar length of interstate highway. Evaluation included the use of hard shoulder running to increase capacity during peak periods

I-35E Managed Lanes Extension Study, St. Paul, Minnesota ($460k fee): Lead Traffic Engineer for the evaluation of interchange concepts to accommodate the extension of MnPASS managed lanes along the I-35E corridor north of St. Paul. The project includes the development and operations modeling of interchange concepts at the I-694/I-35E interchange, where the two freeways run concurrently for approximately one mile on a common pavement section. The study focuses significantly on options for implementing the managed lanes through this system-to-system interchange and common freeway section, including both reconfiguration options and testing discontinuity of the managed lanes. Scott's responsibilities included overseeing the development of CORSIM modeling of each of the alternatives, advising the geometric concepts, and preparing the measures of effectiveness inputs into the evaluation.

Relevance: Performed modeling for significant Interstate corridor to improve mobility, reliability, operations, safety and reduce congestion – increased reliability

I-94/TH-280 Managed Lanes Feasibility Study, Twin Cities, Minnesota ($540k fee): Lead Traffic Engineer for the evaluation of interchange concepts to accommodate the provisions of managed lanes along the I-94 corridor between downtown Minneapolis and downtown St. Paul. The project includes the development and operations modeling of interchange concepts at TH-280, where the existing system-to-system interchange configuration, including left-hand entry and exit ramps, inhibits the ability to implement managed lanes. Several interchange concepts were developed and tested, incorporating collector-distributor roadways, ramp braiding, a modified trumpet interchange configuration and others to avoid impact to a nearby railroad bridge and third-level arterial roadway bridge. In addition, direct managed lane connection options into the two downtowns were evaluated. Scott's responsibilities included overseeing the development of CORSIM modeling of each of the alternatives, advising the geometric concepts, and preparing the measures of effectiveness inputs into the evaluation.

Relevance: Performed traffic analysis, simulation and optimization for interstate corridor dealing with CD roadways to improve Mobility, safety, maintainability, and reduce congestion.

Michigan On-Call Connected Vehicle Technical Support, Statewide, Michigan ($800k fee): Project Manager for an on-call contract supporting connected vehicle initiatives within the MDOT's ITS Program Office. This program includes development of several application-specific concepts of operations, and a regional deployment plan for connected vehicle infrastructure and fleet deployment in and around the Detroit region. In addition, Scott will be supporting MDOT in outreach and reporting related to the connected vehicle initiatives, and supporting future pilot program initiatives. Scott's responsibilities include serving as the overall project manager and point of contact for project support, and leading multiple technical and planning tasks.

Relevance: Managing task for implementation of Advanced Technologies that is relevant to the potential future adaptation of IS 270 for future technologies.

DESIGN-BUILD - New Bridge for the St. Lawrence (NBSL), Montreal, Quebec ($50k fee): ITS Lead, providing oversight and peer review of the conceptual ITS design for this significant bridge replacement program Design-Build. The design for the ITS elements of the project included a fiber optic network throughout the corridor, field devices including CCTV cameras, lane control signage, dynamic message signs, and road weather sensors along the bridge structure, as well as a traffic management center for the bridge operated by the concessionaire. Scott's

responsibilities included serving as the independent peer review lead for the ITS design element of this design-build project.
Relevance: Design-build implementation of ITS technology for improved mobility, operations and safety.

• Environmental Compliance Manager – Pamela McNicholas, PWS

Years of Experience: 23 (5 years with Parsons Brinckerhoff, 18 with others)

Education:	Registration/Certifications:
M.S., 1999, Environmental Science, Johns Hopkins University; B.S. 1994, Environmental Analysis and Planning, Biology Minor, Frostburg State University	Certified Professional Wetland Scientist, Society of Wetland Scientists: 1999 (#0001215)

Training: 1998, Rosgen's Applied Fluvial Geomorphology (Level I); 2000, Rosgen's River Morphology and Applications (Level II)

Key Qualifications

Pam McNicholas has 23 years of experience as an Environmental Scientist and Manager. She has extensive experience throughout all phases of transportation projects, from the feasibility study phase to initial NEPA project planning phases and through final design and permitting phases. She has managed and/or authored numerous NEPA/MEPA documents including EISs, EA/FONSIs, CEs, and Section 4(f) Evaluations. Pam's technical expertise is within natural environmental analyses/management. She has managed numerous environmental technical studies, including natural, socio-economic and cultural resource elements of projects. Her technical experience includes natural resources delineation/functional assessments, mitigation site selection/concept design, federal, state and local agency coordination, permitting and monitoring and tracking environmental commitments.

Project Experience

Environmental Permit/Program Management, Maryland Transportation Authority (MDTA), Statewide, Maryland ($640k fee): **Project Manager providing environmental Permit/Program Management services involving acquisition and management of environmental permits, including mitigation.** Tracks and manages environmental permits, and develops processes, procedures and tools to facilitate efficient tracking and management of permits. Pam acquires, coordinates and tracks all types of environmental permitting/approvals including wetlands / Waters of the US, floodplains, trees, forest, Chesapeake Bay Critical Area, Stormwater Management, Erosion and Sediment Control, and Section 106 of the National Historic Preservation Act. She manages identification of mitigation sites, coordination with agencies, and develops mitigation plans. Post-construction monitoring is also completed for projects to ensure mitigation commitments were met during construction, and to monitor success of mitigation site and plant survivability.
Relevance: Extensive Maryland specific environmental compliance experience including program management, regular federal and state regulatory agency coordination, development of permit application packages, mitigation identification, agency negotiation, development and monitoring, mitigation and environmental commitments, major MD highway corridors.

Painters Mill Levee Modifications, Maryland State Highway, Baltimore, Maryland ($250k fee): **Environmental Manager for conducting GIS desktop inventory, natural resources field delineations, and development of wetland/waterways permit application packages related to upgrades and FEMA certification of the Painters Mill Levee.** Managed the Waters of the U.S (WUS)/wetland delineation, forest characterization, and detailed tree survey, followed by preparation and successful procurement of Wetland/Waterways permits from the Corps and MDE. Prepared and procured the Wetland/Waterways permits from the Corps and MDE within an aggressive timeframe. This schedule was accomplished by avoidance/minimization of impacts within the MDSPGP-4 threshold limits, minimizing the scope of the project while still meeting the purpose and need, avoiding impacts to the adjacent Wetland of Special State Concern (WSSC), and minimizing wetland impacts to below 5,000 sf (allowing SHA to pay into the MDE in-lieu fee mitigation program).
Relevance: Pam successfully procured permits under fast tracked schedule, for a project with political implications and performed sensitive resource avoidance/minimization avoiding wetland mitigation creation requirements.

MDE Wetland and Waterways Division Consultant Reviewer, Maryland State Highway Administration, Statewide, Maryland ($4M fee): **Pam conducted independent nontidal and tidal wetland/waterways application reviews as an expedited Consultant reviewer on behalf of the MDE for SHA projects throughout Maryland.** Responsible for determination of adequacy of application information, development of review comments, and creation

of position reports leading to issuance of authorization. The MDE Toolkit/Database was utilized to track application data/information requests, review status, and to upload/store correspondence, design plans, permit application impact plates, and copies of the final permit upon authorization to applicant.
Relevance: Performed MDE reviews for SHA projects, to procure wetland/waters permitting and mitigation requirements, special conditions requirements, first-hand knowledge of agency permit application requirements and expectations.

Baltimore Red Line, Maryland Transit Administration, Baltimore City and County, Maryland ($54M fee): Deputy Environmental Planning Project Manager for the GEC responsible for NEPA DEIS/FEIS/ROD preparation/management and Post-NEPA environmental compliance. Key member of NEPA document team responsible for final NEPA documents, including review and QC of natural environmental, air, noise, secondary and cumulative effects sections, and Section 4(f) Evaluation. Tracked and maintained an aggressive NEPA schedule, including publication of the FEIS/Draft Section 4(f) Evaluation in Dec 2012. Following publication of the FEIS, Pam led the team in responding to over 850 public comments received on the FEIS, which were published as an attachment to the final ROD. Primary author of the ROD, summarizing effects and mitigation commitments related to natural, community, air, noise, traffic, and Section 4(f). Coordinated regularly with PMC and FTA, leading to ROD signature by FTA in Feb 2013. Post-ROD, she continued to monitor and track design changes as the project advanced into more detailed design to ensure continued compliance with NEPA and fulfillment of ROD design and construction environmental commitments. Worked closely with the noise technical specialists to ensure noise related commitments were incorporated into the advanced phases of design. Lead environmental manager for reviewing milestone Post-NEPA designs to compare against NEPA, re-evaluated Section 4(f) impacts to parks and historic resources. Worked with the design engineers to ensure Section 4(f) consistency with the FEIS/ROD, and coordinated with Section 4(f) property owners, as needed to obtain concurrence.
Relevance: Development/management of NEPA document, schedule, and associated technical reports (natural, cultural, socio-economic, noise, Section 4(f)), NEPA agency coordination, successful NEPA document decision, post-NEPA environmental commitment monitoring/tracking.

Virginia Avenue Tunnel, CSX Corporation, Washington, DC ($2.3M fee): Pam managed the Natural Environmental tasks required as part of the NEPA process, including resource identification, impact assessment, and documentation for this controversial EIS project. Resources evaluated included: waters/wetlands, floodplains, trees, threatened/endangered species, and groundwater. Coordinated with DDOT and regulatory agencies regarding issues/concerns and the project's mitigation requirements. Authored the natural environmental sections of the DEIS and FEIS. As part of the NEPA documentation team, Pam reviewed/commented on the noise section of the DEIS and FEIS, and worked closely with the noise technical team to ensure DEIS noise related comments were adequately addressed in the FEIS and ROD. Reviewed the Section 4(f) Evaluation for the project related to the Section 106 cultural resources.
Relevance: Evaluated/documented alternatives that met the purpose and need. GIS inventory, resource assessment, agency coordination, public involvement, and successfully obtained a NEPA decision by FHWA.

MD 4 Suitland Parkway/Marbury Drive Mitigation, Prince George's County, Maryland ($1M fee): SHA's consultant Project Manager for a project that involved wetland delineation, permit preparation, mitigation site selection/design, and agency coordination. Led the JD field review and obtained concurrence on a stream mitigation site, and oversaw conceptual and final designs. The mitigation component of this project involved extensive community/public outreach regarding restoration along the tributary to Southwest Branch, in the medial of Marbury Drive, in District Heights. Pam was responsible for development of the mitigation project, obtaining approval from the permitting agencies, and tracking for successful completion of environmental commitments.
Relevance: Performed resource assessment, coordinated permitting and oversaw development of mitigation to meet commitments, and was involved with public/community outreach.

Intercounty Connector Project (ICC), Maryland State Highway Administration, Prince George's and Montgomery Counties, Maryland ($4M fee): Lead author and managed development, including methodology, for the EIS secondary/cumulative analysis, and presented findings to agencies. During design, reviewed SWM retrofit sites proposed as ICC environmental stewardship on behalf of MDE. Involved review of SWM retrofit plans to identify potential permitting issues or resource concerns, and communicated with MDE's Nontidal Wetlands staff

regarding any potential concerns. Provided comments to ICC team, and made recommendations for resource impact avoidance and minimization on behalf of MDE.
Relevance: Contributed during early NEPA phases and during Design-Build phase related to design reviews on behalf of MDE. Close proximity to I-270 corridor.

- Additional Design Key Staff - Managed Motorways Specialist – David H. Ungemah

Years of Experience: 21 (7 with Parsons Brinckerhoff, 14 with others)

Education: M.P., Urban Planning, University of Minnesota, 1996; B.A., Political Science, University of Colorado, 1994

Professional Leadership: Transportation Research Board: Chair of Congestion Pricing Committee (2011 - current), Chair of Multimodal Pricing Implementation Joint Subcommittee (2008 – 2011); Association for Commuter Transportation: Region V Director (2008 – 2010); Transportation Demand Management Institute: Trustee (2009 – 2013), Chair of Research Division (2008 – 2010)

Key Qualifications

David Ungemah offers 21 years of experience with particular emphases in managed lanes policy, planning, and facility development; congestion pricing programs; and highway management and operations development, including Active Traffic Management (ATM) systems. David is internationally recognized for his expertise in congestion pricing and managed lane systems, including his role as the current chair of the TRB Congestion Pricing Committee. David has served as project and task manager for varying types of freeway traffic management efforts. Notable efforts include: project manager for the I-94 / TH 280 Managed Lanes Study in Minneapolis / St. Paul, which included the development of conceptual designs for a managed lanes system connecting these two downtowns; deputy project manager for the I-35 Corridor Development Program, a City of Austin led study of I-35, examining managed lane and operational treatment options for the freeway corridor; and project manager to the Colorado Department of Transportation for the development and implementation of the I-25 Express Lanes, which opened in 2006 as the nation's sixth priced managed lanes facility. In addition to these clients, David guided the development of managed lane applications for the Washington, New York, North Carolina, California, Ohio, Pennsylvania, and Texas Departments of Transportation, Metropolitan Transportation Commission, Charlotte Department of Transportation, Maricopa Association of Governments, and the Ministry of Transportation Ontario.

Project Experience

I-35 Corridor Development Program, Austin, Texas ($10 Mil): Deputy Project Manager for an assessment of operations and infrastructure options along the 27 mile, I-35 corridor in the Austin metropolitan area. This project involves a Context Sensitive Solutions (CSS) evaluation process, including minimizing right of way, utility, and environmental impacts, to discover current corridor needs within an urban, community context, identifying a range of appropriate and innovative operational options to remedy congestion hotspots and bottlenecks and improve travel time reliability and safety, and conduct a feasibility assessment of managed lane options along the mainline of the freeway corridor. Potential proposed features include Transportation System Management (TSM), reversible lanes, improving pedestrian and bicycle connectivity, enhancing regional bus services, integrating measure for quicker removal and management of incidents, ramp metering, reducing and revising access points and ramp geometry, and Active Traffic Management strategies including lane use control and dynamic speed advisories. The anticipated outcome is a Corridor Investment Program that will seek to combine financial resources and collaborative authority for the development of projects in both the short- and medium-term. David is responsible for oversight of the assessment of different solutions, coordination of alternatives and amongst team members, and leading the concept development effort.
Relevance: Developed a Corridor Investment Program that targeted innovative remedies such as managed lane options to improve mobility, reliability, and safety along an interstate corridor.

Colorado Managed Motorways Feasibility Study, Denver, Colorado ($7 Mil): Project Manager for the feasibility assessment of a managed motorways concept for Colorado Department of Transportation. This concept, leveraging the successful deployment of managed motorways on the M1 in Melbourne, Australia, involves the comprehensive provision of coordinated ramp metering, adaptive flow control, and active traffic management to prevent traffic

saturation on urban freeways. The feasibility assessment involves a peer exchange with Australian implementers, an evaluation of existing ramp metering and flow control efforts, and preliminary effectiveness evaluation of managed motorway concepts. The effort concluded with a recommendation to pursue a demonstration project along the I-25 corridor in the south Denver metro area. Since the conclusion of the feasibility study, Colorado DOT is developing a uni-directional, 6-month pilot program on a 13-mile segment of I-25 in the Denver area. The effort is currently in systems engineering and design, with anticipated delivery in 2017 for operations and testing. David was responsible for overall project management, coordination between stakeholders and Managed Motorways operators in Australia (Transmax and VicRoads) for accurate and complete implementation of proven strategies.

Relevance: Project manager for a study to determine feasibility of implementing ITS devices on urban freeways utilizing Australia's Managed Motorways methodology; including ramp metering, adaptive flow control and active traffic management in an effort to improve mobility, travel time reliability, and safety.

Regional Managed / Transit Priority Lanes Network Study, San Antonio, Texas ($300k fee): Project Manager for the Alamo Area Metropolitan Planning Organization development of a regional concept and system plan for managed and transit priority lanes. David was responsible for overall project management; multi-agency facilitation and coordination; and oversight of modeling and screening of corridor opportunities; development of policy, design, implementation, and strategy research documents; and development of a strategic implementation plan for the region's metropolitan transportation plan.

Relevance: Project manager for a study that provided a strategic plan for implementing ITS strategies such as lane management in a large metropolitan region.

I-25 North Express Lanes Extension, Denver, Colorado ($60 Mil): Task Manager for the development and design of tolling, managed lanes, active traffic management, and ITS components for the I-25 North Express Lanes, between U.S. 36 and 120th Avenue in Denver. This facility extends the reversible I-25 Express Lanes section, a project for which David served as project manager, seven miles to the north with concurrent flow managed lanes. David was responsible for leading the development of a preliminary (30%) design of toll/managed lanes/Active Traffic Management/ITS components, development and submittal of a final design package, creation of a concept of operations for the corridor, and construction oversight for the project.

Relevance: Managed the task to develop, design, and implement ITS techniques along an interstate corridor including Active Traffic Management, ITS components, and reversible lanes.

Metropolitan Highway System Investment Study, Minneapolis/St. Paul, Minnesota ($250k fee): Project Manager for this study that investigated the long term implementation of managed lanes and active traffic management (ATM) projects as a build alternative to the regional long range transportation plan. Called "right-sizing" of the long-range plan, this study involved the identification of regional managed lane and ATM projects, defined performance parameters, developed traffic models to analyze the impacts of the strategies, and determined cost-effectiveness metrics for each of the corridors. The outcome of this legislatively-mandated study was an update to the long-range transportation plan's highway investments and incorporation within short-term development proposals for MnPass system expansion. David was responsible for overall project management, coordination with stakeholders, overseeing the development of traffic models, and analyzing the impacts of the proposed strategies.

Relevance: Managed the study to compare innovative traffic strategies such as lane management and ATM with traditional methods using traffic analysis, simulation and optimization models to determine the cost-effectiveness of various alternatives.

2. Key Staff Experience and Qualifications

ii. Construction Key Staff

ii. Construction Key Staff

• Design-Build Project Manager – Lou Robbins, PE, DBIA

Years of Experience: 47 (4 with Corman, 43 with others)

Education:	Registration/Certifications:
Master of Science, Environmental Engineering / Urban Transportation Planning, Brooklyn Polytechnic Institute, 1973; Bachelor of Science, Civil Engineering, Clarkson College, 1969; Applying Expertise as an Engineering Expert Witness, 2009; Design-Build – Principles, Fundamentals, Contract and Risk Management	Professional Engineer: Maryland (9465), Washington, DC, Virginia, Delaware, New Jersey, New York, North Carolina, Pennsylvania, West Virginia Design-Build Professional – DBIA Certificate, Value Engineering Training, National Highway Institute, 1996;

Key Qualifications

Mr. Robbins has extensive experience managing complex projects with diverse team members. His background encompasses transportation planning, EIS/NEPA documentation/preparation, preliminary & final design, Design-Build, and field construction inspection/Quality Control. He has strong technical, project management, and leadership skills and over 40 years of experience managing projects of all sizes. His strengths are organizing and leading diverse project teams of designers, contractors, owners and stakeholders by encouraging open, honest, and timely communication with the ultimate goal of "No Surprises." He has been Designer, Construction Inspector, Resident Engineer, Project Manager, Quality Manager and Principal-in-Charge for various types of projects from small municipal road and park improvements to large transportation projects. Lou has led partnering sessions as the facilitator for ($ 70 Mil) highway projects as well as internal change initiatives. His past duties also include the leadership of a firm-wide Quality Control process and the development and maintenance of a firm-wide Health & Safety program for a diverse staff of more than 1,800 individuals.

Mr. Robbins is Corman's discipline lead on Design-Build projects. As such, he is involved in all of Corman's Design-Build projects either as a "hands on" leader or from an oversight role. Earlier in his career he was the Project Manager for the EIS for I-195 from US 1 to BWI and MD 2 and 4 on the western approach to the Thomas Johnson Bridge. He has been involved in Design-Build since 1985 when his design firm held the contract and he led a Design-Build team of contractors and engineers for a project near Baltimore, MD. Other Design-Build projects he has taken an active role in include: Project Manager for the Civil/Site Portion of the $600M Walter Reed Hospital Project at Bethesda Naval Hospital Center; Design-Build Project Coordinator for the Rehabilitation of 13 SHA Bridges in Salisbury, MD; Design-Build Project Coordinator for Fall Hill Avenue & Mary Washington Blvd. Extension, Fredericksburg, VA; and Co-Principal-in-Charge (with Parsons Brinckerhoff) and QC Manager for the $220 Mil Atlantic City/Brigantine Connector Tunnel for Mirage Casino's , NJDOT and SJTA.

Mr. Robbins is a former Chair of the DBIA National Licensure Committee, former Chair of NJACEC and NJAGC Design-Build Committees, and former Chair of the 2004 and 2008 DBIA National Transportation Conference. He is a current Board Member of the Local DBIA Chapter. He is currently on the leadership team for DBIA's Civil Infrastructure Committee. He has taught Fundamentals of Design-Build and Design Management in DBIA's National Educational Tour and ACEC's educational seminars in addition to facilitating numerous lectures and panel discussions at various national professional organizations. He was a founding member if ITS America, New Jersey Chapter.

Project Experience

DESIGN-BUILD Intercounty Connector-Contract C, Montgomery & Prince George's Counties, MD, Maryland State Highway Administration ($523 Mil): This project included 3.8 miles of new six-lane ICC roadway, 20 new bridges, a new three level interchange with Rte 29, new interchange with Briggs Chaney Road, and a new three level interchange with I-95 to increase mobility in the region. Design included widening I-95, installing new CD roadways and installation of ITS devises on I-95. Construction involved interchange structures over existing and heavily traveled US 29 and I-95, and depressing of the ICC under existing Old Columbia Pike, Briggs Chaney Road, and Old Gunpowder Road, while maintaining existing traffic on existing roadways. Project completed on time and on budget. Quality functions included the consideration of safety, operability, and maintainability in both the design and construction. As Quality Manager, Lou was responsible for the monitoring, enforcement, and reporting of the Quality Management Plan

for this Design-Build project to the MSHA. His duties included preconstruction design, construction coordination, and quality control efforts.
Relevance: Major highway construction project involving bridges; signage; roadway; ITS; toll rate systems, automatic tolling; utilities; maintenance of traffic; E&S control; community outreach; coordination with stakeholders; environmental sensitivity to 13 live streams, forest, and wildlife (including relocation of 400 turtles); innovation including ATC reconfiguring interchange from 3-level to 2-level, eliminating 300,000-sf of bridge deck from RFP concept plans, both of which reducing cost/MOT impacts and the use of citosan flocculant system to manage stormwater runoff.

EIS, Preliminary and Final Design of I-295 Direct Connection, New Jersey DOT ($400 Mil): Project Manager for the EIS, pre-construction, and preliminary design portion of the project which reconstructs the I-295, I-76, and Rte 42 (Atlantic City Expressway) interchange to improve mobility, relieve congestion, improve safety, and modernize South Jersey's transportation infrastructure. Four construction contracts involve reconstruction of I-295; relocation of 15 housing units; construction of new connection ramps, 10 new bridges, one bridge widening, one bridge rehab, 2 temporary bridge structures, 22 retaining walls, 40 new sign structures, 15,000-ft of noise walls, and new lighting and signing. *One Advance ITS contract was also issued which includes ITS facilities in surrounding areas to accommodate rerouting traffic, adaptive traffic signal systems, installation of 2 portable and 7 permanent dynamic message signs, and travel time readers.* Additional project requirements included ROW acquisition, various permits, utility relocations/installation, and a new pump station. Responsible for leading team that identified and evaluated existing environmental features, developed and evaluated multiple alternatives for traffic, safety, operations, constructability and environmental impacts. Led the development of Federal NEPA documents. Developed and led public outreach and Involvement efforts for this interchange and corridor which is the main access point from Southern New Jersey onto the Walt Whitman Bridge and downtown Philadelphia.
Relevance: Major interstate highway project to relieve chronic congestion and repeated safety issues along a major commuter corridor with high ADT, limited travel time reliability, high number of accidents and daily congestion. Project included identifying and prioritizing the issues and evaluating multiple alternative analysis performed of both traditional and innovative solutions.

Route 80 MAGIC (Metropolitan Area Guidance Information and Control) Project, New Jersey DOT ($40 Mil): Project Principal *for this project which included the installation of ITS traffic surveillance and motorist information systems on 60 miles of interstate and primary roadways in New Jersey.* Project limits were predominantly along I-80 from I-287 to the George Washington Bridge and along the I-287, US 46 and I-95 corridors leading to I-80. Improvements included VMS and DMS signage, traffic monitoring equipment, construction, commissioning, and start-up of North Jersey TOC, installation of new Backbone fiber along I-80 and I-287. Project was the first of its kind in the NY Metropolitan area. Project goals of increased mobility, reliability, safety and low maintenance costs were all successfully achieved. Lou managed a staff of 4-6 construction inspectors providing quality oversight to the Contractor on behalf of NJDOT. Cross section of I-80 is similar to IS-270 project area starting with a typical multi-lane interstate with a wide median and transiting to a congested widened 4 barrel Interstate with full length CD roadways as it approached the George Washington Bridge and NYC.
Relevance: Major regional congestion management project in high density urban area to increase mobility, reduce travel times, improve reliability and operations along the major interstate corridors into the NYC central core from New Jersey. The reduction of MOT impacts during construction was a key project goal.

DESIGN-BUILD Route 1 Widening, Fairfax County VA, Eastern Federal Lands ($70 Mil): As Design-Build Project Coordinator, Lou was responsible for the proper coordination and design of this 3.6 mile roadway widening designed to increase mobility. It included median reservation for future transit, two new bridges, roadway widening thru two historic districts associated with George Washington's original estate, disposal of a historic bridge, traffic control on Rte 1 as well as access to the Fort and new Community Hospital, drainage, traffic, ROW acquisition, and relocations of 80 residents and 12 retail businesses. Owners included VDOT, Fairfax County, Fort Belvoir, and EFL-FHWA. Other Stakeholders included the National Historic Trust, VA SHPO, WMATA, DAR, OEA, etc. Mr. Robbins led the proposal pre-construction effort, management of the design team, and the coordination and risk management between the contractors and design staff as well as with the owners and stakeholders. He was active in developing the partnering efforts and leading the preparation of several public meetings required prior to the completion of the design and start

of construction. Parsons Brinckerhoff was the preliminary Engineer for the owner and lead VDOT reviewer of the construction documents

Relevance: Duties included coordination of design and construction teams, and the Owner and their agents in the preparation of final construction documents and the inclusion of timely constructibility reviews.

Major Design/Construction Projects Throughout New York and New Jersey, Various Owners ($1.5 Bil): Principal-in-Charge or Project Manager of multiple major design and construction projects in the NY/NJ metropolitan area. Design efforts included construction or reconstruction of several major highways including US 206, I-287 from Rte 10 to Rte 202, Rte 3 over the Passaic River, Rte 29 and I-195 Interchange, Atlantic City/Brigantine Connector Tunnel, Hightstown Bypass, and I-270/First Street. Construction quality control inspection projects included the, FRD Drive/East River Drive, I- 278 (Staten Island Expressway from the Goethals Bridge to the Verrazano Bridge), new Rte 1 and Rte 18 interchange, reconstruction of 5 bridges and installation of a complex ITS monitoring and motorist information system on the New York State Thruway in Yonkers and Buffalo, NY, and numerous NJ Turnpike and Garden State Parkway reconstruction projects. The total cost of these projects exceeds $1.5B. Lou's responsibilities included the preparation of Highway preliminary and final designs as well as the direct supervision of over 40 construction inspectors and the preparation, implementation and adherence to detailed project specific quality control plans for both design and construction.

Relevance: Conceptual, preliminary and final design and construction quality control for Major regional significant highway projects to relieve chronic congestion and repeated safety issues along major commuter corridor with high ADT, limited travel time reliability, high number of accidents and daily congestion.

Construction Manager – David Levine

Years of Experience: 30 (11 with Corman, 19 with others)

Education:	Registration/Certifications:
Construction Management North Carolina State University-1996-1997 BS Civil Engineering, Rutgers University-1986	MDE Green Card

Key Qualifications

David's 28 years in the construction industry have provided opportunities throughout the US and overseas as an Educator, Project Engineer, Superintendent, Estimator, Assistant Project Manager and Project Manager specializing in project management, craft supervision, field layout, subcontract negotiations/administration, quality control, material control/procurement, safety management, environmental compliance management, cost accounting and scheduling for heavy highway and civil engineering projects. As Construction Manager, Dave will be involved with the constructability reviews during pre-construction, supervise field operations; coordinate labor, equipment and subcontractors; develop schedules; oversee safety, quality control compliance, and project close out.

Project Experience

I-95/I-695 Interchange, Baltimore, MD, Maryland Transportation Authority ($208.6 Mil): This is a four-mile roadway and bridge project along the I-95 corridor on the north side of Baltimore; the first of two contracts for the complete I-95/I-695 interchange reconstruction and realignment for future HOV lanes. The new reconfigured three-level interchange realigns general purpose lanes and adds new managed lanes of I-95 and I-695. Scope included removing the double-braided interchange and constructing a new reconfigured two-level interchange for general purpose roadways and ramps to facilitate construction of managed roadways and ramps in the follow-on contract. This "basketweave" design interchange presented the challenge of accommodating 178,000/149,000 (I-95/I-695) ADT and two live streams that flowed through the project throughout reconstruction. Project also consisted of ITS, CCTV, and backbone conduit, four multi-span flyover bridges, approximately 2,200-ft. long with steel erection, forming, pouring and curing 272,000 SF of structurally-reinforced substructure concrete and 510,000 SF of structurally-reinforced bridge deck over I-95 and I-695. There are an additional seven low-level bridges; four were constructed over I-95 and I-695 traffic. Five precast concrete noise walls were constructed totaling 215,000 SF of precast architectural concrete panels, 608 each concrete posts, and 3,570 CY of caisson concrete. When the interchange was originally designed in the 1960s, exits were on the left side off of I-95 and the beltway creating bottlenecks. This project places the exits on the flyovers on the right to alleviate those bottlenecks. Project involved extensive MOT, coordination with adjacent

contractors requiring traffic control, public outreach, and environmental controls (earning an A rating), Traffic Control Plans maintained 240,000 vehicles/day. Safety was a priority with a resulting lost time injury rate of .50.

As Assistant Project Manager/Project Engineer, David supervised engineers, field personnel, and subcontractors; planned operations; prepared/reviewed drawings; oversaw material procurement; performed monthly schedule updates; estimated/prepared change orders, cost control reports and quality-control compliance; and coordinated with utility agencies. Additionally, David worked with in-house engineering consultants on concept designs and feasibility and constructability reviews for implementing temporary shoring. Prior to being awarded the project Dave was a senior estimator performing take off and pricing for the project.

Relevance: This project relieved heavy congestion in one of the busiest sections of the I-95 corridor with ADTs of 178,000. Effective MOT was critical for the deluge of daily commuters as well as the heavy weekend traffic along the I-95 corridor during holiday and summer months. Contractors and designers redesigned the interchange at I-95 and I-695 while maintaining flow of traffic, upholding safety, and maintaining an A rating for E&S control. Project also included HOV lanes, value engineering for pile driving resulting in a $1M savings to the State. This project was completed on time and within budget.

MD Route 70 Rowe Boulevard Bridges, Annapolis, MD, MD Dept. of Transportation ($29.6 Mil): This project consisted of replacing the Weems Creek Bridge on MD 70 (Rowe Blvd.) and replacing the superstructure and rehabilitating the substructure for the College Creek Bridge on MD 70 while improving the environment. Cofferdams were installed in the water for both bridges. Rehabilitation required 10,500-CY of cast-in-place concrete, erecting precast pilaster, coping elements, five retaining walls, five bio-retention facilities, storm drainage pipe and structures, a stormwater management pond retrofit, new 12" water main, high-voltage electrical and communication cable relocations, bridge approach construction, asphalt paving, and extensive roadside development. Corman proposed and implemented alternative redesigns for both bridges saving the State over $200,000. Vehicular and pedestrian traffic were maintained during construction. Significant safety measures were taken resulting in a .8 OSHA lost-time incident rate.

As Project Manager, David supervised engineers, field personnel, and subcontractors, planned operations, prepared/reviewed drawings, material procurement, monthly schedule updates, estimated/prepared change orders, cost control reports, quality-control compliance, coordinated with utility agencies, and community relations. David attended monthly meetings involving MSHA personnel, structural consultants, landscape architects, and environmental engineering and construction team members. Prior to being awarded the project Dave was a senior estimator performing take off and pricing for the project.

Relevance: This project relieved heavy congestion on main gateway to the state capitol and downtown historic district. Effective MOT was critical for the proper protection of daily commuters as well as the heavy holiday and summer tourist's months. Corman recommended several Value Engineering proposals for more effective Bridge Construction which were accepted by SHA. Project included maintaining flow of traffic, roadway, drainage, landscaping, E&S, Structural / Bridge, Electrical and communications cable construction, upholding safety, and maintaining an A rating for E&S control. This project was completed on time and within budget.

DESIGN-BUILD - Main Pumping Station Diversions, Division I, Washington, DC, DC Water ($40 Mil): This project provides control and consolidation of flow coming from Combined Sewer Overflow (CSO) Structures. Major construction components include: Large underground concrete hydraulic diversion, surge and approach structures constructed around turn of the century brick arch sewers, protection of the existing sewers, reinforced concrete internals in 110-ft deep 56-ft diameter concrete shaft, detailed and complex ground and structure monitoring, road reconstruction, instrumentation of new facilities including tie back to existing control center, odor control structure, and boring of new facilities under existing brick structures. Detailed geotechnical and condition assessments were performed prior to actual construction. Project is currently on schedule and within budget.

David was the Lead Estimator for the cost proposal development of this project and is also the Design-Build Project Manager. As such, he was responsible for preconstruction activities including management of the designers, constructibility reviews, quantity take off, management of the full estimating team, pricing, development of risk and contingency documents. He led collaboration meetings with the Owner, stakeholders, and designers, managing schedules, providing supportive excavation including road repair. During construction David supervises engineers, field

personnel, and subcontractors; plans operations, prepares/reviews drawings, conducts material procurement, prepares monthly schedule updates, estimates/prepares change orders, reviews cost control reports, ensures quality-control compliance, coordinates with utility agencies, and is involved with community relations. David attends bi-weekly meetings involving the Owner, multiple stakeholders, consultants, and environmental engineering and construction team members.

Relevance: Leadership involvement in the entire project from initial estimating through bidding, collaboration meetings with the Owner, subcontractor selection, management of designer, performance of constructibility reviews through the actual construction on-site as Corman's lead individual. David deals with stakeholders during design and construction and close out.

- **Cost Estimator –** David Gates

Years of Experience: 30 (10 with Corman, 20 with others)

Education:	**Registration/Certifications:**
BS, Civil Engineering, University of Hartford, 1981	MDE Green Card

Key Qualifications

David has been the Lead Estimator on 15 winning major highway Design-Build projects, two winning CMAR projects, and numerous bid-build projects. David was instrumental in the success of SHA's first CMAR project, MD 24. Collaboration with agencies, stakeholders, and designers is a key aspect of a successful project. He is currenly completing the Estimating for SHA's largest CMAR – the $100 mil rehabilitation of the beltway (I-495/I-95) in Greenbelt. David's experience with past CMAR and Design-Build projects is key for constructability reviews, developing and scheduling maintenance, and maintaining the project budget. As the Lead Cost Estimator, David will work with the ICE, SHA, and Parsons Brinckerhoff, FHWA, MDE, and all stakeholders to develop the pricing and to mitigate the risk.

Project Experience

I-95/Telegraph Road Interchange Improvements, Alexandria, VA, Virginia DOT ($267.9 Mil): This Corman/Kiewit JV project was a fast-track 2.5 mile reconstruction of I-95/I-495 and Telegraph Rd for traffic to enter/exit Virginia by crossing the new Woodrow Wilson Bridge (WWB) and a widening/reconstruction connecting the WWB project with new HOT lane projects. With an ADT of 160,000, the new grade-separated interchange provides access to roadways through elevated ramps over Telegraph Rd to refine traffic flow. There are 11 new bridges and five flyover ramps, including two curved girder, 11 box culverts (new and extensions), four signaled intersections, 17 interchanges, two express lanes, four local lanes, interchange auxiliary lanes, improvements to 24 lane miles with roadway paving/marking, 500,000-CY excavation, 22 retaining/MSE walls, four sound barrier walls, storm drainage with six SWM ponds, waterline, electrical, and communication installation, protected/relocated a 36-inch water main, new traffic systems, lighting, traffic/overhead signage (static and dynamic), ITS, traffic management system upgrades, E&S controls that include General Water Permits, and an environmental mitigation project at Cameron Run. The Joint Venture team revised MOT plans reducing six-phase-design to three phases and 12 traffic shifts to six. Worked with WMATA adjacent construction to coordinate access and track shutdown for bridge construction over railroad and maintain WMATA security. There was an aggressive schedule as it was linked with existing traffic patterns and other WWB projects that were accommodated while working over rail, water, and on the Capital Beltway.

As the Lead Joint Venture Cost Estimator, Dave led the Joint Venture estimating team in evaluating the constructability of the project with the other adjacent major highway projects associated with the WWB. Maintaining the high traffic volumes was a major task while constructing this project. David's extensive experience with major highway construction helped to develop the team's approach to minimize impacts to the environment, traffic, utility relocation, and the traveling public. This enabled the estimating team to develop their best competitive estimate to successfully bid VDOT's largest bid-build project to-date.

Relevance: Construction/reconstruction of a major roadway with heavy ADT, complex MOT, ITS, coordination with adjacent projects, HOT lanes, environmental sensitivity, construction workers' and public safety.

DESIGN-BUILD - Intercounty Connector Contracts A & B, Montgomery County, MD, Maryland State Highway Administration ($1.04 Bil): Contract A was a 7.2 mile controlled-access, tri-lane, divided highway with 18 steel/precast

concrete girder bridges and four bridge widenings on I-370, a 625-ft deck-over structure, a "Signature" Arch Bridge spanning Rock Creek and a "Gateway" Bridge. MOT (including maintaining traffic during widening/constructing a new I-370 roadway and interchange to WMATA's Shady Grove Metro Station to replace the existing partial interchange), E&S controls, adjacent project coordination, 2.5 million-CY earthwork, 400,000-SF sound walls, box culverts and extensions, SWM/drainage systems, restored adjacent streams/wetlands, 130,000-SF retaining/MSE walls, lighting/signalization, overhead/cantilever signs, Electronic Toll Collection facilities, ITS, utility relocations at 106 locations including water, sewer, power/electrical, cable lines, fiber optic, and critical transmission lines, and community outreach to 10,000 residents. As Sr. Corman Cost Estimator, David led Corman's estimating team to develop their best pricing for this complex roadway with major MOT issues. Minimizing environmental impacts, utility relocations, and ROW property impacts, all while coordinating with major agencies such as FHWA, SHA, MDE, were crucial components, including roadway, bridge, and in-stream work, and transition from the estimates to the initial design coordination. He met with stakeholders to address concerns and updated them on progress. For Contract B, minimizing environmental impacts, utility relocations, and ROW property impacts, all while coordinating with major agencies such FHWA, SHA, MDE, was crucial. As an initial Onsite Roadway Design-Build Coordinator, David was instrumental in coordinating the design and permit approvals for 7-mile roadway design segments through the MDE approval process to meet the fast-track schedules. With this onsite experience, he knows the impacts to environment, permit acquisition, the traveling public, property owners, adjacent project, costs, schedules, and constructability. David led Corman's estimating team to develop their initial and final pricing for this complex roadway with major MOT issues.

Relevance: Construction of a major roadway, ITS, coordination with adjacent projects, environmental sensitivity, construction workers' and public safety.

CMAR Services for IS-95/495-Baltimore Washington Parkway to US 1 (Greenbelt Metro Access), Prince George's County, MD, Maryland State Highway Administration ($ In Progress): David is currently on his second CMAR with SHA. In anticipation of increased travel demands to the Greenbelt Metro area due to WMATA's Joint Development Program and possible installment of the new FBI headquarters complex at the site, this project proposes to reconstruct the partial interchange between I-95/I-495 and the Greenbelt Metro Station with a full interchange. It includes the addition of auxiliary lanes along I-95/I-495 between US 1 and the B/W Parkway and the reconstruction of the I-95/I-495 inner and outer loop bridges over Rhode Island Avenue and the inner loop bridge over MD 193. The final scope of improvements along I-95 outside of the full interchange at the Greenbelt Metro Station will be dependent on the needs to accommodate traffic for the development and/or the project budget. This project is currently completing the preconstruction stage.

As Lead Cost Estimator, David's primary responsibilities occur during preconstruction where he is manage\ing the open-book cost estimating to develop the OPCC and risk register, tracking constructibility review comments, coordinating with the independent cost estimator (ICE), assisting with design coordination, performing conceptual estimates, and finalizing the CAP for the project. David and the ICE are collaborating on the bid items for pricing. They are performing independent estimates and are working seamlessly together so the reviews towards a GMP will be simple and efficient. David is also managing the project risk register. This promotes transparency and efficiency and allows the Team to make timely decisions. During construction, David will assist with finalizing subcontractor bid packaging and negotiations. This will also streamline construction start-up to meet construction schedules and deliver the project on time. In addition, David has been working as a Design Coordinator. He meets with design firms, stakeholders, and various agencies to advance the development of the design while accommodating all parties involved. David is assisting in creating and managing the Preconstruction Schedule. This schedule includes design, environmental permits, utility, procurement, right-of-way, and stakeholder activities.

Relevance: Construction/reconstruction of a major roadway/interchange, complex MOT, ITS, similar pricing method, coordination, safety.

•	Additional Construction Key Staff – Commissioning/Testing/Integration – Anthony Gasiorowski
Years of Experience: 30 (11 with Parsons Brinckerhoff, 19 with others)	
Education: B.S., Civil Engineering, University of Michigan, 1996	Registration/Certifications:

Professional Affiliations: Intelligent Transportation Society of America / Michigan; Michigan Connected and Automated Vehicle Working Group	Low Voltage Cabling Installation, Maryland Cisco Certified Network Analyst, In-Progress

Key Qualifications

Anthony Gasiorowski is a Lead System Engineer with Parsons Brinckerhoff. He has over 30 years of experience with Systems Development Life Cycle (SDLC), National Transportation Communications for Intelligent Transportation System Protocol (NTCIP) Communications, Intelligent Transportation Systems (ITS) and Information Technology (IT) systems from single site to large-scale enterprise-class systems. This includes configuration, installation, integration and planning for operations, maintenance, command/control and Connected Vehicle projects. Anthony also has a deep background in IT management, help-desk implementations/integration, IT/business delivery alignment, networking (IPv4 and IPv6), telecommunications, and field device design, installation and integration.

Project Experience

2014 ITS World Congress Connected Vehicle Deployment, Detroit, Michigan ($600k fee): Anthony was the Systems Engineering Lead for the technical design, configurations, testing, troubleshooting, commissioning, and deployment of 19 Dedicated Short Range Communications (DSRC) Roadside Units (RSUs) on portable trailers with wireless backhaul at Belle Isle, Michigan. Anthony developed the IPv4 and IPv6 addressing scheme, equipment specifications, led the equipment installation and configuration teams, and managed onsite deployment and setup of all equipment. This included the implementation of multiple traffic Virtual Local Area Network (VLAN) implementations, and network security design. Anthony's responsibilities included management, design, QA, implementation and configuration support for the back-haul communications network, commissioning, as well as DSRC packet capture and analysis, event/network troubleshooting, and diagnostics for the DSRC and wireless data interfaces between the infrastructure and the vehicle.

Relevance: Installation, configuration, commissioning, and testing of communications infrastructure for advanced and innovative ITS applications.

Safety Pilot Deployment, Ann Arbor, Michigan, U.S. Department of Transportation ($2.5 Mil fee): Anthony was the Lead Systems Engineer for the infrastructure design, configuration, commissioning, testing, troubleshooting and support of the Safety Pilot Deployment (SPMD). This included providing network, communication, security and IT engineering support to test Dedicated Short Range Communications (DSRC) devices and applications in 3,000+ vehicles through the connected vehicle infrastructure in and around the Ann Arbor, Michigan area. Anthony managed the infrastructure elements, including the planning, procurement, installation, and operation of more than 30 RSE's, back-haul communications, and Traffic Signal Controller (TSC) upgrades. The TSC upgrades were implemented to accommodate Signal Phase & Timing (SPaT) messaging at two dozen signalized intersections with DSRC broadcast messages to the enabled fleet vehicles. In addition, he worked directly with the City of Ann Arbor traffic engineer and Traffic Signal Maintenance on the replacement of signal controllers from Econolite (ASC/3-2100) and Siemens/Eagle (EPAC Mod 50) and along two corridors. These SPaT enabled locations were configured to broadcast MAP/ Graphic Intersection Descriptions (GID), phase and time data, and phase to lane movement (PLTM) information via the DSRC network. In EPAC Mod50 TSCs SPaT was integrated with the City's Split Cycle Offset Optimization Technique (SCOOT) traffic adaptive system. Anthony was responsible for design, deployment, configuration, operations and management of IPv6 communications across back-bone, core network integration, and commissioning with City of Ann Arbor, IPv4/IPv6 dual stack and VLAN design, development of equipment specifications, installation, operations and maintenance for RSE back-haul network through City IT enterprise network. Provided recommendations of security design, management, configuration, equipment specifications, and operations for RSE back-haul and secure communications between IPv4, IPv6, VLANs (traffic/ITS) implementation. Anthony's responsibilities included installation, operation, commissioning, and maintenance support for network management, configuration management and asset management design, configuration, customized development and integration of software solutions to support this infrastructure deployment, operations and maintenance project.

Relevance: Installation, configuration, troubleshooting, commissioning, operations and maintenance of communications infrastructure and field device integration for advanced and innovative ITS applications.

IntelliDrive Demonstration, Detroit, Michigan, Michigan Department of Transportation-Detroit Metro Region ($540k fee): Anthony designed and supported the network infrastructure, development environments, and server

configuration (web and database servers). Anthony assisted with GIS data preparation/map production, field GIS/GPS data collection, system integration with Dynamic Message Signs (DMS), GPS and vehicle data feeds, ITS devices, and field communications equipment. Anthony's responsibilities include the design, installation, support, configuration, troubleshooting, and commissioning of communications and field devices.
Relevance: Installation, configuration, troubleshooting, commissioning, operations and maintenance of communications infrastructure and field device integration for advanced and innovative ITS applications.

Ethernet Conversion for the Traffic Signal Network, Pittsburgh, Pennsylvania, City of Pittsburgh Department of Public Works ($250k fee): Anthony provided systems engineering support services for upgrade of 123 existing signalized intersections and communication network infrastructure in order to improve stability, reduce maintenance costs, and provide for future expansion though scalability. Support for the Advanced Transportation Management Systems (ATMS) Center to Field Equipment included: developing Ethernet network architecture and Internet Protocol (IP) address plan, implementation phasing, costing estimates, anticipated risk/benefit summary, alternative implementation options and recommendations for replacement equipment. Anthony's responsibilities included the planning, design, configuration, commissioning, and troubleshooting for the IP network implementation.
Relevance: Configuration, troubleshooting, commissioning, operations and maintenance of communications infrastructure and field device integration for advanced and innovative ITS applications.

ITS Communication Enhancements, Detroit, Michigan, Michigan Department of Transportation-Detroit Metro Region ($750k fee): Anthony worked with Michigan Department of Transportation in the Detroit Metro region to develop telecommunication and network improvements that would increase reliability of the ITS communication infrastructure. These projects were identified by analyzing existing conduit paths, determining core network locations, device densities/locations, and outlining critical projects descriptions, requirements, phasing, and their related financial magnitude. By identifying projects that link key Hub and Node locations together with backbone fiber reduced the need for leased fiber and monthly recurring costs. Increased reliability was provided through strategic placement of wireless backhaul backup locations and multiple fiber Rings to route network traffic in case of link failure. This upgrade of the existing network and implementation of key proposed network projects is improving operations; safety and mobility through improved ITS device management and information at the regional TMC. Anthony's responsibilities included the alternatives analysis, planning and design of the improvements.
Relevance: Design of regional ITS telecommunications network to support backhaul and device connectivity, including redundancy across multiple topologies.

Network Troubleshooting, Detroit, Michigan, Motor City Electric Technologies and the City of Detroit, Michigan ($50k fee): Anthony provided Motor City Electric Technologies and the City of Detroit technical services for network analysis, network performance assessment and network configuration, testing and troubleshooting. The core concern was identifying and resolving issues associated with the reliability of Integrated Traffic System (ITS) device communications from remote locations to the Traffic Management Center (TMC), namely Closed-Circuit Television (CCTV) multicast data streams. Anthony's responsibilities included network troubleshooting, packet captures and analysis, bandwidth analysis of wired and wireless subnets including VLANs, firewall configuration, test and plan development, commissioning, configuration recommendations, and resolution documentation.
Relevance: Configuration, troubleshooting, commissioning, operations and maintenance of communications infrastructure and field device integration for advanced and innovative ITS applications

3. Project Understanding and Progressive Design-Build Approach

3. PROJECT UNDERSTANDING AND PROGRESSIVE DESIGN-BUILD APPROACH

i. Understanding of Project Goals

The IS 270 Innovative Congestion Management project is a unique and exciting opportunity to provide significant mobility and safety benefits to the citizens of Maryland that utilize this vital corridor. We recognize and embrace the fact that this is a complex project—the first of its kind in the United States, which is an energizing factor and challenge for our Team. As a Progressive Design-Build procurement, the consultant and contracting communities will collaboratively provide innovative ideas, concepts and alternatives through the procurement process to assist the State Highway Administration in setting the scope of the project; with the proposer of the solution that best meets the goals of this contract and providing the highest value to the state, ultimately winning the contract.

The overall vision of this project is clearly identified in the RFQ/RFP: provide implementable, practical, bold and innovative solutions to increase vehicle throughput, reduce delay and increase travel time reliability along IS 270 within the contract budget. To achieve this vision several goals were established such as maximizing vehicle throughput, creating more predictable commuter trips, and improving safety. The solutions need to be maintainable, operable, and adaptable to advancements, and our approach needs to be centered around the principals of a well-managed project.

PROJECT GOAL #1 – PROVIDE IMPROVEMENTS THAT MAXIMIZE MOBILITY

Understanding: The main goal of this project is to provide improvements that maximize vehicle throughput, minimize vehicle travel times, and create a more predictable commuter trip along IS 270. This element is a fundamental goal because it not only delivers highly visible benefits to the traveling public, but it sets the stage for improving safety, quality of life in the region, and environmental stewardship. If we sufficiently address mobility problems, we address a number of other important issues simultaneously.

Approach: To maximize vehicle throughput and minimize vehicle travel times, the Corman/Parsons Brinckerhoff Team will investigate and propose a menu of solutions that collectively cover the entire corridor, from I-70 in Frederick to I-495 in Montgomery County. All users should reap the benefits of this project, regardless of whether or not they traverse the entire corridor or only a small section of it. While certain solutions may be specific to a micro-location, other alternatives may be specific to larger segments. Our approach is to propose the optimum combination of strategies that provide the most cumulative benefits for the citizens of Maryland.

Strategies and solutions that may be investigated to address IS 270 mobility include (but are not limited to): inside widening, reversible lanes, Collector-Distributor lane geometry and access points to balance traffic, and other geometric considerations. Innovative Active Traffic Management tools such as hard shoulder running, queue warning, speed harmonization, variable speed advisories, and ramp metering will definitely be explored, and leading-edge enhancements to those solutions (such as the Australian Managed Motorways strategy and University of Crete's "Complete Corridor Management" algorithm) will be analyzed and considered. Other ITS solutions such as real-time travel information, enhanced incident detection and response tools, weather detection, and connected vehicle applications will be reviewed for applicability throughout the corridor. And localized interchange improvements will be considered where necessary for items including but not limited to acceleration/deceleration lengths, merge lengths, mainline and ramp capacity, sight distance, signal timing, and weaving.

A key issue affecting the predictability of travel time along the corridor is unplanned traffic incidents. Whether it's a crash, flat tire, police action or sudden change in weather condition, these incidents can and do have a severe impact on travel time reliability. Coordinated Highways Action Response Team (CHART) is a program (and Office) within the SHA charged with maintaining and improving real-time operations of Maryland's highway system. They have a proven track record in quickly detecting an incident, identifying the appropriate response, coordinating with police/fire/first responders, and notifying travelers of any potential disruptions. Any strategy the Corman/ Parsons Brinckerhoff Team proposes for this corridor needs to be in alignment with CHART principals, operational practices, and technological operating systems. Seeking input from operations personnel is a key element in our discovery process toward mobility solutions, and identifying technology that can maintain or improve incident detection, verification of response, and traveler notification for CHART will be welcome in our suite of tools.

An opportunity to consider connected vehicle technology will also coincide with the conduct of this project, and applications that rely on Vehicle-to-Infrastructure (V2I) and Vehicle-to-Vehicle (V2V) technology will be included in our exploration. These applications can result in benefits directly to the traveling public (as their vehicles become equipped with companion technology in the next 5 years), but will also have indirect benefits to the traveling public by assisting CHART in its detection, response, and management of recurring and non-recurring congestion. Vehicle information will provide important data in terms of speed, volume, weather conditions, pavement conditions, and more. CHART systems can utilize this data to enhance their real-time operation of the corridor, and private parties can utilize this data for in-vehicle or mobile applications that provide benefits to users of the network.

Once we have established a proposed set of strategies and tools, the Corman/Parsons Brinckerhoff Team will obtain traffic data, analyze, and input into a model for the existing condition as well as the design year. All proposed improvements will be designed to meet or exceed the anticipated traffic demand years from when the project opens to traffic. If it is not possible to meet the design year, the model will be analyzed to gauge how long the improvements will last until the corridor returns to existing level of congestion.

PROJECT GOAL #2 – PROVIDE A SAFE CORRIDOR

Understanding: Safety is a core value to the Corman/Parsons Brinckerhoff Team, as it is with SHA. The protection and well-being of all highway users and workers within our construction sites and on our finished roadways is paramount. This applies to all roads, bridges, and infrastructure we design and construct.

Approach: To provide a safer IS 270, we must first fully understand where and why the crashes occur, as well as their frequency, type, and severity. Once this information is obtained we can effectively determine a cause and propose a solution. In some instances the solutions we propose to address mobility will have an equal and significant impact on safety. We will study the crash data provided ensuring that the locations identified with the highest frequencies of crashes are investigated and solutions with the highest benefit based on AASHTO *Highway Safety Manual* crash modification factors incorporated into our proposed design. Whenever we can propose a strategy or technology that provides safety benefits in addition to mobility or other benefits, we will note the duality of their outcomes and highlight that in our proposed menu of options. All proposed strategies and solutions will be evaluated for safety, even if that wasn't their initial emphasis and utilizing available tools such as the Highway Safety Manual wherever possible. A Traffic Control Plan will also be developed and evaluated to ensure the highest possible level of safety for the workers and drivers alike. A number of solutions suggested for exploration under the Mobility goal have an equally valuable role in providing safety benefits. In fact, any tool that helps reduce recurring or non-recurring congestion is indeed helping improve safety. It's important to note that responding to an incident is the "second half" of the equation; preventing the incident in the first place through the use of innovative strategies and advanced technology is its companion "first half" and should be considered an equally important factor in weighing and evaluating possible treatments.

PROJECT GOAL #3 – OPERABILITY/MAINTAINABILITY/ADAPTABILITY

Understanding: When ownership of these tools and strategies is transferred back to SHA, the costs to operate and maintain should not be an unreasonable burden on the citizens of Maryland. The Corman/Parsons Brinckerhoff Team understands this concern, and will analyze and review operational procedures, maintenance issues and costs, technology proficiency, and lifecycle expectations for all solutions and strategies considered. Our approach will balance being bold and innovative against being practical and feasible at every step along the way.

Adaptability is an equally important part of this goal and has myriad issues that both complement and overlap with operations and maintenance concerns. This is not only looking at sustainable solutions, but also the potential for future technologies to be incorporated into the proposed solutions with ease and minimization of impacts.

Approach: As part of our discovery and collaboration with CHART and SHA's Office of Maintenance, our Team will work to identify any changes in operations or maintenance from current conditions that could result from proposed solutions. We will investigate each alternative and treatment proposed in regards to plowing and mowing operations, accessibility of features requiring maintenance or replacement, maintenance or replacement costs, electrical usage and costs, any special training or service requirements, any need for additional SHA personnel, difficulty to perform relative to its occurrence, and SHA Asset Management and tracking. This data will allow the Team to rate the operability and maintainability of each alternative and treatment, subsequently assisting the Team in determining what options best meet

the current and long term needs of SHA. Simple solutions that may be implemented for ease of maintenance and operations include quick disconnects to devices, easy mounting brackets, solar power, and back-up power.

The first step to achieving adaptability is to understand how proposed solutions tie into SHA's existing network; whether it is the CHART software management system or the SHA radio network, it needs to be useful from day one without too much variability from the existing networks. Proposing a separate operational and control system has been identified as feasible by SHA, but our objective in this effort is to try our best and integrate any potential solutions into the existing CHART operational and software system to better facilitate ongoing operations and maintenance. The second step in adaptability is to consider the impact of any solutions on technology still in development or being researched. No one has a crystal ball, but trends and indicators are readily available that thoroughly outline the potential issues surrounding automated vehicles, next generation cellular communications, crowd sourcing, automated occupancy detection, and advanced computing capabilities. Designing our solutions to adapt as technology evolves is a fundamental need to ensure applications and benefits are not limited to specific segments of society, specific vendors of technology, or specific approaches to operations and maintenance. And the third step in adaptability is to review the impacts of our solutions on the overall future of the corridor. Will additional interchanges be on the radar? Will there be significant changes in VMT at certain locations? Are there parallel or intersecting roadways that might be undergoing significant changes in the next decade? All of these must be reviewed and documented as part of our proposed solution set.

PROJECT GOAL #4 – PROVIDE A WELL-MANAGED PROJECT

Understanding: A well-managed project should be a goal of every project. Each project Corman Construction and Parsons Brinckerhoff deliver strives to achieve this goal. Our team is committed to a well-managed project as we evaluate and implement improvements for all of our clients. When a project is managed well it benefits all parties; owner, consultant, contractor, and all stakeholders. This goal specifically requests a Project Management and Work Plan that addresses communications, coordination, and risk management, achieving collaborative partnership with all members of the project Team and stakeholders while successfully advancing the project goals.

Approach: A Project Management Plan and Work Plan are required for every Corman and Parsons Brinckerhoff project. For this project, and all projects, we embrace the Partnering Process during design and construction to develop that team relationship essential to deliver a project. An environment of open communication, collaborative problem solving, and expedient issue resolution is absolutely necessary for a project of this magnitude, visibility, and importance; which is exactly what Partnering will bring. In addition to a project specific Project Management and Work Plan, Corman is one of the few contractors with an in house Design-Build Procedures Manual implemented and required to be followed on each Design-Build Project. This will help keep the project on track as most of the policies included in the manual are applicable to the Progressive Design-Build process. Corman also has a Project Management/ Quality Control Manual that will be utilized on this project. Parsons Brinckerhoff will apply their own Quality Control Plan as defined in the Quality Management System which requires documentation of specific PM processes to be followed.

Coordination, Communication, and Documentation are the keys to managing a project successfully. Communication amongst Team members is essential to every successful project, which is why project Team meetings will be held regularly. These meetings will include owner, Design-Builder, and other stakeholders as necessary. During the concept development and design phases of the project, Team meetings will be held to include Parsons Brinckerhoff, Corman and all subconsultants to maintain regular coordination. During construction, Corman will hold regular meetings with the subcontractors and Parsons Brinckerhoff so that any internal issues may be resolved without SHA needing to get involved. In addition to the regular Team meetings, discipline specific meetings will be held on an as needed basis to get the necessary parties in the same room so that a specific issue can be resolved without the entire Team. These may include permitting agencies, stakeholders, and specific Team members from SHA. All meetings and conversations will be documented via minutes or briefings and will be stored on SHA's ProjectWise/Aconex as appropriate.

Managing risks is also critical to successful management of a project. Corman/Parsons Brinckerhoff will develop a Risk Register to track all risks for the project; including those attributable to SHA, Corman/Parsons Brinckerhoff, and other stakeholders. The Register will have a rating for the likeliness to occur, cost implications, and mitigation strategies proposed and implemented for each risk. Finally, Parsons Brinckerhoff has had significant experience in executing major projects like this in other locations (both in MD and around the world), and in all of our more successful efforts a heavy dose of public involvement has been fundamental. Working closely with the SHA Public Information team, this project

could include a number of strategies such as focus groups, targeted marketing, use of social media, and commuter or traveler assistance.

ADDITIONAL GOAL #1 - MOBILITY AND SAFETY DURING CONSTRUCTION

The Corman/Parsons Brinckerhoff Team acknowledges that mobility and safety during construction will be an inherent challenge as the IS 270 corridor is already one of the most congested in Maryland. With segments of the corridor carrying approximately 240,000 vehicles per day on average, the project's construction has the potential to generate a high level of public interest. This project is likely to be identified as significant per SHA's Guidance on Identifying Significant Projects, and therefore We will develop a rigorous Transportation Management Plan (TMP) that will include strategies to sustain operations during construction, manage the work zone impact area, manage incidents, and provide public outreach to manage expectations prior to and during construction. In some instances technology solutions can be advanced to provide maintenance of traffic during construction and re-purposed for long term benefit. This was an innovative approach that Parsons Brinckerhoff used in the Dallas Horseshoe construction. In other instances temporary use of strategies and technology can be employed to ensure the safety of workers and mobility of commuters/travelers during the various phases of the effort. As part of the ICC Contract A work, Corman installed new ITS facilities including Overhead DMS and Toll Rate Signs on the portion of IS 270 near its interchange with IS 370. By keeping the public informed, and working at night and off peak hours, only minimal impacts to existing traffic was encountered.

ADDITIONAL GOAL #2 – SCHEDULE

The IS 270 Innovative Congestion Management project is under intense scrutiny, both publicly and politically. As such, any change in schedule will be negatively viewed for all and may cause the project to be viewed as a failure, regardless of the perceived benefit when complete. Schedule slips are costly to the Owner, cause undue hardship on the traveling public, and are costly to the Design-Builder.

Once a schedule is agreed upon, our Team will deliver each milestone on-time and will require regular coordination and early communication of issues amongst Team members, to facilitate expedient issue resolution. An issue resolution ladder will be implemented with timeframes associated with each level, and as issues remain unresolved, they will be passed up the chain of command.

Permits, Right of Way, and Utilities are the usual suspects when it comes to project delays. Permits will be obtained as early as possible, right of way impacts limited wherever possible and will be coordinated with utility relocations, and utility impacts will be minimized, with utility owner coordination beginning as early as possible. These issues will be treated with the highest level of urgency to keep the project moving forward.

KEY ISSUES

There are many issues and risks associated with the IS 270 ICM Project. We will briefly address each one below:

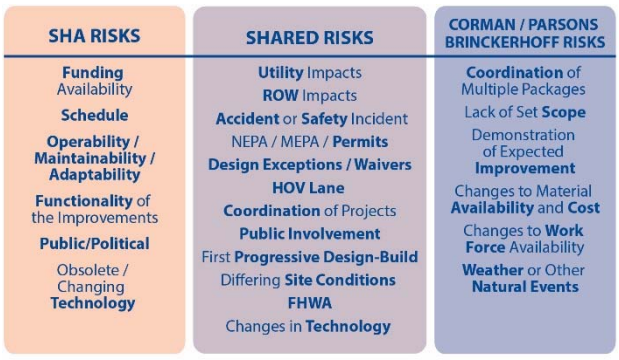
- High Occupancy Vehicle Lanes: The HOV lanes are required to be maintained within their existing longitudinal limits and any deviation will require an equivalency study. This is a factor to be considered during development of possible solutions and any changes will be thoroughly investigated prior to proposing a solution.
- Maximize the scope within the budget: This contract has a fixed budget of $100M and it cannot be increased. We understands that in the current era financial constraints commonly challenge DOTs with addressing system mobility, safety, and performance needs. Therefore, we will evaluate our proposed solution based on Practical Design prior to submittal to ensure the project stays within the core purpose and need. This will guarantee the elimination of non-essential design elements from the proposed scope of work, lowering the cost of the project while improving its value. Value Engineering will be performed to reduce cost wherever possible and provide more scope items to be constructed as part of the project. Lou Robbins (DBPM) has the appropriate 40 Hr FHWA Value Engineering Certificate to ensure it is done correctly. A benefit-cost analysis will be used to help prioritize features.
- Coordination with other projects: The IS 270 Corridor is approximately 34 miles, including the spur to I-495. This is an extensive corridor to be working on at one time and there is a high probability that other projects will be planned, designed, or constructed concurrent with the Innovative Congestion Management project, not the least of which are the Watkins Mill Interchange project, MD 121 Interchange Reconstruction and MD 85 (Buckystown) Interchange Reconstruction project. Communication with SHA, Montgomery & Frederick Counties, Maryland-National Capital

Parks & Planning, local municipalities, and other local agencies is necessary for identifying other projects in the region being planned, designed, or constructed. We understand the need to coordinate with these other projects, provide compatibility between the 3+ projects, and prevent future conflicts, issues, or delays on these projects.

- National Environmental Policy Act (NEPA)/Maryland Environmental Policy Act (MEPA): NEPA compliance will be required when federal actions are necessary; otherwise, MEPA regulations will apply. This Environmental coordination can be a very time consuming process and will need to begin as early as possible. With the possibility of several construction packages and several associated environmental documents to match, the environmental documentation, commitments, and required mitigation will need to be tracked and managed as a total program. Public involvement will incorporate the travel-shed and the air and noise policies will be met, with associated technical reports completed. In addition, a DNR managed property (Seneca Creek State Park) is within the contract limits, as well as the Monocacy Battlefield. Our Team will work with SHA and FHWA as early as possible to scope out and address the NEPA/MEPA requirements. We will also develop a resource and regulatory agency stakeholder list to engage agencies during early project phases and through design and construction.
- Minimize Environmental Impacts: E&SC/SWM, JPA, Roadside Tree, and Reforestation permits will be needed for each construction package and we are prepared to complete the application processes on behalf of SHA, and coordinate with the appropriate permitting agencies, or expedited consultant reviewers in some cases. Our Team will track and manage environmental permits and develop process, procedures, and tools to facilitate efficient tracking and management of permits. We will prepare all required application packages, identify/recommend appropriate mitigation, negotiate with the regulatory agencies on proposed mitigation, develop/implement monitoring plans and track all environmental commitments. Any mitigation will need to be designed, constructed and tracked along with other environmental commitments and monitoring requirements. A streamlined environmental program management approach will be taken to ensure all environmental laws, commitments, and requirements are followed. Environmental impacts will be minimized to the maximum extent practical.
- Utility and Property Impacts and Relocations: These are major risks to the project as their impacts and associated relocations can be very time consuming and expensive to resolve, taking funding away from improvements to the corridor that would be implemented to further address the goals of this project. These impacts will be minimized to the maximum extent practical. We will design around utility and property impacts where possible and be pro-active with necessary utility relocations and parcel acquisitions.

RISKS

Many of the issues above are risks to the project and in turn are risks to both SHA and Corman/Parsons Brinckerhoff. Without a well-defined scope of work, elements of the preliminary project development process typically accomplished by SHA leading up to advertisement of a project has not occurred, which means there are significant unknowns, and in turn, risks.



By understanding the implementation issues and risks of each stakeholder at the table, our Team can help mitigate for them, leading to a successful partnership between SHA and Corman/Parsons Brinckerhoff. Delivering a successful IS 270 Innovative Congestion Management Project and assisting SHA in achieving its goals of mobility, safety, operability/ maintainability/ adaptability, and a well-managed project is our main objective.

ii. Design-Builder's Approach to Progressive Design-Build

Progressive Design-Build is relatively new to the transportation industry. It combines the best of traditional Design-Build with enhanced collaboration between the Owner and Design-Build Contractor and Engineer inherent to the Construction Manager at-Risk (CMAR) procurement method; while challenging the engineering and construction communities to develop innovative solutions to a difficult problem. Corman has been providing Design-Build services in Maryland to SHA since 1998 and was the first to start and successfully complete a CMAR project for SHA. The success of the IS 270

Innovative Congestion Management Contract, the first Progressive Design-Build project in MD, will require an industry leader experienced in being the first. Corman is that firm and has been the Contractor responsible for the following successful local firsts (both large and small) including:

- **Hampstead By-Pass ($43 Mil):** SHA's first, true, best value procurement and SHA's first Design-Build that included structure design;
- **ICC Contracts A & B ($1.04 Bil):** SHA's largest Design-Build projects to-date completed on-time and on-budget;
- **Route 24/Rocks Creek ($5 Mil):** SHA's first CMAR project;
- **Zion Crossroads Design-Build project ($7 Mil):** VDOTs first Diverging Diamond Interchange (DDI);
- **Military Highway Design-Build project ($60 Mil):** VDOT's first Continuous Flow Intersection (CFI);
- **DC Water's Div I & Div D CSO Diversions ($40 Mil +/- each):** First Design-Build in Washington, DC area to include collaboration meetings during the selection process.

The key to any successful project is choosing the right team members that share our mission for delivering quality projects on-time and on-budget utilizing partnering and innovative solutions. We strive to develop and implement innovative solutions that minimize:

- **Risk** – to the Owner, Corman/Parsons Brinckerhoff Team, and general public;
- **Time** – ensure on-schedule completion;
- **Re-Work** – for the designers and contractors;
- **Public Impacts** – pedestrian, commercial, residential, vehicle,
- **Negative conflicts** or issues arising out of hard firm stances. By putting "Project First" we ensure the long term growth of our firm.

In addition to carefully choosing our partners and projects to pursue, our Progressive Design-Build strategy includes Partnering as its cornerstone. Corman has received numerous partnering awards including the MdQI Award of Excellence in Partnering for: Route 50 over Route 301 Bridge Rehabilitation; Intercounty Connector Contract-B; and MD 924 from MD 22 to Maulsby Avenue.

The key attributes of partnering are:

- Open and honest communication;
- Maintaining the decision responsibility at the lowest possible level;
- Enforcing the use of a decision tree;
- Putting the project success ahead of your own;
- Frequent and regular meetings; and
- Looking at issues from the point of view of all involved.

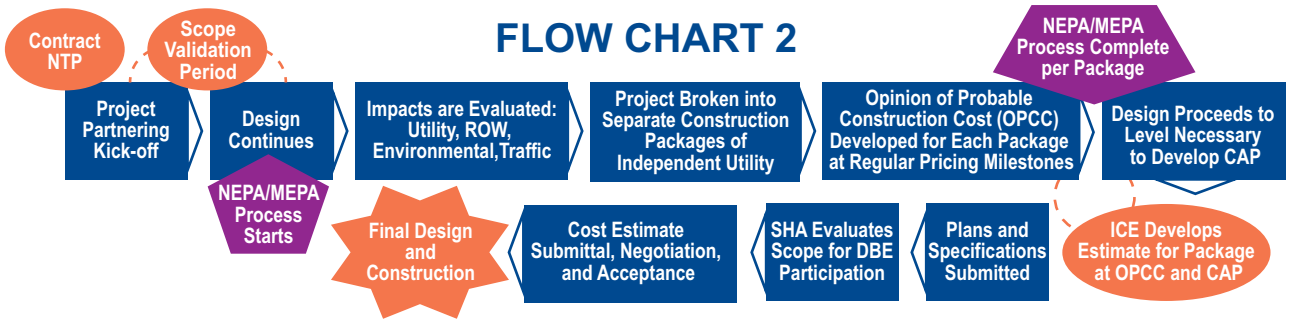
These have been Corman's Standard Operating Procedure since its founding over 94 years ago. We understand that the Corman/Parsons Brinckerhoff Team will become part of the design team along with SHA, SHA's representatives, and other stakeholders, and that Partnering through all stages will help to deliver a successful project for all. Included on our Team are Matt Harrell, the former Partnering in Design Coordinator for SHA, as well as Jo Ellen Sines, a champion of the Partnering process who represented the Contractor on one of the first Partnering teams in MD. Together, Matt and Jo Ellen will assist SHA's Partnering Coordinator, Ms. Bridgid Seering, to facilitate the process and ensure that the Partnering tools are fully utilized on the project, from Concept Development to Construction close-out.

DESIGN PROCESS

On this innovative project (the first in MD to start with a *"blank slate"*), SHA has not provided conceptual plans or vetted it through the preliminary design and environmental process. The Design-Build Team is free to explore all options—from high tech to heavy infrastructure—to improve the mobility of the corridor. The Corman/Parsons Brinckerhoff Team will follow the below work-flow (Flow Chart 1) to develop, evaluate, and propose the most beneficial alternative to the State.

SHA input on process via one-on-one meetings, proposer Q/A, and PTC review and feedback

As a full partner from day one, SHA will be deeply involved through regular collaboration meetings with the full project team during the preliminary and final design phases. Every discipline and many offices will be involved to some degree, as is typical on an SHA design project. As the Design-Builder's engineers move forward with design and better define the impacts and constraints, the contractor will be at the table to evaluate constructability and budgetary conformance. As the ultimate owner/operator of the facility, SHA and CHART, as well as other major stakeholders such as FHWA, are intimately involved in the evaluation of the proposed design from a construction, operations, maintainability, safety, and public acceptance point of view before ready-for-construction plans are developed and a CAP is approved. The below work flow visualizes the process for taking a concept to construction through the Progressive Design Build process:



SHA and select stakeholder involvement throughout process via regular communication and partnering/team meetings.
Public Outreach and involvement throughout process to not only fulfill NEPA/MEPA requirements, but maintain positive communication.

As you see on the flow chart above (Flow Chart 2), Public Involvement will take place throughout the design process. It is of upmost importance to keep the traveling public and the local stakeholders informed as to happenings with the project, what aspects are moving forward, and how they will be affected. Stakeholders that need to be considered include:

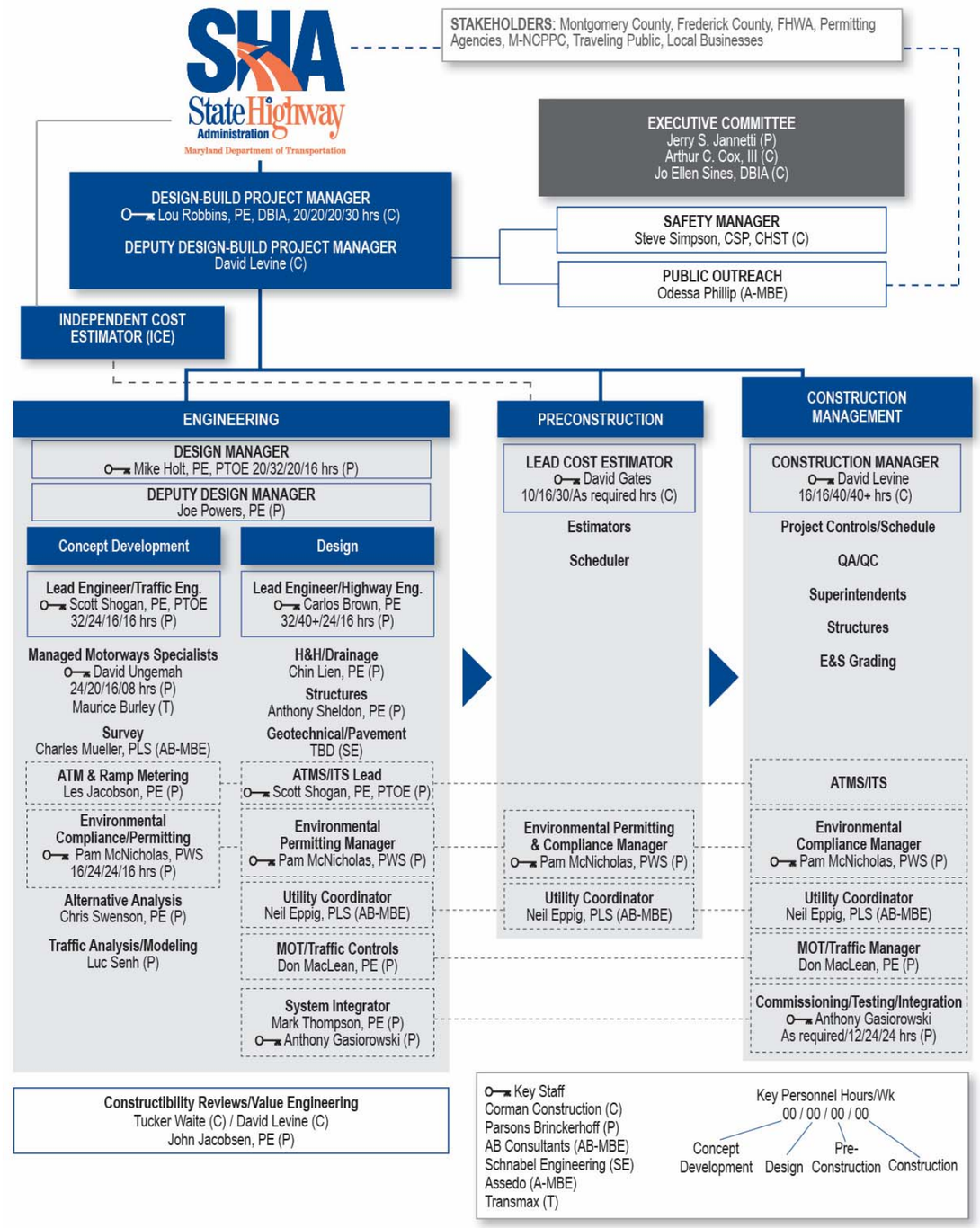
GOVERNMENTAL	PERMITTING	PUBLIC
SHA and MDOT	MDE/ MDNR	Traveling Public
FHWA	Army Corps of Engineers	Local Businesses
Montgomery County	SHPO/Maryland Historical Trust	Property Owners
Frederick County	M-NCPPC	Law Enforcement
Transit Organizations	National Park Service	Emergency Services
Elected Officials	US Fish & Wildlife Service	Community Groups

In short, Corman and Parsons Brinckerhoff understand the unique attributes of Progressive Design-Build, will stress partnering for project success, put the success of the project in the forefront, and most importantly, assign the right people to run the project without building internal roadblocks while providing them the resources they need to perform quality work on time, on budget, with zero safety incidents.

iii. Composition of the Design-Builder

The Corman/Parsons Brinckerhoff Team has collaborated on numerous complex transportation projects in and around Maryland. Their combined expertise in design and construction have resulted in several award-winning achievements including: ICC-A, ICC-B, Woodrow Wilson Bridge (WWB), Rte 1 Tie-in to (WWB) Urban Deck VA-4, WWB MD210 MB-3, WWB I-95 Telegraph Road Interchange, and the reconstruction of 4 miles of heavily congested Rte 1 outside Ft Belvoir in Fairfax VA. These projects all involved major roadways with heavy volume requiring careful evaluation and planning to maintain traffic flow, avoid inconvenience, and provide a safe passage for the public.

To assist in implementing the Australian Managed Motorway Concept for this corridor, Transmax, has agreed to join our Team. Transmax is a wholly owned enterprise of the Queensland (Australia) Government DOT, having evolved from the ITS branch of the DOT to a non-profit enterprise providing ITS and traffic management services to all other states in Australia. Transmax operates the award-winning VicRoads (Victoria DOT), M1 Freeway Management System, which includes the Managed Motorway concept and incorporated the predictive ramp metering algorithms ALINEA and HERO as developed by the University of Crete. Transmax will provide guidance and oversight from a operators point of view to the implementation of a Managed Motorway Concept along I-270 to ensure the most traffic benefit is realized.



Design-Build Project Manager (DBPM) - Lou Robbins, PE, DBIA. As the DBPM, Lou will have full responsibility for compliance to all contractual and technical project requirements, as well as overall project quality management and contract administration. Lou will ensure the Team is fully integrated and that the project stays on time and within budget. He will regularly report project progress/conformance to SHA and the Executive Committee.

Construction Manager (CM) – David Levine. Our CM and Deputy DBPM, David Levine, will report to the DBPM. He will manage the onsite construction team including the E&S staff, Project Controls, Environmental Permitting & Compliance, Structure, and MOT/Traffic Managers, Utility Coordinator, and Commissioning/Testing/Integration Manager. Dave's focus will be to perform upfront constructability reviews during the preconstruction efforts, maintain construction safety and ensure all work is in conformance with approved plans/contract documents. He will regularly coordinate with the design team during construction to issue/review RFIs and shop drawings on time, and prepare as-builts and plan revisions. During field operations, Dave will oversee MOT to minimize impacts to pedestrians, bicyclists, motorists and/or field staff safety.

Cost Estimator – David Gates. As the Lead Cost Estimator, David will report to the DBPM. He will work with the ICE, SHA, Parsons Brinckerhoff, FHWA, MDE, and all stakeholders to develop plans and pricing and mitigate risks, as well as develop Opinion of Probable Construction Costs and finalize Construction Agreed Price. David will be involved throughout all phases of the development from Preconstruction, through Construction, and to completion. He will provide constructibility reviews and cost estimates, manage project risk register, be involved with subcontractor bid packaging, and maintain the project budget.

Additional Construction Key Staff – Commissioning/Testing/Integration - Anthony Gasiorowski. As the field system integrator, Anthony will report to the Lead/Highway Engineer during Design and to the Construction Manager during construction. He will work with the System Integration Lead to ensure that all field devices and telecommunications network elements are installed, configured, tested and operational in accordance with the designs. In addition, he will ensure that all system components have documented use cases and testing procedures and that all test results are documented and verified.

Project Design Manager (DM) – Michael Holt, PE, PTOE. Mike will report to the DBPM. He will be responsible for executing the design and other professional efforts and oversee all elements of the design. He will ensure that design leaders coordinate with each other and construction staff. He will ensure that all required permits are obtained, utility and right-of-way impacts are coordinated and resolved, and necessary coordination with stakeholders occurs. Mike will assign resources, oversee/coordinate design subconsultants, coordinate design schedules, develop/implement corrective measures, if needed, and integrate environmental compliance measures into the design. During Construction, Mike will manage plan modifications and shop drawings and review construction activities with the CM.

Highway Engineer – Carlos Brown, PE. As Highway Engineer, Carlos will be the lead engineer during the final Design Phase and report to the DM. He will be responsible for the highway geometric design and ensure that all geometric design standards are met. Carlos will lead development of roadway alignments, profiles, typical sections, proposed models and design roadside features such as traffic barrier. He will develop and calculate quantities, develop estimates at each milestone, develop right-of-way needs, and prepare any design exceptions as required. During Construction he will answer requests for information, review field changes, develop red line revisions and review shop drawings.

Traffic Engineer – Scott Shogan, PE, PTOE. As Traffic Engineer, Scott will be the lead engineer during the Concept Development Phase of the project and will report to the DM. He will be responsible for leading the development of alternatives; performing traffic analysis, computer simulations, and optimization models; and assessing alternative trade-offs. During the final Design Phase, Scott will report to the Lead/Highway Engineer and will oversee the traffic engineering design including the design of any temporary or permanent signage, lighting, pavement markings, maintenance of traffic, and intelligent transportation systems required for the project. Scott will perform a safety analysis and oversee development of the Traffic Management Plan and Traffic Operations Analysis Report. He will also prepare and submit an HOV equivalency analysis to FHWA for approval, if required.

Environmental Compliance Manager – Pam McNicholas, PWS. As the Environmental Compliance Manager and the Environmental Permitting Manager, Pam will be responsible for Environmental Compliance through the life of this project, from Concept Development to Construction close-out. She will report to the lead engineers during Concept Development and Design, the Lead Cost Estimator during Preconstruction, and the Construction Manager during Construction. During Concept and Design, Pam will lead the development of environmental documentation (NEPA/MEPA), associated technical reports such as air quality, noise and Section 4(f) evaluations, and assist Odessa Phillip in Public Outreach. She will coordinate with federal, state and local permitting/approval agencies, develop permit application packages, and coordinate and lead the design of environmental mitigation required. During Pre-Construction, Pam will develop and monitor environmental commitments for the project packages to ensure they are met. During Construction, Pam will provide inspections prior to and after large storm events, interface with SHA, MDE, independent environmental monitors, the CM, and the DM to strictly enforce environmental requirements and resolve non-compliances.

Additional Design Key Staff – Managed Motorways Specialist - David Ungemah. As the Managed Motorways Specialist, David will be responsible for the analysis and design development of a complete implementation of an Active Traffic Management System through the corridor with specific emphasis on the Managed Motorways Concept. He brings not only development experience with other states, but also international relationships with the owners and operators of corridors utilizing these systems. David will report to the Lead/Traffic Engineer during the Concept Development stage and will continue in an advisory role as the project continues through Design and into Construction.

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

4. DESIGN-BUILD TEAM'S ABILITY AND/OR EXPERIENCE

i. Design-Build Team's Ability and/or Experience to be Successful

On a project like IS 270 Innovative Congestion Management, where a world-class solution is not only being requested but is required to achieve the goals of the project, SHA needs a Design-Build Team with world-class experience. The Corman/Parsons Brinckerhoff Team perfectly fits this description, with Parsons Brinckerhoff's global experience teamed with a Best-in-Class, Maryland-Based contractor. Our team members have worked on many projects, at the regional, national, and global levels, to successfully meet the same goals as IS 270, and achieve them with innovative solutions. Our abilities are un-matched, being able to tap into the knowledge of Subject Matter Experts and resources from around the world who have seen similar issues to IS 270, assessed the best treatments, implemented the solution, and realized the benefits of a more mobile, safer, operable/maintainable and adaptable corridor through a well-managed project. However, Corman chose Parsons Brinckerhoff to be the lead designer for this project not only because of the global knowledge and resources they bring, but also for the local experience and talent available to work directly on this project. Parsons Brinckerhoff was the lead designer on the only completed ATM project on the east coast, the Design-Build I-66 ATMS in Northern Virginia. The same Parsons Brinckerhoff staff that successfully delivered the I-66 project will assist the national resources leading the process, with local experience and knowledge. Parsons Brinckerhoff has also been involved in every mega-project in the Maryland area over the past 15 years, including the Woodrow Wilson Bridge, ICC, Red Line, Purple Line, and the Nice Bridge. That kind of local, mega-project experience cannot be matched, and the lessons learned will carry forward to a successful IS 270 project.

But, the true value of our expertise transcends simply listing four or five individual projects—those are important representative efforts which demonstrate our ability to thrive in a unique contracting environment such as Progressive Design-Build. It's important, however, to also highlight the fact that Parsons Brinckerhoff is an international leader in ITS planning, design, implementation, and ongoing program support. We have significant roles in engineering, deploying and maintaining traditional AND next generation ITS systems throughout the country—and a deep bench of regional and local resources to service clients all across the globe.

They offer expertise in leading-edge areas such as connected vehicle research, performance monitoring, active transportation and demand management, managed lanes, and TMC operations—just to name a few. And that's important, because the strategies employed along IS 270 will be diverse. The challenge of integrating those many strategies with each other, and with the existing CHART network, will be handled smoothly with help from the deep bench of experts Parsons Brinckerhoff have within the team.

Parsons Brinckerhoff Wrote the Book

When a consultant proclaims "we wrote the book," they are often basing it on practical experience in the field. Our team of experts has worked on dozens of projects around the country (and world) and bring a unique blend of skills and disciplines to the table. But when it comes to transportation operations and individual solutions to mitigate congestion, we actually HAVE written the book in terms of research and guidance published by the Federal Highway Administration and other national bodies.

As the original pioneer in bringing the Capability Maturity Model to transportation systems management & operations (TSM&O), our experts developed the original (and still current) *Guide to Systems Operations and Management*. This guide for state DOTs was scoped to help improve and "mainstream" system operations and management into their formal core programs. The *Guide* includes assistance related to best practice in the areas of program design related to strategies applications, planning and business processes, systems and technology, performance measurement, organization and staffing, and partnerships.

Parsons Brinckerhoff also led the development of an FHWA sponsored *Active Traffic and Demand Management (ATDM) White Paper and Guidebook*. The comprehensive *Guidebook* covers important topics such as the relationship between Traffic and Demand Management, different ATDM Concepts, consideration factors for feasibility evaluation, indicators for ATDM deployment, case studies, outreach and educational strategies, and gaps in practice.

Experts from Parsons Brinckerhoff developed a comprehensive *Ramp Management Guidebook* on a task order to FHWA. The *Guidebook* provided an overview of ramp management, discussions on strategies for developing, selecting, implementing, operating, maintaining, monitoring, evaluating and reporting on ramp management. It included sections on policy, planning and design considerations, and provided several case studies. Related activities included producing outreach and communication material to publicize and explain the contents of the handbook and the role it can play in helping freeway management practitioners improve the operation of the transportation system. Parsons Brinckerhoff also wrote a new chapter of the *Freeway Management and Operations Handbook* on ramp management as part of this project.

From Academic to Practical Application

Not only did experts from Parsons Brinckerhoff write the book on TSM&O, we have mastered the art of teaching it. Our team created a national TSM&O workshop program for FHWA where interested state DOTs apply for, and host, one-day workshops. The structure of these workshops—in terms of facilitated self-evaluation, level identification and key actions—was developed to fit into a one-day format and to assure practical outcomes. Fifty-one TSM&O self-evaluation workshops have been conducted to date, and more are scheduled. Our team also produced the FHWA Primer "Creating an Effective Program to Advance Transportation Systems Management and Operations." Twenty-seven of these workshops have included an expanded approach by adding a pre-workshop senior leadership meeting and post-workshop implementation plan development based on the priority actions established in the self-assessment process. Here in Maryland, Parsons Brinckerhoff staff were instrumental in helping the agency launch their TSM&O planning efforts and conducting the first workshop.

We are also taking our expertise in Ramp Metering "on the road" conducting workshops in several places across the country to help agencies interested in ramp metering. Our one day workshops cover a range of new and updated guidance and technical support material, including a better understanding of the current state of the practice, including reasons why ramp metering is not more widely deployed (i.e., the barriers). These workshops—of which Parsons Brinckerhoff staff have developed and are leading—provide technical assistance materials to support agencies considering deploying ramp metering for the first time, expanding their existing ramp metering system or upgrading to a more active, system-wide approach to their ramp metering system.

Leading Edge Not Bleeding Edge

The vehicle of the future is just around the corner, and it's approaching faster than you think! Considered futuristic just a few years ago, connected and automated vehicles are feasible, practical, safe—and inevitable. Driverless vehicles are now being road-tested, and leading transportation agencies are already engaging in pilot projects and in some cases implementing technologies to allow vehicles to communicate with each other and with roadside infrastructure. The dizzying pace of technological innovation with respect to connected and automated vehicles (C/AV) will require owners and operators of roadway infrastructure to adopt policies and technology to accommodate the vehicles of the future. For the IS 270 effort, the consideration of C/AV is a must—whether it is simply planning for future C/AV applications or including pilot elements in this project.

Our staff includes executives with broad policy experience at the highest levels of federal and state governments, as well as experienced ITS project managers and a team of technical specialists with comprehensive capabilities in all facets of the implementation of C/AV. We understand how to balance real-world needs against future opportunities, and as a result can guide agencies toward leading edge vs bleeding edge implementation. Again our work is not simply academic but practical. We have led the way on large federal projects such as the Safety Pilot Model Deployment in Michigan, where Parsons Brinckerhoff was part of the largest implementation of C/AV roadside technology in the nation. We have integrated C/AV principals and strategies into ongoing planning efforts such as the I-96 ATM Concept of Operations in Michigan or the Trans Hudson Commuter Capacity study in New York/New Jersey. And we are currently supporting roadside infrastructure AND data management warehousing for the Ann Arbor Connected Vehicle Test Environment for the University of Michigan.

Bottom line, Parsons Brinckerhoff has become the industry leader for C/AV on the infrastructure side, and has the experience and expertise to advise owners and operators as they consider strategy for the implementation of policy and technology. We offer a wide range of services to support the planning, design, deployment and maintenance of ITS and C/AV projects across the U.S. including:

- Roadside Infrastructure - We advise transportation agencies on the design and installation of dedicated short-range communications (DSRC) roadside infrastructure and have worked with vendors and telecommunication specialists to implement DSRC networks.
- Telecommunications Expertise - We offer telecommunications expertise in support of DSRC back-haul infrastructure as well as for other applications that require a telecommunications backbone.
- Data Management, Warehousing and Integration - We help to manage large volumes of data coming from connected vehicles and translate that data into usable information for transportation management centers and/or agency-specific applications.
- Asset and Configuration Management - We assist in deploying emerging technology while being mindful of performance management tracking, ensuring that equipment functions as planned and can expand as needed.

For the IS 270 Innovative Congestion Management Project, the scope of the improvements has not been identified, but what is known is that an innovative solution is required to meet the needs and accomplish the goals of this project. Parsons Brinckerhoff's experience in leading edge technology will directly influence our review of the corridor, with the potential of direct application and implementation to improve mobility, reliability, and improve safety.

Unmatched Project Experience

Finding a Design-Build team with real-world experience implementing and applying the technology and features described above is difficult. The Corman/Parsons Brinckerhoff Team has this experience on projects varying in size, complexity, location, and phase of design. From planning studies and concept development to final design and construction, Corman/Parsons Brinckerhoff has achieved similar goals to IS 270 through innovative applications.

DESIGN-BUILD AND PROJECT MANAGEMENT EXPERIENCE

I-66 Active Traffic Management System (ATMS) Design-Build Project

The team of Parsons Brinckerhoff and TransCore ITS, LLC is responsible for the first implementation of a fully integrated Active Traffic Management System (ATMS) on the east coast. The project is a Design-Build delivery along one of the most congested corridors (167,000 AADT) in the Northern Virginia Region, covering approximately 34 miles of I-66 from the Washington, DC line on the east to Gainesville, VA on the west. The Active traffic management portion of the project covered 7.2 miles of the most congested and crash prone portion of the system. The system has improved safety and incident management and includes new overhead sign gantries, shoulder and lane control signs, speed displays, incident and queue detection, and increased traffic camera coverage. Parsons Brinckerhoff served as the designer, ITS technical lead, QA/QC manager and provided field inspection services.

VDOT D-B I-66 ATMS designed by Parsons Brinckerhoff

Technology selection on the project was led by Parsons Brinckerhoff. Technology elements included the implementation of 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 the existing VDOT 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 hard shoulder monitoring system provided 100% video coverage of the hard shoulder running area using sophisticated video analytics to detect stopped vehicles, slow traffic, peds/bikes, and debris in the shoulder lane area. The system eliminated VDOT's need to manually sweep the shoulder before opening it to traffic use.

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

People

Our Design Manager was Joe Powers (proposed Deputy Design-Build Project Manager) who was supported by our ITS/system integration lead Mark Thompson.

Benefits

Implementation of an ATMS provides improved operational safety, congestion management and reduced fuel consumption. The I-66 project achieved specific benefits through:

- Informing motorists of congestions ahead conditions, crash information, and through the management of traffic on a per lane basis. This allows motorists to make informed decisions as to travel choices and manage traffic speeds prior to reaching back of queue conditions.
- The video based automated hard shoulder lane monitoring system allows VDOT to implement shoulder lanes use when congestion builds, regardless of time-of-day or day-of-week; currently the shoulder lanes are used only during weekday peak periods.
- Managed lane use in support of emergency responders by closing lanes to provide transportation, safety, and law enforcement personnel to respond more quickly and appropriately to incidents
- DMS and lane controls signs allow traffic operations staff to advise motorists on incidents and delays, lanes that are usable or blocked, guidance on merging traffic, etc. in real time

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 if needed – thus reducing impact to traffic and reducing maintenance costs. The material cover over the signs was designed for minimum cleaning needs, support for ice melting, and energy efficient operation.

Our team incorporated a “roadway design for safety” philosophy as a part of our plan development process. This project addressed safety associated with elements such as post construction maintenance activities, signing pollution and clutter, pavement markings and roadway lighting. The table below illustrates examples of designing for safety. We have used these and other strategies on all ATMS projects to-date and will continue to improve upon them through lessons learned and our world-wide network of connected engineers and planners.

Strategy	Benefit	Impact
Enhanced pavement markings for enhanced driving operation, such as retroreflective materials	Reduce lane departures and support AC/CV operations, improving safety and subsequently predictability	AASHTO reports 61% of highway deaths are due to lane departure issues
Design with maintenance in mind, routine maintenance and/or repair activities have safe access	Reduce maintenance worker exposure to traffic, improving Safety, Operability, and Maintainability	In 2010, FHWA reports over 20,000 incidents in highway work related activities
Reduction in visual signing pollution and clear messaging at decision points for enhanced driver attention and ease of decision making	Reduce information load on drivers, improving safety and subsequently predictability	Caltrans study shows that an increased sign frequency on urban freeways increased accident frequency, with a simultaneous increase in multivehicle collisions
Roadway lighting	Increase visibility of the roadway and its immediate environment, thereby permitting the driver to	USDOT studies show that lighting can reduce the ratio of night-to-day accidents by as much as 14% of total accidents

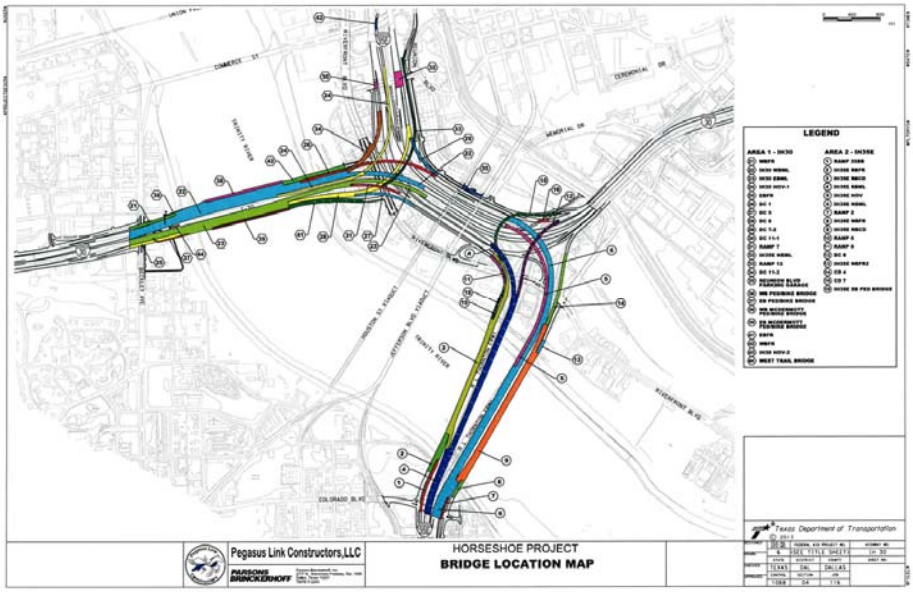
Strategy	Benefit	Impact
	maneuver more efficiently, improving safety and subsequently predictability.	
Pavement design and construction with specific provisions for high skid resistance qualities	Minimize wet weather skidding and accidents due to stopping distance issues, improving safety and subsequently predictability	FHWA data shows accidents rates are 1.5 times greater under wet pavement conditions

Dallas Horseshoe Design-Build Project

Parsons Brinckerhoff was lead designer on this $798 Mil project to upgrade the aging I-30 and I-35E bridges that cross the Trinity River, as well as a portion of the Dallas Mixmaster depressed freeway. Dubbed the "Horseshoe Project" due to its U-shape, this project was given high priority by TxDOT due to the increasing bridge maintenance costs from rapid deterioration of bridges built in the 1930s and 1950s. The Horseshoe Project includes I-30 from Sylvan Avenue to I-35E and I-35E from north of Eighth Street to the I-30/I-35E interchange in Dallas. This project will improve mobility, safety and traffic flow in the heart of downtown Dallas. The design work began in early 2013 with expected project completion as early as 2017—at least five years ahead of the conventional design-bid-build process. This project included an innovative Active Traffic Management Design (ATM), as described below.

Mobility

Parsons Brinckerhoff designed the ATM to inform motorists of lane closings, reduced speed limits and incidents in advance. This deployment allows drivers to make early lane decisions and avoid congestion, directly influencing the reliability of the corridor. ATM enables lane designation, route confirmation, and safe speed to be communicated to drivers in real time over the travel lanes, utilizing small 5' x 5' dynamic message signs mounted over each lane for lane control signals (LCS), utilizing existing bridges, overhead sign structures or a temporary gantry structure.



Our proposed Design Manager was also the Design Manager for this large TexDOT ATM deployment.

Safety

The ATM will reduce potential driver error, support incident management, reduce the potential for secondary incidents, and smooth the traffic flow both within the work zone and approaching it from each leg of the Horseshoe, further improving safety. Early identification of incidents allows for variable speed limits to be adjusted and communicated to drivers upstream, allowing them to slow down and reduce the likelihood of secondary crashes.

Operability/Maintainability/Adaptability

The field components are controlled locally through a Type 336S field cabinet; each cabinet was strategically designed to provide maintenance access during construction. The LCS are also controlled through a wireless network connection to a temporary traffic management center within the project limits, utilizing vendor software. By using a wireless system, it is less likely that adjacent construction could disrupt the communication and network of the system, due to a cable or conduit being cut. The system was developed to be adaptable to the Texas traffic management system so that upon project completion, Texas DOT has the option to take permanent ownership of the ATM system for incorporation into their

regional freeway management system. The color LCS provide flexibility in displaying various graphics for traffic management, including color-coded lane control arrows or interstate shields for route confirmation. Design of the system was reviewed specifically for ease of maintenance prior to implementation.

Well Managed Project

The ATM was a small but significant component of the much larger Horseshoe project, it required collaboration with the other design disciplines, including roadway, structures, signals, signing and markings, and ITS. Mike Holt, our proposed Design Manager on the IS 270 project, participated in weekly team coordination calls to ensure the ATM design accommodated these other project components, particularly with respect to the electrical design and structural attachment details. All design documentation was stored on ProjectWise for controlled team access and review. This pro-active coordination kept the project on schedule.

People

Mike Holt, PE, PTOE (our proposed Design Manager) led the ATM design; Les Jacobson, PE (our proposed ATMS and ramp metering specialist) provided design oversight. Mike worked with design and production staff throughout the firm to prepare voltage drop calculations, sign structure analysis, construction details, quality control reviews, and keep the project on schedule.

Woodrow Wilson Bridge Replacement

Parsons Brinckerhoff was the lead member of the Joint Venture that served on the $2.4 Bil replacement of the Woodrow Wilson Bridge Project. The project replaced the existing six-lane bridge on the Capital Beltway over the Potomac River with a new 12-lane structure, as well as four adjacent interchanges. The project required significant maintenance of traffic, community outreach and involvement, environmental assessments and permitting, ITS technology implementation, congestion management, value engineering, partnering, construction management, and construction inspection.

This major undertaking was sponsored by the Virginia Department of Transportation, the Maryland State Highway Administration, the District of Columbia Department of Public Works, and the Federal Highway Administration; requiring significant coordination effort. Corman, as a Prime, Joint Venture Lead or Joint Venture Partner constructed four of the individual projects, including the largest at $267 Mil for a total construction value of $501.1 Mil.

Mobility/Safety

Parsons Brinckerhoff established standards and requirements for the design of the TMS and performed a preliminary ITS analysis of the project corridor to determine the transportation characteristics of the area; identify existing system resources, ITS devices, and communications infrastructure; and review existing agency operations and maintenance procedures and agreements for sharing ITS data. Traffic management included surveillance, control, incident detection, demand management, emergency management, and work zone management. Traveler information services include multimodal trip planning, pre-trip, and en-route driver and traveler information systems, such as the Internet, to provide corridor travelers with project-related traffic information. A congestion management system plan (CMSP) was written to reduce congestion and delays, improve safety, maximize travel reliability, and improve air quality. The project team identified and developed ITS strategies that support congestion management alternatives such as incident management, measures to encourage HOVs, multimodal transportation initiatives, and commercial vehicle operations and goods movement. Many current Parsons Brinckerhoff and Corman engineers and contractors who worked on this project are still with their respective firms and available to participate in the IS 270 project

CORRIDOR ASSESSMENTS AND CASE STUDIES

Colorado and Utah Managed Motorways Pilot Projects

Despite having been fully reconstructed 10 years ago with additional highway capacity and new adjacent rapid rail service, Denver's I-25 suffers from severe unreliability during peak periods. Motorists must allocate up to three times the free-flow travel time in peak periods in order to ensure an on-time arrival, with average speeds below 40 mph in peak periods. Similarly, the I-15 corridor in Salt Lake City was reconstructed 15 years ago with the inclusion of an HOV lane, later converted to a priced express lane in each direction. However, traffic congestion is a recurring problem on this critical corridor through the metropolitan region.

In response, Parsons Brinckerhoff assisted both the Colorado Department of Transportation (CDOT) and Utah Department of Transportation (UDOT) in exploring the Managed Motorways concept from Australia to significantly reduce the severe travel time uncertainty and improve safety. Although independently analyzed for each corridor, CDOT and UDOT shared findings and participated with each other's decision making regarding conclusions of the Managed Motorways assessment. This partnership was facilitated by Parsons Brinckerhoff. TransMax who operates the M-1 freeway in Australia provided guidance and oversight for the implementation study, and has also agreed to work with our Team for the IS-270 ICM project.

Australian Managed Motorways on M1 Freeway (Melbourne)

Mobility

Much like the anticipated outcome of the IS 270 ICM Project, Managed Motorways enhances the functional efficiency of existing roadways without expanding capacity or requiring controversial concepts like tolling. In Melbourne, the Managed Motorways concept increased traffic flows and substantially improved reliability, with a sustained increase in peak traffic flow rate (up to 15%) and average traffic speed improvement between 35% and 60% during peak periods. Additionally, overall travel time reliability improved between 150% during the AM peak period and over 500% during the PM peak period.

Parsons Brinckerhoff examined the feasibility of deploying the Managed Motorways concept on both I-25 and I-15. In both cases, a pilot project would include: coordinated and dynamic ramp metering, predictive mainline flow management, real-time multimodal traveler information signage, and dynamic rerouting of traffic for incident management. Arterials and interstate systems will be linked to optimize the performance of the system and achieve regional benefits. In the course of the feasibility assessments, Parsons Brinckerhoff conducted:

- Concept Assessment (likelihood that Australian measured benefits would be seen in the US);
- Corridor Assessment (suitability of the design environment for optimizing vehicle entry into the freeway mainline);
- Technology Assessment (capability of vehicle detection, communication, and ramp control systems to accommodate the requirements of the predictive algorithms that prevent traffic saturation);
- Benefits Assessment (modeling the performance benefits using the predictive algorithms);
- Cost Assessment (assessing the costs for deploying a pilot project).

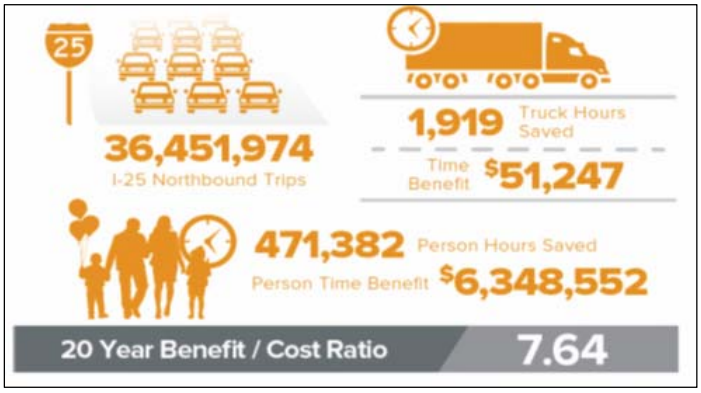
Because the "*Managed Motorways*" concept is new to the US, Parsons Brinckerhoff gave considerable care to develop a study approach that would provide reliable results and conclusions to inform investment decisions. Independent steps to validate the findings included:

- Literature Review of ramp metering state of the practice to confirm the general viability of the Managed Motorways ramp metering concept;
- Practical Review by Australian-based implementers of Melbourne's concept to determine the general viability of implementing Managed Motorways on I-15 and I-25;
- Macroscopic Modeling of current and future conditions to quantify the benefits from implementing the concept;
- Collaborative Workshops to facilitate in-person, peer-to-peer discussion between UDOT, CDOT, and the implementers and operators of Melbourne's Managed Motorways.

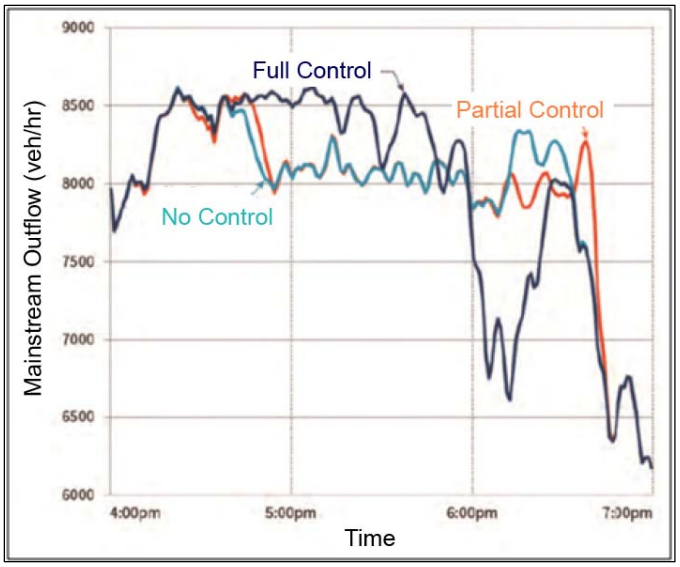
Parsons Brinckerhoff completed both feasibility studies in late 2015. In the following months, both CDOT and UDOT retained Parsons Brinckerhoff to assist in the planning, systems engineering, and design of operational pilot projects in both corridors. For I-25, CDOT will pursue a 13-mile, unidirectional pilot project at a cost of approximately $12 Mil. The design is to be completed by Parsons Brinckerhoff in 2016, and the operations of the pilot project will be conducted by Parsons Brinckerhoff in partnership with the Australian state agencies who operate the same facilities in Melbourne—Transmax. For I-15, UDOT will construct a larger initial implementation along 21 miles (both directions) at a cost around $50 million. UDOT is currently compiling funding for the project, through state and federal resources.

People

David Ungemah, our Managed Motorways Specialist, is the Project Manager for the Colorado program, and works side by side with CDOT and the Parsons Brinckerhoff project team for all activities. David also served as a senior advisor to the UDOT project and has been involved in all project developments. Les Jacobson, P.E. led the investigation of all the ITS, Active Traffic Management, and ramp metering requirements for both projects. Chris Swenson, P.E. has led the traffic, benefits, and cost analyses for the Colorado project and is the Project Manager for the Georgia Department of Transportation feasibility study of Managed Motorways.



Annualized Benefits for I-25 Managed Motorways Project



Modeled Effectiveness of Managed Motorways on I-15

City of Austin IH 35 Corridor Development Plan

The IH 35 corridor is easily recognizable as the most congested in the Austin area, and it consistently ranks in the Top 10 most congested corridors in national surveys, as well. To address the impacts that the congestion has on the region, the City of Austin initiated the IH 35 Corridor Development Program, which involves all affected local, state and federal agencies with a stake in implementing improvements. Parsons Brinckerhoff served as the prime consultant for the 27-mile, multimillion-dollar program. In addition to harvesting community input, Parsons Brinckerhoff is leading a multidisciplinary team in the development of a list of short- and mid-term recommendations for improving traffic flow as a consolidated plan, but with discrete implementable projects.

Mobility

Much like the I-270 Innovative Congestion Management Project, the IH 35 Corridor Development Program pursues projects that can improve the functional capacity of existing roadways in a short period of time without significant additional right-of-way, utility impacts, environmental impact or substantial cost.

Over the past five years, the program has sponsored dozens of stakeholder meetings, multiple open houses, and monthly engagements with agency stakeholders. Attendees proposed more than 300 ideas to address issues including intersection shortcomings as well as discontinuities in bicycle and pedestrian movements. The list of strategies identified for further evaluation includes:

- Providing Transportation System Management (TSM) treatment for downtown access at Riverside Drive and Cesar Chavez Street;
- Implementing two-way express lanes managed through congestion pricing and access;
- Improving the functionality of upper and lower decks through dynamic rerouting;
- Improving pedestrian and bicycle path connectivity;
- Enhancing regional express bus services;

- Integrating measures for quicker removal and management of incidents;
- Adding lanes by making existing lanes and shoulders narrower;
- Metering the number of cars that can enter the interstate from ramps; and
- Reducing the number of entrances and exits downtown.

Additional capacity was provided by adding a lane on each side through narrowing existing lanes and shoulders and revisiting cross sections. Active traffic management features, such as lane use control and dynamic speed advisories were included in managed lane options. Parsons Brinckerhoff also revised ramp configurations throughout the corridor, improving flow to and from adjacent frontage roads. The changes, in incremental stages along I-35 between U.S. 290 in North Austin and William Cannon Drive in South Austin, cost a few hundred thousand dollars to a few million dollars each, so strategies could begin quickly even as larger capacity expansion was continued.

This project analyzed many options for deployment in the I-35 corridor, including: Active Transportation and Demand Management, Arterial Management/Traffic Signal Operations, Real-Time Transportation Information, and Traffic Incident Management and Events Management.

People

David Ungemah (our proposed Managed Motorways Specialist) was the Deputy Project Manager on the project, and Les Jacobson, PE (our proposed ATMS and Ramp Metering Specialist) led the investigation of all ITS (including ATDM) and Traffic Incident Management solutions.

ATM Case Studies: I-5 and I-35W

On one of our FHWA IDIQ task orders, Parsons Brinckerhoff was tasked with developing case studies for 2 active traffic management (ATM) projects, one in Minnesota (I-35W) and one in Washington State (I-5). The purpose of these case studies was to document lessons learned in the application of integrated freeway active traffic management (ATM) projects resulting from various scan tours of European experience. These ITS-based applications took the role of freeway management forward in attempting to address improved performance and safer operations. Up to the timing of the case studies, limited performance and operational data existed in the United States from which to draw definitive conclusions. The case studies provided a comprehensive synthesis of the planning and implementation stages of developing an ATM project.

The two freeways that were studied are high-volume, heavily congested, urban freeways similar to I-270. They both had a full complement of ITS equipment, including dynamic message signs (DMSs), CCTV cameras, detectors, and ramp meters. They were both proactively managed through their respective traffic management centers. Both agencies had an active traffic incident management program in place. The goals for the ATM systems were to improve safety and reduce collisions.

The Parsons Brinckerhoff Team interviewed DOT staff from the Washington State DOT (WSDOT) and Minnesota DOT (MnDOT) and reviewed documentation in the development of the case studies. The case studies identified lessons learned in planning and feasibility studies, project development, implementation process, performance monitoring, and public outreach.

Lessons Learned from the study that will be implemented on IS 270:

- Strong agency outreach and involvement in the planning and feasibility phase was important and led to strong support for the projects.
- Requirements were documented by both agencies early in the project development phase; however, only WSDOT developed a concept of operations. Earlier coordination with FHWA on symbols used on the over-lane signs would have been helpful.
- Both agencies designed their sign structures to make maintenance more efficient. MnDOT included catwalks and signs that could swivel vertically so maintenance could be accomplished from the catwalk behind the signs. WSDOT opted for no catwalk and mechanisms to quickly disconnect the signs from the structure and the wiring harness. This allowed signs to be replaced under a rolling slowdown instead of traditional lane closure traffic control.

- WSDOT used a design-bid-build process for their gantry installation and a Design-Build process for the ATM equipment. This led to some coordination issues. They indicated that they would have preferred including both the gantries and the signs and systems in one contract.
- Because of the number of signs, testing was a challenge. WSDOT required that every sign be tested in Seattle before they could be installed. This led to the need for a large facility with power that could be used for testing.
- Both agencies found the need to operate the ATM systems 24 hours per day, 365 days a year. WSDOT was able to receive some additional funding to add staff to cover the ATM system during all hours. MnDOT had to cover some weekend shifts with overtime.

PLANNING AND ENVIRONMENTAL EXPERIENCE

The I-270 Innovative Congestion Management Project will require a single robust environmental document, or potentially multiple documents and reevaluations. It is understood that MEPA will be required when federal actions are not required. Parsons Brinckerhoff's abilities to develop and process a significant environmental analysis are well documented. Additionally, environmental compliance and permitting is key to the success of the IS 270 Innovative Congestion Management Project. The environmental portions of this project will need to be managed at a high, programmatic level, due to the high likelihood of multiple design and construction packages being planned, developed, or constructed at any one time. Multiple distinct permit applications, submittals, approvals, mitigation commitments, NEPA documents and more will need to be tracked, managed and coordinated. Our Environmental Compliance Manager, Pam McNicholas, has direct firsthand experience managing a similar program for the MDTA, which will help us exceed the goal of a Well-Managed Project for I-270.

Red Line

Parsons Brinckerhoff, in Joint Venture, began the NEPA process including planning and engineering services for the 14-mile urban east-west corridor for the Red Line in Baltimore. Parsons Brinckerhoff prepared the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) and New Starts Package submittal. As the lead Joint Venture partner, Parsons Brinckerhoff continued to provide services on the Red Line GEC team to advance this project through the PE/FEIS/ROD phase.

The Red Line project was focused on increasing mobility and accessibility for people living and working in the region; support ongoing community revitalization and planned economic development initiatives; and help the region address congestion. These are very similar goals to that of the IS 270 ICM Project—only the transportation mode was different.

The AA/DEIS document for the Red Line included alignment evaluations, environmental impacts assessment, conceptual engineering, and public involvement. Multiple alternatives were presented in the document. The AA/DEIS was signed in late 2008 and received *FTA's Outstanding Achievement Award for Excellence in Environmental Document Preparation.* Parsons Brinckerhoff's key roles included planning management, travel demand forecasting, traffic analysis, capital and operations cost estimates, geotechnical evaluations, and support of public involvement program elements.

Parsons Brinckerhoff continued services through the FEIS and engineering phases with responsibility for the overall management of the project. The project received special accommodations from the federal government to expedite the permitting and environmental review processes, and under the leadership of Parsons Brinckerhoff, the approved FEIS was published for public review in less than 18 months after we tracked and maintained the aggressive NEPA schedule. Publication of the FEIS/Draft Section 4(f) Evaluation occurred in 2012, and in addition to preparation of the FEIS, we performed travel demand forecasting, community involvement, cultural resources, environmental justice, pedestrian and bicycle access, construction impacts, air quality and GIS database development. Following publication of the FEIS, Parsons Brinckerhoff led the team to respond to over 850 public comments, leading to signing of the ROD.

Similarities: As mentioned earlier, NEPA will be required for any construction package that requires a Federal Action, including approval on an IAPA or a design exception. This project shows Parsons Brinckerhoff's ability to successfully complete the NEPA process, under extreme time constraints, on a highly complex project, and under the leadership of Pam McNicholas; contributing to the success of a well-managed project focusing on mobility.

ICC General Engineering Consultant

The ICC planning study was conducted using a streamlined environmental review process that involved significant early coordination with federal, state, and local transportation, environmental, and planning agencies. The streamlined process relied on concurrence from US Army Corps of Engineers (USACE) and Maryland Department of the Environment (MDE) at key milestones. Concurrence demonstrated that agency comments were satisfactorily considered, and allowed the study documents to be used by the agencies for National Environmental Protection Act (NEPA) and permitting purposes. USACE and MDE were joint sponsors of the public hearings, and solicited public comments for the study. Parsons Brinckerhoff, as member of the Joint Venture, performed Section 4(f) and NEPA documentation for the Environmental Stewardship and Compensatory Mitigation sites attributable to the project, as identified in the Final Environmental Impact Statement (FEIS).

Environmental Monitoring and Compensatory Mitigation

Parsons Brinckerhoff provided a variety of environmental monitoring and related support functions during the construction of environmental restoration projects for the ICC. Similar mitigation and restoration projects may be necessary for this project.

Environmental Inspector for Environmental Construction Projects

Parsons Brinckerhoff provided environmental inspectors for a variety of projects including NW-69, SC-19 and the Lake Frank Trail. For REF 3 Reforestation at Seneca Creek State Park, REF 10/11 Reforestation at South Germantown Recreation Park and REF 21 Reforestation at City of Bowie, Parsons Brinckerhoff provided both Project Engineer and Environmental Inspector duties such as project compliance with erosion and sediment control plans, protection of key resources, taking photographs and documenting field conditions.

Agency Coordination During Planning, Design & Construction, Maryland-National Capital Park and Planning Commission On-Site Support

Parsons Brinckerhoff provided an on-site support staff person to M-NCPPC whose primary responsibility was to oversee the environmental stewardship of Park and Planning property and to ensure that the environmental commitments made to M-NCPPC during the planning phase of the project were fulfilled during design and construction. Task included on-site design and construction support services for 50-plus environmental stewardship or compensatory mitigation projects. These include a variety of project types including stream restoration, reforestation, stormwater management BMPs, and wetland creation.

MDTA Environmental Permit / Program Management

Parsons Brinckerhoff is currently providing Environmental Permit/Program Management services involving preparation, coordination, acquisition and management of stormwater and environmental permits and mitigation. This involves managing the many different types of projects that require acquisition of environmental permits or approvals from state or federal regulatory agencies; acquiring, tracking and managing environmental permits; developing processes, procedures and tools to facilitate efficient tracking and management from development to close-out; completing program- and policy-level tasks such as final execution of the Critical Area Commission (CAC) Memorandum of Understanding (MOU); and initiating a Mitigation Banking Agreement. Coordinating, tracking, and acquiring all types of environmental permits/approvals for wetlands/Waters of the US (Joint Permit Application); floodplains; trees/forests; Chesapeake Bay Critical Area; Stormwater Management; Erosion & Sediment Control; Section 106 of the National Historic Preservation Act; USFWS/DNR rare, threatened and endangered species concerns; and fisheries concerns from the DNR. Agencies coordinated with include MDE, CAC, DNR, FWS, MHT, ACE and more. Tasks include but are not limited to: identifying/verifying project permit/approval throughout design; conducting design and constructability reviews; recommending avoidance and minimization strategies; reviewing and submitting permit applications; conducting agency coordination; developing/maintaining permit schedules; tracking permits through close-out; identifying/implementing permit conditions and permit compliance requirements/schedules; preparing watershed assessments and identifying water quality retrofits to assist in MS4 permit compliance;

identifying/implementing mitigation requirements, fulfillment, monitoring, and schedules. Wetland Delineations were performed as necessary. This task includes preparation and acquisition of environmental permits for stormwater-related remedial projects that require emergency or immediate repairs; coordination with regulatory agencies on expedited reviews; identification of mitigation sites for roadside tree mitigation; Critical Area mitigation; developing mitigation plans; pre-construction staking; developing as-builts, and preparing photo documentation following construction.

Similarities: Due to the implementation of multiple construction packages for the IS 270 ICM project, the environmental permitting and NEPA/MEPA portions of the project will need to be managed as a total program, to track the permits, commitments, mitigation, and compliance for each package. This project shows Parsons Brinckerhoff's experience successfully administering a similar program for another business unit, under the leadership of Pam McNicholas.

CONSTRUCTION PROJECT EXAMPLES

Woodrow Wilson Bridge - I-95 Telegraph Road Interchange Improvements, Alexandria, VA, Virginia Department of Transportation

This $236.3M fast-track, Corman (led) JV project included reconstructing the Telegraph Road interchange and widening/reconstructing approximately 2.5 miles I-95/I-495 and 24 lane miles of local roadways connecting the Woodrow Wilson Bridge (WWB) project with new HOT lane projects. This project had high mainline ADT (140,000) plus extensive traffic management required on local streets to be reconstructed. Extensive coordination was required with local and regional stakeholders. Main objectives were separating local traffic from thru interstate traffic, and upgrading the ITS infrastructure throughout the WWB corridor. The configuration of two barrels of interstate traffic utilizing a continuous CD roadway is the same as currently exists in the most congested segments of the IS 270 corridor. ADT is similar to that experienced on IS 270. The goal of the project that was successfully achieved was increased mobility, safety, improved operations, and minimizing future operations and maintenance costs. Parsons Brinckerhoff was a key JV partner in the GC that led the project for VDOT, DDOT & MSHA. This project was completed early and within budget.

Similarities:
Like the I-270 project, this project presents the challenge of making improvements to a heavily traveled highway in as short a time as possible with minimal obstruction to traffic. Construction included new ATMS traffic systems, lighting, installed multiple interstate-grade overhead, cantilever, and ground-mounted sign systems, ITS, traffic management system upgrades, guardrails, landscaping, erosion and sediment (E&S) controls..

People: David Gates (our Lead Cost Estimator) was the Lead Cost Estimator for the JV.

Mobility: The interchange improves local and interstate traffic movement by eliminating complex mergers for safer and more efficient travel through connecting bridges and ramps and also by widening. It expands 2.5 miles of lanes on I-495 to tie into the corridors through local lane configuration from the new Wodrow Willson Bridge. Coordination with WMATA, CSX, and Amtrak/VRE allowed for uninterrupted rail service while working on the Telegraph Road bridges.

Maintenance of Traffic: Corman's revised MOT plans greatly reduced the original design of six phases to three phases and from 12 traffic shifts to six shifts, thereby also reducing the project's duration by nine months.

Safety: The interchange improves local and interstate traffic flow in a highly-congested area and eliminates complex mergers for safer and more efficient travel through connecting bridges and ramps. Our construction safety program

required crews to stop for five minutes at 9:00 am, 11:00 am and 1:30 pm to inspect, discuss, and immediately correct any issues. There were no lost time accidents in two years.

Well-Managed Project: Minimized project delays and claims were the result of excellence in construction management and effective partnering practices. There were regularly scheduled meetings including Weekly Progress Meetings, Quarterly Partnering Meetings, Monthly Schedule Update Meetings, and Railroad Coordination Meetings. Extensive coordination with adjacent projects, local residents, project stakeholders, and utility companies were handled by Corman in conjunction with VDOT's GEC. ***Project Substantial Completion was 9 months ahead of schedule and earned all possible milestone incentives.***

Design-Build, Intercounty Connector Contract A, Montgomery County, MD, $483M – Joint Venture

The entire Intercounty Connector project is an 18.8-mile, six-lane, toll highway that spans from Rockville to Laurel to ease congestion on Maryland's highways and local roads while improving mobility and safety. Parsons Brinckerhoff was a JV member of the GC that managed the project for MSHA.

Contract A included inside widening of existing I-370, ***new Automated Traffic Maintenance Signal (ATMS) including Digital Message Signs and changeable toll rate signs on IS 270 within the same corridor currently included in the new project.*** Similar project elements included lighting/signalization, overhead and cantilever signs, Electronic Toll Collection (ETC) facilities, Intelligent Transportation Systems (ITS), utility relocations, maintenance of traffic, quality control, and community outreach to approximately 10,000 residents surrounding the corridor.

Innovations included: re-design of the MAR Interchange from a three-level to a two-level eliminating retaining walls and saving the owner millions of dollars long-term; using dogs to relocate over 400 turtles prior to construction; the first use in MD of citosan flocculant for managing stormwater runoff.

People: As Chief Cost Estimator, David Gates (our proposed Lead Cost Estimator) estimated the major roadway, MOT, and environmental components and led the transition from the estimates to the initial design coordination. As Onsite Roadway Design-Build Coordinator, David coordinated design and permit approvals for roadway design segments with design and construction groups, Owner, and MDE to meet fast-track schedules.

Mobility: The Project increased mobility across the central part of Maryland from the same IS 270 corridor currently under consideration eastwards to IS 95. Traffic was maintained during: multiple-phased widening and construction of a new I-370 interchange to WMATA's busy Shady Grove Metro Station to replace the existing partial interchange; construction of a new interchange at ICC-A and MD 97; new bridges construction in multiple phases while shifting traffic north and southbound on MD 97 and on IS 270 to install new ITS overhead signage and conduit

Safety: Construction safety included daily Take 5 Meetings; daily inspections by foremen, engineers, superintendents, and managers; new hire orientation for all employees; weekly Tailgate meetings; weekly foremen safety meetings; monthly All Hands Safety Meetings. Public safety started with communication with the local communities through public outreach including flyers, project update mailers, community meetings, media notifications of traffic switches, site visits by local newspaper and television news stations.

Operability/Maintainability/Adaptability: The project required close coordination with CHART and the operators of the toll facilities both during the design as well as during construction for the toll facilities as well as the tunnel. Maintainability was built into the Design-Build project both during the design (Choice of materials, operations of the tunnel, provisions for access to the SWM ponds, toll facilities and tunnel for both police and maintenance workers) and construction with a rigorous QC program.

Well-Managed Project: The most important aspect of the approach included bringing all stakeholders together early, including permitting agencies, ICC, the Owner, and the Design-Build Team. Coordination was also essential with the adjacent ICC Contract B and construction of the MDTA Maintenance Facility. Toll Facilities were also integrated into the overall ICC toll network by onsite integration contractors working directly for the Owner. This project won multiple awards including: DBIA National Design-Build Award (for the entire ICC), FHWA Award for Exceptional Environmental Stewardship, and the EFCO Safety Award.

Route 1 Tie-in to Woodrow Wilson Bridge Urban Deck VA-4, Virginia Department of Transportation, $62M

Two-phase, project widened 0.5 mile of the I-495 Beltway from six lanes to the final 14-lane configuration from the Route 1 Interchange to the Woodrow Wilson Bridge west abutment and adjacent to the extremely congested I-95/I-495 Beltway in the densely-populated City of Alexandria. Project included CCTV, lighting, and electrical facilities, installation of ITS conduits and signage, and the new South Washington Street Urban Deck Bridge constructed in four quadrants to maintain South Washington Street traffic flow. Working in a heavily-traveled area among many other Woodrow Wilson Bridge corridor projects resulted in daily communication and formal weekly corridor-wide MOT coordination meetings.

Corman, as the prime contractor, was responsible for construction and proposed innovative, cost-effective value engineering. Highlights included revising the MOT plan by reducing construction phases from five to four resulting in:

1. Increased mobility & reliability for the commuters during the construction; safer; better quality;
2. Time savings of approximately one month;

The award-winning, two phase "Beltway Shift" was constructed to the bridge by shifting the Capital Beltway, which allowed construction to commence on the north half nine months earlier making it independent of the other projects. Corman planned and executed this traffic switch by closing the beltway to one lane at each direction for a short duration to minimize overall impacts to the traveling public.

Regarding the "Beltway Shift"

"The outcome was surprisingly better than expected. The shift was completed ahead of schedule and without incident—and with no significant traffic delays. The phenomenal results are attributable to excellent teamwork, advance planning and constant coordination."
—Nick Nicholson
Project Manager,
Woodrow Wilson Bridge

Mobility: Constant attention to MOT functionality and signs and MOT devices were critical to maintaining the smooth flow of heavy commuter traffic. Corman drove the project several times daily to review the effectiveness and condition of the controls. Also communication with adjacent contracts paid off by minimizing delays and improving safety.

Safety: Construction safety: Morning huddles with the crews set the safety and production goals for the day. Project finished with a 0.24 Lost Time Incident Rate and a 1.96 Recordable Incident Rate. Public safety: Constant attention to MOT functionality and signs and MOT devices were critical to maintaining the smooth flow of heavy commuter traffic. Corman drove the project several times daily to review the effectiveness and condition of the controls. Also communication with adjacent contracts paid off by minimizing delays and improving safety.

Well-Managed Project: Corman made coordination with VDOT, the GEC adjacent projects, local residents and utility companies a top priority. Parsons Brinckerhoff was part of the GEC, handling construction inspections and public relations. At the height of construction, Parsons Brinckerhoff had five staff members onsite full time. Corman worked with them in managing community outreach. There was also extensive coordination with electric, sewer and water companies handled by Corman in conjunction with VDOT's GEC representative. We coordinated with Alexandria City Sewer for relocations and new construction and coordinated tie-ins with the owners. Daily coordination and weekly meetings discussed work plans and public information. This project won several awards

including: VDOT's Commitment to Excellence Award for Environmental Compliance Distinction and VDOT Commissioner's Award for Outstanding Achievement for the "Beltway Shift" – Innovation and Quality Improvement.

Woodrow Wilson Bridge, MD210 MB-3, Maryland State Highway Administration, $44M

A complete reconstruction of the MD210 Interchange with I-95/I-495 (Capital Beltway), including widening I-95 from six to 12 lanes with on and off ramps and work along MD 210 and Oxon Hill Road: Construction of Ramps A (Northbound MD 210 to the Inner Loop Local), C (Inner Loop Local to Northbound MD 210), and H (Southbound MD 210 to the Inner Loop Local) totaling 4,008 LF, relocation of the Oxon Hill Salt Storage Facility, including a new "barn" facility, excavation of 252,000 CY of material, foundations, utility relocations, realignment/transformation of the Oxon Hill Road/MD 210 Intersection into a grade-separated interchange, grading and drainage systems, five retaining walls (one cast-in-place concrete and four MSE), two stormwater management ponds (including major outfall pipe construction), 19,000 LF of steel H-pile, 10,000 CY structural concrete with form-liner finish, demolition/reconstruction of 425' long bridge on Route 210 over I-495, construction of 140-ft. bridge on Route 210 over Oxon Hill Road, 85,000 tons asphalt, bore and jack 650 LF of 20" and 36" casing pipe, 18,000 LF curb and gutter and 49,000 SF sidewalk, erosion and sediment control, ITS, overhead signs and signals, and landscaping. Due to complex phased construction, an extensive tie-back system was used to support adjacent bridges and roadway, where approximately 20,000 SF of temporary support was installed. Project was completed on time and under budget.

Mobility: All work constituted major maintenance of traffic (six complex MOT phases), including a temporary signal, interim lighting, temporary roadway and detours. At the onset of the project, a MOT plan was devised to eliminate phases and detours that accommodated traffic flow on one of the most congested interchanges in the Washington DC/Baltimore area. Traffic was accommodated during the project through careful planning and re-phasing of original plans.

Safety: This project achieved an outstanding safety record.

Well-Managed Project: This section of the Woodrow Wilson Bridge Corridor was particularly challenging from a coordination standpoint as it was intertwined with MD 295 and National Harbor Tie-In projects working concurrently making close coordination among all parties crucial. Corman turned potential schedule disconnects into a non-issue by advancing key deck pours months ahead of schedule. Corman also piggy-backed road closures with an adjacent contractor to minimize traveling public inconvenience. Numerous utility conflicts plagued this project throughout, but due to the outstanding team effort of working closely with utility companies and designers, issues were resolved timely. This project won several awards and was a Finalist for the MdQI Award of Excellence –Construction Partnering Category.

As a testament to this success, Glen Evans from the GEC acknowledged at a partnering meeting that Corman's corporate values and strong planning in advance of field work has earned us a great reputation as a "top-notch" outfit.

PUBLIC INVOLVEMENT IS CRITICAL

Corman/Parsons Brinckerhoff understands that on any significant project, keeping the Public informed of activities is absolutely necessary to a successful completion of the project. As GEC of the ICC, Parsons Brinckerhoff engaged in extensive public affairs activities. Our public and community relations team prepared a comprehensive Communications Plan that was proactive, flexible, and responsive in addressing a slate of public information/community involvement issues. The plan included creating and distributing newsletters and brochures, developing project website content, speaking at community meetings.

Immediate activities included identifying community issues that affected the design of the roadway and needed to be resolved quickly as part of the design process. The GEC provided practical design solutions to the public's concerns over this controversial project. Environmental impacts were lessened and mitigated. Bridges, retaining walls, and noise walls were designed with concerns voiced by stakeholders in mind and aesthetics were changed, locations and heights were modified, and the overall impact of the project was lessened as much as possible.

Onsite professionals were contracted through the GEC for public and community relations services. All public and media relations activities were coordinated with Maryland SHA's and MdTA's Offices of Communications to ensure MDOT and the Administration approved the messages being communicated. Activities include media relations, outreach to elected officials, interface with interested groups, contractor and minority firm outreach, coordination of site tours, and marketing efforts to build user understanding about the tolled facility.

Additionally, memoranda of understanding (MOU) were developed to obtain consensus and agreement between SHA and multiple agencies. Parsons Brinckerhoff negotiated and prepared the MOUs with 15 different utility companies, Montgomery County, Prince George's County, and the Maryland National Capital Park and Planning Commission. The MOU language was drafted by Parsons Brinckerhoff's legal staff, submitted for Maryland SHA review, and executed with the pertinent agency. With the multiple communities, agencies, and utility companies as stakeholders in the IS 270 Innovative Congestion Management Project, MOUs may be necessary.

On the Woodrow Wilson Bridge Project, Parsons Brinckerhoff led the GEC Joint Venture Team and was responsible for developing a Public Involvement Program. To help communication and accessibility to stakeholders, public information centers were housed within each of the project offices. The centers were open to the public during specific hours and were available by appointment. In addition, stakeholder panels were established to provide advice during the actual design phase of the project and continued through construction. Regarding the Potomac River Bridge element, a design competition process included extensive external stakeholder participation. Key issues included construction sequencing, site lines, and aesthetics. A 3D model was created to show existing conditions and an interactive map was developed of the project area. Computer simulations assisted in communicating complex engineering design concepts to stakeholders, specifically the general public.

ACCESS TO LESSONS LEARNED

The Corman/Parsons Brinckerhoff team has over 34,000 employees worldwide, including laborers, foremen, estimators, engineers, technicians, scientists, architects, planners, surveyors, and program and construction management professionals. Through a robust series of "practice area networks," internal communication tools for experts around the world to collaborate and share ideas, we can solicit feedback on concepts and lessons learned on just about any topic that could be raised. While the implementation and policies might differ from state-to-state and country-to-country, the underlying philosophy and purpose (and often benefits) are strikingly similar.

Additionally, Transmax, a governmental based non-profit entity in Queensland, Australia which operates VicRoads' M1 Freeway Management System is joining with us as a specialty consultant to enhance our ability to properly explore and evaluate the Managed Motorways options. Through the use of real-time collected traffic data at every on-ramp, off-ramp, and mainline, the Managed Motorways system communicates throughout the corridor to better control access and speeds; identifies conditions and incidents; and relays the information to the driver, the owner, and emergency services when necessary. This system has been proven to increase mobility, reliability, and safety on multiple corridors in Australia, and Transmax will help us bring it to Maryland. Their experiences, knowledge and understanding of the Managed Motorways concept will be essential to understanding how the concept could be implemented along IS 270, and their lessons learned will be invaluable to SHA.

That kind of reach allows the Corman/Parsons Brinckerhoff Team to "think global, act local," and will give the citizens of Maryland their best foot forward at all times.