

TECHNICAL PROPOSAL



STATE HIGHWAY
ADMINISTRATION

MD 32

SOUTH OF LINDEN CHURCH ROAD TO I-70

DESIGN-BUILD | CONTRACT NO. H07565370 | SEPTEMBER 20, 2018



Table of Contents

MD 32 from South of Linden Church Road to I-70 Contract No. HO7565370

	Page No.
4.1 Cover Letter	N/A
Lead Design Firm Certificate of Insurance	Following Cover Letter
4.2 Safety and Mobility	
4.2.A. Discussion of Project Elements	1
4.2.B. Network Traffic Operations and Safety	12
4.2.C. 10 AASHTO Controlling Criteria	18
4.3 Project Schedule & Project Management	
4.3.A. Project Schedule	19
4.3.B. Phasing and Maintenance of Traffic	24
4.3.C. Triadelphia Road Phasing Construction Timeline and Maintenance of Traffic	26
4.4 Well Managed Project	
4.4.A. Approach to Coordinating with Potential Utility Relocations	29
4.4.B. Minimizing Impacts to Environmental Resources	33
4.4.C. Customer Outreach Plan	35
4.5 Appendix	
Addenda Letters and Responses to RFIs	
Proposer's ATCs and MDOT SHA's Approval or Conditional Approval Letters	
Figure 1: Key Map	
Figures 2 through 4: Project Displays – Construction Work Zones	
Figure 5: Elimination of Structure S2, Retaining Wall Along MD 32 Southbound	
Figures 6A and 6B: Typical Culvert Sequence of Construction and Maintenance of Stream Flow	



STATE HIGHWAY
ADMINISTRATION

TECHNICAL PROPOSAL

MD 32

SOUTH OF LINDEN CHURCH ROAD TO I-70
DESIGN-BUILD | CONTRACT NO. H07565370



4.2

SAFETY AND MOBILITY

4.2 SAFETY AND MOBILITY



4.2 Safety and Mobility

4.2.A. DISCUSSION OF PROJECT ELEMENTS

General: The MD 32 from South of Linden Church Road to I-70 Design-Build Project (MD 32 Project) as proposed by Wagman/WRA below will provide for the efficient and safe flow of traffic along MD 32 and nearby roadways by dualizing MD 32 from a 2-lane undivided roadway to a continuous 4-lane dualized roadway and by providing operational improvements at the I-70 interchange to the maximum extent possible within the fixed price established by MDOT SHA of this project. To this end, Wagman/WRA is proposing to provide a continuous four-lane dualized roadway from MD 32 from the limits of the MD 32 Phase 1 Dualization at Linden Church Rd to the MD 144 intersection, while maintaining the existing dualization through MD 144 and the I-70 interchange. **By doing so, Wagman/WRA is proposing to construct the maximum possible number of continuous four-lane dualized roadway lane miles for the project. This proposed dualization will contribute to the project goal of addressing the more than 75% increase in ADT by 2040 by providing a four-lane divided roadway to improve corridor traffic operations.** In addition to the dualization, we also are proposing to construct improvements north of MD 144 at the MD 32 NB to I-70 WB on-ramp intersection by constructing a second left turn lane along MD 32 NB and a second receiving lane along the I-70 WB ramp. **These improvements to the MD 32 and I-70 interchange will improve corridor traffic operations and safety while being designed to accommodate the future planned corridor improvements as depicted in the 2005 FEIS with interchanges at the Dayton Shop, Rosemary Lane, MD 144, and I-70, as well as associated local access roadways. The proposed improvements will also meet MDOT SHA's objectives for reducing network delay for both the AM and PM peak periods for the 2040 design year when compared to the no build condition, for ensuring that most of the signalized intersections, along with the basic, merge, diverge, and weaving sections, operate at a Level of Service E or better in the 2040 design year, and for reducing the crash rate for rear-end collisions, reducing the crash rate between MD 144 and the I-70 interchange, and reducing the overall corridor-wide crash rate.**

Roadway: Wagman/WRA will design and construct all roadway geometrics including the horizontal alignment, vertical alignment, superelevation, cross slopes, lane widths, shoulder widths, medians, and clear zone grading in conformance with RFP PR 3 and other applicable RFP requirements. All approved or conditionally approved ATCs that are part of our design are listed below and included in the Appendix herein. Any deviations from the RFP and/or applicable guidelines based on the ATCs are noted and Wagman/WRA understands that we are responsible for any redesign, obtaining permits, any additional utility coordination/relocation, and ensuring all improvements are within the ROW for all deviations from the RFP and/or applicable guidelines based on these changes. Wagman/WRA's proposed design will be developed to maximize project elements to the fullest extent practical while minimizing required design exceptions as we believe this best achieves MDOT SHA's critical project goal by providing ***"a project that maximizes the project elements to improve traffic operations and safety while being compatible with the future planned corridor improvements"***. As such, we are proposing to only require the two design exceptions acquired by MDOT SHA for the existing grade (6%) on MD 32 near Rosemary Lane (Sta. 436+70 to Sta.444+00) and for the adverse superelevation on MD 32 through the intersection with MD 144 along the curve. No additional design exceptions will be required for the 10 AASHTO Controlling Criteria as outlined in Section 4.2.C. herein. The MD 32 Project Design Criteria follows RFP PR 3.4.1 and is shown in Table 1 below. Additional Design Criteria for MD 32 includes Design Hour Volume of 8%, Directional Distribution of DHV 73%, Percent Trucks – ADT 10%, and Percent Trucks – DHV 9%. Howard County's Local Road criteria applies to Rosemary Lane and Access Road 4, Howard County's Residential Access Street criteria applies to River Valley Chase, and Howard County's Residential Access Place criteria applies to Parliament Place, Stiles Way, Fox Chase Road, and Vistaview Drive.

Table 1 - MD 32 Project Design Criteria

Roadway	MD 32	MD 144	I-70 Interchange Ramp	Triadelphia Road	Local Road	Residential Access Street	Residential Access Place
Design Speed	60 mph	45 mph	40 mph (25 mph for loops)	35 mph	30 mph	30 mph	30 mph
Posted Speed	55 mph and 50 mph	40 mph	N/A	30 mph	25 mph	25 mph	25 mph

Table 1 - MD 32 Project Design Criteria (Continued)

Roadway	MD 32	MD 144	I-70 Interchange Ramp	Triadelphia Road	Local Road	Residential Access Street	Residential Access Place
Functional Classification	Rural Other Principal Arterial	Rural Major Collector	N/A	Howard County – Major Collector	Howard County – Local Road	Howard County – Access Street	Howard County – Access Place
Terrain Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling	Rolling
Maximum Superelevation	6%	6%	8%	4%	4%	4%	4%
ADT in 2040	51,175	5,200		11,000			

The proposed MD 32 typical section will consist of a 4-lane dualized highway with MD 32 NB generally following the existing roadway and MD 32 SB following a newly constructed roadway to the west of existing MD 32. We are proposing 12' wide travel lanes (maximized beyond the 11' wide travel lanes conditionally approved in ATC No. 18R), 10' wide mainline outside paved shoulders (maximized beyond the 8' wide mainline outside paved shoulders conditional approved in ATC No. 19), and 4' wide mainline inside paved shoulders to maximize the project elements through the dualization while providing the following project benefits: 1) travel lane width does not require a design exception, 2) all elements are fully compatible with the future FEIS design as shown on FEIS Figure II-I Typical Sections for Mainline MD 32 and future reclassification to a fully controlled access freeway, 3) typical section is compatible with the adjacent typical sections of existing MD 32, and 4) wide paved shoulders provide sufficient width and stability for emergency and maintenance pull-off. We are also proposing 10' wide auxiliary lanes and 6' wide auxiliary lane shoulders. The auxiliary lanes to be constructed as part of this project will ultimately be removed and replaced by new interchange ramps in the future; therefore, they are compatible with the future FEIS design. Acceleration lanes will be constructed for all unsignalized intersections as conditionally approved in ATC No. 25R – Reduced Acceleration Lane Lengths. Each acceleration lane length will be evaluated for operational sufficiency as part of the Operational Assessment of Design Alternatives in RFP PR 6.4.1. Deceleration lanes will be constructed for all unsignalized intersections. Each deceleration lane length will be evaluated for adequate deceleration and storage of queuing vehicles. A typical median width of 34' is proposed, including two 4' wide inside paved shoulders unless otherwise noted below or if during final design a reduction is necessary to reduce impacts to environmental resources or utilities, or to mitigate a project constraint. Median barrier W beam will be placed in the median along the entire length of the project and will be offset 2' from the proposed edge of inside shoulder. Our design will minimize W beam traffic barrier along the outside of the roadway to the maximum extent practicable in favor of a clear zone graded typical section to enhance safety. W beam traffic barrier or concrete traffic barrier will be placed only as required to shield hazards in compliance with AASHTO criteria and will be offset 2' from the edge of shoulder except at proposed bridges where barrier will connect to the proposed parapet at the edge of the proposed shoulder. The MD 32 NB cross slope will be normally crowned at 2% along tangent sections of the roadway following the existing roadway cross slope to maintain existing drainage patterns and minimize the need for clearing and stormwater management facilities; thus, minimizing impacts to environmental resources. Wedge and level pavement course will be applied on the existing roadway surface where cross slopes are deficient to bring the proposed MD 32 NB into compliance with AASHTO cross slope and superelevation criteria. The MD 32 SB cross slope will be sloped to the outside at 2% in tangents and will comply with AASHTO cross slope and superelevation criteria. Rumble strips, which are a noted high safety benefit to cost ratio element, will be provided along the inside and outside shoulders of both roadways.

Wagman/WRA will construct all local roads to their full typical section within the limits of work and to smoothly transition to tie into the existing roadways. Our proposed design consolidates select driveways with direct access to MD 32 to reduce the number of access points along MD 32 where feasible in a manner consistent with the FEIS and to enhance safety. All properties have been confirmed to comply with the 3 minutes rule which states that vehicles travelling to or from private property with modified access shall not see their commute increase by greater than 3 minutes from pre-project assuming

travel at posted speed limits and proposed current year average peak hour intersection delays. The design of driveways will conform to Howard County Standards and will be coordinated with the property owner(s). Wagman/WRA proposes to use a WB-62 design vehicle for travel along MD 32 as well as turning movements from MD 32 to MD 144, a WB-67 for turning movements from MD 32 to I-70 and to the Dayton Shops and at J-turns, a WB-50 for turning movements from MD 32 to local roads, and a fire truck with a 45-foot turning radius for the emergency turnaround. The entire project will be developed to be in compliance with bicycle guidelines although we understand that bicycles will be prohibited on MD 32 south of Burntwoods Road interchange. Maintenance vehicle access will be provided to SWM and other facilities in conformance with RFP PR 7 and PR 11. All work will be completed within the right-of-way limits except as agreed upon on the Nixon Farm property for the stream restoration on the upper reach of the Middle Patuxent River. All maintenance of traffic and temporary traffic control elements will be developed in conformance with RFP PR 10 and other applicable RFP requirements, refer to the response to Section 4.3B for additional information. All erosion and sediment control and maintenance of stream flow for the project will be developed in conformance with RFP PR 11 and PR 13 and other applicable RFP requirements.

The proposed MD 32 dualization will tie to the Phase 1 project at the Southern Terminus at Sta. 217+50, north of Linden Church Road. This limit is at the beginning of the MD 32 SB crossover which will be removed. This is also the limit of pavement work along MD 32 SB. The limit of pavement resurfacing on MD 32 NB will be at Sta. 206+50, south of Linden Church Road. This work will eradicate the existing lane reduction markings and will only consist of grinding and resurfacing the left lane and left shoulder as conditionally approved in ATC No. 8 - Pavement Marking Eradication and Resurfacing. The full width of pavement resurfacing along MD 32 NB will begin at Sta. 217+50. The entrance to the Dayton Shop will remain at its existing location at Sta. 279+00. All turning movements into and out of the entrance will be accommodated. An acceleration and deceleration lane will be constructed along MD 32 NB for right turns in and out. An acceleration and deceleration lane will be constructed in the median along MD 32 SB for left turns in and out. An additional 300' long raised median will be constructed between MD 32 SB and the left turning movements to allow for MD 32 SB traffic to flow uninterrupted at this intersection.

North of the Dayton Shop intersection, a median opening will be provided at Sta. 321+50 for Emergency Vehicles. The inside shoulders of MD 32 will be widened to 10' approaching the median opening to allow emergency vehicles to decelerate on the inside shoulder out of the left travel lane. Existing Bridge No. 13045, located at Sta. 334+75, on Triadelphia Road over MD 32 (Structure S4) will be replaced in its entirety with a two-span bridge. The bridge typical section will include two 12' lanes, a 6' shoulder, 5'-8" sidewalk, and 1'-7" parapet along the westbound side, and an 8' shoulder and 2' parapet on the eastbound side. The Triadelphia Road improvements will be in conformance with design criteria for Howard County Major Collector and as listed in the RFP for Triadelphia Road. The roadway typical section will match the bridge typical section at each end of S4 then smoothly taper to meet the existing roadway section. A new sidewalk will be carried to the west to a reconstructed entrance to the Royal Farms store and to the east to a reconstructed entrance at the Westwood Furniture Store. A new entrance to the Olde Tyme Liquor Store along Triadelphia Road EB west of the bridge will be constructed in coordination with a redevelopment plan for this parcel. MD 32 will pass under the Triadelphia Road Bridge with a 16'-9" minimum vertical clearance provided from the highest point on the MD 32 roadway and the bottom of girder of S4. The MD 32 typical section, as described previously, will be maintained under the bridge, except the median W beam traffic barrier will transition to two single face W beam traffic barriers on each side of the median to protect the bridge pier. There will also be 150' long, 42" single face concrete traffic barriers along the outside of MD 32 NB and MD 32 SB at the bridge to allow for the shortening of the bridge. Riprap slope protection will be used behind the concrete barriers to grade up to the proposed abutments.

At the existing Burntwoods Road Interchange, the existing travel lanes will be maintained as the outside lanes for both MD 32 NB and MD 32 SB and widening will occur on the inside of the existing roadways to provide the second lane in each direction. At the MD 32 underpass, a 16'-9" minimum clearance will be provided from the highest point on the MD 32 roadway and the bottom of girder of the existing Burntwoods Road Bridge which will remain. Beginning at Sta. 406+50, the MD 32 SB roadway will shift to the west of the existing MD 32 roadway while MD 32 NB will remain on the existing roadway, creating a widened median area. Some inside pavement reconstruction of MD 32 NB will be required in this area to provide for the full MD 32 typical section and auxiliary lane requirements. At the intersection with Parliament Place, a deceleration lane will be provided for MD 32 NB right turns and MD 32 SB left turns. The MD 32 SB left turn will also

4.2 Safety and Mobility | Continued



function as a J-turn to provide access for vehicles that need to U-turn to access driveways and side roads along MD 32 NB. A continuous auxiliary lane will be constructed along the outside through lane of MD 32 NB from Parliament Place to north of Rosemary Lane. At River Valley Chase, right-in, right-out access from MD 32 SB will be provided with a deceleration lane and acceleration lane; however, access will be provided for emergency vehicles to enter the community from the MD 32 NB median travel lane across a 3" mountable concrete median. The inside shoulder will be widened to 10' at this location for emergency vehicles to decelerate on the inside shoulder out of the left travel lane prior to the crossover. The Stiles Way intersection will accommodate right turn movements to and from MD 32 NB only and the existing channelization island will be removed. Left turns onto MD 32 will be prohibited at Parliament Place, River Valley Chase, and Stiles Way to enhance safety. Left turns to access MD 32 SB will be provided at a J-turn being constructed north of Structure S7. The continuous auxiliary lane will accommodate MD 32 NB right turning traffic and an acceleration lane will accommodate Rosemary Lane WB right turning traffic onto MD 32 NB. A deceleration lane will be constructed for MD 32 SB left turns on to Rosemary Lane. Existing driveways tying into MD 32 will be consolidated to limit access points along MD 32 to enhance safety. Driveways will only be provided at Sta. 443+00 Lt., Sta. 459+50 Rt., and Sta. 465+00 Rt. Left turns onto MD 32 from Rosemary Lane and the driveways will be prohibited. The MD 32 SB horizontal alignment will shift back towards the existing roadway and the typical median width will be provided, beginning at Sta. 459+19. As approved in ATC No. 11 - Eliminate Retaining Wall S2, the MD 32 SB vertical alignment will be raised from Sta. 473+00 to Sta. 490+00 to eliminate Structure S2 as shown in the RFP Concept Plans and the MD 32 NB vertical profile will also be adjusted to follow the MD 32 SB profile, requiring the reconstruction of MD 32 NB. The MD 32 NB J-turn will be constructed at Sta. 506+00 as conditionally approved in ATC No. 5 - Relocate NB J-turn to Station 505 and the loon will accommodate the turning movement of a WB-67. This J-turn provides access to MD 32 SB for those prohibited movements at Parliament Place, Stiles Way, Rosemary Lane, River Valley Chase, and select individual driveways. A deceleration lane will be constructed on MD 32 NB and an acceleration lane will be constructed on MD 32 SB for U-turning vehicles. On the south side of the MD 144 intersection along MD 32 NB we will tie to the existing roadway while maintaining the existing thru and auxiliary lanes. Horizontally and vertically MD 32 SB will tie into the existing MD 32 SB roadway with two thru lanes, just south of the MD 144 intersection, at approximate Sta. 528+13. The vertical profile of MD 32 NB and MD 32 SB will be raised to provide a larger opening at Structure S7 over Terrapin Branch in conformance with the RFP PR 5.3 requirements for 100-year flood passage.

Access Road 4 will be constructed west of MD 32 to consolidate and remove access points along MD 32 including four driveways (one being for Nixon Farm) and Fox Chase Road, and to provide access for proposed relocated utilities. As noted during various project one-on-one meetings, paving of Access Road 4 is not required as part of this project; however, Wagman/WRA has included it in our proposal since it maximizes project elements and is compatible with future planned corridor improvements and removes access points along MD 32 to enhance traffic operations and safety. At the southern terminus, Access Road 4 will intersect with Vistaview Drive to the west and a driveway connection to the east side. The connection to Vistaview Drive will eliminate direct access to MD 32 from Fox Chase Road. At the northern terminus, Access Road 4 will intersect with MD 144, approximately 500' west of the MD 32 and MD 144 intersection. The proposed roadway will consist of two-way open section roadway with a 28' wide travelled way, following the Howard County typical section for Local Roads. Driveway connections will be reconfigured to tie into Access Road 4 at Sta. 1015+10 Lt., 1021+60 Lt., and 1028+40 Lt. We will remove the existing driveways only within the LODs needed construct Access Road 4 and MD 32 improvements. Access Road 4 will also serve as a utility access road for relocated utilities being impacted due to the MD 32 dualization. The Access Road 4 alignment follows the FEIS alignment; therefore, it is compatible with future planned corridor improvements.

On the north side of the MD 144 intersection along MD 32 NB at the I-70 WB ramp (Ramp H), a second left turn lane with a 400' parallel lane and a 180' taper will be constructed by widening to the median. Ramp H will be widened to receive the additional left turn lane from MD 32 NB and will merge to one lane prior to the gore with I-70. Curb and gutter will be constructed within the median on MD 32 at the second left turn lane on MD 32 NB. Ramp H will include a 15' travel lane in the one lane section and two 12' travel lanes in the two-lane section. The ramp shoulder will include a 4' wide inside paved shoulder and the existing 10' wide outside paved shoulder will be maintained. At the MD 32 underpass, a 16'-9" minimum clearance will be provided from the highest point on the MD 32 roadway and the bottom of girder of the existing I-70 bridges which will remain.

Drainage/SWM/ESC: Wagman/WRA will design and construct all surface drainage, stormwater management and erosion and sediment control in conformance with RFP PR 11 and other applicable RFP requirements including the MDOT SHA Highway Drainage Manual and the 2015 MDOT SHA PRD Sediment and Stormwater Guidelines and Procedures. All drainage and stormwater facilities will be designed to ensure no adverse impacts to waterways upstream and downstream of the project site.

Surface drainage along the length of the project is primarily comprised of open section roadway along both the MD 32 NB and MD 32 SB shoulders and within the MD 32 median. Along MD 32 SB, parallel Chapter 5 Environmental Site Design (ESD) swales and roadside ditches are generally proposed, with bioswales collecting roadway drainage to provide Environmental Site Design Volume (ESDv) treatment to the Maximum Extent Practical (MEP) and ditches collecting offsite runoff from the west to maintain the drainage area threshold of one acre for ESD swales. Bioswales will include 1-foot tall check dams in conformance with the RFP while meeting minimum freeboard requirements. Grass Swales will be provided where bioswales are determined to be infeasible due to high groundwater levels or where shallow underlying rock is encountered. Generally, MDOT SHA Precast Type K inlets are proposed at the downstream terminus of proposed swales; where site conditions permit, diversion of ESD swales into the parallel ditch will be proposed via earthen weirs once drainage area thresholds have been met, minimizing the required number of drainage structures. The parallel ESD swale/ditch configuration is avoided adjacent to culvert structures to minimize the required length of the structures. Due to the steep longitudinal slope of the roadway from Sta. 434+00 to Sta. 456+50, no ESD swales are proposed as the maximum allowable slope of 4% is exceeded. Roadside ditches will be provided in open section roadway where ESD swales are not considered feasible. Existing ditches will be maintained along proposed MD 32 NB where drainage areas will not be altered. In areas of MD 32 NB reconstruction, the parallel ESD swale/ditch configuration is proposed in a similar configuration to MD 32 SB. ESD swales are proposed throughout the open section median of MD 32 where feasible. MDOT SHA Precast Type K median inlets downstream of median swales are aligned with inlets along MD 32 SB to minimize the required length of storm drain systems. From Sta. 354+00 to Sta. 376+00, provision of ESD swales is limited to the median through the existing Burntwoods Road interchange as roadway widening is limited to the existing median. The parallel ESD swale/ditch configuration as described above is proposed along Access Road 4 where feasible. Additional ESDv treatment is proposed where ESD swale treatment is not considered feasible due to site constraints via four Chapter 5 micro-bioretenion facilities along MD 32 between Stiles Way and MD 144 at Sta. 447, Sta. 450, and Sta. 505, and Sta. 527, and via two micro-bioretenion facilities along Access Road 4 at Sta. 1001 and Sta. 1029. One existing wet pond at Sta. 399 will be converted to a submerged gravel wetland to provide additional ESDv and quantity management for the project.

Once ESDv treatment is proposed to the MEP via a combination of ESD swales, micro-bioretenion and submerged gravel wetlands, remaining WQv requirements are proposed to be met via Chapter 3 bioretention or sand filter facilities where required. Variances will be requested from MDOT SHA PRD where ESDv requirements cannot be met via Chapter 5 ESD facilities alone. Remaining Cpv and Qp10 requirements are proposed to be met via dry, extended detention facilities. The use of wet pools is avoided per RFP requirements due to the project's location within a Use Class IV Watershed. Maintenance access will be provided to all ponds in conformance with MDOT SHA's Site Development Guidelines. All proposed pond orifices will be placed above seasonal groundwater elevations to avoid drawdown of groundwater. Five dry, extended detention ponds are proposed along MD 32 SB south of Triadelphia Road at Sta. 234, Sta. 260, Sta. 269, Sta. 302, and Sta. 318. Existing wet ponds located in the Burntwoods Road interchange that are not impacted by the proposed improvements will remain in conformance with the RFP. Existing wet ponds within the Burntwoods Road Interchange have been previously designed to accommodate the proposed widening and no changes in hydrology due to the proposed improvements are anticipated that will necessitate modification of the existing ponds. Nine dry, extended detention facilities are proposed throughout the Burntwoods Road interchange north to Stiles Way at Sta. 338, Sta. 349, Sta. 355, Sta. 366, Sta. 403, Sta. 409, Sta. 413, Sta. 421, and Sta. 439. North of Stiles Way to MD 144, a Chapter 3 sand filter facility at Sta. 453 and Chapter 3 bioretention facility at Sta. 507 are proposed to provide additional WQv and Cpv treatment as environmental constraints in this area prevent provision of ESDv treatment to the MEP. Two additional dry extended detention facilities are proposed between Stiles Way and MD 144 at Sta. 481 and Sta. 488. Applicability to MD Pond Code 378 Criteria has been assessed for all new SWM ponds. Ponds 234 and 453 will require design in accordance

4.2 Safety and Mobility | Continued



with MD Pond Code 378 and will be subject to review by the MDE Sediment and Stormwater Plan Review Division.

MDOT SHA Standard precast COG or Type S inlets will be provided in closed section roadways with spacing in conformance with the MDOT SHA Highway Drainage Manual. Inlets will be placed upstream of curb termini to minimize concentrated flow through the travel way. Proposed closed storm drain systems will generally outlet beneath MD 32 SB to avoid reconstruction of the MD 32 NB roadway and the associated maintenance of traffic requirements. Closed section drainage is proposed in the MD 32 median from Sta. 266+00 to Sta. 287+75 to accommodate auxiliary lanes at the Dayton Shop. No scuppers are proposed on the proposed Triadelphia Road Bridge. Standard inlets are proposed adjacent to the bridge along the closed section roadway along Triadelphia Road, and proposed storm drain systems will convey runoff to both the MD 32 NB and MD 32 SB roadside ditches below, maintaining existing drainage patterns. Closed section drainage is additionally proposed from Sta. 502+00 to Sta. 505+50 to accommodate the deceleration lane for the proposed loon at Sta. 506+00 per ATC No. 5 discussed above. All existing pipe culverts and storm drain systems not identified by the RFP as requiring complete replacement or identified by an MDOT SHA Structure Number will be extended beneath the proposed MD 32 SB roadway where required in conformance with RFP requirements. Waivers will be pursued for all existing culverts to remain or to be extended where passage of the 100-year design storm cannot be achieved during final design. Culvert extensions are proposed at Sta. 303+25, Sta. 309+10, Sta. 318+35, Sta. 338+40, Sta. 348+60, Sta. 396+68, Sta. 399, Sta. 403+16, Sta. 409+40, Sta. 413+20, Sta. 423+00, Sta. 442+30, Sta. 495+43, Sta. 502+00, Sta. 507+80, Sta. 514+30, Sta. 518+65, and Sta. 521+45. All existing pipes to remain have been field inspected and determined to be structurally sound and in working condition. The existing 24" RCP at Sta. 423+00 will be extended with 24" RCP. An MDE Dam Safety Review will be required based on a height of embankment in excess of 20 feet. The extension of this culvert assumes the embankment will be classified as special embankment design by MDE Dam Safety and will require a filter diaphragm, watertight joints, and a concrete cradle on the new portion of the pipe. It is also assumed that the existing pipe extension at Sta. 514+30 will require special embankment design based on a $HW/D > 2$ and will require a filter diaphragm, watertight joints, and a concrete cradle on the extension only. Both pipes will be subject to review by the MDE Stormwater and Sediment Plan Review Division. All other culvert extensions have been analyzed per MD Pond Code 378 criteria and no special design requirements are anticipated. The existing culvert at Sta. 455+22 will be replaced to accommodate the proposed Pond 453 outfall and will be designed to pass the 100-year storm without overtopping MD 32.

Structures: Wagman/WRA will design and construct all structures in conformance with RFP PR 5 and other applicable RFP requirements. Three box culverts are proposed in the southern portion of the project, **Structure S3**, **Structure S8**, and **Structure S1**. Additionally, **Small Structure 13034X0**, a 50"x31" CMP, located at Sta. 269+00 is proposed to be completely removed and replaced with a comparable 53"x83" HERCP concrete structure beneath MD 32 NB and MD 32 SB to convey the 100-year storm and provide the required cover between the MD 32 roadway and the top of the structure. Structure S3, located at Sta. 227+45, is a 7' wide by 12' high concrete box culvert conveying Clyde's Branch beneath MD 32 flowing to the east. The culvert is proposed to be depressed 3 feet with triangular weir walls at a maximum of 40' spacing to accommodate fish passage. A 60" RCP relief pipe is proposed parallel to the box culvert to lower water surface levels in order to defer MDE Dam Safety Review based on an embankment height in excess of 20 feet as conditionally approved in ATC No. 15 - Realignment of Relief Pipe at S3. Structure S8, located at Sta. 250+39, is a 6' wide by 7' high concrete box culvert conveying an unnamed Tributary of Clyde's Branch beneath MD 32 flowing to the east. Structure S1, located at Sta. 254+93, is a 7' wide by 8' high concrete box culvert also conveying an unnamed Tributary of Clyde's Branch beneath MD 32 flowing to the east. Both S8 and S1 are proposed to be depressed 1-foot with triangular weir walls at a maximum of 40' spacing to accommodate fish passage. All three culverts, S3, S8, and S1 are subject to FEMA CLOMR review. However, Wagman/WRA is not proposing to vary these culvert designs from the CLOMR provided by MDOT SHA; thus, a modification to the CLOMR is not anticipated. S1 and S8 will use precast concrete boxes and wing walls with cast-in-place headwalls as approved in ATC No. 3 - Precast Concrete Culvert and Wing Walls for S1 and S8. For alignment purposes, the headwall and toewall portions at each end of the culverts will be cast-in-place. The wing walls and last two precast segments of S1 and S8 will be founded on a 1'-0" thick, cast-in-place unreinforced concrete leveling pad. For setting and alignment purposes, a 2" min. thickness of No. 10 stone dust or other OOS acceptable material will be placed between the concrete leveling pad and the precast concrete wing wall footings and last two segments of the precast concrete culvert bottom slab. Undercut and additional bedding requirements for the entirety of each culvert and the wing walls will be evaluated during the foundation design. All joints between precast concrete culvert segments and wing wall

elements will be positively connected utilizing MDOT SHA OOS bolting details and will have a 2-ply waterproofing membrane applied to the joints after tensioning and prior to placing of backfill material. S3 will use precast concrete boxes and wing walls with cast-in-place headwalls as conditionally approved in ATC No. 4 - Precast Concrete Culvert Barrel, Wing Walls, and Wing Wall Footings for S3. S3, including the entire limit of the culvert and wing walls, will be founded on a 1'-0" thick, cast-in-place, concrete leveling pad reinforced with a single layer of #4 bars at 12" in each direction. For setting and alignment purposes, a 2" min. thickness of No. 10 stone dust or other OOS acceptable material will be placed between the concrete leveling pad and the precast concrete wing wall footings and the precast concrete culvert bottom slab. Undercut and additional bedding requirements for the culvert and wing walls will be evaluated during the foundation design. All joints between precast concrete culvert segments and wing wall elements will be positively connected utilizing MDOT SHA OOS bolting details and will have a 2-ply waterproofing membrane applied to the joints after tensioning and prior to placing of backfill material. In addition, an expandable waterstop will be incorporated on the inside of the joint to make them watertight. Wagman/WRA will be responsible for obtaining approval from MDE Stormwater and Sediment Plan Review Division and MDE Dam Safety Division for the use of precast elements at S3.

Existing Bridge No. 13045, located at Sta. 334+75, on **Triadelphia Road over MD 32 (Structure S4)** will be replaced in its entirety utilizing two-stage bridge construction. S4 will be a two span, haunched, continuous steel girder bridge providing a structure that is configured similarly to the existing Burntwoods Road Bridge as required in RFP PR 5.05.01.01. The bridge will have an out-to-out superstructure width of 47'-3". The typical section includes two 12' lanes, a 6' shoulder, 5'-8" sidewalk, and 1'-7" parapet along the westbound side, and an 8' shoulder and 2' parapet on the eastbound side. The bridge vertical alignment will be established to provide a minimum clearance of 16'-9" from the highest point on the MD 32 roadway to the bottom of the steel girder. Along the outside of MD 32 NB and MD 32 SB at the bridge location, a 150' long, 42" single face concrete traffic barriers will be constructed to allow for the shortening of the bridge from approximately 200' to approximately 160', consisting of two 80' spans. Riprap slope protection will be used behind the concrete barriers to grade up to the proposed abutments. Concrete stub abutments with concrete wing walls supported by steel piles with the front row battered are proposed. The abutments will utilize the MDOT SHA OOS standard abutment configuration with expansion joint cross beams and will keep the exposed face of abutment, from top of footing to the abutment seat, to a maximum of 3'-0" per RFP requirements. The pier will consist of a concrete cap supported by concrete columns with a concrete footing and battered steel piles. The fixed bearings will be located at the pier and MDOT SHA OOS standard compression seals will be used at both abutments. In conformance with RFP PR 5.05, the appearance and aesthetic treatment of the structure will be similar to the configuration of the nearby Burntwoods Road Bridge. The steel girders will be haunched at the pier, the pier columns will be flared in both directions and ashlar stone formliner will be provided on the parapets, wing walls and exterior pier columns to provide the desired aesthetic treatment.

Three structures are proposed in the northern portion of the project, **Structure S5, Structure S6, and Structure S7**. Structure S5, located at Sta.449+91, is a double 10' wide by 9' high box culvert conveying the Rosemary Tributary from east to west beneath MD 32. S5 is proposed to be depressed 1-foot to accommodate fish passage. Relocation of the Rosemary Tributary is proposed upstream of the culvert to align the stream channel with the proposed structure. Restoration of the Rosemary Tributary is proposed downstream of the culvert to the confluence with the Middle Patuxent River to provide mitigation for the project's stream impacts. As approved in ATC No. 14 - Precast Concrete Culvert and Wing Walls for S5, precast concrete boxes and wing walls with cast-in-place headwalls are proposed. S5, including the entire limit of the culvert and wing walls, will be founded on a 1'-0" thick, cast-in-place, concrete leveling pad reinforced with a single layer of #4 bars at 12" in each direction. For setting and alignment purposes, a 2" min. thickness of No. 10 stone dust or other OOS acceptable material will be placed between the concrete leveling pad and the precast concrete wing wall footings and the precast concrete culvert bottom slab. Undercut and additional bedding requirements for the culvert and wing walls will be evaluated during the foundation design. All joints between precast concrete culvert segments and wing wall elements will be positively connected utilizing MDOT SHA OOS bolting details and will have a 2-ply waterproofing membrane applied to the joints after tensioning and prior to placing of backfill material.

Structure S6, located at Sta. 471+30, is a dual, two-span, precast, MDOT SHA OOS standard prestressed concrete slab bridge conveying the Middle Patuxent River beneath MD 32 from west to east. The Middle Patuxent River will be relocated in conjunction with the new bridge placement, to be aligned with the center of the existing floodplain and to address maintenance concerns with the existing alignment. S6 is subject to FEMA CLOMR review and the CLOMR will be updated

by Wagman/WRA to accommodate proposed changes in the design of this structure as a result of the MD 32 NB J-turn being located at Sta. 506+00 per conditionally approved ATC No. 5 discussed above. The changes will be submitted to Howard County for concurrence prior to FEMA. Each dual bridge will consist of two 55'-0" spans with a continuous concrete overlay and concrete end diaphragms to provide a jointless configuration to match OOS details at each abutment. Cast-in-place concrete cantilever abutments and wing walls with a cast-in-place concrete closure wall between abutments are proposed, with the pier consisting of a cast-in-place concrete solid shaft. All elements will be supported by drilled shafts.

Structure S7, located at Sta. 487+40, is a dual, single span, precast, MDOT SHA OOS standard prestressed concrete slab bridge conveying Terrapin Branch from west to east beneath MD 32. Terrapin Branch will be realigned upstream and downstream of S7 to accommodate the new bridge crossing. Each dual bridge will consist of a 55'-0" span with concrete overlay and concrete end diaphragms to provide a jointless structure. Cast-in-place concrete cantilever abutments and wing walls with a cast-in-place concrete closure wall between abutments are proposed, supported by drilled shafts.

Both S6 and S7 will utilize the same typical section for both dual bridges. The out-to-out width of each bridge will be 42'-0", which will provide a 38'-11 1/2" clear roadway width and two 1'-6 1/4" 42" F-Shape parapets. The bridges will provide two – 12'-0" lanes, a 10'-0" min. outside shoulder, and a 4'-0" min. median shoulder. The superstructures will consist of prestressed concrete slabs and transverse post-tensioning rods in conformance with MDOT SHA OOS standards. The substructures will be designed for the design flood, scour, and checked for lateral stability under the 500-year flood. In addition, riprap scour countermeasures are anticipated to be placed within the entire limits of both structures; however, the final limits and size will be determined by final hydraulic and scour analyses. S6 and S7 will be constructed using coordinated temporary crossovers utilizing approved in ATC No. 6 – Middle Patuxent Bridge - Eliminate Temporary Bridge for MOSF eliminating the need for temporary bridges and/or pipes, thereby improving the project schedule by 5 months.

Additionally, Small Structure 13058X01, a 66" CMP, located just south of MD 144, will not be impacted by our proposed design or construction so it will not be replaced. There are three other major stream crossings located north of MD 144. An 84" SPP (Small Structure No. 13088X0), located at Sta. 51+00 where Terrapin Branch crosses Ramp H, a 60" RCP (Small Structure No. 13090X0), located at Sta. 52+75 where a tributary to Middle Patuxent crosses Ramp H, and a 54" RCP (Small Structure No. 13091X0), located at Sta. 58+75 where a tributary to Middle Patuxent crosses Ramp H. Only **Small Structure No. 13091X0** will be impacted by the proposed improvements. We are proposing to extend this structure to accommodate the proposed ramp widening. Lastly, there is 120" CMP (Structure No. 13098001) that conveys a tributary of Terrapin Branch beneath MD 32 at Sta. 546+50. This structure will not be impacted by our proposed design or construction so it will not be replaced.

Pavement Design: Pavement design for Roadway Elements 1, 2 and 3 will be based on a 25-year pavement design life and a minimum design subgrade resilient modulus of 4,500 psi. Pavement design for pavement rehabilitation will be based on a 15-year pavement design life and a minimum design subgrade resilient modulus of 4,500 psi.

Roadway Pavement Section: The proposed pavement sections for each roadway element are as follows:

Roadway Elements 1 and 2 – Full Depth Construction of MD 32 SB Mainline and Inside Shoulders and Full Depth Widening of Existing MD 32 Mainline, Inside Shoulders, and Acceleration/Deceleration and Turn Lanes:

- 2" Gap Graded Asphalt Mix 12.5 mm for Surface, PG 64E-22, Level 5
- 3.5" Superpave Asphalt Mix 19.0mm for Base, PG 64S-22, Level 2
- 9" Superpave Asphalt Mix 25.0 mm for Base, PG 64S-22, Level 2 (Two 4.5" lifts)
- 12" Graded Aggregate Base Course* (Two 6" lifts)

Roadway Elements 1 and 2 - Full Depth Construction of MD 32 SB Outside Shoulders (8' of 10' width):

- 2" Gap Graded Asphalt Mix 12.5 mm for Surface, PG 64E-22, Level 5
- 3" Superpave Asphalt Mix 19.0mm for Base, PG 64S-22, Level 2
- 3" Superpave Asphalt Mix 25.0 mm for Base, PG 64S-22, Level 2
- 18.5" Graded Aggregate Base Course* (Three 4.5" lifts and one 5" lift)

Roadway Element 3 - Full Depth Widening of Existing MD 32 Ramp H

- 2" Gap Graded Asphalt Mix 12.5 mm for Surface, PG 64E-22, Level 5
- 3.5" Superpave Asphalt Mix 19.0mm for Base, PG 64S-22, Level 2
- 8" Superpave Asphalt Mix 25.0 mm for Base, PG 64S-22, Level 2 (Two 4" lifts)
- 12" Graded Aggregate Base Course* (Two 6" lifts)

Roadway Element 4 – Base Widening of Access Road 4 and River Valley Chase Road:

- 1.5" Superpave Asphalt Mix 9.5 mm for Surface, PG 64S-22, Level 2
- 6" Superpave Asphalt Mix 19.0 mm for Base, PG 64S-22, Level 2 (Two 3" lifts)
- 6" Graded Aggregate Base Course*

Roadway Element 5 - Bridge Approaches for Triadelphia over MD 32 (S4), MD 32 over Middle Patuxent River (S6) and MD 32 over Terrapin Branch (S7):

Bridge approach pavement sections will follow Standard No. MD 580.09. For Structures S6 and S7, the following surface will be used instead of what is provided in the heavy traffic detail:

- 2" Gap Graded Asphalt Mix 12.5 mm for Surface, PG 64E-22, Level 5

Roadway Element 6 – Base Widening of Triadelphia Road:

- 2" Superpave Asphalt Mix 12.5 mm for Surface, PG 64S-22, Level 2
- 10" Superpave Asphalt Mix 25.0 mm for Base, PG 64S-22, Level 2 (Two 5" lifts)
- 12" Graded Aggregate Base Course* (Two 6" lifts)

Roadway Element 7 - Full Depth Widening and Reconstruction of Residential Driveways:

Residential driveway sections will follow Standard No. MD 580.08 Driveways and Bike Paths. Resurfacing of mainline MD 32 NB will consist of:

- 2" Gap-Graded Asphalt Mix 12.5 mm for Surface, PG 64E-22, Level 5

* Graded Aggregate Base layers may be substituted with Reclaimed/Recycled Concrete.

Pavement Patching: A pavement survey, performed in conformance with the MDOT SHA Pavement Design Guide, will be performed prior to the proposed resurfacing. The depth and material of required permanent patches will match the depth and material of the existing pavement. The depth and material of required permanent partial depth patches will be consistent with RFP PR 4.6.4.1.1. Based on our preliminary pavement survey, a longitudinal crack exists between the two travel lanes from the beginning of the project to approximately Sta. 342+00 and from Sta. 553+00 to the end of the project. Wagman/WRA will fill the existing crack with a crack filler material prior to resurfacing. In addition, areas of pavement distresses were noted within the existing shoulders. The asphalt surface appears to have de-bonded from the base or observed extensive cracking is limited to the surface course. In these areas, the surface course will be removed prior to resurfacing, instead of patching. Other areas of distress noted during our preliminary pavement surveys will be repaired as noted above based on repair guidelines provided in the Pavement and Geotechnical Design Manual. These areas include the existing MD 32 NB shoulder from Sta. 226+00 to Sta. 229+50, near Sta. 334+00, and Sta. 490+00 to Sta. 495+00. Also included is the existing MD 32 NB mainline near Sta. 253+00 and the merge lane from Parliament Place, and the existing MD 32 SB near Sta. 425+00. As noted above, a pavement condition survey will be performed prior to pavement resurfacing. Full depth pavement patches are not anticipated due to the thickness of the pavement and the severity of the pavement distresses noted in the preliminary survey. All travel lanes that fall on top of existing travel lanes, all auxiliary lanes that fall on top of existing auxiliary lanes, and all shoulders that fall on top of existing shoulders will not be reconstructed but will be patched and resurfaced consistent with the RFP and the MDOT SHA Pavement Design Guide.

Subgrade Preparation: For new roadway, widening, or reconstruction areas, if wet unsuitable soils are encountered at subgrade, a subgrade improvement strategy will be implemented to provide the minimum design subgrade resilient modulus of 4,500 psi. Subgrade improvement will consist of undercutting 1-foot of unsuitable soils and replacing with selected borrow or geotextile stabilized select borrow. Based on the preliminary information provided by MDOT SHA and our experience on projects in the area, soil cement does not appear to be a viable option to increase the design subgrade resilient modulus beyond the minimum 4,500 psi. Based on the subsurface data provided, undercut of poor unsuitable soils is anticipated in the following areas: Sta. 275 to Sta. 277, Sta. 318 to Sta. 321, Sta. 360 to Sta. 381, the vicinity of S6 (Sta. 467 to Sta. 474), and Sta. 396 to Sta. 414.

The subgrade will be test rolled in conformance with Section 204.03.01c of the Standard Specifications for Construction and Materials to verify that the section of subgrade provides a stable construction platform and the minimum design subgrade strength of 4,500 psi. If the subgrade does not pass test rolling, the area will be improved to a point where it meets or exceeds the required subgrade strength and will be verified through additional test rolling.

Pavement Drainage: The pavement drainage system will include longitudinal underdrain, underdrain outlets and a free

4.2 Safety and Mobility | Continued



draining granular base layer. The longitudinal underdrain spacing, size of underdrain and details will conform to the requirements provided in RFP PR 4.3.2.5.3 and the MDOT SHA Pavement Design Guide. As noted above, the proposed pavement sections include a minimum 4" granular base layer to facilitate pavement drainage.

Geotechnical Design: MDOT SHA has completed a preliminary subsurface investigation. Samples obtained from this investigation and geologic maps were reviewed to determine the site geology. The project is in a Piedmont area, with crystalline rock overlain by residuum. Alluvium may be encountered at the surface of small stream crossings. A supplemental subsurface investigation, developed in conformance with RFP PR 8, will be performed. Soil parameters for geotechnical design elements will be developed based on laboratory test data. Drained friction angles of granular soils will be based on correlations with SPT test results. Fill and cut slopes will be constructed no steeper than 2H:1V. Roadway slopes that are greater than 20 feet in height will include a bench. Fill slopes will include geotextile inclusions placed along the edge of the fill embankments as required. If needed, based on the results of slope stability analyses using limit equilibrium methodologies (PC STABL, ReSSA or GSTABL), basal reinforcement will be added to provide the required safety factor against slope instability. Long and short-term settlement analyses (immediate, consolidation and secondary settlement) will be evaluated and the fill embankments will be designed to limit the estimated total long-term settlement to 1 inch over 50 years. Geologic maps indicate that the overburden thickness is expected to be less than 20 feet along areas of the site. Rock outcrops were observed in some locations. Based on field observations and available subsurface data, rock excavation methods are anticipated in the vicinity of S1, S3, and the SWM ponds left of Sta. 260 and Sta. 413.

Landscape Design: Wagman/WRA will develop the landscape design in conformance with RFP PR 7 and other applicable RFP requirements.

Reforestation: The MD 32 Project will be designed and constructed to minimize impacts to existing individual trees, woods and forest stands by reducing the limits of disturbance through innovated engineering and construction techniques including roadway footprint reductions, elimination of SWM facilities, roadway alignment and profile refinements, steepening embankment slopes, support of excavation, etc. to the maximum extent practical. The RFP concept design estimated 115.92 acres of forest land will be cleared. Wagman/WRA's design is estimated to clear approximately 74 acres of forest, a savings of 42 acres of forest. To compensate for forest removal, the project will re-establish forest through reforestation plantings at suitable sites within the project corridor at a mitigation ration of 1 to 1. This will include 58 acres of reforestation within the LOD and another 16 acres within the project limits but outside the LOD. The reforestation density and planting stock will be in conformance with MDOT SHA Landscape Design Guide and Maryland Department of Natural Resources Reforestation Law 5-103 and as approved in ATC No. 23R – Reduced Reforestation Plantings.

Screen Planting: The MD 32 Project will remove existing plantings along select portions of the alignment and reduce the buffer to adjacent residences. In areas where an insufficient buffer remains due to the project improvements, screen plantings will be installed in conformance with the RFP to compensate for the loss and in support of the community. Screen plantings will be added next to communities, including communities at Sta. 318 Lt., Sta. 430 Lt., Sta. 442 Rt., and Sta. 458 Rt. The density and planting stock will be in conformance with RFP PR 7.4.3.

Revegetation Planting: Revegetation plantings will be installed to the reforestation density and planting stock noted above in areas that are unable to meet reforestation credit in conformance with RFP PR 7.4.5. Areas of revegetation planting will not qualify as reforestation under the Maryland Reforestation Law.

Turfgrass: Turfgrass will be established in conformance with RFP PR 7.4.1 in areas requiring regular mowing, such as in curbed medians, grass swales, ditches, and for the replacement of turfgrass on private properties. Turfgrass sod will be placed only where prompt turfgrass stabilization is necessary.

Naturalized Areas: In areas where regular mowing is not required to maintain sight distance such as center of open medians or other open space areas, an Upland Meadow Establishment seed mixture will be placed in conformance with RFP PR 7.4.2.

Stream Restoration Plantings: Plantings will be installed to revegetate banks and floodplains of reconstructed or rehabilitated stream areas. Restoration of these areas will be in conformance with RFP PR 7.4.7.

SWM Facilities: The MD 32 Project will design and construct several types of SWM facilities to meet the MEP requirements including grass swales, bioswales, dry ponds and microbiovention. Temporary and permanent vegetation for SWM facilities will be in conformance with RFP PR 7.4.8.

Traffic Control Devices (TCD): Wagman/WRA will coordinate with other disciplines, other projects, and local

jurisdictions for the design and construction of the project TCDs in conformance with RFP PR 6 and PR 15 and other applicable RFP requirements. TCDs will include: signing (standard, ground mounted and overhead/cantilever structure mounted guide); inlaid pavement markings; roadway lighting; and traffic signals and systemization. All Design Requests (DR) and traffic analyses required for the project design and construction will be in conformance with RFP PR 6.4.

Signing: Proposed signing within the project limits will be fully-compliant with all applicable standards including addressing any existing deficiencies, as well as replacement or removal of signing outside the project limits required for the operational changes associated with the MD 32 Project. Along MD 32 mainline and ramps, standard signing (regulatory, warning, and guide) signing will be sized for MDMUTCD Expressway size, with fonts for custom guide signs following the requirements of MDMUTCD Table 2E-2 & 2E-3. Similar to the MD 32 Phase 1 project, all exit directional guide signing will be installed overhead, and any mainline lane drop guide signs will be installed overhead. All other intersecting roadways will follow the sign size requirements outlined in RFP PR 6.5, including those for J-turn and MD T intersections. All signs will be fabricated of ASTM D4956 Type IV/IX/XI high performance micro-prismatic retroreflective sheeting on aluminum substrates (sheet or extruded for signs larger than 4'x10'). Sign supports will meet MDOT SHA's standard details with breakaway features when not protected by traffic barrier.

Pavement Markings: Proposed pavement markings and markers will be inlaid pavement marking tape with recessed snowplowable raised pavement markers with plastic holders and lenses along MD 32 mainline and ramps in conformance with RFP PR 6.6.1.2 and MDOT SHA's latest Pavement Marking Material Selection Policy and Guidelines for expressways. All other intersecting roadways will follow the pavement markings requirements outlined in RFP PR 6.6.

Traffic Signals: Proposed traffic signals will be designed and constructed in conformance with RFP PR 6.7 and DRs for temporary and permanent signals at the following intersections: MD 32 and Dayton Shop (preemptive on-demand push button operation for maintenance and emergency vehicles) and MD 32 and I-70 WB Ramps. The signal at MD 32 and I-70 WB Ramps will be interconnected with the other signals at MD 144 and I-70 EB Ramps and will include high speed data communication in conformance with the MDOT SHA's ATMS guidelines. All signal cabinets installed will be MDOT SHA supplied NEMA size S with UPS where warranted.

Lighting: Proposed lighting will be analyzed (photometrics), designed (including voltage drop calculations), constructed, and as-built inventory data collected within the project limits in conformance with RFP PR 6.8 to provide LED roadway lighting at intersections with traffic signals and with left turns across MD 32; HPS fixture replacements (specifically at Burntwoods Road interchange); and partial interchange lighting at the MD 32 NB and I-70 WB on-ramp. All proposed light poles will be installed on breakaway bases where not installed behind traffic barrier.

Power Service: Wagman/WRA will coordinate the design, construction, and installation of power services by BGE as needed for all signals and lighting required for the project. We will begin coordination early with MDOT SHA D-7 Traffic and TEDD and will prepare and submit power service applications to BGE. We will continue to coordinate the applications and the schedule for service during design and construction with BGE and MDOT SHA.

Environmental Mitigation: To mitigate for approximately 5.54 acres of wetland impacts associated with the MD 32 Project, Wagman/WRA will design and construct approximately 2.23 acres of compensatory wetland mitigation, in addition to the approximately 3.31 acres of available credit at the Nixon Farm site. Mitigation will be completed at the MDOT SHA selected Gossage Wetland Mitigation site (GWMS). Construction of the GWMS will be initiated prior to completion of authorized project impacts in conformance with MDE and USACE permit special conditions. The GWMS is an existing agricultural field located downstream of the MD 32 crossing near Nixon Farm and adjacent to the Middle Patuxent River (MPR) at Sta. 474 Rt. The MPR will be realigned to the east and with the new channel constructed contiguous to a floodplain palustrine forested (PFO) wetland on the GWMS. The wetland creation will serve to convert the agricultural use, minimize future nutrient and sediment sources, provide essential habitat for native flora/fauna, and provide flood flow protection for MD 32 and MPR. The Phase II Mitigation Plan for GWMS will comply with MDE's Phase II Plan Checklist and MDE Nontidal Wetland Mitigation Guidance.

To mitigate for impacts to Waters of US, Wagman/WRA will work to avoid or minimize impacts to streams and Waters of US to greatest extent practical. Wagman/WRA will complete compensatory stream restoration within the MD 32 Project site along the Rosemary Lane Tributary (RLT) from MD 32 to the confluence with the Middle Patuxent River (MPR) to satisfy MDE and USACE permit special conditions. Additional streams will be relocated to accommodate the proposed project elements. This includes the relocation of Middle Patuxent River at approximate Sta. 471 upstream and downstream

of Structure S6, and two locations along Terrapin Branch (TB), including a realignment upstream and downstream of S7 to accommodate the new bridge crossing and one other reach being relocated at approximate Sta. 495 to accommodate the dualization of MD 32. Proposed stream relocations are anticipated to be self-mitigating and impacts will be minimized to the greatest extent practical. Restoration of RLT and relocation of MPR and TB will involve natural stream channel design including repairing eroded stream banks and modifying the channel geometry within the limits of our proposed work to help mitigate future erosion by reconnecting them to their floodplains. The restored streams/floodplains will help attenuate erosive forces within the channels and downstream sedimentation while providing a valuable segment of wildlife corridor. However, the stream restoration work proposed will not correct various degraded existing stream reaches upstream and downstream of our proposed work. In-stream structures consisting of rock and/or logs will be installed to direct storm flows away from vulnerable banks and to provide grade control. Rock structures will be incorporated to promote oxygenation of the water and provide optimal habitat for benthic macroinvertebrates. Trees needed for log structures will be sourced from suitable native trees slated for removal within the project corridor. Instream habitat features such as root wads, will be installed in pools to provide cover for trout and other native species. Native vegetation will be installed along stream banks to provide stabilization, shade, and habitat for native fauna. New box culverts under MD 32 will be installed at different elevations to allow the waterways to remain connected to the floodplain both upstream and downstream of the roadway crossing. Evidence-based hydraulic models and computations will be used to support the proposed design of stable stream habitats.

Utilities: Underground and aerial utilities are located throughout the MD 32 Project corridor owned by BGE Electric, BGE Gas, Verizon of Maryland, Comcast Television, Howard County Fiber Networks, Colombia Gas, MDOT SHA (traffic control devices); and private well and septic systems. The MD 32 Project will impact utilities along the corridor at select locations, requiring their relocation. Except for MDOT SHA facilities, all impacted utilities are being relocated by their respective owners. Except for impacted utilities at the proposed Triadelphia Road bridge replacement, impacted utilities relocation will be performed after the MD 32 Project's Notice to Proceed. In order to facilitate the utility relocations, Wagman/WRA will maintain and provide access to existing utilities and proposed relocations, including the design and construction of a temporary utility access path beginning near the Terrapin Branch crossing at MD 32 and extending to the proposed Access Road 4 connecting Vistaview Drive to the south with MD 144 to the north. The temporary access path will be able to accommodate a SU 30 truck with a drivable surface. Access Road 4 will be designed to carry both SU 30 trucks servicing utilities facilities and vehicles access to properties now connecting to Access Road 4. At the completion of the MD 32 Project, utilities access along MD 32 will be provided with outside grading along the outside shoulders or auxiliary lanes. Wagman/WRA will coordinate with BGE to maintain existing and to activate new services to MDOT SHA signals and lighting.

4.2.B. IMPROVEMENTS TO NETWORK TRAFFIC OPERATIONS AND REDUCTION OF CRASHES

The MD 32 corridor is expected to experience a more than 75% increase in ADT by the 2040 design year. Therefore, as noted by MDOT SHA's selection of Safety and Mobility as Goal 1 on the project, addressing corridor traffic operations and safety is critical. At the highest level, the project traffic operations can be described by heavy directional volumes through the corridor with 50% of the volume entering and exiting the network at the I-70 interchange, which is the northern project limit. The MD 32 NB PM peak volume is the heaviest with queues from the MD 32 and I-70 WB Ramps intersection spilling back south through the MD 32 and MD 144 intersection. Therefore, providing improvements to address the MD 32 NB PM peak volumes would be the most important project element to maximize to contribute to improving traffic operations and safety. However, since the segment of MD 32 between MD 144 and I-70 is already dualized and it is located at the northern end of the project limits, improvements in this segment need to take a secondary place within this fixed-price procurement in order to achieve MDOT SHA's more critical goals of maximizing the number of continuous four-lane dualized roadway lanes miles while providing a project that maximizes the project elements.

As such, within the fixed-price afforded, Wagman/WRA is proposing to construct the maximum number of continuous four-lane dualized roadway lane miles possible from the limits of the MD 32 Phase 1 Dualization at Linden Church Road to MD 144, with additional improvements north of MD 144 at the MD 32 NB and I-70 WB on-ramp intersection by constructing a second left turn lane along MD 32 NB and a second receiving lane along the I-70 WB on-ramp. **These improvements will improve network traffic operations and reduce crashes while being designed to accommodate**

the future planned corridor improvements as depicted in the 2005 FEIS. The proposed improvements will also meet MDOT SHA's objectives for reducing network delay for both the AM and PM peak periods for the 2040 design year when compared to the no build condition; for ensuring that all of the signalized intersections, along with the basic, merge, diverge, and weaving sections, operate at a Level of Service E or better in the 2040 design year; and for reducing the crash rate for rear-end collisions, between MD 144 and the I-70 interchange, and corridor-wide.

MDOT SHA provided VISSIM files as part of the RFP package for the projected 2040 volumes for the No Build and RFP (Build) scenarios. The microsimulation traffic modeling software model extends from south of the interchange with MD 108 to just north of the interchange with I-70, though these files do not include all the ramps with I-70, nor I-70. The No Build and Build were evaluated to determine where the problem areas are in the corridor. Then Wagman/WRA developed its own VISSIM model of our proposed improvements to test alternatives in order to present a proposal that would provide the best overall value for this fixed-price design-build procurement, while meeting the RFP goals, value statements, and objectives of providing the maximum number of continuous four-lane dualized roadway lane miles on MD 32 while maximizing the project elements to improve corridor traffic operations and safety. Alternatives were tested to evaluate improvements that would provide the greatest traffic operational benefit while meeting the more critical goal of maximizing the dualized roadway. The following is a quantitative and qualitative summary of the traffic operations and safety analyses and benefits for the MD 32 Project as proposed by Wagman/WRA and summarized in Section 4.2.A. herein.

Summary of Key Traffic Operations and Safety Benefits:

- In the AM peak hour, the MD 32 Project reduces delay by 57.7 seconds, a **55% reduction over No Build conditions**. In the PM peak hour, delay is reduced by 140.0 seconds, a **47% reduction over No Build conditions**.
- In the AM peak hour, the MD 32 Project reduces the average number of stops from 2.90 stops per vehicle to 0.79 stops per vehicle, a **73% decrease over the No Build condition**. In the PM peak hour, the average number of stops reduces from 12.35 stops per vehicle to 2.67 stops per vehicle, a **78% decrease over the No Build condition**.
- The MD 32 Project greatly reduces latent demand. The MD 32 Project reduces latent demand during the AM peak hour to 18 vehicles for a **reduction of 99% over the No Build condition** and reduces latent demand to 217 vehicles during the PM peak hour, a **decrease of 86% over the No Build condition**. Latent demand primarily comes from MD 32 north of I-70 and from MD 144 west of MD 32. With the increased capacity along MD 32 with the MD 32 Project, **more vehicles are able to enter the network** from these entry points.
- In the AM peak hour, the number of intersection approaches **operating at LOS 'E' decreases from five to two**, with two of these approaches improving to LOS 'D' or better. In the PM peak hour, the number of approaches **operating at LOS 'F' decreases from six to four with significant decreases in delay for two approaches that continue to operate at LOS 'F'**. Delay along the eastbound MD 144 approach will **decrease by 23% as compared to No Build conditions**, and delay along the I-70 Eastbound Off-Ramp will **decrease by 77%**.
- With the MD 32 Project, the lane-miles operating at LOS 'F' **decreases by 31% during the AM peak hour and by 25% during the PM peak hour, as compared to No Build conditions**.
- The most significant safety benefit of the MD 32 Project is the dualization of the roadway with grass median with W-beam traffic barrier (similar to a raised median), which will **reduce the predicted number of crashes by 29%, and the predicted number of fatal and injury crashes by 49%**.
- Other area-wide safety improvements in the MD 32 Project include shoulder rumble strips (**16% reduction in predicted number of crashes**), wet-reflective pavement markings (**14-16% reduction, dependent on weather**), and several other improvements that are not included in the *AASHTO's 2010 Highway Safety Manual* (HSM) or the Crash Modification Factors (CMF) Clearinghouse, but can be expected to improve safety, such as near side traffic signals. Local improvements include replacing the left-turn movements from Parliament Place, River Valley Chase, and Rosemary Lane with right turns only followed by a downstream U-turn (**51% reduction**) and signal controller upgrades to allow MDOT SHA implementation of adaptive signal control at the three signals from MD 144 to the I-70 WB Ramps intersection (**17% reduction**).

Network Traffic Operations:

Quantitative Analyses – Model Description: The following modifications were made to the Build files to match the concept plans and existing geometry, as well as to ensure that the network includes all facilities whose operations are impacted by

4.2 Safety and Mobility | Continued



the MD 32 Project: corrected an error in the lane configuration along MD 32 NB at the ramp to I-70 EB where one of the through lanes became the off-ramp; added I-70 to the network, based on its existing geometry, including all ramps within its interchange with MD 32 to ensure that the impacts of operations at this interchange are included in the model; added the missing left-turn lane and left-turn volume from MD 32 SB to Parliament Place EB that exists today; added the existing right-in, right-out intersection with Stiles Way; corrected the length of the southbound left-turn lane at MD 144 and added the southbound right-turn lane; added the continuous right-turn lane along MD 32 NB from Parliament Place to Rosemary Lane; added the acceleration lane from the proposed J-turn located approximately 0.5 miles north of Rosemary Lane.

The MD 32 Project includes continuation of the dualization of MD 32 from MD 108 to MD 144, similar to the RFP Alternative. While the RFP Alternative proposed changing the signal phasing at the intersection of MD 32 at MD 144 from concurrent phasing along the MD 144 approaches to split phasing, the MD 32 Project, which maintains existing geometry at this intersection due to project budget constraints, maintains concurrent phasing with no widening at the intersection. WRA's evaluation found that implementing concurrent phasing results in lower delay and less latent demand as compared to converting to split phasing. At the I-70 interchange, a second MD 32 NB left-turn lane is provided at the I-70 WB on-ramp, along with a second receiving lane along the ramp that merges to one lane, similar to the RFP alternative.

Quantitative Analyses – Overall Results: VISSIM has several measures of effectiveness (MOEs) to summarize traffic operations. The following MOEs were selected for a basis of comparison of the No Build to the MD 32 Project models. Table 2 provides a summary of VISSIM outputs for the No Build scenario and MD 32 Project.

- **Average Delay** – the time, in seconds, spent by a vehicle traveling through the network over its no-stop travel time. This measurement is an average of all vehicles throughout the network.
- **Average Number of Stops** – the number of times the average vehicle must come to a stop while traveling the network.
- **Latent Demand** – the number of vehicles that are unable to enter the network due to queues that extend outside the network. As these vehicles never enter the network, they are not factored into other MOEs.
- **Travel Time** – the time, in minutes, of a vehicle traveling along MD 32 across the network. This is measured in both directions and serves as a measurement of operations along MD 32 only, independent of operations along side streets.
- **Number of LOS 'E'/'F' Approaches** – while the objective in the RFP is that all signalized intersections operate at LOS 'E' or better, some intersection approaches continued to operate at LOS 'F' with the RFP Alternative. This was one of the key early drivers for the development of alternatives by Wagman/WRA to determine if these LOS 'F' intersections could be improved. Intersections can be configured to prioritize overall improvement while letting one or two approaches fail. Therefore, this analysis evaluates how many intersection approaches, both signalized and unsignalized, operate at LOS 'F', as well as how many operate at LOS 'E', to better understand the problem areas.
- **Lane-Miles of LOS 'E'/'F'** – one of the RFP objectives is that all basic, merge, diverge, and weaving segments operate at LOS 'E' or better. This MOE evaluates the individual lanes to account for segments where one or more lanes may operate at an acceptable LOS while other lanes do not, such as where there is a lane drop in a downstream segment that prompts vehicles to distribute unevenly amongst the lanes.

Table 2 - Improvement Alternatives [2040]

Scenario	AM Peak Hour		PM Peak Hour	
	No Build	MD 32 Project	No Build	MD 32 Project
Average Delay (s)	104.0	46.3	295.2	155.2
Average # Stops	2.90	0.79	12.35	2.67
Latent Demand (veh)	1,530	18	1,571	217
NB Corridor Travel Time (min)	12.8	11.6	47.6	26.6
SB Corridor Travel Time (min)	15.6	11.6	13.4	12.4
# LOS 'E' Approaches	5	2	3	3
# LOS 'F' Approaches	0	1	6	4
Ln-Mi of LOS 'E'	5.93	0.00	0.61	0.27
Ln-Mi of LOS 'F'	1.82	1.25	14.77	11.10

Travel Times by Segment: During the AM peak hour, when the peak direction of travel is southbound, travel times decrease over No Build conditions by 4.0 minutes (26%) with the MD 32 Project. Northbound travel times decrease over No Build conditions by 1.2 minutes (9%) with the MD 32 Project. During the PM peak hour, when the peak direction of travel is northbound, travel times decrease over No Build conditions by 21.0 minutes (44%) with the MD 32 Project. Southbound travel times decrease by 1.0 minute (7%) with the MD 32 Project. The significant decrease in northbound travel time can be attributed to dualization of MD 32, as projected 2040 volumes are well above the capacity of the existing configuration of one through lane per direction.

Intersection Results: The objectives of the RFP include ensuring that all signalized intersections operate at LOS 'E' or better in the 2040 design year. All other approaches operate at LOS 'D' or better during both peak hours with each scenario. Note that some approaches operate with greater delay in the MD 32 Project compared to No Build conditions due in part to increased throughput to these intersections with dualization of the MD 32 corridor. While all signalized intersections operate at an acceptable LOS 'D' or better with No Build conditions, some individual approaches operate at LOS 'F'.

- **No Build Conditions** - Six intersection approaches are projected to operate at LOS 'F' during the PM peak hour with No Build conditions, including two approaches with an average delay of over 400 seconds (I-70 EB off-ramp and MD 144 EB). Additionally, five approaches are projected to operate at LOS 'E' during the AM peak hour and three approaches are projected to operate at LOS 'E' during the PM peak hour.
- **MD 32 Project** - One approach would operate at LOS 'F' during the AM peak hour and four approaches would operate at LOS 'F' during the PM peak hour, though many of these approaches will have significantly less delay as compared to No Build conditions. The MD 144 EB approach to MD 32 would continue to operate at LOS 'F' during the PM peak hour, but with a 99.7-second reduction in delay (23%) as compared to the No Build condition, and the MD 144 WB approach would operate at LOS 'C' with a reduction in delay of 48.5 seconds (59%) compared to No Build conditions. The MD 144 EB approach would also improve from LOS 'E' with No Build conditions to LOS 'D' during the AM peak hour with the MD 32 Project, with a decrease in delay of 5.5 seconds (9%). A degradation in delay along the MD 144 NB approach is caused by increased throughput with dualization of MD 32. Additionally, the delay along the I-70 EB off-ramp decreases by 317.2 seconds (77%) during the PM peak hour.

Segment Density: The objectives of the RFP include ensuring that basic, merge, diverge, and weaving sections operate at LOS 'E' or better in the 2040 design year. For this analysis, segments were evaluated by lane and not by overall segment. Evaluating density lane-by-lane ensures that lane utilization is considered so that the most realistic operations of each segment are evaluated. LOS thresholds are based on density per the *Highway Capacity Manual*. For a free-flow speed of 55 mph, LOS 'F' corresponds to a density of greater than 45 vehicles per hour per lane (vphpl), and LOS 'E' corresponds to 36 to 45 vphpl. With No Build conditions, 1.82 lane-miles are projected to operate at LOS 'F' during the AM peak hour and 14.77 lane-miles are projected to operate at LOS 'F' during the PM peak hour. These segments fail due to lack of capacity in the single-lane section, primarily in the northbound direction during the PM peak hour, and due to lack of capacity through the intersections with MD 144 and the I-70 ramps. With the MD 32 Project, the lane-miles operating at LOS 'F' decreases to 1.25 lane-miles (31% reduction) during the AM peak hour and 11.10 lane-miles (25% reduction) during the PM peak hour, as compared to No Build conditions.

Safety:

MD 32 within the study area is characterized by recurring congestion during peak periods. This congestion creates the potential for crashes, particularly rear end and sideswipe crashes. The safety analysis performed for this project identified and evaluated safety trends based on historical crash data along MD 32. The available methods and tools for evaluating roadway safety can be separated into two categories: quantitative and qualitative. Both types of analyses were performed for the MD 32 project and those results are summarized below. Additionally, the predictive crash methods detailed in the HSM were also considered for evaluation as part of this project. However, the Safety Performance Functions (SPFs) for roadway segments on rural two-lane highways are applicable to AADTs up to 17,800 vehicles per day. The AADT along MD 32 well exceeds 17,800, limiting the reliability of using the predictive method for No Build conditions. Due to the unreliability of using the predictive method for the No Build conditions, which would be needed for comparison purposes to the MD 32 project conditions, using this tool for the MD 32 project conditions would provide little benefit in terms of

4.2 Safety and Mobility | Continued



informing decision making. Therefore, the quantitative safety analysis focuses on the review of available crash modifications factors (CMFs) and their application to the MD 32 project

Quantitative Analyses Summary: MDOT SHA's Traffic Development and Support Division (TDS) summarized crash data along the 7.14-mile study corridor of MD 32 between Linden Church Road and I-70 in a memo dated October 12, 2017, see Table 3. During the three-year study period of January 1, 2013 to December 31, 2015, a total of 168 crashes occurred along the corridor, including 50 crashes resulting in injury and 118 crashes resulting in property damage. No crashes resulted in fatality. The most frequent crash types were Rear End (66 crashes/39% of all crashes), Fixed Object (44 crashes/26% of all crashes), Other (20 crashes/12% of all crashes), Left Turn (16 crashes/10% of all crashes), and Angle (16 crashes/10% of all crashes). 14 of the 44 Fixed Object crashes involved Guardrail/Barrier.

Table 3 - Crash Data Summary, 2015-2017 (Source: TDS Memo, October 2017)

Day of Week	# of Crashes	Time of Day	# of Crashes
Sunday	12	12:00 AM to 3:00 AM	8
Monday	21	3:00 AM to 6:00 AM	14
Tuesday	30	6:00 AM to 9:00 AM	31
Wednesday	20	9:00 AM to 12:00 PM	28
Thursday	27	12:00 PM to 3:00 PM	20
Friday	36	3:00 PM to 6:00 PM	31
Saturday	22	6:00 PM to 9:00 PM	18
Total	168	9:00 PM to 12:00 AM	18
Surface Condition	# of Crashes	Total	# of Crashes
Dry	112	Illumination	
Wet	50	Day	98
Snow/Ice	2	Dark – Lights On	35
Other	4	Dark – No Lights	18
Total	168	Dawn/Dusk	13
Reported Year	# of Crashes	Other	4
2013	66	Total	168
2014	57	Crash Type	# of Crashes
2015	45	Rear End	66
Total	168	Left Turn	16
Weather Condition	# of Crashes	Angle	16
Clear/Cloudy	125	Sideswipe	6
Raining	36	Fixed Object: Guardrail/Barrier	14
Snow/Ice	2	Fixed Object: Light Pole	6
Foggy	1	Fixed Object: Sign Pole	6
Other	4	Fixed Object: Other Pole	5
Total	168	Fixed Object: Tree/Shrubbery	5
Severity	# of Crashes	Fixed Object: Culvert/Ditch	4
Fatal	0	Fixed Object: Contr. Barrier	1
Injury	50	Other Fixed Object	3
Property Damage Only	118	Other	20
Total	168	Total	168

The MD 32 Project will dualize the remaining undivided segments of MD 32 between Linden Church Road and I-70 and restrict side street left-turning movements from Parliament Place, River Valley Chase, and Rosemary Lane. The conversion of MD 32 from a two-lane undivided roadway to a four-lane divided roadway results in an overall decrease in the predicted number of crashes. While the HSM does not provide a CMF to indicate an increase or decrease in crashes associated with conversion of a two-lane undivided roadway to a four-lane divided roadway, it has a CMF for providing a

raised median (similar to a grass median with W-beam traffic barrier) on a rural multilane roadway. This CMF is 0.88 (12% decrease) for injury crashes and 0.82 (18% decrease) for non-injury crashes. Likewise, 66 crashes were rear end crashes (39% of all crashes). Rear end crashes are often associated with traffic congestion that will be mitigated with dualization of the roadway through addition of operational capacity.

Additionally, the web-based comprehensive listing of available CMFs including both CMFs included and not included in the HSM, has two CMFs for adding a through lane on both directions and a raised median to a two-lane undivided roadway. One CMF of 0.71 (29% decrease) is provided for all types and severities of crashes, and another CMF of 0.51 (49% decrease) is provided for all types of fatal and injury crashes. Using any of the CMFs for conversion of MD 32 from a two-lane undivided roadway to a four-lane divided roadway results in an overall decrease in the predicted number of crashes.

The CMFs discussed above are summarized in Table 4 and applied to the recent crash history to calculate the predicted crash frequency. It should be noted that the predicted crash frequencies provided for each treatment should be not be added together as they are not independent of one another; rather, each CMF is provided for comparison purposes and for use in identifying relationships between design elements and safety.

Table 4 - Predicted Crash Frequency Scenarios

Treatment						
Location	Setting	Crash				
		Type (Severity)	CMF	Ex. No. (3 yrs.)	Ex. Frequency (crashes/yr)	Predicted Frequency (crashes/yr)
Provide a median						
Area-Wide	Rural (Multilane)	All types (Injury)	0.88	50	16.7	14.7 (-2.0)
		All Types (Non-Injury)	0.82	118	39.3	32.3 (-7.0)
Add a through lane in both directions and a raised median						
Area-Wide	2-Lane Rural Undivided Roadway	All types (all severities)	0.71	168	56.0	39.8 (-16.2)
		All types (Fatal and Injury)	0.51	50	16.7	8.5 (-8.2)
Replace direct left-turn with right-turn/U-turn						
Parliament Place/River Valley Chase	Unspecified (Unsignalized intersections – access points on 4-lane divided arterial)	All types (all severities)	0.49	5	1.7	0.8 (-0.9)
Rosemary Lane				8	2.7	1.3 (-1.4)
Install continuous milled-in shoulder rumble strips						
Area-Wide	Divided Rural Multilane Roadway, AADT of 2,000 to 50,000	All types (all severities)	0.84	168	56.0	47.0 (-9.0)
Upgrade markings to wet-reflective markings						
Area-Wide	Principal Arterial Other Freeways and Expressways	Wet road (all severities)	0.861	112	37.3	32.1 (-5.2)
		Dry weather (all severities)	0.838	56	18.7	15.6 (-3.1)
Adaptive traffic signal control						
MD 144 to I-70 Ramps	Urban and Suburban	All types (all severities)	0.83	64	21.3	17.7 (-3.6)

4.2 Safety and Mobility | Continued



There is also a CMF for providing intersection illumination, which is proposed at all signalized intersections and interchanges within the MD 32 Project. This improvement has a CMF of 0.62 for all types of crashes that occur at night and result in injury. RFP crash data does not report the number of injury crashes that occurred at night at these three intersections. However, it does provide data showing a total of 50 injury crashes and 53 nighttime crashes (and 13 dawn/dusk crashes) network-wide. Based on the CMF, the predicted number of nighttime injury crashes at these intersections within the MD 32 Project will decrease by 38% with the installation of lighting.

Qualitative Analyses Summary: The following improvements are proposed with the MD 32 Project that have safety benefits, but do not have their own CMFs and therefore are summarized qualitatively:

- Recessed pavement markers with plastic holders, which provides greater visibility of lane lines and centerlines and address a noted safety issue with metal housings become projectiles.
- High performance micro-prismatic retroreflective sign sheeting for sheet aluminum and extruded aluminum signs.
- 12-inch near side traffic signal indications, which will improve signal visibility, likely reducing rear-end crashes.
- UPS signal cabinets, which include a battery backup to keep the signals operating in the event of a power failure.
- Maximization of clear zone and use of breakaway traffic control devices, with minimization of traffic barrier, except as needed for protection of obstacles.
- Consolidation of select driveways with direct access to MD 32 to reduce the number of access points consistent with the FEIS and to enhance safety.

4.2.C. 10 AASHTO CONTROLLING CRITERIA

This section evaluates the MD 32 Project to ensure it meets the design guidelines for the following 10 controlling criteria established by the FHWA: 1) Design Speed; 2) Horizontal Curve Radius; 3) Superelevation Rate; 4) Grade – Maximum/Minimum; 5) Stopping Sight Distance (Horizontal and Vertical); 6) Vertical Clearance; 7) Lane Width; 8) Shoulder Width; 9) Cross Slope; and 10) Design Loading Structural Capacity.

Our review was based on the following design guidelines:

- A Policy on Geometric Design of Highways and Streets (2011 Edition) (Green Book)
- A Policy on Design Standards Interstate Systems (January 2005)
- AASHTO Roadside Design Guide (2011 Edition) (RDG)
- Maryland Manual of Uniform Traffic Control Devices 2011 (MDMUTCD)
- SHA Guidelines for Traffic Barrier Placement and End Treatment Design (2006 Edition)

The following conditions within the MD 32 Project do not meet the AASHTO controlling criteria; however, both have received MDOT SHA and FHWA Design Exception approval. Further, the MD 32 Project design will include mitigation for these conditions as described below.

1. The maximum grade on MD 32 from Sta. 433+42 to Sta. 447+60, south of Rosemary Lane will match existing at 6%, exceeding the AASHTO maximum of 4% for this type of roadway. Mitigation strategies proposed on the MD 32 Project include roadway dualization which will allow faster moving vehicles to pass slower moving vehicles; and, a continuous auxiliary lane in the MD 32 NB downgrade direction between Parliament Place and Rosemary Lane allowing vehicles accessing these streets to have additional area to accelerate or decelerate.
2. The superelevation rate on MD 32 NB, Horizontal Curve MD32NB-2 and MD 32 SB, Horizontal Curve MD32SB-2 at the MD 144 intersection will be lower than AASHTO criteria in order to avoid having to adjust the MD 144 profile substantially to the east and west, thereby significantly reducing impacts to environmental resources. Mitigation strategies proposed on the MD 32 Project include retaining the existing traffic signalization and intersection lighting at this location to encourage lower travel speeds and to provide better illumination; Inlaid high-retroreflective pavement markings along MD 32 to provide better visibility; and MD 32 resurfacing to provide better side friction for vehicles through these curves.

All other MD 32 Project elements meet the design guidelines for the 10 AASHTO controlling criteria. The conditionally approved ATC No. 18R allowed for the reduction in travel lane width to 11'. However, we are retaining a travel lane width of 12' width since this follows AASHTO design guidelines for this roadway classification and avoids the need for a design exception. Additionally, the 12' wide travel lanes allow for the roadway to be fully compliant with the future FEIS design as shown on FEIS Figure II-I Typical Sections for Mainline MD 32. The FEIS reclassifies MD 32 from arterial to freeway.



STATE HIGHWAY
ADMINISTRATION

TECHNICAL PROPOSAL

MD 32

SOUTH OF LINDEN CHURCH ROAD TO I-70
DESIGN-BUILD | CONTRACT NO. H07565370



4.3

PROJECT SCHEDULE & PROJECT MANAGEMENT

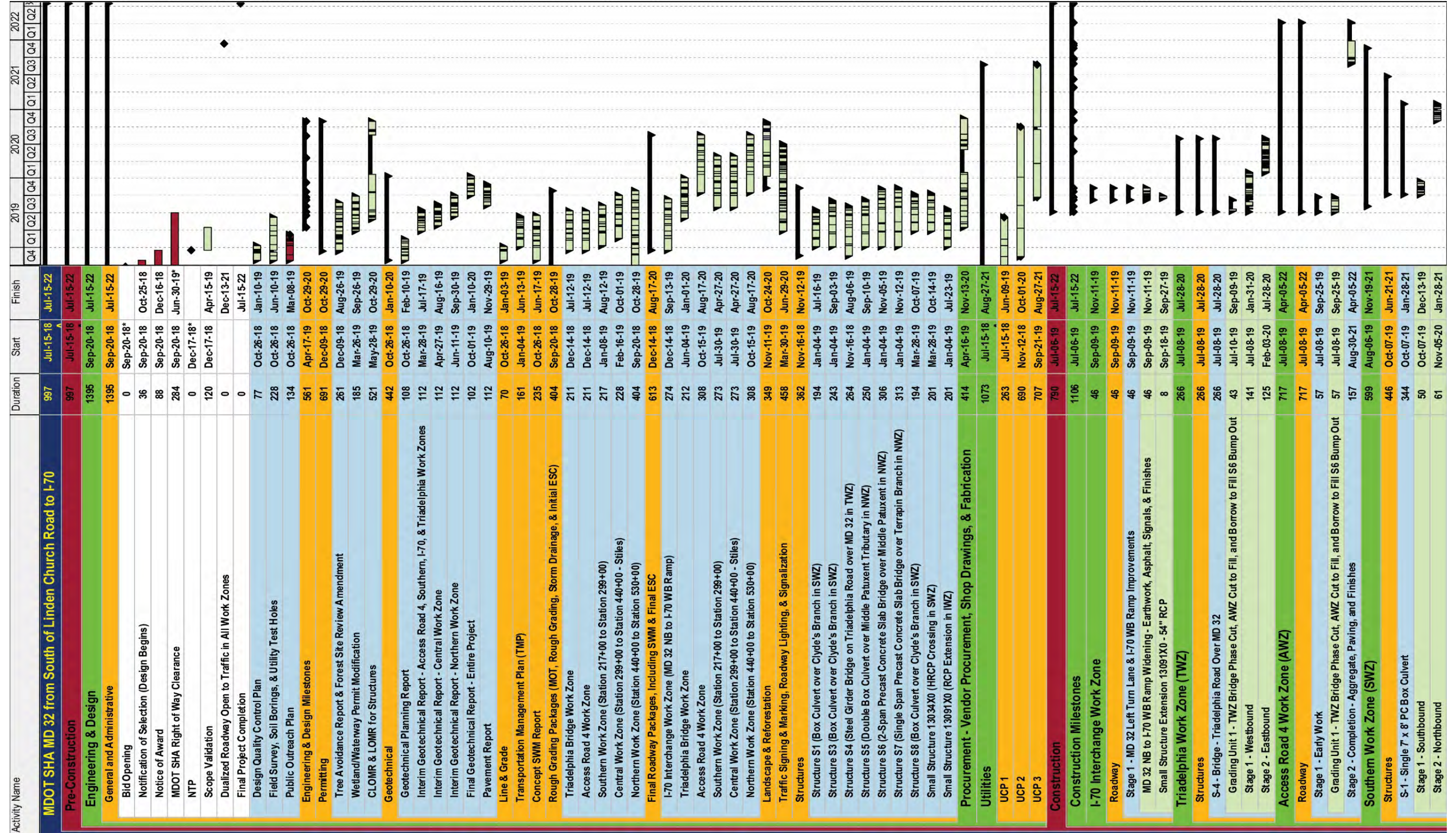


General Construction | Heavy Civil | Geotechnical

4.3 Project Schedule & Project Management



PROJECT SCHEDULE



4.3 Project Schedule & Project Management



4.3.A. PROJECT SCHEDULE (CONTINUED)

General: Wagman/WRA understands that the project schedule is a significant goal to the MD 32 Project. Our understanding of the MD 32 Project has yielded a balanced schedule that accounts for the resources required to design and build the project, as well as the work restrictions that we must be planned and approvals/permits that must be received. Wagman/WRA will deliver the following schedule benefits to MDOT SHA: **Dualized Roadway Open to Traffic in All Work Zones by December 13, 2021 with a Final Project Contract Completion Date of July 15, 2022.**

Project Staging: Wagman/WRA is proposing to construct the MD 32 Project in six construction work zones (see **Figures 1 through 4 in the Appendix herein**) with three mainline MD 32 work zones (southern, central, and northern), an Access Road 4 work zone, a Triadelphia Road work zone, and an I-70 Interchange work zone. The three MD 32 work zones will generally be staged in the same manner as discussed below. Access Road 4 and Triadelphia Rod Bridge work will be completed in two stages while the I-70 improvements completed in one stage.

Stage 1: Traffic will remain on the existing MD 32 roadway while the new MD 32 SB roadway is constructed. Structures under the MD 32 SB roadway will be completed within the footprint of construction.

Stage 2: Traffic will shift to newly constructed MD 32 SB. Improvements will be made to the existing roadway as needed to convert it to the new MD 32 NB roadway. Structures under the MD 32 NB roadway and median work will be completed.

Stage 3: Traffic will be dualized. Construction will consist of final surface paving, final striping, and rumble strips on the new MD 32 SB roadway under MOT conditions with at least one lane open at all times.

Annual Work Restrictions: Our project schedule accounts for work restrictions that are reasonably expected or contractually stipulated through various work-day calendars. The calendars set aside the appropriate time where work may proceed and are individually assigned to each activity in the schedule. The calendars ultimately can be grouped into the following three categories:

Weather: Activities that may suffer potential weather impacts have been placed on calendars that reasonably anticipate those impacts. The bulk of our activities for non-specialized work (clearing & grubbing, E&SC, storm drainage, earthwork, and traffic barrier) have been placed on a five-day work calendar. We plan to use weekend time to recover any lost time suffered during the week for weather. Placement of GAB has been placed on a restricted calendar due to temperature restrictions with work from March until Thanksgiving in any given calendar year. Asphalt work also has been placed on a restricted calendar due to temperature and precipitation with work from April through October in any given calendar year. Landscape and planting work also has been placed on a restricted calendar due to weather concerns and contractual limitations with no work occurring in the months of January or July. Concrete and structural work has not been placed on a restricted calendar as our experience working in this region gives us confidence that we can mitigate this schedule risk by following industry accepted best practices for cold weather concrete placement if necessary.

Streams: The project area includes Use IV-P streams; therefore, work may only occur from June 1 through February 28 of any calendar year. All stream work has been placed on a stream restricted calendar so that no work impacting a stream will occur within the restriction period. This calendar applies to activities that impact streams associated with all of the structures on the project and one required stream relocation in the Northern Work Zone.

Triadelphia Road Bridge: The work activities for the Triadelphia Road Bridge construction have been placed on a restricted calendar in line with the requirements outlined in the MOT section of the RFP and discussed under Section 4.3.C. herein. The traffic detour and work to replace the bridge is to occur from July 8, 2019 through July 28, 2020.

Design Submittals: Our project schedule accounts for multiple, sequentially completed, design submittal packages to expedite design approvals/permitting and initiate construction within a work zone as early as possible. Proposed design packages for each work zone, as applicable, will include: Project-Wide Roadway Line and Grade; Rough Grading including initial sediment and erosion control (E&SC), clearing and grubbing, initial earthwork excavation and embankment, initial drainage, and MOT; Final Roadway including final E&SC, fine grading, roadway, final drainage, stormwater management (SWM), pavement, and MOT; Structural including separate packages for each bridge and box culvert; Stream Restoration/Relocation; Wetland Creation; Roadway Lighting; Signing and Pavement Markings; Traffic Signalization; and Project-Wide Landscaping and Reforestation.

Other design submittals have been accounted for in the project schedule including: an Early Work Package for advanced clearing along MD 32 north of Burntwoods Road for a utility path from MD 32 to Access Road 4 and along Access Road 4 for utility owners to initiate their utility relocations; Design Quality Control Plan; Public Outreach Plan; Transportation

Management Plan; Tree Avoidance and Minimization Report and Forest Site Review Amendments; Wetland/Waterway Permit Modifications; CLOMR Revisions; Phase II Wetland Mitigation Plan submissions; Stream Relocation/Restoration submissions; Interim and Final Pavement Reports; and Interim and Final Geotechnical Reports including Foundation Reports for each structure. Early work activities for supplemental survey, pavement and geotechnical investigations, utility test pitting, etc. have also been accounted for in the project schedule.

Our project schedule includes an IDQM review period and/or reasonably expected or contractually stipulated review periods for other entities (e.g., PRD, MDE, DNR, ACOE, OOS, utility owners, etc.) Our project schedule also provides for an internal design QC and/or constructability review period for each submittal. Although not specifically tied to work activities, we understand that MDOT SHA has a 21-day review period for audit/concurrence prior to signature for approval.

Construction Work Zones: As noted above, the MD 32 Project as proposed by Wagman/WRA will be divided into six construction work zones (see Figures 1 through 4 in the Appendix herein) in a way that best balances environmental disturbance, flow of materials, design and construction resources, and time of year and contractual work restrictions, while minimizing impacts to the traveling public and local community. The following is our approach to the specific work zones:

Triadelphia Work Zone (TWZ): The TWZ includes the Triadelphia Road Bridge and all necessary incidental work to complete the bridge and approach roadway work including clearing & grubbing, E&SC, drainage, earthwork, shoring, bridge demolition and construction, stone base, asphalt, signing, striping, and traffic control. Work in this area will begin on or about July 8, 2019 with clearing and grubbing, E&SC, drainage followed by bridge demolition and reconstruction. The first stage is expected to be completed with the traffic switched to the second stage by January 31, 2020 with the final stage of construction including all approach roadway work completed by July 28, 2020. Our plan uses only 12 of the 15 months allowed for the detour, thereby minimizing the impact to the local schools, community, and businesses.

Access Road 4 Work Zone (AWZ): The limits of the AWZ include all work from the proposed tie in at Vistaview Drive to the connection at MD 144. Work will begin on or about July 8, 2019 with clearing & grubbing, earthwork, drainage, and the utility access path. Initial work in AWZ will be complete on September 25, 2019 to provide the area to the utility companies until the completion of UCP 3 relocations. Depending on phasing in this area, the access road may be used early for residential and Nixon Farm ingress and egress. The final stage for Access Road 4 will begin on or about August 30, 2019 and includes placing GAB, asphalt paving, and other finishes. The AWZ will be fully complete by April 5, 2022.

I-70 Interchange Work Zone (I-70WZ): The I-70WZ limits are Sta. 554 to Sta. 560. Construction elements include MD 32 NB median widening for an additional left turn lane, I-70 WB on-ramp widening for a second receiving lane, and the extension of Small Structure 13091X0 under the ramp. Work will begin on or about September 9, 2019 and will be completed on or about November 11, 2019 with traffic signal work, resurfacing, signing and pavement markings. This work will occur early to gain operational improvements at the MD 32 and I-70 interchange as soon as possible.

Southern Work Zone (SWZ): The SWZ begins at the southern terminus of the project and extends to Sta. 299. Major construction elements include Structures S1, S3, S8, Small Structure 13034X0, 106,000 CY of balanced excavation to fill, GAB, asphalt, SWM facilities, and traffic barrier. Stage 1 work in this area will begin on or about August 6, 2019 and will include the portion of structures under MD 32 SB. The work has been divided into two grading units. Work will begin at Sta. 299 and work toward Sta. 230 between cuts and fills while hauling off road. Once the area is stabilized, a second grading unit from Sta. 230 to the southern terminus will begin on or about April 3, 2020. GAB, base asphalt, and striping will start on or about April 28, 2020 and is set to be completed by November 4, 2020. Upon completion of Stage 1, Stage 2 construction will begin including the second portion of the structures, earthwork for MD 32 NB shoulder widenings, and median work. Upon completion of these activities on or about June 21, 2021, asphalt rehabilitation will begin for MD 32 NB followed by surface paving and final traffic control devices. The dualized roadway will be opened on or about September 22, 2021. Stage 3 surface paving on MD 32 SB under lane closures will then begin followed by striping, rumble strips, and landscaping with final completion of the SWZ on or about November 19, 2021.

Central Work Zone (CWZ): The CWZ begins at Sta. 299 and extends to Sta. 440 including the median widening from Sta. 345 to Sta. 387 through the Burntwoods Road interchange. Major construction elements include approximately 200,000 CY of excavation and a net export of 112,000 CY going to fills in the NWZ. The TWZ is adjacent to the CWZ requiring internal coordination for the last two months of concurrent TWZ work. Stage 1 work in this area will begin on or about May 22, 2020 at Sta. 299 working toward the north making local cuts to fills with off-road equipment before hauling excess material over the road to fills in the NWZ. Earth disturbing work area is dependent upon the stabilization of the

4.3 Project Schedule & Project Management | Continued



SWZ due to grading unit acreage limitations. Temporary sediment traps at proposed SWM ponds will be used along MD 32 NB and MD 32 SB. When work up to Sta. 345 is sufficiently stabilized, construction will begin at Sta. 387 working north toward Sta. 417. This area will generate the balance of the excess material that will be trucked to the NWZ. Upon sufficient stabilization up to Sta. 417, work will continue north toward Sta. 440. The final section from Sta. 417 to Sta. 440 is balanced and is expected to be worked off road. As earthwork, drainage, and stabilization of the area is completed, GAB, asphalt, traffic barrier, SWM facilities, and temporary striping will occur in the CWZ from south working to the north while deferring work between Sta. 345 to Sta. 387. On or about May 4, 2021, Stage 2 will begin with traffic shifted to the newly constructed MD 32 SB roadway and continue to be split from Sta. 345 to Sta. 387 (Burntwoods Road interchange). Upon completion of earthwork from Sta. 417 to Sta. 440, pavement widening will be performed on MD 32 SB and MD 32 NB concurrently, from Sta. 345 to Sta. 387. Traffic will remain split through this section until MD 32 NB rehabilitation is complete. After the traffic switch to the MD 32 SB roadway, asphalt rehabilitation will begin for MD 32 NB followed by surface paving and final traffic control devices. The dualized roadway will be opened on or about September 29, 2021. Stage 3 surface paving on MD 32 SB under lane closures will begin followed by striping, rumble strips, and landscaping with final completion of the CWZ on or about December 3, 2021.

Northern Work Zone (NWZ): The NWZ begins at Sta. 440 and extends to Sta. 530. Major construction elements include Structures S5, S6, S7, 51,000 CY of excavation, 202,000 CY of fill, stream relocations, wetland mitigation site construction, GAB, asphalt, SWM facilities, and traffic barrier. The majority of the fills on the project occur within this work zone so the advancement of earthwork and structures in NWZ is critical to the schedule. Stage 1 work in this area will begin on or about July 16, 2019 after approval of an early work package to build a temporary runaround road to start the first phase of S6 NB. The temporary road (Sta. 469 to Sta. 478) will be ready to accept traffic and work on S6 NB and S7 SB will begin on or about November 6, 2019. Work on the first stage of S5 will begin on or about October 22, 2019. Major earthwork activity will begin with constructing the future MD 32 SB roadway from Sta. 478 to Sta. 493. After the final grading unit in the SWZ has been stabilized and allowing time for the Stage 1 S6 and S7 to progress, work will begin on the MD 32 SB roadway from Sta. 493 to Sta. 502 beginning on or about May 22, 2019. The Terrapin Branch stream relocation at Sta. 495 is scheduled to start just after the stream closure period has ended and prior to the start of earthwork moving operations. Work from Sta. 478 to Sta. 493 and Sta. 493 to Sta. 502 also rely on excavation hauled in from CWZ (Sta. 330 to Sta. 345 and SWM ponds) and NWZ ponds along MD 32 SB. Once earthwork is complete and these areas are stabilized, GAB, asphalt, traffic barrier, and temporary striping work will be done. Stage 2 of S6 and S7 will begin with traffic crossing over at Sta. 493 to the new MD 32 SB roadway, remain on the new MD 32 SB roadway to a return crossover at Sta. 475 where motorists will travel over the new S6 NB allowing for Stage 2 S6 (SB) and S7 (NB) work to begin. Earthwork will continue progressing to the north in the next grading unit and local cut to fill will be done on the MD 32 SB side at Sta. 502 to Sta. 511 with more fill placed from Sta. 511 to Sta. 530. Fill from Sta. 511 to Sta. 530 will be hauled from excavation in CWZ from Sta. 347 to Sta. 417. Upon sufficient stabilization from Sta. 502 to Sta. 530, work will begin in the next grading unit. Local cut to fill will start from Sta. 417 to Sta. 448 and Sta. 459 to Sta. 465 and fill from remaining CWZ excavation, wetland mitigation sites, and initial stream excavation for structures will be placed from Sta. 448 to Sta. 459 and Sta. 465 to Sta. 469. Once earthwork is complete and these areas are stabilized, GAB, asphalt, traffic barrier, and temporary striping work will be completed. On or about April 27, 2021 traffic will shift completely to the new MD 32 SB roadway in the NWZ allowing for construction of Stage 2 S5 (NB), Middle Patuxent Tributary relocation to S5, remaining earthwork, and pavement rehabilitation on the MD 32 NB side. The most critical work in this stage includes the earthwork from Sta. 455 to Sta. 467 which is a balanced cut to fill with fill being placed from Sta. 472 to Sta. 495. The Middle Patuxent River will be relocated to S6 to allow for the removal of the existing S6 and completion of SB fill. Terrapin Branch will be relocated to S7 for the removal of existing S7. Excavation will be hauled from remaining stream relocation material stockpiles and excavation sites. S5 will be completed on or about October 14, 2021 allowing for the completion of roadway widening from Sta. 440 to Sta. 455. Work will begin on the MD 32 NB asphalt rehabilitation from Sta. 440 to Sta. 455 and Sta. 495 to Sta. 530 followed by surface paving and final traffic control devices. The dualized roadway will be opened on December 13, 2021. Stage 3 surface paving on MD 32 SB under lane closures will begin followed by striping, rumble strips, and landscaping with final completion of the NWZ on July 15, 2022.

4.3.B. PHASING AND MAINTENANCE OF TRAFFIC

General: Wagman/WRA will design and construct the MD 32 Project in coordination with MDOT SHA's goal of minimizing disruptions to the community and the traveling public, while completing the project in a timely and efficient manner. The MD 32 Project's construction phasing is designed to allow Wagman/WRA to expeditiously obtain the necessary design approvals and permits in a sequenced and coordinated manner to allow for the construction of bridge and drainage structures outside of designated stream restriction periods, balance of earthwork, coordination and facilitation required utility relocations, maintenance of access and minimization of impacts to the community and traveling public throughout construction, and maintenance of drainage patterns and protection of the environment at all times. Wagman/WRA proposes to design and construct the MD 32 Project in six construction work zones as described in Section 4.3.A. herein.

The Transportation Management Plan (TMP) process, in conformance with RFP PR 10.5 and other application RFP requirements, will be used to develop work zone strategies to balance impacts to traffic while maximizing work areas. As the TMP is a "living document" it will be used throughout design and construction to guide the maintenance of traffic implementation for the project. Wagman/WRA will develop the TMP in coordination with project stakeholders including MDOT SHA ICD, D-7 Construction, D-7 Traffic, D-7 Community Liaison, Office of Traffic and Safety; Howard County DPW, Howard County Public Schools, emergency services, adjacent construction contracts, and utility companies performing relocations. ATSSA Certified MOT Managers will review and assist with TMP development. The TMP access and mobility plan and public outreach sections will be two of the key sections to provide strategies to mitigate and inform the community and project stakeholders as to potential traffic disruptions during construction. The TMP will include an assessment of work zone impacts, work zone traffic analysis, and work zone impact management strategies to minimize traffic impacts that occur within/near the work zone and/or along the detour route. The work zone impacts assessment portion of the TMP is the heart of the TMP, where the MOT alternatives are evaluated in the MOTAA section. The MOT Red Flag Summary will identify MOT issues that should be considered during project development. Per the TMP implementation and monitoring plan the Traffic Manager will monitor work zone traffic, and if operational concerns (e.g. excessive queuing and/or delays, safety concerns, etc.) are observed, opportunities for improvements to traffic conditions will be investigated including, mitigation measures such as additional notification and outreach activities and/or the modification of temporary traffic control set-ups and devices to minimize or mitigate impacts to traffic will be implemented. At the monthly partnering meetings MOT design and construction issues will be discussed to provide an opportunity for project stakeholders to voice concerns regarding the work zone impacts, with action items assigned to the appropriate project team member for follow-up. The Wagman/WRA team will also have daily MOT discussions and have daily MOT equipment inspections during construction. Per the TMP incident management plan, emergency response within the Project Limits will include a trained incident response team who will provide MDOT SHA details regarding the potential cause of the incident; remedial actions; responsible individual(s); and the expected duration of the disruption. MDOT SHA will serve as spokesperson with affected parties including CHART and local media for all emergency and/or unforeseen disruptions. Per the TMP contingency plan, Wagman/WRA will consult weather forecasts prior to scheduling work and associated temporary traffic control set-ups to determine whether forecasted weather events pose a hazard to workers and/or the traveling public. If so, during these events work will not be scheduled that requires temporary traffic control and only work that is protected by a temporary concrete traffic barrier will be performed.

The MD 32 Project maintenance of traffic (MOT) plans will be per the approved TMP and will be fully coordinated with the erosion and sediment control and maintenance of stream flow plans. The project will include minimum temporary travel lane widths of 11-ft with a minimum of one 10-ft shoulder in one direction and one 2-ft shoulder in the opposite direction on MD 32 during construction. Temporary concrete traffic barrier will be installed in all locations where drop-offs would occur within the roadway clear zone such as at culverts and bridges. All temporary lane closures will be in conformance with RFP SP 104, adhering to work restrictions and temporary lane and shoulder closure schedules. All buffer and taper lengths, clear zone distances, attenuator arrangements, and other temporary traffic control elements will be developed in conformance with RFP PR 10 and other applicable RFP requirements, including MDOT SHA standards and guidelines, MDMUTCD/MUTCD, and AASHTO. If included in the approved TMP, we will implement any speed reductions and/or Automated Speed Enforcement (ASE) in coordination with MDOT SHA. We will also coordinate to ensure the trucking industry is aware of any oversize load restrictions along MD 32 during construction. The three primary MD 32 work zones

4.3 Project Schedule & Project Management | Continued



(SWZ, CWZ, and NWZ) will be constructed in three primary construction stages as described earlier in Section 4.3.A. herein. Construction will occur in one or more work zones at a time as noted below. Depending on construction progress temporary crossovers will be built at the interface between work zones to allow traffic to switch between work zones that are in different stages of construction.

Triadelphia Work Zone (TWZ): Construction in the TWZ will be broken out into an early work package and will overlap with Stage 1 work in the CWZ. The work consists of replacement of Structure S4 in two stages utilizing a Triadelphia Road EB traffic detour during both stages. Temporary lane closures using flagging and/or traffic drags on MD 32 will be implemented during the bridge demolition and steel erection. Refer to Section 4.3 C. below for more details on the Triadelphia Work Zone.

Access Road 4 Work Zone (AWZ): AWZ will be constructed in two stages with any early work stage to facilitate the relocation of utilities. Access Road 4 will be cleared and grubbed with rough grading sufficient to allow utility companies access as early as possible. The Access Road 4 will be completed under a later stage and opened to traffic prior to disruptions due to the NWZ to Fox Chase Road and the four driveways along MD 32 SB between Fox Chase Road and MD 144. Access to these roadways and driveways will be maintained at all times as described above. The earthwork roughly balances for the AWZ.

I-70 Interchange Work Zone (I-70WZ): The I-70WZ will be constructed in one construction stage consisting of MD 32 NB median widening for a second left turn lane and ramp widening along the I-70 NB on-ramp for a receiving lane. Traffic along MD 32 and access to the I-70 ramps will be maintained at all times. All existing travel and auxiliary lanes will be maintained in their current configuration. The second left turn lane will be opened to traffic early in the schedule to improve operations at the MD 32 and I-70 interchange.

Southern Work Zone (SWZ): Construction in the SWZ will follow Stages 1, 2, and 3 as described above in Section 4.3.A. herein. All turn lanes into and out of the Dayton Shop will be maintained throughout construction with access provided at all times. At the southern terminus a temporary crossover will be constructed in Stage 1 at Sta. 224 to allow MD 32 NB traffic to cross over onto the new MD 32 SB roadway during Stage 2. The SWZ includes three SWM ponds along MD 32 SB which will be constructed in Stage 1. The SWZ also includes three box culverts and one small structure pipe culvert that convey Clyde's Branch or tributaries of Clyde's Branch beneath MD 32; S3 will be constructed on the same alignment as an existing culvert and includes a 60" RCP parallel relief pipe; S8 will be constructed on the same alignment as an existing culvert; S1 will be constructed on a new alignment; and Small Structure 13034X0, will be replaced. The initial portion of these structures under MD 32 SB will be built during Stage 1 and the remaining portion of these structures under MD 32 NB will be built during Stage 2. The maintenance of stream flow and construction staging for the three structures will be similar with installing temporary diversions pipes under Stage 1 and extending diversions pipes under Stage 2 (see Figures 6A and 6B in the Appendix herein for Typical Culvert Sequence of Construction Plans). After the new culvert construction is complete, the temporary diversion pipes will be either removed or filled and abandoned in place. The earthwork roughly balances for the SWZ.

Central Work Zone (CWZ): Construction in the CWZ will generally follow Stages 1, 2, and 3 as described above in Section 4.3.A. herein except Stage 1 work will occur in the median along MD 32 NB and MD 32 SB at the Burntwoods Road interchange. Access to Burntwoods Road will be maintained throughout construction. During Stage 1 all existing ramps will remain open and temporary crossovers will be constructed at Sta. 344 and Sta. 394. During Stage 2 all traffic will be maintained along MD 32 SB. MD 32 NB to Burntwoods Road traffic will use the temporary crossover at Sta. 344 and traffic from Burntwoods to MD 32 NB will use the temporary crossover at Sta. 394. The MD 32 SB dualization construction at the existing crossover at Sta. 390 will be constructed in two sub-stages 1A and 1B in order to maintain traffic during full depth pavement reconstruction in this area. Access to Parliament Place/River Valley Chase and Stiles Way will be maintained at all times. All existing turns into and out of the Parliament Place/River Valley Chase and Stiles Way will be maintained during Stage 1. During Stage 2 turn lanes into and out of River Valley Chase will be provided and access to Parliament Place and Stiles Way will be provided on the existing MD 32 roadway with access from Rosemary Lane. During Stage 3 access to these roadways will be provided in the ultimate roadway configuration. The CWZ includes 10 SWM ponds along MD 32 SB which will be constructed in Stage 1 and includes two SWM ponds along MD 32 NB which will be constructed in Stage 2. The CWZ has more excavation than fill. Excess material in this zone will go to the NWZ. Demolition of the existing Triadelphia Road Bridge will be completed before major earthmoving operations begin in

the CWZ to allow hauling to occur off road.

Northern Work Zone (NWZ): Construction in the NWZ will generally follow Stages 1, 2, and 3 as described above in Section 4.3.A. herein. At the northern limit of the NWZ near MD 144, a temporary crossover will be constructed in Stage 1 at Sta. 522 to allow MD 32 NB traffic to cross back onto the existing MD 32 NB roadway during Stage 2. Access to Rosemary Lane will be maintained at all times. All existing turn lanes in and out of the Rosemary Lane will be maintained during Stage 1. During Stage 2 turn lanes into and out of the Rosemary Lane will be provided on the new roadway. During Stage 3 MD 32 SB left turning vehicles into Rosemary Lane will travel south to Parliament Place to use the new J-turn at this location to return to Rosemary Lane. Access to driveways in the NWZ will be maintained at all times. The NWZ includes 3 SWM ponds along MD 32 NB which will be constructed in Stage 2. The NWZ also includes S5, S6, and S7. The portion of S5 under MD 32 SB will be built during Stage 1 and the portion of S5 under MD 32 NB will be built during Stage 2. For Stage 1, temporary dual 60" pipes will extend the stream flow beyond the work area for the MD 32 SB roadway and S5 SB construction. Stage 2 will be split into two sub-stages. Stage 2A will include construction of the portion of the structure below MD 32 NB and a majority of the upstream stream realignment grading. During Stage 2A, stream flow will be collected upstream of the stream realignment limits using dual 60" pipes and piped through the work zone to the existing structure. During Stage 2B, the upstream dual 60" pipes will be shifted to convey flow to the new structure. Stage 2B will also include final stream relocation work and filling the existing structure and dual 60" diameter pipes below MD 32 SB with flowable fill.

The MOT for Structures S6 and S7 will be coordinated as approved in ATC No. 6 – Middle Patuxent Bridge (S-6) Eliminate Temp Bridge with MD 32 Shift. In implementing ATC No. 6, we have eliminated the need for temporary bridges and/or pipes and thereby improved the project schedule by five months. During the first part of Stage 1, MD 32 will be temporarily relocated at the proposed location of the S6 NB bridge via a temporary runaround road. With traffic maintained on existing MD 32 and the temporary roadway, the S6 NB bridge, MD 32 SB roadway from just north of S6, the S7 SB bridge, and a temporary cross over north of the S7 SB bridge will be constructed. Also, a second crossover will be constructed just north of the new S6 NB bridge to MD 32 SB. Traffic will then be switched to run across the new S6 NB bridge to the second crossover to MD 32 SB and will stay on MD 32 SB across the new S7 SB bridge to the new crossover back to existing MD 32. During this traffic configuration, the new S6 SB bridge, the new S7 NB bridge, and the reconstructed MD 32 NB roadway from north of S6 to north of S7 will be constructed. Traffic will then be switched back to MD 32 NB. With the completion of S6 and S7, the Middle Patuxent River and Terrapin Branch streams will be relocated. By this time the remainder of Stage 1 will be complete, and traffic will be shifted to MD 32 SB to begin Stage 2 construction. During Stage 2 the existing S6 and S7 bridges will be removed and reconstructed as full depth pavement. The NWZ requires more fill than excavation. Embankment material in this zone will be trucked off road from the CWZ.

TRIADELPHIA ROAD PHASING CONSTRUCTION TIMELINE AND MAINTENANCE OF TRAFFIC

General: The MD 32 Project will include the replacement of existing Bridge No. 13045 on Triadelphia Road over MD 32 (Structure S4) and improvements to the approach roadways leading up to the bridge. The bridge replacement will accommodate the proposed improvements along MD 32. In conformance with the RFP, Wagman/WRA is proposing a two-span, haunched steel girder bridge of similar configuration to the nearby Burntwoods Road Bridge over MD 32. The bridge typical section will include two 12' lanes, a 6' shoulder, 5'-8" sidewalk, and 1'-7" parapet along the westbound side, and an 8' shoulder and 2' parapet on the eastbound side. A new sidewalk will be carried to the west to a reconstructed entrance to the Royal Farms store and to the east to a reconstructed entrance at the Westwood Furniture Store. A new entrance to the Olde Tyme Liquor Store along Triadelphia Road EB west of the bridge will be constructed in coordination with a redevelopment plan for this parcel. Design and construction of the Triadelphia Road Bridge and associate approach roadway work will be broken out into an early Triadelphia Road Work Zone (TWZ) package and will overlap with Stage 1 work along MD 32 in our Central Work Zone (CWZ) package as described in Section 4.3.B. herein. The timeline for design and construction as discussed below is included in our project schedule outlined in Section 4.3.A. herein. Most construction work, including demolition, excavation support, foundations, concrete, and steel erection, will be self-performed by Wagman; thereby allowing for faster construction and reducing risk to the schedule.

Bridge Construction Phasing and Traffic Control: During the Technical Proposal and bid development phase, Wagman/WRA investigated several options for the replacement of the bridge to minimize or eliminate the need for the

4.3 Project Schedule & Project Management | Continued



detour of Triadelphia Road, including a slide-in-place accelerated bridge construction option and a temporary bridge option. Although these options were determined to be feasible, they were also determined not to be cost efficient for this fixed price procurement and added risk to the project in the form of potential additional utility relocations and inadequate right of way. Therefore, since MDOT SHA had a limited budget for the MD 32 Project and desired to maximize the number of continuous four-lane dualized roadway lane miles along MD 32, maximize the project elements, and improve corridor traffic operations and safety, the added cost was determined better used toward those higher project goals. As such, Wagman/WRA is proposing to construct S4 in two major stages with one Triadelphia Road WB lane being maintained on the bridge and Triadelphia Road EB traffic being detoured during both stages of construction. The detour is one-way and will only affect Triadelphia Road EB. As outlined in our project schedule, Triadelphia Road EB traffic will be detoured from approximately July 8, 2019 through July 28, 2020 encompassing only the 2019-2020 School Year. The detour route for Triadelphia Road EB traffic described in the RFP is being proposed and will follow Ten Oaks Road NB to a right onto Burntwoods Road EB to a left onto MD 32 NB to a right onto Rosemary Lane SB to a right onto Triadelphia Road WB to return to the bridge location. MD 32 SB traffic heading toward Triadelphia Road will be directed to follow Rosemary Lane SB to a right onto Triadelphia Road WB to return to the bridge location. The detour route is approximately 4.7 miles from the Ten Oaks Road intersection and 2.4 miles from Rosemary Lane. This detour is unchanged from what has been discussed with and accepted by the public and Howard County DPW. As a condition of the Transportation Management Plan (TMP), a work zone impacts assessment and traffic analysis will be performed on the detour route. The entire detour route will be analyzed with an emphasis on the intersection of MD 32 and Rosemary Lane. We will ensure that adequate MD 32 SB left turn lane storage is provided for the additional vehicles turning onto Rosemary Lane resulting from the rerouted traffic heading toward Triadelphia Road. We will also modify the intersection to prohibit left turns from Rosemary Lane onto MD 32 SB to enhance safety at this intersection. No construction work will occur along MD 32 from the Burntwoods Road on-ramp to Rosemary Lane during the detour to maintain current conditions. In addition, the existing travel lanes and shoulder widths will be maintained in this section during the duration of the detour. We will also review the detour route to determine if any minor improvements can be provided within the right of way or cost-effective work zone impact management strategies employed to improve safety along the detour while it is in operation. Potential improvements may include additional signing, ensuring all MUTCD required warning signs are installed along the detour, and/or installing speed-activate, battery-operated flashing hazard identification beacon for vehicles traveling at excessive speeds along alignment or at the speed posted curve on Rosemary Lane. We will conduct a review of issues brought up by local residents during the Public Meeting held on April 18, 2018 regarding cut through traffic on Rosemary Lane and Walt Ann Drive and farm vehicles needing to traverse the bridge during staged construction to determine if any minor improvements may be implemented to address these concerns.

Coordination: Wagman/WRA will coordinate with Howard County DPW on any potential solutions on county roadways. We will also coordinate the detour route and implementation as early as possible with Howard County Public Schools to alleviate any concerns and to assist them with their school bus rerouting for the 2019-2020 school year.

Design: Prior to beginning construction of S4, Wagman/WRA will prepare all design packages required for construction of Triadelphia Road as outlined in our project schedule. Constructability reviews will occur during all milestones throughout design. In support of our design efforts, we will perform supplemental field surveys, perform utility test holes, and obtain soil borings as needed. Throughout the design process, constructability reviews will be performed to eliminate issues that may delay construction. Due to the accelerated schedule between Notice of Selection and construction initiation, a Concept SWM package covering the TWZ only will be developed for approval in conjunction with the overall project Concept SWM package. Concurrent with the TWZ Concept SWM package, a TWZ Rough Grading package will be developed for approval consisting of MOT plans, initial ESC, and drainage elements to allow early construction activities to begin while the TWZ Bridge Design packages (e.g., TS&L/Foundation, Structural/Final Review, and Revised Final Review) and TWZ Final Roadway package are being developed for review and approval. We will schedule submissions to obtain IDQM certification/PRD approval of the TWZ Concept SWM and Rough Grading packages by June 17, 2019 and July 12, 2019, respectively, and IDQM certification/OOS approval of the TWZ Final Structure Design package by August 6, 2019 and IDQM certification/PRD approval of the TWZ Final Roadway package by January 1, 2020. As portions of S4 packages are reviewed and ready for approval, the process for procuring materials such as piling, rebar, structural steel, etc. will begin

4.3 Project Schedule & Project Management | Continued



including the preparation/submission/approval of shop drawings. Shop drawings are scheduled to be initiated by May 14, 2019 and be ready to release for fabrication by July 11, 2019.

Pre-Stage 1 and Stage 1 Construction: Prior to the beginning of construction of S4 and along the approaches of Triadelphia Road, several utilities on both the northside and southside of S4 will be relocated by utility owners to clear the work zone of conflicts as part of UCP 1 – Triadelphia Road: Pole and UG conduit relocations. UCP-1 relocation work has recently begun with initial clearing and is anticipated to be completed by mid-June 2019, prior to the beginning of the detour. Relocations include utility poles carrying BGE, Comcast, and Verizon, a 4” BGE gas main, and an underground Howard County Fiber Optic conduit. Also, existing MDOT SHA Traffic ITS – Virtual Weigh Station equipment will be removed by the MDOT SHA. Prior to initiating Stage 1 construction, Wagman/WRA will perform pre-stage construction work such as preparing and submitting shop drawings for S4 including bridge girder, foundation, reinforcement steel, support of excavation, and debris shield (for the removal of the existing bridge). Also, traffic control devices consisting of temporary concrete traffic barrier, attenuators, temporary construction warning signs will be installed along MD 32. The route markers for the detour route will be installed with detour signs covered over until the detour is implemented. A dry-run of the proposed detour will be performed with MDOT SHA to review sign locations and visibility. Signs will be adjusted as necessary. Pre-stage earth disturbance and tree clearing operations will be commenced after IDQM certification/PRD approval of the Rough Grading package has been obtained and the DNR Forest Site Review Amendment has been obtained. With approvals and permits in-hand, E&SC measures will be installed for TWZ for clearing and grubbing operations and S4 earth disturbing construction activities. At least two weeks prior to the initiation of the detour, Portable Variable Message signs (PVMs) will be installed along both directions of Ten Oaks Road, Triadelphia Road WB, and MD 32 SB to advise motorists of the pending detour. Also, Wagman/WRA will support MDOT SHA with advanced public outreach in conformance with the approved TMP and our team’s approved Customer Outreach Plan, refer to the response to Section 4.4C on Customer Outreach. A “pardon our dust” meeting will be held to inform local residents and businesses about the detour route and the proposed construction schedule/sequence. The start date for the detour implementation and Stage 1 construction will be on or about July 8, 2019 and will occur after the time of school closure for the 2019 School Year which is scheduled for June 17, 2019 but may be as late as June 21, 2019 depending on the need for makeup days. Upon completion of all preparatory work, the temporary signs will be uncovered along the detour route, the Triadelphia Road EB lane will be closed across the existing bridge, and temporary pavement markings and temporary concrete barrier on the bridge will be installed. With the detour being implemented, the Stage 1 bridge demolition and construction will begin. A single face temporary barrier will be bolted thru the bridge deck maintaining an 11’-6” Triadelphia Road WB travel lane and 3’ sidewalk along the south side of the bridge and a 6” buffer between the back of the barrier and the work zone. The following is the proposed schedule for Stage 1: Start bridge demolition work on or before August 12, 2019 with the bridge foundation and substructure work starting on or before September 10, 2019. Start bridge superstructure work on or before November 11, 2019 with roadway approach work in early January 2020. Stage 1 work to be completed in late January 2020. Temporary lane closures using flagging and/or traffic drags on MD 32 will be implemented during the bridge demolition, steel erection, and other activities over MD 32, in conformance with Section 104 SP restrictions.

Stage 2 Construction: Wagman/WRA anticipates switching to Stage 2 construction on or about February 3, 2020. At this time the one lane of WB traffic will be shifted to the newly constructed north side of the bridge. A single face temporary concrete barrier will be bolted to the bridge deck maintaining a 13’-10” Triadelphia Road WB travel lane and 5’-8” sidewalk along the north side of the bridge and a 6” buffer between the back of the barrier and the work zone. The remaining bridge demolition will begin on or about February 5, 2020 with remaining foundation and substructure work beginning on or about March 9, 2020. The remaining superstructure work will begin on or about May 8, 2020 with the remaining roadway approach work performed in late June and completed by July 24, 2020. After Stage 2, two-way traffic will be reopened on the new bridge and the detour will be removed on or about July 28, 2020. Final surface pavement and final pavement markings will then be installed during temporary lane closures using a flagging operation and Triadelphia Road construction will be complete. Wagman/WRA is planning to complete Stage 2 construction and remove the detour approximately one month prior to schools reopening for the 2020-2021 school year. This one month will provide Wagman/WRA a buffer to address any issues that arise during construction.



TECHNICAL PROPOSAL
MD 32
SOUTH OF LINDEN CHURCH ROAD TO I-70
DESIGN-BUILD | CONTRACT NO. H07565370



4.4

WELL MANAGED PROJECT



4.4 Well Managed Project



4.4.A. APPROACH TO COORDINATING WITH POTENTIAL UTILITY RELOCATIONS

General: Wagman/WRA understands the many challenges associated with the protection, maintenance, and required concurrent relocation of utilities on the MD 32 Project. As such, our Project Utility Coordinator, Jason Hershey (Wagman), will proactively oversee and coordinate all Wagman/WRA design and construction activities potentially effecting the utilities within the project corridor (e.g., BGE Electric, BGE Gas, Verizon, Comcast, Howard County Fiber Optic, Columbia Gas, MDOT SHA Traffic Control and ITS Device Connections, and Private Wells and Septic Systems). During the Technical Proposal phase, Wagman/WRA reviewed available documents including test pit information, completed utility research, and held numerous meetings, including attending the MDOT SHA Utility One-on-One Meeting, to discuss design modifications and construction techniques that may be employed to avoid or minimize anticipated utility impacts, and to sequence the project's design and construction activities to best coordinate with those of the third party utilities. We have gained a deeper understanding of the known utilities in the project corridor, prepared a detailed utility map, identified work areas requiring advanced clearing and utility company access, and developed a conceptual design that avoids and minimizes impacts and an integrated design and construction schedule that sequences anticipated utility relocation work activities with our work activities to the greatest extent practical. Even so, as a first order of work upon notification of selection, we will immediately request, conduct, and facilitate (led by Mr. Hershey) a Utility Conference with MDOT SHA (OHD, District 7 Utility Engineer, District 7 Construction, etc.) and all utility owners to preview and discuss the design and/or construction status and schedule of all anticipated utility relocations, our design and construction status and schedule, utility coordination, and to identify and discuss constructability issues. At this meeting, we will also discuss utility clearance requirements, establish overall expectations for each utility owner, develop an issue resolution process and matrix, and establish a utility coordination/partnering meeting schedule. Many utilities will be relocated in advance of our construction activities; therefore, we will check the as-built conditions against our design to ensure utility owner requirements are being met both during construction and after completion. Throughout design and construction of both the MD 32 Project and the utility relocations themselves, Wagman/WRA will be very proactive to ensure effective utility coordination. We will hold frequent utility coordination/partnering meetings with MDOT SHA and all utility owners to ensure the adequate protection and maintenance of all utility service, to review compatibility and constructability of completed designs with existing utilities and proposed relocations, to resolve conflicts, to discuss and adjust schedules, to evaluate avoidance and minimization alternatives, and to discuss MOT and permitting. Utility coordination will be a topic at weekly Wagman/WRA coordination meetings and internal utility task force meetings and during weekly field construction meetings. As part of change management, it is extremely important to have both the project and utility designers using the most up-to-date information and be notified of revisions to minimize potential impacts. As needed, separate meetings during design and construction will be held between Wagman/WRA, MDOT SHA, and individual utility owners to facilitate coordination and resolve conflicts and issues quickly and proactively.

Wagman/WRA understands there are numerous public and private utilities within the project limits that may be impacted by the project that require coordination as noted above. We also understand there are several utilities within the project limits (e.g., Columbia Gas and BGE Gas Transmission) that most likely will not be impacted by the project but will still require coordination during design to avoid impacts and during construction to ensure we meet required clearance and protection requirements when construction activities are adjacent to these utilities. We further understand there are several utilities within the project limits (e.g., MDOT SHA Traffic Control and ITS Devices) that will be the responsibility of Wagman/WRA to design and/or relocate, and to coordinate the power connections. Additionally, should private septic impacts be unavoidable, Wagman/WRA will be responsible to coordinate with the property owner and Howard County Department of Health on the relocation and/or removal of the existing system. For the existing septic system located at 2920 MD 32, MDOT SHA is responsible for coordinating with the property owner. Also, Wagman/WRA is responsible for abandoning the onsite wells and septic systems in conjunction of the removal and disposal of the structures located on seven impacted properties. We understand a utility access path is required for the relocation of utilities from Sta. 485+50 to Sta. 530+00 for the ultimate build-out of MD 32 as depicted in the FEIS. This access path will be utilized by utility owners to facilitate their relocations and thus needs to be available for their use as a first order priority for the MD 32 Project.

The following is our approach to utility coordination and minimizing impacts to utilities during design and construction:

Underground Facilities: During the design phase, Wagman/WRA will obtain design and/or as-built documents from utility owners and will test hole as needed at critical locations (e.g., drainage features, SWM facilities, bridge footings,

traffic barriers, etc.) to verify the as-built location of the relocated utilities. Also during design, to confirm the cover, additional test holes will be performed at the proposed ditches since they will reduce the cover over a facility. This information will be shown on the project's utility map and the MD 32 construction plans. In addition, test holes will be performed during construction as needed to verify utility locations. If inadequate cover or clearances are discovered (either during design or construction), MDOT SHA and utility owner will be notified, and a meeting will be commenced to discuss the issue and potential means and methods to minimize or avoid the conflict. A course of action will be developed at the least cost with minimal impact to the project schedule.

Columbia Gas: A gas transmission line crosses MD 32 near Sta. 220+00. Based on MDOT SHA supplied test hole data, it appears there will be a minimum of 3 feet of cover between top of the facility and the proposed ditch inverts; therefore, no impacts are anticipated. Wagman/WRA will provide construction plans showing work activities, cross-sections, and other supporting documents including construction equipment and techniques (e.g., excavation, compaction of subgrade, etc.) to Columbia Gas for review during the design phase to obtain their concurrence prior to finalizing the design. Columbia Gas will be notified a minimum of 72 hours in advance of any work activities near and/or above their facilities.

BGE Gas: BGE Gas has several crossings under MD 32 within the project limits. A 20" gas transmission line crosses MD 32 near Sta. 271+00. Two test holes were acquired by MDOT SHA at the proposed roadside ditches. Based on this test hole data, there appears to be a minimum of 3 feet of cover between the top of facility to the proposed ditch inverts; therefore, no impacts are anticipated. Wagman/WRA will provide construction plans showing work activities, cross-sections, and other supporting documents including construction equipment and techniques (e.g., excavation, compaction of subgrade, etc.) to BGE Gas for their review during the design phase to obtain their concurrence prior to finalizing the design. BGE Gas will be notified a minimum of 72 hours in advance of any work activities near and/or above their facilities.

A 4" gas line crosses under MD 32 near Sta. 334+50. This facility is in direct conflict with the proposed MD 32 dualization and replacement of the Triadelphia Road Bridge. It is our understanding based on the RFP documents and one-on-one discussions with MDOT SHA that MDOT SHA has coordinated with BGE Gas on the relocation of their facility to avoid the proposed concept bridge construction. Construction of the relocated facility was scheduled to start on July 15, 2018 with a 60-day construction duration. Therefore, this gas line is anticipated to be relocated prior to NTP for the MD 32 Project (December 17, 2018). However, based on a recent field visit it does not appear that BGE Gas work has started; therefore, if their work is not completed by the time we begin our construction activities, we will work with them and MDOT SHA to the greatest extent practical to coordinate any concurrent work activities to minimize conflicts between work activities.

A gas line is located west of the existing MD 32 SB dualization at Burntwoods Road interchange, from approximate Sta. 363+50 to Sta. 365+50. No project improvements are being proposed near this gas line; therefore, no impacts are anticipated. However, during the design phase, Wagman/WRA will verify this remains true through additional field investigations as design progresses and we will provide construction plans showing work activities, cross-sections, and other supporting documents including construction equipment and techniques (e.g., excavation, compaction of subgrade, etc.) to BGE Gas for their review to obtain their concurrence prior to finalizing the design. BGE Gas will be notified a minimum of 72 hours in advance of any work activities near their facilities.

The RFP documents indicate a gas line near Sta. 377+50; however, it was not located through several MDOT SHA test holes. To confirm no potential conflicts with the proposed project improvements, additional test holes at proposed critical drainage features and/or SWM facility inverts will be performed during design and construction. Should the line be located, the project's design and/or construction methods will be reviewed for options to minimize or avoid a conflict.

The RFP documents indicate a gas line is being abandoned near Sta. 427+50 by terminating it along River Valley Chase Road prior to the MD 32 intersection. BGE Gas will be notified 72 hours in advance of any work activities near the abandoned gas line. If the abandoned gas line needs to be removed within the roadway construction work, Wagman/WRA will work with BGE Gas to perform the work in a safe manner and precautions will be taken to properly vent any residual gas that may still reside in the facility; however, we do not anticipate the removal of this facility.

BGE Electric: BGE Electric has several underground facilities within the project limits. The RFP documents indicate an existing underground electric facility near Sta. 428+00, near the MD 32 and Parliament Place/River Valley Chase intersection, will be relocated by directional bore under MD 32; an existing underground electric facility near Sta. 442+50, serving several residences, will be relocated by directional bore; an existing underground facility near Sta. 478+75, near Fox Chase Road, will be relocated with directional bore; and an existing underground facility near Sta. 498+75, near Nixon

4.4 Well Managed Project | Continued



Farm Lane, will be relocated with a directional bore. Preliminary relocation plans of the proposed bores were provided with the RFP documents and were reviewed by Wagman/WRA. We have determined that additional coordination efforts are required as the relocation plans do not depict the proposed conceptual MD 32 roadway alignment. Additionally, coordination will be required to address any roadway alignment revisions being proposed by Wagman/WRA. Our coordination efforts during design will include advising BGE Electric of the proposed MD 32 horizontal and vertical alignments, drainage features, SWM facilities, and traffic barriers that may influence the location and depth of the bore, while working with them to ensure well-coordinated efforts to avoid issues during construction of relocations and the project improvements. If required, traffic control protection at the bore jacking pit and receiving pit will be coordinated. Several of the bore locations are within the proposed detour route of Triadelphia Road; however, our construction schedule indicates this work will be completed by April 10, 2019, well in advance of the implementation date of the detour and in advance of the roadway work, allowing the construction of the bores to be performed prior to the roadway work.

In addition to known replacements of the existing underground facilities, an additional bore at Terrapin Branch, near Sta. 486+00, and near Sta. 498+50 are being considered with a new underground 34KV cable and duct system from a bore near Sta. 498+50 continuing within the MD 32 NB outside shoulder to approximate Sta. 519+00, according to an advanced print of BGE Electric relocation services provided with the RFP documents. These conduit and duct systems appear to be installed in conjunction with relocating aerial facilities along MD 32 to an off-alignment utility corridor adjacent to Access Road 4. Wagman/WRA will coordinate our proposed design with the proposed bores to ensure the depth and length of the bore is compatible with the proposed roadway improvements. If required, traffic control protection along the MD 32 NB shoulder will be coordinated with the installation of the 34KV cable and conduit.

Comcast: An existing underground facility is located along the east side of MD 32 from approximate Sta. 398+00 (3,000 feet south of Parliament Place) to approximate Sta. 464+00 (1300 feet north of Rosemary Lane). The proposed improvements to the existing MD 32 may necessitate the relocation of the existing facility. Preliminary relocation plans were not provided with the RFP; therefore, Wagman/WRA is unable to determine the proposed relocation. However, Wagman/WRA is proposing to maintain MD 32 NB on the existing roadway alignment to the greatest extent practical within this region, limiting the widening of along the eastside. Therefore, a reduction in impacts to the Comcast facility is likely. Within this area, there are four underground crossings which serve facilities on the west side of MD 32. These crossings are located near Sta. 398, Sta. 426, Sta. 479 and Sta. 484. These crossing will be impacted by the proposed MD 32 dualization; therefore, requiring their relocation. Wagman/WRA will coordinate our proposed design with the proposed relocations to ensure the two are compatible. Several of the bore locations are within the proposed detour route of Triadelphia Road; however, our construction schedule indicates this work will be completed by August 8, 2019, just at the beginning of the detour but prior to the beginning of the 2019-2020 school year.

Verizon: Verizon has several underground facilities crossing under MD 32 located near Sta. 428, 444, and 479 and an existing underground facility located on the west side of MD 32 from approximate Sta. 499+00 to MD 144. The proposed improvements to MD 32 will impact these facilities. Concept relocation plans were not provided with RFP; therefore, the proposed relocations are unknown at this time. The proposed relocation of these facilities will be a topic of discussion at the initial Utility Coordination meeting to fully understand the proposed realignments and coordinate required relocations.

An existing underground conduit system is located along the east side of MD 32 from approximate Sta. 496+50 (4500 feet north of Rosemary Lane) to approximate Sta. 529+00 (MD 144 intersection) with a crossing under MD 32 near Sta. 528+50. Based on the utility plans provided with the RFP and our proposed design no impacts are anticipated.

Howard County Fiber Optic: An underground fiber optic system originates from the Dayton Shop and runs along the MD 32 NB outside shoulder to Triadelphia Road where the system crosses under MD 32 and continues east on Triadelphia Road to two public schools and west to Ten Oaks Road. Within this portion of the system, from the Dayton Shop to 2300 feet north, per the RFP documents the system is proposed to be relocated further to the east to accommodate the proposed MD 32 NB acceleration lane from the Dayton Shop. Also, the crossing at Triadelphia Road will be impacted by the proposed Triadelphia Road Bridge replacement. Per the RFP, this relocation work is being performed in advance of the MD 32 Project's NTP and is expected to be completed prior to the initiation of the MD 32 roadway construction. During the design phase, Wagman/WRA will obtain as-built documents from Howard County.

A fiber optic system is located on the east side of MD 32, approximately 550' south of Parliament Place, on power poles at which point it becomes an underground facility with a crossing under MD 32. It remains underground along existing MD

4.4 Well Managed Project | Continued



32 SB outside shoulder to MD 144. At MD 144, the facility remains underground but crosses over and runs adjacent to MD 32 NB outside shoulder toward I-70. With the proposed dualization of MD 32, the entire underground facility from south of Parliament Place to MD 144 will be impacted requiring relocation. Per the RFP documents, a new underground facility will be installed along the eastside of the MD 32 NB outside shoulder and will remain underground at Terrapin Branch. The proposed alignment shown on the fiber optic relocation plans is not compatible with our proposed design and will need to be moved to an alternate alignment. Therefore, as an early work activity, Wagman/WRA will coordinate our proposed design with the proposed system relocation to ensure the relocation is compatible with the proposed roadway improvements. From Terrapin Branch, the facility will become aerial where it crosses over MD 32 to run along Access Road 4 to MD 144. Coordination with the construction of Access Road 4 and BGE and Verizon relocations will be required in this location. At MD 144, the facility will remain aerial to the MD 32 intersection where a new underground system will be installed along both MD 32 SB and MD 32 NB toward I-70. The new system will connect back to the existing system approximately 600 feet north of MD 144. Maintaining the existing facility along MD 32 SB shoulder prior to it being taken out of service will be challenging with the facility in the construction work zone. Wagman/WRA will coordinate with Howard County to determine if select portions of the facilities can be relocated temporarily to facilitate the roadway construction. In other areas, the facility will be protected during construction.

MDOT SHA Traffic Control and ITS Devices: Traffic control and ITS devices associated with the MD 32 Project include traffic signalization at the Dayton Shop and MD 32 NB at I-70 WB ramp; the Virtual Weigh Station (VWS) on MD 32 south of Triadelphia Road for which we will coordinate with MDOT SHA for its removal; roadway lighting at the MD 32 and Burntwoods Road interchange, MD 32 NB at I-70 WB ramp, and connecting roadways/driveways. Wagman/WRA will be responsible for maintaining all existing MDOT SHA facilities that remain in operation during and/or after construction, and for the design and construction of new and relocated facilities. Design will proceed with input from MDOT SHA D-7 Traffic and TEDD and we will coordinate power services by BGE Electric for all devices. We will prepare, submit and coordinate power service applications and schedule during design and construction with BGE Electric and MDOT SHA.

Private Well and Septic Systems: The MD 32 Project may impact the existing septic system located at 3020 MD 32. MDOT SHA is responsible for coordinating with the property owner on relocating the system. If the system is relocated, the existing drain fields and septic tank are expected to be abandoned in place. Should impact to other septic systems and/or private wells be unavoidable, Wagman/WRA will be responsible to coordinate with the property owner and Howard County Department of Health on relocating and abandoning the impacted system. Also, in conjunction with the removal and disposal of structures on seven impacted properties, the existing on-site wells and septic systems will be abandoned in a manner compliant to COMAR 26.04.04.11 and Howard County Department of Health codes.

Aerial Facilities: BGE Electric, Comcast, and Verizon aerial lines cross MD 32 near Sta. 335+00, just north of the Triadelphia Road Bridge. These facilities are in direct conflict with the proposed MD 32 dualization and replacement of Triadelphia Road Bridge. It is our understanding based on the RFP documents and one-on-one discussions with MDOT SHA that MDOT SHA has coordinated with each utility owner on the relocation of their facilities to avoid the proposed concept bridge construction. Construction of the relocated facilities was scheduled to start July 15, 2018 with BGE Electric estimating a 120-day construction duration, Comcast estimating a 90-day duration, and Verizon estimating 120-day duration. Based on the provided durations, all facilities should be relocated before Wagman/WRA begins the Triadelphia Road Bridge replacement construction. Based on a recent field visit it appear that clearing work has started but no overhead relocation work has begun. Therefore, if all facilities are not completed by the time we begin our construction activities, we will work with those utility owners and MDOT SHA to the greatest extent practical to coordinate any concurrent work activities to minimize conflicts between work activities. During the design phase, Wagman/WRA will obtain design and/or as-built documents from BGE Electric, Comcast, and Verizon and will survey the relocated poles and utilities (including wire height) to verify as-built locations. This information will be shown on the project's utility map and the MD 32 construction plans. As our design will not deviate materially from MDOT SHA's concept design, we will use this information to confirm no conflicts exist and to evaluate constructability concerns (e.g., high voltage act clearances, excavation adjacent to poles, etc.) If issues are discovered (either during design or construction), MDOT SHA and the effected utility owner(s) will be notified, and a meeting will be commenced to discuss the issue and potential means and methods to minimize or avoid the conflict. The project team will develop a course of action to minimize impacts to the project schedule and cost.

Other aerial crossings are located near Sta. 272+50, Sta. 364+50, Sta. 380+25 and Sta. 481+50. No impacts at these locations are anticipated due to the project improvements. During design, the poles and crossings will be checked to ensure no impacts to the facilities, such as adequate pole embedment for remaining poles and proper clearance provided over MD 32. During construction, discussion of nearby utilities will be part of our daily safety toolbox talks, and warning signs will be installed to alert construction personnel of overhead electrical facilities. Our on-site personnel will coordinate with the utility companies daily to mitigate any potential conflicts.

Aerial facilities (BGE Electric, Comcast, and Verizon) are located near Sta. 455+50. The proposed project improvements will impact the existing utility poles and require the renewal of the existing poles. Coordination with the utility owners will be required to verify the proposed pole location is compatible with the roadway grading with adequate pole embedment and line heights. Proposed cut/fill depth will be provided to the utility owner for the proper pole height and length. If necessary, advance clearing of trees will be provided to obtain access to the poles along MD 32 SB. Initial pole related work is scheduled to be complete by April 10, 2019 and ultimate UCP 2 utility relocations are scheduled to be complete by October 1, 2020. Earthwork in this area is not scheduled to start until November 12, 2020 so we do not anticipate conflicts in the field related to this relocation. However, if the earthwork in this area begins early, we will coordinate our work with final relocations to avoid schedule impacts.

Three BGE Electrical aerial crossings are located at the northern limits of the project near Sta. 495+00, Sta. 512+50 and Sta. 523+50. These facilities will be impacted by the project improvements. The RFP documents indicate that these facilities are being removed in their entirety with BGE Electric, Verizon, Comcast, and Howard County Fiber Optic facilities being relocated along Access Road 4 from Terrapin Branch crossing at MD 32 to MD 144. The utility access path has an off-alignment portion from MD 32 SB beginning near Terrapin Branch and extending in a western direction to meet Access Road 4 which then serves as the utility access path to MD 144. The access path will be able to accommodate a SU truck on a drivable surface. Concept plans provided in the RFP identify BGE Electric and Howard County Fiber Optic will be relocated on utility poles. Since the access path will be constructed prior to the full completion of Access Road 4 construction, the cut/fill depth of each pole will be provided to BGE Electric for their proposed pole embedment and length. The disposition of Verizon and Comcast is not known as conceptual plans were not provided with the RFP. The construction of the access path is schedule critical; therefore, the initial grading of Access Road 4 has been scheduled as an early work effort to obtain approval by July 5, 2019 with Access Road 4 clearing to begin on or about July 8, 2019 and initial grading completed on or about September 25, 2019. The utility construction phase is scheduled in this area to commence on September 21, 2019; therefore, the area will be ready to accept utility construction equipment. As per the RFP, BGE Electric has estimated a duration of 180 days to relocate their facilities. During the preparation of our pre-bid design, it appears that project improvements may be performed without a complete relocation of these facilities by installing temporary poles to replace existing poles in direct conflict the project improvements. This approach will be investigated further and may be suggested to BGE Electric to accelerate their relocation schedule and/or avoid unintended coordination delays. Daily safety toolbox talks to discuss adjacent utilities and warning signs will be installed to alert construction personnel of overhead electrical.

Aerial BGE Electric is located along the MD 32 NB outside shoulder from approximate Sta. 400+00 to Sta. 530+00 along with other aerial utilities. A majority of the existing system will remain in place except at select locations where MD 32 NB is widened for auxiliary lanes, MD 32 NB roadway vertical alignment is revised, or drainage structures impact utility poles, requiring relocation. The RFP documents include preliminary concept plans of BGE Electric facilities which are based on the RFP concept roadway plans. However, Wagman/WRA is proposing a significant reduction in the limits of the outside grading along MD 32 NB in this location; therefore, impacts to existing utility poles should be greatly minimized. Impacts to existing poles such as proposed cut/fills will be determined and forwarded to BGE Electric to determine if the existing pole can remain or needs to be renewed. During utility relocation, a majority of the work will be along MD 32 NB existing roadway, requiring shoulder closures. We will coordinate MOT needs between Wagman/WRA and the utility owners.

4.4.B. MINIMIZING IMPACTS TO ENVIRONMENTAL RESOURCES

Wagman/WRA shares the high value that MDOT SHA places on environmental stewardship and will ensure compliance to the MD 32 Project's permit and approval commitments and requirements while avoiding and minimizing impacts to sensitive environmental resources, including wetlands, Waters of US (WUS), forest, floodplains, species, and historic/cultural resources, to the greatest extent practical. Wagman and WRA have a proven track-record of delivering

4.4 Well Managed Project | Continued



reductions in impacts on multiple successful design-build projects demonstrating Wagman/WRA's commitment to environmental stewardship. On the ICC Contract A, ICC Contract B, and MD 404 design-build projects, Wagman received avoidance and minimization incentives by reducing impacts to sensitive resources. Wagman optimized roadway design elements on both ICC projects to eliminate excess excavated material and reduce environmental impacts, saving forest, champion trees, and specimen trees and minimizing impacts to wetlands, streams, and floodplains. Wagman reduced impacts to streams by utilizing open bottom culverts to maintain the natural stream channel, installing underground SWM basins to reduce thermal impact, and constructing bioswales for long-term water quality. Wagman achieved a similar reduction in environmental resource impacts during design and construction of the MD 404 project. WRA has also successfully reduced environmental resource impacts on several of its design-build projects, including Arena Drive, MD 237, and MD 32 Phase 1. On Arena Drive, WRA's design resulted in the removal of two SWM ponds, preserving 5 acres of originally permitted forested area impacts. On MD 237, WRA's design significantly reduced originally permitted impacts to wetlands and WUS impacts by reducing the LOD and SWM pond footprints. And, on MD 32 Phase 1, by innovatively minimizing reconstruction of the existing roadway and the associated reductions in the project's LOD, WRA was able to reduce originally permitted impacts to wetlands, WUS, and forest.

Wagman/WRA will deliver the dualization of the MD 32 Project while avoiding and minimizing environmental impacts to the greatest extent practical through sound and proven environmental stewardship measures. Our approach to avoiding and minimizing impacts to sensitive environmental resources and satisfying RFP PR 13 (Environmental Performance Specification) will include an Environmental Compliance Plan (ECP) focused on proactive and close coordination with MDOT SHA and incorporation of avoidance/minimization measures during final design and construction to satisfy all permit, approval, and RFP requirements. The ECP will support strict adherence to commitments and permit requirements in partnership with MDOT SHA while expediting the acquisition of permit modifications and Phase I/II mitigation plans, including wetland mitigation and restoration of the Middle Patuxent River, Rosemary Lane Tributary, and Terrapin Branch. Our ECP will include an organization chart, integrated CPM schedule, environmental impact summary, list of required permits, summary of NEPA and permit requirements, environmental commitments, wetland and stream mitigation design, and a comprehensive avoidance/minimization summary for tracking and reporting. Early and proactive coordination with MDOT SHA will be initiated with a Pre-Permitting Meeting to review permit processes and discuss Wagman/WRA's approach to avoidance/minimization during design and construction. Monthly meetings to review designs and avoidance/minimization efforts will be held with MDOT SHA, Wagman/WRA, and the agencies. Conceptual Avoidance and Minimization Plans that furthers the reduction of wetlands, buffers, WUS, floodplain, and forest impacts will be prepared to establish maximum total allowable project impacts. Avoidance and minimization measures will be considered and implemented during design and may include: roadway footprint reductions, reduced stream relocation, elimination of SWM facilities, roadway alignment shifts, roadway profile refinement, the use of lower impact E&S controls such as diversion fence near environmental features, and steepening embankment slopes. During each design coordination meeting, Wagman and WRA staff will discuss design approaches and construction methods that may be used to avoid or minimize impacts, and ensure constructability is evaluated early and continuously throughout the design process. Each design package will be reviewed for environmental compliance prior to submittal, and final constructability reviews of each design package will ensure construction activities can be accomplished within the established LOD. Wagman/WRA will continuously monitor/track environmental impacts during design and construction. **Wetlands and Waters of US:** Wagman/WRA has modified the RFP Concept Design by incorporating roadway, drainage, and SWM design revisions to minimize impacts to wetlands, buffers, WUS, and floodplains while satisfying the RFP in conformance with 2015 PRD guidelines including: adjustment of a 60" relief pipe adjacent to Culvert S3 as conditionally approved in ATC #15 to minimize floodplain and WUS impacts; elimination of a cross culvert at Sta. 232 to avoid floodplain and WUS impacts; elimination of MBR 474 to minimize floodplain impacts; and elimination of Pond 553 to avoid impacts to a tributary of Terrapin Branch. We will review the use of BMP sub-drain to ensure that secondary impacts to wetland hydrology do not occur. We will minimize Pond Code 378 embankments that may require clearing of embankments to toe-of-slope. We will minimize culvert lengths and size and depress per COMAR for aquatic passage. **Forests:** By modifying the roadway design and eliminating several bioswales, submerged gravel wetlands, grass swales, and ponds from the RFP Concept Design, Wagman/WRA is proposing to minimize impacts to forest from 115.92 acres permitted to 73.6 acres proposed, and existing TMDL reforestation areas. The need for and size of conceptually proposed SWM BMPs will be continually

assessed and unnecessary facilities eliminated or re-sized to avoid additional impacts. Reduction of forest impacts was also achieved by maintaining the normal crown along existing MD 32 NB, thus enabling existing drainage patterns to be retained while minimizing ditch grading and SWM requirements. **Species:** Measures to minimize impacts to terrestrial and aquatic species will include design modifications to maintain forest canopy closure, maximization of on-site reforestation, and limiting impacts to forest edges. Forest habitat disturbance will be avoided during the April to August FIDS breeding season and orange construction fence will be installed to protect resources outside the LOD. In addition, MDE stream closure period of March 1 through May 31 will be adhered to, and where practical riparian vegetation will be retained, aquatic species passage will be maintained, and aquatic biota will be relocated downstream of dewatered areas in perennial streams. **Historic and Cultural Resources:** Two historic structures have been identified to have direct impact from the MD 32 project. Though effects to both properties were found to be not adverse and no mitigation is currently proposed, Wagman/WRA will continue consultation as may be required. Discovery of unanticipated and previously unidentified archaeological resources (including human remains) will result in immediate halt to construction in the area and notification of MDOT SHA in conformance with the RFP. Eligibility determinations and consultation with the MD SHPO regarding plans for avoidance, protection, and recovery will be directed by MDOT SHA.

Avoidance/Minimization During Construction: Measures to avoid or minimize impacts will continue throughout construction. Project specific environmental training will be provided to all workers and subcontractors prior to construction. Each employee will be empowered by Wagman's CEO to stop work for safety or environmental compliance concerns by issuing a stop work order. Our dedicated E&SC Construction Manager (ESCM) and all foreman and superintendents have successfully completed MDE Yellow Card Training. All resources and LOD will be clearly demarcated in the field prior to construction including fencing, flagging, and signage. The ESCM will coordinate daily E&SC inspections at the end of each working day, will coordinate with dedicated E&SC crews for prompt stabilization and proactive correction of deficiencies, and will provide severe weather event planning to ensure all sediment controls are installed properly and functioning prior to forecasted major weather events. Within 24 hours of any major storm event, all sediment controls will be inspected to ensure compliance, repairs will be made to any sediment controls not functioning properly, and all workers will ensure compliance prior to resuming construction. Following the above protocol, Wagman has maintained an "A" rating on multiple projects throughout Maryland. To further minimize resource impacts, Wagman/WRA will use innovative construction techniques for maintenance of stream flow at culvert crossings and access roads within floodplains utilizing wood mulch to mitigate wetland impacts. Throughout construction and in conformance with our ECP, Wagman/WRA's Environmental Manager will track compliance with environmental commitments and permit conditions and generate quarterly reports.

4.4.C. CUSTOMER OUTREACH PLAN

Wagman/WRA strives to be a good neighbor with the local communities, adjacent business and property owners, and the travelling public during the execution of a project. As a continuation of MDOT SHA's dialogue with community stakeholders and the public, Wagman/WRA's Public Relations/Outreach Coordinator, Brian Riffel, PE, (WRA) will actively assist and support MDOT SHA in meetings with community stakeholders, public meetings, and providing advance information regarding construction phasing, detour routes, and expected travel impacts. We will coordinate these activities through frequent meetings with MDOT SHA's Office of Communications Community Outreach Manager and District 7 Community Liaison. Our proactive coordination will keep property owners, businesses, community groups and local officials informed of work schedules and notify them, a minimum of every 30 days, of what will occur within the next 30 days. Our Public Outreach Plan (Plan) will meet the requirements outlined in the RFP PR 16 and will be submitted to MDOT SHA within 45 days of NTP. Our Plan for the MD 32 Project will provide a framework and a variety of mechanisms for stakeholders and special interests groups to receive information about this critically important transportation improvement project. Stakeholders include: Howard County, State and local political leaders, schools and childcare centers, religious entities, adjacent property owners and tenants within the corridor, homeowners' associations, local businesses/residents, community/public, emergency service providers, and State and local police.

Our Public Relations Coordinator, working alongside MDOT SHA, will develop an effective relationship with the community and businesses that are in proximity to the construction and will:

- Research, write and edit draft news releases, fact sheets, traffic alerts, briefing memos, advertising copy, speeches, web content, social media content, newsletters and brochures for approval by MDOT SHA.
- Collect and provide clips of project media coverage for inclusion in MDOT SHA's daily report.

4.4 Well Managed Project | Continued



- Provide construction updates and project timelines and work with MDOT SHA to input and distribute the data through all applicable communication channels such as mainstream media, social media, and website postings.
- Draft responses to correspondence, emails, etc., including Customer Care Management System assignments.
- Assist with website content management and development, including writing, editing and potentially uploading content on multiple websites; as well as project photographs and video.
- Facilitate and coordinate obtaining any aerial or digital photography, graphical maps of traffic patterns and project design, art or other materials needed for public relations.
- Coordinate and participate in a variety of community/stakeholder events and meetings.
- Coordinate with Howard County Public Schools.
- Coordinate with MDOT SHA on the development of graphics, presentations, videos, PowerPoint, slide shows or other visual presentations for community/stakeholder events and meetings.
- Help implement/coordinate special events and/or VIP and media events, including materials preparation and logistics.
- Develop and write copy for marketing materials such as e-blasts, inserts, newsletters, brochures, fliers, fact sheets, calendars and maps. Manage distribution including zip code mailings and door hanger postings.
- Research inquiries from the public, elected officials, and media and develop responses for MDOT SHA's use.

Our Plan will include:

- Construction progress tracking and traffic monitoring with Unmanned Aerial Vehicles (UAS or Drone) videos and photos. Wagman/WRA has certified FAA UAS certified pilots and owns UAS equipment. We have and currently are providing similar services for multiple clients in Delaware, Maryland, and Virginia. Our UAS footage will be used to report and forecast construction progress and monitor the detour route operations on an as needed basis. This footage will be supplied to facilitate public information via the Project Web Page and newsletters.
- Toll-free Telephone Number: This number will be used for the public to contact Wagman/WRA in the event of an emergency. We will maintain a log of all calls made to the number, including date, time, name of caller, reason for call, caller's address and phone number. These logs will be accessible to MDOT SHA for review and submitted every two months once the phone line is made available to the public. We will post the toll-free telephone number prominently within the project limits, at MDOT SHA's project field office, and on all flyers distributed on the project.
- Telephone Trees: We will establish and manage an emergency response telephone tree. All appropriate emergency response agencies will be included on this telephone tree for immediate response in the event of an emergency.
- Notifications: Our Public Relations Coordinator will provide written notifications of lane closures, major traffic changes, detours, critical utility shut-off/diversion, business/commercial utility shutdown, residential utility shutdown, and roadway and driveway closures.
- Hold "Pardon Our Dust" meetings to inform the public of major work activities, traffic changes, detours, etc.
- Meetings during design and construction to inform first responders (e.g., police, fire, EMT, fire, ambulance service, hospitals, etc.) of planned and/or upcoming activities that may impact their ability to serve the community.
- Coordination and a meeting with Howard County Public Schools to alleviate any concerns and to assist them with their school bus rerouting for the 2019-2020 school year.
- Weekly Construction Updates: Our Public Relations Coordinator will provide construction updates weekly and identify all planned traffic shifts, lane closures and utility shut-downs and activities. This information will come directly from the field personnel to ensure accuracy.
- Construction Progress Photographs: High-resolution construction progress photographs will be provided monthly or at any time that a new significant activity commences. This includes the UAS videos and photos noted above.
- Support to the MDOT SHA in meetings with individual land owners, local officials, and community groups and public meetings to keep the public involved in design and construction activities.

MDOT SHA and Wagman/WRA have a shared responsibility for the Public Outreach Program. MDOT SHA will be the lead on Public Outreach activities, with active support provided by Wagman/WRA as noted above. We have the primary responsibility for performing the activities specified in PR16. Wagman/WRA will not interface with the media without prior consent of MDOT SHA. In emergency situations, we will immediately notify MDOT SHA of any situations that may involve the media. Our outreach during the design and construction of the MD 32 Project will inform and engage the residents, businesses, elected officials, communities, motorists, and other interest groups within the project area.

