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VOLUME 1
Technical Proposal



A Design-Build Project

I-81 Bridge Replacement
at Exit 114
Montgomery County/
Town of Christiansburg, Virginia

March 2, 2018

State Project No.: 0081-154-733, R201,
C501, B601, B616
Federal Project No.: NHPP-081-2(992)
Contract ID Number: C00093074DB96

Submitted By:



in conjunction with



Subconsultants:



4.1

LETTER OF SUBMITTAL



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CONSTRUCTION COMPANY

www.ordersconstruction.com

March 2, 2018

Mr. Stephen D. Kindy, P.E.
Alternative Project Delivery Division
Virginia Department of Transportation
1401 East Broad Street, Annex Building, 8th Floor
Richmond, VA 23219

**Re: Letter of Submittal - Design-Build Project - I-81 Bridge Replacement at Exit 114,
Montgomery County/Town of Christiansburg, Virginia
Contract ID Number: C00093074DB96**

Dear Mr. Kindy,

Orders Construction Company, Inc. (Orders), as the Offeror, is pleased to submit to the Virginia Department of Transportation (VDOT) our Letter of Submittal and accompanying Technical Proposal and Attachments in response to the Request for Proposal (RFP), for the I-81 Bridge Replacement at Exit 114 Project (Project). Orders, has teamed again with our lead designer **Whitman, Requardt & Associates, LLP (WRA)** to deliver this important project for VDOT.

4.1.1 Full legal name and address of the Offeror: Orders Construction Company, Inc.,
501 Sixth Avenue, Saint Albans, WV 25177.

4.1.2 Offeror's intent to enter into a contract with VDOT: Orders Construction Company, Inc., if selected, will enter into a contract with VDOT for the Project in accordance with the terms of this RFP.

4.1.3 Offer will remain in full force and effect for one hundred twenty (120) days: Pursuant to Part 1, Section 8.2, Orders Construction Company declares that the offer represented by the Technical and Price Proposals will remain in full force and effect for one hundred twenty (120) days after the date the Technical Proposal is submitted to VDOT.

4.1.4 Point of Contact for the Offeror: Charlie Stokes, Vice President
Address: 605 Lithia Road, Wytheville, VA 24382
Tel: 276.227.0378 (P), 276.223.0134 (F)
Email: cstokes@ordersconstruction.com

4.1.5 Principal Officer for the Offeror: Nathaniel R. Orders, President
Address: 501 Sixth Avenue, Saint Albans, WV 25177
Tel: 304.722.4237 (P), 304.722.4230 (F)
Email: nate@ordersconstruction.com

4.1.6 Final Completion Date: November 15, 2021

4.1.7 Executed Proposal Payment Agreement: An executed Proposal Payment Agreement is included in Appendix, in the form set forth in Attachment 9.3.1 Proposal Payment Agreement.

4.1.8 Certification Regarding Debarment Form: Executed copies of the Certification Regarding Debarment Forms as set forth in Part 1, Section 11.8.6 are provided in Appendix, Attachment 11.8.6 (a) and (b) Certification Regarding Debarment Forms.

The Orders/WRA Design-Build Team has thoroughly evaluated the RFP requirements and conceptual design and feel our design and construction approach greatly enhances the project. We appreciate the opportunity to provide you with our conceptual design and technical proposal for your review and consideration.

Sincerely,



Nathaniel R. Orders
President

4.2

OFFEROR'S QUALIFICATION

4.2 OFFEROR'S QUALIFICATIONS

4.2.1 SOQ Statement

The information and statements made in our SOQ remain true and accurate in accordance with Part 1, Section 11.4 with one exception noted below. ECS, our QC testing lab was found to have a conflict of interest and at VDOT's request was removed from our team. We have replaced ECS with Specialized Engineering for QC testing lab services. SCC and DPOR documentation for Specialized Engineering is included in the Appendix of Volume I of our Technical Proposal.

4.2.2 Organizational Chart

The Orders/WRA Design-Build Team's organizational chart is presented on Page 10 and identifies the chain of command for each team member along with their function and reporting relationships that will be followed throughout the design and construction of the project. This structure is identical to what was submitted in the SOQ. Since our QC testing lab has changed, and is considered a revision to our proposed staffing that was presented in the original SOQ, a revised organizational narrative follows per the RFP with changes **highlighted in yellow**.

OFFEROR'S TEAM STRUCTURE NARRATIVE

Orders Construction Company, Inc. (Orders) will be responsible for managing the project in its entirety, supervising the construction and performing major elements of the construction work. Additional subcontractors for various specialty items such as guardrail, signage, and pavement striping will be under direct subcontract to Orders. Whitman, Requardt & Associates, LLP (WRA) will lead the design effort for all aspects of the project and will be responsible for the design QA/QC as well as Construction Quality Assurance. The Orders Team includes highly qualified subconsultants that bring specific expertise to enhance the team and ensure a quality project for VDOT. A complete list of team members follows and an organizational chart of the team is included in Section 3.3.2.

Orders Construction Company, Inc. (Orders) - Offeror, Legal Entity, Lead Contractor

Orders is a family-owned business now being managed by third- and fourth-generation highway contractors and Registered Professional Engineers. Orders was founded in 1964 as a general contractor specializing in bridge construction for West Virginia clients and has grown to become a widely diversified supplier of construction services to a broad range of clients from the Mid-Atlantic to the Midwest.

Whitman, Requardt & Associates, LLP (WRA) – Lead Designer and Quality Assurance Management

WRA is a full service engineering firm that was founded over 100 years ago primarily serving state and local governments in the Mid-Atlantic region of the United States. WRA will serve as the Lead Designer for this project and will be responsible for the design QA/QC as well as managing survey work performed by our survey subconsultant. WRA will also be performing Quality Assurance Inspection and Testing for the project. WRA has been performing work for state and local governments in Virginia for over 65 years. WRA is **very** familiar with this section of I-81 with an office only minutes away in Blacksburg, and having completed the original I-81 Corridor Study for this segment of the interstate in the late 1990s.

Subconsultants

The following team of subconsultants has been carefully selected based on their relevant past experience and established working history of successful projects with VDOT, Orders Construction, and/or WRA:

Quinn Consulting Services, Inc. (QCS) will provide Quality Control Inspection Services for the Orders Team. QCS is a 100% Woman-Owned WBE/DBE firm providing construction inspection services to VDOT for 20 years. They have provided similar services on over 40 Design-Build projects and were awarded VDOT's DBE Consultant Engineering Firm of the year in 2014.

Specialized Engineering will provide QC Testing & Lab Services for the Orders Team. Established in 1992, Specialized Engineering has been providing industry leading Laboratory Testing & Analysis, Construction Management & Inspections, Construction QA/QC, Geotechnical Engineering, and Environmental Consulting Services on projects in MD, VA, WV, DC, and PA.

Froehling & Robertson, Inc. (F&R) will provide a Quality Assurance Lab for the Orders Team. F&R was founded in 1881 and is the oldest independent consulting engineering/testing firm in the United States. Their in-house soil, materials, and asphalt laboratories are accredited by AASHTO Materials Reference Laboratory (AMRL) and the US Army Corps of Engineers (USACE).

H&B Surveying and Mapping, LLC (H&B) a Virginia-Certified, DBE/WBE (Woman-Owned Business) founded in 2009 will provide Surveying and Subsurface Utility Locating for the Orders Team. Since 2010, H&B Surveying and Mapping, LLC has teamed with WRA to provide surveying services on over 75 VDOT projects throughout Virginia and they have provided similar services on 10 separate VDOT Design-Build projects.

Bowman Consulting (Bowman) will provide right-of-way acquisition for the project under the leadership of Richard Bennett, the former State Right-of-Way and Utility Manager for VDOT. Bowman has extensive experience performing these services on both VDOT Design-Bid-Build and Design-Build projects. Appraisal Review Services will assist Bowman as a subconsultant.

Access is a full service, fully-integrated, marketing and communication Agency located in Roanoke, Virginia. Intimately familiar with the project area, business leaders, local government representatives and local media, Access will assist the Orders Team with all public outreach and stakeholder communications needs. Their inclusive process relies on strong partnerships for improved communication outcomes.

3.3.1 Key Personnel

Key personnel Resume Forms are included in Attachment 3.3.1 located in Appendix C. A brief summary of key personnel follows, and more detailed project experience for each are listed on the Resume Forms.

The symbol **DB** indicates those proposed personnel that have Design-Build Experience.

Design-Build Project Manager – Charlie Stokes (Orders – 47 years of experience)

DB Charlie Stokes (DBPM) will serve as the project's DBPM and will have ultimate responsibility for project delivery. He has been constructing VDOT roads and bridges for 47 years, and has served as **DBPM** on **12 Design-Build** projects, 3 of which were for VDOT, including the I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek; the Route 60 Main Street Bridge Replacement in Clifton Forge; and the Wolf Creek Bridge Replacement in Giles County. He was also Project Manager on the Route 419 and East Main Street Interchange Bridge in Salem, VA and on the Route 23/Kane Avenue in Gate City, VA. Throughout his career Charlie has excelled in bringing large transportation projects to completion on time and within budget on projects ranging from the Capital Beltway to structures over South Holston Lake in Washington County.

Quality Assurance Manager – Brian Henschel, PE, CCM (WRA - 22 years of experience)

DB **Brian Henschel, PE, CCM (QAM)** will report directly to the DBPM and will have direct, independent access to VDOT. Brian has performed this role previously on the George Mason University Cross Campus Connector Design-Build roadway and bridge project in Fairfax, as well as the Route 636 Relocation PPTA in Augusta County, VA. His relationship with Orders includes managing QC staff for the I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build and the Route 501 Bridge Replacement over the James River project. As the QAM, Brian will be responsible for the Quality Assurance program and will coordinate with VDOT, supervise project QA inspection staff, and coordinate with the QA testing firm, Froehling & Robertson, Inc. Through this effort he will ensure conformance with the Contract Documents including the Approved for Construction plans and specifications. Brian will have overall responsibility for the development of, and adherence to, the Design-Build QA/QC Plan including coordination with the Design QA/QC Manager, Mark Vasco, PE. Brian will serve as a direct report to the DBPM, and will function independently from the Construction QC Manager, auditing and monitoring Orders Construction Quality Control Program. He will have the authority to stop construction activities to ensure compliance with the specifications and issue Non-Compliance Reports (NCRs) if necessary. In addition, Brian will submit monthly written reports on the status of the QA Program to both VDOT and the Orders Design-Build Team.

Design Manager – Michael Russell, PE, DBIA (WRA – 28 years of experience)

DB **Michael Russell, PE, DBIA (DM)** Mike has 28 years of experience designing and managing transportation projects and programs for VDOT. He will also report directly to the DBPM with whom he has enjoyed building and strengthening a strong working relationship since 2003. He is currently the Design Manager of the Orders Construction Team for the I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build project in the Bristol District that is currently under construction, which has almost identical MOT and geological conditions that may be encountered on this project. He will be responsible for providing quality product; meeting all design milestones; continual Design-Build Team coordination; and ensuring the Design QA/QC Manager's involvement throughout the design phase. Mike will be responsible for ensuring all design work is performed in accordance with current VDOT Policies, Procedures and Guidelines. He will manage all aspects of design including, but not limited to, roadway; structural; hydraulic; traffic; MOT; environmental; and geotechnical. He will assign resources as needed; oversee the design subconsultant for survey; coordinate design and review schedules; develop and implement corrective measures if necessary; and ensure environmental compliance measures are integrated into the design. He will coordinate the design and construction with the Environmental Permitting Coordinator, Taylor Sprenkle, to ensure all project commitments are fulfilled. Mike will maintain involvement in the project during construction to oversee any plan modifications and shop drawings, and review construction activities with the CM as work progresses.

Construction Manager – Earl Adwell (Orders – 45 years of experience)

Earl Adwell (CM) will report to the DBPM and be responsible for the project site during construction. Earl has over 45 years of experience and has been employed with Orders for 40 years. Earl has teamed with the DBPM on 5 major projects in the region. He will be responsible for managing the overall construction process, including construction and quality control. Earl served as Construction Manager on VDOT's I-81 Maury River Bridge Replacement in Rockbridge County (designed by WRA); Construction Manager on the Avens Bridge over South Holston Lake in Washington County, VA; Construction Manager on the Flannagan Lake Bridge Replacement in Dickenson County, VA; and Superintendent on the Route 640 Bridge and roadway re-alignment over the Shenandoah River. Earl holds a Competent Person Certificate in trench excavation, scaffolding and is a certified rigger and crane operator.

ORGANIZATIONAL CHART

The Orders Design-Build Team Organizational Chart on Page 10 identifies key personnel members and depicts the reporting structure of the team. Solid lines identify the direct lines of reporting relationships of our team members from the DBPM to the Design, Construction and QA team. Dashed lines represent indirect reporting relationships and obligations to the DBPM and the team members. Furthermore, the reporting structure for the Quality Assurance shows a clear separation between the Construction Quality Control Inspection and field/laboratory testing duties.

As a commitment to the success of the project, Orders has added several “*Value Added*” positions to our team that are in addition to the RFQ requirements. This includes adding an Assistant Design-Build PM and adding Access, *a professional public relations firm*, led by Jeremy Butterfield to assist with public outreach and ongoing project communications. Another unique feature of our structure is the addition of an *MOT Task Force* that will be responsible for continual assessment of the work zone’s operational characteristics and will adjust the MOT/TMP plan as needed.

As a continuation of the functional relationships for Key Personnel described in Section 3.3.1, the following narrative further defines the roles and functional relationships of the additional team members. Each of these team members were carefully chosen based on their extensive experience and well-established working relationships on previous projects.

Assistant Design-Build Project Manager

DB Assistant DBPM/Design-Construction Coordinator/Construction Environmental Manager: *Joshua Sproles, PE* will be “shadowing” the DBPM and assisting with the delivery of the project as a “*Value Added*” team member. He has worked for the DBPM since college graduation; he will provide additional support with overall management of the Design-Build contract and will coordinate project reviews with the construction staff during design and processing RFIs during construction. His previous 4 projects working directly with the CM has forged a strong working relationship that will be leveraged on this project in this role. Joshua will assist the DBPM with the initial schedule development and ongoing updates as he is currently doing on VDOT’s I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build in Washington County. He will also serve as the Construction Environmental Manager (CEM) and will closely interface with the E&S Control Reviewer, Glen Wilson.

Safety Manager

DB Safety Manager: *Jeff Dixon, CSP* will report to the CM and serve as the Company Safety Director for Orders Construction. Jeff will ensure that this project is operating safely and in accordance with OSHA regulations. Jeff is a Certified Safety Professional and has been working with Orders Construction for 11 years. Jeff will be responsible for safety training to all Orders employees, ensuring they have all the required personal protective equipment. Jeff is also in charge of all pre-employment training and certifications, and compliance with all job-specific safety plans for Orders Construction.

Right-of-Way Manager

DB Right-of-Way Manager: *Richard Bennett* has over 49 years of experience in the right-of-way and utilities sector, including serving as the State Right-of-Way Manager for VDOT. He will report directly to the DBPM and will manage all aspects of right-of-way acquisition.

Utility Manager

DB Utility Manager: *Paul Martin* has more than 27 years of experience in highway and bridge construction, including 12 years specializing in utility relocations for VDOT. Paul has served as WRA’s Design-Build lead for utility relocation and coordination on such projects as the I-95 Safety Improvements at Route 3 Design-

Build and the I-95 Express Lanes Southern Terminus Extension Design-Build Project. Paul will report to the DBPM and will interact closely with the DM and CM.

Public Relations Manager

Public Relations Manager: *Jeremy Butterfield* has 13 years of experience in the public relations field and is currently the Director of Public Relations with Access. He will report directly to the DBPM as a “*Value Added*” team member and will manage the public outreach and communication plan working very closely with the Salem District Communications staff.

Design

DB Structural/Bridge Engineer: *Jeremy Schlüssel, PE* reports to the DM and will be in charge of structural engineering for the project, including the I-81 Bridges and associated retaining walls. Jeremy has over 20 years of experience designing bridge projects for VDOT including the I-81 Bridge Replacements over the New River in the Salem District, I-81 Bridge Replacements over Maury River (Constructed by Orders with Charlie Stokes as the PM) and I-81 Bridge Replacements over Buffalo Creek in the Staunton District, and most recently the VDOT’s I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build in Washington County. Jeremy serves as Structure Design lead for all of WRA’s VDOT Design-Build projects; he has managed over 200 bridge improvement tasks for VDOT’s Structure and Bridge Division under On-Call contracts over the last 10 years. He will lead production efforts for all structural engineering designs including plans, estimates and specifications for the project. Jeremy will also review structural shop drawings and assist the DBPM, CM and DM during construction.

DB Roadway Engineer: *Brad Stipes, PE* has 29 years of highway design experience and will report to the DM and lead the roadway design efforts for the project. He is currently serving as the lead designer on the I-81 Bridge Replacements over the New River, a \$98 million project (\$58M for the NB bridge currently under construction, and \$40M for the planned SB replacement) in the Salem District. He has extensive working relationships with the Location & Design Staff in the Salem District having worked on numerous Salem District projects for more than 23 years, including WRA’s current Statewide On-Call design contract. Brad has worked on numerous highway and roadway projects and understands VDOT policies and procedures, particularly as they relate to interstate projects.

DB Geotechnical Engineer: *Jeff Basford, PE* has over 16 years of experience in subsurface explorations, geotechnical analysis, design of pavement sections and shallow and deep foundations, slope stability analysis, concrete and geosynthetic reinforced earth retaining structures, and in-situ testing and verification during construction. Jeff is currently the Lead Geotechnical Engineer on the I-81 Bridge Replacements over the New River project in the Salem District, and was the Lead Geotechnical Engineer on both the I-81 Maury River and Buffalo Creek Bridge Replacement projects in the Staunton District, as well as the I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build project in the Bristol District. He has also been involved on numerous Design-Build projects for WRA in Virginia and Maryland. Jeff has a thorough understanding of the VDOT Manual of Instruction, Chapter 3. Jeff will report to the DM and collaborate with the Structural Design Engineer and CM.

DB MOT/Traffic Engineer: *Dana Trone, PE, PTOE* has over 20 years of experience in traffic engineering including development of transportation management plans (TMP); MOT design; lighting; signing; ITS; and pavement marking plans. Dana has developed numerous TMPs for bridges with construction on, and over, interstates in Virginia, including numerous Design-Build projects. She is extensively familiar with the Traffic Engineering Handbook; MUTCD; Highway Safety Design Manual; and the Virginia Work Area Protection Manual. Dana will report to the DM and collaborate directly with the Construction MOT Manager.

DB Drainage/Hydraulics Engineer: David Gertz, PE will report to the DM and lead the design efforts for drainage and SWM. David has over 37 years of experience in roadway drainage design and stormwater management, and has designed numerous projects for VDOT utilizing the new Virginia stormwater regulations that took effect in July 2014. David has worked on VDOT projects as the Lead Drainage/Hydraulics Engineer continuously for the last 25 years. He most recently served as Lead Drainage/Hydraulics Engineer for the Berkmar Extension section of VDOT’s Route 29 Solutions Design-Build project in Albemarle County.

DB Environmental Permitting: Taylor Sprenkle, PWD will report to the DM and secure all environmental permits needed for the project. Taylor has over 13 years of experience with environmental reviews and permitting required for transportation projects, including the I-81 Truck Climbing Lanes in Montgomery County and the 17-mile Route 460 project in the City of Suffolk and Isle of Wight County. Taylor will work closely with the CEM, Joshua Sproles, to ensure all permit requirements are fulfilled.

Design QA/QC

DB Design QA/QC Manager: Mark Vasco, PE will report to the DM. Mark will coordinate with the QAM to integrate the Design QA/QC plan into the Design-Build Project QA/QC plan and will ensure that all design quality control procedures are completed in accordance with that plan. He will verify that QC and interdisciplinary reviews, including comment resolution, are made prior to submissions. Mark has more than 33 years of experience in the design of transportation projects with extensive experience in both highway and maintenance of traffic designs, and has extensive experience with VDOT Design Manuals; IIMs; design standards; and VDOT/AASHTO criteria. Mark recently served as the Design QA/QC Manager on VDOT’s Fall Hill Avenue & Mary Washington Boulevard Extension Design-Build project.

Construction QC

DB Construction QC Manager (CQC): John Anthony (Bud) Williams will report to the Construction Manager and has over 18 years of experience inspecting roadway and bridge construction projects. He will be responsible for managing all QC inspectors for Orders, including project documentation and coordinating ECS’s testing lab and technicians. Bud began his career with VDOT as an inspector and has recently completed QC inspection of the Federal Highway Fort Lee Gate A Roundabout Design-Build in Prince George County and VDOT’s I-64 Exit 91 Design-Build project in City of Waynesboro.

Construction

DB Project Controls/DBE Compliance: Cheri George will report to the DBPM and currently serves as the Office Manager for the Virginia office of Orders Construction. Cheri oversees day-to-day project controls and DBE compliance for all projects in Virginia. Cheri has served continuously for 26 years in this capacity.

DB Superintendent: Dave George will report to CM and will be responsible for all phases of construction, including personnel supervision, job site safety, and subcontractor management. Dave possesses his VDOT Intermediate Work Zone Traffic Control and Virginia DCR’s ESCCC certifications. Dave is the general superintendent for the VDOT’s I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build Project and as the Superintendent for VDOT’s Route 670 “Avens” Bridge Replacement over South Holston Lake and the Route 501 Bridge Replacement over James River projects.

Maintenance of Traffic Task Force: A Task Force dedicated to traffic management will be an effective method to manage the risks associated with the safety of the travelling public and the on-site construction workers. As a “Value-Added” component of our team structure, this group will consist of Orders and WRA project staff, VDOT, and Third-Party Stakeholders. The Task Force will meet monthly and as needed to

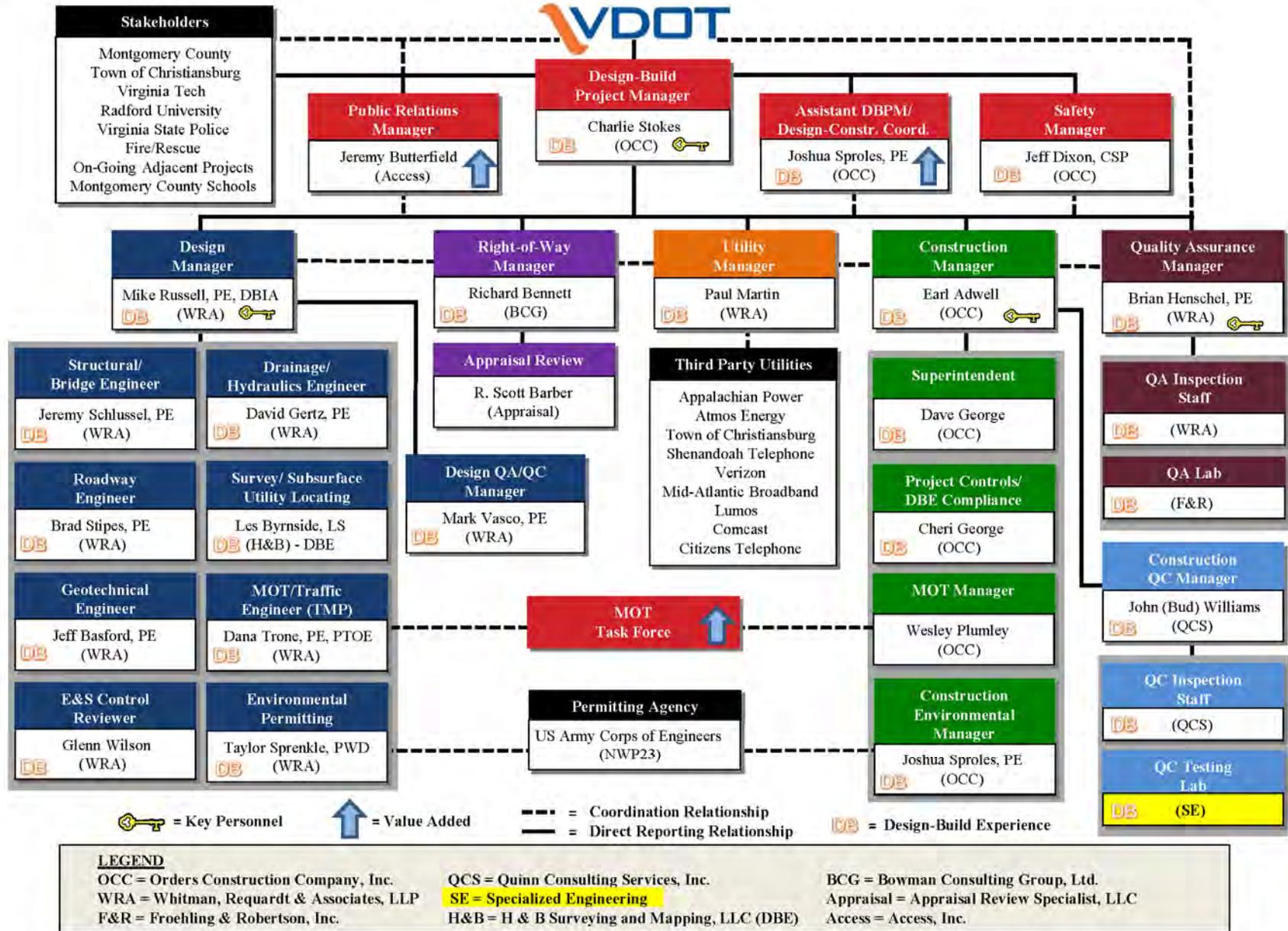
review the current MOT plan to determine if any changes are needed to address current concerns or upcoming activities.

Summary: The Orders Team was carefully assembled based on each firm’s intimate knowledge of the site, existing working relationships internally and with VDOT, and their specific expertise to manage the project risks. The WRA design team has worked together extensively on major I-81 bridge replacement projects successfully managing very similar risks to those on this project including extensive MOT and geotechnical constraints. The risk management plan is developed to adapt quickly with mitigation and contingency plans in place prior to construction beginning. Partnering during construction ensures issues are quickly resolved with minimal impact to the project schedule. The Orders Team relationships forged on previous similar interstate projects such as the I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build, the I-81 Maury River Bridge Replacement Project and the I-64 Maury River Bridge project are being leveraged to present a Team to VDOT with a proven track record of effectively managing and delivering Design-Build projects for the Department. These examples of corporate partnership combined with the professional relationship forged between Charlie Stokes (DBPM) and Mike Russell (DM) that dates back to 2003, further illustrates the mutual respect and ability to partner that our team members have firmly in place. The Orders Team has fully embraced the Design-Build program that has evolved over the past several years with VDOT and is a proven leader in the Design-Build arena in Virginia. This partnership has most recently proven evident on the I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek that is close to entering the second phase of construction.



WRA/Orders Design-Build Team on VDOT’s I-81 Bridge Replacement Over Sinking Creek and Halls Bottom Road Project (August 2017)

4.2.2 Organizational Chart



4.3

DESIGN CONCEPT

4.3 DESIGN CONCEPT

The Orders/WRA Design-Build Team Conceptual Design for this project begins with the first-hand understanding our team members have of the interchange itself -- many of us live and work nearby and have a firm grasp of the operational characteristics, safety concerns, locality-specific interests, and traffic patterns that need to be addressed during design and construction. With this working knowledge as an important foundation, Design Manager **Mike Russell, P.E., DBIA** has led the Team through a detailed Conceptual Design process including the following:

- ✓ Thorough review of VDOT’s RFP Package (plans, documents, reports, formal Q&A, etc.)
- ✓ Site visits and team meetings between Orders and WRA to brainstorm/assess alternative ideas
- ✓ Extensive, formal Conceptual Design process to thoroughly investigate ideas
- ✓ Proprietary Meeting with VDOT (including follow-up clarifications from meeting minutes, etc.)
- ✓ Refinement of the Orders/WRA Design-Build Team Conceptual Design presented in this proposal

Our internal Conceptual Design process, between seasoned design and construction professionals from both Orders and WRA, has been a highly-collaborative one. Our Team’s formal coordination with VDOT through the prescribed process in the RFP has been equally collaborative and productive. The result of these efforts, we believe, is that ***the Orders/WRA Design-Build Team is providing a project design that provides operational improvements that meet or exceed the RFP Technical Requirements while providing increased value by achieving the following goals:***

- ✓ Reduces the number of bridge construction phases (simplifies construction)
- ✓ Reduces traffic pattern changes (simplifies Maintenance of Traffic)
- ✓ Enhances safety of the traveling public during construction
- ✓ Reduces project cost
- ✓ Reduces long-term inspection and maintenance costs for VDOT by eliminating the longitudinal joint in the proposed southbound bridge

The Conceptual Design process provided ample opportunity to discuss our enhancement ideas with key VDOT staff and, in the process, demonstrate our understanding of the project scope and VDOT’s goal and objectives for the project. We have worked diligently as a team of technical and construction professionals to fully consider project constraints, potential risks, and stakeholder interests/concerns in developing the Conceptual Design that is presented in Volume II of this proposal. As stated previously, ***the Orders/WRA Design-Build Team’s final product is a Conceptual Design that meets or exceeds all the RFP Design Technical Requirements established in Part 2 of the RFP document, and subsequent addendums, and provides the following Design Enhancements and Value Added Benefits*** that are depicted and described on the following page in Figure 1:

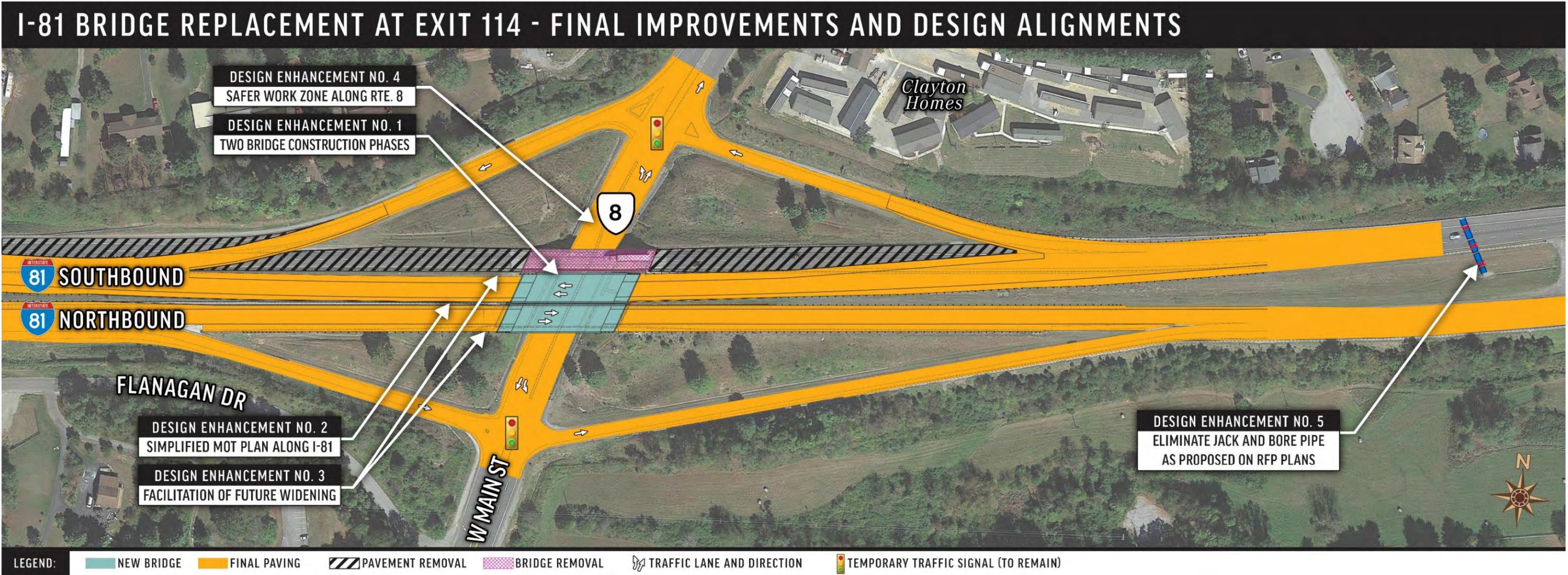


Figure 1 - Design Enhancement Graphic

Design Enhancement #1 – Two (2) Phases of Bridge Construction (Versus 3 in RFP Plans)

The Orders/WRA Design-Build Team's Conceptual Design simplifies project construction by reducing the bridge replacement process along I-81 to two (2) major bridge construction phases instead of three (3). The RFP Plans depict two intermediate construction phases requiring traffic shifts (1 NB and 1 SB) into the median area to utilize a portion of the new I-81 SB structure while the NB Bridge and balance of SB Bridge is constructed. The RFP Plan approach requires four (4) significant traffic shifts. Our Conceptual Design requires one less traffic shift during construction, which is achieved by maintaining I-81 NB and SB traffic in its current configuration (roadway approaches and bridges) while a new I-81 SB Bridge is constructed in the median. Once the new I-81 SB Bridge construction is complete, I-81 NB traffic will be shifted to this bridge while the I-81 NB Bridge is replaced. Once the new I-81 NB bridge construction is complete, I-81 NB traffic will be shifted into its ultimate pattern on the new I-81 NB bridge and approach roadway. The final phase is to construct the permanent roadway approaches to the new I-81 SB bridge, and shift I-81 SB traffic onto the new bridge and approach roadway – its ultimate configuration. The Orders/WRA Design-Build Team conceptual design, therefore, requires only two phases of bridge construction and three major traffic shifts (1 SB and 2 NB) during construction.

The following are *Value Added Benefits* of this *Design Enhancement*:

- ✓ Enhances driver expectancy and safety by keeping existing I-81 NB and SB traffic on the existing roadway and bridge configuration longer during construction
- ✓ Places traffic in ultimate configuration sooner
- ✓ Reduces project cost

Design Enhancement #2 – Enhanced Maintenance of Traffic Plan

The Orders/WRA Design Build Team Conceptual Design offers a simplified Maintenance of Traffic (MOT) scheme that will result in safer traffic operations during construction. As described above in Design Enhancement #1, our Conceptual Design requires only three (3) major shifts during project construction instead of four (4) as required in the RFP Plans.

The following are *Value Added Benefits* of this *Design Enhancement*:

- ✓ Reduces traffic pattern changes
- ✓ Enhances driver expectancy
- ✓ Enhances safety of the traveling public during construction
- ✓ Enhances Incident Management operations

Design Enhancement #3 – Facilitation of Future Interstate Widening

The Orders/WRA Design-Build Team Conceptual Design offers the Department enhanced flexibility to add an additional outside travel lane in both I-81 NB and SB directions in the future. This future opportunity is created by maximizing the use of the existing median with this bridge replacement project, and by incorporating extended superelevation transition lengths with the new approach roadway designs. Maximizing the use of the existing median simplifies outside widening in the future in the I-81 SB direction. Our design also incorporates extended superelevation transitions in both the I-81 NB and SB directions; these transition lengths are increased in our design from 120-feet to 180-feet to further accommodate an additional

future, outside travel lane. (Note: 120-feet is required to transition a single 12-foot lane from -2% to +2% at 70 mph, while the required distance increases to 180-feet to transition two 12-foot lanes).

The following are *Value Added Benefits* of this *Design Enhancement*:

- ✓ Facilitates future I-81 SB outside travel lane addition by maximizing the use of the existing median
- ✓ Facilitates future I-81 NB and SB outside travel lane additions by applying extending superelevation transition lengths
- ✓ Reduces future widening costs

Design Enhancement #4 – Safer Work Zone Along Route 8 (Modified Maintenance of Traffic Plan)

The Orders/WRA Design-Build Team Conceptual Design enhances safety by creating additional buffer space between active travel lanes and the work zone. This additional buffer space is made possible by reducing Route 8 to one lane in each direction with left turn lanes. An additional four (4) feet of width will be provided along Route 8 for pedestrian and bicycle accommodations as required by the RFP.

Our team identified this safety opportunity early in the RFP process, and provided supporting traffic analyses and results at our December 20, 2017 Proprietary Meeting with VDOT that demonstrate acceptable levels of service for all movements during construction. The RFP Addendum #1 dated February 6, 2018 includes provisions for this request provided a supporting traffic analysis is developed and approved by VDOT.

The following are *Value Added Benefits* of this *Design Enhancement*:

- ✓ Single Route 8 NB and SB Lanes within project limits will tie directly to single Route 8 NB and SB lanes beyond interchange limits, enhancing driver expectancy during construction
- ✓ Additional buffer space (8 feet of outside travel lane plus shoulders) between active traffic and work zones along Route 8 will enhance safety for everyone working in, or passing through, the work zone

Design Enhancement #5 – Eliminating Proposed Jack and Bore Storm Sewer Pipe Along I-81 SB

The Orders/WRA Design-Build Team has identified an alternative drainage design in the vicinity of I-81 SBL Constr. B/L Sta. 967+10 that eliminates the need for a proposed jack and bore pipe between Structures 241 and 244. Our team has identified the opportunity to divert a significant portion of stormwater runoff along the I-81 SB shoulder that is currently draining to Structure 241 (on the RFP Plans), and diverting it to Structure 234 (approx. I-81 SBL Constr. B/L Sta. 961+50). This plan modification eliminates the need for a jack and bore pipe installation.

The following are *Value Added Benefits* of this *Design Enhancement*:

- ✓ Eliminates the known risk of a shallow jack and bore operation beneath I-81 (potential bulging of existing pavement) that is required in the RFP Plans
- ✓ Enhances safety by eliminating an uncommon construction operation (jack and bore) along I-81 SB lanes that can distract drivers
- ✓ Reduce project cost

4.3.1 Conceptual Roadway Plans

The Orders/WRA Conceptual Design plans provided in Volume II of this submittal meet or exceed the RFP, VDOT, and AASHTO requirements for the project, including all criteria found in Attachment 2.2 of the RFP Technical Requirements (Part 2), with no additional design exceptions or waivers required other than the approved ones identified in the RFP. Specific design features are as follows:

(a.) General geometry including horizontal curve data and associated design speeds, the number and widths of lanes and shoulders

The design geometry for each key roadway design element is provided in the below table:

Roadway	Geometric Design Standard	Design Speed (MPH)	Number and Width of Lanes (each direction)	Roadway Shoulder Width	Paved Shoulder Width	Bridge Shoulder Width
Interstate 81	GS-1 (Rolling Terrain)	70	2 – 12'	*12' + 4' w/ Guardrail (Approved Design Waiver)	4' Left 10' Right	6' Left 12' Right
Ramps A, B, C, D	GS-R (Rolling Terrain)	35 (min.)	1 – 16'	6' Left 10' Right	4' Left 8' Right	N/A
Route 8 (within Christiansburg CL)	GS-5 (Rolling Terrain)	40	1 – 12'	10'	8'	N/A
Route 8 (outside Christiansburg CL)	GS-2 (Rolling Terrain)	50	1 – 12'	10'	8'	N/A

Table 1–Roadway Geometry

* Median Shoulder Widths Between I-81 SBL Const. B/L Sta. 944+25 to Sta. 961+00 and I-81 NBL Const. B/L Sta. 945+00 to Sta. 961+75 vary from 6' to 12' as per approved Design Waiver.

(b.) Horizontal alignments

The horizontal curves and alignments that the Orders/WRA Design-Build Team are proposing in our Conceptual Design all meet or exceed the minimum radii for all required design speeds. The tabulation of our proposed horizontal curve data contrasted with VDOT Geometric Standards and the RFP Plans is shown on Table 2 on the following page.

Noteworthy differences between the RFP Conceptual Plans and the WRA/Orders Conceptual Plans (see Volume II) are as follows:

- The RFP Plans incorporate three (3) short horizontal curves, including an undesirable “broken-back” curve, between I-81 NBL Const. B/L Sta. 943+75 +/- and Sta. 961+80 +/- . The Orders/WRA Design-Build Team Conceptual Design is enhanced as it eliminates these curves by replacing the I-81 NB bridge in its existing location, along a tangent section of the interstate.

- The RFP Plans incorporate three (3) horizontal curves, including an undesirable “broken-back” curve, between I-81 SBL Const. B/L Sta. 937+90 +/- and Sta. 965+75 +/- . The Orders/WRA Design-Build Team Conceptual Design reduces the number of proposed horizontal curves to two (2), as well as eliminating the “broken-back” curve.

Roadway	Minimum Curve Radius (feet) per VDOT Geometric Standard	Minimum Curve Radius (feet) on RFP Plans	Minimum Curve Radius (feet) on Orders/WRA Conceptual Plans
Interstate 81	1,821	5,730	5,730
Ramps A	316	1,060	360
Ramp B	316	2,370	775
Ramp C	316	1,030	1,030
Ramp D	316	1,030	1,220
Route 8 (within Christiansburg CL)	536	3,000	3,000
Route 8 (outside Christiansburg CL)	760	3,000	3,000

Table 2 – Horizontal Alignment Data

(c.) Maximum Grades for all segments and connectors

The profile grades in the Orders/WRA Design-Build Team Conceptual Design meet all RFP requirements and were decreased where possible to improve traffic operations and safety throughout the interchange. Notable changes from the RFP Plans are depicted in the Orders/WRA Design-Build Team conceptual plans and are as follows:

Roadway	Max. Grade per RFP Design Criteria	Max. RFP Conceptual Plan Grades	Max. Orders/WRA Design Grades
Interstate 81	4%	2.5%	2.4%
Ramp A	6%	4.9%	4.9%
Ramp B	6%	6.0%	4.8%
Ramp C	6%	4.4%	4.4%
Ramp D	6%	1.3%	2.4%
Route 8 (within Christiansburg CL)	8%	4.8%	4.8%
Route 8 (outside Christiansburg CL)	5%	4.8%	4.8%

Table 3 – Maximum Vertical Grades

(d.) Typical sections of the roadway segments to include ramps, retaining walls and bridge structures.

The Orders/WRA Design-Build Team's typical sections are detailed in Volume II of this Technical Proposal and include all features required by the RFP. Our Conceptual Design also provides design enhancements for future widening of Interstate 81 in both the Northbound and Southbound direction (see *Design Enhancement #3 – Facilitation of Future Interstate Widening* on Page 13), which represents significant future value when our Conceptual Design is incorporated. All proposed minimum pavement sections are in accordance with the RFP requirements.

(e.) Conceptual hydraulic and stormwater management design

A combination of culverts, storm sewer, and roadside ditches will convey runoff from the site towards the same designated offsite outfalls identified in the RFP Plans. Hydraulic facilities will be designed in accordance with the RFP requirements including the VDOT Drainage Manual and associated design guidelines. Our conceptual drainage design conveys post development runoff to the same existing receiving channels by way of existing and proposed permanent drainage easements. Our conceptual drainage design requires the same two permanent drainage easements anticipated by the RFP and are detailed on the conceptual plans provided in Volume II of our proposal. Our design also significantly improves the headwater condition at structure 245 as desired by the RFP.

As for Stormwater Management, this project is “grandfathered” and will be subject to Part IIC Technical requirements of the Virginia Department of Environmental Quality criteria. As such, water quality treatment requirements will be calculated according to Performance Based criteria, and offsite nutrient credits will be purchased to satisfy Part IIB Technical Criteria of the Virginia Stormwater Management Program Regulations. Water quantity design will satisfy MS-19 criteria. All existing outfall channels will be shown to be adequate to convey post developed runoff. No on-site post project detention facilities are proposed, avoiding long-term maintenance cost to the Department.

(f.) Proposed right-of-way limits

The Orders/WRA Design-Build Team Conceptual Design reflects *no additional right-of-way or easement impacts* to adjacent properties. Our Conceptual Design depicts the *same two* permanent drainage easements on parcel 003 (International Church of the Foursquare Gospel).

(g.) Proposed utility impacts

The Orders/WRA Design-Build Team's Conceptual Design on the I-81 Bridge Replacement at Exit 114 project is straight forward and results in minimal utility impacts. Utility relocations will be in accordance with VDOT's Utility Manual, Manual of Instructions, Utility Relocation Policies and Procedures, and the project RFP document. Our Conceptual Design reflects a focused effort to avoid or minimize utility impacts. We have already begun utility coordination activities; all utility companies have been contacted, and existing records obtained from these utilities.

At present, the only anticipated utility conflict is with the buried communications lines for Lumos Networks along the western edge of Route 8, where the existing lines will conflict with the removal of existing bridge piers. Although the survey provided by the RFP indicates there is adequate clearance, there remains a possibility of conflicts for Citizen's Telephone and Verizon lines, located along both edges of Route 8. This is also due to the work for removing the existing bridge pier substructures to a depth of 7 feet below finished grade. Test holes along these lines will confirm their actual location and ideally this conflict will be mitigated by protecting the fiber optic lines during excavation and removal of the existing bridge pier. Further elaboration on Utility Coordination is included in the Project Approach section of our proposal (Section 4.4).

(h.) Other key project features

Lighting

As required by the RFP, Lighting is proposed at traffic signals and under the proposed I-81 bridges. Lighting at the intersections will include luminaires mounted to traffic signal poles and standalone poles as required to meet photometric requirements. The underpass lighting includes luminaires mounted to the bridge piers or abutments with all necessary electrical appurtenances. Point-to-point lighting calculations will be performed demonstrating adherence to RP-08-14 illuminance and luminance criteria for all lighting design. Electric service for traffic signal and lighting may be shared, pending coordination with APCO.



Route 8 Below I-81 NB and SB Bridges

4.3.2 Conceptual Structural Plans

The Orders/WRA Design-Build Team has reviewed the RFP documentation and developed a bridge replacement concept that is a significant enhancement to the RFP Conceptual Design. Our Team’s overall project approach and proposed bridge replacement design will accelerate bridge construction activities and provide long-term, low maintenance replacement bridge structures. Our Team confirms that the proposed bridge structures will be designed per AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014 and in accordance with the current Instructional and Informational Memoranda, including the Manual of the Structure and Bridge Division.

Proposed Layout

After a careful review of the RFP plans and documentation, our Team evaluated various concepts that would maintain the existing vertical clearance during construction, meet the minimum 16’-6” vertical clearance for the proposed bridge structure, maintain the specified 2-foot minimum clearance between I-81 NB and I-81 SB bridges, and allow for the future widening of Route I-81 and Route 8. Our team’s Conceptual Design achieves these requirements, while also delivering several value-added benefits noted below and in **Table 4** on the following page.

Using the guidelines provided by VDOT’s Manual of the Structure and Bridge Division (Part 2, Chapters 6 and 17) and per the RFP Section 2.3.2, the Orders/WRA Design-Build Team reviewed various layouts for the replacement of the existing bridge structures. Our Conceptual Design modifies the overall layout from the RFP documentation that will:

- ✓ Modify the skew angle from 25°-26’-06” degrees to 24°-30’-00” degrees. This change in skew will reduce potential geometric issues for the layout of the skewed bridge structures and for fabrication of the elements.
- ✓ Reduce the overall length (end-of-slab to end-of-slab) from 148’-7” to 140’-2 1/2” while still maintaining the Structural Obstruction Zone as defined in the RFP.
- ✓ Construct each bridge superstructure in a single phase of bridge construction which will eliminate longitudinal joints shown in the RFP plans and potential issues with a deck closure pour on a long span skewed bridge structure.

Feature	Enhancement	Project Benefit
Bridge Configuration	<ul style="list-style-type: none"> Reduce bridge length by 8' Reduce bridge construction to two phases No longitudinal construction joint 	<ul style="list-style-type: none"> Reduces deck area by 545 SF Reduce construction cost Reduce impact to traveling public Reduces long term inspection and maintenance costs
Superstructure	<ul style="list-style-type: none"> Eliminates one beam line on the SB bridge from the RFP Design 	<ul style="list-style-type: none"> Reduce construction cost Reduce future maintenance
Substructure	<ul style="list-style-type: none"> Utilize skewed wingwalls 	<ul style="list-style-type: none"> Reduces parapet length, which will reduce construction cost and future maintenance

Table 4– Bridge Enhancements

Superstructure

Using the modified design approach details described previously, the Orders/WRA Design-Build Team evaluated the use of VDOT Bulb-T Girders and Weathering Structural Steel with either a semi-integral or deck slab extension option as permitted by the VDOT Structure & Bridge Guidelines to support I-81 NB and SB bridge replacement structures. Using this knowledge, our Team evaluated cost-effective bridge superstructure options for the replacement bridge structures at this location for both short-term initial costs and long-term maintenance costs. The following is a summary of our comparison highlights between structural steel and prestressed concrete:

Structural Steel

- **Advantages**
 - Reduced dead loads, which reduces foundations/substructure requirements and reduces crane requirements
 - Meets the FHWA criteria for use of weathering steel, which eliminates initial and future coating costs
- **Disadvantages**
 - Stormwater runoff on the weathering steel could stain the substructure units over time unless protected by silicone sealant
 - Dead load deflections are larger, which could lead to unanticipated, additional deck cracks
 - Constructability checks could require additional temporary support works to satisfy AASHTO requirements
 - Requires installation of shear studs in the field, which increases field erection time

Prestressed Concrete

- **Advantages**
 - Lower long-term maintenance costs
 - Reduced deflections, which should result in less deck cracking
 - Reduced field time
 - Shear stirrups are pre-cast in beam, which results in the ability to immediately place deck pans
- **Disadvantages**
 - Higher Dead Loads, which require larger substructure foundations and units to accommodate bearings and requires larger cranes

- Due to girder size requirements, shipping weight may require additional permits
- Potential camber issues between design and fabrication for long span Bulb-T girders
- Future coating maintenance costs associated with the stain as required by RFP
- Additional superstructure depth requiring the finished grade to be raised even more on I-81

Following an extensive review of the identified advantages and disadvantages above, and evaluation of overall project cost and benefits, the Orders/WRA Design-Build Team proposes to use a 60-inch deep web ASTM A709 Grade 50W (Weathering Structural Steel Girder) for the proposed bridge structure. This selection was made due largely to its inherently reduced dead loads, and for the longer-term benefits that were previously identified. The concrete abutments will be protected with a silicone sealant to avoid staining from the weathering steel in accordance with the VDOT Road and Bridge Specification 404.03(1)3. In addition, the superstructure will incorporate the F-shape parapet that meets the TL-5 Criteria and will have the drystack stone pattern that is stained randomly per the RFP requirements to approximate the appearance of the Renva W. Knowles Bridge over Route 114 within Christiansburg Corporate Limits.

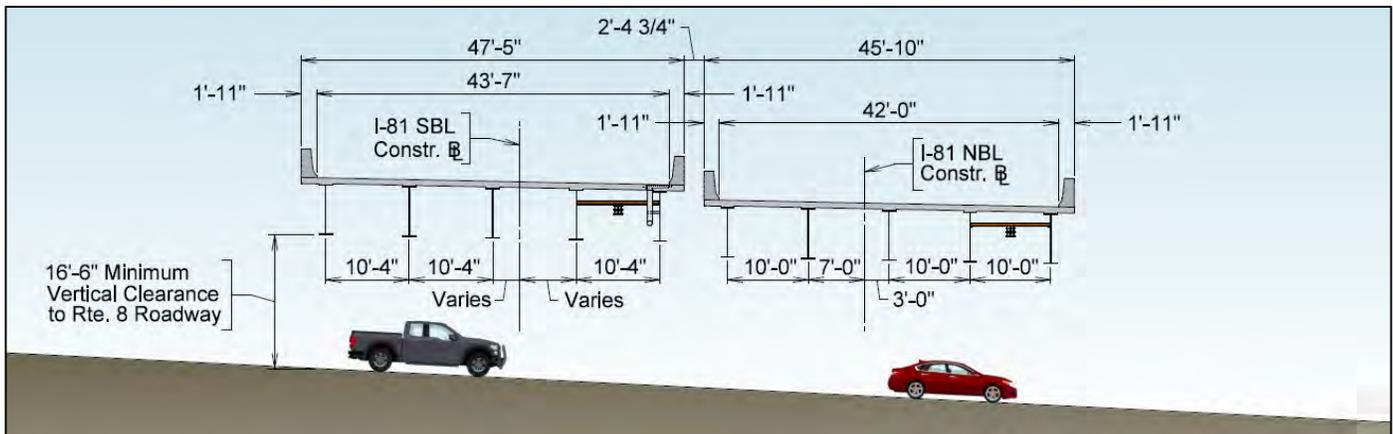


Figure 2 – Bridge Transverse Section

Substructure

The geometry and skews of our modified layout allow the superstructure to meet the requirements of VDOT’s Manual of the Structure and Bridge Division Part 2, Chapter 17 to be either be semi-integral or have a deck slab extension. Our Team evaluated various substructure alternatives to conform with these abutment types, reduce the overall bridge length, and maintain clearance to the Structural Obstruction Zone. We ultimately selected a cost effective, tall wall reinforced concrete abutment supported on steel piles.

The WRA/Orders Design-Build Team evaluated the proposed contours and the use of U-back, In-line and skewed wingwall (or combination) to support the roadway approach fills. After extensive evaluation of the proposed roadway alignment with our roadway designers, the design of the wingwalls will be detailed to be skewed to the abutment and tapered to meet the proposed grades. This geometric layout will provide for shorter wingwall lengths (height and length) and it reduces the length of the parapet as it is 100% contained on the bridge structure. In addition, the angled wingwalls will allow I-81 to be widened in the future with minimal impact to the bridge structures wingwalls since no parapet is located on this retaining feature.

To support the new superstructure, our Team’s approach incorporates “lessons learned” from our multiple projects along the I-81 corridor that we have designed in karst terrain when supporting major substructure units. Working with our geotechnical engineering staff, our Conceptual Design proposes the use of H-piles

to support the tall wall abutment. To support the tall wall and its associated dead loads and lateral loads, our Conceptual Design specifies three rows of piles that incorporate pile points for driving; the piles will be driven to refusal. The bridge and geotechnical staff will work closely during the design efforts to evaluate the existing geological conditions to identify potential risks. Our design staff will develop a contingency action plan if during pile driving activities experience pile plunges through a cavity (see section 4.4.3, Page 26 for additional information on our Geotechnical approach).

The strategic combination of the geometric changes to the proposed bridge structures described above enables our Team to propose single-span, semi-integral weathering structural steel bridge replacement structures, which will minimize the long-term maintenance with these bridge replacements while also facilitating future widening of Route I-81 and Route 8.

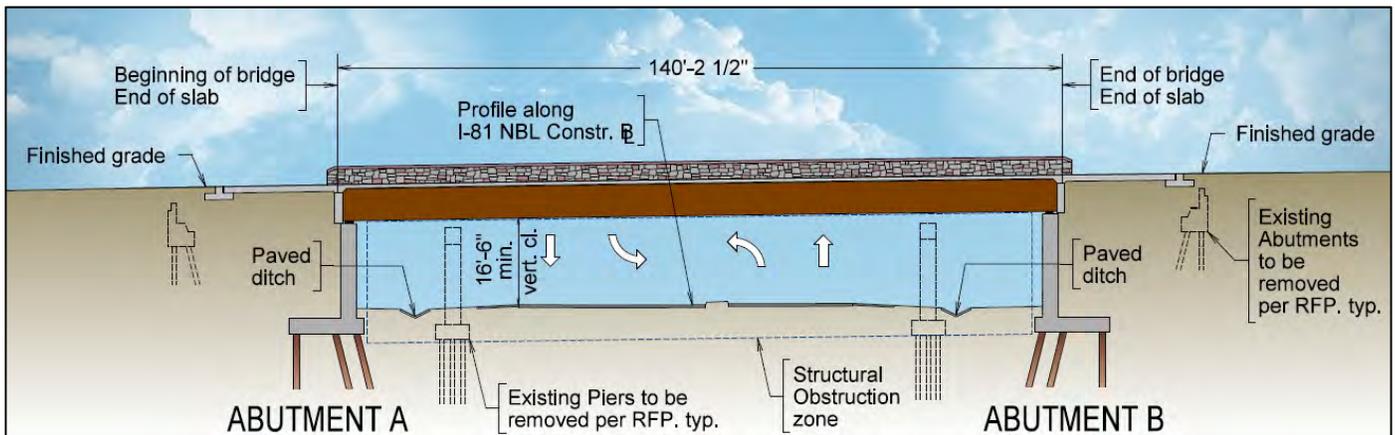
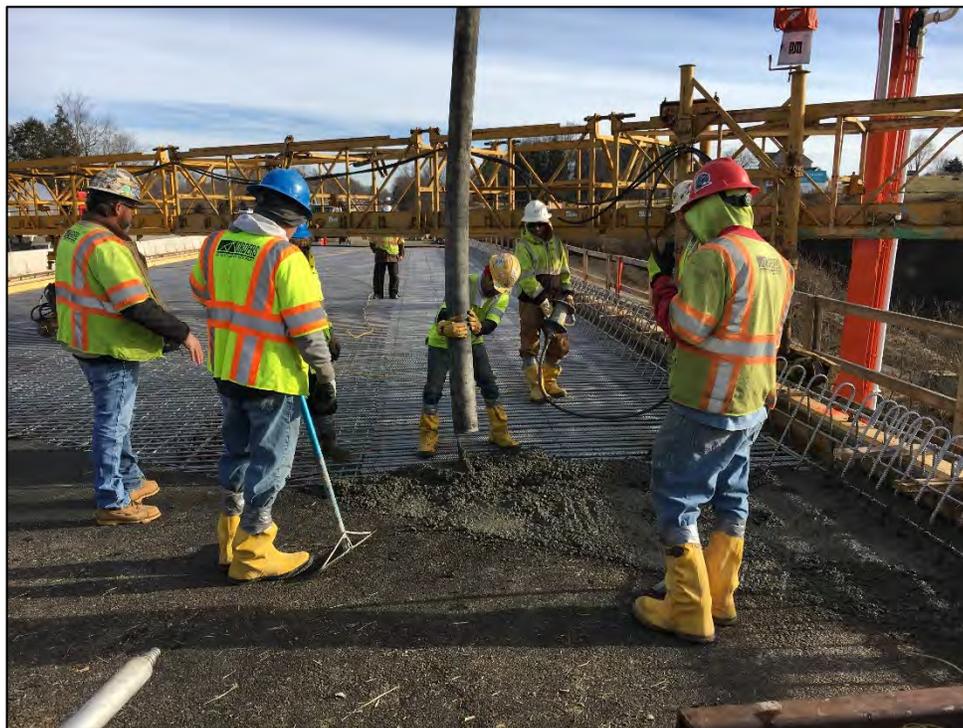


Figure 3 – Bridge Developed Section



Orders I-81 Deck Pour Commencing

4.4

PROJECT APPROACH

4.4 PROJECT APPROACH

4.4.1 Environmental Management

The Orders/WRA Design-Build Team recognizes that securing environmental permits during the design phase and maintaining compliance with environmental permits during the construction phase are both critical to maintaining the project schedule and reducing overall risk to the project. Our Conceptual Design was developed using an integrated approach that linked the designers, environmental staff, and construction experts to ensure that our design will facilitate the permitting process. This integrated approach has allowed us to develop solutions that minimize impacts and to identify required permits and environmental commitments.

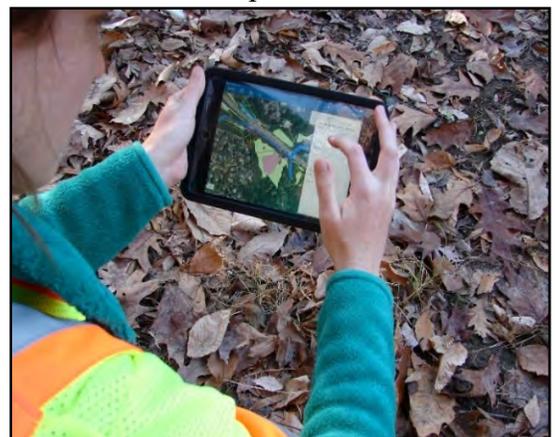
Our project schedule accounts for the timeframes required to acquire all permits. Both the DBPM and Design Manager will integrate into the environmental management team with a main focus on anticipating and mitigating potential delays. During final design, our environmental staff will continue to collaborate with the designers and the Design-Construction Coordinator (DCC) to identify and minimize impacts. By working with the DCC, all construction means and methods are taken into account when preparing permit applications. The following will be performed to ensure that environmental resource impacts have been documented, minimized, and are cleared by the regulatory agencies for construction and that environmental commitments are met during construction.

Identify and Update Environmental Resources: Upon Notice to Proceed (NTP), environmental resource locations within the project corridor will be refined based on our Design. Field work and technical services will be conducted as necessary and may include wetland delineation, stream assessments, water quality studies, and threatened and endangered species reviews that will be utilized for water quality permitting and environmental compliance monitoring. Should this refinement identify unanticipated or unknown resources, the preliminary design will be modified to support avoidance and/or minimization opportunities.

Cultural Resources: As stated in the RFP, VDOT, in consultation with the Virginia Department of Historic Resources (VDHR), has determined that there are no historical properties present or affected by the project as proposed in the RFP Conceptual Plans. On March 16, 2016, VDHR provided concurrence that the Project would have No Effect on historic architectural properties in the Area of Potential Effect (APE) and that no further work is warranted. On March 29, 2016, VDOT’s cultural resources manager concluded that there is little to no potential for intact archeological resources and no further work is warranted. Our proposed design is entirely within the APE of the cultural resources investigation; therefore, it is anticipated that VDOT’s and VDHR’s No Effect determinations will remain valid.

The VDHR’s Virginia Cultural Resource Information System (V-CRIS) was queried on January 5, 2018 to determine if any new resources had been identified since the No Effect determinations. No new resources were identified.

Hazardous Materials Management and Studies: As stated in the RFP, VDOT has already conducted studies to identify hazardous materials that could occur within the project area. VDOT identified low-level petroleum impacted soils within the vicinity of the project; however, the petroleum impacted soils will not be impacted by the construction of our design. Category



Environmental Data Collection

II Regulated Asbestos Containing Material (ACM) is present on both the I-81 NB and SB bridges and will require abatement prior to bridge demolition in accordance with the Special Provision for Asbestos Removal and National Emission Standards for Hazardous Air Pollutants (NESHAP)-related Demolition Requirements for Structures on Design-Build Projects. The existing bridge structures are designated as Type B and management of lead-based paint will be accomplished in accordance with Section 411 and 413 of the 2016 VDOT Road and Bridge Specifications. It is not anticipated that hazardous materials will impact the project schedule.

The Virginia Department of Environmental Quality's (VDEQ's) Virginia Environmental Geographic Information Services (VEGIS) "What's in my backyard?" application was queried on January 5, 2018 to determine if new resources had been identified since the September 2017 Phase II Environmental Site Assessment Report. No new resources were identified within the project area. Since no right of way is being acquired for this project, no additional hazardous material studies (including Phase 1 Environmental Site Assessments) are required. A Spill Prevention, Control, and Countermeasure Plan will be prepared prior to construction. The Orders/WRA Design-Build Team will comply with Hazardous Materials Special Provisions as per the RFP:

Secure the Virginia Dept. of Environmental Quality Virginia Stormwater Management Program Permit: Starting at NTP, the Orders/WRA Design-Build Team will design an Erosion and Sediment Control and Stormwater Management Plan to meet the Virginia Stormwater Management Program's regulatory requirements. Our Team will consult with VDOT to discuss our permitting approach for the MOT, grading and drainage advanced work package and will submit a permit application to VDOT to secure a Virginia Pollutant Discharge Elimination System (VPDES) permit. Based on our previous Design-Build experience, we anticipate receiving the VPDES permit within 45 days of the final permit application submittal.

Coordinate with Agencies for Threatened and Endangered Species: The Orders/WRA Design-Build Team has reviewed the threatened and endangered species studies and coordination conducted by VDOT. VDOT's database searches identified three listed species, Roanoke logperch (*Percina rex*), northern long-eared bat (*Myotis septentrionalis*), and Indiana bat (*Myotis sodalis*) as potentially occurring in the area. The study area does not contain suitable habitat for Roanoke logperch. VDOT conducted a bat inventory on the bridges on May 24, 2017. No signs of bat use were observed. If bridge activities do not commence before May 24, 2018, the Orders/WRA Design-Build Team will conduct annual bridge inventories until construction commences. An acoustic bat survey was conducted on May 15-17, 2017 and the report was transmitted to the U.S. Fish and Wildlife Service (USFWS) on August 17, 2017. USFWS concurred with the bat survey findings on September 21, 2017. The survey had negative results for both northern long eared bat and Indiana bat and the survey is valid for three years. Due to the negative survey results, no time-of-year restrictions for tree clearing are anticipated.



Northern Long Eared Bat

On September 28, 2017, VDOT conducted threatened and endangered species coordination through the USFWS Information for Planning and Consultation (IPaC) System and generated a self-certification letter. No further coordination is required unless subsequent bridge inspections identify protected bat species. This self-certification is valid until September 28, 2018. Should project coordination extend beyond this date, the Orders/WRA Design-Build Team will seek recertification from the USFWS. Per the conditions of the RFP, the Orders/WRA Design-Build Team will also inspect the bridges for nesting migratory birds prior to

construction.

On January 5, 2018, the VDGIF Virginia Fish and Wildlife Information Service (VaFWIS) database, the VDGIF Wildlife Environmental Review Map Service (WERMS), the USFWS IPaC database, the VDCR-DNH online searchable database, the Center for Conservation Biology (CCB) Mapping Portal, and the USFWS Virginia Field Office's Bald Eagle Map Tool were queried to determine if new threatened or endangered species occurrences had been documented in the project area. No new species were identified.

Conduct Avoidance and Minimization: Because of the minimal impacts to wetlands and streams, opportunities for cost-effective avoidance and minimization in the design phase are minimal. The Orders/WRA Design-Build Team will minimize impacts to downstream water quality during the construction phase by adhering to strict erosion and sediment control and stormwater management measures.

Secure Water Quality Permits: VDOT conducted stream assessments and collected wetland delineation information on various dates. The Orders/WRA Design-Build Team will verify the delineation information and will request a Preliminary Jurisdictional Determination from the U.S. Army Corps of Engineers (USACE). The Orders/WRA Design-Build Team will determine compensation for any stream proposed for impact by applying the Unified Stream Methodology (USM).

Immediately upon notice to proceed the Orders/WRA Design-Build Team will hold a Pre-application Meeting with USACE, VDEQ, and VMRC to discuss scope and identify any agency concerns early in the process. The purpose of this meeting is to partner with the regulators and to identify any additional studies, design considerations or constraints that would cause delays or additional cost.

Based on a preliminary assessment, we anticipate impacts to approximately 0.15 acres of wetlands and 50 linear feet of stream. Because the project has an approved Programmatic Categorical Exclusion (CE) and will result in impacts less than 0.5-acre of wetlands and 1,000 linear feet of streams, it is anticipated that the project will qualify for a Nationwide Permit 23 from the USACE. No streams proposed for impact have a drainage area larger than 5 square miles; therefore, a permit from VMRC is not required.

Environmental Compliance: The Orders/WRA Design-Build Team understands the importance of maintaining compliance with environmental permits through all phases of construction and has qualified staff that are currently assisting with environmental compliance for various VDOT construction projects in the Salem District. Our organizational structure includes a construction environmental manager who will be assigned to the project. The Construction Environmental Manager will report directly to the DBPM and will have the authority to stop work. Once construction begins, the Construction Environmental Manager will collaborate with and support the construction staff to meet environmental commitments and to advise the field construction staff of any issues or construction activities that may impact environmental permits. Our Team will take a proactive approach to environmental compliance to identify potential issues and mitigate those issues before they become violations.

4.4.2 Utilities

Our approach for utility coordination on the I-81 Bridge Replacement at Exit 114 project is straight forward and in accordance with the VDOT Utility Manual, Manual of Instructions, Utility Relocation Policies and Procedures and the project RFP documents. Utility coordination activities have already begun during the proposal preparation stage of the project. All utility companies have been contacted and existing records from those companies have been obtained. These records have been compared to the utility designation survey for completeness and are included in the proposal plans. At present, the only anticipated utility conflicts are with

the buried communications lines for Lumos Networks along the western edge of Route 8, where the existing lines will conflict with the removal of existing bridge piers. There are also Citizen's Telephone and Verizon lines, in close proximity to the work for removing the existing bridge pier substructures to a depth of 7 feet below finished grade. The exact location of these lines will be determined by performing test holes. Based on the clearance shown on the RFP survey, we will be able to avoid relocation through the use of a protection system during the removal of the piers. Existing aerial lines by AEP and Shentel crossing I-81 and Route 8 have been evaluated and found not to be in conflict with the proposed construction. An existing Town of Christiansburg water line crossing I-81 to the north of the bridges has also been evaluated and found not to be in conflict with the planned work.

Advanced utility coordination activities will take place immediately following issuance of Notice to Proceed for the project. This will include hosting the VDOT 45 day Utility Meeting and Preliminary Utility Review Meeting with all of the utility companies with facilities on the project, to explain the impact of the project and sequence of work. Proposal plans will be distributed to the utilities to allow for their review as early as possible. Also at this time, all of the pertinent utility data will be entered for the project into the VDOT Right-of-Way and Utility Management System (RUMS) system and draft versions of the Design-Build "Master Agreements" will be submitted to the utility companies for review. The utilities will be made aware immediately which facilities of theirs are most likely in conflict, and how those conflicts will play into the project staging.

The locations of all necessary utility test holes will be compiled and investigations performed. For this particular project, special attention will be given to the need to perform test holes for the Verizon and Citizen's Telephone lines along Route 8 to verify if the locations for the lines shown in the utility designation survey match their actual locations on site.

As design on the project progresses, the close coordination with the utility owners will continue. The Town of Christiansburg will be engaged as they are exploring a betterment extension of their current water and sewer facilities through the project site. We will ensure project designs minimize or avoid utility conflicts. We will utilize an online cloud based utility coordination tracking system that incorporates both "ball in court" notifications and set due dates for utility coordination tasks. The utility representatives will be able to access the current version of the tracking system at all times.

When the project plans have reached a level of completeness to show all project impacts to the utilities, we will hold the Utility Field Inspection Meeting (UFI). Plans and preliminary VDOT UT-9 forms will be distributed to the utilities approximately 2 weeks before this meeting. At that meeting, all of the utilities will be able to put forth their relocation strategies, preliminary schedules for performing adjustments and relocations, and their utility easement requirements, if they exist. We currently do not expect utility easements will be necessary for this project. Any questions to the utility relocation cost prorate established in the UT-9 forms can be addressed. Due dates will be set for utility relocation and adjustments plan and estimate submittals, no conflict letter submissions, Design-Build Utility Master Agreement completion, and completed UT-4 form submissions.

Utility relocations and adjustments will be incorporated into the project schedule and not cause delay. Currently it is not anticipated that the utility relocations will impact the schedule until the second phase of this project, when the existing NB bridge is to be removed. The anticipated utility relocations are expected to be completed well in advance of this so that they will not impact the project schedule critical path. If delays are encountered in the utility relocation, additional coordination work will be done with the utilities and assistance offered so that delays are minimized.

Further, we will use the resources of the Orders/WRA Design-Build Team for the benefit of the utility companies where possible. They can be provided with traffic control assistance, clearing, construction entrances, and lay down yards so that money spent towards utility adjustments and relocations are not wasted on redundant service providers. This will reduce costs and also help mitigate against any delays.

As project construction approaches, all Design-Build Construction supervisors and crews will be trained to look out for potential unmarked utilities. If they see any evidence of a utility facility in place that is not marked or shown on the plans, they will stop work in the vicinity at once and call for a Miss Utility 3-hour emergency locate. The Design-Build Utility Manager will be notified immediately and will seek to determine if an unmarked utility is present and active. Likewise, if there is a strike of a utility line during construction, all work will stop except for that necessary to maintain public safety. The struck facilities will remain uncovered and the Design-Build Utility Manager will immediately be notified and seek to determine the nature of the utility facility and the utility owner.

As utility adjustments and relocations are completed, the Orders/WRA Design-Build Team will keep the VDOT RUMS system updated with progress of the utilities and close them out as appropriate. The utilities will be directed to submit prompt and correct billing and to submit for all necessary as-built land use permits.



Lumos Line on Route 8

The WRA Design-Build Utility Coordination team is very experienced working on VDOT Design-Build projects, with three active Design-Build projects underway. We have performed relocation coordination with many utility companies in the past including Dominion Energy, Verizon, Cox, Comcast, Summit IG, Uniti Fiber, Windstream, and Lumos.

4.4.3 Geotechnical

Geotechnical Approach: The Orders/WRA Design-Build Team has reviewed the information included in the Geotechnical Data Report (GDR) provided with the RFP, and researched geological and geotechnical references, maps and publications. The project is located within the Valley and Ridge physiographic region, southeast of the Pulaski Fault Zone, where the bedrock consists of limestone and dolomites from the Lower Ordovician and Cambrian Formations. Based on the borings drilled and included in the GDR, along with historical borings drilled for the existing bridge back in 1962, the site is underlain by residual soils consisting mainly of stiff, highly plastic silts and clays, and occasional layers of medium dense silty, clayey sands. The twin I-81 bridges over Route 8 have up to 25’ of embankment fill soils, consisting of silt and clays of same consistency and plasticity as in-situ residual soils before encountering residuals soils. The thickness of soil overburden on top of the bedrock varies between 40’ to 70’ below the existing ground surface. Along I-81 NB bridge, upper layers of limestone were encountered at depths of approximately 50’ below the ground surface (30’ relative to Route 8 grades) with clay seams up to 19’ above the lower Dolomite rock.

Groundwater was encountered at depths over 50’ below existing I-81 grades (approximately 30’ below Route 8 grades, or within EL 2132’) and only on one boring (BB-2). At such depth, groundwater within the site is anticipated to be associated with water levels of the tributary streams to Smith Creek, especially when considering the underlying karst geology.

It is expected that the encountered highly plastic soils will require treatment if encountered at the pavement subgrade. These soils are also expected to compress and settle if new fill is placed on top and might also present long term issues with loss of shear strength from stress relief when these are excavated.

The primary geotechnical consideration with the project site is karst geology, especially when seams of up to 19' were observed on the available borings. Although records of previous sinkholes within the interchange are unknown, the project site is surrounded by historic sinkhole events and cave entrances (see Hubbard, 1988 Selected Karst Features of Central Valley and Ridge Province, Virginia). Such features can impact the project, especially functionality and serviceability of the proposed bridge foundation and Route 8. Therefore, the Orders/WRA Design-Build Team will conduct a subsurface investigation consisting of geophysical testing, complemented with additional Standard Penetration Test (SPT) borings to develop design and installation criteria for the proposed bridge foundation, as well as additional soil sampling for laboratory soil strength testing to aid with the abutment and wingwall designs, and minimum pavement section validation.

Geophysical testing will consist of electric resistivity soundings to identify voids within the project limits which could impact the bridge and proposed drainage structures. Several lines will be tested parallel and perpendicular to the proposed abutment locations. SPT borings would be drilled along the outside shoulder of Route 8 to aid in developing a design subsurface profile at each abutment. SPT borings will also be drilled at specific locations as determined from the results from the geophysical tests. This approach was followed for the I-81 Bridge Replacement over Sinking Creek and Halls Bottom Rd. (see Figure 4 below), which helped identify the underlying subsurface profile and depth to karst features. Direct shear tests and additional California Bearing Ratio (CBR) tests may also be performed.

Additional SPT borings will also be pursued to evaluate conditions within the proposed overhead sign structure for the design and construction of its foundation, and at the two potential jacking pits for the proposed storm drain pipe under I-81 SB at Sta. 953+65.

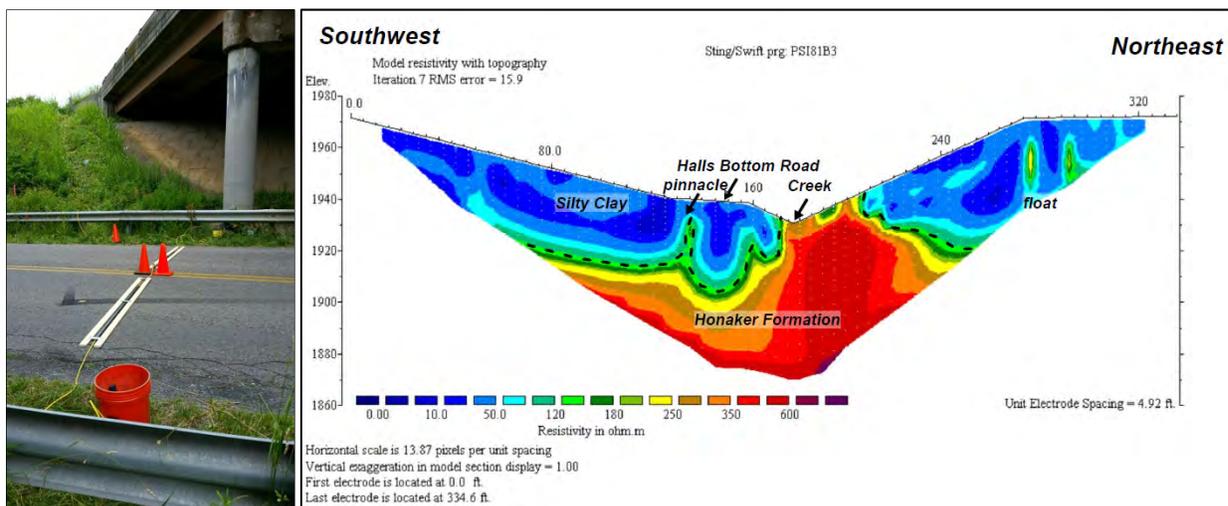


Figure 4 - Electric Resistivity Plot for I-81 Over Sinking Creek and Halls Bottom Road

Bridge Foundation: The Orders/WRA Design-Build Team is proposing semi-integral bridge abutments supported with three rows of steel H-piles driven with tip protection to rock at refusal blow count criteria. Dynamic load tests will be pursued for the bridges, with one test per abutment to monitor stresses at end of drive and define refusal driving conditions.

This approach considers a close spacing between H-piles to allow for an increased foundation redundancy for the proposed bridge in the events some piles plunge in the future as a result of punching failure through a thin limestone crust voided underneath. A soil-structure interaction analysis for each abutment structures will be performed during design using FB-MultiPier with the goal of obtaining an early assessment of the pile group behavior in the events some piles plunge and cannot be effectively provide support. This analysis will be updated during construction as piles are driven, and will serve useful when determining the effectiveness of plumb piles at certain locations or the effects of adjusting the pile spacing because of potential obstructions from existing piles.

For this option, the Orders/WRA Design-Build Team will monitor the installation of each pile and develop mitigation measures to shield the existing bridge foundation or provide temporary support via “crutch” pile bents during the planned construction stages. Such measures would also include a sinkhole stabilization plan to stabilize pavement subgrades along Route 8 and near the existing I-81 Bridge approaches from potential sinkholes. The plan would consist of using flowable fill and a triaxial geogrid capped with No. 21 stone to stabilize the area and avoid progression of the feature. These measures will be defined further following the results of the proposed subsurface investigation.

Pavement Subgrades: Given the project’s realignment of I-81 SB towards the existing median, new pavement is required, especially at the proposed bridge approaches, and inner shoulders prior to having the roadway tie in with the existing alignment. New pavement is also required within sections of the four (4) I-81 ramp connections to Route 8 due to slight shifts in the ramp alignments relative to the new I-81 alignment through the interchange.

The provided GDR included three CBR test results, two of which were from bulk soil samples taken near Ramps A and B, and the third from within the southeast quadrant between Flannigan Drive and Route 8. The samples were described as clays, two of which were highly plastic clays, with some sand content. CBR values varied from 5% to 8%, with swell values less than 1.4% and maximum unit weights (densities) up to 106 p.c.f. Based on the nature of the soils tested, the Orders/WRA Design-Build Team proposes to perform additional CBR testing to corroborate these test results and evaluate the validity of the specified minimum pavement sections included in the RFP. The additional sampling for CBR testing is proposed along the I-81 inner shoulders and median, including near the existing tie-ins with Ramps C and D and along the Ramp B right shoulder. If the test results fall short of the subgrade strength requirements for the minimum pavement section specified in the RFP, the Orders/WRA Design-Build Team will evaluate partial undercuts and replacement with biaxial/triaxial geogrid capped with 21B stone or in-place soil treatment with lime mixing.

4.4.4 Quality Assurance / Quality Control (QA/QC)

The Quality Assurance/Quality Control Mission

The Orders/WRA Design-Build Team believes that a quality project is the result of a well-directed, core partnership between design and construction staff, the Quality Control Manager (QCM) and inspectors, the independent Quality Assurance Manager (QAM) and Quality Assurance (QA) staff, and VDOT. Extended partners in the quality process include the other jurisdictional agencies and identified project stakeholders, all of which we have identified in our Organizational Chart (Page 10). The combined mission of this core partnership will be to *meet or exceed the quality requirements* for the I-81 Bridge Replacement at Exit 114 Project.

Overall Quality Assurance/Quality Control Approach

The Orders/WRA Design-Build approach to the development and implementation of the Quality Assurance/Quality Control (QA/QC) Plan will be to prepare, present, obtain approval, and continually update the Project QA/QC Plan based on VDOT's *Minimum Requirements for Quality Assurance and Quality Control on Design Build and Public-Private Transportation Act Projects (January 2012)*. The Orders/WRA Design-Build Team will build on our current implementation of a successful QA/QC Plan that we developed for the delivery of the VDOT I-81 Bridge Replacement over Halls Bottom Road and Sinking Creek Design-Build project, and several other completed projects across Virginia. The QA/QC Plan developed by the Team will emphasize the importance of defining a process for obtaining a high quality product in every project feature with a consistent, repeatable method for evaluating quality as well as for addressing and curing non-conforming work. Quality will be a key consideration in the day-to-day decisions made by employees at every level and all team members will be required to become familiar with and follow these procedures.

Our QA/QC Plan will assure that auditable procedures are in place to achieve the quality of workmanship standards set by the Orders/WRA Design-Build Team. These practices will establish the protocol to be followed by all team members, including all subcontractors, during the design and construction of the project. Central to these quality guidelines are complying with the minimum requirements, specifications and standards of all applicable Federal, State and Local laws and VDOT Standards, Specifications, and Reference Documents. When materials, workmanship and/or equipment do not meet the required standards, the QA Auditing and Nonconformance Recovery Plan will define the uniform reporting, controlling, correction and disposition, and resolution of nonconformance issues that arise on the project. The successful implementation of the Plan will result in process efficiencies, schedule efficiencies by elimination of re-work, increased employee morale, and ultimately, a successful project for the Team, VDOT and the public.

Our QA/QC Plan will be organized into sections, with appropriate attachments in the Appendices, which provide additional guidance and checklists for the Orders/WRA Design-Build Team to implement the QA/QC Plan for the project. In particular, the **Design QA/QC Plan** will define what processes, roles, and responsibilities that WRA will follow to ensure Quality Assurance and Quality Control in the design of the project. WRA's QAM will implement the **Construction QA/QC Plan** to define Quality Assurance and Quality Control inspections and testing that will be followed during the construction of the project. Our QA/QC Plan will be a living document, updated continuously with lessons learned as the project progresses to constantly learn and improve quality at each step. A regular review of the QA/QC Plan and its requirements will be performed as part of monthly progress meetings and the QAM's QA/QC status report to ensure quality standards are being met or exceeded.

Design Quality Assurance/Quality Control Approach

As Design Manager (DM), *Mike Russell, P.E., DBIA*, will have ultimate responsibility for implementation of quality control and quality assurance processes for all design elements of the project. The Design portion of the QA/QC Plan addresses procedures and responsibilities to ensure the project design is correct and consistent with appropriate standards and specifications. Each design submittal of plans, calculations, or reports, whether intermediate or final will be subject to an independent quality review of both Design QC and Design QA functions. Each review is finalized by a review summary form, which indicates by signature that the reviewer has completed the review and that the Design Manager (DM) has confirmed that all review comments have been properly incorporated. The review set of documents becomes a permanent part of the project files.

Design quality control reviews will include examination to verify numerical accuracy and completeness of calculations and plans and conformance to VDOT standards and contract requirements. This review will assess coordination between disciplines, sub-consultants, and details, and will assure that the design is correctly reflected on the plans. This process makes extensive use of standardized checklists, including VDOT LD-436, and materials developed in-house. Design quality assurance reviews will look at the “big picture” to verify completeness and reasonableness of the design solution. The plan will also include conformance with contract requirements for each design discipline and will include the following efforts as a minimum:

1. All existing design data and calculations will be reviewed by the Design Engineer with an emphasis on engineering design and conformance with current VDOT standards in order to identify deficiencies. Deficiencies will be corrected as appropriate by the Design Engineer.
2. The general geometry shown on the drawings will be reviewed by the Design Engineer to ensure standards are met.
3. Once all calculations have been verified, the drawings will be checked by the independent QC Engineer to confirm that the design information has been correctly transferred to the plans.
4. Quantity calculations will be confirmed by starting with the original calculations as compiled by the Design Engineer being independently checked by the QC Engineer and comparing the information to the final drawings.
5. Special provisions and special provisions copied notes will be reviewed by the Design Engineer to confirm their applicability. Additional special provisions will be provided as necessary with the concurrence and approval of the DM.

The DM will review constructability, adequate right-of-way and easements, potential utility conflicts, traffic maintenance issues, and interdisciplinary coordination. WRA will work directly with Orders’ Design Construction Coordinator and the QAM to complete the constructability reviews of the plans to thoroughly ensure that all aspects of the project can be physically constructed in a safe manner. In addition to being safe, reviews will ensure the completed work is maintainable during and after construction. This especially holds true for the impact the design will have on the Maintenance of Traffic (MOT). Items such as material delivery/storage, workforce accessibility, and crane and other equipment placement will be reviewed to minimize traffic impacts. Finally, the constructability review will evaluate optimizations in design and sequencing to seek minimum project duration. The DM will carry out his responsibilities by ensuring all QC and QA reviews are performed appropriately and by conducting planned design meetings and special meetings for specific issues and concerns.

Any field changes or any other deviations to the approved construction documents will be subject to the same design QC and QA measures and procedures applied to the original design. The requested change will be logged for tracking and will be sent to the Design Engineer who performed the original design. Once the change has been reviewed and the appropriate QC Engineer check performed, the requested change will be forwarded to the QA Engineer for review and DM for approval. Once the DM has approved the change, it will be sent to Orders and ultimately to VDOT if required with a recommendation for approval. If there are no comments, then the field change will be incorporated into the as-built plans. If comments are received, they will be forwarded back to the original designer and we will continue the process until the requested change is acceptable to VDOT and/or the appropriate entity.

The Orders/WRA Design-Build Team has developed the flowchart shown in Figure 5 that we adhere to, and that graphically depicts our overall QA/QC Process in practice:

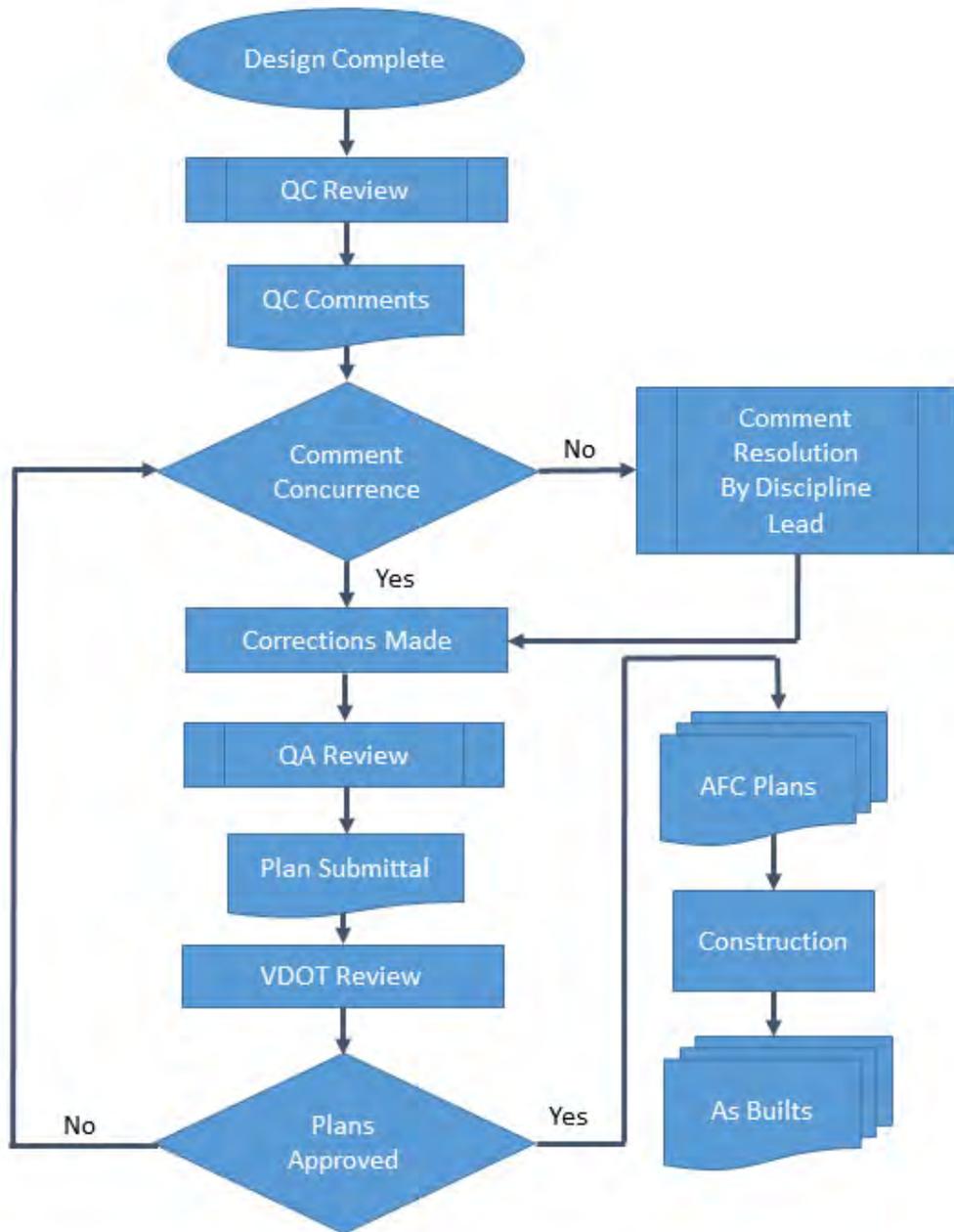


Figure 5 – QA/QC Flow Chart

VALUE: A successful integrated QA/QC process that includes the QC staff, designers, contractors, and the design team’s quality control checkers.

A final, key ingredient that drives success is effective communication among everyone involved with the design. Our Team’s QA/QC design procedures goals are to:

- Design features that are safe and maintainable, and also meet VDOT regulations and Design Manuals;
- Conform to the standards and reference documents in RFP, Part 2, Section 2.1.1.
- Design elements that meet requirements and are constructible, durable, economical, inspectable, and minimize maintenance.
- Meet design schedule, budget, and construction staging requirements.
- Minimize design costs.
- Provide an organized and indexed set of design calculations, including design criteria and assumptions.
- Minimize VDOT Reviews.

In summary, *our mission has always been to provide quality designs and quality plans in the fast-paced delivery of a Design-Build project, and we are fully committed to do the same on the I-81 Bridge Replacement at Exit 114 project.*

Design QA/QC Staffing Plan

The Orders/WRA Design-Build Team has carefully considered our staff’s technical expertise and availability for this project, and are confident to state that we have assembled a first-class slate of practitioners to capably handle each key responsibility in the QA/QC Design Process. Please note the below graphic that details our proposed staffing plan for Design QA/ QC reviews:

Discipline/ Responsibility	Firm Responsible	Design Engineer (Originator, Backchecker, & Corrector)	QC Engineer (Checker & Verifier)	QA Engineer	Engineer in Responsible Charge
Design Manager	WRA	-----	-----	-----	Mike Russell
Roadway Design Plan Development/Alignment/Grade	WRA	Russell Workman	Andrew Koser	Mark Vasco	Brad Stipes
Hydraulics/Drainage/SWM/E&S	WRA	Dave Dehoff	Jenae Carraway	Kyle Kennedy	David Gertz
MOT/Traffic Engineering (TMP)	WRA	Andrew Koser	Mark Vasco	John Holst	Dana Trone
Lighting	WRA	Sean Dalina	Jeff Cheng	John Holst	Jeff Cheng
Signals/Signing/Marking	WRA	John Holst	Dana Trone	Nick Fleming	Dana Trone
Geotechnical	WRA	Ricardo Fernos-Jones	Cameron Troxel	Monica Paylor	Jeff Basford
Environmental	WRA	Joe Felton	Nick Nies	Taylor Sprenkle	Mike Russell
Right of Way	Bowman	Rickey Stuchell	Lee Cooper	Richard Bennett	Ronnie Van Cleve
Surveying	H&B	Ryan Brown	Leslie Byrnside	Alison Hanson	Leslie Byrnside
Structural	WRA	Maria Lang	Timothy Beavers	Gary Shelor	Jeremy Schlussel

Table 5 – Staffing Plan for Design QA/QC Reviews

Specific Design QA/QC Element – Roadway Geometry

The I-81 Bridge Replacement at Exit 114 includes necessary mainline interstate realignment to facilitate the bridge construction. Extreme care will be taken, and oversight provided, in the design and development of



Quality Control Plan Review

horizontal and vertical alignments for both temporary and permanent mainline traffic shifts. The Orders/WRA Design-Build Team recognize that safety of the travelling public and construction workers alike is enhanced when work spaces are separated as much as possible from traffic spaces, and when close scrutiny is given when designing temporary shifts necessitated by Maintenance of Traffic requirements. These geometric constraints combined with the restrictive structural exclusion zone that is a requirement of the project stress the importance of design accuracy early in the project development. Because of the critical nature of the geometry a design QA/QC review of the geometry will be performed prior to any subsequent design (bridge, drainage, etc.) being performed.

The QA/QC process described above will be followed as if this were a true submittal to the Department. Once the Designer has checked their work for completeness, the DM will direct QC Engineers from each discipline to perform a QC Review. Once comments have been resolved, incorporated, and back-checked, a separate QA review will be performed to ensure the QC process was followed in accordance with the QA/QC plan. Finally, a review will be conducted by the DM to ensure the entire process is complete.

Construction Quality Assurance/Quality Control Approach

The Orders/WRA Design-Build Team will use a systematic approach to Quality Assurance (QA) and Quality Control (QC) covering *all construction activities* throughout the project. QA is the overall process performed *independently of the construction contractor* (contractor’s production forces) for the purpose of determining the conformance of the work by examining Quality Control (QC) data and/or providing objective evidence (independent sampling and testing), to verify the contractor’s quality control sampling and testing. The Construction QA/QC Plan is intended to describe how the Orders/WRA Design-Build Team will achieve the QA and QC functions in accordance with this definition and according to the requirements in the Minimum Guidelines. The QA Staff is led by **Brian Henschel, PE, CCM, PMP**, the WRA Quality Assurance Manager (QAM), under the leadership of **Charlie Stokes**, the Design-Build Project Manager (DBPM), and includes the WRA QA Inspectors and the QA Laboratory and Testing Technicians.

The QC Staff, led by QC Manager **John (Bud) Williams** (Quinn Consulting Services, Inc.), will report to Construction Manager **Earl Adwell** (Orders Construction), and includes the Quinn QC Inspection Staff and the QC Laboratory and Testing Technicians.

The DBPM will be ultimately responsible for the quality of the construction of the individual work elements, including the workmanship and materials incorporated into the Project. The QAM will report directly to the DBPM and will manage the construction Quality Assurance program. The QA organization will be separate from the design and production teams, including the entire QC Staff. The QA staff will not perform conflicting duties or production work. Thus, in full compliance with VDOT’s requirements, the QA organization will be distinct and separate from the design and production staff and all key personnel performing QA or QC functions will be exclusively designated as such and will not be assigned to perform conflicting duties or production work.



Nighttime Paving Operation

The QAM will provide inspection and testing to assess construction processes relative to the applicable standards and specifications. The QAM and his staff will perform independent control testing in accordance with the QA/QC Plan, which is based on VDOT's "Minimum Quality Control and Quality Assurance Requirements for Design-Build & Public-Private Transportation Act Projects" dated January 2012 (Minimum Guidelines). The QAM will provide feedback to the VDOT Project Manager, and will assure that all the necessary documentation regarding QA/QC inspections and testing of materials and in-place construction has been performed and adheres to the contract before any payment is approved. Per VDOT's Guidelines, the Design-Builder will give the QAM written authority to stop work not performed to Contract requirements.

Once construction starts, the QAM and his staff will interface on a daily basis with the Construction Manager, QC Manager, and his Quality Control Team. The QAM's primary point of contact on site will be the DBPM. The QC Staff, including QC Inspectors, Technicians and Laboratory, will submit all of the QC documentation to the QAM for review and acceptance. Based on the Contractor's schedule provided to the QAM on a weekly basis, the QAM will ensure that upcoming work items are properly inspected and tested in accordance with the frequencies and testing requirements in the QA/QC Plan. Four phases of inspection will be used to ensure the work is performed in accordance with the contract document are: the Preparatory Phase, Intermediate Phase, the Completion Phase, and the Punch-List Phase.

Witness and Hold Points will be established where notification of VDOT is required for the Department's option of observing or visually examining a specific work operation or test. Witness Points are points identified within the QA/QC Plan and CPM schedule, which require notification of VDOT. Work may proceed beyond a witness point with or without participation by VDOT provided proper notification has been given. Hold Points are mandatory verification points identified within the QA/QC Plan and CPM schedule beyond which work cannot proceed until mandatory verification is performed and a written release is granted by VDOT. The QAM will work with VDOT to identify witness and hold points accordingly.

The QAM, Assistant DBPM, and Construction Manager under the guidance of the DBPM will hold Preparatory Inspection Meetings before the start of work activity, and these meetings provide an opportunity to proactively address issues and to convey lessons learned. Preparatory Inspection Meetings will be Hold Points and will be held in advance of specific work activities to verify approval of proper documents, materials, and permits, discuss the means and methods and sequencing that will be employed in the activity, plan for testing and necessary Owner interaction, and schedule the necessary inspection activities to include necessary staffing levels. The meeting will allow for coordination and communication between Orders Construction, the production personnel, relevant Design-Team members, QC and QA personnel, and VDOT and VDOT's Independent Assurance and Verification, Sampling, and Testing representatives. The meetings will ensure that all parties have the same understanding of the design intent and to confirm the completeness and suitability of the plans, and identify all relevant inspection checklists, inspections and testing that will occur for each work package.

In order to reinforce the level of quality discussed at the beginning of the project as the project develops, the Orders/WRA Design-Build Team will conduct regular QA/QC meetings with the Orders, WRA, QA, QC and VDOT teams on-site to ensure each individual understands his or her respective responsibilities and that all work is covered and properly documented. Daily communication with the Construction Manager and QC Manager will occur to review the project’s scheduled activities and to ensure proper coordination of QA/QC



Mock Closure Pour

activities. The importance of daily communication between the Construction Manager and QC Manager cannot be overestimated; it is the foundation for clarity and responsibility on the day-to-day operations at the work site. The Orders/WRA Design-Build Team understands this and will apply this practice on the I-81 Bridge Replacement at Exit 114 project. When beneficial, the Orders/WRA Design-Build Team will conduct supplemental Preparatory Meetings to discuss QA/QC topics and highlight challenges that the project has had since the first meetings. The Orders/WRA Design-Build Team has found this practice to be particularly valuable when a new subcontractor commences operations on the project that will impact a previously covered element of work.

When the procedures established in the QA/QC Plan and discussed at the Preparatory and Weekly Meetings are not followed, the QAM will utilize the enforcement and documentation tools at his disposal, including an Internal Non-Conformance Statement (INCS), Non-Conformance Report (NCR), and Stop Work Notice. An INCS will be utilized when an element of work has been observed by QA, QC, Orders Construction, or VDOT staff that is not in compliance with the project requirements but the non-compliance can be quickly corrected prior to being incorporated into the permanent work. Examples of this would include the placement of tack on asphalt that has not yet been properly cleaned. An INCS would be issued for the tack to be removed, the asphalt layer cleaned, and tack reapplied. In the event that the INCS was not corrected within seven (7) days and the contractor proceeded with placement of the next lift of asphalt on the uncleaned surface, a NCR would be issued. The contractor would then have to justify the proposed corrective action to the satisfaction of the QAM and the Design Manager. The QAM would withhold payment until the NCR is closed.

Another example using enforcement and documentation tools is monitoring work zone compliance. On a daily basis the QC inspector will inspect the project’s MOT elements for general compliance and on a weekly basis the QC and QA inspectors will complete separate Work Zone Safety Inspection Checklists (TE-97001). The inspectors will document the compliance of the various elements of the work zone within the checklist, review with the contractor, sign and file the checklist with his daily work report. The VDOT checklist already follows the established enforcement policy established within Orders/WRA Design-Build Team’s QA/QC Plan. If an item is deemed non-compliant per the VWAPM and not an immediate safety hazard (damaged barrel or leaning signage), the inspector will note it as such in the appropriate checkbox and re-inspect the noncompliant items within 5 business days. If an item requires immediate action because it has been determined to be an immediate safety hazard (clear zone infraction or malfunctioning advanced warning light) an NCR and a Stop Work Notice for that operation will be issued until the issue is corrected.

In addition to minor or immediately correctable INCS’s that are not addressed in a timely fashion, full NCR’s will be issued for non-compliances that are not immediately correctable or require review by the Design Manager and/or VDOT prior to implementation of the correction. For example, if Class A4 concrete

incorporated into the Bridge superstructure does not meet the required permeability characteristics when tested, an NCR will be issued while the Orders/WRA Design-Build Team develops a corrective plan of action. All NCR's are tracked on an NCR Log, and the status of open NCR's will be reviewed at each Progress Meeting. An NCR will not be closed out until the approved corrective action or payment reduction is agreed upon and completed to the satisfaction of the DBPM, the QAM and VDOT.

QA and QC Staffing will be provided at levels required to meet the oversight requirements of the QA/QC Plan, based on the Minimum Guidelines requirements and the RFP. The QAM will be on-site at least on a weekly basis (and likely multiple times each week), attending all regular design and construction meetings, including weekly construction QA/QC field meetings. The QAM will personally review all non-compliances, and will inspect the work at a frequency regular enough to be able to certify the work is complete and acceptable for incorporation into the final product. The QAM is responsible for the Materials Book, ensuring that it is fully up to date with all required paperwork needed to certify the monthly Pay Application. Regarding QA Inspectors, the RFP requires two (2) full time inspectors, which will be assigned to the project full time throughout construction. In addition to these two full time inspectors, the Team expects to augment this minimum number for short periods when there are double work shifts (day and night), intermittently to ensure documentation upkeep, and during times of peak work when there are multiple concurrent operations. The QA Laboratory will have staff as needed to provide required QA lab testing.

The QC Staffing will fluctuate with work activities on the project. The QC Manager will be engaged sufficiently to know and understand the QC staffing needs on the project, and to acquire and assign the needed staff. He will review all QC documentation and forward to the QAM for review. The QC Manager will attend all construction progress and QA/QC meetings and will communicate daily with the Construction Manager and QAM. QC Inspection Staff will be required to continuously inspect key elements of the project, including pipe backfill, grading operations, concrete operations, and others as required. Structural concrete operations and miscellaneous concrete operations over 25 c.y. will require two QC inspectors. Other activities require intermittent checks, such as erosion and sediment control and MOT devices. With dual shifts likely at times during the projects, full time QC Staff is likely to fluctuate between two (2) and six (6) inspectors depending on the work activities planned. QC Laboratory staff will be provided as necessary.

Specific Construction QA/QC Element – Maintenance of Traffic

Maintenance of Traffic (MOT) throughout the project is the project element that Orders/WRA Design-Build Team considers most critical from the construction perspective. Safe, continuous flow of traffic on I-81 and primary Route 8 is of paramount importance, and will be continuously monitored throughout the project. VDOT has specified the level of importance it places on this safe, continual traffic flow by placing significant consequences for leaving in lane closures beyond the restricted hours, by limiting the total number of 20-minute closures that can occur on Route 8, and by specifying a detailed process of evaluation and correction prior to resuming permission to install lane and shoulder closures should the Design-Builder fail to re-open a lane or shoulder closure by the stipulated time.

The Orders/WRA Design-Build Team concurs with VDOT's prioritization of safe, continual traffic flow on both I-81 and Route 8. With a bridge directly adjacent to live interstate traffic and over primary route traffic, means and methods will have to be adjusted with Maintenance of Traffic in mind. Normally utilized equipment, staging, access, and expected productivity may be altered by the presence of the adjacent traffic. Orders, QA and QC Staff will be constantly attuned to how traffic is flowing, proper installation and maintenance of MOT devices, and the ability to produce quality work safely within the available work area.

The QA/QC team members will be completely familiar with the communication chain prescribed in the projects Transportation Management Plan (TMP). As part of the TMP, the Orders/WRA Design-Build Team will include an Incident Management Plan that details communication requirements and an emergency contact list so that all team members are connected. Due to the impact of an MOT failure, all team members will be empowered to immediately stop work should an imminent safety issue be observed. The plan to ensure quality in the maintaining of traffic will begin in the design phase, and continue through constructability reviews to ensure the MOT plans will result in optimal safety during construction. MOT will be the first Preparatory Inspection Meeting and a Hold Point, during which the Design-Builder, QA Staff, QC Staff, VDOT and associated stakeholders such as the VDOT TOC, Town of Christiansburg and Montgomery County emergency services, Virginia State Police, and the Design-Builder's Public Relations firm will attend.



MOT on I-81

Clear understanding of lane closure restrictions, work restrictions, safety considerations relative to MOT in each operation, and the process for communicating the initiation and removal of MOT will be discussed. Work plans will be altered for key events such as Virginia Tech and Radford's graduation and move in, the Floyd Fest, and other Virginia Tech events noted in the RFP. The Orders/WRA Design-Build Team will review key specifications, such as the Lane Closure Coordination/Lane Closure Implementation special provision, and all required documentation and checklists and their frequencies. The Incident Management Plan prepared as part of the TMP will be reviewed and discussed throughout construction so that all parties are fully prepared to respond during an emergency.

During implementation of the MOT Plan, QC will inspect MOT daily, being present and inspecting the installation and removal of MOT devices, with periodic reviews throughout the day. QA will also review MOT each day, completing a weekly Work Zone Safety Checklist. Communication will continue to be key. As construction plans and schedules change, daily work plan meetings between the Construction Manager, QC Manager, and QA Staff will review planned MOT activities for the following day. This information will be disseminated to VDOT, TOC, and other appropriate stakeholders so the public can be alerted. The Design-Builder's PR Firm may be engaged to assist in this information campaign.

QA staff will serve as the primary party reviewing compliance with lane closure restrictions, tracking the total number of 20-minute closures on Route 8, ensuring the Design-Builder is contacting the TOC at least one (1) hour ahead of the expected opening time, and tracking whether lane closures were removed within the stipulated time. Should the Design-Builder fail to remove the lane closure within the stipulated time, the QAM will issue an NCR that will document the penalty time. The QAM will coordinate with the Design-Builder and assist VDOT as desired in evaluating the reasons for the failure and the plan to assure VDOT that the causes have been corrected. If such a failure occurs, the QAM will facilitate a meeting with the Design-Build Team and VDOT to discuss the causes of the failure, the contingencies that could have been implemented to avoid the failure, and the lessons learned for future closures. The QAM will ensure no more closures are allowed until VDOT has reviewed and approved the Design-Builder's submission. Finally, the QAM will ensure the penalties are encompassed on the subsequent Pay Application to close out the NCR.

4.5

CONSTRUCTION OF PROJECT

4.5 CONSTRUCTION OF THE PROJECT

The Orders/WRA Design-Build Team has experience individually and as a team working on other Design-Build projects in Virginia; the most recent being the I-81 Bridge Replacement over Sinking Creek and Halls Bottom Road Design-Build Project in the Bristol District. This experience is critical because it provides a depth of lessons learned that has been drawn upon to develop the means and methods needed to deliver this very important project efficiently, safely, and on schedule. The Orders staff consisting of the Design-Build Project Manager, Assistant Design-Build Project Manager, Construction Manager, and the Lead Bridge and Roadway Superintendents bring over 150 years of experience in highway and bridge construction experience. With this experience, the team understands what items are critical in delivering this project efficiently, safely and on schedule. The Orders/WRA Design-Build Team is focused on the below items in order to achieve these goals:

- Construct the majority of the project without impacting traffic
- Reinforce the safety of the traveling public and our workers during construction
- Reduce environmental impacts
- Minimize impacts to right-of-way
- Decrease the maintenance of traffic phases
- Execute effective public outreach
- Accomplish overall project acceleration

The Orders/WRA Design-Build Team has studied and reviewed thoroughly the RFP requirements, and proposes a project that meets or exceeds the expectations set forth therein. The Orders/WRA Design-Build Team Conceptual Design proposes a Sequence of Work that eliminates an entire traffic shift phase in the Maintenance of Traffic Plan as depicted in the RFP plans. By reducing Maintenance of Traffic Phases the construction can progress in a more efficient and safer manner. The highlights of this construction approach are illustrated in the table below.

Project Enhancement	Positive Impacts for the Traveling Public
Two Phase Bridge Construction and Elimination of a Maintenance of Traffic Phase	Safer Construction Zone due to the reduction in traffic shifts; this increases safety for all modes of the traveling public.
Optimized Alignment	Smoother Operation of Interchange and meets drivers expectations
Elimination of Jack and Bore Operation	Eliminates Disruptions and Distractions for Traveling Vehicles
Reduction of Lanes on Route 8 in the Work Zone	Safer due to providing a larger buffer between construction activity and the traveling public

Table 6 - Construction Approach Project Enhancements

4.5.1 Sequence of Construction

Approach to Construction Phasing

When planning the Sequence of Construction, the Orders/WRA Design-Build Team wanted to minimize delays to the traveling public and provide a clear path to successfully completing the project by the Final Completion date as set forth in the Letter of Submittal. Experience has taught us that no matter how great a plan is, things can happen to delay the plan. The Orders/WRA Design-Build Team will minimize the chance for delays by thoroughly investigating areas that have the potential to cause delays, and coordinate closely with all stakeholders to minimize impacts that have local concerns.

Geotechnical Investigation

The Orders/WRA Design-Build Team will complete the necessary testing and develop the Geotechnical Engineering Report. Recommendations will be generated in advance of construction to address the impacts of unsuitable soils, low CBR values, and hard residual soils encountered during the construction of embankments, subgrade and structure foundations.

Embankments, Cut Slopes and Pavement Subgrade

Soil testing in advance of construction will be performed along each proposed alignment to evaluate the suitability of the in-situ material. This testing will provide information that will be utilized in designing the embankments that will be constructed for I-81. It will also identify soils that are unsuitable for use as pavement subgrade or as fill material during construction. This information will be used along with the information provided in the GDR.

Bridge Foundation and Temporary Support of Excavation

The proposed bridges consist of single span steel girders with semi-integral abutments. The preliminary foundation design for these bridges, based on the boring information provided, propose that the structures will be supported on HP piles, driven to practical refusal. Temporary support of excavation will be required to accommodate this construction. In areas where adequate width and headroom exist, the support of excavation will be handled with sheet piling or a pile and lagging system. In other constrained areas where the existing structures prohibit these methods of restraint, temporary internally stabilized wire walls will be utilized.

Environmental Impacts

Many construction activities impact the environment. However, it is the goal of the Orders/WRA Design-Build Team to minimize these impacts and potential for any unnecessary impacts to the surrounding areas. The Orders/WRA Design-Build Team has evaluated each area and phase of construction with the mindset of “prevention and protection” in regards to the environment. With this approach, the Orders/WRA Design-Build Team has developed a design and construction plan to minimize environmental impacts. Two examples with this design are the avoidance of the hazardous material located at the beginning of the project and the avoidance of impacts to the CCTV Camera located between the onramp and Mainline I-81 SB.

The Orders/WRA Design-Build Team is committed to minimizing environmental impacts. So much so, that in conjunction with the plans to minimize impacts during construction, the Orders/WRA Design-Build Team will have personnel on site whose number one priority is to review and monitor daily, regardless of weather, all active erosion and sediment control measures. This individual will have the authority to direct maintenance, improvements, or changes as deemed necessary. This position is *above and beyond* the normal inspection staff.

Permanent Easement Acquisition

Acquiring right-of-way and easements can result in unavoidable delay. However, to mitigate this unknown, the Orders/WRA Design-Build Team includes Bowman for acquiring the permanent easements required for the project. Bowman has extensive experience performing these services on both VDOT Design-Bid-Build and Design-Build projects. The following easements will be needed:

- Parcel 003 (International Church of the Foursquare Gospel): Permanent Drainage Easement #1 required for pipe outfall maintenance
- Parcel 003 (International Church of the Foursquare Gospel): Permanent Drainage Easement #2 required for pipe outfall maintenance

Vehicular Safety and Operations

Vehicular accidents can occur when the driver's expectations are not met. The Orders/WRA Design-Build Team's Conceptual Design attempts to meet driver's expectations while traveling through the work zone. Each traffic shift and/or change in the normal traffic patterns increases the chances for accidents during a project. The Orders/WRA Design-Build Team is pleased to be able to construct this project with only three major traffic shifts, they are as follows:

- I-81 NB shift to the newly constructed I-81 SB Bridge
- I-81 NB shift to the new permanent alignment
- I-81 SB shift to the new permanent alignment

In addition to reducing traffic shifts during construction, the Orders/WRA Design-Build Team's innovative design has the horizontal alignment for the I-81 NB lane located in essentially the same location as the current I-81 NB alignment. Keeping the final horizontal alignment the same as existing increases the safety of the traveling public. Also, the radii used for the I-81 SB alignment exceed minimum radii design standards making it easier to navigate vehicles on the I-81 SB alignment. These items, collectively, will allow I-81 Exit 114 Interchange to operate in a smoother and safer condition than the original proposed design.

Conjointly, the Orders/WRA Design-Build Team will be using Portable Changeable Message Signs (PCMS) to warn motorist that there is construction ahead and the driver should be prepared for these traffic pattern changes. Group II channelizing devices along with temporary paint will be used to assist in guiding vehicles safely through the work zone. Every activity will be accordance with the Virginia Work Area Protection Manual. The approach to vehicular safety and how vehicles operate through the work zone is a critical issue. The Orders/WRA Design-Build Team understands the importance of work zone safety and will be diligent in maintaining a safe and predictable work zone throughout construction.

Staging and Storage Areas

The staging/storage areas must be close to the site and convenient to optimize production. They also must have safe ingress and egress to avoid disruption to the traveling public. With these ideas, the team evaluated multiple options and decided on having the staging/storage areas behind each crane set-up for each phase of bridge construction. By having the staging/storage areas on each side of the project during bridge construction, access with trucks and equipment will be greatly simplified. These locations will have no effect on sight distance for the traveling public and will be located beyond the limits of the clear zone. It will also be essential that all trash and debris be gathered and controlled at all times. The team will have dumpsters and trash cans that have securable lids to minimize the opportunity for debris to be wind blown into traffic areas. A clean work area is a much safer work area.

Construction Sequence

The Orders/WRA Design-Build Team’s design allows for much of the improvements to be constructed out of traffic. The first phase of the project has the entire I-81 SB Bridge being constructed between the existing I-81 bridges. The sequencing for this phase is listed below:

Phase 1

- Install E&S measures as required for the proposed construction activities
- Install initial traffic control devices and signs
- Install temporary traffic signals at ramp intersections with Route 8
- Place concrete barrier as necessary along I-81 using nighttime lane closures
- Construct temporary construction entrances at north and south ends of the project using nighttime lane closures; approved temporary impact attenuators will be used to protect the travelling public
- Build two crane pads, one on each side of the proposed I-81 SB bridge
- Reduce Lanes on Route 8 (see Proposed Lane Closure section for details)
- Start SB bridge work

- **Bridge Construction Sequence**

- Install temporary shoring at each new abutment
- Drive bearing pile and fabricate forms for abutment “A”
- Form, reinforce, and pour abutment “A” footer
- Drive bearing pile for abutment “B”
- Assemble engineered form system for abutment tall walls
- Form, reinforce, and pour abutment “B” footer
- Erect and pour abutment “A” tall wall, with architectural treatment
- Erect and pour abutment “B” tall wall, with architectural treatment
- Install bearings on abutment seats
- Erect new girders on I-81 SB bridge, utilizing two cranes and Orders’ heavy lift plan. Girders will be temporarily braced and diaphragms installed.
- Install shield in bottom of girders
- Form, reinforce, and pour end diaphragms on both abutments
- Place select backfill on both abutments
- Install superstructure metal deck forms
- Install overhang form system, edge forms, and bulk head
- Place deck reinforcing steel
- Install screed rail, runoffs, and deck screed
- Pour bridge deck concrete
- Form, reinforce, and pour approach slabs
- Form, reinforce, and pour parapets and terminal walls with architectural treatment
- Groove Deck



Bridge Construction of I-81 Bridges over Halls Bottom Road and Sinking Creek, July 2017

- Remove existing overhead sign at the I-81 NB off ramp
- Remove any unsuitable material from I-81 NB cross over alignment and haul to an approved disposal site
- Place approved fill material (borrow material will be hauled at night during off hours to minimize impacts to traffic)
- Perform 18” RCP jack and bore operation at bridge
- Install permanent drainage system that will be used to drain I-81 NB crossovers
- Install the temporary drainage items that are specific to the I-81 NB crossover
- Place aggregate base for I-81 NB crossover
- Complete crossover roadway approaches
- Pave and stripe I-81 NB crossovers

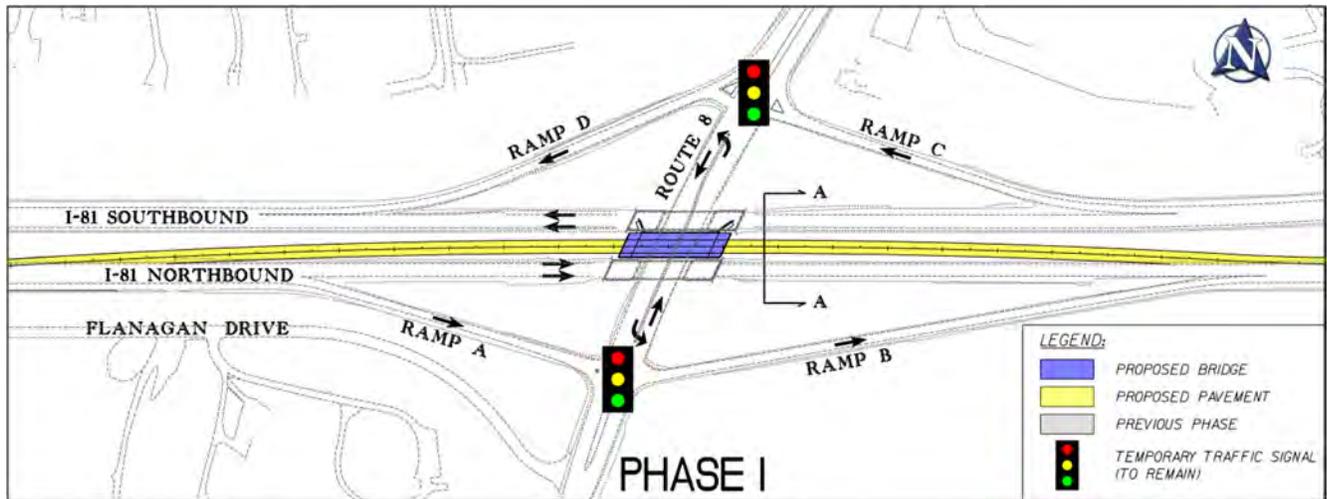


Figure 6 – Phase I MOT

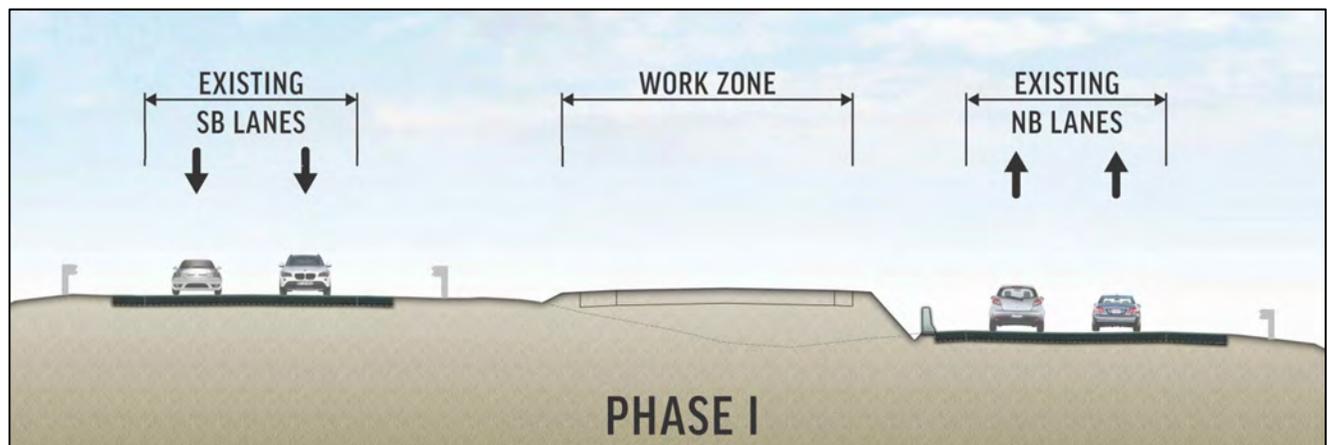


Figure 7 – Phase I Section AA Work Zone

The next phase will shift I-81 NB traffic to the new I-81 SB Bridge. This allows for the demolishing of the old I-81 NB Bridge and the construction of the new I-81 NB Bridge. The sequencing for this phase is as follows:

Phase 2

- Shift I-81 NB traffic to the cross over alignment, per the Traffic Management Plan, using the new I-81 SB bridge
- Demolish existing I-81 NB bridge
 - This work will have minimal traffic impacts to Route 8
- Start NB bridge work – following same sequence as SB bridge
- Install permanent drainage items to complete I-81 NB drainage system
- Construct I-81 NB roadway approaches to the new bridge
- Overlay and stripe I-81 NB roadway
- Switch I-81 NB traffic to its permanent alignment

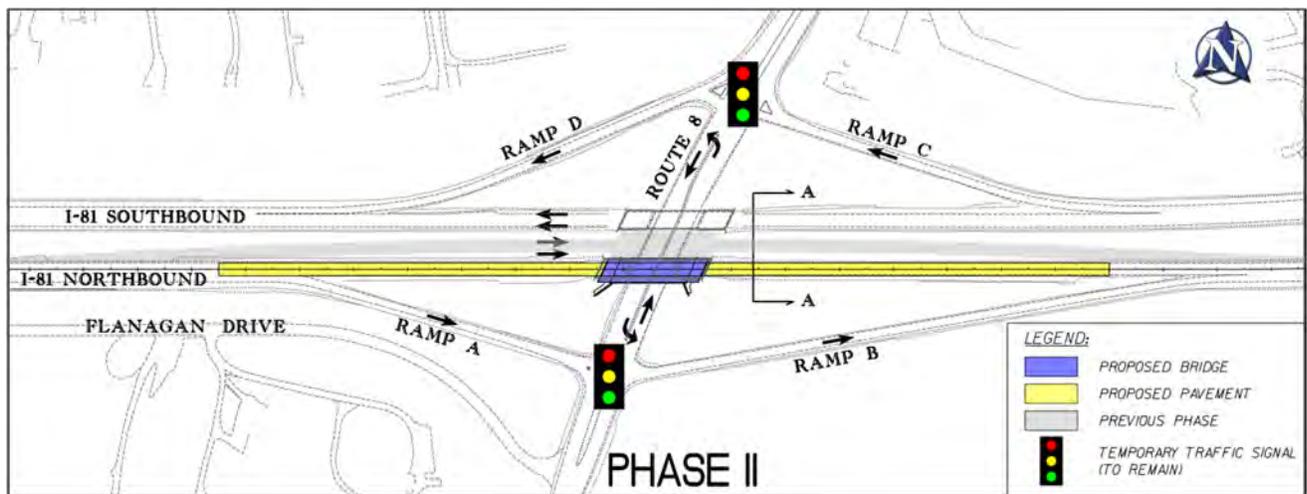


Figure 8 – Phase II MOT

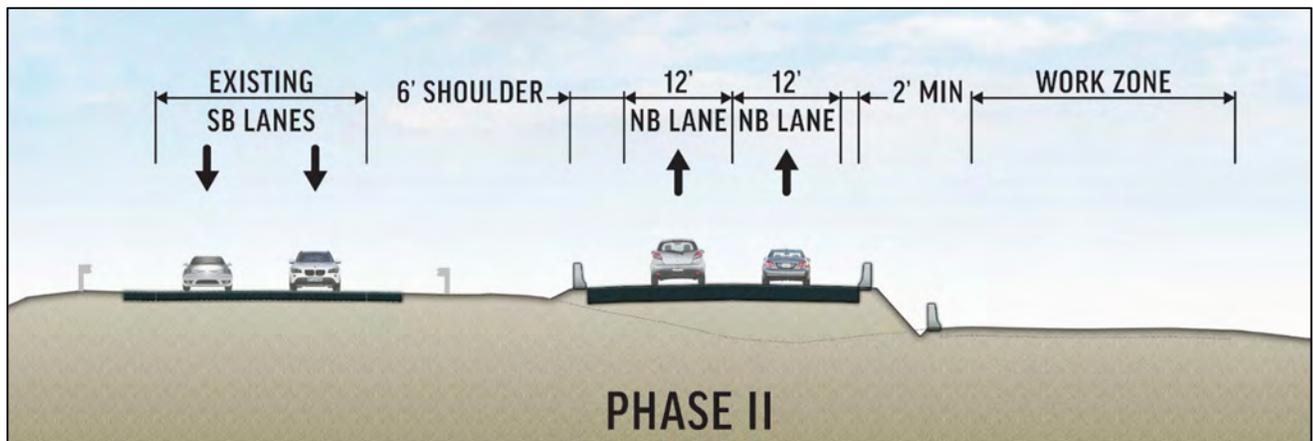


Figure 9 – Phase II Section AA Work Zone

The final phase allows for the removal of the I-81 NB crossovers, the construction of the new I-81 SB roadway alignment, and the removal of the old I-81 SB Bridge. The sequencing for this phase is on the following page:

Phase 3

- Remove I-81 NB crossovers
- Construct the new I-81 SB roadway on its permanent alignment
- Install remaining drainage items for I-81 SB roadway
- Pave and stripe new I-81 SB roadway
- Move I-81 SB traffic to its final alignment
- Complete rehabilitation work on other drainage items
- Construct I-81 SB ramp tie-ins
- Demolish old I-81 SB approaches and I-81 SB bridge
- Construct west wing walls
- Construct new overhead sign for I-81 NB exit ramp
- Final overlay and striping on I-81, ramps, and Route 8
- Complete project stabilization and remove all E&S measures
- Complete project

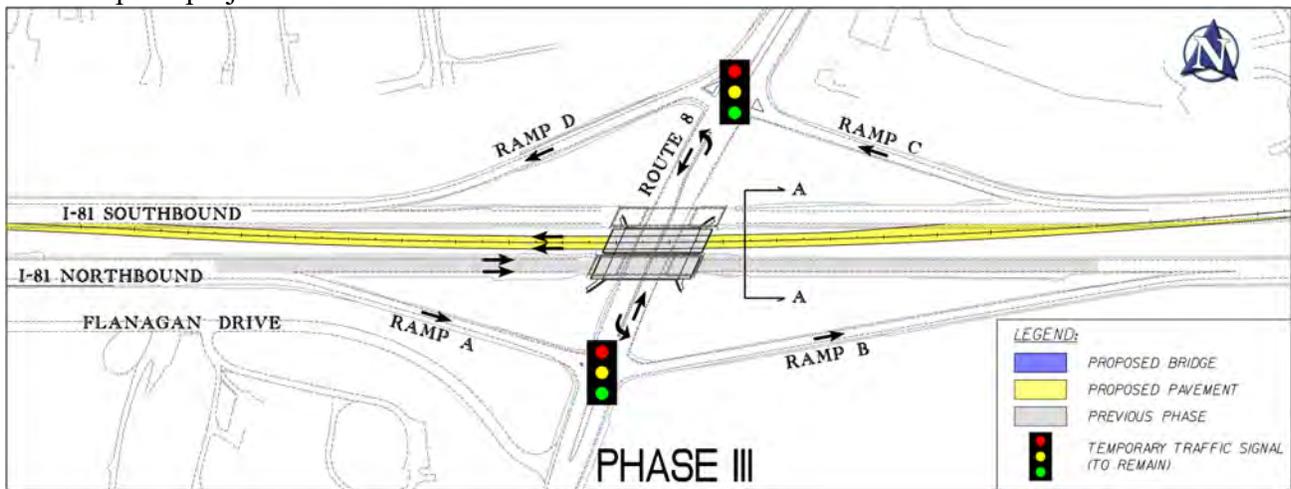


Figure 10 – Phase III MOT

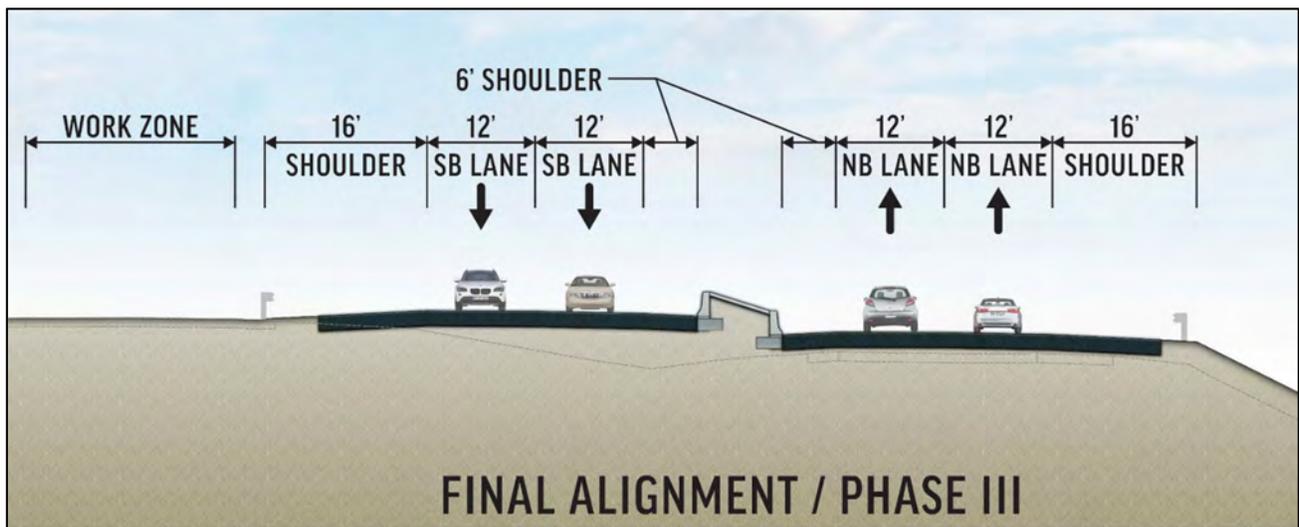


Figure 11 – Phase III Section AA Work Zone

4.5.2 Transportation Management Plan

Maintaining Traffic Through All Phases of Construction

The main purpose of this project is to replace two aging bridges on Interstate 81 at Exit 114 to ensure safety and reliability of the corridor. The Orders/WRA Design-Build Team is fully aware of the ultimate goal for this project. It is also of utmost importance that the path taken to get these bridges replaced is a safe and efficient path for all individuals involved: construction workers, traveling public, bicyclist, inspectors, surveyors etc.

To pave the way for this safe and efficient path, the project has been designed to allow for most of the construction to take place out of traffic. The following will be included in the Transportation Management Plan (TMP):

- A Temporary Traffic Control (TTC) Plan, designed to accommodate each phase of construction.
- Public Communication Plan, that will be used to address each phase of the project.
- Incident Management Plan (IMP), which will be tailored to fit each phase of the project.

The detailed TTC Plan will address the needed traffic control elements, and the locations of them for each construction activity, to safely move vehicles through the work zones. These elements will include the following items: concrete barrier, temporary roadway striping, temporary advanced work zone signage, group II channelizing devices, advanced warning using Portable Changeable Message Signs (PCMS), and the location of construction entrances.



Work Zone on I-81 over Halls Bottom and Sinking Creek, September 2017

With the assistance of **Access** (our Public Relation Specialist) a detailed Public Communication Plan will be developed and will include regular meetings throughout the project. These meetings will be used to update VDOT and to share project information with the public using social media and other news outlets. Detailed work zone information will be distributed to the traveling public by using PCMS and local radio. For major items such as traffic shifts or lane closures, law enforcement will be used to supplement with these operations.

The Incident Management Plan (IMP) is a critical plan that requires coordination with VDOT, emergency response organizations, and other concerned stakeholders. This plan prepares for and documents steps that will be taken if an incident occurs within the corridor. The IMP will address the following:

- 24 hour, 7 days a week emergency contact list
- Coordination with first responders and VDOT TOC
- Pre-planned messages for PCMS in the case of an incident
- Agency responsibilities checklist

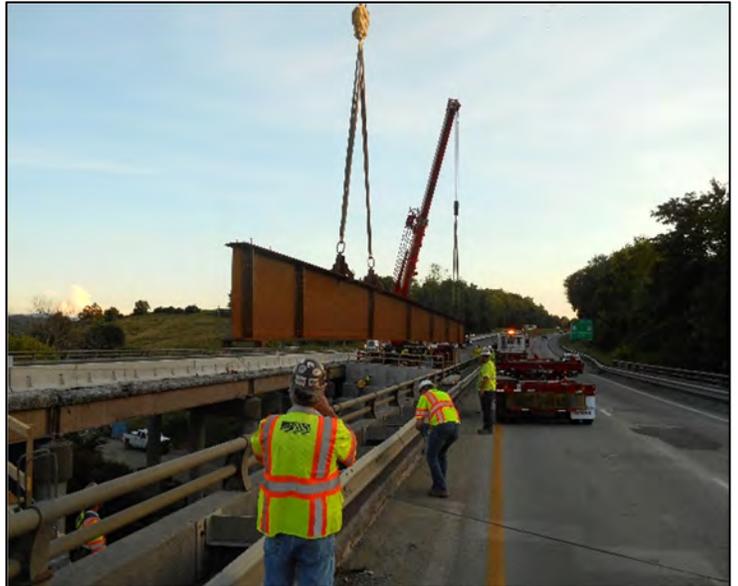
Proposed Lane Closures

In accordance with the RFP that states: “Requests for alterations to the existing lane configurations and/or recommended allowable work hours on VA Route 8 may be submitted to VDOT for approval with the appropriate documentations and Operational Analysis to support the recommended changes during construction activities”.

Our Team has performed such a traffic operational analysis and submitted its findings at the proprietary meeting on December 20, 2017. The analysis concluded that Route 8 could be reduced to one lane in each direction with left turn lanes. Therefore, our proposed design, will reduce Route 8 one through lane with a left turn lane in each direction.

Other temporary lane closures will be utilized to construct the following:

- Nighttime I-81 Lane Closures for I-81 NB and I-81 SB crossover tie-ins
- Nighttime I-81 Lane Closures for setting temporary barrier
- Nighttime I-81 Lane Closures for girder erection on the I-81 SB Bridge.
- Nighttime I-81 Lane Closures for the construction of the median access points required for project construction.



Girder Placement On I-81 over Halls Bottom Road, July 2017

Time of Day Restrictions

Our Team is aware of and will adhere to the Time of Day Restrictions established in the RFP.

Flagging Operations

The following operations will require flagging on Route 8:

- Installation of temporary traffic signals
- Removal of existing I-81 bridge overhangs that are over Route 8 travel ways
- Girder removal and girder erection
- Final Paving

Minimum Lane Widths

The minimum lane widths for I-81 and Route 8 will be 12-feet.

Work Zone Speed Reductions

The Orders/WRA Design-Build Team will perform a Work Zone Speed Analysis to determine the impact of a reduced work zone speed. Should a reduced speed be requested it will be in accordance with TE-350.1.

Project Stakeholders

The summary below outlines the stakeholders that are located in or near the project footprint, and outlines our planned communication and mitigation strategies to limit disruptions to vehicular, pedestrian, and bicycle

traffic through the work area and adjacent public roadways. The Orders/WRA Design-Build Team has added **Access**, a public relations firm, to assist with project communication with the stakeholders. **Access** is a full service, fully-integrated, marketing and communication agency located in Roanoke, Virginia. Intimately familiar with the project area, business leaders, local government representatives and local media, **Access** will assist the Orders Team with all public outreach and stakeholder communications needs. Their inclusive process relies on strong partnerships for improved communication outcomes. To supplement this public relations effort, the Orders/WRA Design-Build Project Manager, Assistant Design-Build Project Manager and Construction Manager commit to maintaining an “open door” policy to ensure the public and all stakeholders have a voice that is heard.

Stakeholder/Impact	Communication/Mitigation Strategies
Traveling Public: <i>Potential time delay for temporary construction operations affecting Route 8 users.</i>	<ul style="list-style-type: none"> • Provide advance warning via PCMS • Facilitate regular public meetings with stakeholders • Access will head up the Public outreach campaign (media), starting with a “Pardon our Dust Meeting”. • Minimize lane closures and traffic shifts • Maximize temporary lane widths
Bicyclist: <i>Potential for bicyclist within the work zone on Route 8.</i>	<ul style="list-style-type: none"> • A suitable compacted 4’ shoulder will be maintained in both directions on Route 8 to allow bicyclist to safely travel through the construction zone.
Montgomery County and Town of Christiansburg: <i>Potential time delay for temporary construction operations</i>	<ul style="list-style-type: none"> • Facilitate regular public meetings with stakeholders • Access will head up the Public outreach campaign (media), starting with a “Pardon our Dust Meeting”.
Utilities (Appalachian Power, Town of Christiansburg, Verizon, Lumos, Shentel, and Citizens Telephone) <i>Need for early notification to ensure coordination of relocations.</i>	<ul style="list-style-type: none"> • Invite utility companies to attend the progress meetings that the Orders/WRA Design-Build Team will be attending. This will enable proper coordination with conflicts and their resolutions. • Evaluate the TMP to ensure the relocation efforts are being accomplished safely.
Local Community Residents <i>Construction in close proximity</i>	<ul style="list-style-type: none"> • Facilitate regular public meetings with stakeholders • Access will head up the Public outreach campaign (media), starting with a “Pardon our Dust Meeting”.
Schools (Montgomery County): <i>Potential delays to school buses and other school drop-off/pick-up traffic.</i>	<ul style="list-style-type: none"> • Facilitate regular public meetings with stakeholders • Access will head up the Public outreach campaign (media), starting with a “Pardon our Dust Meeting”. • Engage the Schools Transportation Personnel to coordinate with bus schedules • Strategically schedule construction activities • Analyze peak AM and PM traffic volumes to minimize disruptions.
Police, Fire & Rescue: <i>Potential for delay in response time</i>	<ul style="list-style-type: none"> • Access will head up the Public outreach campaign (media), starting with a “Pardon our Dust Meeting”. • Facilitate regular public meetings with stakeholders

Table 7 – Stakeholder Impact and Mitigation Strategies

4.6

DISADVANTAGED BUSINESS ENTERPRISE (DBE)

4.6 DISADVANTAGED BUSINESS ENTERPRISES (DBE)

Orders Construction confirms that we are committed to meeting or exceeding an 8% DBE participation goal for the entire value of the contract.

4.7

PROPOSAL SCHEDULE

4.7 PROPOSAL SCHEDULE

4.7.1 Proposal Schedule

The 11x17 copy of the proposal schedule follows.

4.7.2 Proposal Schedule Narrative

The Orders/WRA Design-Build Team is pleased to present the Proposal Schedule found in Section 4.7.1 above and Proposal Schedule Narrative to demonstrate the Team’s commitment and comprehensive plan to meet the Contract milestone and completion deadlines, managing and delivering each phase of the project to the Department at or ahead of schedule. The Orders/WRA Design-Build Team has extensive experience exceeding contractual deadlines on VDOT Design-Build projects, and will use this experience to deliver the I-81 Bridge Replacement at Exit 114 project to the Department and the traveling public.

The Orders/WRA Design-Build Team is committed to meeting the contractually required delivery schedule outlined in this section, and throughout the project will continually examine interim schedule deadlines, means and methods, resources, potential for additional concurrency of work, and other opportunities to deliver the project ahead of schedule.

The following Schedule Narrative describes the Orders/WRA Design-Build Team’s proposed overall plan to accomplish the Work and complete the project for final acceptance no later than November 15, 2021, and identifies the Team’s plan for overall sequencing, a description and explanation of the Critical Path, our proposed means and methods, and other key assumptions on which the Proposal Schedule is based. Our design and construction approach is found in Sections 4.4 and 4.5 and details our plan to minimize impacts to the traveling public and expedite completion of construction.

Project Milestones

Utilizing the optimized design concept and sequencing presented by the Team, the Orders/WRA Design-Build Team is pleased to commit to the following delivery schedule for the project, minimizing traffic impacts to levels at or below the levels of impact allowed for in the RFP. The Team will make efforts to advance the schedule at each phase of the project. The following are the key milestone dates from our Proposal Schedule:

Key Milestone	Milestone Date
CTB Approval/Notice to Award	May 16, 2018
DB Contract Execution	June 6, 2018
Notice to Proceed	June 8, 2018
Scope Validation Period Complete	October 6, 2018
Begin Construction Activities	December 17, 2018
Early Completion / “No Excuses” Incentive	May 19, 2021
Final Completion Date	November 15, 2021

Work Sequence and Critical Path

In order to meet the schedule, the Orders/WRA Design-Build Team will focus on pursuing the critical path activities, while looking for opportunities to accelerate work productivity and maximize the amount of concurrent work. The general sequencing of the project and an explanation of the critical path is as follows:

Efforts will begin immediately to identify Scope issues, and performing survey, geotechnical investigations, environmental permitting, and utility coordination as soon as Notice to Proceed is issued. Stage I and Stage II bridge design will progress while the Roadway Work Package 1 is prepared and approved. With a VPDES permit in hand, Phase I maintenance of traffic features can be installed along with erosion and sediment controls, temporary signals along Route 8. Grading and drainage work may also commence.

While Work Package 1 items are constructed in the field, final bridge and roadway plans will be completed and submitted for approval by VDOT. Phase 1 of the project will include construction of the future I-81 SB Bridge in the median. During this phase, the Orders/WRA Design-Build Team will construct a temporary crossover that will allow I-81 NB traffic to utilize the future I-81 SB Bridge during Phase 2 of the project. Once the crossover and bridge are complete, NB traffic will be switched over to the future I-81 SB Bridge.

In Phase 2, the Orders/WRA Design-Build Team will demolish the existing NB bridge, and re-build the new future NB bridge and approaches to the final configuration. We will then pave and stripe I-81 NB and shift NB traffic onto the new roadway to complete the phase.

In Phase 3, the Orders/WRA Design-Build Team will remove the temporary crossovers used during Phase 2, and complete the grading and approaches to the final I-81 SB configuration. This work will include the final drainage, median barrier, overhead sign installation and paving. Traffic will be switched to the final configuration on the SB lane, and Orders will demolish the existing SB Bridge and pavement, and complete grading to the final cross sections. Lastly, Orders will complete final paving and striping of Route 8, I-81 NB and SB, and the exit ramps.

The critical path of the project will flow through the geotechnical evaluation and bridge design for the bridge sub and superstructure through the shop drawing process and procurement of the Phase 1 structural steel. Once the structural steel is delivered, the SB Bridge superstructure construction will remain critical until bridge completion, followed by switching the NB traffic onto the new bridge. In Phase 2, demolition of the existing NB Bridge, and construction of the new NB Bridge is critical until its completion. To complete Phase 2, I-81 NB traffic is shifted onto the new NB Bridge. Moving to Phase 3, the critical path lies through removing the temporary crossovers that had been used in Phase 2 by NB traffic, and completing grading and paving the final SB lane. After switching SB traffic onto the new SB Bridge, Orders will demolish the existing SB Bridge, re-build portions of the I-81 on/off ramps, and remove all remaining extraneous existing pavement. To complete the project, the Team will complete final surface mix paving on Route 8, I-81 NB and SB, and the exit ramps, striping and punchlist work will lead to final completion. The individual Critical Path activities are shown on the schedule in Section 4.7.1 above and have zero (0) or near zero float.

Work Breakdown Structure

A Work Breakdown Structure (WBS) was selected to organize the activities needed to deliver the project into logical and sequential groups. Design and Construction phase activities have been broken down by Phase into the components as follows:

Project Milestones: A list of the key contractual milestones applicable to the project.

Administrative: Activities in the Administrative WBS include Scope Validation, Baseline Schedule submittals, QA/QC Plan submittals, and other General Conditions activities on the project.

Design Phase: The Design Phase WBS includes all activities necessary to deliver the project to construction. Specific sub-level groupings include Design Milestones, which identifies key team goals for design deliverables, as well as Survey, Geotechnical Investigations (divided between Roadway and Bridge), Environmental Permits, Utility Relocation/Coordination, Easement Acquisition, and Final Design (split into the anticipated Work Packages: WP 1 – MOT, E&S, and Initial Grading, WP 2 – Bridge Substructure, WP 3 – Bridge Superstructure, WP 4 – Final Roadway, and WP 5 – lighting, signage, and striping).

Construction Phase: The Construction Phase is divided up into sub-level groupings including the QA/QC (including Preparatory Meetings and other QA/QC Functions), Submittals and Procurement (key materials

submittal and review time, as well as fabrication and delivery of long lead time items), and Project Start-up and Completion (key start-up activities such as mobilization, construction surveying, and erosion control measures). Sub-level construction activities continue with activities needed to complete Phase 1 Construction (divided into MOT/Grading and Bridge construction), Phase 2 Construction (divided into MOT/Grading and Bridge construction) and Phase 3 Construction (demolition of existing SB bridge and final construction).

Below is a summary of the WBS by Level.

WBS Level 2	WBS Level 3	WBS Level 4
Project Milestones	<i>Project Milestones</i>	
Administrative	<i>Administrative Activities and General Conditions</i>	
Design Phase	<i>Design Phase Activities:</i> <ul style="list-style-type: none"> • Design Milestones • Survey • Geotechnical Investigations • Environmental Permits • Utility Relocation/Coordination • Easement Acquisition • Design 	<ul style="list-style-type: none"> • Bridge • Roadway • WP 1 – RW/MOT / E&S / Grading • WP 2 – Bridge Substructure • WP 3 – Bridge Superstructure • WP 4 – Final Roadway • WP 5 – Lighting/Signs/Striping
Construction Phase	<i>Construction Phase Activities</i> <ul style="list-style-type: none"> • QA/QC • Submittals & Procurement • Project Start-up and Completion • Phase 1 – Build SB Bridge • Phase 2 – Build NB Bridge • Phase 3 – Demo Existing SB Bridge 	<ul style="list-style-type: none"> • MOT / Grading • I-81 SB Bridge (Sub/Superstr.) • Grading • I-81 NB Bridge (Sub/Superstr.) • Demo Existing I-81 NB Bridge • Final Roadway • Bridge Demolition

Calendars & Working Hours

To account for holidays, weather (and the effects of normal weather), and other anticipated periods of non-work on the project throughout all phases of the project, several project calendars were developed and applied to the project. In general, working hours are expected to be 10 hours/day, Monday through Friday, with Saturday work utilized to advance the schedule, or recover lost time as necessary. Lane closures and road closures may be utilized during the timeframes allowed as identified by RFP Part 2 Addendum 1 Section

2.10.3 for Interstate I-81, Route 8 and the exit ramps (all three differ in allowable impacts). Activities are scheduled by Working Days based on productivity for each given location and work hour restriction on the project, such that one Working Day for an activity on I-81 that requires a lane closure incorporates the understanding that a lane closure will only be allowed from 9:00 PM the day before until 6:00 AM the morning after, from Sunday through Thursday nights (for example). Lane and road closures will not be allowed outside of the allowable timeframes. The Orders/WRA Design-Build Team is committed to limiting or eliminating road and lane closures whenever possible except as needed for the safety of workers and the traveling public, and to reduce overall duration of the roadway impact.

Non-working times also incorporates the special dates identified by RFP Part 2 Addendum 1 Section 2.10.3, including Graduation and Move-in Days for Virginia Tech and Radford, the Floyd Fest, and anticipated Virginia Tech home football games. Most of these Event dates fall on weekends, which are already designated as non-working days in the CPM schedule, though Move-in Days (such as Radford’s 2018 Move-in Day on Friday, August 24th) and the Floyd Fest (July 25-29, 2018), as well as occasional Thursday night home football games for Virginia Tech, could impact activities. Since all applicable Special Event dates are not fully scheduled by the respective organizers through the contract duration as of the time of this proposal, but will be known in advance and are tied to limited work restrictions, alternative work plans have been developed to address the restrictions without impact and no calendar adjustments are necessary.

A description of each calendar, as well as periods of non-work are as follows:

Submittal / 7-Day Calendar: The 7-day calendar is developed to generally represent activities that have contractual durations (such as the 120 day Scope Validation Period or a 21 day submittal review period) that are not affected by weekends, holidays or weather, as well as other administrative and design functions that are most conveniently identified by Calendar Days rather than Working Days. During construction, the 7-day calendar is also used to represent activities unaffected by periods of work or non-work, such as concrete curing times.

5-Day Bridge with Weather & Holidays: The 5-Day Bridge activity calendar is used to represent the working and non-working time for bridge activities. Non-working periods include all contractual holidays and events (as well as non-working times around holidays), and anticipated adverse weather and the effects of that weather. Bridge activities are normally less impacted by weather (the effects of weather) than grade activities, including generally lesser impacts the day after a precipitation event, and so a corresponding reduced monthly anticipated impact is included. Monthly weather impact days include:

January – 6 Days	May – 5 Days	September – 4 Days
February – 6 Days	June – 4 Days	October – 4 Days
March – 5 Days	July – 3 Days	November – 4 Days
April – 4 Days	August – 3 Days	December – 6 Days

5-Day Grade with Weather & Holidays: The 5-Day Grade activity calendar is used to represent the working and non-working time for all grading activities (except paving). Non-working periods include all contractual holidays and events (as well as non-working times around holidays), and anticipated adverse weather and the effects of that weather. Grade activities are normally more impacted by weather than bridge activities, including greater impacts the day after a precipitation event, and so a corresponding increased monthly anticipated impact is included. Monthly weather impact days include:

January – 7 Days	May – 5 Days	September – 4 Days
February – 7 Days	June – 4 Days	October – 4 Days
March – 6 Days	July – 3 Days	November – 5 Days
April – 5 Days	August – 3 Days	December – 7 Days

Paving Calendar: The Paving calendar is associated with all asphalt activities, and incorporates the 5-Day grade calendar with additional non-working time between December 5th and March 15th. Other highly weather sensitive items (such as permanent pavement markings) may also be associated with this calendar.

Other Schedule Information

The Proposal Schedule is in compliance with the requirements of RFP Part 1, Section 4.7, and is the basis upon which the Baseline Schedule submittal will be prepared, as defined in Exhibit 11.1, in regards to schedule logic, avoidance of using constraints except as noted, and other schedule activity requirements.

Plan and Strategy to Accomplish the Work

The Orders/WRA Design-Build Team has developed a plan and strategy for each phase of the project to meet and exceed the contractual milestones and delivery dates. The foregoing CPM Schedule shows the Orders/WRA Design-Build Team’s plan, sequence of construction and interim delivery dates in order to achieve on-time completion. The following is our narrative explanation of plans and processes by which the Orders/WRA Design-Build Team will achieve contractual completion with minimum impact to the traveling public.

To meet the dates and deadlines presented in our schedule, the Orders/WRA Design-Build Team will review the project schedule in each phase to look for means to advance the schedule, focusing on meeting and exceeding each interim completion date. The Orders/WRA Design-Build Team will review the schedule during weekly design and construction coordination meetings, looking for opportunities to perform work concurrently, to provide additional resources while maintaining productivity per resource, and/or improve means and methods to make production more efficient. To expedite the start of bridge construction, the bridge substructure will be submitted separately from the superstructure. During construction, the Team may work double shifts on the critical abutment construction by moving in a second crew from non-critical work.

The Orders/WRA Design-Build Team has learned that another key to early completion is to always stand ready for the next phase of the work, such that if a critical design or construction activity is completed early, there are no administrative or other non-critical obstacles to beginning the next phase. The Orders/WRA Design-Build Team will accomplish this ‘Always Ready’ practice through:

- Early coordination of non-critical design activities, such as acquiring easements, clearing utilities, and obtaining environmental permits before the schedule actually indicates this work must be complete,
- Early preparation of materials submittals, such as C-25’s, mix designs, and DBT information,
- Early submission of design submittals, such as shop drawings, catalog cuts, signal designs, and anything requiring VDOT input or review,
- Advance preparation for QA/QC Plan requirements, such as prepared and ready Preparatory Meeting agendas, QA and QC checklists, approved back-up QA and QC inspectors for different disciplines, and weekly testing and inspection meetings to define requirements for upcoming work activities,
- Expedited fabrication and delivery schedules, to have long and short lead-time materials and equipment on hand to take advantage of schedule advances, and
- Constant preparation, such as Preparatory Meetings, field Schedule meetings, and general coordination meetings so that Orders, Orders’ subcontractors and suppliers, QA, QC, the WRA Design Team and VDOT are seamlessly on the same page throughout construction.

The next strategy for early completion is involving VDOT at the right time, to the right extent. VDOT will be invited to participate in over-the-shoulder design reviews prior to the full submission, and will be notified by in-person coordination, through progress schedule updates and two-week look-ahead schedules, and through progress meetings of upcoming review requirements to prepare resources to perform the required reviews. During construction, the Orders/WRA Design-Build Team will provide advanced notice of Witness and Hold Point activities, coordinating closely to ensure minimal lost time waiting for inspections and testing. Our extensive experience on Design-Build projects will directly influence early completion.

The Orders/WRA Design-Build Team has developed a plan and strategy to expedite each phase and discipline of the project. In our plan for each component, we have identified: 1) a strategy to meet/exceed scheduled timeframes, 2) key assumptions the schedule is based on, 3) major threats to meeting the proposal schedule (risks), 4) contingencies allowed within schedule and a plan to mitigate risks, 5) time for internal review of work product and QA/QC, and 6) the required external review by VDOT or other regulatory agencies, noting any process or timeframe that is outside of the Design-Builder's control. Key parts of the plan include:

Design: The Design Phase portion of the schedule reflects moderately aggressive durations with some concurrency of design activities, while including the full contractual time period for submittals, internal QA/QC and VDOT reviews, and revisions based on VDOT review comments in the schedule. In practice, the Orders/WRA Design-Build Team will meet or exceed the timeframes shown by more aggressively pursuing milestones by concurrency of activity, and coordinating with VDOT in advance to perform over-the-shoulder reviews to help reduce review time of the official submittals and limit or eliminate revision requests. These factors are also the Team's contingencies should design take longer than planned; for instance if a geotechnical recommendation results in the need to explore a different design alternative for a bridge abutment, the time savings noted above could be used to avoid delay to delivering the approved work package.

Key Design assumptions used to develop the schedule are further identified in Section 4.3 – Design Concept. Further risk mitigation strategies include a comprehensive internal constructability and plan review prior to work package submission, and prompt identification and submission of potential Scope Issues during the Scope Validation period. As mentioned, the schedule includes full review and feedback cycles for both our internal QA/QC reviews and VDOT and FHWA Reviews.

Geotechnical: Geotechnical investigations always leave the potential for necessary field modifications that could impact the schedule. Section 4.4.3 identifies the Orders/WRA Design-Build Team's approach to managing the risks noted in the SOQ, as well as mitigation strategies. From a schedule perspective, the Proposal Schedule contains additional time to perform these investigations into potential karst topography and other features, as well as during the construction phase should additional bridge foundation or retaining wall elements and/or subgrade stabilization be required.

Environmental Permits: The schedule includes all activities necessary for the evaluation, preparation, submissions and regulatory agency review and approval of any and all environmental permits. With only approximately 0.15 Acres of Wetland disturbed, the permitting risk to the schedule is considered low on this project, and critical work could continue if there was a delay to permits. The permits accounted for in the schedule based on our preliminary review are the USACE Nationwide Permit 23 and the VPDES Permit. As found in Section 4.4 – Project Approach, impacts due to Hazardous Materials, Cultural Resources and/or Threatened and Endangered Species are anticipated to be little to none, and contingencies are identified. There is no anticipated Time of Year restriction on clearing, and no Stage 1 Environmental Site Assessment, further limiting the risk of schedule delay for environmental related items.

Right-of-Way Acquisition: The project has been designed without any additional right-of-way impacts per the requirements of the RFP. There are two modest permanent drainage easements needed in Phase 2 that will be acquired following the approval of Work Package 1 (which will include RW Authorization). Constructing the new SB lane in the existing median reduces the footprint of the project outside of the existing limits. The risk for schedule impact is very low, and all of Phase 1 and the critical bridge work can occur without risk of delay.

Utility Relocation: Section 4.4 indicates that a Lumos line is the only known conflict, and only affects the demo of the existing bridges in Phases 2 and 3; We have scheduled three (3) months to perform this relocation, allowing a significant amount of time to coordinate relocation before the project would face the risk of an impact. The Orders/WRA Design-Build Team will protect the Citizens and Verizon fiber optic lines, and will work early to pothole locations of other utilities that pose any schedule risk to the proposed work.

Construction Activities and Sequencing: The Proposal Schedule identifies the sequence of activities the Orders/WRA Design-Build Team will use to complete the project on time.

In addition to the resources, a key strategy for timely completion is to structure Work Package submittals so that work included in those Packages can begin as soon as possible. Work Package 1 includes the temporary traffic signals at Route 8, clearing, erosion and sediment controls, and traffic controls including traffic barrier and construction signage. Grading and installation of drainage structures will also be installed as part of this Work Package. When Work Package 2 (bridge substructure) and Work Package 3 (bridge superstructure) are released, Orders will have maximum possible efficiency in building the bridge.

The greatest impact to the project schedule is reduced productivity, mainly resulting from building the new bridge in such close proximity to live traffic. Work adjacent to I-81 and over Route 8 will necessarily progress more slowly to ensure safety. Orders will employ means and methods that may include slightly smaller equipment, and slower production with more safety checks and balances incorporated. In addition, Orders may use work in off-peak traffic hours to allow for lane closures in lanes directly adjacent to the work zone, allowing a greater separation from live traffic as means of mitigating the inherent safety risks. A form of temporary shoring will be needed to build the Phase 1 future southbound bridge to account for the lower elevation of the open roadways on either side of the Phase 1 approaches. The ultimate result will be to favor safety over production, particularly in the first phase of the project. This slower production is accounted for in the project schedule, as the Phase 1 SB Bridge construction is longer than the Phase 2 NB Bridge construction, and includes activities to construct the temporary shoring as well as longer construction durations to complete the nearly identical construction features as are found in Phase 2.

The Proposal Schedule allows for this reduced productivity while maintaining the planned completion date. Orders will complete the bridge with two bridge crews working simultaneously to allow concurrency of critical activity, and may utilize subcontractors for grading, paving, traffic control and other non-bridge activities.

The Proposal Schedule also accounts for QA/QC inspection and testing. Schedule activities are included in the Proposal Schedule to anticipate necessary Preparatory Meetings. QA and QC inspectors will be provided in accordance with the RFP requirements (including two full time QA inspectors) such that inspection and testing requirements should not result in any delay to the schedule. As mentioned, the QAM will meet weekly with the DB Construction Manager and QC Manager to coordinate upcoming testing and inspection requirements, ensuring Preparatory Meetings are held and all materials submittals are submitted, reviewed and approved in a timely fashion so as to not delay work.

With these proposed resources, means and methods, and strategies for meeting or reducing the contractual duration of the project, the Orders/WRA Design-Build Team proposes to deliver the project on November 15, 2021, 4 days ahead of the November 19, 2021 Final Completion Date.

Schedule Management

Once Notice to Proceed is issued, the Orders/WRA Design-Build Team will plan, schedule and manage the project, submitting a Baseline Schedule Submittal as required by Exhibit 11.1 of the provisions. Creation and maintenance of the schedule, including all updates, revisions, and if necessary, Schedule Impact Analyses, will be handled by the Design-Build Construction Manager with the assistance of scheduling support staff, input from the Design Manager and each major subcontractor. The Construction Manager will work directly under the Design-Build Project Manager, who is directly responsible for the implementation of the project controls system.

The Orders/WRA Design-Build Team will manage the schedule from the local field office, utilizing personnel who are on-site at least on a weekly basis and are involved in all progress and design/construction coordination meetings, such that the monthly updated schedule is always an accurate representation of the plan to build the project. As means and methods, sequences of construction, or unexpected occurrences change the plan, the schedule will be modified to reflect the current plan. If the modification involves a subcontractor, the Construction Manager will discuss the proposed impacts with the subcontractor to ensure deadlines and required resources are available. The Schedule Update Narrative will also be used to identify potential concerns or risks to the project schedule. The actual versus planned progress, potential risks and impacts, and planned upcoming work will be a standing item at each regular progress meeting.

Should progress begin to slip behind the planned schedule, the Orders/WRA Design-Build Team will submit a Recovery Schedule identifying how it will make up lost time and complete on or ahead of the milestone dates. The Recovery Plan may include providing additional crews or equipment, increased work shifts or work hours (where permissible), re-sequence work to allow non-impacted work to proceed.

Through careful management, monitoring, and implementation of the project schedule, the Team will deliver the project to VDOT and the Traveling Public a quality project that all stakeholders can be proud to have been involved with, while also completing on schedule and on budget.

APPENDICES AND ATTACHMENTS

- **Attachment 4.0.1.1**
 - Technical Proposal Checklist and Contents
- **Attachment 3.6 (Form C-78-RFP)**
 - Acknowledgement of RFP, Revisions, and/or Addenda
- **Attachment 9.3.1**
 - Proposal Payment Agreement
- **Attachment 11.8.6(a) and 11.8.6(b)**
 - Certification Regarding Debarment Forms
 - *Orders Construction Company, Inc.*
 - *Whitman, Requardt & Associates, LLP*
 - *Froehling & Robertson, Inc.*
 - *Bowman Consulting Group, Ltd.*
 - *Appraisal Review Specialist, LLC*
 - *Quinn Consulting Services, Inc.*
 - *DIW Group Inc. t/a Specialized Engineering*
 - *H & B Surveying and Mapping, LLC*
 - *Access, Inc.*
- **SCC and DPOR Information**
 - Specialized Engineering
(DIW Group Inc. t/a Specialized Engineering)

Attachment 4.0.1.1

Technical Proposal Checklist and Contents

ATTACHMENT 4.0.1.1
I-81 Bridge Replacement at Exit 114
TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Offerors shall furnish a copy of this Technical Proposal Checklist, with the page references added, with the Technical Proposal.

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Technical Proposal Checklist and Contents	Attachment 4.0.1.1	Section 4.0.1.1	no	Vol. 1 - Appendix
Acknowledgement of RFP, Revisions, and/or Addenda	Attachment 3.6 (Form C-78-RFP)	Sections 3.6, 4.0.1.1	no	Vol. 1 - Appendix
Letter of Submittal	NA	Sections 4.1		Vol. 1 - Pgs. 1-2
Letter of Submittal on Offeror's letterhead	NA	Section 4.1.1	yes	Vol. 1 - Pgs. 1-2
Identify the full legal name and address of Offeror	NA	Section 4.1.1	yes	Vol. 1 - Pg. 1
Authorized representative's original signature	NA	Section 4.1.1	yes	Vol. 1 - Pg. 2
Declaration of intent	NA	Section 4.1.2	yes	Vol. 1 - Pg. 1
120 day declaration	NA	Section 4.1.3	yes	Vol. 1 - Pg. 1
Point of Contact information	NA	Section 4.1.4	yes	Vol. 1 - Pg. 1
Principal Officer information	NA	Section 4.1.5	yes	Vol. 1 - Pg. 1
Interim Milestone and Final Completion Date(s)	NA	Section 4.1.6	yes	Vol. 1 - Pg. 1
Proposal Payment Agreement or Waiver of Proposal Payment	Attachment 9.3.1 or 9.3.2	Section 4.1.7	no	Vol. 1 - Pg. 1, Appendix
Certification Regarding Debarment Forms	Attachment 11.8.6(a) Attachment 11.8.6(b)	Section 4.1.8	no	Vol. 1 - Pg. 1, Appendix
Offeror's Qualifications	NA	Section 4.2		Vol. 1 - Pgs. 3-10

ATTACHMENT 4.0.1.1

I-81 Bridge Replacement at Exit 114

TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Confirmation that the information provided in the SOQ submittal remains true and accurate or indicates that any requested changes were previously approved by VDOT	NA	Section 4.2.1	yes	Vol. 1 - Pg. 3
Organizational chart with any updates since the SOQ submittal clearly identified	NA	Section 4.2.2	yes	Vol. 1 - Pg. 10
Revised narrative when organizational chart includes updates since the SOQ submittal	NA	Section 4.2.2	yes	Vol. 1 - Pgs. 3-9
Design Concept	NA	Section 4.3		Vol. 1 - Pgs. 11-21
Conceptual Roadway Plans and description	NA	Section 4.3.1	yes	Vol. 1 - Pgs. 15-18, Vol. 2 - Pgs. 49-55
Conceptual Structural Plans and description	NA	Section 4.3.2	yes	Vol. 1 - Pgs. 18-21, Vol. 2 - Pgs. 56-59
Project Approach	NA	Section 4.4		Vol. 1 - Pgs. 22-37
Environmental Management	NA	Section 4.4.1	yes	Vol. 1 - Pgs. 22-24
Utilities	NA	Section 4.4.2	yes	Vol. 1 - Pgs. 24-26
Geotechnical	NA	Section 4.4.3	yes	Vol. 1 - Pgs. 26-28
Quality Assurance/ Quality Control (QA/QC)	NA	Section 4.4.4	yes	Vol. 1 - Pgs. 28-37
Construction of Project	NA	Section 4.5		Vol. 1 - Pgs. 38-47
Sequence of Construction	NA	Section 4.5.1	yes	Vol. 1 - Pgs. 39-44
Transportation Management Plan	NA	Section 4.5.2	yes	Vol. 1 - Pgs. 45-47

ATTACHMENT 4.0.1.1
I-81 Bridge Replacement at Exit 114
TECHNICAL PROPOSAL CHECKLIST AND CONTENTS

Technical Proposal Component	Form (if any)	RFP Part 1 Cross Reference	Included within page limit?	Technical Proposal Page Reference
Disadvantaged Business Enterprises (DBE)	NA	Section 4.6		Vol. 1 - Pgs. 48
Written statement of percent DBE participation	NA	Section 4.6	yes	Vol. 1 - Pgs. 48
Proposal Schedule	NA	Section 4.7		Vol. 1 - Pgs. S1-S16
Proposal Schedule	NA	Section 4.7.1	no	Vol. 1 - Pgs. S2-S8
Proposal Schedule Narrative	NA	Section 4.7.2	no	Vol. 1 - Pgs. S9-S16
Proposal Schedule in electronic format (CD-ROM)	NA	Section 4.7	no	CD-ROM

Attachment 3.6 (Form C-78-RFP)

Acknowledgement of RFP, Revisions, and/or Addenda

ATTACHMENT 3.6

**COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION**

RFP NO. C00093074DB96
PROJECT NO.: 0081-154-733

ACKNOWLEDGEMENT OF RFP, REVISION AND/OR ADDENDA

Acknowledgement shall be made of receipt of the Request for Proposals (RFP) and/or any and all revisions and/or addenda pertaining to the above designated project which are issued by the Department prior to the Letter of Submittal submission date shown herein. Failure to include this acknowledgement in the Letter of Submittal may result in the rejection of your proposal.

By signing this Attachment 3.6, the Offeror acknowledges receipt of the RFP and/or following revisions and/or addenda to the RFP for the above designated project which were issued under cover letter(s) of the date(s) shown hereon:

1. Cover letter of RFP – October 23, 2017
(Date)
2. Cover letter of RFP Addendum No. 1 – February 6, 2018
(Date)
3. Cover letter of _____
(Date)

 _____ SIGNATURE	<u>3-2-18</u> _____ DATE
<u>NATHANIEL R. ORDERS</u> _____ PRINTED NAME	<u>PRESIDENT</u> _____ TITLE

Attachment 9.3.1

Proposal Payment Agreement

ATTACHMENT 9.3.1
PROPOSAL PAYMENT AGREEMENT

THIS PROPOSAL PAYMENT AGREEMENT (this “Agreement”) is made and entered into as of this 2nd day of March, 2018, by and between the Virginia Department of Transportation (“VDOT”), and Orders Construction Company, Inc. (“Offeror”).

WITNESSETH:

WHEREAS, Offeror is one of the entities who submitted Statements of Qualifications (“SOQs”) pursuant to VDOT’s July 12, 2017 Request for Qualifications (“RFQ”) and was invited to submit proposals in response to a Request for Proposals (“RFP”) for the **I-81 Bridge Replacement at Exit 114, Project No. 0081-154-733** (“Project”), under a design-build contract with VDOT (“Design-Build Contract”); and

WHEREAS, as part of the procurement process for the Project, Offeror has already provided and/or furnished to VDOT, and may continue to provide and/or furnish to VDOT, certain intellectual property, materials, information and ideas, including, but not limited to, such matters that are: (a) conveyed verbally and in writing during proprietary meetings or interviews; and (b) contained in, related to or associated with Offeror’s proposal, including, but not limited to, written correspondence, designs, drawings, plans, exhibits, photographs, reports, printed material, tapes, electronic disks, or other graphic and visual aids (collectively “Offeror’s Intellectual Property”); and

WHEREAS, VDOT is willing to provide a payment to Offeror, subject to the express conditions stated in this Agreement, to obtain certain rights in Offeror’s Intellectual Property, provided that Offeror submits a proposal that VDOT determines to be responsive to the RFP (“Offeror’s Proposal”), and either (a) Offeror is not awarded the Design-Build Contract; or (b) VDOT cancels the procurement or decides not to award the Design-Build Contract to any Offeror; and

WHEREAS, Offeror wishes to receive the payment offered by VDOT, in exchange for granting VDOT the rights set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants and agreements set forth in this Agreement and other good and valuable consideration, the receipt and adequacy of which are acknowledged by the parties, the parties agree as follows:

1. **VDOT's Rights in Offeror's Intellectual Property.** Offeror hereby conveys to VDOT all rights, title and interest, free and clear of all liens, claims and encumbrances, in Offeror's Intellectual Property, which includes, without restriction or limitation, the right of VDOT, and anyone contracting with VDOT, to incorporate any ideas or information from Offeror's Intellectual Property into: (a) the Design-Build Contract and the Project; (b) any other contract awarded in reference to the Project; or (c) any subsequent procurement by VDOT. In receiving all rights, title and interest in Offeror's Intellectual Property, VDOT is deemed to own all intellectual property rights, copyrights, patents, trade secrets, trademarks, and service marks in Offeror's Intellectual Property, and Offeror agrees that it shall, at the request of VDOT, execute all papers and perform all other acts that may be necessary to ensure that VDOT's rights, title and interest in Offeror's Intellectual Property are protected. The rights conferred herein to VDOT include, without limitation, VDOT's ability to use Offeror's Intellectual Property without the obligation to notify or seek permission from Offeror.

2. **Exclusions from Offeror's Intellectual Property.** Notwithstanding Section 1 above, it is understood and agreed that Offeror's Intellectual Property is not intended to include, and Offeror does not convey any rights to, the Escrow Proposal Documents submitted by Offeror in accordance with the RFP.

3. **Proposal Payment.** VDOT agrees to pay Offeror the lump sum amount of **thirty thousand and 00/100 Dollars (\$30,000.00)** ("Proposal Payment"), which payment constitutes payment in full to Offeror for the conveyance of Offeror's Intellectual Property to VDOT in accordance with this Agreement. Payment of the Proposal Payment is conditioned upon: (a) Offeror's Proposal being, in the sole discretion of VDOT, responsive to the RFP; (b) Offeror complying with all other terms and conditions of this Agreement; and (c) either (i) Offeror is not awarded the Design-Build Contract, or (ii) VDOT cancels the procurement or decides not to award the Design-Build Contract to any Offeror.

4. **Payment Due Date.** Subject to the conditions set forth in this Agreement, VDOT will make payment of the Proposal Payment to the Offeror within forty-five (45) days after the later of: (a) notice from VDOT that it has awarded the Design-Build Contract to another Offeror; or (b) notice from VDOT that the procurement for the Project has been cancelled and that there will be no Contract Award.

5. **Effective Date of this Agreement.** The rights and obligations of VDOT and Offeror under this Agreement, including VDOT's ownership rights in Offeror's Intellectual Property, vests upon the date that Offeror's Proposal is submitted to VDOT. Notwithstanding the above, if Offeror's Proposal is determined by VDOT, in its sole discretion, to be nonresponsive to the RFP, then Offeror is deemed to have waived its right to obtain the Proposal Payment, and VDOT shall have no obligations under this Agreement.

6. **Indemnity.** Subject to the limitation contained below, Offeror shall, at its own expense, indemnify, protect and hold harmless VDOT and its agents, directors, officers, employees, representatives and contractors from all claims, costs, expenses, liabilities, demands, or suits at law or equity (“Claims”) of, by or in favor of or awarded to any third party arising in whole or in part from: (a) the negligence or wilful misconduct of Offeror or any of its agents, officers, employees, representatives or subcontractors; or (b) breach of any of Offeror’s obligations under this Agreement, including its representation and warranty under Section 8 hereof. This indemnity shall not apply with respect to any Claims caused by or resulting from the sole negligence or wilful misconduct of VDOT, or its agents, directors, officers, employees, representatives or contractors.

7. **Assignment.** Offeror shall not assign this Agreement, without VDOT's prior written consent, which consent may be given or withheld in VDOT’s sole discretion. Any assignment of this Agreement without such consent shall be null and void.

8. **Authority to Enter into this Agreement.** By executing this Agreement, Offeror specifically represents and warrants that it has the authority to convey to VDOT all rights, title, and interest in Offeror’s Intellectual Property, including, but not limited to, those any rights that might have been vested in team members, subcontractors, consultants or anyone else who may have contributed to the development of Offeror’s Intellectual Property, free and clear of all liens, claims and encumbrances.

9. **Miscellaneous.**

a. Offeror and VDOT agree that Offeror, its team members, and their respective employees are not agents of VDOT as a result of this Agreement.

b. Any capitalized term used herein but not otherwise defined shall have the meanings set forth in the RFP.

c. This Agreement, together with the RFP, embodies the entire agreement of the parties with respect to the subject matter hereof. There are no promises, terms, conditions, or obligations other than those contained herein or in the RFP, and this Agreement shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties hereto.

d. It is understood and agreed by the parties hereto that if any part, term, or provision of this Agreement is by the courts held to be illegal or in conflict with any law of the Commonwealth of Virginia, validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Agreement did not contain the particular part, term, or provisions to be invalid.

e. This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia.

IN WITNESS WHEREOF, this Agreement has been executed and delivered as of the day and year first above written.

VIRGINIA DEPARTMENT OF TRANSPORTATION

By: _____

Name: _____

Title: _____

[Insert Offeror's Name]

By:  _____

Name: **Nathaniel R. Orders** _____

Title: **President** _____

Attachment 11.8.6(a) and 11.8.6(b)

Certification Regarding Debarment Forms

- *Orders Construction Company, Inc.*
- *Whitman, Requardt & Associates, LLP*
- *Froehling & Robertson, Inc.*
- *Bowman Consulting Group, Ltd.*
- *Appraisal Review Specialist, LLC*
- *Quinn Consulting Services, Inc.*
- *DIW Group Inc. t/a Specialized Engineering*
- *H & B Surveying and Mapping, LLC*
- *Access, Inc.*

ATTACHMENT 11.8.6(a)
CERTIFICATION REGARDING DEBARMENT
PRIMARY COVERED TRANSACTIONS

Project No.: 0081-154-733

1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; and have not been convicted of any violations of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification, or destruction of records, making false statements, or receiving stolen property;

c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1) b) of this certification; and

d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

Charles Stokes

Signature

2-15-18

Date

Vice President

Title

Orders Construction Company, Inc.

Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project No.: 0081-154-733

- 1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

- 2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	February 15, 2018	Vice President
Signature	Date	Title

Whitman, Requardt & Associates, LLP
Name of Firm

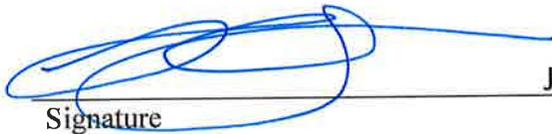
ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project No.: 0081-154-733

1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.


Signature

January 2, 2018
Date

Branch Manager
Title

Froehling & Robertson, Inc.
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project No.: 0081-154-733

1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	1/2/2018	<u>Michael Bruen, Chief Operating Officer</u>
Signature	Date	Title

Bowman Consulting Group, Ltd.
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project No.: 0081-154-733

1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	January 2, 2018	Managing Partner
Signature R. Scott Barber	Date	Title

Appraisal Review Specialists, LLC
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project No.: 0081-154-733

- 1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

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The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.



Signature

January 11, 2018
Date

President
Title

Quinn Consulting Services, Inc.
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

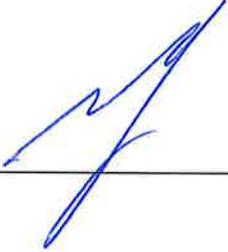
Project No.: 0081-154-733

1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.

	January 10, 2018	VP of Business Development
Signature	Date	Title



DIW Group Inc. t/a Specialized Engineering
Name of Firm

ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project No.: 0081-154-733

- 1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

- 2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.


Signature

January 3, 2018
Date

Vice President
Title

H&B Surveying and Mapping, LLC
Name of Firm

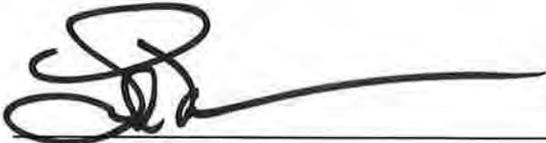
ATTACHMENT 11.8.6(b)
CERTIFICATION REGARDING DEBARMENT
LOWER TIER COVERED TRANSACTIONS

Project No.: 0081-154-733

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The undersigned makes the foregoing statements to be filed with the proposal submitted on behalf of the Offeror for contracts to be let by the Commonwealth Transportation Board.



Signature

1.3.12

Date

President

Title

Access

Name of Firm

SCC AND DPOR INFORMATION

DIW Group Inc,
DBA Name: **Specialized Engineering**

Alert to business entities regarding mailings from VIRGINIA COUNCIL FOR CORPORATIONS or U.S. BUSINESS SERVICES is available from the Bulletin Archive link of th Clerk's Office website.

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DIW GROUP, INC.

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- Give Us Feedback
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- UCC or Tax Liens
- Court Services
- Additional Services

General

SCC ID: F1281908
 Entity Type: Foreign Corporation
 Jurisdiction of Formation: MD
 Date of Formation/Registration: 1/30/1997
 Status: Active
 Shares Authorized: 2000000

Select an action

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Principal Office

4845 INTERNATIONAL BLVD.
 #104
 FREDERICK MD21703

Registered Agent/Registered Office

C T CORPORATION SYSTEM
 4701 COX ROAD
 SUITE 285
 GLEN ALLEN VA 23060
 HENRICO COUNTY 143
 Status: Active
 Effective Date: 12/12/2013

Screen ID: e1000

Need additional information? Contact sccinfo@scc.virginia.gov Website questions? Contact: webmaster@scc.virginia.gov

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Build #: 1.0.0.29601

Commonwealth OF Virginia



State Corporation Commission

CERTIFICATE OF GOOD STANDING

I Certify the Following from the Records of the Commission:

That DIW GROUP, INC., a corporation incorporated under the law of Maryland, is authorized to transact business in the Commonwealth of Virginia;

That it obtained a certificate of authority to transact business in Virginia from the Commission on January 30, 1997; and

That the corporation is in good standing in the Commonwealth of Virginia as of the date set forth below.

Nothing more is hereby certified.



Signed and Sealed at Richmond on this Date:

May 23, 2017

Joel H. Peck

Joel H. Peck, Clerk of the Commission

[Skip to Content \(#skipPoint\)](#)

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[About DPOR \(/About/\)](#)

[Contact \(/Contact/\)](#)



<http://www.facebook.com/VirginiaDPOR>

License Details Related Licenses

Name	DIW GROUP INC
DBA Name	SPECIALIZED ENGINEERING
License Number	0407004748
License Description	Business Entity Registration
Firm Type	Corporation
Rank	Business Entity
Address	4845 INTERNATIONAL BLVD #104, FREDERICK, MD 21703
Initial Certification Date	2005-11-01
Expiration Date	2019-12-31

The license information in this application was last updated at Mon Feb 26 02:50:21 EST.

[License Lookup legal disclaimer](#)

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[Jay W. DeBoer, Director \(/About/Director_bio/\)](#)

COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation

9960 Mayland Drive, Suite 400, Richmond, VA 23233

Telephone: (804) 367-8500

EXPIRES ON
12-31-2019

NUMBER
0407004748

BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, LAND SURVEYORS, CERTIFIED INTERIOR DESIGNERS
AND LANDSCAPE ARCHITECTS
BUSINESS ENTITY REGISTRATION

PROFESSIONS: ENG



DIW GROUP INC
SPECIALIZED ENGINEERING
4845 INTERNATIONAL BLVD
#104
FREDERICK, MD 21703



Jay W. DeBoer
Jay W. DeBoer, Director

Status can be verified at <http://www.dpor.virginia.gov>

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DPOR-LIC (02/2017)

(DETACH HERE)



COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation

BOARD FOR APESCIDLA
BUSINESS ENTITY REGISTRATION

NUMBER: 0407004748 EXPIRES: 12-31-2019

PROFESSIONS: ENG

DIW GROUP INC
SPECIALIZED ENGINEERING
4845 INTERNATIONAL BLVD
#104
FREDERICK, MD 21703



(FOLD)

Status can be verified at <http://www.dpor.virginia.gov>

DPOR-PC (02/2017)



in conjunction with



Subconsultants:



March 2, 2018



Copy 1 of 10 Copies
(Original)

VOLUME 2: Roadway and Bridge Design Concept Plans and Proposal Schedule

A Design-Build Project

I-81 Bridge Replacement at Exit 114

Montgomery County/ Town of Christiansburg, Virginia

State Project No.: 0081-154-733, R201, C501, B601, B616

Federal Project No.: NHPP-081-2(992)

Contract ID Number: C00093074DB96

Submitted By:



In Conjunction With:



Existing I-81 Structures



Existing I-81 Structures



Existing I-81 Structures



Existing I-81 Structures

THIS PROJECT WAS DEVELOPED UTILIZING THE DEPARTMENT'S ENGINEERING DESIGN PACKAGE (GEOPAK). GEOPAK COMPUTER IDENTIFICATION NO. 93074



FHWA 534 DATA 21111

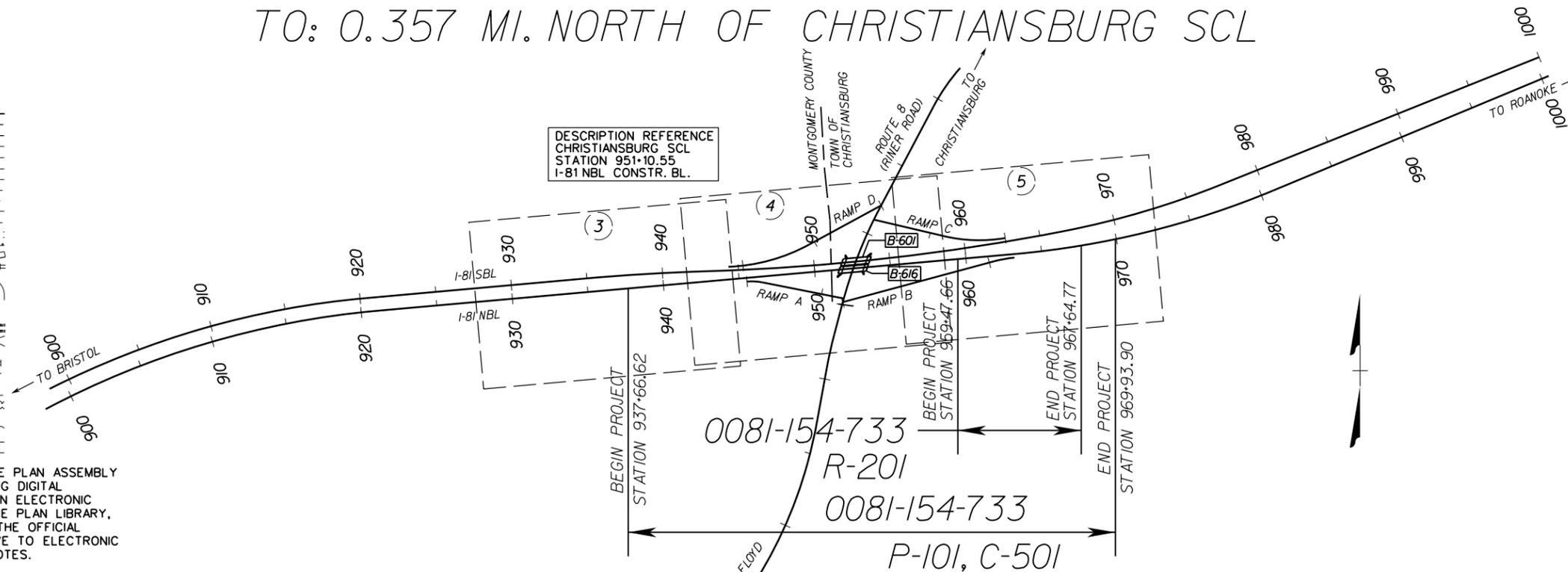
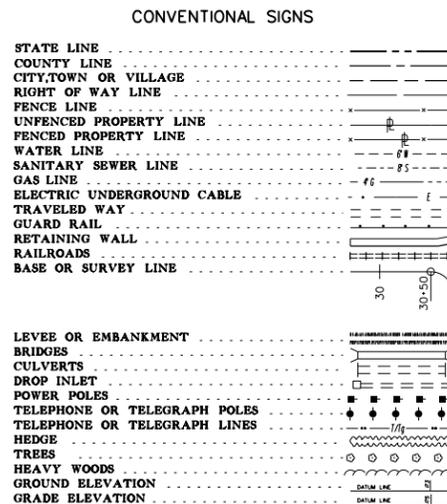
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE OF PROPOSED
STATE HIGHWAY

I-81 BRIDGE REPLACEMENT AT EXIT 114
MONTGOMERY COUNTY / TOWN OF CHRISTIANSBURG
FROM: 0.255 MI. SOUTH OF CHRISTIANSBURG SCL
TO: 0.357 MI. NORTH OF CHRISTIANSBURG SCL

FUNCTIONAL CLASSIFICATION AND TRAFFIC DATA			
	MAINLINE	RAMPS	ROUTE 8 (WITHIN CHRISTIANSBURG CL)
FROM:	0.255 MI. SOUTH CHRISTIANSBURG SCL	-	-
TO:	0.357 MI. NORTH CHRISTIANSBURG SCL	-	-
FUNCTIONAL CLASSIFICATION	RURAL PRINCIPAL ARTERIAL (INTERSTATE)-DIVIDED	INTERCHANGE RAMP	URBAN PRINCIPAL ARTERIAL
MIN. DESIGN SPEED	70 MPH	35 MPH	40 MPH
ADT (2017)	26,500 NB / 26,500 SB	2,450 / 4,250	14,300
ADT (2040)	34,500 NB / 33,600 SB	3,350 / 5,900	20,000
DHV	2,800 NB / 3,800 SB	-	-
D (%) (design hour)	60%	-	-
T (%) (design hour)	27% NB / 24% SB	5% - 7%	2%
V (MPH)	-	-	-
TC STD.	TC-5.11R	TC-5.11R	TC-5.11U
GEOMETRIC STD.	GS-1	GS-R	GS-5

* SEE PLAN SHEETS FOR HORIZONTAL CURVE DESIGN SPEEDS.



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DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.

THIS PROJECT IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE DEPARTMENT'S 2016 ROAD AND BRIDGE SPECIFICATIONS, 2016 ROAD AND BRIDGE STANDARDS, 2009 MUTCD, 2011 VIRGINIA SUPPLEMENT TO THE MUTCD, 2011 VIRGINIA WORK AREA PROTECTION MANUAL AND AS AMENDED BY CONTRACT PROVISIONS AND THE COMPLETE ELECTRONIC PDF VERSION OF THE PLAN ASSEMBLY.

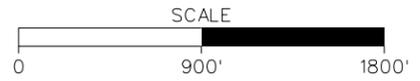
ALL CURVES ARE TO BE SUPERELEVATED, TRANSITIONED AND WIDENED IN ACCORDANCE WITH STANDARD TC-5.11R, EXCEPT WHERE OTHERWISE NOTED.

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MONTGOMERY COUNTY POPULATION 94,392 (2010 CENSUS)
TOWN OF CHRISTIANSBURG POPULATION 21,041 (2010 CENSUS)

STATE PROJECT NO.	SECTION	FEDERAL AID PROJECT NO.	TYPE CODE	UPC NO.	LENGTH INCLUDING BRIDGE(S)		LENGTH EXCLUDING BRIDGE(S)		TYPE PROJECT	DESCRIPTION
					FEET	MILES	FEET	MILES		
0081-154-733	P-101	NHPP-081-2(1992)	PENG	93074	3,227.28	0.611	3,087.07	0.585	PRELIM. ENG.	FR: 0.255 MI. SOUTH CHRISTIANSBURG SCL TO: 0.357 MI. NORTH CHRISTIANSBURG SCL
	C-501	NHPP-081-2(1992)	I000	93074	3,227.28	0.611	3,087.07	0.585	CONSTRUCTION	
	R-201	NHPP-081-2(1992)	ROWA	93074	717.11	0.136	717.11	0.136	RIGHT OF WAY	FR: 0.159 MI. NORTH CHRISTIANSBURG SCL TO: 0.294 MI. NORTH CHRISTIANSBURG SCL
	B-601	NHPP-081-2(1992)	X271	93074	140.79	0.027	-	-	BRIDGE	I-81 SBL OVER ROUTE 8
	B-616	NHPP-081-2(1992)	X271	93074	140.21	0.027	-	-	BRIDGE	I-81 NBL OVER ROUTE 8

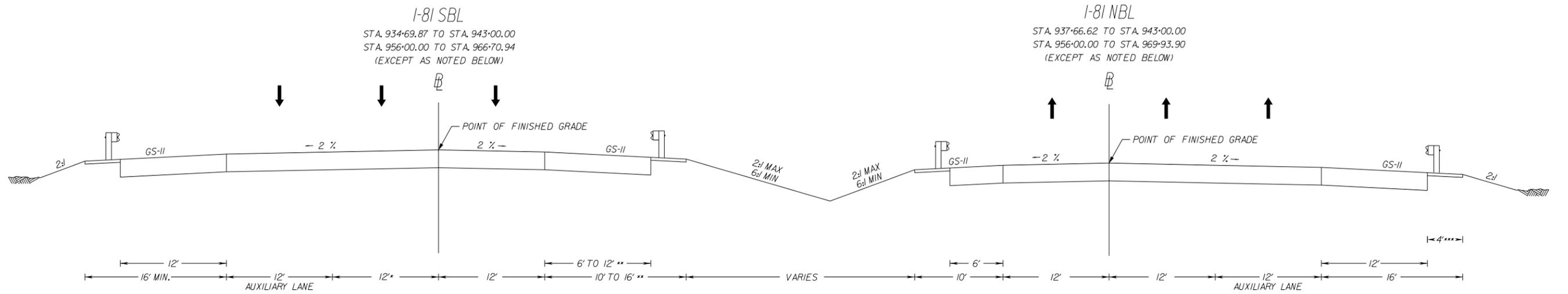
NOTE: PROJECT LENGTHS BASED ON I-81 NB CONSTRUCTION BASELINE, EXCEPT B-601.



TECHNICAL PROPOSAL CONCEPT PLANS
I-81 BRIDGE REPLACEMENT AT EXIT 114
(PROJECT: 0081-154-733)
SHEET 1

NOTE: SEE PLAN SHEETS FOR AREAS OF FULL-DEPTH VS. MILL / OVERLAY.

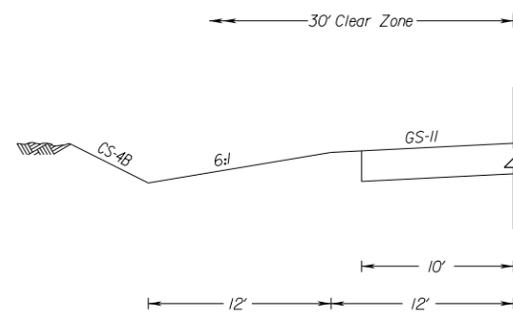
TYPICAL SECTIONS



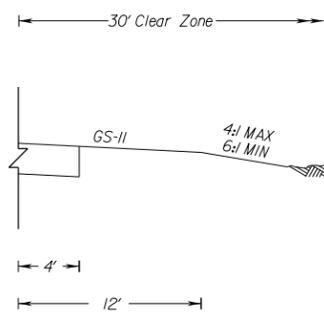
* NOTE: SBL OUTSIDE THROUGH LANE VARIES 12' TO 24'
STA. 956+12.00 TO STA. 960+32.10

** INSIDE SHOULDER WIDTH
I-81 SBL: STATION 956+00 TO STATION 961+00
STATION 961+00 TO STATION 965+25
TRANSITION (6' TO 12' PAVED, 10' TO 16' TOTAL)
12' PAVED, 16' TOTAL

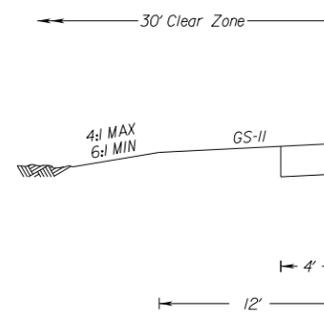
*** NOTE: WHERE LESS THAN 4' (MIN. 2'-1").
LONG POST GUARDRAIL REQUIRED.



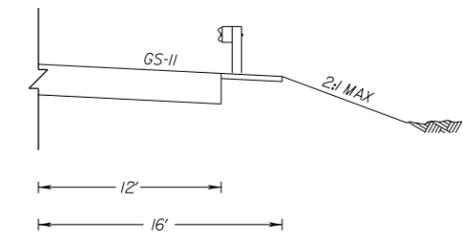
STA. 956+15.00 TO STA. 962+73.28



STA. 965+25.00 TO STA. 966+70.94



STA. 960+50.00 TO STA. 969+93.90



STA. 956+00.00 TO STA. 963+18.84

NOTE: SEE PLANS FOR EXACT GUARDRAIL LOCATIONS.
SEE SB PARTIAL TYPICAL SECTION FOR SHOULDER
REQUIREMENTS WITHOUT GUARDRAIL.

MINIMUM PAVEMENT SECTIONS PER RFP

I-81 MAINLINE, SHOULDERS, AND RAMPS NEW PAVEMENT SECTIONS:

SURFACE - 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE SMA-12.5 (64E-22)
INTERMEDIATE - 2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE IM-19.0D
BASE - 8" ASPHALT CONCRETE BASE COURSE, TYPE BM-25.0D+0.4 (HMHB)
AGGREGATE - 8" AGGREGATE BASE MATERIAL, TYPE I, NO. 21B
SUBBASE - 8" SELECT MATERIAL, TYPE I, MIN CBR-30

VA ROUTE 8 MAINLINE AND SHOULDERS NEW PAVEMENT SECTIONS:

SURFACE - 2" ASPHALT CONCRETE, TYPE SM-9.5A
BASE - 6" ASPHALT CONCRETE, TYPE BM-25.0A
SUBBASE - 8" AGGREGATE BASE MATERIAL, TYPE I, NO. 21-B

REHABILITATION PAVEMENT (I-81 MAINLINE, SHOULDERS, AND RAMPS):

MILL - 3.5" MINIMUM
SURFACE - 1.5" ASPHALT CONCRETE, TYPE SMA-12.5 (64E-22)
INTERMEDIATE - 2" ASPHALT CONCRETE, TYPE IM-19.0D

REHABILITATION PAVEMENT (VA ROUTE 8 MAINLINE, SHOULDERS, AND CONNECTIONS):

MILL - 1.5" MINIMUM
SURFACE - 1.5" ASPHALT CONCRETE, TYPE SM-9.5D
I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (0.0' TO 1.0' BUILD-UP):
MILL EXISTING PAVEMENT TO UNIFORM DEPTH 4.5" BELOW FINAL DESIGN GRADE
INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE

I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (1.0' TO 6.5' BUILD-UP):

MILL EXISTING PAVEMENT TO UNIFORM DEPTH 6.5" BELOW FINAL DESIGN GRADE
BASE - PLACE BM-25.0D+0.4 (HMHB) TO POINT 3.5" BELOW FINAL DESIGN GRADE
INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE

I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (6.5' BUILD-UP):

BASE - PLACE BM-25.0D+0.4 (HMHB) TO POINT 3.5" BELOW FINAL DESIGN GRADE
INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE

TEMPORARY PAVEMENT SECTION:

SURFACE - 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE SM-9.5D
BASE - 6" ASPHALT CONCRETE BASE COURSE, TYPE BM-25.0A
SUBBASE - 8" AGGREGATE BASE MATERIAL, TYPE I, NO. 21B

TECHNICAL PROPOSAL CONCEPT PLANS
I-81 BRIDGE REPLACEMENT AT EXIT 114
(PROJECT: 0081-154-733)
SHEET 2A(1)

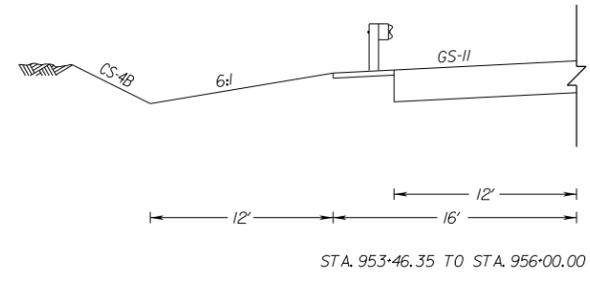
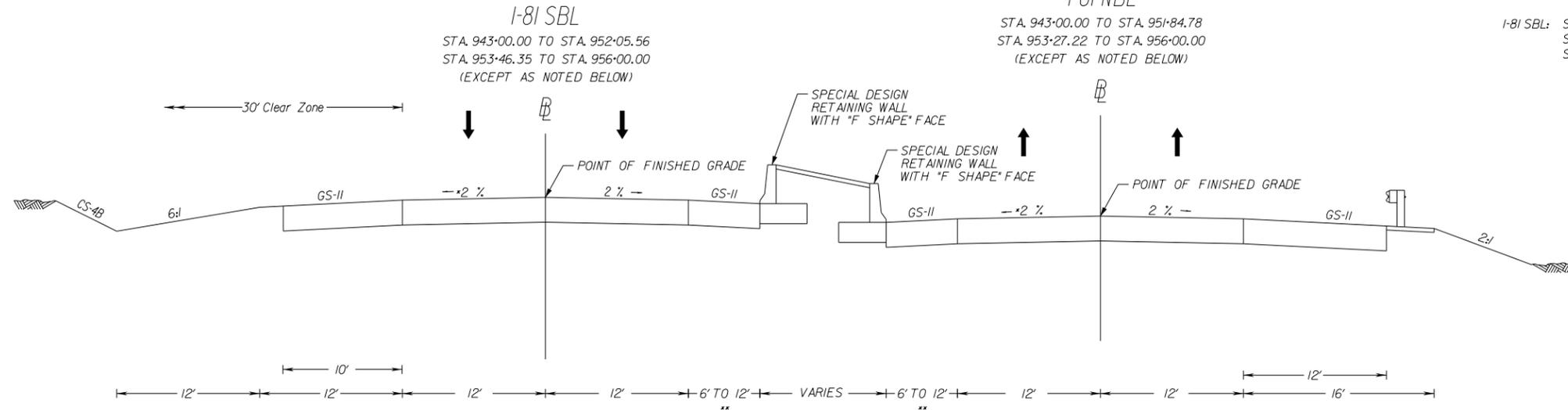


NOTE: SEE PLAN SHEETS FOR AREAS OF FULL-DEPTH VS. MILL / OVERLAY.

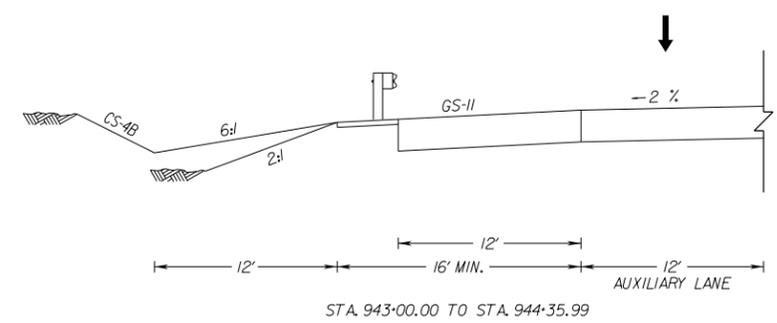
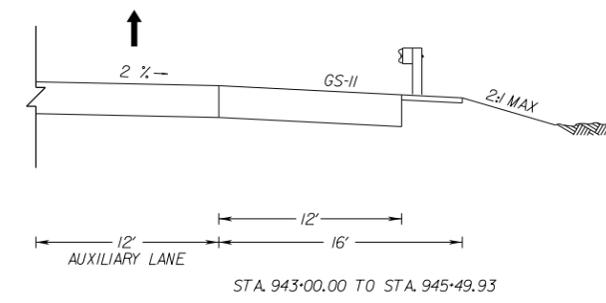
TYPICAL SECTIONS

* NOTE: LEFT SIDE CROSS-SLOPE SHALL BE +2% ACROSS BRIDGES WITH TRANSITIONS OCCURRING ON THE ROADWAY APPROACHES, IN ACCORDANCE WITH THE FOLLOWING STATION RANGES:

I-81 NBL: STATION 949+60 TO STATION 951+40 TRANSITION
 STATION 951+40 TO STATION 953+70 +2%
 STATION 953+70 TO STATION 955+50 TRANSITION
 I-81 SBL: STATION 949+80 TO STATION 951+60 TRANSITION
 STATION 951+60 TO STATION 953+90 +2%
 STATION 953+90 TO STATION 955+70 TRANSITION



** I-81 NBL: STATION 943+00.00 TO STATION 945+00.00 12'
 STATION 945+00.00 TO STATION 947+00.00 TRANSITION
 STATION 947+00.00 TO STATION 951+84.78 6'
 STATION 953+27.22 TO STATION 956+00.00 6'
 ** I-81 SBL: STATION 943+00.00 TO STATION 944+25.00 12'
 STATION 944+25.00 TO STATION 945+50.00 TRANSITION
 STATION 945+50.00 TO STATION 952+05.56 6'
 STATION 953+46.35 TO STATION 956+00.00 6'



NOTE: SEE PLANS FOR EXACT GUARDRAIL LOCATIONS. SEE SB TYPICAL SECTION FOR SHOULDER REQUIREMENTS WITHOUT GUARDRAIL.

MINIMUM PAVEMENT SECTIONS PER RFP

I-81 MAINLINE, SHOULDERS, AND RAMPS NEW PAVEMENT SECTIONS:
 SURFACE - 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE SMA-12.5 (64E-22)
 INTERMEDIATE - 2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE IM-19.0D
 BASE - 8" ASPHALT CONCRETE BASE COURSE, TYPE BM-25.0D+0.4 (HMHB)
 AGGREGATE - 8" AGGREGATE BASE MATERIAL, TYPE 1, NO. 21B
 SUBBASE - 8" SELECT MATERIAL, TYPE 1, MIN CBR-30
VA ROUTE 8 MAINLINE AND SHOULDERS NEW PAVEMENT SECTIONS:
 SURFACE - 2" ASPHALT CONCRETE, TYPE SM-9.5A
 BASE - 6" ASPHALT CONCRETE, TYPE BM-25.0A
 SUBBASE - 8" AGGREGATE BASE MATERIAL, TYPE 1, NO. 21B
REHABILITATION PAVEMENT (I-81 MAINLINE, SHOULDERS, AND RAMPS):
 MILL - 3.5" MINIMUM
 SURFACE - 1.5" ASPHALT CONCRETE, TYPE SMA-12.5 (64E-22)
 INTERMEDIATE - 2" ASPHALT CONCRETE, TYPE IM-19.0D

REHABILITATION PAVEMENT (VA ROUTE 8 MAINLINE, SHOULDERS, AND CONNECTIONS):
 MILL - 1.5" MINIMUM
 SURFACE - 1.5" ASPHALT CONCRETE, TYPE SM-9.5D
I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (0.0' TO 1.0' BUILD-UP):
 MILL EXISTING PAVEMENT TO UNIFORM DEPTH 4.5" BELOW FINAL DESIGN GRADE
 INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
 SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE
I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (1.0' TO 6.5' BUILD-UP):
 MILL EXISTING PAVEMENT TO UNIFORM DEPTH 6.5" BELOW FINAL DESIGN GRADE
 BASE - PLACE BM-25.0D+0.4 (HMHB) TO POINT 3.5" BELOW FINAL DESIGN GRADE
 INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
 SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE

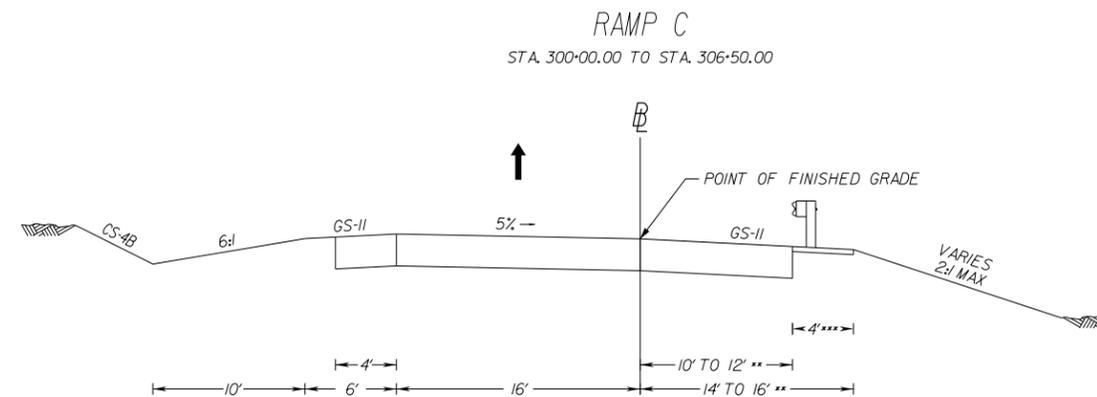
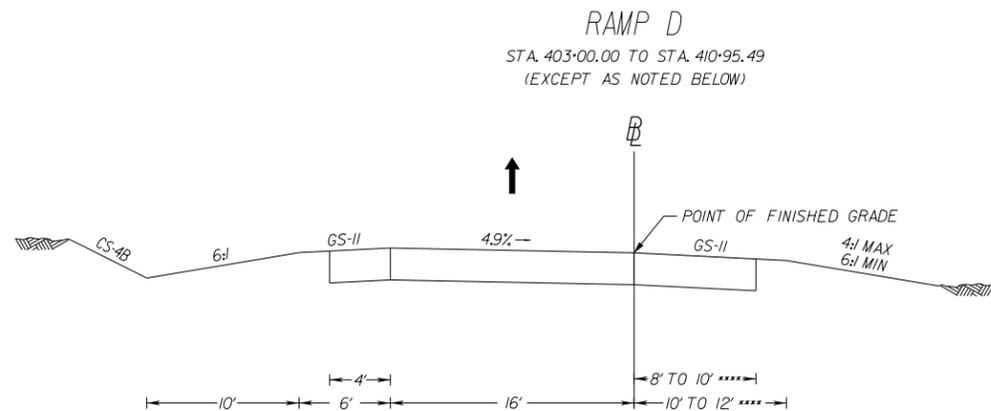
I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (6.5' BUILD-UP):
 BASE - PLACE BM-25.0D+0.4 (HMHB) TO POINT 3.5" BELOW FINAL DESIGN GRADE
 INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
 SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE
TEMPORARY PAVEMENT SECTION:
 SURFACE - 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE SM-9.5D
 BASE - 6" ASPHALT CONCRETE BASE COURSE, TYPE BM-25.0A
 SUBBASE - 8" AGGREGATE BASE MATERIAL, TYPE 1, NO. 21B

TECHNICAL PROPOSAL CONCEPT PLANS
 I-81 BRIDGE REPLACEMENT AT EXIT 114
 (PROJECT: 0081-154-733)
 SHEET 2A(2)



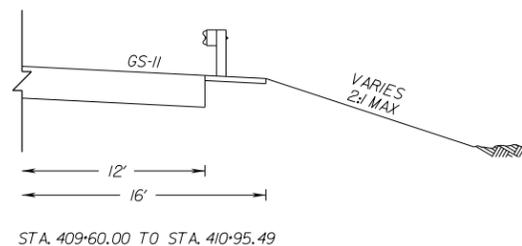
NOTE: SEE PLAN SHEETS FOR AREAS OF FULL-DEPTH VS. MILL / OVERLAY.

TYPICAL SECTIONS

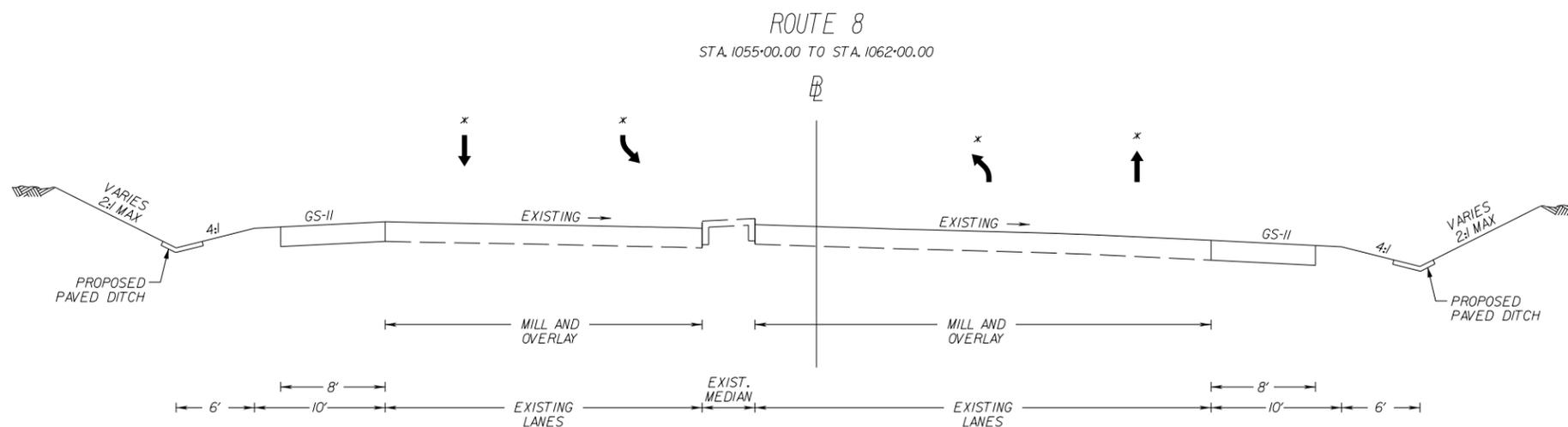


*** NOTE: WHERE LESS THAN 4' (MIN. 2'-1"). LONG POST GUARDRAIL REQUIRED.

*** RIGHT SHOULDER WIDTH
 RAMP D: STATION 403+00.00 TO STATION 407+97.72 8' PAVED, 10' TOTAL
 STATION 407+97.72 TO STATION 408+77.72 TRANSITION
 STATION 408+77.72 TO STATION 409+60.00 10' PAVED, 12' TOTAL



** RIGHT SHOULDER WIDTH
 RAMP C: STATION 300+00.00 TO STATION 302+38.63 12' PAVED, 16' TOTAL
 STATION 302+38.63 TO STATION 303+18.63 TRANSITION
 STATION 303+18.63 TO STATION 306+50.00 10' PAVED, 14' TOTAL



* NOTE: FINAL LANE CONFIGURATION SHOWN IN ACCORDANCE WITH VDOT SWRO'S SIGNAL WARRANT STUDY AND OPERATIONAL ANALYSIS AS REQUIRED BY PART 2 OF RFP (ADDENDUM NO. 1) SECTION 2.9.2.

MINIMUM PAVEMENT SECTIONS PER RFP

I-81 MAINLINE, SHOULDERS, AND RAMPS NEW PAVEMENT SECTIONS:
 SURFACE - 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE SMA-12.5 (64E-22)
 INTERMEDIATE - 2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE IM-19.0D
 BASE - 8" ASPHALT CONCRETE BASE COURSE, TYPE BM-25.0D+0.4 (HMHB)
 AGGREGATE - 8" AGGREGATE BASE MATERIAL, TYPE I, NO. 21B
 SUBBASE - 8" SELECT MATERIAL, TYPE 1, MIN CBR-30

VA ROUTE 8 MAINLINE AND SHOULDERS NEW PAVEMENT SECTIONS:
 SURFACE - 2" ASPHALT CONCRETE, TYPE SM-9.5A
 BASE - 6" ASPHALT CONCRETE, TYPE BM-25.0A
 SUBBASE - 8" AGGREGATE BASE MATERIAL, TYPE I, NO. 21-B

REHABILITATION PAVEMENT (I-81 MAINLINE, SHOULDERS, AND RAMPS):
 MILL - 3.5" MINIMUM
 SURFACE - 1.5" ASPHALT CONCRETE, TYPE SMA-12.5 (64E-22)
 INTERMEDIATE - 2" ASPHALT CONCRETE, TYPE IM-19.0D

REHABILITATION PAVEMENT (VA ROUTE 8 MAINLINE, SHOULDERS, AND CONNECTIONS):
 MILL - 1.5" MINIMUM
 SURFACE - 1.5" ASPHALT CONCRETE, TYPE SM-9.5D

I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (0.0' TO 1.0' BUILD-UP):
 MILL EXISTING PAVEMENT TO UNIFORM DEPTH 4.5" BELOW FINAL DESIGN GRADE
 INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
 SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE

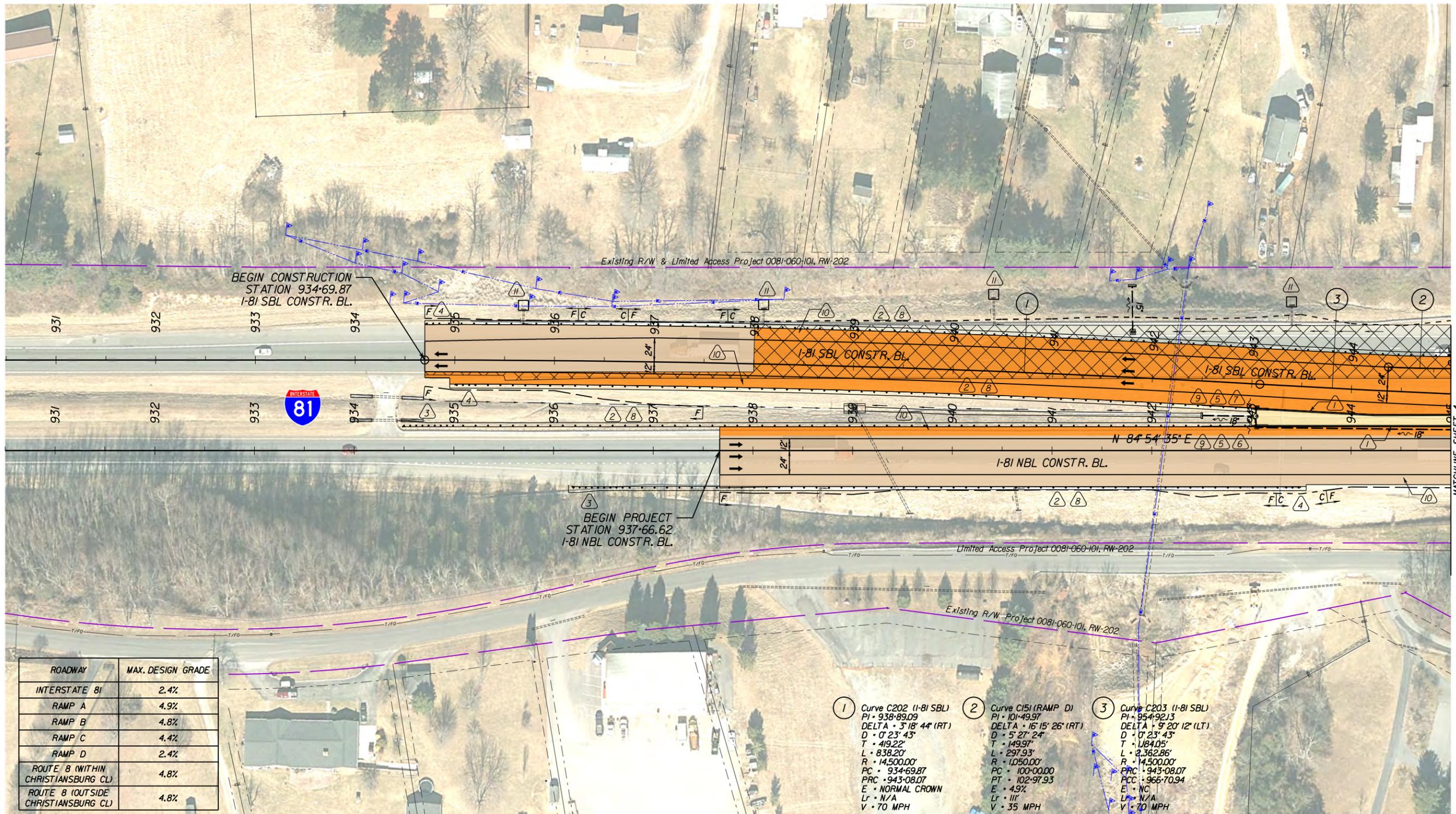
I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (1.0' TO 6.5' BUILD-UP):
 MILL EXISTING PAVEMENT TO UNIFORM DEPTH 6.5" BELOW FINAL DESIGN GRADE
 BASE - PLACE BM-25.0D+0.4 (HMHB) TO POINT 3.5" BELOW FINAL DESIGN GRADE
 INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
 SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE

I-81 MAINLINE, SHOULDERS, AND RAMPS - BUILD-UP OF EXISTING PAVEMENT (6.5' BUILD-UP):
 BASE - PLACE BM-25.0D+0.4 (HMHB) TO POINT 3.5" BELOW FINAL DESIGN GRADE
 INTERMEDIATE - PLACE IM-19.0D TO POINT 1.5" BELOW FINAL DESIGN GRADE
 SURFACE - PLACE SMA-12.5 (64E-22) TO FINAL DESIGN GRADE

TEMPORARY PAVEMENT SECTION:
 SURFACE - 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE SM-9.5D
 BASE - 6" ASPHALT CONCRETE BASE COURSE, TYPE BM-25.0A
 SUBBASE - 8" AGGREGATE BASE MATERIAL, TYPE I, NO. 21B

TECHNICAL PROPOSAL CONCEPT PLANS
I-81 BRIDGE REPLACEMENT AT EXIT 114
 (PROJECT: 0081-154-733)
 SHEET 2A(3)





ROADWAY	MAX. DESIGN GRADE
INTERSTATE 81	2.4%
RAMP A	4.9%
RAMP B	4.8%
RAMP C	4.4%
RAMP D	2.4%
ROUTE 8 (WITHIN CHRISTIANSBURG CL)	4.8%
ROUTE 8 (OUTSIDE CHRISTIANSBURG CL)	4.8%

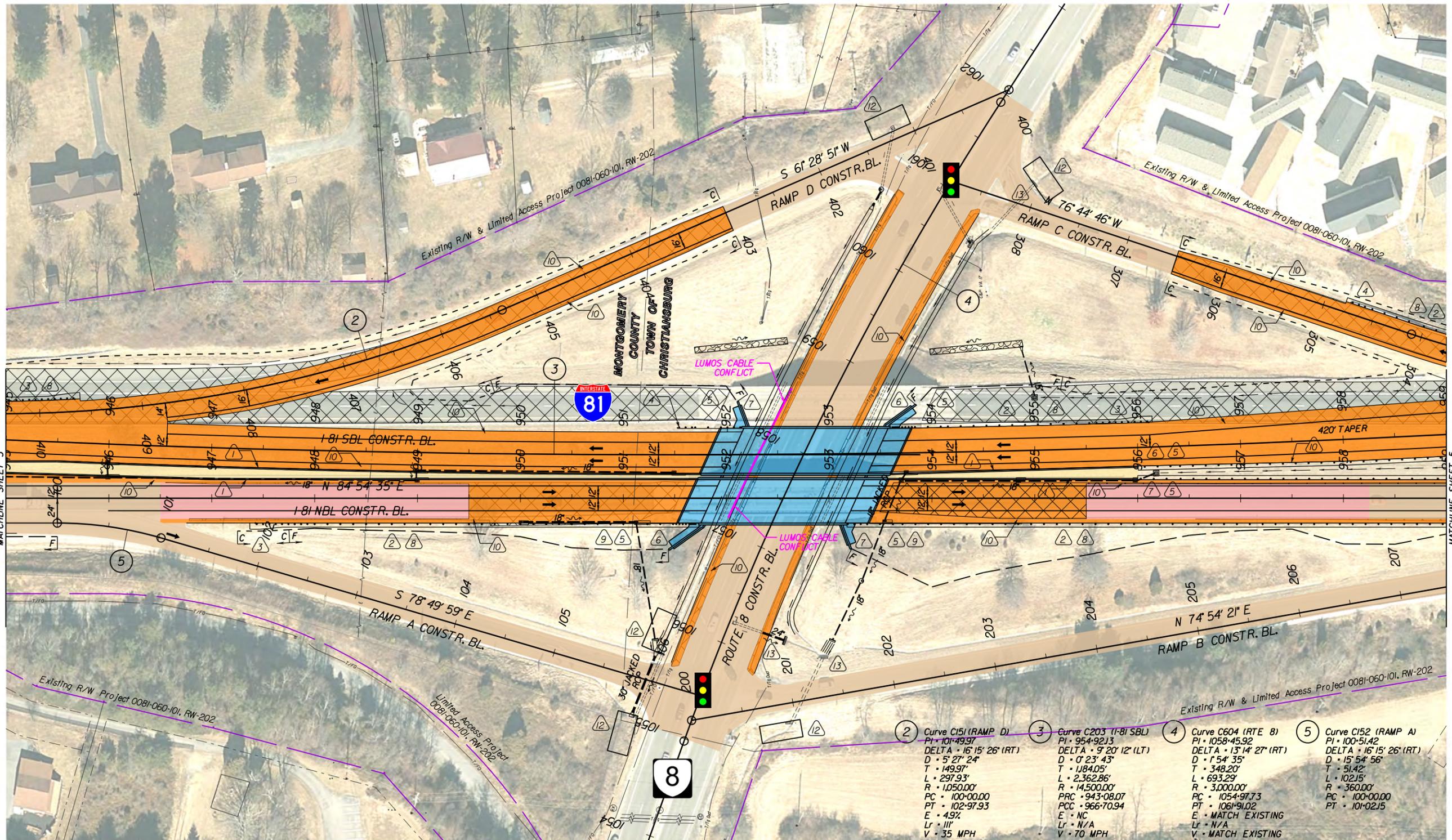
- ① Curve C202 (I-81 SBL)
 PI • 938+89.09
 DELTA • 3° 18' 44" (RT)
 D • 0' 23' 43"
 T • 419.22'
 L • 838.20'
 R • 14,500.00'
 PC • 934+69.87
 PRC • 943+08.07
 E • NORMAL CROWN
 Lr • N/A
 V • 70 MPH
- ② Curve C151 (RAMP D)
 PI • 101+49.97
 DELTA • 15° 15' 26" (RT)
 D • 5' 27' 24"
 T • 149.97'
 L • 297.93'
 R • 1,050.00'
 PC • 100+00.00
 PT • 102+97.93
 E • 4.9%
 Lr • III'
 V • 35 MPH
- ③ Curve C203 (I-81 SBL)
 PI • 954+92.13
 DELTA • 9° 20' 12" (LT)
 D • 0' 23' 43"
 T • 1184.05'
 L • 2,362.86'
 R • 14,500.00'
 PRC • 943+08.07
 PCC • 966+70.94
 E • NC
 Lr • N/A
 V • 70 MPH

LEGEND:

— — — — — EXISTING RIGHT OF WAY & EXISTING LIMITED ACCESS LINE	PROPOSED BRIDGE	— SAN — SANITARY LINE	SPECIAL DESIGN RETAINING WALL WITH 'F' SHAPE FACE
— — — — — EXISTING EASEMENT	MILL AND OVERLAY	— G — GAS LINE	ST'D. GR-MGS1 REQ'D.
— — — — — RFP & PROPOSED PERMANENT EASEMENT	OVERLAY / BUILDUP & MILL WHERE NECESSARY	— W — WATER LINE	ST'D. GR-MGS2 REQ'D.
— — — — — EXISTING PIPE	FULL DEPTH PROPOSED PAVEMENT	— E — UNDERGROUND POWER CABLE	ST'D. GR-MGS3 REQ'D.
WETLANDS	PROPOSED CONCRETE	— FO — EXISTING FIBER OPTIC	ST'D. GR-MGS4 REQ'D.
DENOTES CONSTRUCTION LIMITS IN CUT	PAVEMENT DEMOLITION	— T/FO — TELEPHONE FIBER OPTIC	ST'D. GR-FOA-2, TYPE 1 REQ'D.
DENOTES CONSTRUCTION LIMITS IN FILL	PROPOSED DITCH	— T/Tg — UNDERGROUND TELEPHONE CABLE	ST'D. GR-FOA-2, TYPE 2 REQ'D.
		— T/Tg Duct — UNDERGROUND TELEPHONE CABLE DUCT	ST'D. MC-4 REQ'D.
		— Unk — UNKNOWN UTILITY LINE	ST'D. MC-3B REQ'D.
			TEMPORARY TRAFFIC SIGNAL (TO REMAIN)

TECHNICAL PROPOSAL CONCEPT PLANS
I-81 BRIDGE REPLACEMENT AT EXIT 114
 (PROJECT: 0081-154-733)
SHEET 3





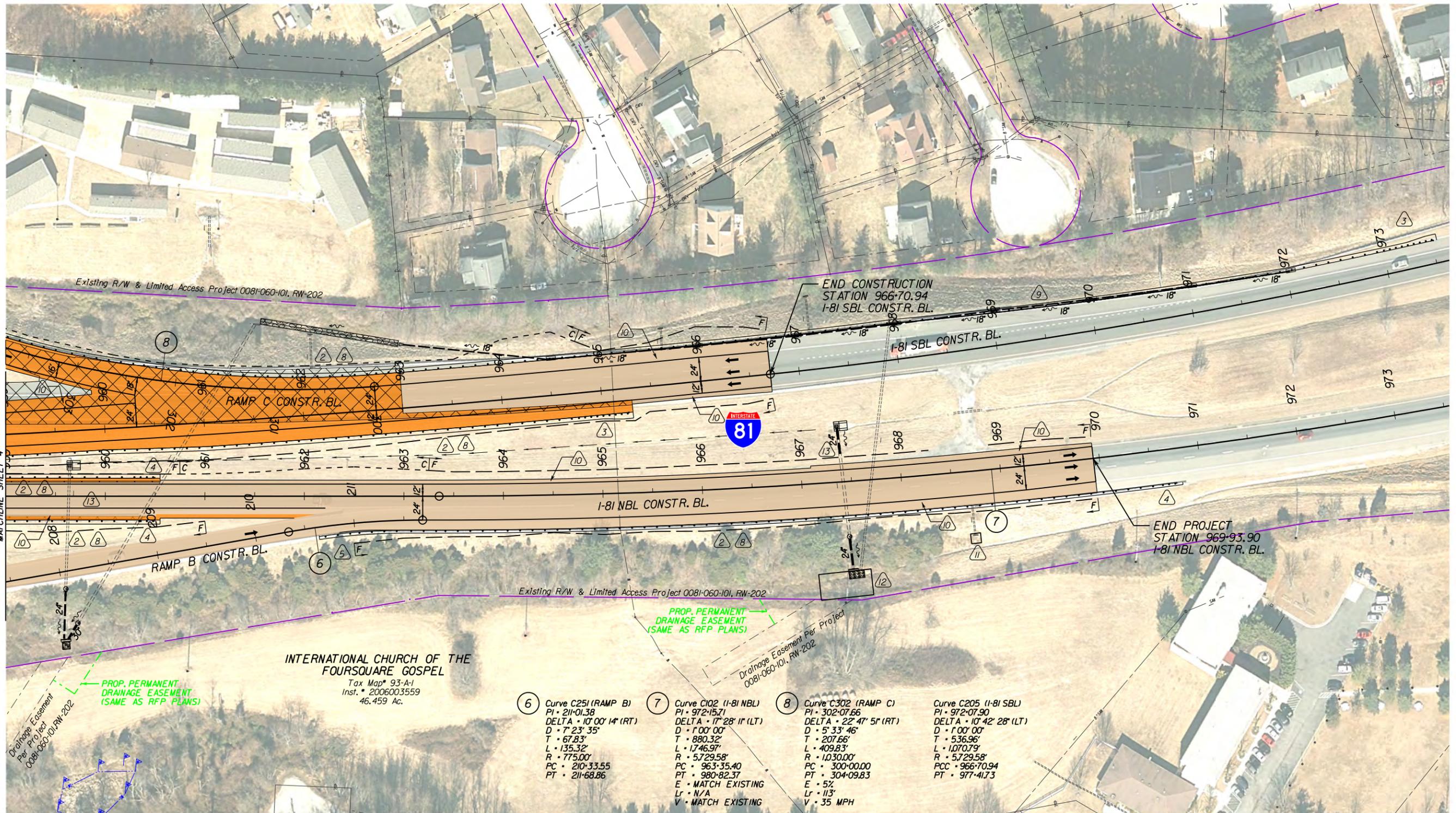
LEGEND:

— — — — —	EXISTING RIGHT OF WAY & EXISTING LIMITED ACCESS LINE	— — — — —	EXISTING EASEMENT	— — — — —	RFP & PROPOSED PERMANENT EASEMENT	— — — — —	EXISTING PIPE	— WL —	WETLANDS	[C]	DENOTES CONSTRUCTION LIMITS IN CUT	[F]	DENOTES CONSTRUCTION LIMITS IN FILL
[Blue Box]	PROPOSED BRIDGE	[Brown Box]	MILL AND OVERLAY	[Pink Box]	OVERLAY / BUILDUP & MILL WHERE NECESSARY	[Orange Box]	FULL DEPTH PROPOSED PAVEMENT	[Yellow Box]	PROPOSED CONCRETE	[Cross-hatch Box]	PAVEMENT DEMOLITION	[Dashed Line]	PROPOSED DITCH
— SAN —	SANITARY LINE	— G —	GAS LINE	— W —	WATER LINE	— E —	UNDERGROUND POWER CABLE	— FO —	EXISTING FIBER OPTIC	— T/FO —	TELEPHONE FIBER OPTIC	— T/Tg —	UNDERGROUND TELEPHONE CABLE
— T/Tg Duct —	UNDERGROUND TELEPHONE CABLE DUCT	— Unk —	UNKNOWN UTILITY LINE	⚠	SPECIAL DESIGN RETAINING WALL WITH 'F' SHAPE FACE	⚠	PAVED SHOULDER	⚠	DISTURBED AREA FOR PIPE ABANDONMENT	⚠	DISTURBED AREA FOR PIPE REHAB	⚠	PIPE REHAB REQ'D.
⚠	ST'D. GR-MGS1 REQ'D.	⚠	ST'D. GR-MGS2 REQ'D.	⚠	ST'D. GR-MGS3 REQ'D.	⚠	ST'D. GR-MGS4 REQ'D.	⚠	ST'D. GR-FOA-2, TYPE 1 REQ'D.	⚠	ST'D. GR-FOA-2, TYPE 2 REQ'D.	⚠	ST'D. MC-4 REQ'D.
⚠	ST'D. MC-3B REQ'D.	⚠	TEMPORARY TRAFFIC SIGNAL (TO REMAIN)	0	100'	200'	SCALE						

2	Curve C151 (RAMP D)	PI • 101-49.97	DELTA • 16° 15' 26" (RT)	D • 5' 27" 24"	T • 149.97'	L • 297.93'	R • 1,050.00'	PC • 100-00.00	PT • 102-97.93	E • 4.9%	Lr • 11'	V • 35 MPH
3	Curve C203 (I-81 SBL)	PI • 954-9213	DELTA • 9° 20' 12" (LT)	D • 0' 23' 43"	T • 1184.05'	L • 2,362.86'	R • 14,500.00'	PC • 943-08.07	PCC • 966-70.94	E • NC	Lr • N/A	V • 70 MPH
4	Curve C604 (RTE 8)	PI • 1058-45.92	DELTA • 13° 14' 27" (RT)	D • 1' 54' 35"	T • 348.20'	L • 693.29'	R • 3,000.00'	PC • 1054-97.73	PT • 1061-91.02	E • MATCH EXISTING	Lr • N/A	V • MATCH EXISTING
5	Curve C152 (RAMP A)	PI • 100-51.42	DELTA • 16° 15' 26" (RT)	D • 15' 54' 56"	T • 51.42'	L • 10215'	R • 360.00'	PC • 100-00.00	PT • 101-0215	E • MATCH EXISTING	Lr • N/A	V • MATCH EXISTING

TECHNICAL PROPOSAL CONCEPT PLANS
I-81 BRIDGE REPLACEMENT AT EXIT 114
 (PROJECT: 0081-154-733)
SHEET 4



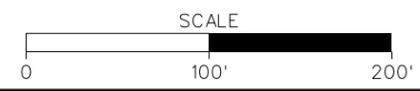


INTERNATIONAL CHURCH OF THE FOURSQUARE GOSPEL
 Tax Map* 93-A-1
 Inst.* 2006003559
 46.459 Ac.

<p>⑥ Curve C251 (RAMP B) PI • 211+01.38 DELTA • 10° 00' 14" (RT) D • 7' 23' 35" T • 67.83' L • 135.32' R • 775.00' PC • 210+33.55 PT • 211+68.86</p>	<p>⑦ Curve C102 (I-81 NBL) PI • 972+15.71 DELTA • 17° 28' 11" (LT) D • 1' 00' 00" T • 880.32' L • 1746.97' R • 5729.58' PC • 963+35.40 PT • 980+82.37 E • MATCH EXISTING Lr • N/A V • MATCH EXISTING</p>	<p>⑧ Curve C302 (RAMP C) PI • 302+07.66 DELTA • 22° 47' 51" (RT) D • 5' 33' 46" T • 207.66' L • 409.83' R • 1030.00' PC • 300+00.00 PT • 304+09.83 E • 5% Lr • 113' V • 35 MPH</p>	<p>Curve C205 (I-81 SBL) PI • 972+07.90 DELTA • 10° 42' 28" (LT) D • 1' 00' 00" T • 536.96' L • 1070.79' R • 5729.58' PCC • 966+70.94 PT • 977+41.73</p>
--	---	---	--

<p>LEGEND:</p> <p>— — — — — EXISTING RIGHT OF WAY & EXISTING LIMITED ACCESS LINE</p> <p>— — — — — EXISTING EASEMENT</p> <p>— — — — — RFP & PROPOSED PERMANENT EASEMENT</p> <p>— — — — — EXISTING PIPE</p> <p>— WL — WETLANDS</p> <p>C — — — — — DENOTES CONSTRUCTION LIMITS IN CUT</p> <p>F — — — — — DENOTES CONSTRUCTION LIMITS IN FILL</p>	<p>PROPOSED BRIDGE</p> <p>MILL AND OVERLAY</p> <p>OVERLAY / BUILDUP & MILL WHERE NECESSARY</p> <p>FULL DEPTH PROPOSED PAVEMENT</p> <p>PROPOSED CONCRETE</p> <p>PAVEMENT DEMOLITION</p> <p>PROPOSED DITCH</p>	<p>— SAN — SANITARY LINE</p> <p>— G — GAS LINE</p> <p>— W — WATER LINE</p> <p>— E — UNDERGROUND POWER CABLE</p> <p>— FO — EXISTING FIBER OPTIC</p> <p>— T/FO — TELEPHONE FIBER OPTIC</p> <p>— T/Tg — UNDERGROUND TELEPHONE CABLE</p> <p>— T/Tg Duct — UNDERGROUND TELEPHONE CABLE DUCT</p> <p>— Unk — UNKNOWN UTILITY LINE</p>	<p>△ SPECIAL DESIGN RETAINING WALL WITH 'F' SHAPE FACE</p> <p>△ ST'D. GR-MGS1 REQ'D.</p> <p>△ ST'D. GR-MGS2 REQ'D.</p> <p>△ ST'D. GR-MGS3 REQ'D.</p> <p>△ ST'D. GR-MGS4 REQ'D.</p> <p>△ ST'D. GR-FOA-2, TYPE 1 REQ'D.</p> <p>△ ST'D. GR-FOA-2, TYPE 2 REQ'D.</p> <p>△ ST'D. MC-4 REQ'D.</p> <p>△ ST'D. MC-3B REQ'D.</p>	<p>△ PAVED SHOULDER</p> <p>△ DISTURBED AREA FOR PIPE ABANDONMENT</p> <p>△ DISTURBED AREA FOR PIPE REHAB</p> <p>△ PIPE REHAB REQ'D.</p> <p>TEMPORARY TRAFFIC SIGNAL (TO REMAIN)</p>
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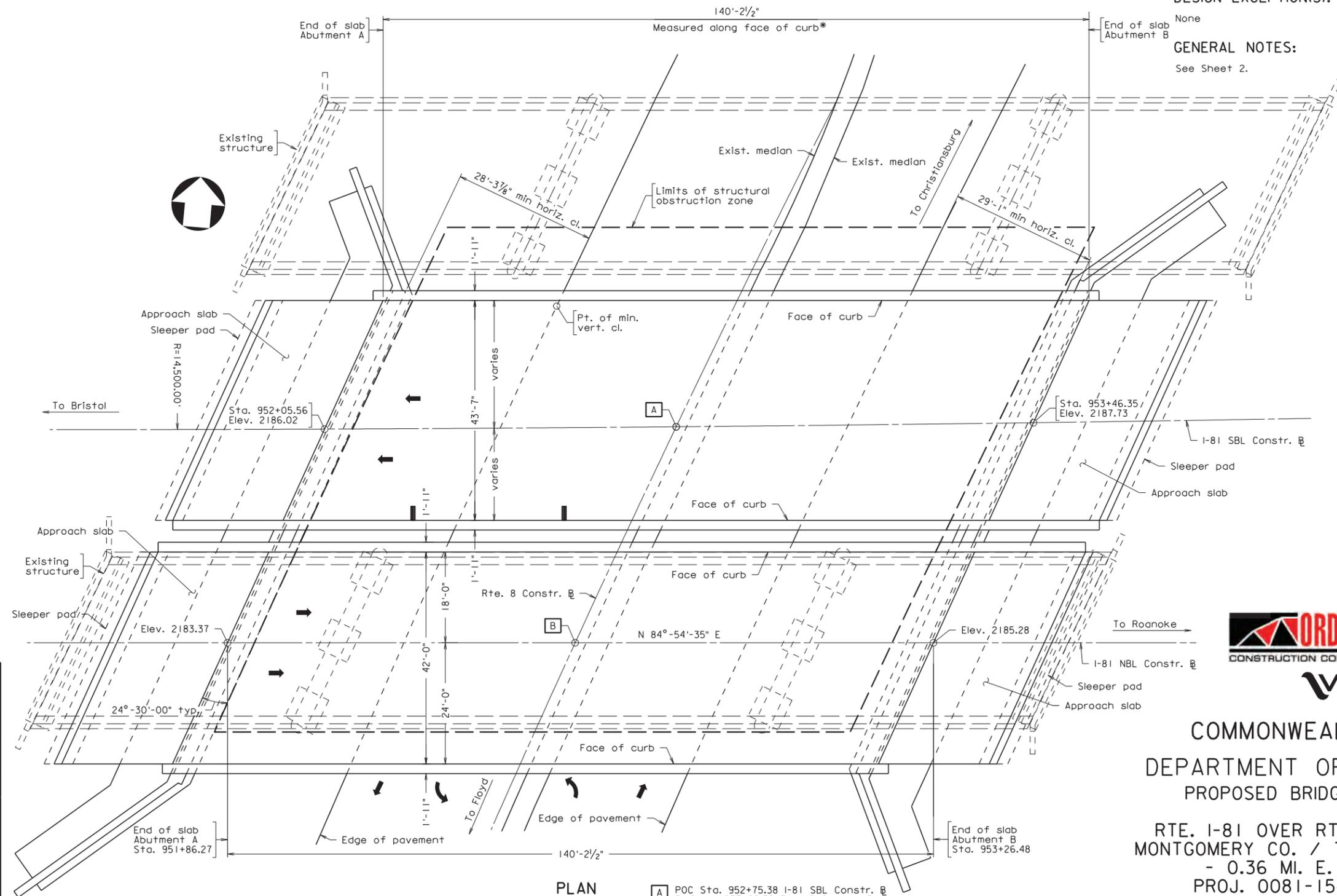
TECHNICAL PROPOSAL CONCEPT PLANS
I-81 BRIDGE REPLACEMENT AT EXIT 114
 (PROJECT: 0081-154-733)
 SHEET 5



STATE	ROUTE	FEDERAL AID PROJECT	STATE ROUTE	PROJECT	SHEET NO.
VA.		NHPP-081-2(992)	81	0081-154-733, B601, B616	1
Federal Structure No. 00000000030366 00000000030365			FHWA Construction and Scour Code: X271-SN		
Federal Stewardship and Oversight Code: NFO				UPC No. 93074	

DESIGN EXCEPTION(S):
None

GENERAL NOTES:
See Sheet 2.



PLAN

* I-81 SBL Bridge is parallel to I-81 NBL Bridge which is parallel to I-81 NBL Constr. \square

- A POC Sta. 952+75.38 I-81 SBL Constr. \square
PI Sta. 1057+99.32 Rte. 8 Constr. \square
 $\Delta = 63^\circ-42'-47''$ Lt.
- B POC Sta. 952+55.32 I-81 NBL Constr. \square
PI Sta. 1057+52.07 Rte. 8 Constr. \square
 $\Delta = 65^\circ-19'-50''$ Lt.

Scale: $\frac{3}{32}'' = 1'-0''$

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

No.	Description	Date
REVISIONS		
For Table of Revisions, see Sheet 2.		

RECOMMENDED FOR APPROVAL FOR CONSTRUCTION
VDOT PROJECT MANAGER
DISTRICT CONSTRUCTION ENGINEER
WHITMAN REQUARDT & ASSOCIATES RICHMOND, VA STRUCTURAL ENGINEER
PLANS BY:
COORDINATED:
SUPERVISED:
DESIGNED:
DRAWN:
CHECKED:



COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
PROPOSED BRIDGE REPLACEMENT ON
RTE. I-81 OVER RTE. 8 (W. MAIN STREET)
MONTGOMERY CO. / TOWN OF CHRISTIANBURG
- 0.36 MI. E. OF INT. ROUTE 8
PROJ. 0081-154-733, B601, B616

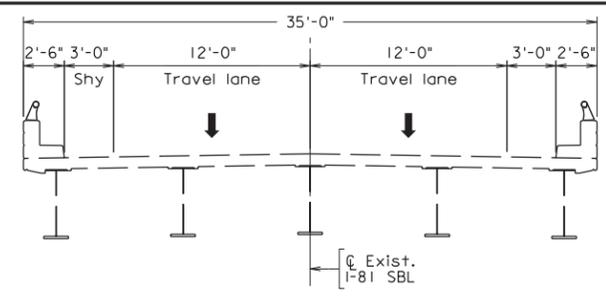
Recommended for Approval: _____ Date _____
Orders Construction Company, Inc.

Approved: _____ Date _____
Chief Engineer

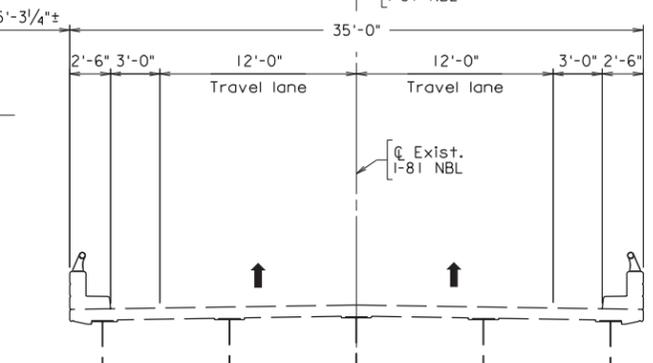
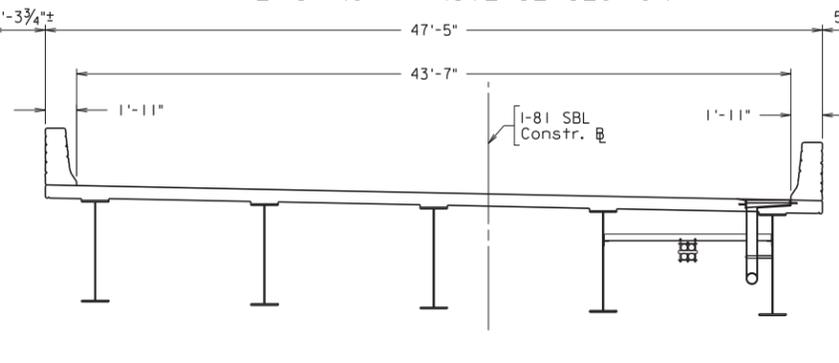
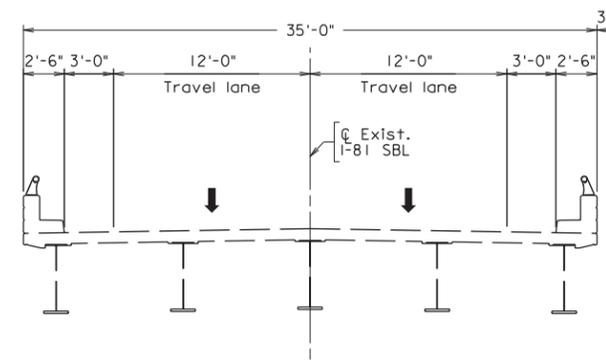
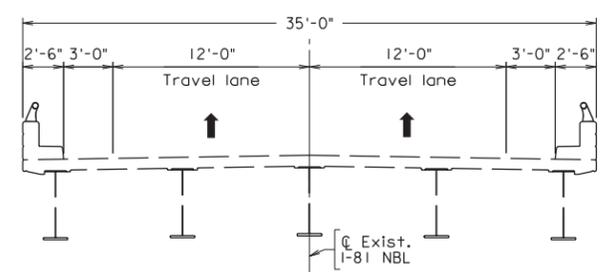
Date: March 2, 2018 © 2018, Commonwealth of Virginia

296-64
Sheet 1 of 4

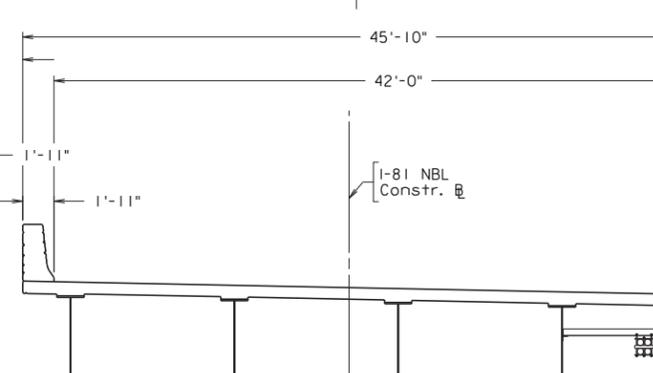
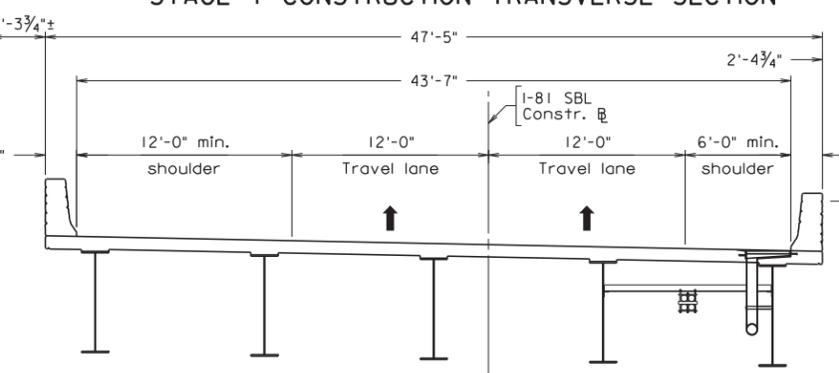
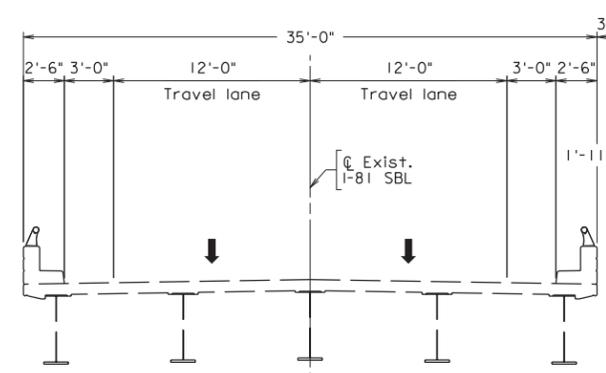
STATE	FEDERAL AID	STATE	SHEET NO.
VA.	PROJECT	ROUTE	PROJECT
		81	0081-154-733, B601, B616
			3



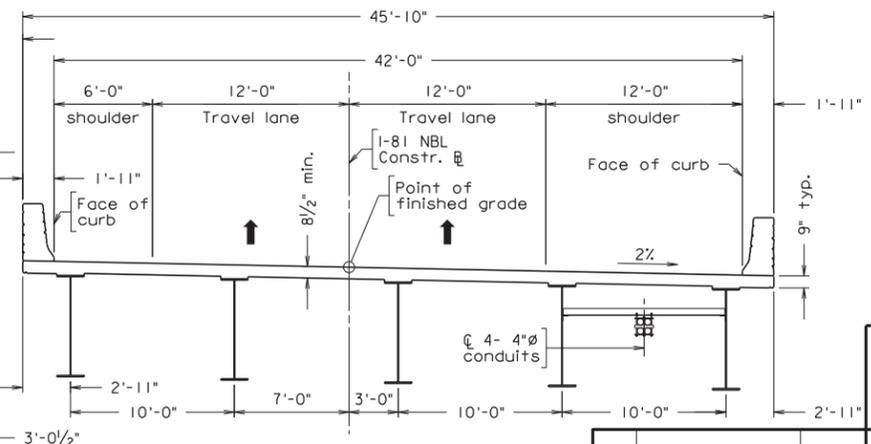
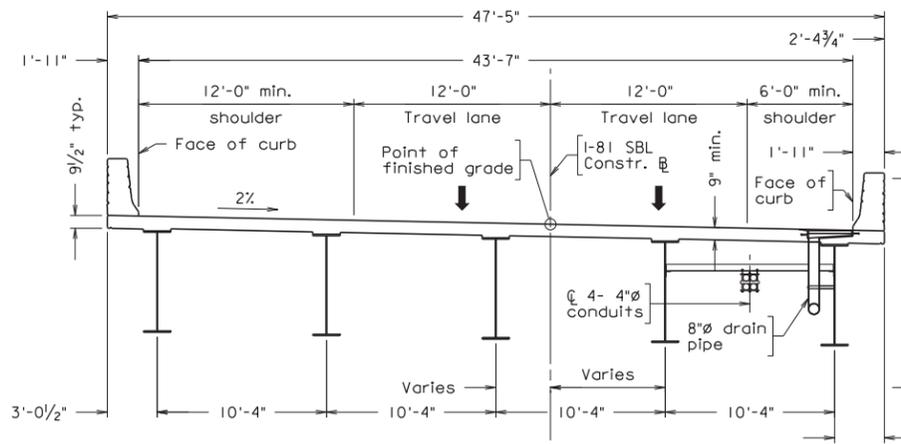
EXISTING TRANSVERSE SECTION



STAGE 1 CONSTRUCTION TRANSVERSE SECTION



STAGE 2 CONSTRUCTION TRANSVERSE SECTION



FINAL TRANSVERSE SECTION

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Scale: 3/16" = 1'-0"

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED
FOR CONSTRUCTION

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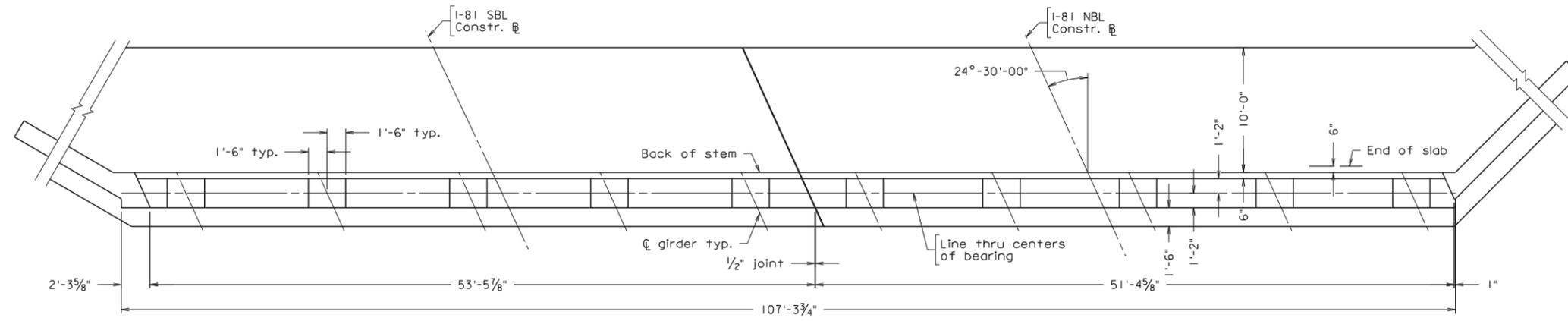
COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

SEQUENCE OF CONSTRUCTION

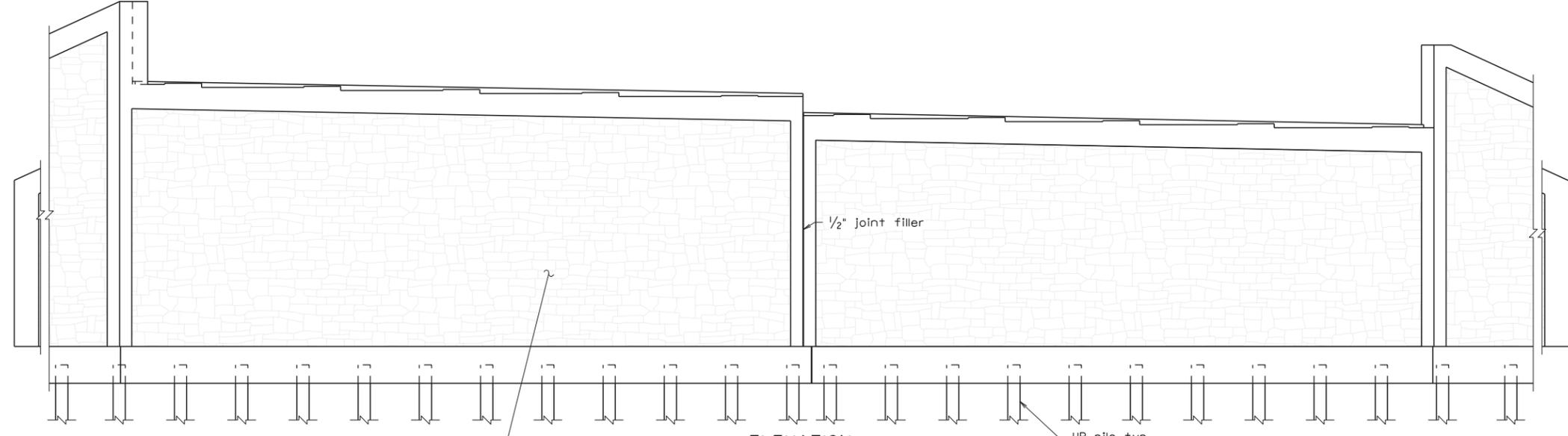
No.	Description	Date

Designed: WRA	Date: Mar. 2018	Plan No.: 296-64	Sheet No.: 3 of 4
Drawn: WRA			
Checked: WRA			

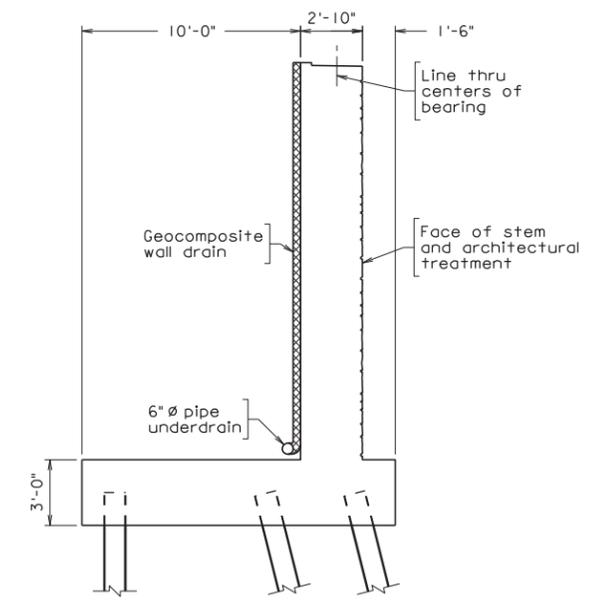
STATE	ROUTE	FEDERAL AID	PROJECT	STATE	ROUTE	PROJECT	SHEET NO.
VA.	—			81	0081-154-733, B601, B616		4



PLAN
(Abutment B shown, Abutment A similar)



ELEVATION
(Abutment B shown, Abutment A similar)



TYPICAL SECTION
Scale: 1/4" = 1'-0"

WHITMAN REQUARDT & ASSOCIATES
RICHMOND, VA
STRUCTURAL ENGINEER

Scale: 3/16" = 1'-0" unless otherwise noted.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED
FOR CONSTRUCTION

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No.	Description	Date



COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
STRUCTURE AND BRIDGE DIVISION

ABUTMENT DETAILS

Designed: WRA.....	Date	Plan No.	Sheet No.
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Checked: JRA.....			



VOLUME 2: Roadway and Bridge Design Concept Plans and Proposal Schedule

A Design-Build Project

I-81 Bridge Replacement at Exit 114

Montgomery County/
Town of Christiansburg, Virginia

State Project No.: 0081-154-733, R201, C501, B601, B616

Federal Project No.: NHPP-081-2(992)

Contract ID Number: C00093074DB96

Submitted By:



In Conjunction With:

