VDOT
Virginia Department of Transportation

Technical Proposal / Volume I

I-81 BRIDGE REPLACEMENT AT EXIT 114

A DESIGN-BUILD PROJECT

Montgomery County / Town of Christiansburg, Virginia

FROM 0.381 MI. SOUTH OF CHRISTIANSBURG SCL TO 0.510 MI. NORTH OF CHRISTIANSBURG SCL

BRANCH CIVIL | *in association with* STV 100 Years

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

4.1 LETTER OF SUBMITTAL

BRANCH CIVIL

March 2, 2018 **4.1 Letter of Submittal**

Mr. Stephen D. Kindy, P.E. (APD Division)
Virginia Department of Transportation (VDOT)
Central Office Mail Center
1401 E. Broad Street
Richmond, Virginia 23219

Re: REQUEST FOR PROPOSALS | A DESIGN-BUILD PROJECT | I-81 BRIDGE REPLACEMENT AT EXIT 114 | State Project No.: 0081-154-733, R201, C501, B601, B616 | Federal Project No.: NHPP-081-2(992) | Contract ID Number: C00093074DB96

Dear Mr. Kindy,

Branch Civil, Inc. (Branch), as the Offeror, submits to the Virginia Department of Transportation (VDOT) this document in response to the Request for Proposals dated October 23, 2017 and Addendum No. 1 dated February 6, 2018. For this pursuit, Branch has partnered with **STV Incorporated dba STV Group Incorporated** (STV) as the lead designer to furnish a product that exceeds design, cost, and schedule expectations.

The Branch Team is a fully integrated team with a proven record of delivering the highest levels of safety and quality on design-build (D-B) projects. Our team is prepared to apply lessons learned from similar D-B projects to provide rapid responsiveness and compliance to VDOT standards and procedures. We are committed to completing a final product that exceeds expectations while addressing the project's key priorities:

- **Cost** | Our project approach allows for design and construction efficiencies that reduce cost, providing VDOT with the best value for the scope of work identified in the RFP.
- **Design Concept** | Our proposed design concept meets or exceeds the RFP requirements and facilitates the construction of the new SB Bridge entirely within the existing median. This approach minimizes construction phasing, simplifies maintenance of traffic, and reduces the number of traffic shifts required. The existing structurally deficient bridges will be replaced with new bridges using prestressed concrete bulb-T beams, which have an excellent track record of providing durable and reliable service with minimal maintenance and inspection needs.
- **Construction** | Our construction means and methods will provide early completion, effective traffic management, environmental stewardship, and a safe separation of construction activities from the traveling public.
- **Project Approach** | The Branch Team is staffing this project with the best, brightest, and most skilled team of design and construction professionals available to manage the work. As displayed in our organizational chart, we are implementing several value-added positions to limit potential risk to all stakeholders. This includes a Construction Design Coordinator to better integrate the design and construction process in support of the Construction Manager and Design Manager, a Traffic Management Task Force to mitigate safety and MOT risks, and subconsultant firm Seventh Point, Inc. to support VDOT's public relations efforts. Our QA/QC approach in design and construction is to establish, implement, and maintain QA and QC

procedures and systems necessary to provide VDOT assurance that design and construction of the project's facilities, components, systems, and subsystems meet the RFP requirements.

4.1.1 Offeror's Full Legal Name and Address:
Branch Civil, Inc. | 442 Rutherford Ave, NE, Roanoke, VA 24016

4.1.2 Declaration of Intent:

It is the Offeror's intent, if selected, to enter into a contract with VDOT in accordance with the RFP terms.

4.1.3 120-Day Declaration:
Pursuant to Part 1, Section 8.2, Branch Civil, Inc. declares that the offer represented by this Technical Proposal and Price Proposal will remain in full force and effect for one hundred twenty (120) days after the date the Technical Proposal is submitted to VDOT ("Technical Proposal Submission Date").

4.1.4 Point of Contact for the Offeror:
Mr. Jason Hoyle, Vice President of Design-Build/Major Projects
Address: 442 Rutherford Ave, NE, Roanoke, VA 24016
Tel: (540) 982-1678 | Fax: (540) 982-4216 | Email: jason.hoyle@branchcivil.com

4.1.5 Principal Officer of the Offeror:
Mr. Patrick Bartorillo, President
Address: 442 Rutherford Ave, NE, Roanoke, VA 24016
Tel: (540) 982-1678 | Fax: (540) 982-4216 | Email: patrick.bartorillo@branchcivil.com

4.1.6 Interim Milestone and Final Completion Dates:
In accordance with RFP Part 1, Section 2.3.1, Branch proposes a Final Completion Date of November 19, 2021.

4.1.7 Proposal Payment Agreement:

An executed Proposal Payment Agreement (Attachment 9.3.1) can be found in the Appendix.

4.1.8 Certification Regarding Debarment Forms:

Certifications for Debarment for Primary and Lower-Tier Transactions have been completed and executed for the Offeror and all subconsultants and subcontractors, and can be found in the Appendix.

Through our careful study of this RFP and project site, we understand the site and conditions, utilities, right-of-way, potential impacts to the environment, and third-party stakeholders. **Our design and construction approach to build both the northbound (NB) and southbound (SB) bridges minimizes construction phasing and will significantly reduce the vehicular, bicycle, and pedestrian safety concerns, allow us to complete the project by our proposed Final Completion Date of November 19, 2021, and provide competitive pricing.**

On behalf of the Branch Team, we appreciate the opportunity to present our technical proposal, which was developed to minimize impacts and meet all project priorities in a safe and timely manner. We look forward to your review and eagerly anticipate another successful project delivery.

Respectfully Submitted,

Branch Civil, Inc.

Patrick K. Bartorillo, President

4.2 OFFEROR'S QUALIFICATIONS

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4.2.1 SOQ CONFIRMATION

Since the submission of our Statement of Qualifications dated September 6, 2017, the Branch Team has not made any changes to our lead contractor, lead designer, or key personnel which would require prior written VDOT approval. For design consultants, materials testing firm Froehling and Robertson has replaced ECS Mid-Atlantic, LLC who has been removed due to project conflicts.

4.2.2 ORGANIZATIONAL CHART

Under the leadership of our **Design-Build Project Manager (DBPM), Jason Hoyle**, the Branch Team is structured to effectively manage and deliver project design and construction, and provide VDOT with a single-source point of contact responsible for all design and construction activities. Our team organization identifies key personnel and major functions to be performed, and has a straightforward chain of command. Although the reporting relationships are rigid, the lines of communication are flexible to meet the requirements of each individual task. If determined to prevent unnecessary delays, it may be beneficial for members within the Branch Team to communicate directly with their counterparts at VDOT. In this case it will be directed and authorized in advance by Mr. Hoyle and the VDOT Project Manager. Our updated organizational chart with the VDOT-approved changes is included on the following page.

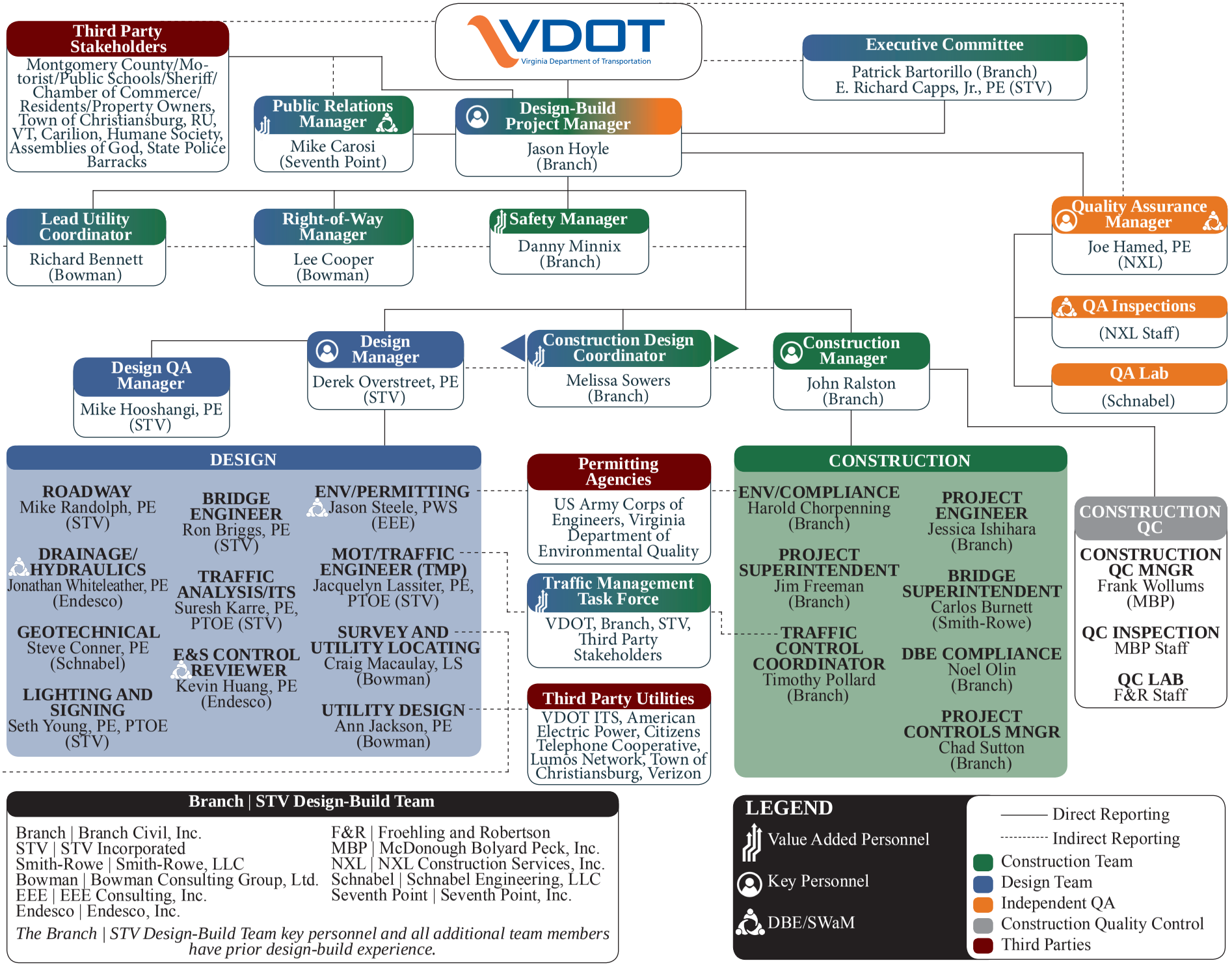
Qualification Highlights

The Branch Team offers the D-B capability, understanding of VDOT procedures and expectations, and established relationships to deliver innovative design and construction solutions. We have assembled a team of industry-leading interstate bridge designers and contractors with the local resources and capacity to design and construct this challenging project. Highlights of our member firms include:

Branch has completed more than $600 million in D-B projects and over $325 million in D-B/PPTA and traditional design-bid-build work in the Salem District. Using resources and lessons learned throughout the District, Branch has led the development, design, and construction improvements to the multi-phased expansion of the US Route 58 Corridor since the early 2000's, and is currently the prime contractor for the US Route 460 Bypass Interchange and Southgate Drive Relocation in the Town of Blacksburg.

STV has provided services to VDOT on a continuous basis since 1985 and ranks among the premier D-B consultants in the industry. They have earned a reputation for providing highly innovative design services for D-B transportation projects and are currently delivering D-B services to VDOT as lead designer on the GRTC Pulse BRT in Richmond, which features complex MOT along a 7.6-mile route through high-density areas and have completed work on the I-581/Valley View Boulevard Interchange Phase II in Roanoke.

Smith-Rowe is an established bridge contractor located only 60 miles from the project site. They have constructed over 500 of bridges and culverts in Virginia and North Carolina including the 952-foot-long Route 623 Bridge over the New River in Pembroke, VA. They have also completed 32 D-B bridge projects with STV.


VDOT
Virginia Department of Transportation
Third Party Stakeholders
Montgomery County/Motorist/Public Schools/Sheriff/Chamber of Commerce/Residents/Property Owners, Town of Christiansburg, RU, VT, Carilion, Humane Society, Assemblies of God, State Police Barracks
Public Relations Manager
Mike Carosi (Seventh Point)
Design-Build Project Manager
Jason Hoyle (Branch)
Executive Committee
Patrick Bartorillo (Branch)
E. Richard Capps, Jr., PE (STV)
Lead Utility Coordinator
Richard Bennett (Bowman)
Right-of-Way Manager
Lee Cooper (Bowman)
Safety Manager
Danny Minnix (Branch)
Quality Assurance Manager
Joe Hamed, PE (NXL)
QA Inspections
(NXL Staff)
QA Lab
(Schnabel)
Design QA Manager
Mike Hooshangi, PE (STV)
Design Manager
Derek Overstreet, PE (STV)
Construction Design Coordinator
Melissa Sowers (Branch)
Construction Manager
John Ralston (Branch)
DESIGN
ROADWAY
Mike Randolph, PE (STV)
DRAINAGE/HYDRAULICS
Jonathan Whiteleather, PE (Endesco)
GEOTECHNICAL
Steve Conner, PE (Schnabel)
LIGHTING AND SIGNING
Seth Young, PE, PTOE (STV)
BRIDGE ENGINEER
Ron Briggs, PE (STV)
TRAFFIC ANALYSIS/ITS
Suresh Karre, PE, PTOE (STV)
E&S CONTROL REVIEWER
Kevin Huang, PE (Endesco)
ENV/PERMITTING
Jason Steele, PWS (EEE)
MOT/TRAFFIC ENGINEER (TMP)
Jacquelyn Lassiter, PE, PTOE (STV)
SURVEY AND UTILITY LOCATING
Craig Macaulay, LS (Bowman)
UTILITY DESIGN
Ann Jackson, PE (Bowman)
Permitting Agencies
US Army Corps of Engineers, Virginia Department of Environmental Quality
Traffic Management Task Force
VDOT, Branch, STV, Third Party Stakeholders
Third Party Utilities
VDOT ITS, American Electric Power, Citizens Telephone Cooperative, Lumos Network, Town of Christiansburg, Verizon
CONSTRUCTION
ENV/COMPLIANCE
Harold Chorpenning (Branch)
PROJECT SUPERINTENDENT
Jim Freeman (Branch)
TRAFFIC CONTROL COORDINATOR
Timothy Pollard (Branch)
PROJECT ENGINEER
Jessica Ishihara (Branch)
BRIDGE SUPERINTENDENT
Carlos Burnett (Smith-Rowe)
DBE COMPLIANCE
Noel Olin (Branch)
PROJECT CONTROLS MNGR
Chad Sutton (Branch)
CONSTRUCTION QC
CONSTRUCTION QC MNGR
Frank Wollums (MBP)
QC INSPECTION
MBP Staff
QC LAB
F&R Staff
Branch | STV Design-Build Team
Branch | Branch Civil, Inc.
STV | STV Incorporated
Smith-Rowe | Smith-Rowe, LLC
Bowman | Bowman Consulting Group, Ltd.
EEE | EEE Consulting, Inc.
Endesco | Endesco, Inc.
F&R | Froehling and Robertson
MBP | McDonough Bolyard Peck, Inc.
NXL | NXL Construction Services, Inc.
Schnabel | Schnabel Engineering, LLC
Seventh Point | Seventh Point, Inc.
The Branch | STV Design-Build Team key personnel and all additional team members have prior design-build experience.
LEGEND
Value Added Personnel
Key Personnel
DBE/SWaM
Direct Reporting
Indirect Reporting
Construction Team
Design Team
Independent QA
Construction Quality Control
Third Parties

4.3 DESIGN CONCEPT

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The Branch Team has studied the RFP and Addendum requirements and understands the challenges and opportunities associated with the replacement of the existing bridges carrying I-81 over Route 8. We have developed a design that meets or exceeds the requirements of the RFP, as well as cost and schedule expectations. Highlights of our proposed design include:

Design Feature	Project Benefits
The alignment for I-81 NB and SB has been shifted to allow the new SB Bridge to be constructed within the existing median in a single construction phase—this minimizes construction phasing, simplifies maintenance of traffic, and reduces the number of traffic shifts required	Provides a significant safety improvement over the RFP concept, simplifying the MOT
An advanced work package will be issued for new traffic signals at the ramp terminals along Route 8	Improves queuing along the existing off-ramps and improves overall operations of the interchange
The profiles for NB and SB I-81 over Route 8 will be raised to accommodate the use of prestressed concrete bulb-T beams for both structures	Reduces construction cost and minimize future inspection and maintenance needs for VDOT as compared to structural steel plate girders
The horizontal and vertical alignments for I-81 NB and SB over Route 8 have been designed to accommodate the future widening of I-81 including the vertical clearance over Route 8 and the design of on- and off-ramps at Route 8	Simplifies the design and construction of any future widening of I-81
The median crossovers used for maintenance of traffic during construction will be designed to meet a 70 mph design speed and maximize overlap with the proposed horizontal and vertical alignments for I-81	Reduces the amount of additional fill material required to be brought to the project site and later removed
The proposed design will not impact streams and contaminated soil associated with the petroleum tanker release—drainage improvements will likely result in minimal impacts to wetlands, which will be addressed by confirming the limits of jurisdictional areas and obtaining the applicable water quality permits	Minimizes impact to environmentally sensitive areas, reducing schedule and cost considerations associated with environmental permits and disturbance/management of soil with documented petroleum impact

4.3.1 CONCEPTUAL ROADWAY PLANS

Conceptual roadway plans are included in Volume II, Tab 4.3.1. The following items specifically answer each of VDOT's roadway design criteria per the RFP.

4.3.1.a General Geometry

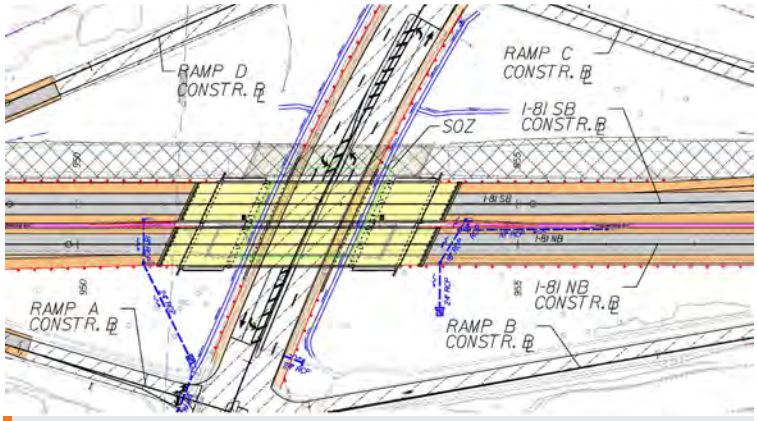
The I-81 Bridge Replacement at Exit 114 includes the realignment of I-81 both horizontally and vertically over Route 8 to accommodate the new bridge locations and profiles related to the Structural Obstruction Zone (SOZ). The I-81 interchange ramps A, B, C, and D will be modified and realigned to tie into the new geometry of I-81.

I-81 is functionally classified as a Rural Principal Arterial Interstate. The VDOT geometric design standard that will be used for I-81 will be GS-1 in rolling terrain with a minimum design speed of 70 mph. The typical section will include two 12-foot-wide travel lanes with a 6 to 12-foot left and 12-foot right paved shoulder in each direction. The proposed typical section will accommodate the MGS Standard guardrail.

I-81 is vertically bifurcated between I-81 SB and I-81 NB and requires a retaining wall between opposing travel ways. In addition the proposed median surface treatment between the retaining walls will eliminate the need for mowing and regular maintenance. The VDOT geometric standard for the interchange ramps will be Interchange Ramp (GS-R) with a minimum design speed of 35 mph.

The portion of Route 8 located within the Town of Christiansburg is classified as an Urban Other Principal Arterial, and the VDOT geometric design standard that will be used for this portion of Route 8 will be GS-5 with a design speed of 40 mph. The portion of Route 8 located in Montgomery County is classified as a Rural Minor Arterial and VDOT geometric design standard GS-2 will be used for this portion of Route 8 with a design speed of 50 mph. The typical section through the interchange generally includes two 12-foot wide lanes and 10-foot outside shoulders.

In Volume II, Tab 4.3.1, we have included a summary of the design criteria including the major geometric elements in addition to the design criteria listed in the RFP Part II Attachment 2.2.



The horizontal alignment allows the SB Bridge to be constructed in the median between the two existing bridges.

Figure 4.3.1.b

4.3.1.b Horizontal Alignments

The Branch Team has developed a horizontal alignment (Figure 4.3.1.b) detailed in Volume II, Tab 4.3.1 that meets or exceeds the requirements of the RFP. The horizontal alignment provides for construction of the SB Bridge in its entirety in the existing median between the two existing bridges. This alignment offers the prescribed clearance over the SOZ and meets or exceeds the RFP design criteria.

4.3.1.c Maximum Grade for Segments and Connectors

The Branch Team has developed a vertical alignment that meets or exceeds the requirements of the RFP and provides the prescribed clearance over the SOZ. The profile grade deviates from the RFP to accommodate the use of prestressed concrete bulb-T beams for both structures with a minimum vertical clearance of 16’-6” over Route 8. See section 4.3.2 of this document and Volume II, Tab 4.3.2 for details.

The profile grade has been developed to minimize the bifurcation between I-81 SB and I-81 NB while adhering to VDOT and AASHTO criteria. Our design does not exceed the maximum proposed vertical grades for each roadway alignment per the RFP, the actual maximum grades are shown in the roadway conceptual plans,Volume II, Tab 4.3.1.

4.3.1.d Typical Sections of Roadway Segments

The geometry of each roadway element is described above and the typical sections are shown in Figure 4.3.1.d, on the following page, and detailed in Volume II, Tab 4.3.1. The typical section identifies the number and width of lanes, shoulders, and pavement sections. For all locations where new guardrail is to be installed, the MGS Standard will be applied.

4.3.1.e Conceptual Hydraulic and Stormwater Management Design

Our hydraulic and stormwater management design meets or exceeds the design criteria in the RFP. Our design complies with Virginia Law, the VDOT Drainage Manual, VDOT’s appropriate IIM’s and the Virginia Stormwater Management Program (VSMP) Regulations. Due to the nature of the project, we

may elect to purchase nutrient credits to satisfy all the post-construction water quality reduction requirements for the project as prescribed in IIM-LD-251.

The Branch Team will be responsible for obtaining any and all necessary water quality permits and permit modifications required by the regulatory agencies.

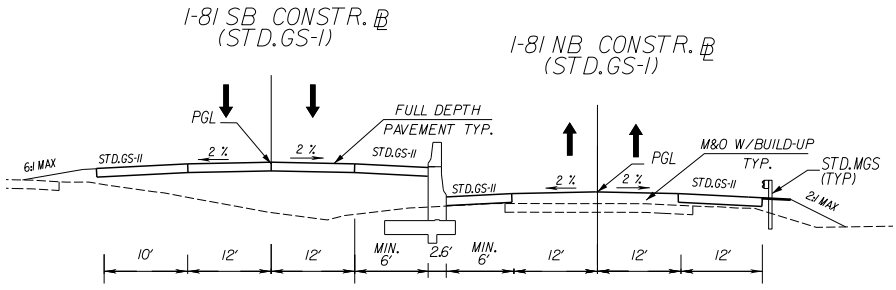


Figure 4.3.1.d *Typical sections of roadway segments*

Drainage Design | In general, our design will follow the conceptual RFP plans including Table 2.7A and Table 2.7B for the required treatment of existing drainage features and those to be left in their existing condition. Further detail including the location of proposed structures is provided in Volume II, Tab 4.3.1.

Stormwater Management Design | Per the RFP, the conceptual plans were developed using Part IIC Technical Criteria of the VSMP Regulations. As such, no post construction stormwater management facilities are anticipated.

4.3.1.f Proposed Right-of-Way Limits

Our right-of-way (ROW) acquisition staff have the required qualifications and experience for this contract. They will use VDOT's policies and procedures, as outlined in the Right of Way Manual, to acquire the necessary ROW in conformance with applicable federal and state laws. The table below indicates the benefits of our ROW acquisition approach:

ROW Acquisition	Project Benefits
Design fully uses existing ROW	- Minimizes the impact on private property - Controls cost of land acquisitions - Minimizes potential schedule delays to acquire ROW or easements
New easements for utility relocations	- Minimizes the need for replacement or new easements - Minimizes the impact on private property - Minimizes potential schedule delays to acquire ROW or easements
New easements for drainage	- Design places easement requirement in a later construction phase/stage which will not affect the critical path to start the SB Bridge construction

4.3.1.g Proposed Utility Impacts

The Branch Team has reviewed the RFP Conceptual Plans for all known utilities and has made contact with each utility owner identified in the RFP. The primary impacts will involve a vertical clearance deficiency at the AEPCO overhead crossing of the interstate and underground telecommunications located along Route 8 in the vicinity of the existing bridge foundations to be removed. We will work with AEPCO to undertake pole replacements within the scope of the bridge replacement schedule and will more accurately identify the location and specific impacts of the underground utilities in order to develop avoidance and/or mitigation plans. We do not believe that any of the utility mitigation work will impact the overall project schedule. Utility impacts are detailed in Section 4.4.2.2.

4.3.1.h Other Key Project Features

In addition to the VDOT required design considerations detailed above, The Branch Team would like to highlight the following additional key features of our design:

Future Widening Considerations | Our design is developed to optimize future changes along the corridor. The minimum clearance over Route 8 has also been designed with future widening in mind. The profile of Route 8 is approximately 6 percent, requiring the orientation of the SB Bridge to be higher than the NB Bridge. The alignment of the SB Bridge has been set to achieve the minimum clearance over Route 8 when the future widening along I-81 occurs. When the SB Bridge is widened, and construction elements are extended, the clearance needed over Route 8 will be achieved.

Maintenance of Traffic | Temporary median crossovers will be used to maintain traffic during Phases 2 and 3 of construction. The median crossover will have a 70 mph design speed and use as much of the proposed horizontal and vertical alignment as practical. The existing emergency/maintenance crossovers will be maintained throughout construction (see section 4.5.1 for additional details).

Traffic Signals | Temporary signals will be installed at the ramp terminals along Route 8 prior to the start of major construction and will limit excessive queuing on the off-ramps and interchange operational challenges until funding is identified for the future interchange project.

Overhead Sign Structure | The existing overhead sign structure along NB I-81 approaching Route 8 will be replaced with a new overhead sign structure as noted in Volume II, Tab 4.3.1.

Existing Traffic Camera and DMS Boards | Our proposed design does not impact the existing traffic camera or DMS boards within the interchange or along the Route 8 corridor.

Roadway Lighting | Roadway lighting will be constructed along Route 8, including under the I-81 bridges to improve safety for motorists, pedestrians, and bicyclists.

Public Outreach | Subconsultant Seventh Point will update the traveling public on upcoming construction phases, lane closures, and detours, and will support VDOT with informal meetings for stakeholders.

4.3.2 CONCEPTUAL STRUCTURAL PLANS

Conceptual structural plans are included in Volume II, Tab 4.3.2. We have provided 11”x 17” renderings of an elevation view, transverse section, abutment, and pier configurations, including pier protection barriers and proposed slope protection for each proposed structure.

4.3.2.a Structural Concept for Bridge Structures

The Branch Team’s approach to the design and construction of the replacement of the existing bridges carrying I-81 over Route 8 is to provide a product which meets or exceeds the RFP requirements using reliable and durable materials.

The resulting bridge solution will offer safe operations, reduced inspection and long-term maintenance needs for VDOT, increased long-term asset performance, improved constructability, and widespread public acceptance.

Based on the required length of the bridges to clear the SOZ denoted in the RFP Conceptual Plans, we determined that the use of a 3-span bridge for both the NB and SB structures was the most cost-effective solution and provided VDOT the maximum benefit in terms of life cycle costs compared to a single span structure. Since the use of MSE walls at the abutments was not allowed by the RFP, a single span bridge would have required the use of very tall cantilevered cast-in-place concrete abutments, which are significantly more costly to construct. The 3-span bridge concept as presented in our conceptual structural plans has the following enhancements/benefits while continuing to meet all requirements of the RFP:

Enhancement	Benefit
The alignment for I-81 NB and SB has been shifted to allow the new SB Bridge to be constructed **entirely within the existing median** in a single construction phase	Eliminates the need to build the new SB Bridge in two distinct construction phases as shown in the RFP Conceptual Plans
Eliminated the need for two longitudinal construction joints in the deck slab of the new SB Bridge as compared to the concept shown in the RFP Conceptual Plans	Reduces inspection and future maintenance needs for VDOT as construction joints create planes of weakness that frequently cause maintenance problems
One entire girder line has been eliminated from the new SB Bridge from the concept shown in the RFP Conceptual Plans	The elimination of an entire girder line will reduce inspection and future maintenance needs for VDOT as well as reducing overall project cost
The layout and geometry of the new bridges have been set to accommodate a future widening of I-81 and improvements to the existing interchange at Exit 114	Better facilitates future bridge widening and provides VDOT the flexibility to implement a variety of interchange concepts for improving the I-81/Route 8 interchange in the future
A Bridge Maintenance and Repair Plan, and corresponding MOT plan developed as part of the construction plans in anticipation that bridge repairs/maintenance will be required to keep the existing bridges in service during construction	Allows our team to address bridge maintenance and repair needs quickly by using a pre-approved plan

Accommodations for Future Improvements

Our approach aligns with the RFP requirements to provide accommodations for future improvements to the existing interchange, a future widening of I-81, and the Town of Christiansburg's long-term water and wastewater extension project—accommodations include:

Accommodation	Benefit
No retaining walls or bridge substructure units have been located within the SOZ denoted in the RFP Conceptual Plans	Provides VDOT the flexibility to implement a variety of interchange concepts for reconfiguring the I-81/Route 8 interchange in the future
The profiles of both I-81 NB and SB have been designed to accommodate a future minimum vertical clearance of 16'-6"	Allows for future widening of I-81 by one 12-foot lane plus an additional 6 feet to widen the inside shoulder from 6 feet to 12 feet in each direction based on VDOT Location & Design and VDOT Structure & Bridge geometric design standards
Foundation elements for existing bridge piers will be removed to an elevation seven feet below finished grade	Eliminates conflicts with planned utility installations

Bridge Layout

The Branch Team evaluated multiple alignment alternatives for I-81 to set the new bridge locations. For each alignment alternative, we considered the proximity of the new bridges to the existing bridges, constructability (construction clearances, locations and maneuverability of cranes and other heavy equipment, requirements for temporary shoring, etc.), maintenance of traffic, schedule, initial cost, considerations for future improvements (including modifications to the existing interchange and the widening of I-81 by one lane in each direction), and future inspection and maintenance needs for VDOT. Our design concept also meets or exceeds the project's intended scope of work and provides maximum benefit to the traveling public in terms of safety, operations, schedule, construction, and public acceptance.

We determined that an alignment which facilitates construction of the new SB Bridge entirely within the existing median, as presented in our conceptual roadway and structural plans, best meets these parameters. Constructing the new SB Bridge entirely within the existing median eliminates having to build the new SB Bridge in two distinct construction phases as was shown in the RFP Conceptual Plans. Constructing the new SB Bridge in one stage is also a significant safety improvement because it

eliminates the need to shift traffic for an additional phase of construction. A comparison of the bridge locations for both the RFP concept and our design is shown in Figures 4.3.2.1 and 4.3.2.2.

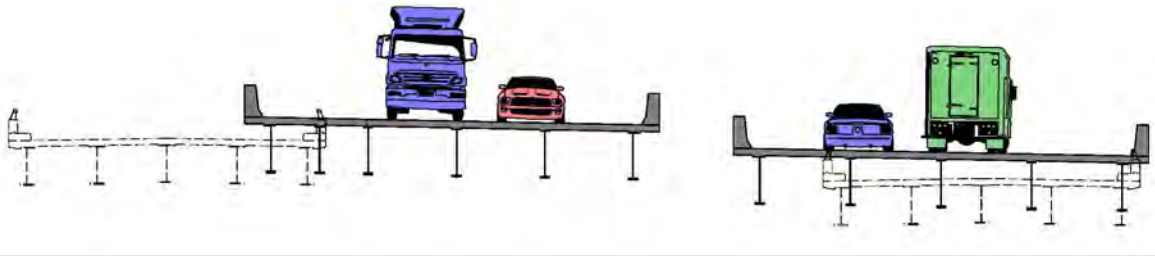


Figure 4.3.2.1

RFP Design (requires the SB Bridge to be constructed in two stages)

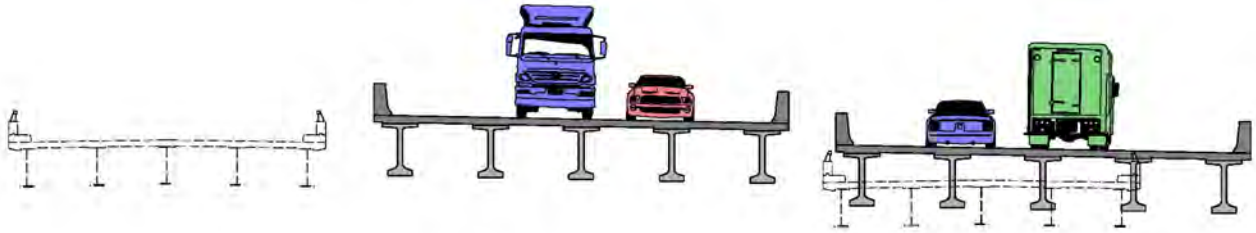


Figure 4.3.2.2

Branch Civil Design (allows the SB Bridge to be constructed in one stage)

For the new SB Bridge, our design concept eliminates two longitudinal construction joints in the bridge deck, removes all bridge deck construction concerns associated with traffic induced vibrations during the second stage of bridge deck construction, eliminates finishing concerns where the two stages of bridge deck would have met, and it removes an entire girder line from the bridge. These design enhancements provide a tremendous benefit to VDOT by reducing future bridge inspection and maintenance needs.

Superstructure

The superstructures for both bridges will conform with VDOT's jointless philosophy by using semi-integral abutments. Semi-integral abutments were determined to be the most appropriate type to provide a jointless bridge based on the abutment type selection algorithm in the VDOT Manual of the Structure and Bridge Division. The proposed structures will each have a clear roadway width of 42 feet, accommodating two 12-foot lanes, a 12-foot outside shoulder and a 6-foot inside shoulder. The conceptual structural plans include plan and transverse section views in compliance with the RFP requirements. The minimum clear width between the NB and SB bridges is 5'-2", which exceeds the RFP requirements.

By shifting the NB and SB alignments to the south to facilitate the construction of the new SB Bridge entirely within the existing median, the amount of elevation change required to raise the grade on I-81 to meet the minimum vertical clearance requirements over Route 8 (both current and future conditions) was minimized significantly as Route 8 is descending in grade at a rate of approximately 5 percent towards the south (i.e., heading in a direction of travel towards Wytheville). This allowed the use of 69-inch-deep prestressed concrete bulb-T beams made continuous for live load. Our team also evaluated a 3-span continuous structural steel plate girder superstructure, however the use of a prestressed concrete beam superstructure offered many advantages over structural steel plate girders including reduced material lead times, faster fabrication and delivery times, reduced erection time and associated impacts to traffic along Route 8, lower long-term maintenance needs, and smaller live load deflections. Prestressed concrete

beams also have an excellent track record of providing durable and reliable service for VDOT and the public with minimal maintenance and inspection needs. The Branch Team's design further reduces the need for future inspection and maintenance by incorporating the following durable materials:

- Low permeability concrete
- Low Shrinkage Class A4 Modified Concrete in the deck slab, parapets, closure diaphragms, and semi-integral backwalls
- CRR steel in conformance with VDOT S&B-IIM-81.7 (IIM) including Class III CRR steel in the superstructure elements defined in the IIM

Substructure

The superstructures for both bridges will be supported by multi-column piers and semi-integral abutments. The new abutments will consist of a cantilevered cast-in-place concrete abutment supported on deep foundations (steel H-piles driven to refusal). The piers for each bridge consist of two multi-column piers that are located entirely outside of the SOZ denoted in the RFP Conceptual Plans. The pier columns will be supported on individual pile footings using steel H-piles driven to refusal. The new piers will be protected by a pier protection system (VDOT BPPS-3 Standard) in accordance with the RFP. To reduce the need for future inspection and maintenance needs, the abutments and piers will use the following durable materials and/or the following design approaches:

- All concrete used in the abutment and pier construction will be low permeability concrete
- Concrete slab slope protection will be used to control erosion
- The new structures will be constructed in accordance with VDOT's jointless philosophy
- Select backfill material will be used behind the abutments to reduce lateral forces, improve drainage, and reduce settlement under the approach slabs and sleeper pads

From our examination of the existing bridge plans and the geotechnical information that was included with the RFP, our team knows there is a wide variation in the rock surface due to the karst geologic conditions, which is a critical project risk. The existing bridge plans also indicated that several of the piles drifted during installation and required adjustments to the existing pile footings. Due to this, we increased the minimum distance from the side of the piles to the nearest edge of the footing from 9 inches (VDOT minimum standard) to 12 inches.

To compensate for potential pile damage or extreme length variations, a pile group efficiency of 80 percent will be adopted for design. Since there is a high potential for the piles to drift due to the highly variable rock surface, we have a plan in place to address design changes quickly during construction. Throughout construction, our geotechnical engineer will be integrated into the construction team and will visit the site to review foundation operations and verify that the work is being completed consistent with the geotechnical recommendations, or if needed, modify the recommendations based on conditions encountered. In addition, STV's bridge engineer will be present during the installation of the deep foundations to address potential foundation design changes quickly.

Bridge Aesthetics

These structures will serve as a gateway entering the Town of Christiansburg from the south. As such, an architectural treatment resembling dry stack stone will be used on both faces of the bridge parapets, including terminal walls, and the presented face of the abutments and wingwalls in accordance with the RFP. In addition, the outer face and bottom of the outermost and innermost prestressed concrete bulb-T beams will be stained to resemble weathering steel.

Maintenance and Removal of Existing Bridges

In our SOQ, the Branch Team identified the condition of the existing bridges to be a critical risk facing this project. The existing bridges carrying I-81 over Route 8 were constructed in 1964 and are structurally deficient. The recent inspection reports indicate that 24 to 47 percent of the deck surface areas are delaminated, spalled, or patched. The existing bridges also have numerous fatigue prone details that require inspection every six months. It is anticipated that repairs and other maintenance work will need to be performed to keep the existing bridges in service during construction. Our team will implement the following mitigation strategies to minimize or eliminate impacts:

Ashlar stone treatment at I-581/Valley View Boulevard Interchange

Structurally deficient condition of existing bridges

Independent Bridge Safety Inspections | In order to establish a baseline assessment of the existing bridge conditions, an independent bridge safety inspection will be performed to identify, mark, and inventory needed repairs. During construction, we will perform independent bridge safety inspections every six months while the bridges are in service. Our inspections will be scheduled between VDOT's inspections, which are anticipated to be performed every six months, so that the bridges will be inspected every three months in order to closely monitor the conditions and identify needed repairs before they become serious issues.

Bridge Load Ratings | Load ratings will be performed on the existing structures where the bridge(s) are carrying traffic and there are loading changes, including temporary conditions. Load ratings will be performed to make certain that repairs or modifications are not required to provide satisfactory load ratings. During construction the load ratings analyses will be updated for changes in condition due to deterioration. Due to the condition of the existing bridges, we developed a maintenance of traffic and construction phasing plan that does not require traffic barrier to be placed on the existing bridges during construction. Instead, traffic barrier approaching the existing bridges will be tied into the end of the bridges. This eliminates the need to strengthen and retrofit the existing bridges to carry the additional load of the traffic barrier service. It also maintains the clear width on the existing bridges at 30 feet, eliminates the need to shift the travel lanes by one foot, and avoids having the crown point located within a travel lane. It also eliminates all impacts to traffic on I-81 and Route 8 associated with anchoring the traffic barrier service through the existing bridge decks.

Bridge Maintenance and Repair Plan | In anticipation that bridge repairs and other maintenance work will be required, a bridge maintenance and repair plan, and corresponding MOT plan, will be developed as part of the construction plan. This plan will include procedures for notifying VDOT, emergency services, and state police. The plan will also address the need to have materials such as high early strength concrete for deck patch repairs readily available. To provide a prompt response time, Branch will partner with local bridge repair specialists, Landford Bothers, to make any needed deck repairs.

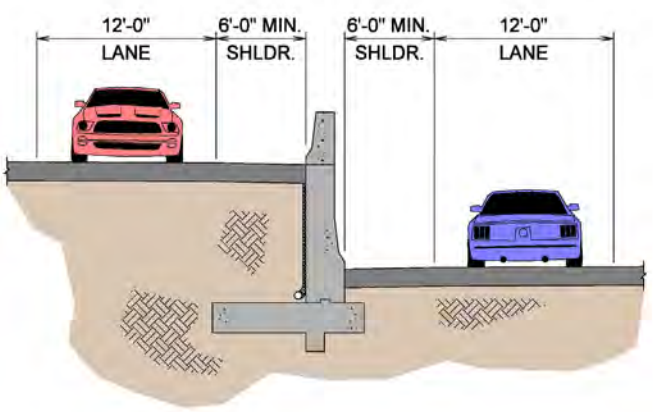
Self-Patrolling | During construction operations, Branch commits to patrolling the I-81 and Route 8 corridors to assess the existing structures for immediate repair needs such as spalled and/or loose concrete in the deck slab, impact damage to the bridge rails, and new collision damage to girders that require an emergency follow-up inspection.

Bridge Removal Plan | A plan will be developed containing details, procedures, and sequence so that the existing bridges can be removed in a safe and controlled manner. The plan will include details and limits for debris shields and other measures required to protect the traveling public, pedestrians, adjacent structures, existing utilities, and other infrastructure.

4.3.2.b Structural Concept for Retaining Walls

Two retaining walls are required due to the bifurcation of the NB and SB roadways. By bifurcating the roadway, as allowed by the RFP, the grade of NB and SB roadways were set independently to better conform to the existing topography. These retaining walls are located at the approaches to the new SB Bridge and will retain the inside shoulder of the SB roadway. The layout of the retaining walls have been realigned to be parallel to the I-81 NB alignment. This new location reduces the required length of the temporary crossover during Phase 2 construction where I-81 NB traffic is shifted to the new SB Bridge.

This new location also reduces the amount of temporary pavement required, it decreases the volume of temporary fill, and it also minimizes the need for temporary retaining structures for the maintenance of traffic crossovers. The new retaining wall locations will also better accommodate the future widening of I-81 and the future interchange improvements. A cast-in-place concrete cantilever retaining wall will be used for both retaining walls.



Typical retaining wall section

Both retaining walls require traffic protection since they are located adjacent to a roadway shoulder. A 42-inch concrete F-shape parapet (BPB-4) will be used on both retaining walls. This parapet meets TL-5 crash test criteria and is also the same style parapet proposed on the new bridges. Both faces of the bridge parapets, including the terminal walls and the exterior faces of the retaining walls, will receive an aesthetic treatment resembling dry stack stone.

4.3.2.c Structural Concept for Major Drainage Structures

There are no major drainage structures located within the project limits.

4.4 PROJECT APPROACH

4.4 PROJECT APPROACH

4.4.1 ENVIRONMENTAL MANAGEMENT

The Branch Team's approach to environmental risk management during design and construction has been developed to anticipate and mitigate potential delays. Through extensive investigation, we have identified the project's areas of concern and have integrated solutions into a design and construction approach that avoids and/or minimizes impacts to the greatest extent possible.

4.4.1.1 Approach to Environmental Management

The overall approach to environmental management is to achieve 100% compliance through a detailed avoidance, minimization, and mitigation process built upon a foundation of accurate resource identification and thorough understanding of the laws and regulations protecting each resource. Early design consideration for access, staging, and construction methodologies will minimize the possible Limit of Disturbance (LOD) for permitting purposes, while reducing the risks associated with modifications during construction. Vigilance and awareness of environmental resources and the permitted limits of construction are hallmarks which will eliminate encroachment. Permit modifications carry risk and will be avoided through a collaborative design and construction process and consistent communication with the regulatory agencies.

Prior to the development of design plans and detailed engineering, our team will identify the anticipated permits. The information provided in the RFP and conceptual design drawings identify impacts to a palustrine emergent wetland (W-1) resulting from two drainage outfall improvements. The anticipated permits for wetland impacts estimated at less than 0.1 acres are a State Programmatic General Permit (17-SPGP-01) and Virginia Water Protection Permit WP3. Immediately upon NTP, more detailed studies (i.e. wetland water area delineations) will be completed in support of U.S. Army Corps of Engineers (USACE) Jurisdictional Determination, to determine if these permits are appropriate/required, or if other permits are needed.

Environmentally Sensitive Areas

1. *Wetland W-1*
2. *Petroleum Tank Accident and Spill*
3. *Streams (J2, J3, and J4)*
4. *Stream (J4)*
5. *Wetland W-4 - *outside construction limits*
6. *Wetland W-3 - *outside construction limits*
7. *Regulated ACM/Lead-Based Paint NB and SB Bridges*
8. *Wetland W-7 and Stream (J1, J6) - *outside construction limits*
9. *Wetland W-6 - *outside construction limits*
10. *Closed Petroleum Release - *outside construction limits*

** No impacts anticipated*

Once design has progressed to a level where the project footprint (including utility relocations) is known, the required permits will be obtained. Our environmental staff will prepare the permit plates, exhibits, and documentation for submission to the permitting agencies. The Virginia Stormwater Management Permit (VSMP) will be supported by completion of the required LD-445 forms, and Phase I documentation will be updated and submitted in advance of the request for ROW plan approval. Copies of all environmental permit submission documentation will be provided to VDOT making known the status of all

environmental permit applications. Copies of approved permits will also be provided once obtained. Coordination of the final construction plans and approved environmental commitments will verify that permit obligations are clearly identified to make sure impacts are avoided during construction. An appropriate software tracking database will be used to monitor environmental compliance and make sure all environmental commitments and permit obligations are met.

Once plans are approved and released for construction, our environmental team will shift to the permit monitoring phase. Prior to the initiation of construction, we will re-remark the limits of jurisdictional wetlands and streams in the project limits (i.e. Environmentally Sensitive Areas Nos. 3 & 4) that will be impacted during construction. As necessary, these critical areas will be marked with safety or silt fence to avoid non-permitted impacts and accessibility to these areas. Proper erosion and sediment (E&S) controls will also be installed in accordance with the approved plans.

Monitoring and inspection throughout the construction phase will facilitate compliance with project permits and current DEQ requirements. Dedicated E&S control staff will inspect the site every 2 weeks, or within 48 hours after a rainfall event of 0.25 inches or greater to verify the effectiveness of installed devices/controls. Specific field walks will be conducted after each major event as defined by VDOT, and any damaged or deteriorated measures will be repaired or reinstalled immediately..

In addition to construction staff making regular inspections of the E&S devices, the environmental staff who prepared the permit drawings and documents will make regular visits to the site as required by the permit documents to see that areas of avoidance are inaccessible to construction staff and the site is either temporarily or permanently stabilized as required by the permit documents.

At the completion of construction, environmental staff will document the final site conditions to close permits. Any corrective action measures will be identified, such as additional seeding or stabilization, before a request for permit closure is made. This process has been used by our team, and to date has been successful at avoiding temporary interruptions in construction due to environmental permitting.

4.4.1.2 Approach/Solutions for Environmental Conditions/Areas of Concern

Our environmental team has investigated the project site and reviewed all provided documentation. We are aware of the recognized environmental conditions (RECs) and areas of concern within the project footprint. The following table summarizes issues, requirements, and potential mitigation solutions.

Environmental Condition/Area of Concern	Requirement	Potential Mitigation
NEPA PCE	Provide information to complete NEPA re-evaluations, including changes in project footprint or environmental conditions—VDOT will prepare re-evaluations at the ROW and PS&E milestones	- Project scope and footprint changes will be avoided to eliminate the need for additional studies
HAZMAT–Petroleum-Based RECs	The team is responsible for confirmation and identification of confirmed, or threats of, petroleum releases into the environment in, and adjacent to, the project footprint	- Update Phase I prior to request for ROW Plan approval - Avoid disturbance in areas with petroleum-impacted soil as documented in the 2017 Phase II ESA report - Characterize and manage any impacted media encountered during construction in accordance with applicable federal, state, and local regulations - Design permanent roadway components to accommodate a 70mph MOT crossover that avoids the petroleum tanker spill location

Environmental Condition/Area of Concern	Requirement	Potential Mitigation
HAZMAT–Asbestos Containing Material (ACM)	The team is responsible for the abatement of regulated asbestos containing material (RACM) in accordance with the VDOT Special Provision	- Abate and monitor the Category II RACM prior to the demolition of existing I-81 NB and SB Bridges - Review bridge as-built plans to screen for suspect materials not previously identified/readily accessible
HAZMAT–Lead-Based Paint	The team is responsible for management of lead-based paint for Type B Structures in accordance with Sections 411 & 413 of the 2016 VDOT Road and Bridge Specs	- Minimize lead paint disturbance during bridge demolition - Recycle waste streams as applicable - Dispose of hazardous material from demolition in accordance with applicable environmental regulations
Commitment Compliance	Provide information to VDOT necessary for completing the Environmental Commitments Checklist prior to releasing the project for construction	- Carry out all necessary environmental commitments and provide documentation of completion to VDOT - Monitor environmental compliance, permitting, and mitigation requirements for environmental issues using a tracking database
Wetlands and Water Quality	The team is responsible for securing all water quality permits and will delineate wetlands and other WOUS, conduct stream assessments, develop permit impact plates, request permits, secure required mitigation, and provide documentation to VDOT as required by the RFP	- Complete early and accurate resource documentation - Avoidance/minimization through design is primary goal - Incorporate realistic schedules to obtain water quality permits from the USACE and DEQ
Threatened and Endangered Species (T&E)	Section 7 coordination resulted in the following effect determinations: Roanoke Log Perch (no effect); Indiana Bat (not likely to adversely affect); Northern Long-Eared Bat (not likely to adversely affect)—The team is responsible for requesting the latest T&E information	- Provide T&E coordination to VDOT prior to the project being released for construction - Avoid project scope and footprint changes to make sure VDOT's acoustic bat survey remains valid - Initiate T&E coordination upon NTP to avoid delays in identifying any potential new species - Complete bat and migratory nesting bird inventories once every two years until construction is commenced

4.4.1.3 Environmental Management Schedule Integration

Early resource identification will confirm awareness of all the environmental design issues, and the inclusion of realistic permitting timeframes in the design and construction schedule will mitigate possible delays. Our team has successfully secured environmental permits on numerous VDOT projects and has a complete understanding of the required documentation, evaluation, analysis, and coordination necessary to secure critical environmental permits. Following a design approach of "avoidance first" and "minimization second", we will see that impacts remain below the thresholds of 1/3 acres of wetlands and 300 linear feet of longitudinal stream impacts to qualify for a 17-SPGP-01 and VWP WP3. If mitigation is required for unavoidable impacts, then compensatory mitigation will likely occur through the purchase of credits from a commercial mitigation bank in the New River Basin, In-Lieu Fee (ILF) Program, or through a permittee-responsible mitigation site. Below is a listing of the anticipated required environmental evaluations and permits with the approving agency and approximate review periods.

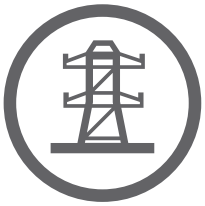
Evaluation/Permit	Regulated Resource/ Approval Agency	Approximate Review Period	Comments
Confirmed Jurisdictional Determination	Wetlands, other Waters of the US, State Waters/USACE	3 months	Required prior to joint permit application for SPGP & VWP General Permits

Evaluation/Permit	Regulated Resource/ Approval Agency	Approximate Review Period	Comments
Threatened and Endangered Species	Federally Listed Species/ DCR, USFWS	1 month	Review VDOT survey results; verify from USFWS and VDGIF databases that no other species are potentially present
17-SPGP-01, Linear Transportation Projects	Wetlands, Waters of the US, State Waters/USACE & DEQ	5 months	Impacts to wetlands less than 1/2 acre and longitudinal stream impacts less than 300' are anticipated
Virginia Water Protection Permit WP3 Linear Transportation Projects	Wetlands, other Waters of the US, State Waters/DEQ	5 months	Impacts to wetlands are anticipated to be less than1/10-acre
Permits for Removal of RACM	Department of Labor & Industry & U.S. EPA	1 month	RACM identified on the existing I-81 SB and NB Bridges
Virginia Stormwater Management Program Permit (VSMP)	Streams/DEQ; includes VDOT ROW and off-site support facilities, as applicable	5 months	Submitted with SWM, SPCC, ESC, and SWPPP Plans prior to land disturbance activities

Per the RFP, the Branch Team will be the permittee for all required environmental permits and will take the lead in all permit-related agency coordination. We will work collaboratively with the regulatory agencies to determine the permitting approach, achieve consensus on appropriate avoidance and minimization, and ultimately secure the required permits using limits of construction that are feasible and cost effective. Our permitting, design, and construction specialists will make sure that LODs reflect maximum avoidance and minimization, while accommodating critical design features and allowing reasonable room for construction, including erosion and sediment control.

Avoidance and minimization plans among our team members are already underway, and will continue in earnest following NTP. Collaboration with the regulatory agencies will begin during the JD confirmation field walk with USACE and VDEQ representatives. When reviewing each feature during the field walk, avoidance and minimization possibilities and constraints will be determined. Typically, additional field visits with the resource agencies are not necessary and additional collaboration can occur by phone or email as design evolution requires.

4.4.2 UTILITIES



The Branch Team's approach to utility coordination is highlighted by first avoiding impacts where feasible. Our experience with the utility owners along the corridor provides the relationships needed to quickly reach agreement on plans, coordinate unavoidable relocations, and mitigate unexpected utility conflicts to minimize risk to construction sequencing and schedule delays. For this project, initial contacts with the relevant utility companies have already been made to minimize lead time during the design phase.

4.4.2.1 Approach for Utility Coordination, Adjustments, and Relocations

The table below identifies potential utility conflicts and our team's potential solutions.

Utility Conflict	Potential Solutions
Appalachian Power – Aerial crossing conflict with increased elevation of new construction	Coordinate with AEPCO on replacement of the existing poles to increase clearance
Verizon – Aerial crossing conflict with temporary signal	Design a temporary signal span wire configuration to eliminate the conflict

Utility Conflict	Potential Solutions
Verizon – Underground duct bank in proximity to existing foundation removal	Verify location of duct bank is outside the area of foundation removal—relocate if in conflict
Citizen – Underground duct bank in proximity to existing foundation removal	Verify location of duct bank is outside the area of foundation removal—relocate if in conflict
Lumos – Underground conduit conflict with removal of existing foundation	Relocate duct bank outside the area of foundation removal

4.4.2.2 Mitigation Strategies to Offset Potential Impacts

The Branch Team will meet with the affected utility companies early in the design to make sure all facilities have been identified and located within the project limits. We will approach identified conflicts by first adapting the design to avoid conflicts if possible, and then coordinating with utilities to develop a relocation strategy that minimizes service interruptions and schedule impacts.

The Branch Team will contact AEPCO to review the proposed construction and schedule. We will coordinate with the power company on their design to increase the vertical clearance for the highway crossing and make sure the construction schedule works in concert with the bridge replacement project to minimize impact.

Potential Utility Impacts
1. Appalachian Power - Overhead crossing
2. Verizon - Overhead crossing
3. Citizen and Lumos - Underground conduit
4. Verizon - Underground conduit

Additionally, we will use test holes along the existing Verizon, Citizen, and Lumos owned underground conduit runs along Route 8 to accurately locate these utilities and evaluate the limits of construction impacts. We will adjust the design or work with the companies to find a location not in conflict with construction, including consolidating separate conduit lines into a common duct bank.

4.4.2.3 Integration of Utilities into Schedule

We have developed the schedule so that neither the adjustment of the Appalachian Power overhead lines or the relocation of the Verizon, Lumos, and Citizen underground communication lines are on the critical path. Our utility staff will work with the design team and utility companies to develop viable solutions.

4.4.3 GEOTECHNICAL

The Branch Team's geotechnical approach features design concepts and construction activities established to manage geotechnical risk. The largest geotechnical risk for this location in karst geology, which will impact the approach to foundation design and construction as explained in 4.4.3.1. Considering the challenges associated with working around existing foundations, maintaining existing structures, and maintaining or reconstructing existing slopes, we offer the following solutions to the project's geotechnical challenges.

4.4.3.1 Identifying and Mitigating Geotechnical Risks

We have identified geotechnical risks using the borings and test results contained in the Geotechnical Data Report (GDR) provided with the RFP and the Supplemental GDR provided with Addendum 1.

The complex karst geology in the area features folded and faulted rock with steeply dipping fractured strata of soluble bedrock that has weathered to create a top-of-rock profile that varies greatly over short horizontal distances. Also, variable degrees of rock weathering can result in inconsistent bearing

material. The design team will identify these variabilities and accommodate for them in the design to minimize the risk of cost overruns and delays in construction. These risks can result in additional foundation lengths due to variations in the rock surface and/or quality, modified design of retaining walls or stabilization of underlying soils if global stability analyses show low factors of safety, and/or undercutting or modifying pavement subgrades with low California Bearing Ratio (CBR) values. The existing data indicates the geotechnical risks include, but are not limited to:

Identification of Geotechnical Risks

Abutments and Piers Supported on Deep Foundations | According to the existing bridge as-built plans, the actual pile lengths indicate a wide variation in the rock surface elevation. For example, the pile lengths in Abutment A for the existing NB Bridge vary from 19.5 feet to 93.2 feet. For driven pile foundations, this variable rock surface can present challenges during installation. A pile can easily be damaged if it slips along the surface of a pinnacle or inclined rock, which can lead to the abandonment of the pile and potential redesign of the foundation elements.

Approach Embankment Settlement at Abutments | The placement of embankment fill will add additional load to the underlying residual soils and cause them to settle. Settlement of the underlying soils could add downdrag loads to the foundations supporting the existing bridge. The GDR borings indicate the soils are typically clay residual soils.

Embankment Slopes | The embankments between Sta. 959+50 to 964+00 will be widened so the outside shoulder can accommodate a slight lane shift. The embankment slope in this area is more than 25 feet high, which classifies as a critical slope. The existing slopes appear to be stable, but the widened embankment will have to meet a minimum factor of safety of 1.5 in accordance with VDOT requirements. Other slopes within the median, and other areas, typically have non-critical heights and slope angles of 2H:1V or flatter.

Pavements | It is anticipated that the on-site soils will have low CBR values and exhibit high swell. These materials will not be suitable for pavement subgrade and might need to be undercut or modified.

The final geotechnical engineering report required by the RFP could disclose additional potential risks. These risks will be identified and mitigation alternatives will be provided in the report.

Mitigation of Geotechnical Risks

We will provide a final geotechnical engineering report according to VDOT Materials Division Manual of Instructions, Chapter III Geotechnical Engineering (MOI Chapter III), and Chapter VI Pavement Design. Our subsurface exploration and testing program will include soil test borings, rock coring, geophysical investigation, in-situ testing, and laboratory testing. The results of this program will be the basis of our final geotechnical engineering report which will include recommendations to mitigate potential geotechnical risks. Mitigation will include the following with regard to the preliminary risks identified:

Variable depth to rock with limestone pinnacles, ledges, and cutters (soil slots) over relatively short distances at the VDOT I-81 Exit 150 project in the Salem District is typical of area conditions.

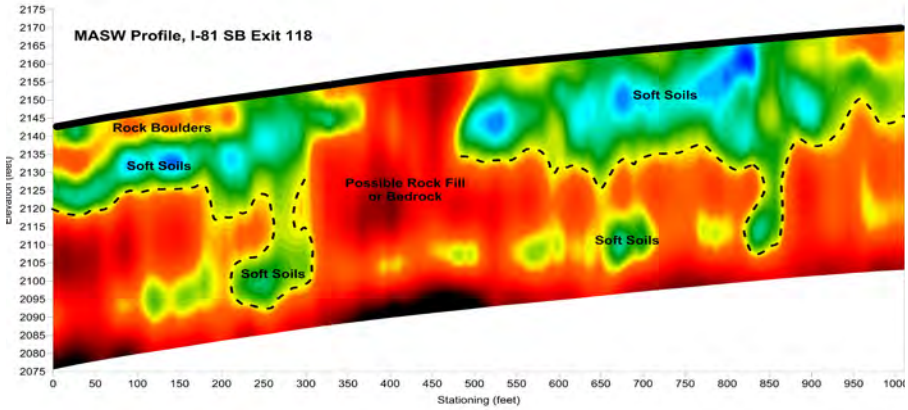
Enhanced Geotechnical Investigation, Geophysical Investigation, and Laboratory Testing Program | Since karst features are highly irregular, our team will thoroughly investigate the subsurface conditions by using geophysical techniques and by completing a

greater number of borings than the minimum number of exploration points specified in Table 3-1 of the VDOT MOI Chapter III denoted below:

Location	MOI Table 3-1 Minimum No. of Borings	Branch Team's Minimum No. of Borings
Abutments and Piers	Two per substructure	Four per substructure
Retaining Walls	One per 100 LF	One per 50 LF

Emphasis for the investigations will be given to the abutment and pier foundations for the bridges. Our drilling program will also include a minimum of 20 feet of rock coring at each substructure, going beyond the minimum 10 feet standard requirement.

Geophysical investigation evaluates an alignment of the site quickly and continuously in order to connect-the-dots between borings. The previous geotechnical investigation shows the depth to rock is extremely variable at this site and borings alone do not represent the true subsurface profile. We considered several geophysical techniques to investigate subsurface conditions in karst, including ground penetrating radar (GPR), micro gravity, seismic refraction, multi-channel analysis of surface waves (MASW), and electrical resistivity imaging (ERI).



This MASW profile shows the variations in subsurface conditions due to karst conditions at nearby I-81 Exit 118 site—similar to what is expected at Exit 114.

GPR is limited in investigation depth to about 6 feet, perhaps less in the local clay soils. Micro gravity can be useful in open areas to define the limits of a known void, but is not unique and creates uncertainty in the results because of the existing surface and subsurface structures and variable depth to rock. Seismic refraction can be useful for a consistent depth to bedrock, but will not detect pinnacles nor soil zones or voids beneath rock. Based on the limitations of GPR, micro gravity, and seismic refraction, we plan to use MASW and ERI to evaluate the subsurface conditions, including depth to rock, presence of pinnacles, cutters, voids, and soil seams in the area of the bridge foundations.

MASW is a seismic method that uses surface waves (rather than p-waves as in seismic refraction) and has the benefit of being effective even in the presence of metal piles, utilities, and in noisy settings such as active traffic. MASW is useful for mapping soft soil zones in contrast to rock or stiffer soil. ERI has the benefit of providing a high-resolution subsurface image of karst features, however, close by metal features, such as piles and utilities, will cause interference during data collection.

During development of the subsurface investigation program, we will evaluate which specific locations are favorable for ERI and/or MASW and design a geophysical survey that provides data coverage to correlate with the test borings and identify karst features to reduce the risk of unknown conditions between borings.

We will also provide a thorough evaluation of the geotechnical data to properly characterize the subsurface conditions and perform calculations to determine the probability of the potential risks including:

Abutments and Piers Supported on Deep Foundations | To mitigate risk for bridge foundations in karst geology, an appropriate engineering solution may include reducing the capacity or group efficiency of driven steel H-piles to provide a more redundant foundation element. The as-built pile driving records for the existing bridge indicate that a design pile group efficiency of 80 percent may be appropriate to compensate for potential pile damage or extreme length variations.

Embankment Settlement at Abutments | We will drill soil test borings with Standard Penetration Tests (SPT) and thin-walled tube sampling to evaluate settlement and slope stability of the bridge approach embankments. Our soil laboratory testing will include consolidation tests with time-settlement readings to calculate short-term and long-term settlements. We will also perform triaxial or direct shear testing of undisturbed samples to obtain soil shear strength parameters for use in slope stability assessments.

Embankment Slopes | We will evaluate the stability of the proposed 2H:1V fill slopes between Stations 959+50 and 964+00, and will perform the necessary classification and shear strength testing to develop the parameters needed to evaluate the slope stability. Based on the GDR boring data available to date and the condition of the slopes, the need for stabilization is not anticipated. However, recommendation for stabilization will be provided as needed.

Involvement during Construction

Because of the karst concerns, our geotechnical engineer will remain an integral part of the team throughout construction. Since subsurface conditions in karst geology can vary drastically over short distances, it is anticipated that the installation of deep foundations for the bridges will require the geotechnical engineer to address potential design changes quickly. Geotechnical subconsultant, **Schnabel**, will be on-site during pile driving operations to aid in evaluating performance. In addition, Schnabel will perform vibration monitoring to confirm protection of the existing bridges. Further, undetected karst features, such as voids, may be encountered or form as a result of the construction. If necessary, Schnabel will quickly assess and provide mitigation options to keep the project moving and maintain the integrity of the existing interstate.

4.4.4 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The Branch Team's approach to, and staffing of, QA/QC, is designed to minimize additional QA/QC effort by VDOT. Design quality management provides easily audited documents to minimize VDOT's contract administration efforts, and construction quality management will verify that construction is being completed in accordance with the RFP requirements. The following directly addresses RFP concerns about design and construction QA/QC:

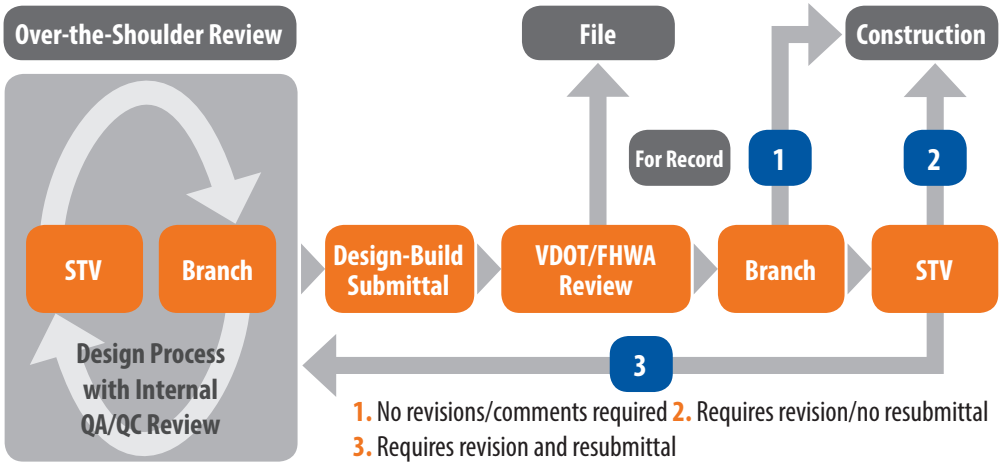
4.4.4.1 QA/QC Approach During Design and Construction

The Branch Team's approach to the development and implementation of the QA/QC Plan is to emphasize the importance of, and define a process for, obtaining a high quality product in every project feature. The QA/QC Plan will detail procedural practices to achieve the quality of workmanship standards required by VDOT. These practices will establish the protocol to be followed by all team members, including subcontractors, during the design and construction phases. Branch has adopted the QA/QC Minimum Guidelines for the QA/QC Plan. Central to these 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. The successful implementation of the QA/QC Plan will result in process efficiencies and project profitability by eliminating re-work, increasing employee morale, and ultimately delivering the highest quality project possible. QA/QC functions include:

Independent Review

To maintain a clear separation between QA and QC functions, **NXL** will be responsible for the independent QA inspection and testing. From their office in Christiansburg, NXL offers services for transportation and infrastructure projects, including bridges and highways, and they provided independent QA for the award winning VDOT I-581/Valley View Interchange Phase II D-B project. NXL also provided QA services for Branch on VDOT's Route 3 Widening D-B project. As they have functioned on previous VDOT projects, NXL will act as a liaison between VDOT and Branch's executive staff on quality issues, delivering QA services in accordance with VDOT requirements.

Our **Quality Assurance Manager (QAM), Joe Hamed, P.E.** with NXL, is responsible for all QA activities and QA sampling and testing for all materials used and work performed. NXL is an independent firm that has no involvement in the construction and QC program/activities. Schnabel will perform QA laboratory testing from their AMRL-certified testing laboratory located in Blacksburg, VA, and is independent from the QC testing laboratory.



Mr. Hamed will make sure that any non-compliant work is documented and corrected using an approved method to facilitate acceptance by VDOT and FHWA, and will review, comment, and approve the monthly invoices to VDOT. He will also facilitate preparatory inspection meetings for major elements with QA, QC, and Branch staff to review the contract requirements pertaining to construction, inspection, and acceptance of work.

Frank Wollums, with **F&R** will manage the QC program for construction and will report directly to the CM. F&R will perform their QC laboratory testing from their AMRL-certified testing laboratory located in Roanoke, VA. To ensure independent QC review, **MBP** will employ a separate testing facility to perform all necessary QC laboratory tests.

Design QA/QC

Our approach to design QA/QC is to establish, implement, and maintain QA and QC procedures and systems necessary to minimize QA/QC effort by VDOT and provide VDOT assurance that the design meets the contract requirements. The overall management of the design QA/QC program (a subset of our QA/QC Plan) will be the responsibility of the **Design Manager (DM), Derek Overstreet, P.E.** The Branch Team will adhere to the approved Design QA/QC Plan, maintaining an appropriate staffing plan to meet QA/QC requirements, conducting design reviews, completing interdisciplinary coordination, performing constructability reviews, involving VDOT in the overall design review process, and making sure all field changes follow QA and QC procedures. An outline and brief discussion of these design QA/QC activities is provided on the following page:

Design QA/QC Plan | The DM will be responsible for the Design QA/QC Plan, which will be developed and implemented in accordance with the contract requirements and VDOT's Minimum Requirements for Quality Assurance and Quality Control on Design-Build and Public Private Transportation Act Projects, January 2012 (January 2012 QA/QC Guide). Aspects of the Design QA/QC Plan include:

The DM is responsible for all design activities, including design QA and QC, review of working plans, shop drawings, field changes, and constructability. The QAM will verify that all design-related work packages submitted for payment have been certified by the DM as being in conformance with the contract documents and the Design QA/QC Plan.

Design Quality Reviews | The Branch Team will use a QA/QC design log to track the completion of design and the status of QA and QC reviews. Each review is tabulated on summary form, which indicates by signature that the QA and QC reviewers have completed their reviews and the DM has confirmed that comments have been incorporated into the design documents. The review documents, including the review summary form, become a permanent part of the project files. Quality reviews will also be conducted for any design changes that may be necessary during construction resulting in a reduction of VDOT's review level effort.

ROW and construction plans will be accompanied by a completed VDOT LD-436 Quality Control Checklist and VDOT RW-301 for the specific submittal, and a notice signed by the DM that includes:

Design QA/QC Plan Activities

1. QA and QC procedures for preparing, checking, correcting drawings, specifications, and design submittals prior to submission
2. QA and QC procedures and staffing for working/shop drawings review and submittals requiring VDOT review and approval
3. Verify all drawings, specifications, and other design submittals are signed and sealed by an appropriate licensed professional
4. Procedures for coordinating work in the same or adjacent area, fabrication shops, casting yards, and other pertinent fabrication facilities
5. Confirm QA and QC requirements are met for avoidance of utility conflicts
6. Identify elements that require special construction QA/QC or emphasis, e.g. soil anchors for temporary retaining structures
7. Design QA/QC functions, including scheduled activities, identifying the drawings, specifications, and design submittals submitted to VDOT for review
8. QA and QC procedures for ROW appraisals, data entry, and VDOT's Right-of-Way in Utilities Management System

- The logical subsections or work packages for which review and approval is being requested
- Confirmation that the submittal has been checked/reviewed in accordance with the QA/QC Plan
- Confirmation that the submittal either meets all requirements of the contract documents and reference documents or that any deviations have been approved by VDOT

Interdisciplinary Coordination | The interaction and coordination among pertinent design disciplines will be the responsibility of the DM who will hold weekly design meetings attended by each discipline lead and members of the construction staff as appropriate. These meetings will cover details of the design and coordinated among the various disciplines including roadway, structural, hydraulics, geotechnical, and traffic engineers.

Constructability Reviews | These reviews significantly minimize the amount of RFI's and field issues, reducing the need for additional VDOT resources. Our team will hold weekly internal design meetings attended by construction staff. These meetings will give the construction staff an opportunity to review the design for constructability and provide immediate feedback so appropriate design adjustments can be made. Prior to each plan submission, a formal constructability review will be scheduled and comments provided to the DM for incorporation and/or further discussion prior to completing each design phase.

Quality Assurance and Quality Control of Design and Field Changes | Design changes, including field changes, will conform to the same design QA and QC measures and procedures as those applied to the original design. Design changes, including field changes and non-conformance evaluations, will be maintained in a database to track design and field changes and update the as-built documents.

Construction QA/QC

QA is defined as 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 QC data and/or providing objective evidence (independent sampling and testing) to verify the contractor's quality control sampling and testing. The Construction QA Plan describes how the Branch Team will achieve the QA functions in accordance with this definition and in compliance with the requirements in the Minimum Guidelines. The QA staff consists of the Design-Build Project Manager (DBPM), NXL's QAM, QA inspectors, and the QA laboratory and testing technicians.

Design-Build Project Manager, Jason Hoyle, will be responsible for the construction quality of the individual work elements, including workmanship and materials. The QAM will report directly to the DBPM and will manage the construction QA program. The QA organization will be separate from the design and production teams and 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."

The QAM will provide inspection and testing to assess construction processes relative to the standards and specifications. The QAM and his staff will perform independent control testing in accordance with the QA Plan which is based on VDOT's January 2012 QA/QC Guide, provide feedback to VDOT's PM, and make sure all the necessary documentation regarding QA/QC inspections, testing of materials, and in-place construction has been performed and adheres to the contract before payment is approved. Per VDOT's guidelines, Branch has given the QAM written authority to stop work or hold payment.

QC preparation prior to setting girders.

Once construction starts, the QAM and his staff will interface daily with the CM and the QC team. The QAM's primary point of contact on site will be the CM. The QC staff, to include the QC inspectors, technicians, and laboratory, will submit all of the QC documentation to the QAM for review and acceptance. Based on the two-week look-ahead schedule provided to the QAM on a weekly basis, the QAM will make sure that upcoming work items are properly inspected and tested. The QAM will review issue logs with the CQCM and discuss any issues with the DBPM and VDOT with recommendations to correct any problem(s). Four phases of inspection will verify that work is performed according to the contract documents; Preparatory Phase, Intermediate Phase, Completion Phase, and Punch-List Phase.

The QAM, DBPM, and CM will use the inspection preparatory meetings to proactively address issues related to upcoming work and convey lessons learned. Preparatory inspection meetings will be hold points and will be conducted in advance of specific work activities to verify approval of proper documents, materials, and permits. Other topics will include discussing means and methods, sequencing,

planning for testing, VDOT interaction, and scheduling inspection activities. These meetings will promote coordination and communication between Branch, Branch production personnel, design team members, QA and QC personnel, VDOT and VDOT's OIA, and OVST representatives. These meetings will confirm that all parties understand the design intent, endorse the completeness and suitability of the plans, identify all relevant inspection checklists, inspections, and testing for each work package.

The challenge in having a preparatory meeting 14 days in advance of a particular operation is that the element of work is constant throughout the life the project. In order to reinforce the level of quality discussed at the project's beginning, the Branch Team will conduct weekly QA/QC meetings with the Branch, QA, QC, and VDOT teams on site to make sure everyone understands their responsibilities and that all work is covered and properly documented. Daily communication with the CQCM will review the scheduled activities and provide proper coordination of QA/QC activities. When necessary, supplemental preparatory meetings will be conducted to discuss previous hold point topics as well as highlight QA/QC challenges and solutions. This practice is particularly valuable when a new subcontractor begins operations that impact a previously covered work element.

Construction QC team checking bridge deck prior to pour.

If the procedures established in the QA/QC Plan and discussed at the preparatory and weekly meetings are not followed, the QAM will employ the enforcement and documentation tools at his disposal and discretion. These tools include an Internal Non-Conformance Statement (INCS), Non-Conformance Report (NCR), and Stop Work Notice. An INCS is used when an element of work is not in compliance with project requirements but the next item in succession for this element of work has not begun. An example would be the placement of tack on asphalt that has not 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 is not corrected within seven 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 to the satisfaction of the QAM, EOR, and VDOT, the proposed corrective action. Payment for that element of work would be withheld until the NCR is closed.

Another example is work zone compliance. On a daily basis the QC inspector will inspect MOT elements for compliance. 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 work zone within the checklist, review with the contractor responsible for the work zone, sign and file the checklist with their daily work report, and maintain a separate log. The VDOT checklist follows the enforcement policy established within the QA/QC Plan. If an item is deemed non-compliant and not an immediate safety hazard (damaged barrel or leaning signage), the inspector will note it and re-inspect the non-compliant items within five business days. If an item is determined to be an immediate safety hazard (clear zone infraction or malfunctioning advanced warning light), a NCR and a Stop Work Notice for that operation will be issued until the issue is corrected.

Witness and hold points will be established where notification of VDOT is required for observing or visually examining a specific operation or test. Witness points are identified within the QA/QC Plan and CPM schedule, and require VDOT notification. 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 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.

4.4.4.2 QA/QC Procedures for Critical Project Element

The proposed driven pile foundations for the new bridges are a unique and critical project element that will require additional QA/QC scrutiny during design and construction. The proper design and installation of the driven pile foundations is absolutely critical to provide longevity, sustainability, performance, and durability of the structures, as well as minimize future maintenance for VDOT. The existence of karst features such as boulders, pinnacles/slots, and voids will likely present challenges for driven pile foundations and must be addressed during design and construction. The two existing bridges are supported on deep foundations, and the interaction between the existing bridge foundations and the new deep foundations must be analyzed and closely coordinated among design, geotechnical, and construction staff. While we believe driven pile foundations are a good choice at this time, it is important to note that we will look at other options, should conditions so warrant.

Design QA/QC Activities

The design of the deep foundations integrates the geotechnical investigation/design and the structural analysis/design, and will require intensive QA/QC effort. The solution that meets these design requirements must be closely coordinated with construction staff to validate the design, the installation means and methods, and the actual field conditions (e.g. the location of karst features such as pinnacles and voids). It is critical that each of these items are completed, properly coordinated, integrated, submitted, and approved so that delivery is coordinated for construction to begin on time.

One of the first steps will be to perform additional geotechnical investigations. Specific QA/QC procedures and check lists will ensure that a boring location plan has been approved, all required permits have been secured, advance notification of property owners has been made, notification letters are valid, requirements for traffic control have been determined and scheduled, and the VDOT PM and VDOT SWRO TOC have been notified prior to the start of the field investigations. QA/QC documentation will be furnished to the VDOT PM verifying that the procedures defined above have been completed, which will minimize the need for expansion of VDOT's contract administration efforts. QA/QC procedures will also be developed to confirm that all laboratory tests are performed in accordance with the AASHTO Accreditation Program and pertinent ASTM or AASHTO standards, and that the data is properly analyzed to provide design and construction recommendations.

The Design QA/QC Plan will define specific procedures for detailed design checks, including all calculations, drawings, specifications, and reports. The plan will also include procedures for performing interdisciplinary coordination (geotechnical and structural) and constructability reviews; for example:

Driven Pile Foundations Procedures
Define specific procedures to confirm that the bridge foundation loads have been adequately accounted for
Provide and discuss foundation loads with the geotechnical engineer
Develop appropriate foundation recommendations based on foundation loads and result of the geotechnical investigation
Develop recommendations for vibration monitoring of existing structures during construction
Coordinate construction and design staff to validate installation means and methods for the driven pile foundations
Provide foundation recommendations to the bridge engineer
Integrate foundation recommendations into the design, plans, and specifications

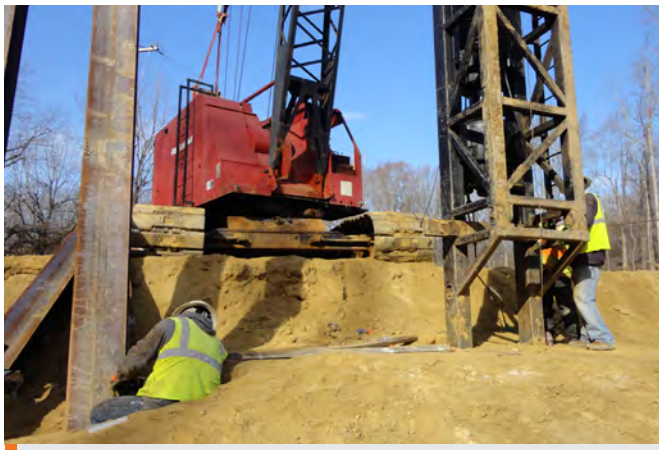
Only after all QA ad QC reviews have been completed by design, geotechnical, and construction staff, will a formal submission be made for review by VDOT.

The geotechnical engineer will be integrated into the construction team and will visit the site to review the installation of the driven pile foundations, including the vibration monitoring results, and will verify that work is being completed consistent with the geotechnical recommendations, or if needed modify the recommendations based on conditions encountered. The Design QA/QC procedures will address the review of submittals and test results such as WEAP drivability analyses and dynamic pile test results for the installation of driven pile foundations.

Design changes, including field changes to the driven pile foundations, will conform to the same design QA and QC measures and procedures as those applied to the original design. Design changes, including field changes and non-conformance revaluations, will be maintained in a database to track design and field changes and update the as-built documents. As-built plans will be prepared in accordance with the VDOT Post Construction Manual and VDOT Structure and Bridge guidelines to make certain that the actual pile lengths, and any other field changes, are properly recorded. Only after all QA and QC reviews have been completed will a formal submission of the as-built plans be made to VDOT.

Construction QA/QC Activities

The Branch team has extensive experience installing pile foundations in karst terrain including Branch's bid-build project at Southgate Drive, which is less than ten miles from I-81 Exit 114 and conditions are expected to be similar. Our project QAM, Joseph Hamed, has overseen the construction of many pile foundations in karst terrain and coordinated foundation design changes for seven bridges on the Christiansburg bypass. At Southgate Drive and other locations, the underground conditions encountered did not match the design assumptions. From our experience with karst, we know that it is difficult, and perhaps impractical, to fully map the underground karst features during design.



The Branch Team is familiar with driving piles in locations with challenging geotechnical features such as karst conditions.

The Branch Team will perform a complete and detailed geotechnical investigation as described above. However, we recognize that despite our best efforts, the encountered conditions may not match the expected conditions. With this in mind, our Construction QA/QC Plan will provide methods to verify the design assumptions and requirements, and to deal with any shortcomings that may require a design change. All changes will be initiated and approved by the structural engineer and the geotechnical engineer with final approval by VDOT.

The Preparatory Inspection Meeting (PIM) for pile installation is a key element of the QA/QC process and attendees include the CM, QA/QC inspectors, foremen, geotechnical engineer, and VDOT representatives. Topics covered include safety and environmental concerns; review of karst conditions; key design provisions from plans, specifications, and geotechnical report; record keeping; test piles; and acceptance criteria for each pile or group of piles. The geotechnical engineer will establish the criteria for the acceptance of each pile/group and make recommendations for design changes if necessary. During construction, each pile installation will be monitored by an inspector. All anomalies with respect to blow count, length, alignment, or other criteria will be immediately reported to the geotechnical engineer.

4.5 CONSTRUCTION OF THE PROJECT

4.5 CONSTRUCTION OF THE PROJECT

Having worked together on previous D-B projects, Branch and STV draw from lessons learned to provide the means and methods required to safely and efficiently deliver this project on schedule. Our construction approach focuses on the following critical elements:

- Reinforce safety of the traveling public, pedestrians, and workers during construction
- Minimize impacts to traffic by reducing traffic shifts
- Reduce impacts to cultural resources, streams, and wetlands
- Minimize impacts to ROW
- Install signals early to regulate vehicular traffic

Members of our team have met on a weekly basis to develop the sequence of work that eventually led to the generation of the project schedule discussed in Section 4.7. The schedule illustrates the detailed effort put into the design, engineering, permitting, utilities, ROW, QA/QC, and construction activities necessary to meet the demands of on-time project delivery. Advantages of our approach include:

Project Enhancement	Advantages for the Traveling Public
Final Completion Date of 11/19/2021	Delivers the project by the Final Completion Date established by VDOT
Early Installation of Temporary Signals	Installing temporary signals prior to construction mobilization allows for drivers to become familiar with the signal prior to construction activities, decreases driver delay, and improves safety at the existing ramp terminals along Route 8
Optimized Alignment	Reduced scope of construction work will require less time to complete, providing safety and driving improvements to the traveling public earlier
Phased MOT Plan	Reduced number of traffic shifts and phases of MOT increases vehicular and pedestrian safety
Minimized impacts to traffic	NB and SB bridges will each be constructed in one phase, simplifying the maintenance of traffic

4.5.1 SEQUENCE OF CONSTRUCTION

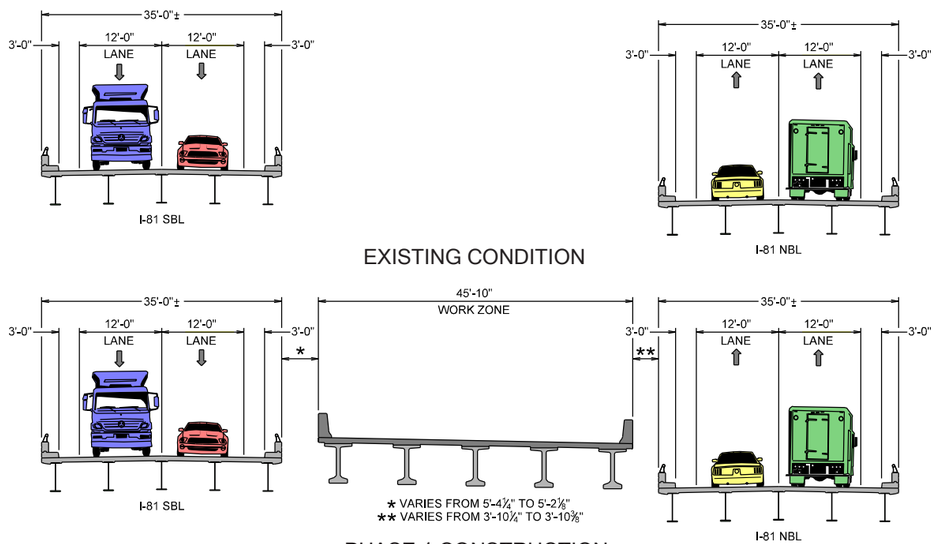
Our approach to sequencing construction addresses safety and operations, geotechnical and environmental impacts, ROW acquisition, staging and storage, public involvement, stakeholder coordination, and governmental approvals. The project schedule is central to our construction sequencing, anticipating and mitigating potential delays. Our approach will deliver on the requirements above while maximizing opportunities for early completion.

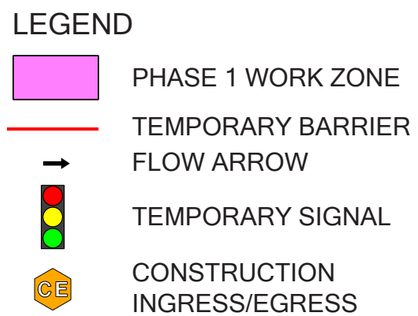
4.5.1.1 Approach to Construction Phasing

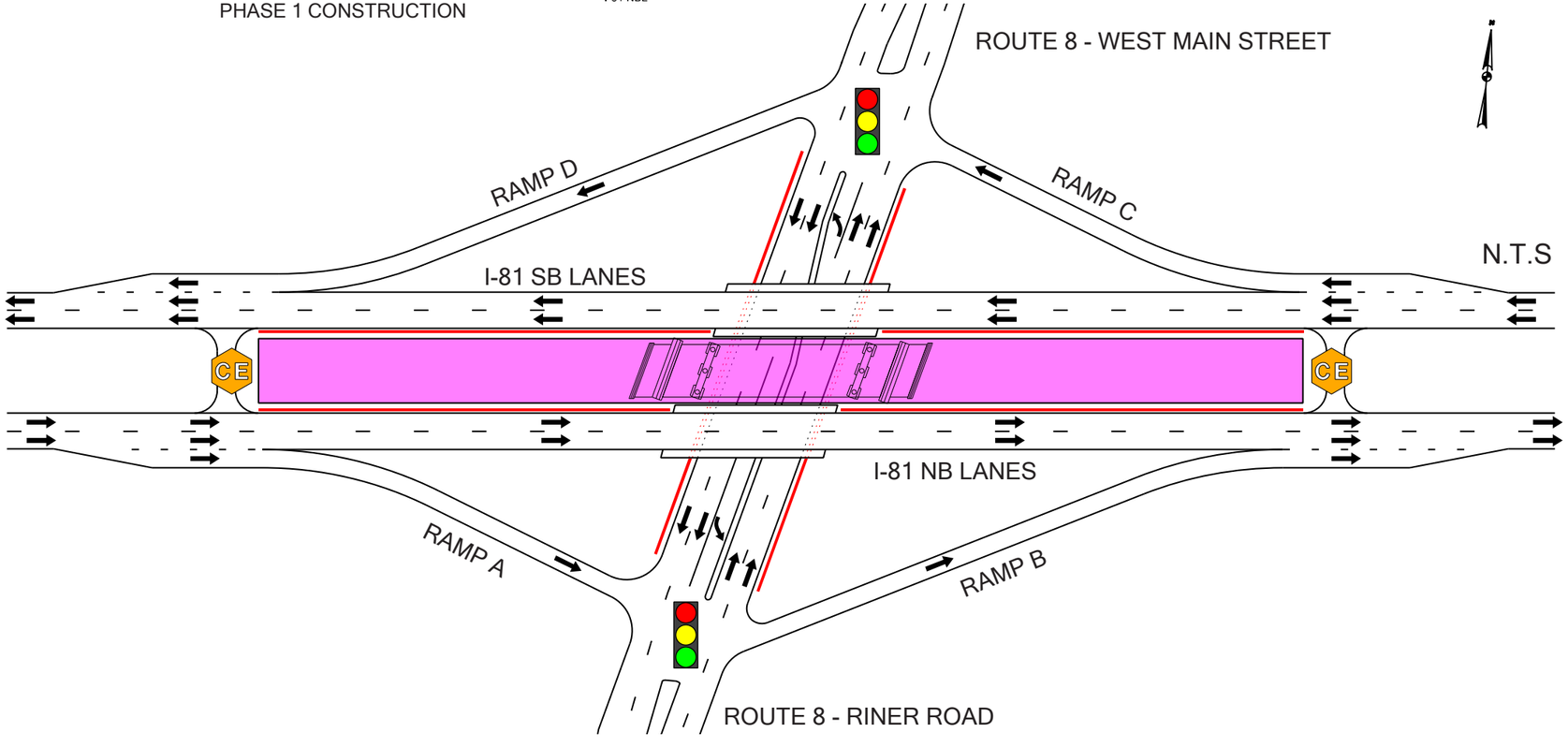
To develop our construction sequence, the Branch Team focused on pre-planning activities to reduce potential construction delays. This approach promotes anticipating and mitigating any potential construction delays and meeting the Final Completion Date of 11/19/2019. Our construction phasing approach is detailed on the following three 11X17 fold-out pages.

SEQUENCE OF CONSTRUCTION AND MOT PHASING – PHASE 1

1. Using overnight lane closures, install temporary concrete traffic barriers along the inside shoulder of NB and SB I-81, as well as, the EB & WB outside shoulders of Route 8—the traffic barriers along I-81 will connect to the existing bridge parapets using a special design connection
2. Install temporary shoring in the median of I-81 adjacent to the existing abutments
3. Construct the proposed SB Bridge
4. Construct the retaining wall in the median to support the future SB travel lanes
5. Construct the temporary roadway crossover for use in Phases 2 & 3 to accommodate shifting NB traffic to the new SB Bridge, including any temporary drainage and pavement
6. Remove the existing overhead sign structure located at Sta. 943+26 and temporarily ground mount each sign during construction
7. Begin constructing improvements to Route 8
8. Install temporary pavement markings, move to Phase 2

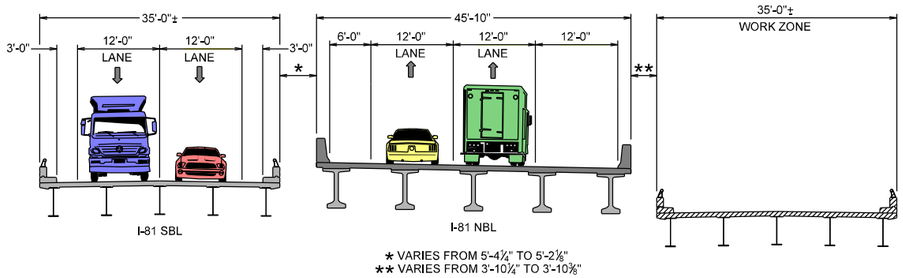






SEQUENCE OF CONSTRUCTION AND MOT PHASING – PHASE 2

1. Using overnight closures, remove temporary concrete traffic barrier service on NB inside shoulder, and install it along the new outside shoulder of the NB lanes—shift NB traffic onto the new SB Bridge using the temporary roadway crossover
2. Demolish the existing NB Bridge and remove the temporary shoring previously installed adjacent to the existing NB Bridge abutments
3. Construct the proposed NB Bridge
4. Construct roadway improvements and features along NB I-81, as well as Ramps A, B, C, and D
5. Continue constructing improvements to Route 8
6. Install temporary pavement markings for the temporary roadway crossover in Phase 3, move to Phase 3

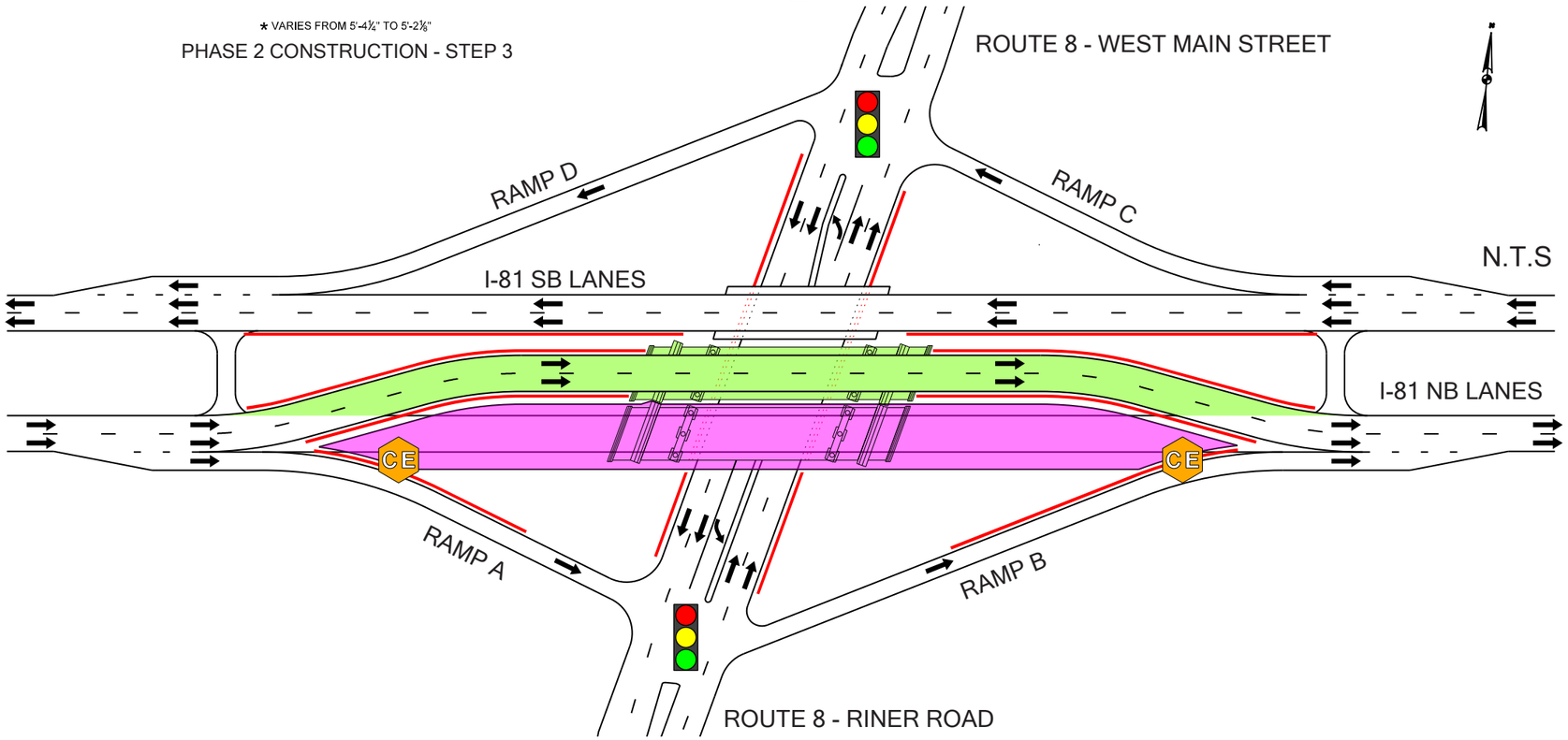


PHASE 2 CONSTRUCTION - STEPS 1&2

PHASE 2 CONSTRUCTION - STEP 3

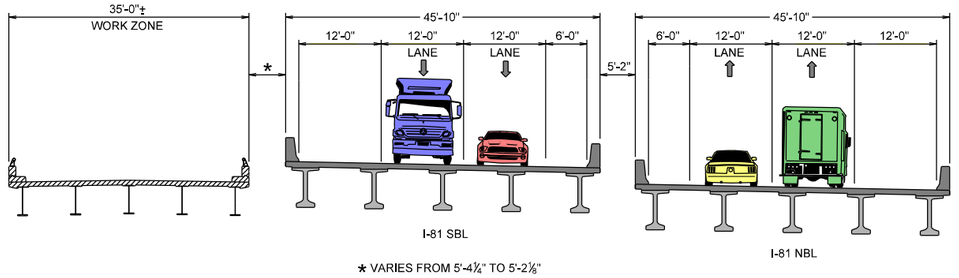
LEGEND

- PREVIOUS PHASE WORK
- PHASE 2 WORK ZONE
- TEMPORARY BARRIER
- FLOW ARROW
- TEMPORARY SIGNAL
- CONSTRUCTION INGRESS/EGRESS

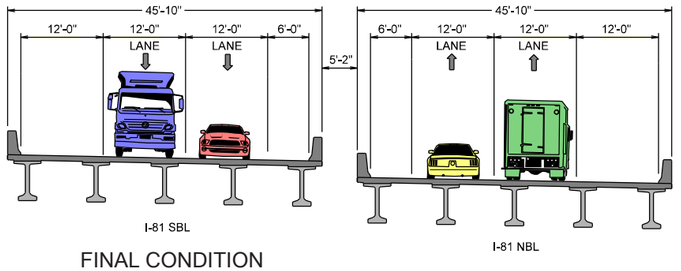


SEQUENCE OF CONSTRUCTION AND MOT PHASING – PHASE 3

1. Using overnight closures, remove temporary concrete traffic barrier service along the NB outside shoulder and install it along the inside shoulder of the newly constructed NB I-81—shift NB traffic onto newly constructed NB Bridge
2. Using overnight closures, remove temporary concrete traffic barrier service on SB inside shoulder, and install it along the new outside shoulder of the SB lanes—shift SB traffic onto the new SB Bridge using the temporary roadway crossover
3. Demolish the existing SB Bridge and approach pavement, and remove the temporary shoring previously installed adjacent to the existing SB Bridge abutments
4. Finish constructing improvements to Route 8
5. Remove temporary concrete traffic barrier service on the outside shoulder of newly constructed SB I-81
6. Using overnight lane closures, place any final overlay or pavement along NB and SB I-81, as well as Ramps A, B, C, and D, and Route 8—install all permanent pavement markings
7. Install new overhead sign structure using a temporary total closure of I-81 NB
8. Place all traffic in final configuration and remove temporary roadway features



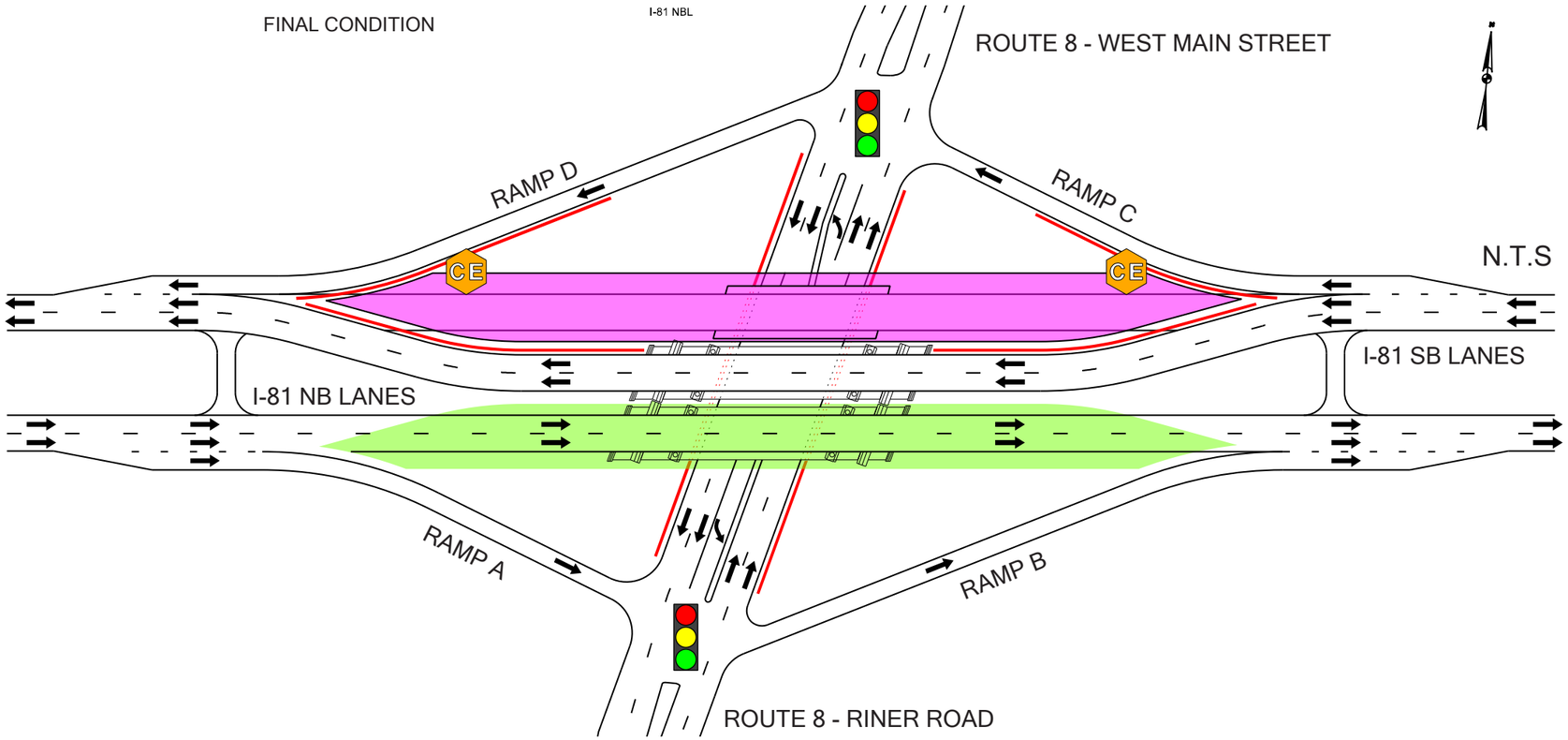
PHASE 3 CONSTRUCTION



FINAL CONDITION

LEGEND

- PREVIOUS PHASE WORK
- PHASE 3 WORK ZONE
- TEMPORARY BARRIER
- FLOW ARROW
- TEMPORARY SIGNAL
- CONSTRUCTION INGRESS/EGRESS



Vehicular and Pedestrian Safety and Operations

The following enhancements to our design have made positive impacts to vehicular and pedestrian safety and operations:

Alignment	Enhancement	Improvement to Safety & Operations
Shifted the profile of the SB lanes horizontally	Allows for both SB and NB bridges to be built in one phase at the same time	Reduces the number of traffic shifts. The SB Bridge will not need to be constructed in two phases
Ramp terminals at Route 8	Installation of temporary traffic signals before construction mobilization	Prior to commencing construction, queue lengths will be managed by signals
MOT median crossover	Allows for reduced number of shifts and expedited construction	Keeps traffic moving at normal speeds of 70 mph

Geotechnical Investigation

The Branch Team will complete the necessary testing to develop the Geotechnical Data Report (GDR). Recommendations will be generated in advance of construction to address the impacts of unsuitable soils, low California Bearing Ratio (CBR) values, and stiff material that may adversely affect the construction of embankments, subgrade, and structure foundations. By identifying these issues before construction begins, we can develop a mitigation strategy to avoid potential delays to the project.

Embankments and Pavement Subgrade

Testing will be performed to evaluate the strength and compressibility for the proposed pavements and fill embankments. This approach to identifying and mitigating issues associated with embankment and pavement subgrade will provide timely solutions to prevent any delays to the construction schedule. The Branch Team will evaluate any problem areas during construction and perform one of the following three treatment options:

1. Undercut 3 feet of the area and replace with material meeting a minimum CBR value of 5
2. Undercut 1-foot and replace with a geotextile and 1-foot of # 21B
3. Use lime or cement to chemically stabilize 1-foot of the subgrade

Bridge Foundations

The proposed bridges consist of a three-span concrete beam with integral abutments. To minimize any delays during bridge foundation construction for both the SB and NB bridges, Schnabel will have an engineer present during the installation of H-piles to address any issues encountered.

Environmental Impacts

The Branch Team's proposed design has not introduced any additional stream or wetland impacts as well as no additional noise impacts.

Right-of-Way (ROW) Acquisition

The final design and construction of the project improvements fall within the existing ROW. New easements for drainage will be required, however, the project phasing will allow the construction of the new SB Bridge to begin while the drainage easements are being acquired for later phases. This approach will not impact the critical path and will allow SB Bridge construction to begin as planned.

Staging and Storage Areas

The Branch Team understands that the planning and establishment of appropriate staging and storage areas is critical to maximizing safety and efficiency. Several factors are considered when determining the most suitable locations for staging and storage areas including proximity to construction activities

and ease of access. Additionally, we evaluated each proposed area for line of sight considerations, ingress/egress safety, and consideration of clear zone location.

The storage of materials and equipment behind existing guardrail or temporary barrier results in a safe work zone with limited impacts to traffic. The Branch Team carefully considered the deflection rate of guardrail and barrier to support the proper placement of materials and equipment to prevent these work zone elements from becoming potential hazards, even when placed behind protective devices.

Locations of staging/storage areas

Similarly, sight lines will be evaluated to verify material and equipment are not placed adjacent to driveways or intersections that may limit visibility for approaching traffic. Each of these potential risks is analyzed and the proposed areas are coordinated with intended construction access points to develop the safest and most efficient plan for staging and storage areas, as well as access points.

Several areas within the project footprint will be considered for staging and storage areas:

- During SB Bridge construction, the existing median of I-81 adjacent to the existing bridges will be used as a staging and storage area. Areas will be designated on each side of the new SB Bridge. Temporary median widening will be constructed near the existing crossovers (Sta. 934+25 and 968+75) to allow vehicles to enter and exit the median.
- During NB Bridge construction, traffic will be shifted onto the new SB Bridge. This will allow staging and storage areas to be created in the gore areas and adjacent to the existing NB travel lanes. Access to these areas will be made from I-81 NB and entering the work zone behind the barrier wall.

Public Involvement

The highest priority of the public involvement program is to create an environment for sustained public awareness. Prior to the start of construction, public involvement subconsultant Seventh Point, will prepare a communications plan detailing communication goals, strategies, messaging, stakeholders, tactics, informal meetings, and procedures for communicating new traffic impacts and project updates to VDOT, key stakeholders, and the general public. We will also prepare an emergency response plan establishing communications protocols for any onsite emergency, including any work zone incidents in accordance with IIM-LD-241. Both plans will be reviewed and approved by VDOT prior to implementation.

We will assist VDOT in holding informal meetings with stakeholders, as directed by VDOT at key project intervals and assist VDOT with collateral materials, including hand-outs and project boards, as needed. We will maintain a master contact list for the project, logging a timeline of inquiries and comments received from the general public and stakeholders, and tracking all responses provided.

Seventh Point has experience collaborating with VDOT to achieve public awareness goals throughout Hampton Roads and Richmond, in particular with interstate projects like I-64 Widening Segment I and Segment II; I-64 Widening in Henrico and New Kent counties; and I-64/I-264 Pavement Rehabilitation.

Governmental Approvals

To avoid the risk of delays to the schedule due to stakeholder approvals, the team must understand all of the parties that have input, their procedures and timeframes for approval, and the effect they have on the sequence of work. We identified the stakeholders in our Organization Chart included in Section 4.2, and will refine this list as the project moves forward.

Mitigating Potential Construction Delays

The Branch Team has already advanced a number of concepts, plans, and procedures for completing the project without delay. As we further develop our schedule, we are constantly focused on issues and concerns that have the potential to create delays and will direct our efforts on mitigation. At various project stages, we rely on proven methods for creating, monitoring, and maintaining the schedule, including:

Technical Proposal Stage | As the groundwork for the schedule was developed, all disciplines have had input. Our team has met on a weekly basis since release of the RFP to discuss issues, create our concept, solicit feedback, and to make schedule adjustments. The schedule presented in Section 4.7 is the result of this close collaboration and has buy-in from all team members.

Design Stage | As we proceed through the design process, the integration of the various disciplines rises to a higher level. We continue to hold team meetings, at a minimum on a weekly basis, to provide an over-the-shoulder review. During this period, our formal project schedule is developed and reviewed with VDOT and other stakeholders. Should issues arise or conditions change during the design that impact the sequence or completion milestones, the team will review schedule options for correction to make sure milestones are maintained. Once finalized, it is communicated to each discipline, our construction forces, subcontractors and consultants, and other affected parties and is the basis for planning efforts moving forward. Throughout this stage, the approved schedule is monitored, updated, and communicated to VDOT by the DBPM.

Construction Stage | As the project transitions to construction, the CM and DBPM closely monitor and update the schedule on a regular basis. The CM communicates the schedule to the entire team, including utility companies, QA/QC, government agencies, and others. In addition, more detailed schedules are created by the construction teams to efficiently plan their work. These 3-week and 90-day look-ahead schedules allow teams to plan activities on a daily basis and communicate specific tasks and milestones in a direct, concise way. Throughout construction, these schedules are monitored and compared to the approved baseline schedule so that delays can be anticipated. The team will evaluate options for avoiding delays or schedule recovery if necessary, including re-sequencing work, adding resources, or re-designing certain features.

4.5.1.2 Approach to Public Safety and Limiting Disruptions

The construction approach to build the SB Bridge in one stage and eliminating a phase of construction is a great benefit to improving safety and limiting disruptions to the traveling public. Installing the temporary signal before construction mobilization will allow drivers to become accustomed to the signal operations and improve management of queuing on the ramps.

4.5.2 TRANSPORTATION MANAGEMENT PLAN

The Branch Team's approach to transportation management is to communicate and mitigate impacts to the traveling public and project stakeholders, while maximizing safety throughout each phase of construction. In direct response to the RFP, our approach includes:

4.5.2.1 Traffic Maintenance Through All Construction Phases

While satisfying safety improvement requirements is a key project focus, the Branch Team places equal focus on making sure the work is completed in a safe and timely manner. Emphasis is on designing and building a transportation solution using a construction program that delivers the highest standard of safety with the least public impact. To satisfy this high standard, we have developed a design to construct the SB Bridge in one phase—allowing traffic along I-81 to be shifted only three times, leading to minimal impact to existing traffic. Our team will also develop a comprehensive Transportation Management Plan (TMP), in compliance with IIM-LD-241.6, that will include the following components:

- Fully-detailed Temporary Traffic Control (TTC) Plan for all phases of construction
- Public Communications Plan
- Transportation Operations Plan
- Incident Management Plan

Our comprehensive TMP will be developed, in part, through the efforts of our Traffic Management Task Force (TMTF). The TMTF will verify that the TMP and construction activities are continually coordinated to mitigate safety and traffic congestion risks. Led by the CM and supported by the MOT/Traffic Engineer and Project Superintendent, the task force will meet at least monthly with appropriate VDOT staff and project stakeholders to review the TMP and determine if any changes need to be made to address safety and logistics concerns. Not only will this regular coordination alleviate safety and traffic risks, but it will also provide an effective means of keeping VDOT and the stakeholders up-to-date on progress and upcoming changes in the traffic pattern.

Following award, the Branch Team will develop fully detailed TTC plans for each phase of construction to identify each traffic control element required for efficient construction and safe movement of traffic through the project. The team will take great care to implement the appropriate devices to promote the safety of the workers and motorists while satisfying the requirements of the Virginia Work Area Protection Manual and the Manual on Uniform Traffic Control Devices (MUTCD). The TTC plans will include barrier locations, temporary attenuation device types and locations, temporary signage and pavement markings, advance warning via PCMS installation, temporary drainage features, construction access points and methods, and delineation of staged worked areas.

As part of the Transportation Operations Plan, the TMTF will review historical crash data and existing safety concerns to verify that the TTC plan mitigates these risks. Our team will consider existing geometry, inadequate sight lines, and any other site characteristics identified that require special consideration for construction sequencing or traffic control. The Branch Team has proactively completed a preliminary review of this data to make sure the sequencing and proposed construction phasing addresses these existing safety concerns. In addition, the Branch Team will analyze traffic operations to make sure mobility is maintained during normal traffic operations and special event scenarios.

A public communications plan will provide regular updates to VDOT and be shared on the project website, public distribution by paper and social media, 511, and pre-approved messages containing work zone information to be displayed on Portable Changeable Message Signs (PCMS). During lane closures and traffic shifts, law enforcement will be engaged. Since I-81 is a major truck thoroughfare, specific attention will be given to the unique amount of truck traffic along the corridor. The Branch Team will work with VDOT TOC and other agencies to push notifications to truckers via CB radio so they can adjust travel routes as necessary.

An Incident Management Plan (IMP) will be developed to address any field work which impacts travel lanes or shoulders. The intent of the IMP will be to prepare for incidents along the construction corridor. Our TMTF will coordinate with VDOT, EMS, and other stakeholders during the development of the plan and hold a stakeholder meeting to discuss the IMP. The IMP will be developed to address the following:

- 24/7 point of contact for emergency notification of incidents by Traffic Operations Center
- Emergency detour routes and sign layout plans in addition to TMP signage
- Agency and stakeholder responsibilities matrix/checklist
- Coordination with VDOT TOC and first responders
- Law enforcement, fire, and rescue access to the road network during incidents
- Pre-planned incident messages on the PCMS and Dynamic Message Signs leading to the corridor
- Contact list for appropriate stakeholder response personnel
- On-call towing information to ensure fast incident clearing

4.5.2.2 Proposed Traffic Impacts

As detailed in 4.5.2.1 minimizing traffic impacts is paramount to project safety and public perception. Proper planning and advanced notice are key to safely implementing traffic changes. Our proposed traffic impacts include:

Lane Closures

As shown on the sequence of construction and MOT phasing plans in Section 4.5.1.1, our team has developed a temporary traffic control strategy that minimizes stakeholder impacts. Upon project award, we will begin the design of the Type B, Category IV TMP and will develop site-specific TTC plans. The TTC plans will detail specific elements required during construction and will be developed for each stage of work to identify barrier and channelization locations, temporary sign locations, PCMS devices, construction access points, temporary pavement markings, temporary drainage, areas of construction, and all other requirements per VDOT's I&IM 241.7, the Virginia Work Area Protection Manual, and the Manual on Uniform Traffic Control Devices (MUTCD). We anticipate using the following lane closures:

Location	Duration	Reason
I-81 NB and SB	Per RFP Part 2, Section 2.10.3	Single lane closures will be used for setting temporary barrier, night time paving, delivery of materials, and bridge work
Route 8	Per RFP Part 2, Section 2.10.3	Time of day restrictions will be used during single lane closures—temporary total closures will be limited to no more than 10 and will adhere to the time of day restrictions
I-81 NB and SB	Per RFP Part 2, Section 2.10.3	Temporary 20 minute total closures will be used for bridge work and overhead sign construction

Ramp Closures

Ramp closures may be required for bridge construction or demolition. If required, the ramps will only be closed from midnight to 5am from Sunday night through Thursday morning.

Temporary Detours

During construction of the SB and NB bridges and demolition of the existing bridges, temporary total road closures will be required on I-81, the exit ramps, and Route 8. Temporary total closures will be made in accordance with the RFP Part 2, Section 2.10.3. In addition, a temporary total road closure of I-81 will be required for the erection of the proposed bridge sign, to take place in accordance with the RFP. **No long-term lane closures or temporary detours are planned**.

Time of Day Restrictions
Time of day restrictions will be in accordance with RFP Part 2, Section 2.10.3 for I-81, ramps, and Route 8, as well as the holiday restrictions.

Flagging Operations
No flagging operations are planned for I-81. Flagging operations will be required for Route 8 and will adhere to RFP Part 2, Section 2.10.3 for time of day restrictions.

Minimum Lane Widths
Minimum 12-foot lanes will be maintained on I-81, ramps, and Route 8 in conjunction with a minimum 2-foot shy distance to the temporary traffic control device.

Zone Speed Restrictions
Our team has proactively completed an analysis using VDOT's TE-350 to determine the appropriate posted speed limit during construction. Based on this analysis, we recommend maintaining the existing posted speed limit of 70 mph on I-81 for the following reasons:

- All temporary geometry and lane shifts will meet the standards for the full posted speed limit, exceeding the requirements of the RFP and allowing traffic to maintain normal operations
- Full 12-foot lane widths will be maintained on I-81 throughout the work zone while proposed construction is underway, allowing truck traffic to easily proceed with normal speeds
- Research has proven that lowering speed limits where not required by geometric conditions degrades safety

We also anticipate maintaining the existing 45 mph posted speed limit on Route 8 because the temporary geometry will meet the standards for the full posted speed limit. These recommendations will be discussed with VDOT's Traffic Engineering staff, and a final determination will be made in coordination with the Salem District Traffic Engineer post-award.

4.5.2.3 Project Stakeholder Impacts
The summary below outlines the stakeholders that are located throughout the project corridor and outlines our planned communication and mitigation strategies to limit disruptions to vehicular and pedestrian traffic in the work area and to adjacent public transportation facilities/roadways.

Stakeholder	Potential Impact/Solution
Traveling Public *Potential time delay for temporary construction operations*	- Provide advance warning via PCMS - Facilitate regular public meetings with stakeholders - Public outreach campaign (media) - Minimize lane closures and traffic shifts - Maximize temporary lane widths
Pedestrians *Potential for pedestrians within the work zone*	- Maintain existing pedestrian access facilities - Engage TMTF to coordinate with stakeholders for special events and seasonal activities
Montgomery County and Town of Christiansburg *Potential time delay for temporary construction operations*	- Provide advance warning via PCMS - Facilitate regular public meetings with stakeholders - Public outreach campaign (media)

Stakeholder	Potential Impact/Solution
Local Community (Residents, Carilion, Humane Society) *Construction in close proximity*	- Facilitate regular public meetings with stakeholders - Public outreach campaign (media) - Maintain access to all adjacent properties
Schools and Churches (Radford University, Virginia Tech, Assembly of God) *Potential for delays traveling to/from school or church*	- Facilitate regular public meetings with stakeholders - Public outreach campaign (media) - Engage TMTF to coordinate with school administration - Strategically schedule construction activities with RFP Part 2, Section 2.10.3 - Analyze peak AM and PM traffic volumes to minimize disruptions
Police, Fire & Rescue *Potential for delay in response time*	- Facilitate regular public meetings with stakeholders - Public outreach campaign (media) - Engage TMTF to coordinate with designated representative of each agency to serve as point-of-contact for proactive dissemination of upcoming traffic pattern or route changes - Analyze existing coverage areas and review the need for pre-staging of services - Pre-traffic switch meeting with agencies prior to major changes in traffic patterns
Trucking Community *Potential for delay in travel time*	- Maximize temporary lane widths - Engage in communication with truck community prior to any traffic shifts and major construction - Coordinate with VDOT for the use of pre-approved messages on statewide DMS boards to allow for truck traffic to seek alternate routes if possible

4.6 DISADVANTAGED BUSINESS ENTERPRISES

4.6 DISADVANTAGED BUSINESS ENTERPRISES

The Branch Team supports VDOT's DBE program and is committed to meeting or exceeding the 8% goal for project design and construction. Furthermore, we will take all necessary steps to provide SWaM firms with the maximum opportunity to perform services on this contract.

DBE Subconsultants: The Branch Team includes the following highly qualified DBE subconsultant: Endesco, Inc. (drainage/hydraulics/E&SC). We have also engaged the following SWaM firms: EEE Consulting, Inc. (environmental/permitting); and NXL Construction Services Inc. (quality assurance)

Subcontracting Plan: Branch will implement a subcontracting plan that offers the maximum opportunity for DBE subcontractors to provide services by researching the capabilities of a wide range of subcontractors. This includes an evaluation of past performance, socioeconomic status, financial condition, current availability, and safety performance. Based on this research, a list of potential subcontractors is developed.

Once a solicitation for pricing has been set, potential subcontractors will have the opportunity to respond with their site-specific worker protection program and best price proposals. The final selection of subcontractors are made by combining the results of the safety and price evaluations to determine which proposals provide the best value to VDOT and Branch. Safety is an integral part of any scope of work performed, and all subcontractors must meet our stringent safety requirements to be a member of the team. Branch will continue DBE outreach efforts throughout the duration of the project.

Branch will also conduct a technical evaluation of the qualifications presented in the subcontractor's proposal, as well as an independent review of their past performance. References provided with their price proposal are questioned about past performance—topics covered include safety, schedule, cost compliance, and quality of work. If the potential subcontractor has worked for Branch, their past performance and safety record will be evaluated. If the potential subcontractor is required to submit a Quality Control Program or Worker Protection Program with their proposal, these documents will also be evaluated.

Branch will solicit subcontractor and supplier price proposals and evaluate for award of a subcontract or purchase order based on quality, past performance, and competitiveness. Once these reviews are complete, our evaluation team members will discuss the results and select the subcontractors and suppliers that best satisfy the requirements of the contract. Any subcontractor that fails to meet these requirements will be eliminated without further consideration.

4.7 PROPOSAL SCHEDULE

4.7 PROPOSAL SCHEDULE

4.7.1 PROPOSAL SCHEDULE

The Branch Team understands the complexities and interrelationships of the project's technical elements, and our proposal schedule, included at the end of this section, outlines our plan to successfully design and construct the I-81 Bridge Replacement at Exit 114 in compliance with the RFP. The proposal schedule depicts the activities, tasks, overall sequence of work, and major deliverables required. This proposal schedule is broken down into major phases using the hierarchical Work Breakdown Structure, showing major phases of work, including but not limited to project milestones, project management, scope validation, design, public involvement, environmental, ROW acquisition, construction, and utilities impacts. It demonstrates the anticipated Critical Path (based on the longest path), review responsibilities by VDOT, FHWA, and other regulatory agencies, as well as activities for the Branch Team and our suppliers and subcontractors. Below is a summary schedule including major milestone and final completion dates.

4.7.2 SCHEDULE NARRATIVE

The Branch Team's proposal schedule, and our experience managing and constructing all phases of D-B projects, will enhance project delivery to benefit VDOT, the traveling public, and all associated stakeholders. Figure 4.7.2 below outlines the key milestone dates from our schedule. After award, Branch will develop the preliminary and baseline schedule for the project.

Work Breakdown Structure

The Work Breakdown Structure (WBS) is a multi-level arrangement of the activities needed to complete the project. Figure 4.7.2.1 on the following page is a summary of the WBS from Level 2 down to Level 3. Preconstruction and construction activities have been broken down by phase and into the following components:

Key Milestone	Date
Notice to Proceed	June 8, 2018
Scope Validation Period Complete	October 5, 2018
Early Installation of Temporary Signals	November 5, 2018
Start of Construction	April 25, 2019
Final Completion Date	November 19, 2021

Figure 4.7.2

Project Milestones | Overall project status.

General Conditions | Preliminary schedule, baseline schedule, scope validation, and QA/QC plan.

Design, Right-of-Way, and Permitting | Design consists of field surveys, geotechnical, preliminary roadway, MOT, clearing and grubbing, drainage, E&S, final roadway, bridge, pavement markings, and signage. Right-of-way will monitor ROW acquisition and any required easements, which includes title searches, appraisals, appraisal reviews, offers, negotiations, and settlements. Parcels that must be acquired early are also included. Permitting includes wetland and stream delineation, coordination of approvals with USACE, stormwater permit, and the identification/coordination of threatened and endangered species. Utility relocations are included and broken down by the individual utility company. This approach will allow better management and coordination of the relocation work required. Submittal milestones and approvals by VDOT are also included for all above items.

Construction | This section is segmented by phase. Construction activities include all work associated with roadway, bridge, MOT, construction access, drainage, signage, quality control, and quality assurance.

Calendar

The following calendars have been used in the development of our schedule to represent a variety of scenarios:

5 DY/WK + HD | This calendar is based on five working days per week plus holidays and is used for all design, administrative, and construction activities except those impacted by adverse weather.

7 DY/WK | This calendar will be assigned to activities that have durations based on seven days per week. This calendar will be used for review periods and milestones.

5 DY/WK + HD + W | This calendar is based on five working days per week, plus holidays and adverse weather days. This calendar will be used for all construction activities except those involving weather, temperature, or time of year restrictions. The following adverse weather days are included:

January/7 days; ***February***/7 days; ***March***/5 days; ***April***/7 days; ***May***/5 days; ***June***/3 days; ***July***/3 days; ***August***/3 days; ***September***/3 days; ***October***/3 days; ***November***/5 days; ***December***/6 days

WBS Level 2	WBS Level 3
Project Milestones	*Project Milestones* - Notice of Intent to Award - CTB Approval/Notice of Award - Design Build Contract Execution - Notice to Proceed - Phase 1 Complete - Phase 2 Complete - Phase 3 Complete - Contract Complete
General Conditions	*General Conditions* - Scope Validation - CPM Schedule - QA/QC Plan
Design, Right-of-Way & Permitting	*Design, Right-of-Way & Permitting* - Design Milestones - Design Survey - Geotechnical Study, Analysis & Reports - Roadway Design – Temp Signals - Roadway Design – Right-of-Way Plans - Roadway Design – Final Plans - Environmental Permits - Utility Relocation/Coordination - Utility Relocations - Right-of-Way Acquisition / Easements - Bridge Design - Bridge Load Ratings - Bridge Inspections - Record Plans (As-Builts)
Construction	*Construction* - Phase 1 – I-81 SB Bridge - Phase 2 – I-81 NB Bridge - Demo SB Bridge

Figure 4.7.2.1

5 DY/WK + HD + W + TOYB | This calendar is based on five working days per week, and includes holidays, adverse weather days (listed above), and the Time of Year Restriction for clearing due to bats. This calendar is limited to clearing activities only.

5 DY/WK + HD + W + Paving Shutdown | This calendar is based on five working days per week, and includes holidays, adverse weather days (listed above), and will not permit work from December 1 through March 1 of each calendar year.

Plan and Strategy

Our team has developed a sequence of construction that will eliminate phased construction of the SB Bridge. This allows for one less traffic shift and for the entire SB Bridge to be constructed out of traffic, enhancing safety and minimizing impacts to the traveling public. Our schedule includes an Advanced Work Package to complete the design and installation of the temporary traffic signals before construction mobilization. Construction mobilization occurs in April 2019, allowing the SB Bridge to be completed by April 2020. After the NB traffic is shifted onto the new SB Bridge, the new NB Bridge will be constructed and completed in March 2021. Other improvements to I-81, the ramps, and Route 8 will be conducted after the NB Bridge is complete. Final completion will be November 19, 2021.

Design
This section of the schedule includes activities required to develop preliminary and final roadway and bridge plans, and obtain the necessary approvals. As specified in the RFP, we have included a 21-calendar day activity for VDOT review after each submission. The design phase also includes activities for the completion of surveys, traffic management plan, E&S control, hydrologic and hydraulic analysis studies, noise analysis, pavement marking, and geotechnical investigations. The design effort will begin following Notice to Proceed (NTP) on June 8, 2018. The proposal schedule reflects approval of final roadway plans by October 26, 2018 and final bridge plans by February 25, 2019.

Environmental Permits
This section of the schedule contains activities involved with the evaluation, preparation, submission, and approval of all environmental permits, including a Joint Wetlands and Waters Permit and LD445 and a Stormwater Permit.

Right-of-Way Acquisition
ROW acquisition will be performed in accordance with VDOT requirements and the RFP. Our project schedule reflects the necessary durations needed to perform all ROW acquisition tasks including title reports, appraisals, appraisal reviews, submittal of offers, negotiations and settlement/closing. To minimize schedule risk, parcels that need to be acquired early will be identified.

Utility Relocation
The table in Section 4.4.2.1 lists the anticipated utility relocations and potential conflicts for the project. The utility relocation schedule has been broken down by utility owner to simplify and track relocations. Utility-related activities include a Level A SUE investigation, utility field investigation meetings, utility plan and estimate preparation by the utility owner, review and approval of plans and estimates, and the relocation of the utilities.

Construction Sequencing
The Branch Team has developed the schedule to mitigate impacts to the traveling public and complete the project by eliminating a phase of construction for the I-81 SB Bridge. This offers a safer construction operation while completing the project by the RFP completion date of November 19, 2021. See details of our construction sequence in Section 4.5.

Critical Path
The critical path begins with the design survey activities associated with ROW, utility test pits, and boring locations for bridge geotechnical investigations. This work is followed by mobilization and construction of the SB Bridge. After NB traffic is shifted onto the new SB Bridge, the NB Bridge is constructed. Traffic is shifted into its final pattern along I-81 both NB and SB allowing for the demolition of the existing SB Bridge and the shoulder improvements along Route 8. Finally, the punchlist is completed, construction operations demobilize, and the project is complete. Below is the summary of critical path activities:

Activity ID	Activity
DS-1000	Property Owner / ROW Research
DS-1070	Distribute Site Investigation Property Owner Notification Letters
DS-1080	Recover Survey Control
DS-1880	Supplemental Base Mapping / Field Survey
DS-1900	Utility Test Pits
DS-1910	Stakeout Soil Boring Locations - Bridge

Activity ID	Activity
DS-1150	Perform Soil Borings and Lab Work - Bridge
DS-1250	Perform Soil Borings and Lab Work - Roadway
DS-1380	Prepare Roadway GER
DS-1440	Complete QA/QC and Submit Roadway GER to VDOT
DS-1500	VDOT Review of Roadway GER
DS-1550	Revise/Resubmit Roadway GER
DS-1590	VDOT Review and Approval of Revised Roadway GER
1025	Mobilization
1045	Install Construction Access
1015	Install Erosion Control Devices
1000	Install Concrete Barrier (I-81 SB Lanes & Route 8 Median)
1050	Grading / Excavation Interior Pier #1 (I-81 SB)
1060	Drive Piles Interior Pier #1 (I-81 SB)
1065	Drive Piles Abutment A (I-81 SB)
1085	Drive Piles Interior Pier #2 (I-81 SB)
1100	FRP Footing Interior Pier #2 (I-81 SB)
1115	FRP Columns Interior Pier #2 (I-81 SB)
1120	FRP Cap Interior Pier #2 (I-81 SB)
1125	FRP Abutment B (I-81 SB)
1135	FRP Slope Protection Abutment B (I-81 SB)
1140	Erect Girders (I-81 SB)
1170	Install Utility Conduits (I-81 SB)
1145	FRP Deck (I-81 SB)
1150	FRP Parapets (I-81 SB)
1180	Cover Depth Survey (I-81 SB)
1155	FRP Approach Slab Abutment A (I-81 SB)
1160	FRP Approach Slab Abutment B (I-81 SB)
1165	Deck Grooving (I-81 SB)
1175	Concrete Staining (Parapets/Bents)
1185	Bridge Safety/Acceptance Inspection
6000	Install Concrete Barrier (I-81 NB)
2105	Demolition of Existing Bridge (I-81 NB)
11180	Grading / Excavation Interior Pier #1 (I-81 NB)
11200	Drive Piles Interior Pier #1 (I-81 NB)
11210	Drive Piles Abutment A (I-81 NB)
11250	Drive Piles Interior Pier #2 (I-81 NB)
11280	FRP Footing Interior Pier #2 (I-81 NB)
11310	FRP Columns Interior Pier #2 (I-81 NB)
11320	FRP Cap Interior Pier #2 (I-81 NB)
11330	FRP Abutment B (I-81 NB)
11350	FRP Slope Protection Abutment B (I-81 NB)
11360	Erect Girders (I-81 NB)
11900	Install Utility Conduits (I-81 NB)
11370	FRP Deck (I-81 NB)

Activity ID	Activity
11380	FRP Parapets (I-81 NB)
11910	Cover Depth Survey (I-81 NB)
11390	FRP Approach Slab Abutment A (I-81 NB)
11400	FRP Approach Slab Abutment B (I-81 NB)
11410	Deck Grooving (I-81 NB)
11920	Concrete Staining (Parapets/Bents) (I-81 NB)
11930	Bridge Safety/Acceptance Inspection (I-81 NB)
1195	Demolition of Temporary Pavement
11980	Grading / Excavation (I-81 Sta. 930+00 to 952+00 SB)
12070	Grading / Excavation (I-81 Sta. 954+00 to 980+00 SB)
12080	Storm Drainage (I-81 Sta. 954+00 to 980+00 SB)
12090	Fine Grading (I-81 Sta. 954+00 to 980+00 SB)
12120	Install Aggregate Base Course (I-81 Sta. 954+00 to 980+00 SB)
12130	Install Asphalt Base Course (I-81 Sta. 954+00 to 980+00 SB)
12140	Install Asphalt Intermediate Course (I-81 Sta. 954+00 to 980+00 SB)
12150	Install Asphalt Surface Course (I-81 Sta. 954+00 980+00 SB)
12100	Pavement Markings/Rumble Strips (I-81 Sta. 954+00 to 980+00 SB)
12110	Guardrail (I-81 Sta. 954+00 to 980+00 SB)
2585	Demolition of Existing Bridge (I-81 SB)
1255	Grading/Excavation Shoulders
1335	Install Pier Protection Barrier
1275	Install Aggregate Base Course
1285	Install Asphalt Base Course
1325	Mill & Overlay Route 8
1295	Install Asphalt Surface Course
1305	Install Guardrail
1315	Install Pavement Markings
5655	Final Punchlist Inspection
5670	Demobilization
5660	Complete Punchlist

Schedule Management

To provide effective schedule management and document control, the Branch Team developed, and will continue to update, the project schedule using Primavera P6 to plan, schedule, and monitor design and construction. To develop the initial overall detailed CPM schedule, each design discipline manager, along with the CM, has been responsible for developing the schedule for their activities. The DBPM meets with all discipline managers and the CM to review the individual schedules and to integrate them into the overall CPM schedule. This process creates buy-in from everyone and captures all activities.

Branch will manage the CPM schedule from the on-site project field office. The project engineer will be responsible for maintaining and updating the schedule. The DBPM, supported by the CM, will ultimately be responsible for the implementation of the project controls required to manage the schedule. The project controls are founded in efficient communication between the design discipline managers and construction staff. The Branch Team includes the value-added Construction Design Coordinator (CDC) to help facilitate the design coordination process.

From the date of NTP through the completion of design activities, we will hold weekly design coordination meetings, which will be facilitated by the DBPM and attended by all design disciplines, the CDC, and the project engineer. The CDC will help provide a constructability review of the design and the project engineer will help manage and maintain the schedule. For each design coordination meeting, the DBPM will review the CPM schedule and identify all activities that were scheduled for completion the previous week and planned for the following two weeks. The design coordination meetings will promote discussion related to the current status of activities, critical completion dates, addition or deletion of activities, activities that can be advanced for earlier completion or take a longer duration, and ways to mitigate any potential schedule delays.

During construction, the same project controls used during the design will be in place. Weekly construction coordination meetings will be held by the DBPM and attended by all construction staff. These meetings will allow all construction schedule activities to be reviewed. The project engineer will help manage and maintain the schedule. The DBPM will review the CPM schedule to analyze all scheduled activities for the previous week along with those planned for the following two weeks. These construction coordination meetings will allow for the construction staff to identify activities in the work plan that can be accelerated or those needing mitigation to avoid delays.

The Branch Team will prepare and submit monthly schedule updates for review and approval by VDOT, which will include a narrative of any schedule changes, updated activities, any issues affecting the schedule, and an updated critical path showing schedule milestones.

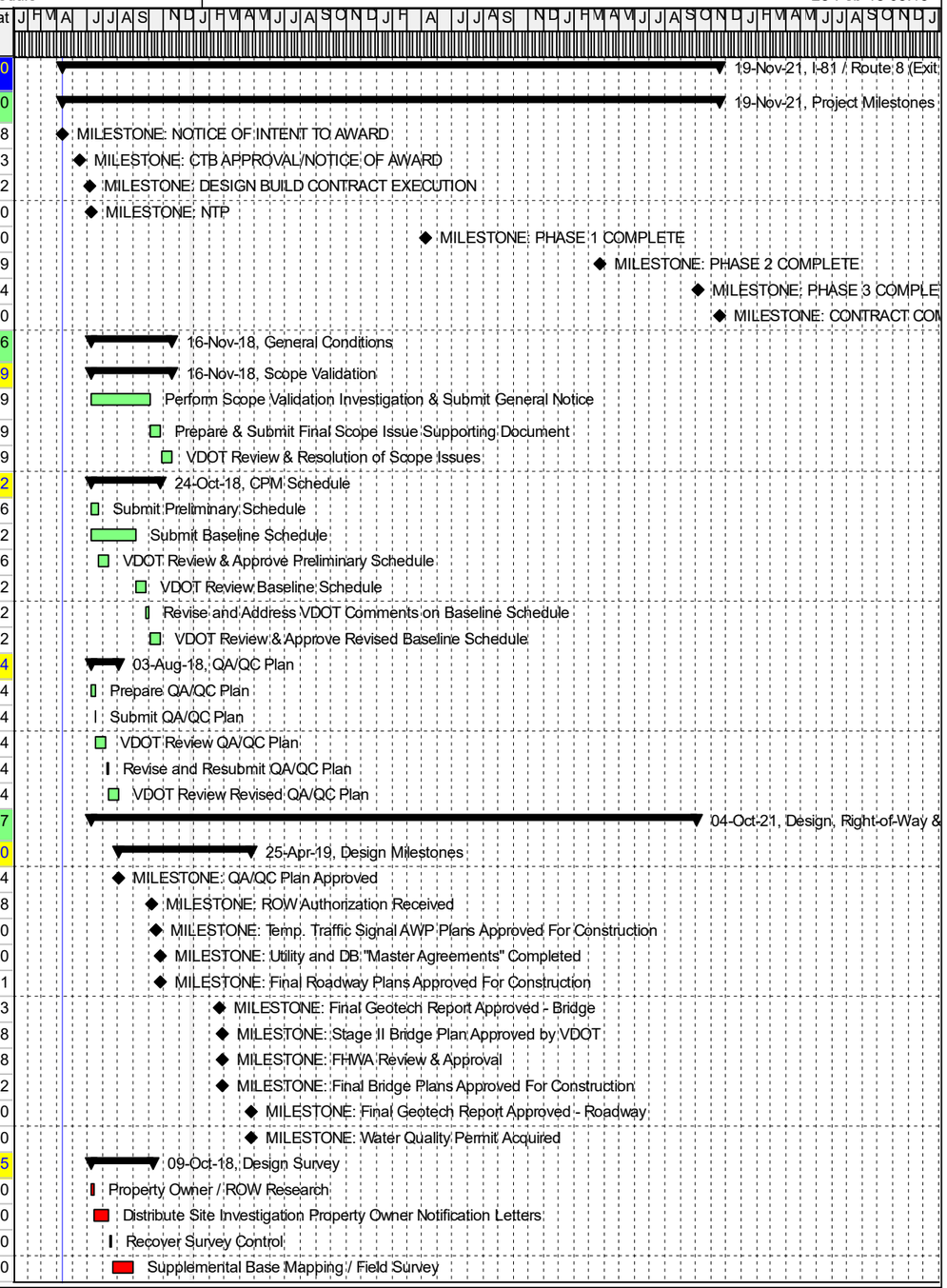
Schedule Recovery

If changes or unforeseen circumstances arise that impact the schedule, Branch will notify VDOT and begin a Time Impact Analysis, review the activities and durations to revise the schedule, and prepare a recovery schedule to reclaim lost time. The recovery plan may include any of the following:

- Additional crews and equipment
- Increased work shifts
- Modifications to the design
- Re-sequencing of construction work
- Revisions to the priority of utility relocation

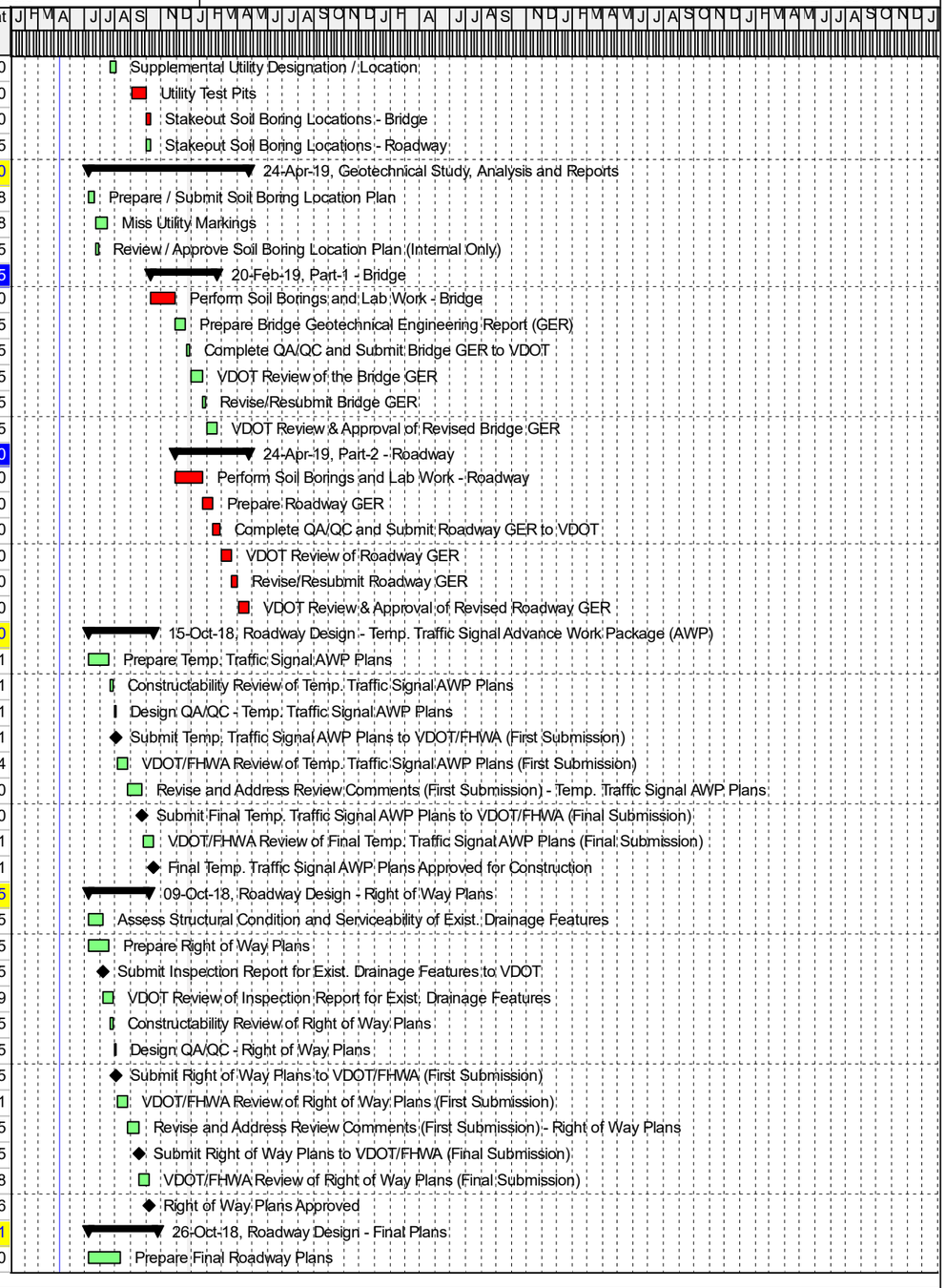
If the schedule needs to be revised and subcontractor work is impacted, the CM will work with the subcontractor to accommodate the changes in the schedule. Weekly communication with subcontractors will be maintained for timely responses to schedule changes, if required.

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
I-81 / Route 8 (Exit 114) Interchange Proposal Schedule		763	11-Apr-18	19-Nov-21	0
Project Milestones		763	11-Apr-18	19-Nov-21	0
M-1000	MILESTONE: NOTICE OF INTENT TO AWARD	0	11-Apr-18*		58
M-1030	MILESTONE: CTB APPROVAL/NOTICE OF AWARD	0	16-May-18*		23
M-1010	MILESTONE: DESIGN BUILD CONTRACT EXECUTION	0	06-Jun-18*		2
M-1020	MILESTONE: NTP	0	08-Jun-18*		0
M-1050	MILESTONE: PHASE 1 COMPLETE	0		08-Apr-20	590
M-1060	MILESTONE: PHASE 2 COMPLETE	0		25-Mar-21	239
M-1070	MILESTONE: PHASE 3 COMPLETE	0		06-Oct-21	44
M-1040	MILESTONE: CONTRACT COMPLETION	0		19-Nov-21*	0
General Conditions		114	08-Jun-18	16-Nov-18	86
Scope Validation		162	08-Jun-18	16-Nov-18	159
GC-1000	Perform Scope Validation Investigation & Submit General Notice	120	08-Jun-18	05-Oct-18	159
GC-1110	Prepare & Submit Final Scope Issue Supporting Document	21	06-Oct-18	26-Oct-18	159
GC-1120	VDOT Review & Resolution of Scope Issues	21	27-Oct-18	16-Nov-18	159
CPM Schedule		139	08-Jun-18	24-Oct-18	182
GC-1020	Submit Preliminary Schedule	15	08-Jun-18	22-Jun-18	236
GC-1030	Submit Baseline Schedule	90	08-Jun-18	05-Sep-18	182
GC-1060	VDOT Review & Approve Preliminary Schedule	21	23-Jun-18	13-Jul-18	236
GC-1080	VDOT Review Baseline Schedule	21	06-Sep-18	26-Sep-18	182
GC-1090	Revise and Address VDOT Comments on Baseline Schedule	7	27-Sep-18	03-Oct-18	182
GC-1100	VDOT Review & Approve Revised Baseline Schedule	21	04-Oct-18	24-Oct-18	182
QA/QC Plan		57	08-Jun-18	03-Aug-18	264
GC-1010	Prepare QA/QC Plan	10	08-Jun-18	17-Jun-18	264
GC-1040	Submit QA/QC Plan	0	18-Jun-18	18-Jun-18	264
GC-1050	VDOT Review QA/QC Plan	21	18-Jun-18	08-Jul-18	264
GC-1070	Revise and Resubmit QA/QC Plan	5	09-Jul-18	13-Jul-18	264
GC-1130	VDOT Review Revised QA/QC Plan	21	14-Jul-18	03-Aug-18	264
Design, Right-of-Way & Permitting		695	08-Jun-18	04-Oct-21	27
Design Milestones		160	03-Aug-18	25-Apr-19	0
DM-1000	MILESTONE: QA/QC Plan Approved	0		03-Aug-18	264
DM-1070	MILESTONE: ROW Authorization Received	0		09-Oct-18	198
DM-1100	MILESTONE: Temp. Traffic Signal AWP Plans Approved For Construction	0		15-Oct-18	110
DM-1010	MILESTONE: Utility and DB "Master Agreements" Completed	0		26-Oct-18	180
DM-1060	MILESTONE: Final Roadway Plans Approved For Construction	0		26-Oct-18	101
DM-1030	MILESTONE: Final Geotech Report Approved - Bridge	0		21-Feb-19	63
DM-1090	MILESTONE: Stage II Bridge Plan Approved by VDOT	0		25-Feb-19	58
DM-1020	MILESTONE: FHWA Review & Approval	0		25-Feb-19	58
DM-1050	MILESTONE: Final Bridge Plans Approved For Construction	0		25-Feb-19	32
DM-1080	MILESTONE: Final Geotech Report Approved - Roadway	0		25-Apr-19	0
DM-1040	MILESTONE: Water Quality Permit Acquired	0		25-Apr-19	0
Design Survey		85	08-Jun-18	09-Oct-18	35
DS-1000	Property Owner / ROW Research	5	08-Jun-18	14-Jun-18	0
DS-1070	Distribute Site Investigation Property Owner Notification Letters	20	15-Jun-18	13-Jul-18	0
DS-1080	Recover Survey Control	5	16-Jul-18	20-Jul-18	0
DS-1880	Supplemental Base Mapping / Field Survey	30	23-Jul-18	31-Aug-18	0

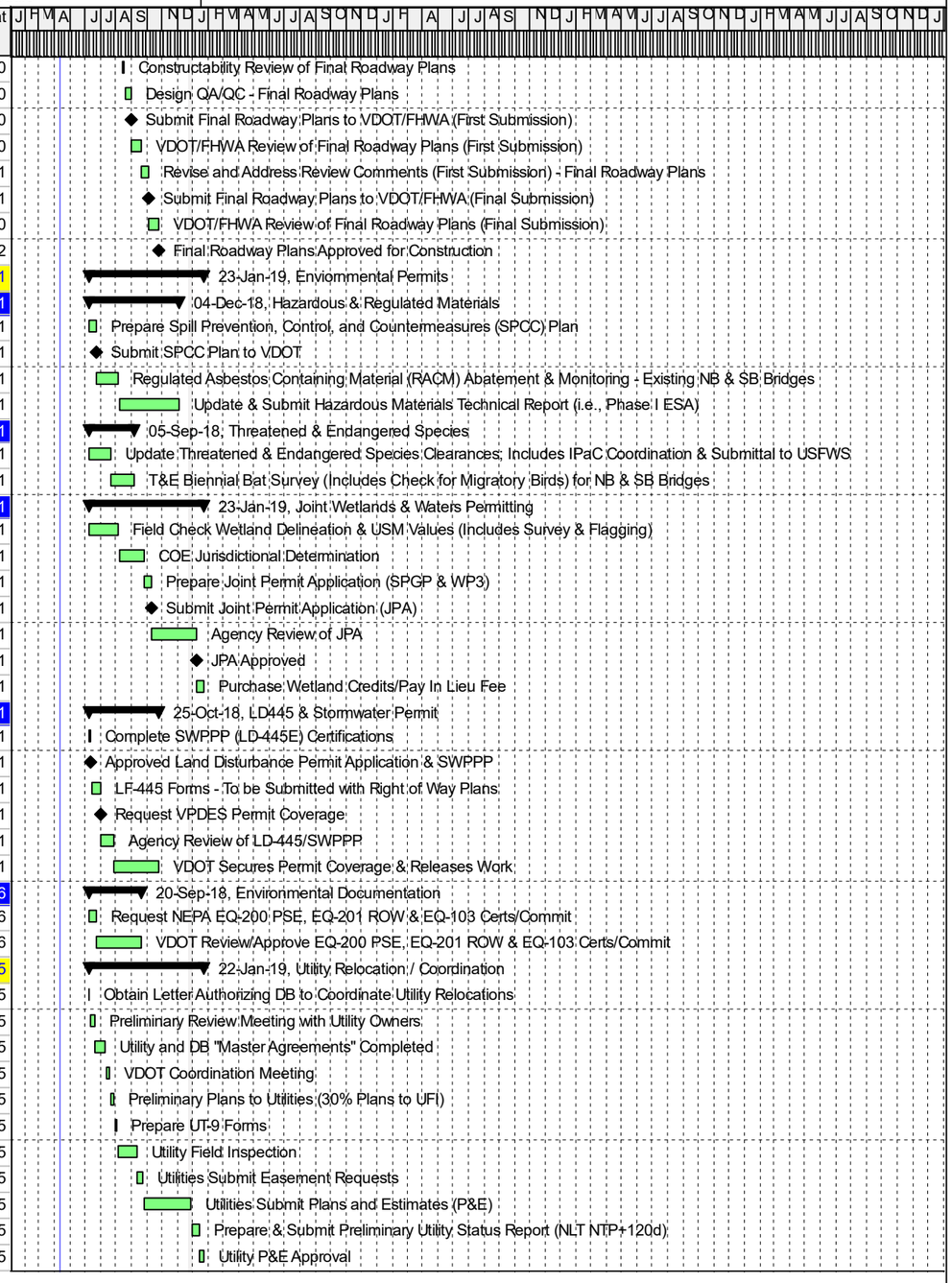


Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

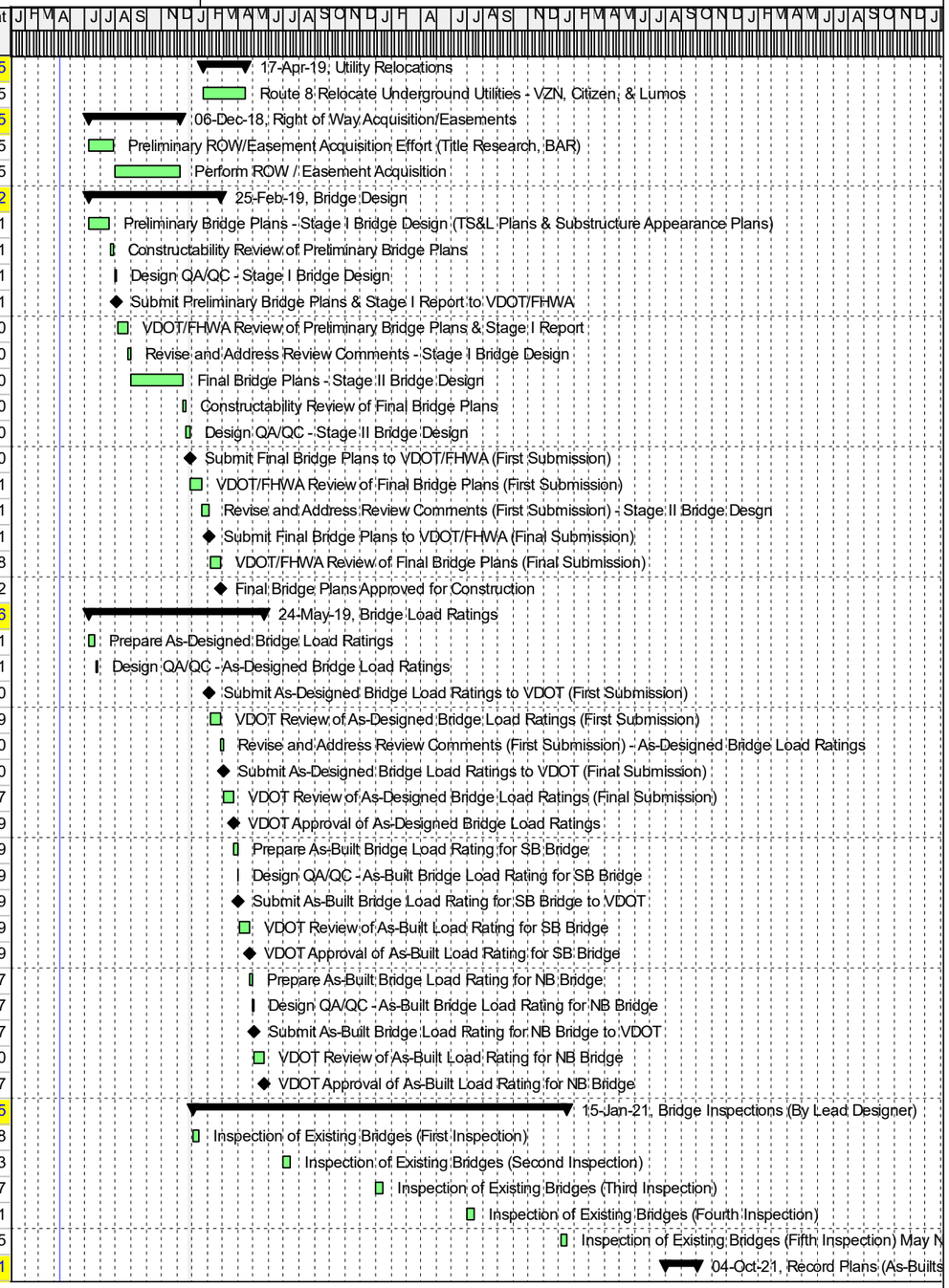
Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
DS-1890	Supplemental Utility Designation / Location	10	23-Jul-18	03-Aug-18	20
DS-1900	Utility Test Pits	20	04-Sep-18	01-Oct-18	0
DS-1910	Stakeout Soil Boring Locations - Bridge	5	02-Oct-18	09-Oct-18	0
DS-1920	Stakeout Soil Boring Locations - Roadway	5	02-Oct-18	09-Oct-18	35
Geotechnical Study, Analysis and Reports		220	08-Jun-18	24-Apr-19	0
DS-1010	Prepare / Submit Soil Boring Location Plan	10	08-Jun-18	21-Jun-18	58
DS-1060	Miss Utility Markings	17	22-Jun-18	17-Jul-18	58
DS-1930	Review / Approve Soil Boring Location Plan (Internal Only)	5	22-Jun-18	28-Jun-18	65
Part-1 - Bridge		90	10-Oct-18	20-Feb-19	45
DS-1150	Perform Soil Borings and Lab Work - Bridge	35	10-Oct-18	29-Nov-18	0
DS-1240	Prepare Bridge Geotechnical Engineering Report (GER)	15	30-Nov-18	20-Dec-18	45
DS-1300	Complete QA/QC and Submit Bridge GER to VDOT	5	21-Dec-18	28-Dec-18	45
DS-1320	VDOT Review of the Bridge GER	15	31-Dec-18	22-Jan-19	45
DS-1370	Revise/Resubmit Bridge GER	5	23-Jan-19	29-Jan-19	45
DS-1420	VDOT Review & Approval of Revised Bridge GER	15	30-Jan-19	20-Feb-19	45
Part-2 - Roadway		100	30-Nov-18	24-Apr-19	0
DS-1250	Perform Soil Borings and Lab Work - Roadway	35	30-Nov-18	22-Jan-19	0
DS-1380	Prepare Roadway GER	15	23-Jan-19	12-Feb-19	0
DS-1440	Complete QA/QC and Submit Roadway GER to VDOT	10	13-Feb-19	27-Feb-19	0
DS-1500	VDOT Review of Roadway GER	15	28-Feb-19	20-Mar-19	0
DS-1550	Revise/Resubmit Roadway GER	10	21-Mar-19	03-Apr-19	0
DS-1590	VDOT Review & Approval of Revised Roadway GER	15	04-Apr-19	24-Apr-19	0
Roadway Design - Temp. Traffic Signal Advance Work Package (AWP)		90	08-Jun-18	15-Oct-18	110
DS-1090	Prepare Temp. Traffic Signal AWP Plans	30	08-Jun-18	20-Jul-18	131
DS-1270	Constructability Review of Temp. Traffic Signal AWP Plans	5	23-Jul-18	27-Jul-18	131
DS-1280	Design QA/QC - Temp. Traffic Signal AWP Plans	5	30-Jul-18	03-Aug-18	131
DS-1330	Submit Temp. Traffic Signal AWP Plans to VDOT/FHWA (First Submission)	0		03-Aug-18	131
DS-1350	VDOT/FHWA Review of Temp. Traffic Signal AWP Plans (First Submission)	21	04-Aug-18	24-Aug-18	194
DS-1450	Revise and Address Review Comments (First Submission) - Temp. Traffic Signal AWP Plans	20	24-Aug-18	24-Sep-18	130
DS-1610	Submit Final Temp. Traffic Signal AWP Plans to VDOT/FHWA (Final Submission)	0		24-Sep-18	130
DS-1680	VDOT/FHWA Review of Final Temp. Traffic Signal AWP Plans (Final Submission)	21	25-Sep-18	15-Oct-18	191
DS-1690	Final Temp. Traffic Signal AWP Plans Approved for Construction	0		15-Oct-18	131
Roadway Design - Right of Way Plans		85	08-Jun-18	09-Oct-18	115
DS-1020	Assess Structural Condition and Serviceability of Exist. Drainage Features	20	08-Jun-18	06-Jul-18	155
DS-1410	Prepare Right of Way Plans	30	08-Jun-18	20-Jul-18	135
DS-1180	Submit Inspection Report for Exist. Drainage Features to VDOT	0		06-Jul-18	155
DS-1400	VDOT Review of Inspection Report for Exist. Drainage Features	21	07-Jul-18	27-Jul-18	229
DS-1460	Constructability Review of Right of Way Plans	5	23-Jul-18	27-Jul-18	135
DS-1470	Design QA/QC - Right of Way Plans	5	30-Jul-18	03-Aug-18	135
DS-1520	Submit Right of Way Plans to VDOT/FHWA (First Submission)	0		03-Aug-18	135
DS-1940	VDOT/FHWA Review of Right of Way Plans (First Submission)	21	04-Aug-18	24-Aug-18	201
DS-1950	Revise and Address Review Comments (First Submission) - Right of Way Plans	15	24-Aug-18	17-Sep-18	135
DS-1960	Submit Right of Way Plans to VDOT/FHWA (Final Submission)	0		17-Sep-18	135
DS-1970	VDOT/FHWA Review of Right of Way Plans (Final Submission)	21	18-Sep-18	08-Oct-18	198
DS-1980	Right of Way Plans Approved	0		09-Oct-18	136
Roadway Design - Final Plans		99	08-Jun-18	26-Oct-18	101
DS-1030	Prepare Final Roadway Plans	45	08-Jun-18	10-Aug-18	120



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
DS-1100	Constructability Review of Final Roadway Plans	5	13-Aug-18	17-Aug-18	120
DS-1110	Design QA/QC - Final Roadway Plans	10	20-Aug-18	31-Aug-18	120
DS-1130	Submit Final Roadway Plans to VDOT/FHWA (First Submission)	0		31-Aug-18	120
DS-1160	VDOT/FHWA Review of Final Roadway Plans (First Submission)	21	01-Sep-18	21-Sep-18	180
DS-1170	Revise and Address Review Comments (First Submission) - Final Roadway Plans	10	21-Sep-18	05-Oct-18	121
DS-1200	Submit Final Roadway Plans to VDOT/FHWA (Final Submission)	0		05-Oct-18	121
DS-1210	VDOT/FHWA Review of Final Roadway Plans (Final Submission)	21	06-Oct-18	26-Oct-18	180
DS-1220	Final Roadway Plans Approved for Construction	0		26-Oct-18	122
Enviornmental Permits		230	08-Jun-18	23-Jan-19	91
Hazardous & Regulated Materials		180	08-Jun-18	04-Dec-18	141
DS-1990	Prepare Spill Prevention, Control, and Countermeasures (SPCC) Plan	15	08-Jun-18	22-Jun-18	141
DS-2000	Submit SPCC Plan to VDOT	0		22-Jun-18	141
DS-2010	Regulated Asbestos Containing Material (RACM) Abatement & Monitoring - Existing NB & SI	45	23-Jun-18	06-Aug-18	141
DS-2020	Update & Submit Hazardous Materials Technical Report (i.e., Phase I ESA)	120	07-Aug-18	04-Dec-18	141
Threatened & Endangered Species		90	08-Jun-18	05-Sep-18	231
DS-2030	Update Threatened & Endangered Species Clearances; Includes IPaC Coordination & Subr	45	08-Jun-18	22-Jul-18	231
DS-2040	T&E Biennial Bat Survey (Includes Check for Migratory Birds) for NB & SB Bridges	45	23-Jul-18	05-Sep-18	231
Joint Wetlands & Waters Permitting		230	08-Jun-18	23-Jan-19	91
DS-2050	Field Check Wetland Delineation & USM Values (Includes Survey & Flagging)	60	08-Jun-18	06-Aug-18	91
DS-2060	COE Jurisdictional Determination	50	07-Aug-18	25-Sep-18	91
DS-2070	Prepare Joint Permit Application (SPGP & WP3)	15	26-Sep-18	10-Oct-18	91
DS-2080	Submit Joint Permit Application (JPA)	0		10-Oct-18	91
DS-2090	Agency Review of JPA	90	11-Oct-18	08-Jan-19	91
DS-2100	JPA Approved	0		08-Jan-19	91
DS-2110	Purchase Wetland Credits/Pay In Lieu Fee	15	09-Jan-19	23-Jan-19	91
LD445 & Stormwater Permit		140	08-Jun-18	25-Oct-18	181
DS-2120	Complete SWPPP (LD-445E) Certifications	5	08-Jun-18	12-Jun-18	181
DS-2130	Approved Land Disturbance Permit Application & SWPPP	0		12-Jun-18	181
DS-2140	LF-445 Forms - To be Submitted with Right of Way Plans	20	13-Jun-18	02-Jul-18	181
DS-2150	Request VPDES Permit Coverage	0		02-Jul-18	181
DS-2160	Agency Review of LD-445/SWPPP	25	03-Jul-18	27-Jul-18	181
DS-2170	VDOT Secures Permit Coverage & Releases Work	90	28-Jul-18	25-Oct-18	181
Environmental Documentation		105	08-Jun-18	20-Sep-18	216
DS-2180	Request NEPA EQ-200 PSE, EQ-201 ROW & EQ-103 Certs/Commit	15	08-Jun-18	22-Jun-18	216
DS-2190	VDOT Review/Approve EQ-200 PSE, EQ-201 ROW & EQ-103 Certs/Commit	90	23-Jun-18	20-Sep-18	216
Utility Relocation / Coordination		155	08-Jun-18	22-Jan-19	345
DS-2200	Obtain Letter Authorizing DB to Coordinate Utility Relocations	1	08-Jun-18	08-Jun-18	345
DS-2210	Preliminary Review Meeting with Utility Owners	7	11-Jun-18	19-Jun-18	345
DS-2220	Utility and DB "Master Agreements" Completed	15	20-Jun-18	11-Jul-18	345
DS-2230	VDOT Coordination Meeting	7	12-Jul-18	20-Jul-18	345
DS-2240	Preliminary Plans to Utilities (30% Plans to UFI)	5	23-Jul-18	27-Jul-18	345
DS-2250	Prepare UT-9 Forms	5	30-Jul-18	03-Aug-18	345
DS-2260	Utility Field Inspection	25	06-Aug-18	10-Sep-18	345
DS-2270	Utilities Submit Easement Requests	10	11-Sep-18	24-Sep-18	345
DS-2280	Utilities Submit Plans and Estimates (P&E)	65	25-Sep-18	28-Dec-18	345
DS-2290	Prepare & Submit Preliminary Utility Status Report (NLT NTP+120d)	10	31-Dec-18	14-Jan-19	345
DS-2300	Utility P&E Approval	5	15-Jan-19	22-Jan-19	345

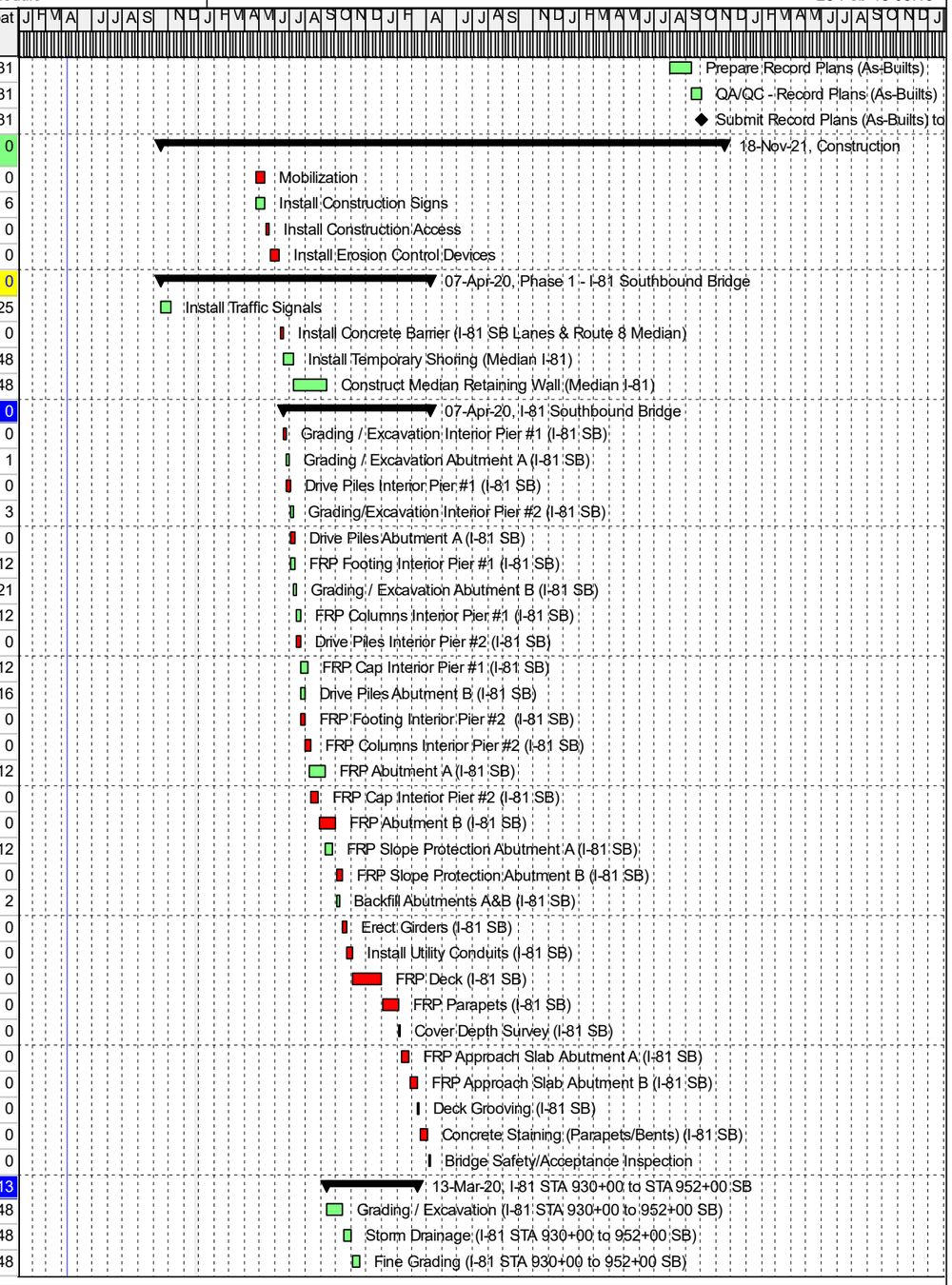


Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
Utility Relocations		60	23-Jan-19	17-Apr-19	345
DS-2310	Route 8 Relocate Underground Utilities - VZN, Citizen, & Lumos	60	23-Jan-19	17-Apr-19	345
Right of Way Acquisition/Easements		125	08-Jun-18	06-Dec-18	95
DS-2320	Preliminary ROW/Easement Acquisition Effort (Title Research, BAR)	35	08-Jun-18	27-Jul-18	95
DS-2330	Perform ROW / Easement Acquisition	90	30-Jul-18	06-Dec-18	95
Bridge Design		168	08-Jun-18	25-Feb-19	32
DS-2340	Preliminary Bridge Plans - Stage I Bridge Design (TS&L Plans & Substructure Appearance P	30	08-Jun-18	20-Jul-18	41
DS-2350	Constructability Review of Preliminary Bridge Plans	5	23-Jul-18	27-Jul-18	41
DS-2360	Design QA/QC - Stage I Bridge Design	5	30-Jul-18	03-Aug-18	41
DS-2370	Submit Preliminary Bridge Plans & Stage I Report to VDOT/FHWA	0		03-Aug-18	41
DS-2380	VDOT/FHWA Review of Preliminary Bridge Plans & Stage I Report	21	04-Aug-18	24-Aug-18	60
DS-2390	Revise and Address Review Comments - Stage I Bridge Design	5	24-Aug-18	31-Aug-18	40
DS-2400	Final Bridge Plans - Stage II Bridge Design	70	31-Aug-18	13-Dec-18	40
DS-2410	Constructability Review of Final Bridge Plans	5	13-Dec-18	20-Dec-18	40
DS-2420	Design QA/QC - Stage II Bridge Design	5	20-Dec-18	28-Dec-18	40
DS-2430	Submit Final Bridge Plans to VDOT/FHWA (First Submission)	0		28-Dec-18	40
DS-2440	VDOT/FHWA Review of Final Bridge Plans (First Submission)	21	29-Dec-18	18-Jan-19	61
DS-2450	Revise and Address Review Comments (First Submission) - Stage II Bridge Desgn	10	18-Jan-19	04-Feb-19	41
DS-2460	Submit Final Bridge Plans to VDOT/FHWA (Final Submission)	0		04-Feb-19	41
DS-2470	VDOT/FHWA Review of Final Bridge Plans (Final Submission)	21	05-Feb-19	25-Feb-19	58
DS-2480	Final Bridge Plans Approved for Construction	0		25-Feb-19	42
Bridge Load Ratings		217	08-Jun-18	24-May-19	366
DS-2490	Prepare As-Designed Bridge Load Ratings	10	08-Jun-18	21-Jun-18	391
DS-2500	Design QA/QC - As-Designed Bridge Load Ratings	3	22-Jun-18	26-Jun-18	391
DS-2510	Submit As-Designed Bridge Load Ratings to VDOT (First Submission)	0		04-Feb-19	240
DS-2520	VDOT Review of As-Designed Bridge Load Ratings (First Submission)	21	05-Feb-19	25-Feb-19	349
DS-2530	Revise and Address Review Comments (First Submission) - As-Designed Bridge Load Ratinç	5	25-Feb-19	04-Mar-19	240
DS-2540	Submit As-Designed Bridge Load Ratings to VDOT (Final Submission)	0		04-Mar-19	240
DS-2550	VDOT Review of As-Designed Bridge Load Ratings (Final Submission)	21	05-Mar-19	25-Mar-19	347
DS-2560	VDOT Approval of As-Designed Bridge Load Ratings	0		25-Mar-19	239
DS-2570	Prepare As-Built Bridge Load Rating for SB Bridge	5	25-Mar-19	01-Apr-19	239
DS-2580	Design QA/QC - As-Built Bridge Load Rating for SB Bridge	2	01-Apr-19	03-Apr-19	239
DS-2590	Submit As-Built Bridge Load Rating for SB Bridge to VDOT	0		03-Apr-19	239
DS-2600	VDOT Review of As-Built Load Rating for SB Bridge	21	04-Apr-19	24-Apr-19	349
DS-2610	VDOT Approval of As-Built Load Rating for SB Bridge	0		24-Apr-19	239
DS-2620	Prepare As-Built Bridge Load Rating for NB Bridge	5	24-Apr-19	01-May-19	457
DS-2630	Design QA/QC - As-Built Bridge Load Rating for NB Bridge	2	01-May-19	03-May-19	457
DS-2640	Submit As-Built Bridge Load Rating for NB Bridge to VDOT	0		03-May-19	457
DS-2650	VDOT Review of As-Built Load Rating for NB Bridge	21	04-May-19	24-May-19	670
DS-2660	VDOT Approval of As-Built Load Rating for NB Bridge	0		24-May-19	457
Bridge Inspections (By Lead Designer)		513	02-Jan-19	15-Jan-21	45
DS-2670	Inspection of Existing Bridges (First Inspection)	10	02-Jan-19*	15-Jan-19	508
DS-2680	Inspection of Existing Bridges (Second Inspection)	10	01-Jul-19*	15-Jul-19	393
DS-2690	Inspection of Existing Bridges (Third Inspection)	10	02-Jan-20*	15-Jan-20	277
DS-2700	Inspection of Existing Bridges (Fourth Inspection)	10	01-Jul-20*	15-Jul-20	161
DS-2710	Inspection of Existing Bridges (Fifth Inspection) May Not Be Required	10	04-Jan-21*	15-Jan-21	45
Record Plans (As-Builts)		45	02-Aug-21	04-Oct-21	31

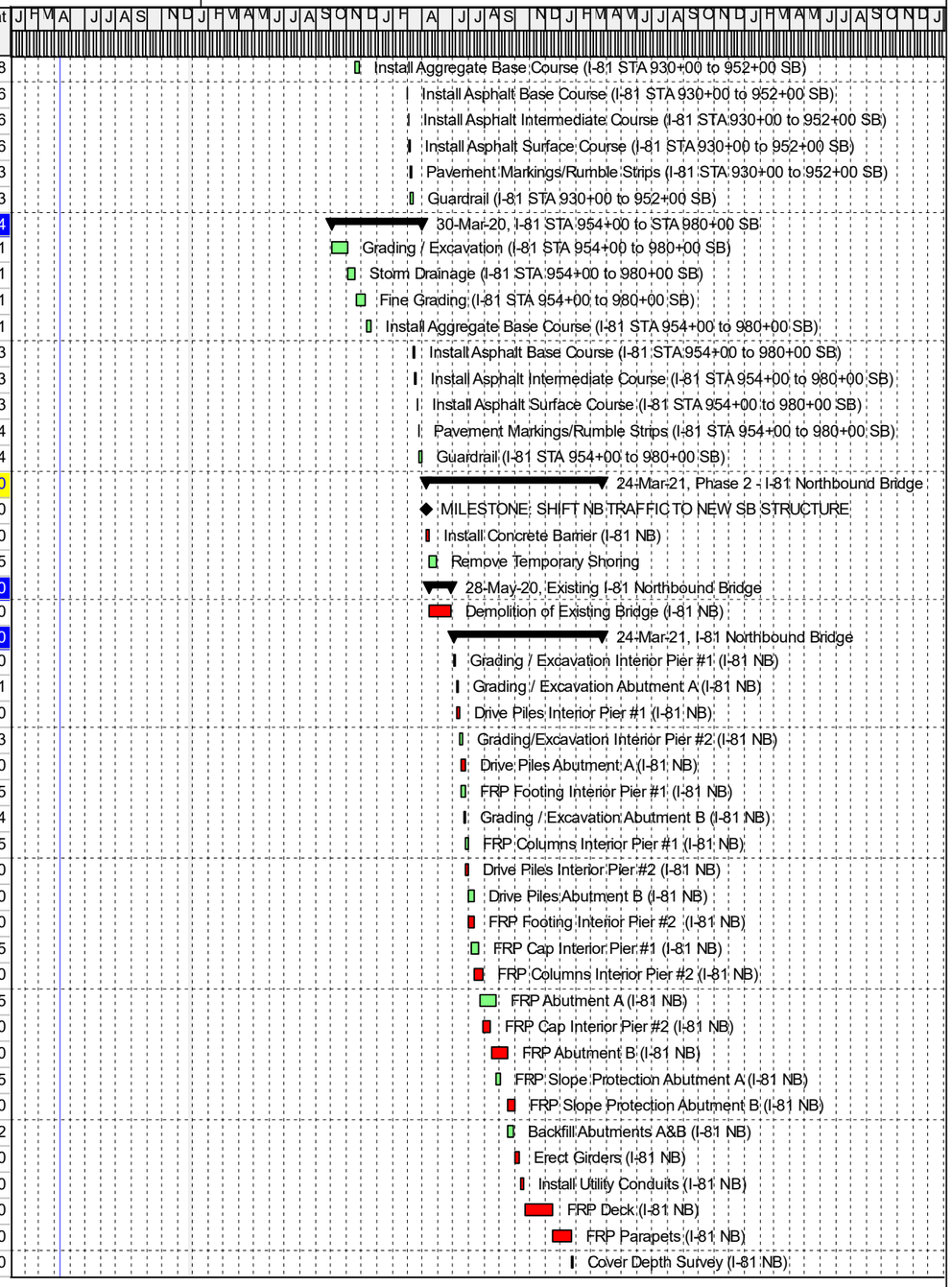


Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

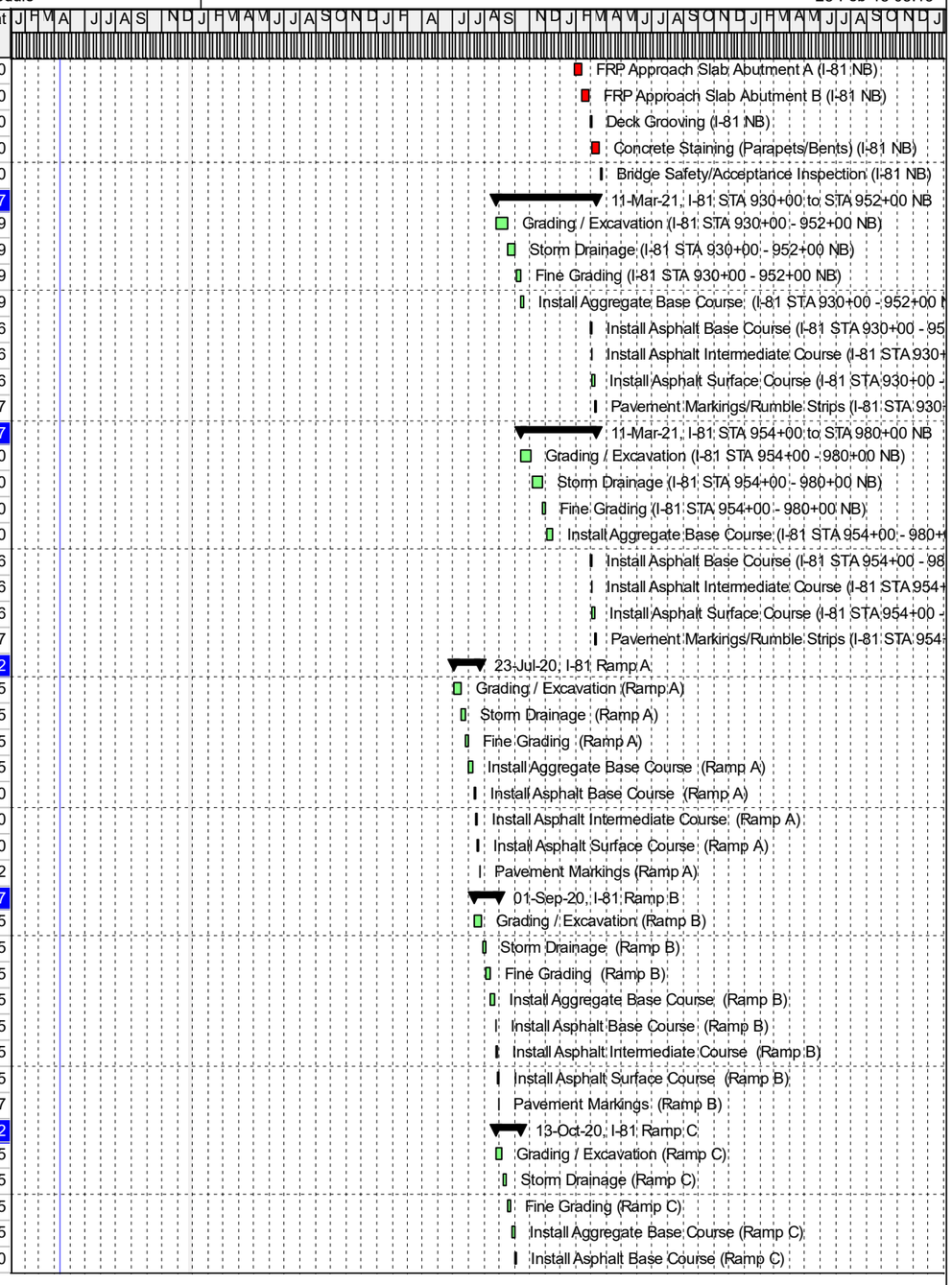
Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
DS-2720	Prepare Record Plans (As-Builts)	30	02-Aug-21	13-Sep-21	31
DS-2730	QA/QC - Record Plans (As-Builts)	15	14-Sep-21	04-Oct-21	31
DS-2740	Submit Record Plans (As-Builts) to VDOT	0		04-Oct-21	31
Construction		632	15-Oct-18	18-Nov-21	0
1025	Mobilization	10	25-Apr-19	13-May-19	0
1035	Install Construction Signs	10	25-Apr-19	13-May-19	6
1045	Install Construction Access	6	14-May-19	22-May-19	0
1015	Install Erosion Control Devices	10	23-May-19	11-Jun-19	0
Phase 1 - I-81 Southbound Bridge		301	15-Oct-18	07-Apr-20	0
1030	Install Traffic Signals	15	15-Oct-18	05-Nov-18	225
1000	Install Concrete Barrier (I-81 SB Lanes & Route 8 Median)	4	13-Jun-19	18-Jun-19	0
1010	Install Temporary Shoring (Median I-81)	12	20-Jun-19	08-Jul-19	48
1020	Construct Median Retaining Wall (Median I-81)	40	09-Jul-19	12-Sep-19	48
I-81 Southbound Bridge		161	20-Jun-19	07-Apr-20	0
1050	Grading / Excavation Interior Pier #1 (I-81 SB)	4	20-Jun-19	25-Jun-19	0
1055	Grading / Excavation Abutment A (I-81 SB)	4	26-Jun-19	01-Jul-19	1
1060	Drive Piles Interior Pier #1 (I-81 SB)	5	26-Jun-19	02-Jul-19	0
1075	Grading/Excavation Interior Pier #2 (I-81 SB)	4	02-Jul-19	08-Jul-19	3
1065	Drive Piles Abutment A (I-81 SB)	6	03-Jul-19	12-Jul-19	0
1070	FRP Footing Interior Pier #1 (I-81 SB)	6	03-Jul-19	12-Jul-19	12
1080	Grading / Excavation Abutment B (I-81 SB)	4	09-Jul-19	15-Jul-19	21
1090	FRP Columns Interior Pier #1 (I-81 SB)	6	15-Jul-19	23-Jul-19	12
1085	Drive Piles Interior Pier #2 (I-81 SB)	6	15-Jul-19	23-Jul-19	0
1105	FRP Cap Interior Pier #1 (I-81 SB)	10	25-Jul-19	08-Aug-19	12
1095	Drive Piles Abutment B (I-81 SB)	6	25-Jul-19	01-Aug-19	16
1100	FRP Footing Interior Pier #2 (I-81 SB)	6	25-Jul-19	01-Aug-19	0
1115	FRP Columns Interior Pier #2 (I-81 SB)	6	02-Aug-19	12-Aug-19	0
1110	FRP Abutment A (I-81 SB)	20	09-Aug-19	10-Sep-19	12
1120	FRP Cap Interior Pier #2 (I-81 SB)	10	13-Aug-19	28-Aug-19	0
1125	FRP Abutment B (I-81 SB)	20	29-Aug-19	01-Oct-19	0
1130	FRP Slope Protection Abutment A (I-81 SB)	8	12-Sep-19	24-Sep-19	12
1135	FRP Slope Protection Abutment B (I-81 SB)	8	03-Oct-19	14-Oct-19	0
1205	Backfill Abutments A&B (I-81 SB)	6	03-Oct-19	10-Oct-19	2
1140	Erect Girders (I-81 SB)	6	15-Oct-19	23-Oct-19	0
1170	Install Utility Conduits (I-81 SB)	6	24-Oct-19	04-Nov-19	0
1145	FRP Deck (I-81 SB)	30	05-Nov-19	02-Jan-20	0
1150	FRP Parapets (I-81 SB)	16	03-Jan-20	04-Feb-20	0
1180	Cover Depth Survey (I-81 SB)	2	05-Feb-20	07-Feb-20	0
1155	FRP Approach Slab Abutment A (I-81 SB)	8	10-Feb-20	26-Feb-20	0
1160	FRP Approach Slab Abutment B (I-81 SB)	8	28-Feb-20	12-Mar-20	0
1165	Deck Grooving (I-81 SB)	2	13-Mar-20	16-Mar-20	0
1175	Concrete Staining (Parapets/Bents) (I-81 SB)	10	18-Mar-20	03-Apr-20	0
1185	Bridge Safety/Acceptance Inspection	2	06-Apr-20	07-Apr-20	0
I-81 STA 930+00 to STA 952+00 SB		96	13-Sep-19	13-Mar-20	13
2000	Grading / Excavation (I-81 STA 930+00 to 952+00 SB)	20	13-Sep-19	15-Oct-19	48
2010	Storm Drainage (I-81 STA 930+00 to 952+00 SB)	10	17-Oct-19	31-Oct-19	48
2020	Fine Grading (I-81 STA 930+00 to 952+00 SB)	10	04-Nov-19	19-Nov-19	48



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
2060	Install Aggregate Base Course (I-81 STA 930+00 to 952+00 SB)	5	20-Nov-19	27-Nov-19	48
2070	Install Asphalt Base Course (I-81 STA 930+00 to 952+00 SB)	2	02-Mar-20	03-Mar-20	6
2080	Install Asphalt Intermediate Course (I-81 STA 930+00 to 952+00 SB)	2	04-Mar-20	05-Mar-20	6
2090	Install Asphalt Surface Course (I-81 STA 930+00 to 952+00 SB)	1	06-Mar-20	06-Mar-20	6
2040	Pavement Markings/Rumble Strips (I-81 STA 930+00 to 952+00 SB)	2	09-Mar-20	11-Mar-20	13
2050	Guardrail (I-81 STA 930+00 to 952+00 SB)	4	09-Mar-20	13-Mar-20	13
I-81 STA 954+00 to STA 980+00 SB		94	03-Oct-19	30-Mar-20	4
11080	Grading / Excavation (I-81 STA 954+00 to 980+00 SB)	20	03-Oct-19	04-Nov-19	41
11090	Storm Drainage (I-81 STA 954+00 to 980+00 SB)	10	05-Nov-19	20-Nov-19	41
11100	Fine Grading (I-81 STA 954+00 to 980+00 SB)	10	21-Nov-19	10-Dec-19	41
11110	Install Aggregate Base Course (I-81 STA 954+00 to 980+00 SB)	5	12-Dec-19	20-Dec-19	41
11120	Install Asphalt Base Course (I-81 STA 954+00 to 980+00 SB)	2	13-Mar-20	16-Mar-20	3
11130	Install Asphalt Intermediate Course (I-81 STA 954+00 to 980+00 SB)	2	17-Mar-20	20-Mar-20	3
11140	Install Asphalt Surface Course (I-81 STA 954+00 to 980+00 SB)	1	23-Mar-20	23-Mar-20	3
11150	Pavement Markings/Rumble Strips (I-81 STA 954+00 to 980+00 SB)	2	25-Mar-20	26-Mar-20	4
11160	Guardrail (I-81 STA 954+00 to 980+00 SB)	4	25-Mar-20	30-Mar-20	4
Phase 2 - I-81 Northbound Bridge		192	07-Apr-20	24-Mar-21	0
M1050	MILESTONE: SHIFT NB TRAFFIC TO NEW SB STRUCTURE	0		07-Apr-20	0
6000	Install Concrete Barrier (I-81 NB)	3	08-Apr-20	13-Apr-20	0
6010	Remove Temporary Shoring	10	14-Apr-20	29-Apr-20	15
Existing I-81 Northbound Bridge		25	14-Apr-20	28-May-20	0
2105	Demolition of Existing Bridge (I-81 NB)	25	14-Apr-20	28-May-20	0
I-81 Northbound Bridge		164	01-Jun-20	24-Mar-21	0
11180	Grading / Excavation Interior Pier #1 (I-81 NB)	4	01-Jun-20	05-Jun-20	0
11190	Grading / Excavation Abutment A (I-81 NB)	4	08-Jun-20	12-Jun-20	1
11200	Drive Piles Interior Pier #1 (I-81 NB)	5	08-Jun-20	15-Jun-20	0
11230	Grading/Excavation Interior Pier #2 (I-81 NB)	4	15-Jun-20	19-Jun-20	3
11210	Drive Piles Abutment A (I-81 NB)	6	16-Jun-20	24-Jun-20	0
11220	FRP Footing Interior Pier #1 (I-81 NB)	6	16-Jun-20	24-Jun-20	15
11240	Grading / Excavation Abutment B (I-81 NB)	4	22-Jun-20	25-Jun-20	24
11260	FRP Columns Interior Pier #1 (I-81 NB)	6	25-Jun-20	02-Jul-20	15
11250	Drive Piles Interior Pier #2 (I-81 NB)	5	25-Jun-20	01-Jul-20	0
11270	Drive Piles Abutment B (I-81 NB)	6	02-Jul-20	13-Jul-20	20
11280	FRP Footing Interior Pier #2 (I-81 NB)	6	02-Jul-20	13-Jul-20	0
11290	FRP Cap Interior Pier #1 (I-81 NB)	10	06-Jul-20	21-Jul-20	15
11310	FRP Columns Interior Pier #2 (I-81 NB)	10	14-Jul-20	29-Jul-20	0
11300	FRP Abutment A (I-81 NB)	20	23-Jul-20	24-Aug-20	15
11320	FRP Cap Interior Pier #2 (I-81 NB)	10	30-Jul-20	14-Aug-20	0
11330	FRP Abutment B (I-81 NB)	20	17-Aug-20	17-Sep-20	0
11340	FRP Slope Protection Abutment A (I-81 NB)	8	25-Aug-20	03-Sep-20	15
11350	FRP Slope Protection Abutment B (I-81 NB)	8	18-Sep-20	30-Sep-20	0
11940	Backfill Abutments A&B (I-81 NB)	6	18-Sep-20	28-Sep-20	2
11360	Erect Girders (I-81 NB)	6	01-Oct-20	09-Oct-20	0
11900	Install Utility Conduits (I-81 NB)	6	12-Oct-20	20-Oct-20	0
11370	FRP Deck (I-81 NB)	30	22-Oct-20	16-Dec-20	0
11380	FRP Parapets (I-81 NB)	16	17-Dec-20	21-Jan-21	0
11910	Cover Depth Survey (I-81 NB)	2	22-Jan-21	26-Jan-21	0

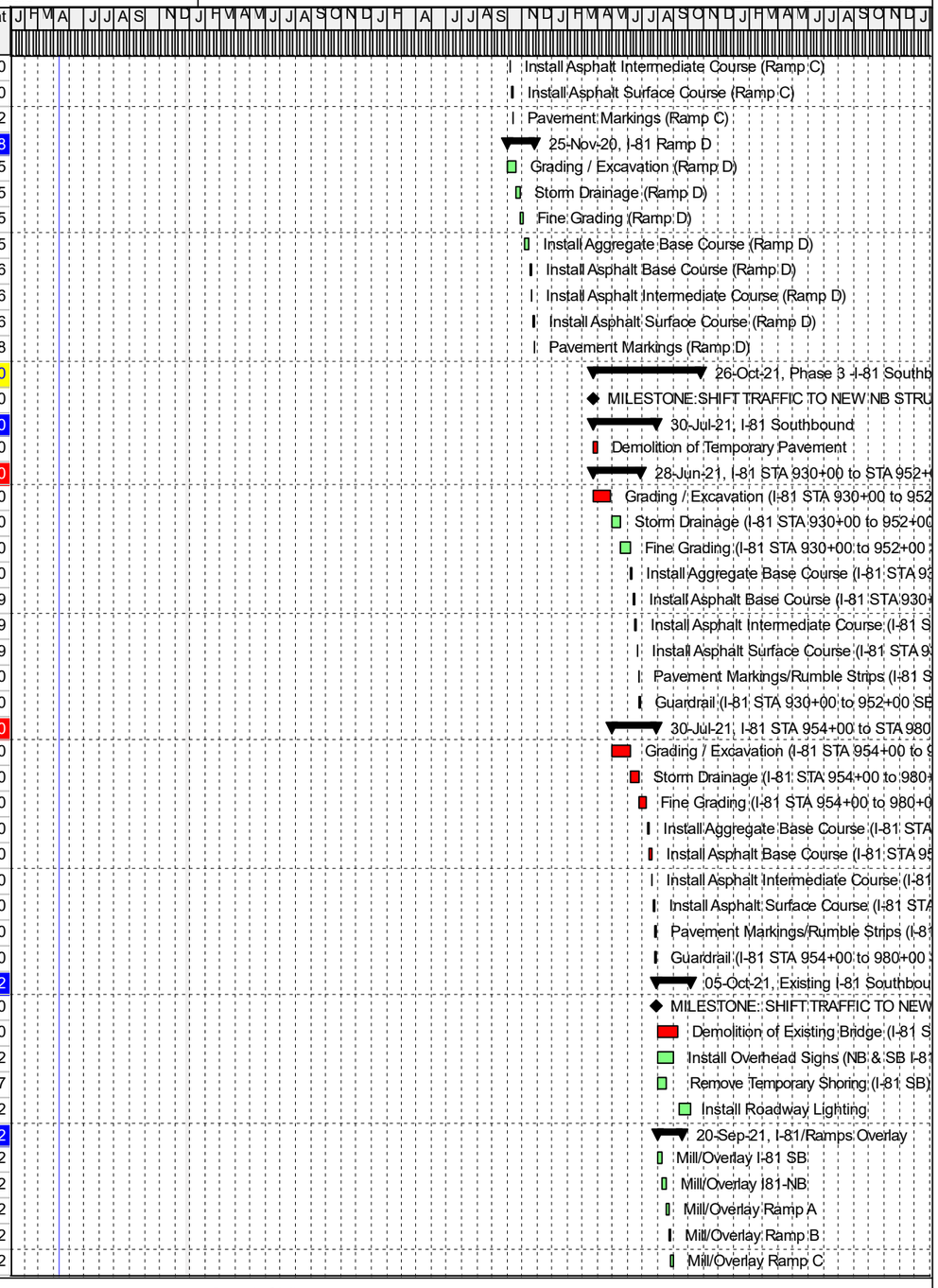


Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
11390	FRP Approach Slab Abutment A (I-81 NB)	8	27-Jan-21	10-Feb-21	0
11400	FRP Approach Slab Abutment B (I-81 NB)	8	12-Feb-21	26-Feb-21	0
11410	Deck Grooving (I-81 NB)	2	01-Mar-21	03-Mar-21	0
11920	Concrete Staining (Parapets/Bents) (I-81 NB)	10	04-Mar-21	19-Mar-21	0
11930	Bridge Safety/Acceptance Inspection (I-81 NB)	2	22-Mar-21	24-Mar-21	0
I-81 STA 930+00 to STA 952+00 NB		106	25-Aug-20	11-Mar-21	7
11740	Grading / Excavation (I-81 STA 930+00 - 952+00 NB)	15	25-Aug-20	17-Sep-20	69
11750	Storm Drainage (I-81 STA 930+00 - 952+00 NB)	10	18-Sep-20	02-Oct-20	69
11760	Fine Grading (I-81 STA 930+00 - 952+00 NB)	5	05-Oct-20	12-Oct-20	69
11770	Install Aggregate Base Course (I-81 STA 930+00 - 952+00 NB)	5	13-Oct-20	20-Oct-20	69
11780	Install Asphalt Base Course (I-81 STA 930+00 - 952+00 NB)	2	01-Mar-21	02-Mar-21	6
11790	Install Asphalt Intermediate Course (I-81 STA 930+00 - 952+00 NB)	2	03-Mar-21	04-Mar-21	6
11800	Install Asphalt Surface Course (I-81 STA 930+00 - 952+00 NB)	2	05-Mar-21	08-Mar-21	6
11810	Pavement Markings/Rumble Strips (I-81 STA 930+00 - 952+00 NB)	2	10-Mar-21	11-Mar-21	7
I-81 STA 954+00 to STA 980+00 NB		77	12-Oct-20	11-Mar-21	7
11820	Grading / Excavation (I-81 STA 954+00 - 980+00 NB)	15	12-Oct-20	03-Nov-20	40
11830	Storm Drainage (I-81 STA 954+00 - 980+00 NB)	10	04-Nov-20	24-Nov-20	40
11840	Fine Grading (I-81 STA 954+00 - 980+00 NB)	5	25-Nov-20	02-Dec-20	40
11850	Install Aggregate Base Course (I-81 STA 954+00 - 980+00 NB)	5	04-Dec-20	14-Dec-20	40
11860	Install Asphalt Base Course (I-81 STA 954+00 - 980+00 NB)	2	01-Mar-21	02-Mar-21	6
11870	Install Asphalt Intermediate Course (I-81 STA 954+00 - 980+00 NB)	2	03-Mar-21	04-Mar-21	6
11880	Install Asphalt Surface Course (I-81 STA 954+00 - 980+00 NB)	2	05-Mar-21	08-Mar-21	6
11890	Pavement Markings/Rumble Strips (I-81 STA 954+00 - 980+00 NB)	2	10-Mar-21	11-Mar-21	7
I-81 Ramp A		32	01-Jun-20	23-Jul-20	132
11420	Grading / Excavation (Ramp A)	10	01-Jun-20	16-Jun-20	55
11430	Storm Drainage (Ramp A)	5	18-Jun-20	24-Jun-20	55
11440	Fine Grading (Ramp A)	5	25-Jun-20	01-Jul-20	55
11450	Install Aggregate Base Course (Ramp A)	5	02-Jul-20	10-Jul-20	55
11460	Install Asphalt Base Course (Ramp A)	2	13-Jul-20	14-Jul-20	90
11470	Install Asphalt Intermediate Course (Ramp A)	2	15-Jul-20	17-Jul-20	90
11480	Install Asphalt Surface Course (Ramp A)	2	20-Jul-20	21-Jul-20	90
11490	Pavement Markings (Ramp A)	1	23-Jul-20	23-Jul-20	132
I-81 Ramp B		32	13-Jul-20	01-Sep-20	107
11500	Grading / Excavation (Ramp B)	10	13-Jul-20	28-Jul-20	55
11510	Storm Drainage (Ramp B)	5	29-Jul-20	04-Aug-20	55
11520	Fine Grading (Ramp B)	5	05-Aug-20	13-Aug-20	55
11530	Install Aggregate Base Course (Ramp B)	5	14-Aug-20	21-Aug-20	55
11540	Install Asphalt Base Course (Ramp B)	2	24-Aug-20	25-Aug-20	65
11550	Install Asphalt Intermediate Course (Ramp B)	2	26-Aug-20	27-Aug-20	65
11560	Install Asphalt Surface Course (Ramp B)	2	28-Aug-20	31-Aug-20	65
11570	Pavement Markings (Ramp B)	1	01-Sep-20	01-Sep-20	107
I-81 Ramp C		32	24-Aug-20	13-Oct-20	82
11580	Grading / Excavation (Ramp C)	10	24-Aug-20	04-Sep-20	55
11590	Storm Drainage (Ramp C)	5	08-Sep-20	15-Sep-20	55
11600	Fine Grading (Ramp C)	5	17-Sep-20	24-Sep-20	55
11610	Install Aggregate Base Course (Ramp C)	5	25-Sep-20	01-Oct-20	55
11620	Install Asphalt Base Course (Ramp C)	2	02-Oct-20	05-Oct-20	40

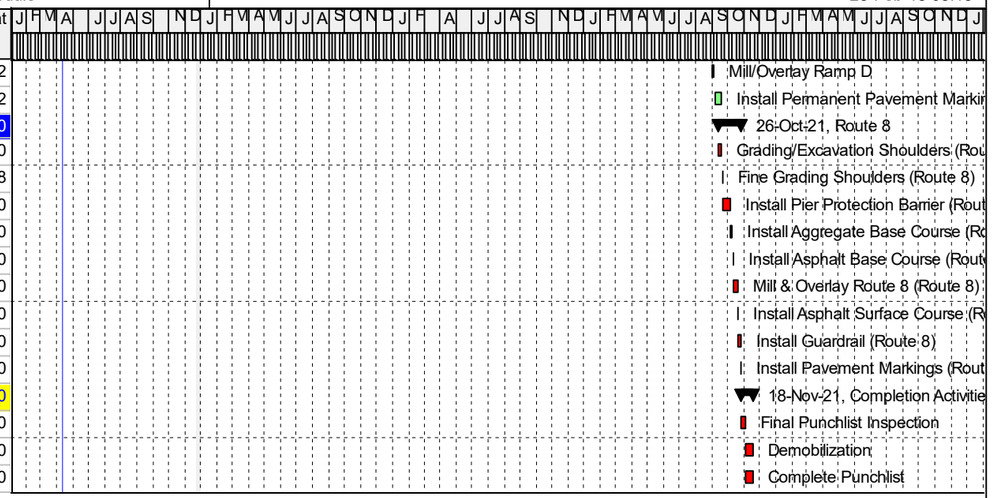


Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
11630	Install Asphalt Intermediate Course (Ramp C)	2	07-Oct-20	08-Oct-20	40
11640	Install Asphalt Surface Course (Ramp C)	2	09-Oct-20	12-Oct-20	40
11650	Pavement Markings (Ramp C)	1	13-Oct-20	13-Oct-20	82
I-81 Ramp D		31	02-Oct-20	25-Nov-20	58
11660	Grading / Excavation (Ramp D)	10	02-Oct-20	19-Oct-20	55
11670	Storm Drainage (Ramp D)	5	20-Oct-20	27-Oct-20	55
11680	Fine Grading (Ramp D)	5	28-Oct-20	03-Nov-20	55
11690	Install Aggregate Base Course (Ramp D)	5	04-Nov-20	13-Nov-20	55
11700	Install Asphalt Base Course (Ramp D)	2	16-Nov-20	18-Nov-20	16
11710	Install Asphalt Intermediate Course (Ramp D)	2	19-Nov-20	20-Nov-20	16
11720	Install Asphalt Surface Course (Ramp D)	2	23-Nov-20	24-Nov-20	16
11730	Pavement Markings (Ramp D)	1	25-Nov-20	25-Nov-20	58
Phase 3 -I-81 Southbound Improvements		125	25-Mar-21	26-Oct-21	0
M1025	MILESTONE:SHIFT TRAFFIC TO NEW NB STRUCTURE	0		25-Mar-21	0
I-81 Southbound		73	25-Mar-21	30-Jul-21	0
1195	Demolition of Temporary Pavement	5	25-Mar-21	02-Apr-21	0
I-81 STA 930+00 to STA 952+00 SB		53	25-Mar-21	28-Jun-21	20
11980	Grading / Excavation (I-81 STA 930+00 to 952+00 SB)	20	25-Mar-21	28-Apr-21	0
11990	Storm Drainage (I-81 STA 930+00 to 952+00 SB)	10	30-Apr-21	18-May-21	20
12000	Fine Grading (I-81 STA 930+00 to 952+00 SB)	10	19-May-21	07-Jun-21	20
12030	Install Aggregate Base Course (I-81 STA 930+00 to 952+00 SB)	3	08-Jun-21	11-Jun-21	20
12040	Install Asphalt Base Course (I-81 STA 930+00 to 952+00 SB)	2	14-Jun-21	15-Jun-21	19
12050	Install Asphalt Intermediate Course (I-81 STA 930+00 to 952+00 SB)	2	17-Jun-21	18-Jun-21	19
12060	Install Asphalt Surface Course (I-81 STA 930+00 to 952+00 SB)	2	21-Jun-21	22-Jun-21	19
12010	Pavement Markings/Rumble Strips (I-81 STA 930+00 to 952+00 SB)	2	23-Jun-21	24-Jun-21	20
12020	Guardrail (I-81 STA 930+00 to 952+00 SB)	4	23-Jun-21	28-Jun-21	20
I-81 STA 954+00 to STA 980+00 SB		53	30-Apr-21	30-Jul-21	0
12070	Grading / Excavation (I-81 STA 954+00 to 980+00 SB)	20	30-Apr-21	07-Jun-21	0
12080	Storm Drainage (I-81 STA 954+00 to 980+00 SB)	10	08-Jun-21	23-Jun-21	0
12090	Fine Grading (I-81 STA 954+00 to 980+00 SB)	10	24-Jun-21	09-Jul-21	0
12120	Install Aggregate Base Course (I-81 STA 954+00 to 980+00 SB)	3	12-Jul-21	14-Jul-21	0
12130	Install Asphalt Base Course (I-81 STA 954+00 to 980+00 SB)	2	16-Jul-21	19-Jul-21	0
12140	Install Asphalt Intermediate Course (I-81 STA 954+00 to 980+00 SB)	2	20-Jul-21	21-Jul-21	0
12150	Install Asphalt Surface Course (I-81 STA 954+00 to 980+00 SB)	2	23-Jul-21	26-Jul-21	0
12100	Pavement Markings/Rumble Strips (I-81 STA 954+00 to 980+00 SB)	2	27-Jul-21	28-Jul-21	0
12110	Guardrail (I-81 STA 954+00 to 980+00 SB)	4	27-Jul-21	30-Jul-21	0
Existing I-81 Southbound Bridge		40	30-Jul-21	05-Oct-21	12
M1055	MILESTONE: SHIFT TRAFFIC TO NEW PATTERN	0		30-Jul-21	0
2585	Demolition of Existing Bridge (I-81 SB)	25	02-Aug-21	10-Sep-21	0
M1065	Install Overhead Signs (NB & SB I-81)	20	02-Aug-21	01-Sep-21	32
2605	Remove Temporary Shoring (I-81 SB)	10	02-Aug-21	17-Aug-21	27
2595	Install Roadway Lighting	15	13-Sep-21	05-Oct-21	12
I-81/Ramps Overlay		30	02-Aug-21	20-Sep-21	22
2155	Mill/Overlay I-81 SB	5	02-Aug-21	09-Aug-21	22
2160	Mill/Overlay I81-NB	5	10-Aug-21	17-Aug-21	22
2165	Mill/Overlay Ramp A	3	19-Aug-21	23-Aug-21	22
2170	Mill/Overlay Ramp B	3	24-Aug-21	26-Aug-21	22
2175	Mill/Overlay Ramp C	3	27-Aug-21	31-Aug-21	22



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
2180	Mill/Overlay Ramp D	3	01-Sep-21	03-Sep-21	22
2190	Install Permanent Pavement Markings	8	07-Sep-21	20-Sep-21	22
Route 8		27	13-Sep-21	26-Oct-21	0
1255	Grading/Excavation Shoulders (Route 8)	5	13-Sep-21	20-Sep-21	0
1265	Fine Grading Shoulders (Route 8)	2	21-Sep-21	22-Sep-21	8
1335	Install Pier Protection Barrier (Route 8)	10	21-Sep-21	05-Oct-21	0
1275	Install Aggregate Base Course (Route 8)	2	06-Oct-21	08-Oct-21	0
1285	Install Asphalt Base Course (Route 8)	2	11-Oct-21	12-Oct-21	0
1325	Mill & Overlay Route 8 (Route 8)	4	13-Oct-21	19-Oct-21	0
1295	Install Asphalt Surface Course (Route 8)	1	20-Oct-21	20-Oct-21	0
1305	Install Guardrail (Route 8)	2	22-Oct-21	25-Oct-21	0
1315	Install Pavement Markings (Route 8)	1	26-Oct-21	26-Oct-21	0
Completion Activities		14	27-Oct-21	18-Nov-21	0
5655	Final Punchlist Inspection	5	27-Oct-21	03-Nov-21	0
5670	Demobilization	9	04-Nov-21	18-Nov-21	0
5660	Complete Punchlist	9	04-Nov-21	18-Nov-21	0



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

APPENDIX

Attachment 4.0.1.1

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	Appendix
Acknowledgement of RFP, Revisions, and/or Addenda	Attachment 3.6 (Form C-78-RFP)	Sections 3.6, 4.0.1.1	no	Appendix
Letter of Submittal	NA	Sections 4.1		1-2
Letter of Submittal on Offeror's letterhead	NA	Section 4.1.1	yes	2
Identify the full legal name and address of Offeror	NA	Section 4.1.1	yes	2
Authorized representative's original signature	NA	Section 4.1.1	yes	2
Declaration of intent	NA	Section 4.1.2	yes	2
120 day declaration	NA	Section 4.1.3	yes	2
Point of Contact information	NA	Section 4.1.4	yes	2
Principal Officer information	NA	Section 4.1.5	yes	2
Interim Milestone and Final Completion Date(s)	NA	Section 4.1.6	yes	2
Proposal Payment Agreement or Waiver of Proposal Payment	Attachment 9.3.1 or 9.3.2	Section 4.1.7	no	Appendix
Certification Regarding Debarment Forms	Attachment 11.8.6(a) Attachment 11.8.6(b)	Section 4.1.8	no	Appendix
Offeror's Qualifications	NA	Section 4.2		3-4

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	3
Organizational chart with any updates since the SOQ submittal clearly identified	NA	Section 4.2.2	yes	3
Revised narrative when organizational chart includes updates since the SOQ submittal	NA	Section 4.2.2	yes	3
Design Concept	NA	Section 4.3		5-13
Conceptual Roadway Plans and description	NA	Section 4.3.1	yes	5-8
Conceptual Structural Plans and description	NA	Section 4.3.2	yes	8-13
Project Approach	NA	Section 4.4		14-27
Environmental Management	NA	Section 4.4.1	yes	14-17
Utilities	NA	Section 4.4.2	yes	17-18
Geotechnical	NA	Section 4.4.3	yes	18-21
Quality Assurance/ Quality Control (QA/QC)	NA	Section 4.4.4	yes	21-27
Construction of Project	NA	Section 4.5		28-38
Sequence of Construction	NA	Section 4.5.1	yes	28-34
Transportation Management Plan	NA	Section 4.5.2	yes	34-38

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		39
Written statement of percent DBE participation	NA	Section 4.6	yes	39
Proposal Schedule	NA	Section 4.7		40-55
Proposal Schedule	NA	Section 4.7	no	46-55
Proposal Schedule Narrative	NA	Section 4.7	no	40-45
Proposal Schedule in electronic format (CD-ROM)	NA	Section 4.7	no	-

Attachment 3.6 (Form C-78-RFP)

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)

Patrick K Bartorillo — SIGNATURE

2-26-2018 — DATE

PATRICK K. BARTORILLO — PRINTED NAME

PRESIDENT — TITLE

Attachment 9.3.1

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 Branch Civil, 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: _____

Branch Civil, Inc.

By: Patrick K Bartolo

Name: Patrick K. Bartorillo

Title: President

Attachment 11.8.6(a)

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.

Signature	Date	Title
[signature]	2-26-2018	PRESIDENT

BRANCH CIVIL, INC.
Name of Firm

Attachment 11.8.6(b)

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	Date	Title
	2/8/18	Manager

Smith-Rowe, 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.

E. Richard Capps	2/13/18	Sr. Vice President
Signature	Date	Title

E. Richard Capps Jr., P.E.

STV Incorporated dba STV Group Incorporated

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	Date	Title
	2/7/2018	Vice President

Bowman Consulting Group, Ltd.
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	2/7/2018 Date	President Title

EEE Consulting, Inc.

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	02/07/2018	President
	Date	Title

Endesco, Inc.

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	February 7, 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

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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	February 8, 2018 Date	Senior Vice President/Regional Manager Title

MBP
Name of Firm

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

Project No.: 0081-154-733

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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	Date	Title
	2/12/2018	V.P. of CM DIVISION

NXL CONSTRUCTION SERVICES, INC.
Name of Firm

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

Project No.: 0081-154-733

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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	2/13/2018 Date	Principal, Senior VP Title

Schnabel Engineering, 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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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.

Wendy Campbell 2/9/18 Public Relations Specialist
Signature Date Title

Seventh Point Transportation PR
Name of Firm

VDOT
Virginia Department of Transportation

Conceptual Project Plans / Volume II

I-81 BRIDGE REPLACEMENT AT EXIT 114

A DESIGN-BUILD PROJECT

Montgomery County / Town of Christiansburg, Virginia

FROM 0.381 MI. SOUTH OF CHRISTIANSBURG SCL TO 0.510 MI. NORTH OF CHRISTIANSBURG SCL

BRANCH CIVIL | *in association with* STV 100 Years

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

SECTION 4.3.1
CONCEPTUAL ROADWAY PLANS

PRELIMINARY PLANS

THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN CONCEPT

THE BRANCH TEAM'S TECHNICAL PROPOSAL MEETS OR EXCEEDS ALL REQUIREMENTS LISTED IN THE DESIGN CRITERIA TABLE AS DEFINED IN THE VDOT RFP (SHOWN ON THIS SHEET). THE LIMITS OF CONSTRUCTION ARE WITHIN THE EXISTING/ PROPOSED RIGHT-OF-WAY LIMITS SHOWN IN THE RFP CONCEPTUAL PLANS WITH THE EXCEPTION OF PERMANENT AND TEMPORARY EASEMENTS. THE PROPOSED PERMANENT EASEMENTS ARE IDENTICAL TO WHAT'S DEFINED IN THE VDOT RFP PLANS.
THE PROPOSED DESIGN CONCEPT DOES NOT INCLUDE DESIGN ELEMENTS THAT REQUIRE DESIGN EXCEPTIONS AND/ OR DESIGN WAIVERS UNLESS THEY ARE IDENTIFIED OR INCLUDED IN THE RFP.

THE CONCEPTUAL ROAD PLANS MEET ALL THE REQUIREMENTS ESTABLISHED IN THE RFP. AS REQUIRED IN THE RFP PART I SECTION 4.3J, THE CONCEPTUAL ROAD PLANS IDENTIFY:

A. GENERAL GEOMETRY INCLUDING HORIZONTAL CURVE DATA AND ASSOCIATED DESIGN SPEEDS. THE NUMBER AND WIDTHS OF LANES AND SHOULDERS; (SEE PLAN AND TYPICAL SECTION SHEETS 3-8)

B. HORIZONTAL ALIGNMENTS; (SEE PLAN AND TYPICAL SECTION SHEETS 3-8)

C. MAXIMUM GRADE FOR ALL SEGMENTS AND CONNECTORS; (SEE TABLE THIS SHEET).

D. TYPICAL SECTIONS OF THE ROADWAY SEGMENTS TO INCLUDE RAMPS, RETAINING WALLS AND BRIDGE STRUCTURES (SEE PLAN AND TYPICAL SECTION SHEETS 3-8). SEE STRUCTURAL PLANS FOR DETAILED DESIGN INFORMATION ABOUT THE RETAINING WALL AND BRIDGE STRUCTURES.

E. CONCEPTUAL HYDRAULIC AND STORMWATER MANAGEMENT DESIGN; (SEE PLAN SHEETS 3-8)

F. PROPOSED RIGHT OF WAY LIMITS - SAME AS VDOT'S RFP CONCEPTUAL RIGHT OF WAY LIMIT. (SEE PLAN SHEETS 3- 8)

G. PROPOSED UTILITY IMPACTS; (SEE PLAN SHEETS 3-8 AND SECTION 4.4 IN PART I)

H. OTHER KEY PROJECT FEATURES:
   1) LIGHTING; (SEE PLAN SHEET 5)
   2) GUARDRAIL/BARRIER (SEE PLAN SHEETS 3-8 AND THE GUARDRAIL AND BARRIER LOCATION TABLE ON THIS SHEET)
   3) LOCATIONS OF MILL AND OVERLAY/BUILDUP OF EXISTING PAVEMENT/NEW PAVEMENT (SEE PLAN SHEETS 3 - 8)
   4) OVERHEAD SIGN STRUCTURES, ITS, SIGNAL, ETC. (SEE PLAN SHEETS 3-8)
   5) AUXILIARY LANE LENGTH (SEE TABLE THIS SHEET)
   6) PAVEMENT DESIGN (SEE SHEET 9)

I. MAJOR PROJECT ENHANCEMENTS PROPOSED IN THE BRANCH'S TEAM DESIGN CONCEPT. (SEE PLAN SHEETS 2-8)

THE CONCEPTUAL BRIDGE PLANS MEET ALL THE REQUIREMENTS ESTABLISHED IN THE RFP. AS REQUESTED IN SECTION 4.3.2. THE CONCEPTUAL BRIDGE PLANS IDENTIFY:

A. STRUCTURAL CONCEPT FOR THE BRIDGE STRUCTURES

B. RETAINING WALLS

C. HORIZONTAL AND VERTICAL CLEARANCES

D. THE NUMBER AND WIDTHS OF LANES AND SHOULDERS

E. RENDERINGS OF AN ELEVATION VIEW, TRANSVERSE SECTION, AND ABUTMENT CONFIGURATIONS FOR EACH PROPOSED STRUCTURE TYPE

GUARDRAIL AND BARRIER LOCATION

ROADWAY	STATION TO STATION FROM	STATION TO STATION TO	OFFSET	TYPE
I-81 NB LANES	934+60	941+00	LT	STD GR-MGS
	941+00	851+27	LT	WALL[1, 2]
	953+68	970+00	LT	WALL[1, 2]
	936+15	943+50	RT	STD GR-MGS
	947+75	951+12	RT	STD GR-MGS
	953+66	960+50	RT	STD GR-MGS
	964+12	971+00	RT	STD GR-MGS
I-81 SB LANES	936+65	940+65	LT	STD GR-MGS
	948+17	951+50	LT	STD GR-MGS
	954+11	956+75	LT	STD GR-MGS
	963+12	974+10	LT	STD GR-MGS
	936+00	944+00	RT	STD GR-MGS
	944+00	951+24	RT	WALL[1, 2]
	954+26	958+45	RT	WALL[1, 2]
	958+45	965+00	RT	STD GR-MGS
RAMP B	26+00	32+62	RT	STD GR-MGS
RAMP C	30+00	35+38	RT	STD GR-MGS
ROUTE 8	1055+91	1056+85	LT	STD GR-MGS
	1056+85	1058+33	LT	STD BPPS-3
	1058+33	1060+45	LT	STD GR-MGS
	1055+79	1057+06	RT	STD GR-MGS
	1057+06	1058+51	RT	STD BPPS-3
	1058+61	1060+71	RT	STD GR-MGS

1. SEE STRUCTURAL PLANS FOR TYPE AND DETAILS.
2. VDOT STD FOA SHALL BE USED IN CONJUNCTION W/GR-MGS4 AT THE TIE-IN AREA ON RETAINING WALL SURFACE.

MAXIMUM GRADES

ALIGNMENT	MAX. UPGRADE RFP DESIGN	MAX. UPGRADE REVISED DESIGN	MAX. DOWNGRADE RFP DESIGN	MAX. DOWNGRADE REVISED DESIGN	ALLOWABLE GRADE
Ramp A	1.12%	1.15%	-5.60%	-4.68%	6%
Ramp B	6%	5%	N/A	N/A	6%
Ramp C	N/A	N/A	-4.40%	-4.46%	6%
Ramp D	1.15%	1.38%	-1.26%	-1.26%	6%
I-81 NB	2.54%	2.50%	-0.58%	-0.60%	4%
I-81 SB	1.57%	1.36%	-0.81%	-0.88%	4%
Rte 8	4.76%	4.76%	N/A	N/A	8%/5%*
* WITHIN/OUTSIDE CHRISTIANSBURG TOWN LIMITS					

AUXILIARY LANE LENGTH AT INTERCHANGE

LOCATION	RFP	REVISED DESIGN
NB Deceleration Lane Length @ Ramp A	1000' with 300' Taper	1025' with 300' Taper
NB Acceleration Lane Length @ Ramp B	1260' with 300' Taper	1300' with 300' Taper
SB Deceleration Lane Length @ Ramp C	890' with 300' Taper	890' with 300' Taper
SB Acceleration Lane Length @ Ramp D	1025' with 300' Taper	1025' with 300' Taper
(Distance Measured from Physical Nose)		

DESIGN CRITERIA TABLE

No.	DESIGN CRITERIA		I-81	RAMPS	ROUTE 8 (Within Christiansburg Town Limits)	ROUTE 8 (Outside Christiansburg Town Limits)
1	Classification		Rural Principal Arterial - Interstate	Interchange Ramp	Urban Other Principal Arterial	Rural Minor Arterial
2	Geometric Design Standard		GS-1	GS-R	GS-5	GS-2
3	Terrain		Rolling	Rolling	Rolling	Rolling
4	Average Daily traffic (ADT)	Existing (2017)	26,500 NB/26,500 SB	2,450-4,250	14,300	14,300
		Design (2040)	34,500 NB/33,600 SB	3,300-5,900	20,000	20,000
5	Truck percentage		24% SB - 27% NB	5%-7%	2%	2%
6	Speed	Posted	70 MPH	N/A	35 MPH	45 MPH
		Design	70 MPH (1)	35 MPH (min)	40 MPH	50 MPH
7	Design Vehicle		WB-67	WB-67	WB-62	WB-62
8	Minimum Curve Radius		1,821 ft	316 ft	536 ft	760 ft
9	Maximum Relative Gradient		0.4	0.71	0.58	0.5
10	Superelevation	Standard	TC-5.11R	TC-5.11R	TC-5.11U	TC-5.11R
		Max Rate	8% (TC-5.11R)	8% (TC-5.11R)	4% (TC-5.11U)	8% (TC-5.11R)
11	Maximum Vertical Grade		4%	6%	8%	5%
12	Minimum Stopping Sight Distance		730 ft	250 ft	305 ft	425 ft
13	Verticle Design Criteria	"K" Crest	247 (4)	29	44	84
		"K" Sag	181 (4)	49	64	96
14	Lane	Number	2 thru lane + 1 aux. at ramp	1 per direction	2 per direction	1 per direction
		Width	12 ft	16 ft	12 ft (5)	12 ft (5)
15	Shoulder Width	Paved - Left	4 ft	4 ft	8 ft	8 ft
		Paved - Right	10 ft	8 ft	8 ft	8 ft
		Total Shoulder Width	12 ft (2)(3) RT or LT	10 ft RT/ 6ft LT	10 ft	10 ft
16	Bridge Shoulder width	Left	6 ft	N/A	N/A	N/A
		Right	12 ft	N/A	N/A	N/A
17	Minimum Vertical Clearance		16'-6"	N/A	16'6"	N/A
18	Slope Design Standard		CS-4B	CS-4B	CS-3, CS-3B	CS-4, CS-4A, CS-4C
19	Clear Zone		VDOT RDM App. A Table A-2-1	VDOT RDM App. A Table A-2-1	VDOT RDM App. A Table A-2-1	VDOT RDM App. A Table A-2-1
20	Minimum Ditch Front Slope		6:1 (6)	6:1	4:1	4:1
21	Minimum Ditch Front Slope Width		12 ft (6)	10 ft	6 ft	6 ft

(1) See Design Waiver No. 002 in VDOT RFP package.
(2) Graded shoulder shall increase 4 ft when std. GR-MGS is required. Asphalt paving under guardrail shall adhere to std. MC-4.
(3) See Design Waiver No. 001 in VDOT RFP package.
(4) Or minimum curve length of L = 3 x DS, whichever is greater.
(5) Or existing
(6) If able to tie to existing front slope with a 4:1 max., 12 ft front slope width does not have to be maintained

DESIGN BUILDER: BRANCH CIVIL

DESIGNED BY: STV 100 Years

STATE PROJECT NO. 0081-154-733,R201,C501,B601,B616

FEDERAL PROJECT NO. NHPP-081-2(992)

I-81 BRIDGE REPLACEMENT AT EXIT 114

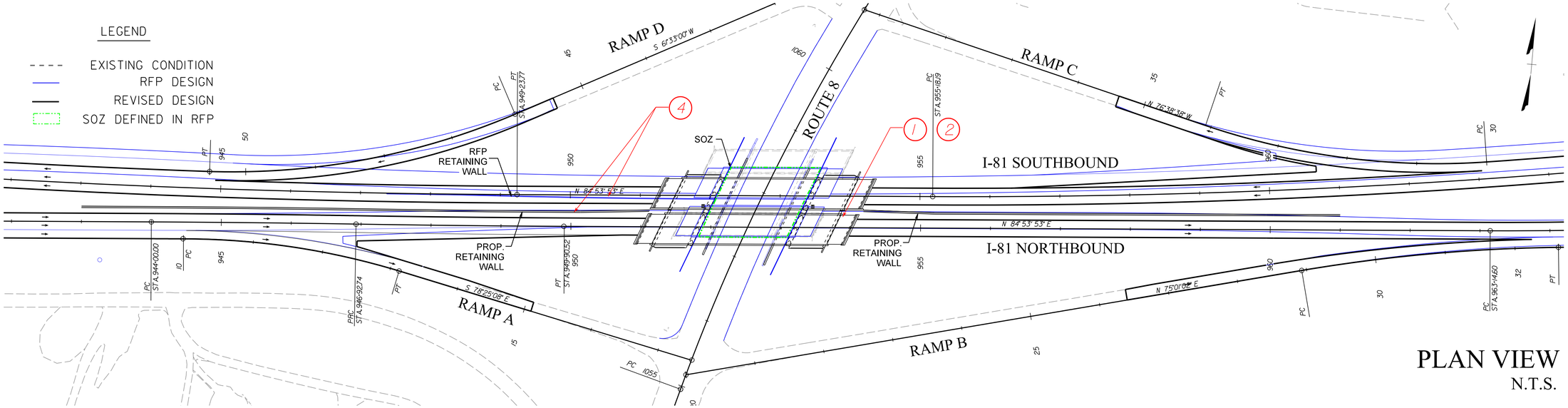
VDOT Virginia Department of Transportation

DESIGN CONCEPT AND NOTES

SHEET NO. 1

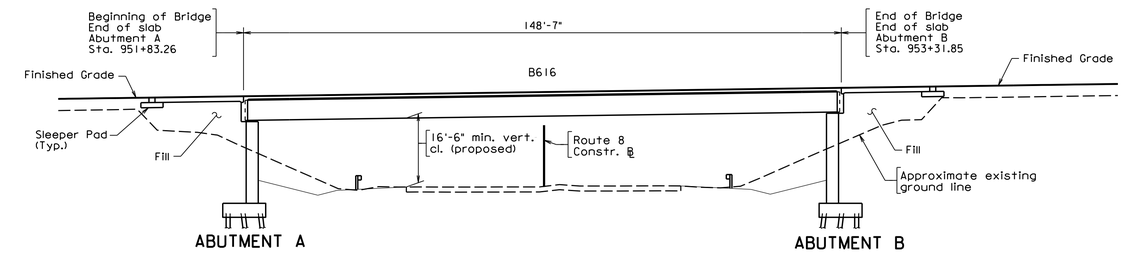
PAGE NO. 1

MAJOR PROJECT ENHANCEMENTS PROPOSED IN THE BRANCH'S TEAM CONCEPT

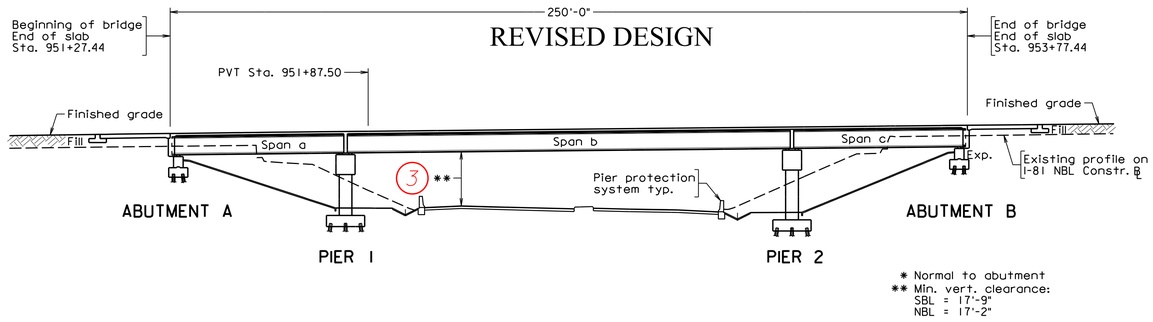


PLAN VIEW
N.T.S.

RFP



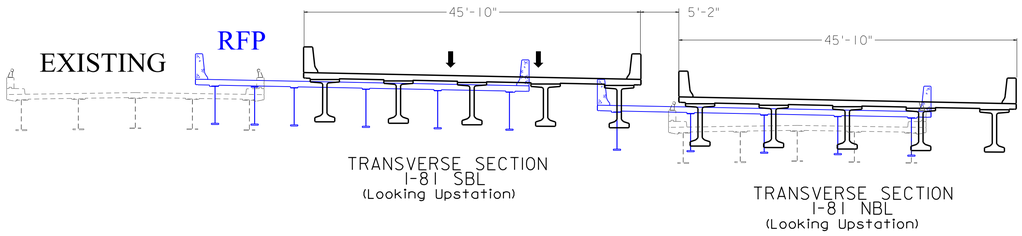
REVISED DESIGN



* Normal to abutment
** Min. vert. clearance:
SBL = 17'-9"
NBL = 17'-2"

DEVELOPED SECTION ALONG I-81 NBL CONSTRUCTION ℄
SBL Bridge Similar.
N.T.S.

REVISED DESIGN



BRIDGE TRANSVERSE SECTIONS
N.T.S.

1. *SHIFTED I-81 ALIGNMENTS TO ALLOW NEW SOUTHBOUND BRIDGE TO BE CONSTRUCTED ENTIRELY WITHIN THE EXISTING MEDIAN IN A SINGLE CONSTRUCTION PHASE.*

2. *PROPOSED 3-SPAN PRESTRESSED CONCRETE BRIDGES ACCOMMODATES FUTURE ROAD AND PEDESTRIAN IMPROVEMNTS AT THIS INTERCHANGE. NO BRIDGE STRUCTURES ARE WITHIN THE STRUCTURAL OBSTRUCTION ZONE (SOZ).*

3. *REVISED BRIDGE PROFILES TO ACCOMMODATE REVISED BRIDGE TYPE,SIZE,& LOCATION,AND PROVIDE VERTICAL CLEARANCE FOR FUTURE WIDENING OF I-81.*

4. *REALIGNED I-81 SOUTHBOUND RETAINING WALL TO BE PARALLEL TO NORTHBOUND MAINLINE TO FACILITATE MOT AND FUTURE INTERCHANGE RECONFIGURATION.*

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN BUILDER
BRANCH CIVIL

DESIGNED BY
STV 100 Years

STATE PROJECT NO.
0081-154-733,R201,C501,B616,C501,B601,B616

FEDERAL PROJECT NO.
NHPP-081-2(992)

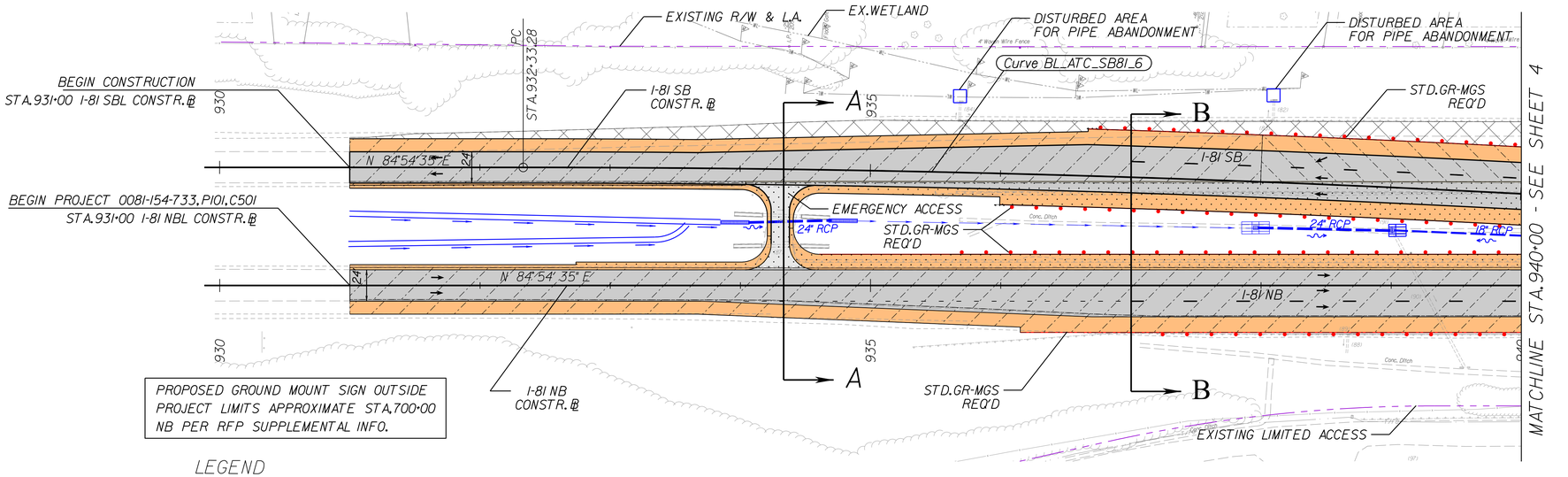
VDOT Virginia Department of Transportation

I-81 BRIDGE REPLACEMENT AT EXIT 114

SUMMARY OF MAJOR DESIGN ENHANCEMENTS

SHEET NO.
2

PAGE NO.
2

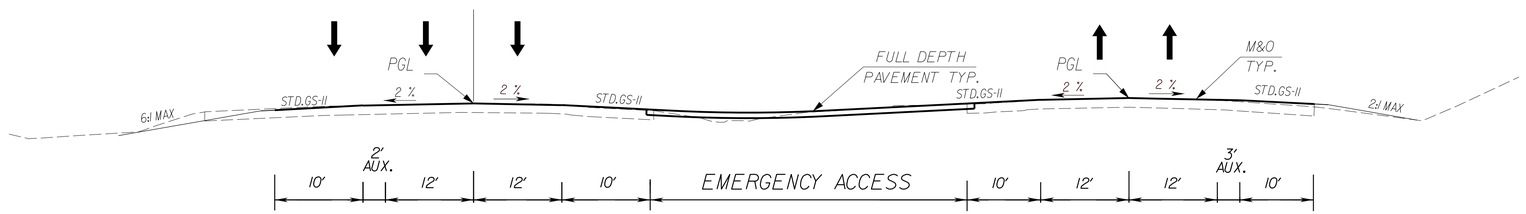


Curve BL_ATC_SB81_6
PI = 936+55.29
DELTA = 3° 20' 02.96" (RT)
D = 0° 23' 43"
T = 422.01'
L = 843.78'
R = 14,500.00'
PC = 932+33.28
PRC = 940+77.06
SE = NC
V = 70 MPH

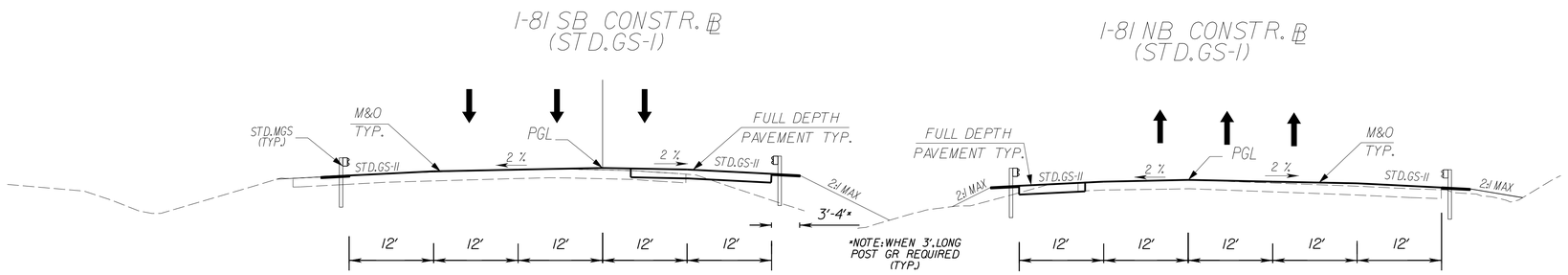
LEGEND

- Denotes Full Depth Pavement
- Denotes Mill & Overlay
- Denotes Mill & Overlay W/ Build-up
- Denotes Demolition of Pavement
- Denotes Travel Lanes
- Denotes Proposed Bridge Limits
- Denotes Exist. Bridge Limits
- Denotes Proposed Paved Shoulder
- Proposed Base Mounted Local Control Cabinet
- Proposed Electrical Service (SE-5)
- Proposed Span Wire
- Proposed LED Luminaire
- Proposed Underbridge LED Luminaire
- Proposed Wooden Pole
- Denotes Existing R/W & L.A.
- Proposed Drainage Pipe
- Proposed Drainage Ditch
- Denotes Utility Impact (W/Note) XX U

SCALE
0 50' 100'



SECTION A-A



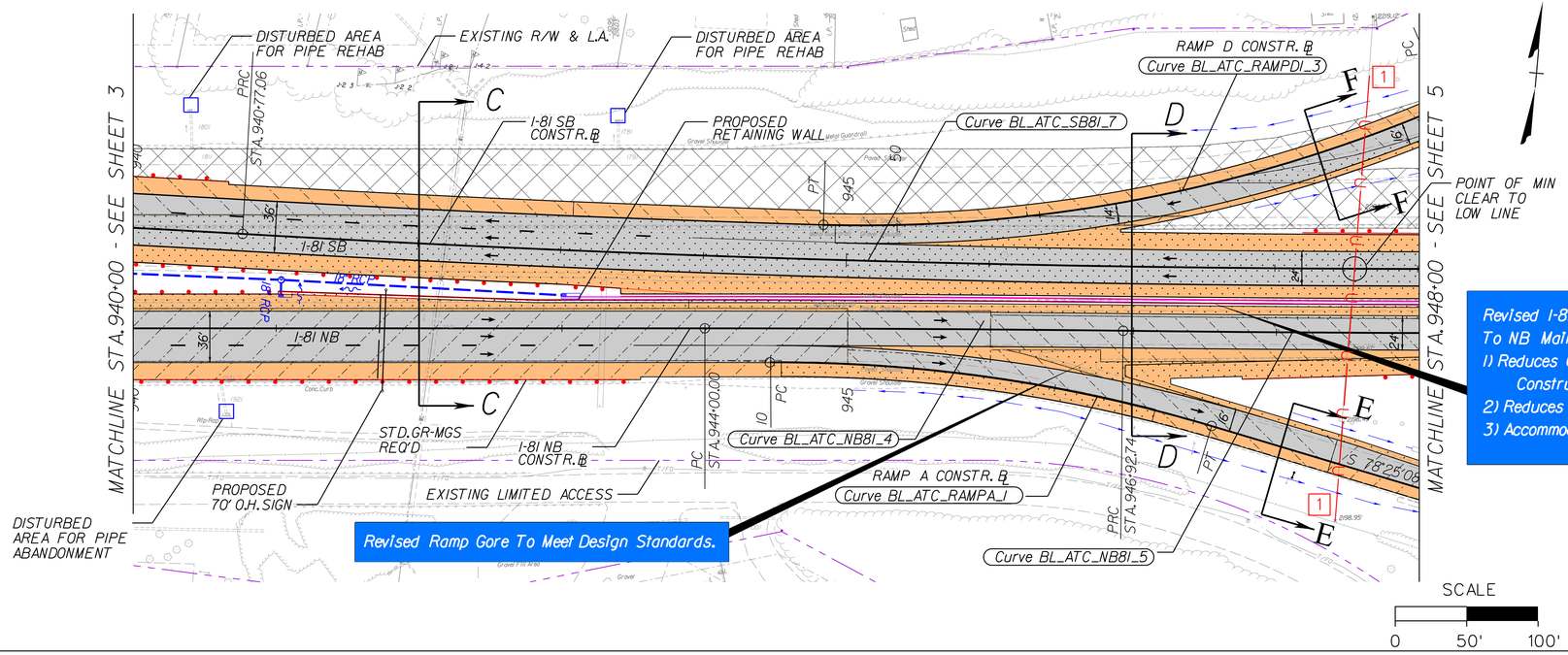
SECTION B-B

FOR PAVEMENT DESIGN SEE SHEET 9

N.T.S.

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN BUILDER: BRANCH CIVIL
DESIGNED BY: STV 100 Years
STATE PROJECT NO.: 0081-154-733,R201,C501,B601,B616
FEDERAL PROJECT NO.: NHPP-081-2(992)
VDOT Virginia Department of Transportation
I-81 BRIDGE REPLACEMENT AT EXIT 114
PLAN AND TYPICAL SECTIONS
SHEET NO. 3
PAGE NO. 3



Revised I-81 SB Retaining Wall Alignment Generally Parallel To NB Mainline:
1) Reduces Conflict With Temporary Pavement Construction For I-81 NB Detour;
2) Reduces Construction Phases And Temporary Shoring;
3) Accommodates Future Interchange Improvements.

Curve BL_ATC_SB81_7
PI = 945+00.54
DELTA = 3° 20' 44.49" (LT)
D = 0° 23' 43"
T = 423.47'
L = 846.70'
R = 14,500.00'
PRC = 940+77.06
PT = 949+23.77
SE = NC
V = 70 MPH

Curve BL_ATC_RAMPDI_3
PI = 48+32.58
DELTA = 25° 03' 32.57" (RT)
D = 5° 33' 46"
T = 228.90'
L = 450.48'
R = 1,030.00'
PC = 46+03.67
PT = 50+54.16
SE = 5.9%
V = 40 MPH

Curve BL_ATC_NB81_4
PI = 945+46.37
DELTA = 0° 40' 15.28" (RT)
D = 0° 13' 45"
T = 146.37'
L = 292.74'
R = 25,000.00'
PC = 944+00.00
PRC = 946+92.74
SE = NC
V = 70 MPH

Curve BL_ATC_NB81_5
PI = 948+41.63
DELTA = 0° 40' 56.82" (LT)
D = 0° 13' 45"
T = 148.89'
L = 297.78'
R = 25,000.05'
PRC = 946+92.74
PT = 949+90.52
SE = NC
V = 70 MPH

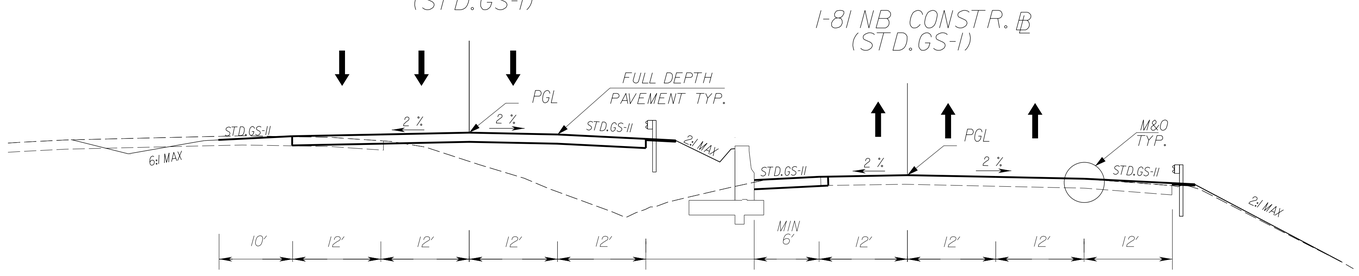
Curve BL_ATC_RAMPA_1
PI = 11+57.62
DELTA = 16° 54' 57.48" (RT)
D = 5° 24' 19"
T = 157.62'
L = 312.95'
R = 1,060.00'
PC = 10+00.00
PT = 13+12.95
SE = 4.9%
V = 35 MPH

Potential Utility Impacts

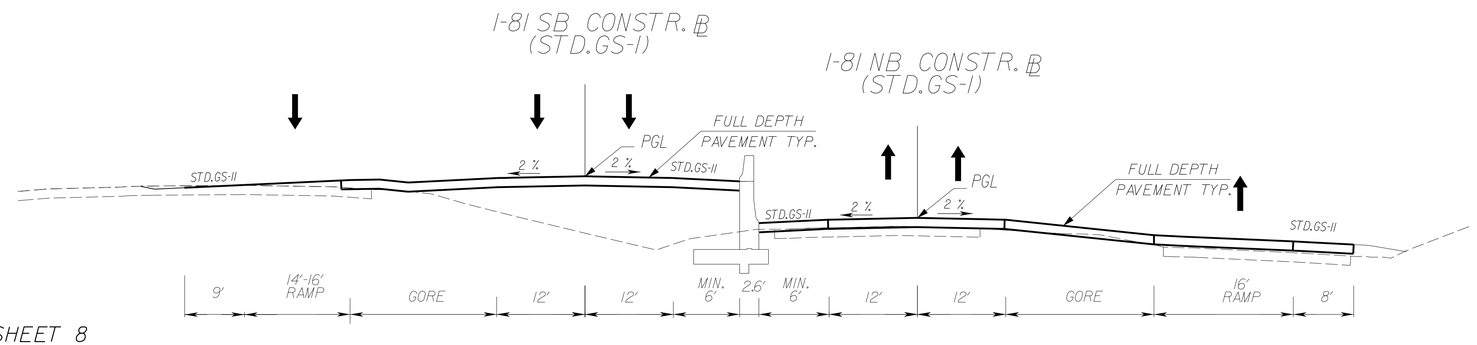
1 Appalachian Power - Overhead crossing

LEGEND

- Denotes Full Depth Pavement
- Denotes Mill & Overlay
- Denotes Mill & Overlay W/ Build-up
- Denotes Demolition of Pavement
- Denotes Travel Lanes
- Denotes Proposed Bridge Limits
- Denotes Exist.Bridge Limits
- Denotes Proposed Paved Shoulder
- Proposed Wooden Pole
- Proposed Base Mounted Local Control Cabinet
- Proposed Electrical Service (SE-5)
- Proposed Span Wire
- Proposed LED Luminaire
- Proposed Underbridge LED Luminaire
- Denotes Existing R/W & L.A.
- Proposed Drainage Pipe
- Proposed Drainage Ditch
- Denotes Utility Impact (W/Note) XX U



SECTION C-C



SECTION D-D

SECTIONS E & F SEE SHEET 8

FOR PAVEMENT DESIGN SEE SHEET 9

N.T.S.

DESIGN BUILDER: BRANCH CIVIL

DESIGNED BY: STV 100 Years

STATE PROJECT NO. 0081-154-733,R201,C501,B601,B616

FEDERAL PROJECT NO. NHPP-081-2(992)

I-81 BRIDGE REPLACEMENT AT EXIT 114

PLAN AND TYPICAL SECTIONS

SHEET NO. 4

PAGE NO. 4

PRELIMINARY PLANS

THESE PLANS NOT TO BE USED FOR CONSTRUCTION

LEGEND

- Denotes Full Depth Pavement
- Denotes Mill & Overlay
- Denotes Mill & Overlay W/ Build-up
- Denotes Demolition of Pavement
- Denotes Travel Lanes
- Denotes Proposed Bridge Limits
- Denotes Exist.Bridge Limits
- Denotes Proposed Paved Shoulder
- Proposed Wooden Pole
- Proposed Base Mounted Local Control Cabinet
- Proposed Electrical Service (SE-5)
- Proposed Span Wire
- Proposed LED Luminaire
- Proposed Underbridge LED Luminaire
- Denotes Existing R/W & L.A.
- Proposed Drainage Pipe
- Proposed Drainage Ditch
- Denotes Utility Impact (W/Note) [xx] —U—
- Structural Obstruction Zone (SOZ) Defined per VDOT RFP

Potential Utility Impacts

[2] Verizon - Overhead crossing

[3] Citizen and Lumos - Underground Conduit

[4] Verizon - Underground Conduit

Revised Bridge & Roadway Alignment
1) New SB Bridge Shifted Entirely Inside The Existing Median Area To Reduce Construction Phases.
2) Provided Longer Tangent Segments For SB And NB Bridges Respectively, Which Are Also Parallel To Each Other.

MATCHLINE STA.948+00 - SEE SHEET 4

MATCHLINE STA.958+00 - SEE SHEET 6

END CONSTRUCTION STA.1062+00 ROUTE 8 CONSTR.℄

EXISTING R/W & L.A.

DISTURBED AREA FOR PIPE REHAB

PROPOSED GROUND MOUNT SIGN

RAMP C CONSTR.℄

RAMP D CONSTR.℄

END OF I-81 SB BRIDGE STA.953+99.89

START OF I-81 SB BRIDGE STA.951+49.89

PROP. RETAINING WALL

SOZ

I-81 SB CONSTR.℄

STD.GR-MGS REQ'D

I-81 SB

I-81 NB

START OF I-81 NB BRIDGE STA.951+27.44

PROPOSED UNDERBRIDGE LUMINAIRE (TYP)

END OF I-81 NB BRIDGE STA.953+77.44

RAMP B CONSTR.℄

RAMP A CONSTR.℄

EXISTING LIMITED ACCESS

DISTURBED AREA FOR PIPE REHAB

PROPOSED SIGNAL/COMBO POLES (TYP.)

BEGIN CONSTRUCTION STA.1055+00 ROUTE 8 CONSTR.℄

EXISTING R/W

Bridge Profiles Designed To Accommodate Future Widening Of I-81 By One Lane In Each Direction.

SECTIONS G & H SEE SHEET 8

NOTE:
LIMITS AND DETAILS OF THE EXISTING PAVEMENT RESTRIPING TO BE DETERMINED DURING FINAL DESIGN.

PROVIDE ADEQUATE TRANSITION BETWEEN VDOT STD.MGS AND BRIDGE PIER PROTECTION BPPS-3.

SCALE
0 50' 100'

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN BUILDER: BRANCH CIVIL

DESIGNED BY:

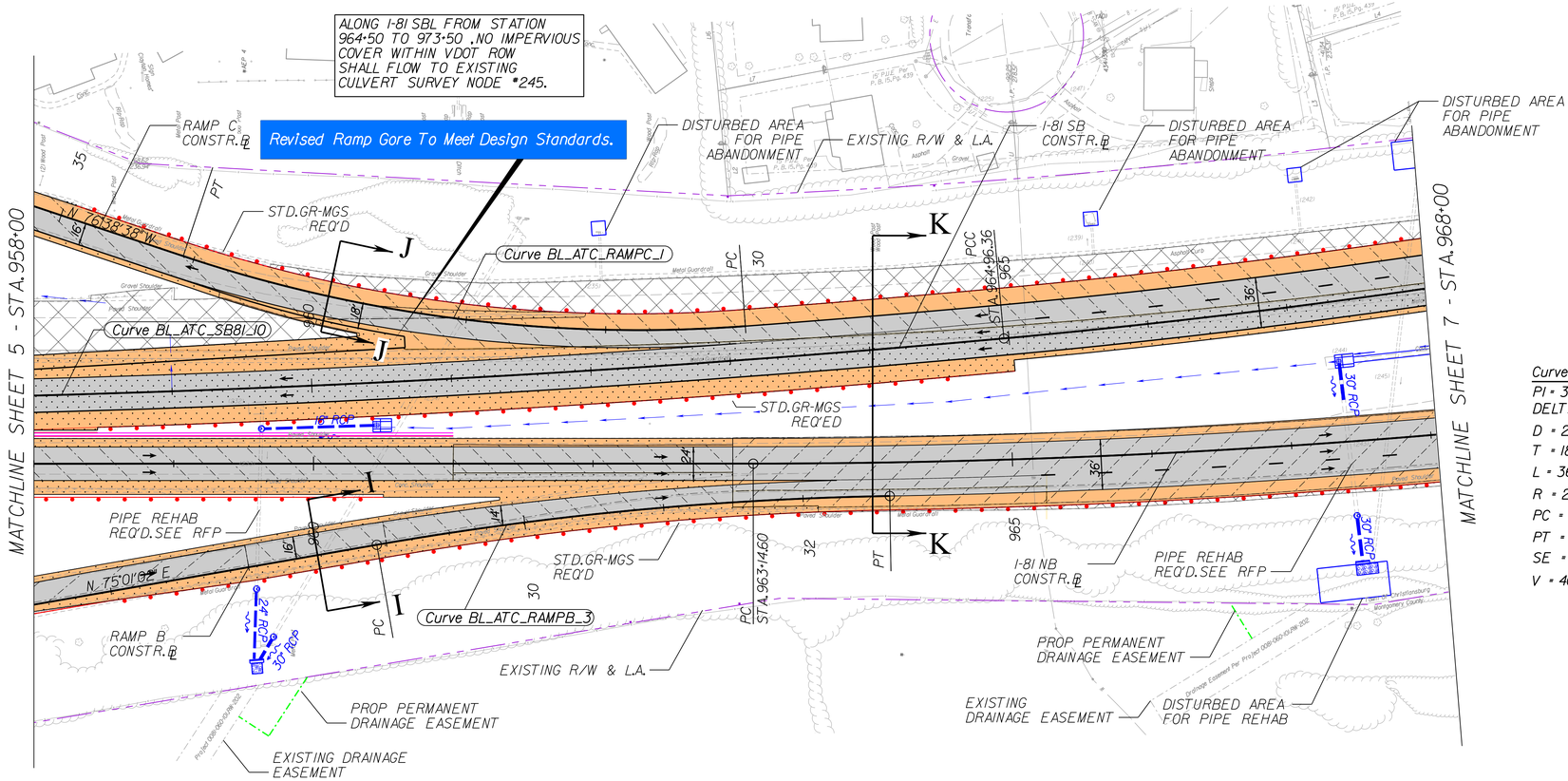
STATE PROJECT NO. 0081-154-733, R201, C501, B601, B616
FEDERAL PROJECT NO. NHPP-081-2992

I-81 BRIDGE REPLACEMENT AT EXIT 114

PLAN AND TYPICAL SECTIONS

SHEET NO. 5

PAGE NO. 5



Curve BL_ATC_SB81_10
PI = 960+07.61
DELTA = 5° 12' 48.61" (LT)
D = 0° 31' 59"
T = 489.42'
L = 978.17'
R = 10,750.00'
PC = 955+18.19
PCC = 964+96.36
SE = 2.0%
V = 70 MPH

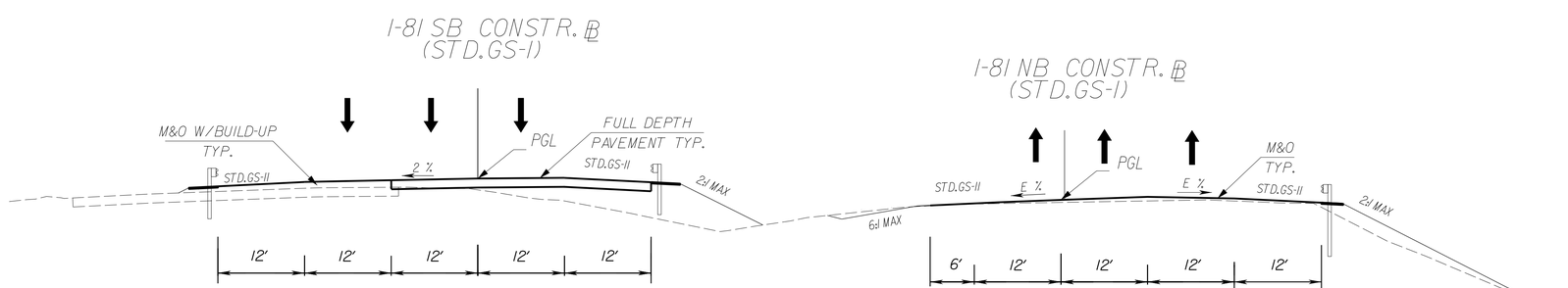
Curve BL_ATC_RAMPB_3
PI = 30+77.91
DELTA = 8° 55' 13.13" (RT)
D = 2° 25' 03"
T = 184.86'
L = 368.98'
R = 2,370.00'
PC = 28+93.04
PT = 32+62.03
SE = 3.2%
V = 40 MPH

Curve BL_ATC_RAMPC_1
PI = 32+06.67
DELTA = 22° 41' 29.37" (RT)
D = 5° 33' 46"
T = 206.67'
L = 407.92'
R = 1,030.00'
PC = 30+00.00
PT = 34+07.92
SE = 5.0%
V = 35 MPH

LEGEND

Denotes Full Depth Pavement	Denotes Travel Lanes	Proposed Base Mounted Local Control Cabinet	Proposed Wooden Pole
Denotes Mill & Overlay	Denotes Proposed Bridge Limits	Proposed Electrical Service (SE-5)	Denotes Existing R/W & L.A.
Denotes Mill & Overlay W/ Build-up	Denotes Exist.Bridge Limits	Proposed Span Wire	Proposed Drainage Pipe
Denotes Demolition of Pavement	Denotes Proposed Paved Shoulder	Proposed LED Luminaire	Proposed Drainage Ditch
		Proposed Underbridge LED Luminaire	Denotes Utility Impact (W/Note) XX

SCALE
0 50' 100'



SECTION K-K
N.T.S.

SECTIONS I & J SEE SHEET 8

FOR PAVEMENT DESIGN SEE SHEET 9

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN BUILDER
BRANCH CIVIL

DESIGNED BY
STV 100 Years

STATE PROJECT NO.
0081-154-733,R201,C501,B601,B616

FEDERAL PROJECT NO.
NHPP-081-2(992)

I-81 BRIDGE REPLACEMENT AT EXIT 114

PLAN AND TYPICAL SECTIONS

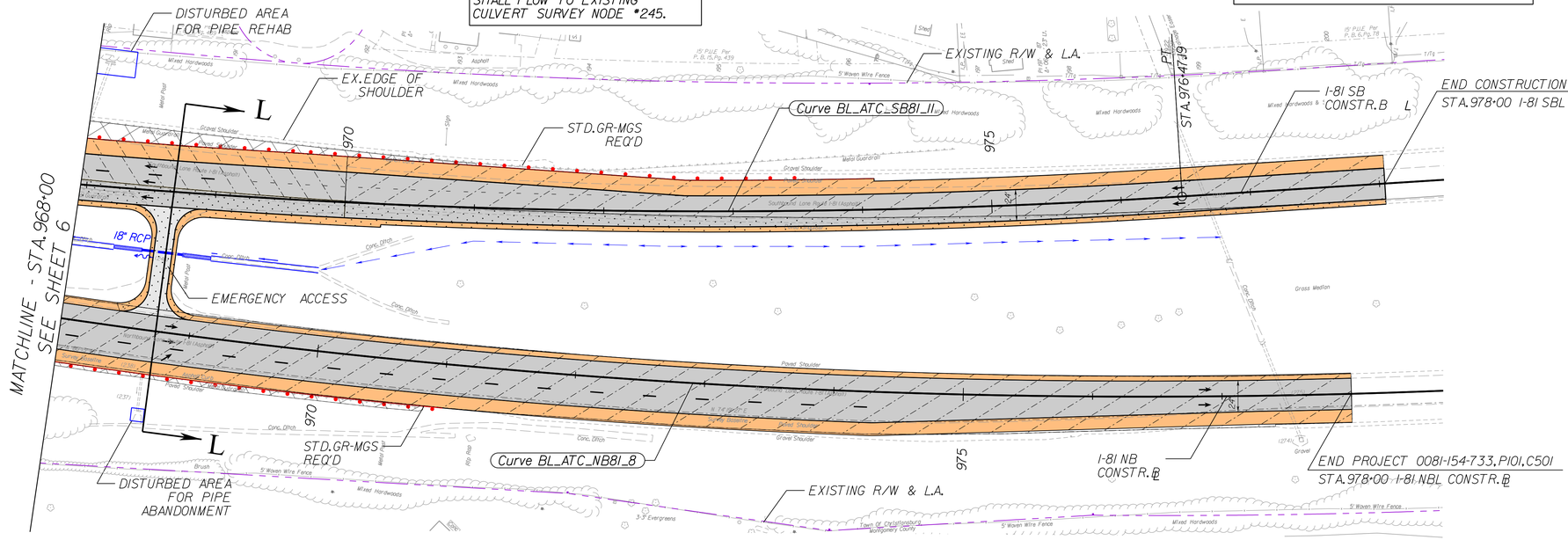
VDOT Virginia Department of Transportation

SHEET NO.
6

PAGE NO.
6

ALONG I-81 SBL FROM STATION 964+50 TO 973+50 ,NO IMPERVIOUS COVER WITHIN VDOT ROW SHALL FLOW TO EXISTING CULVERT SURVEY NODE #245.

PROPOSED GROUND MOUNT SIGN OUTSIDE PROJECT LIMITS APPROXIMATE STA.90+00 SB PER RFP SUPPLEMENTAL INFO.



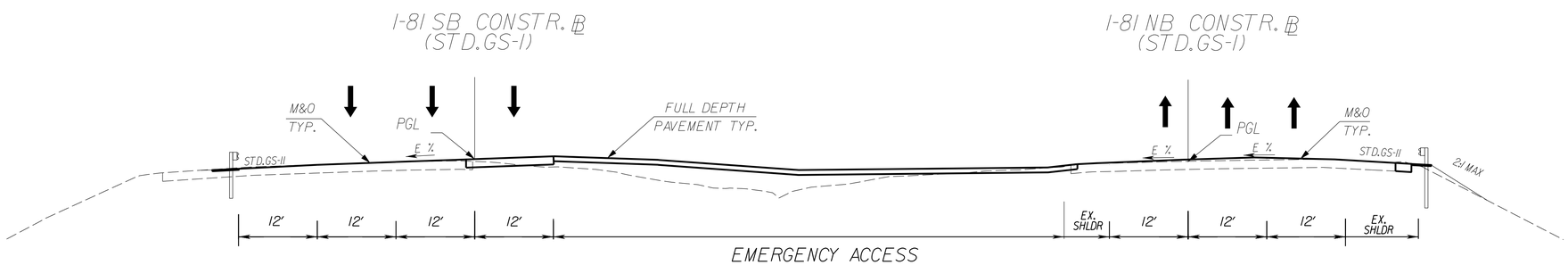
Curve BL_ATC_SB81_11
PI = 970+73.72
DELTA = 11° 30' 26.85" (LT)
D = 1° 00' 00"
T = 577.36'
L = 1,150.83'
R = 5,730.00'
PC = 964+96.36
PT = 976+47.19
SE = EXISTING
V = 70 MPH

Curve BL_ATC_NB81_8
PI = 972+05.15
DELTA = 17° 27' 29.46" (LT)
D = 0° 59' 16"
T = 890.54'
L = 1,767.28'
R = 5,800.01'
PC = 963+14.60
PT = 980+81.88
SE = EXISTING
V = 70 MPH

SCALE
0 50' 100'

LEGEND

- Denotes Full Depth Pavement
- Denotes Mill & Overlay
- Denotes Mill & Overlay W/ Build-up
- Denotes Demolition of Pavement
- Denotes Travel Lanes
- Denotes Proposed Bridge Limits
- Denotes Exist.Bridge Limits
- Denotes Proposed Paved Shoulder
- Proposed Base Mounted Local Control Cabinet
- Proposed Electrical Service (SE-5)
- Proposed Span Wire
- Proposed LED Luminaire
- Proposed Underbridge LED Luminaire
- Proposed Wooden Pole
- Denotes Existing R/W & L.A.
- Proposed Drainage Pipe
- Proposed Drainage Ditch
- Denotes Utility Impact (W/Note) XX



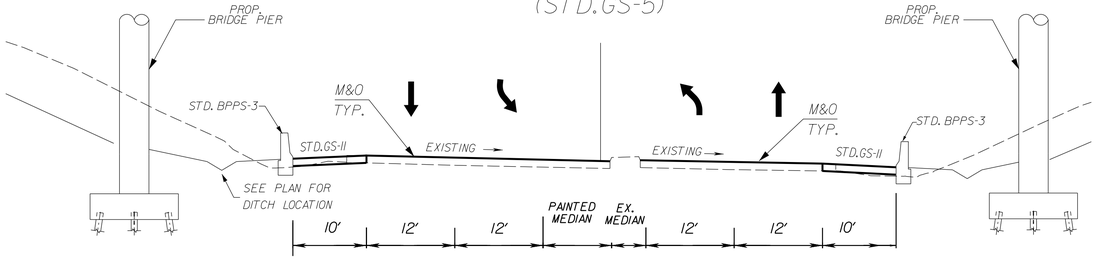
SECTION L-L
N.T.S.

FOR PAVEMENT DESIGN SEE SHEET 9

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN BUILDER: BRANCH CIVIL
DESIGNED BY: STV 100 Years
STATE PROJECT NO.: 0081-154-733,R201,C501,B601,B616
FEDERAL PROJECT NO.: NHPP-081-2(992)
I-81 BRIDGE REPLACEMENT AT EXIT 114
PLAN AND TYPICAL SECTIONS
VDOT Virginia Department of Transportation
SHEET NO. 7
PAGE NO. 7

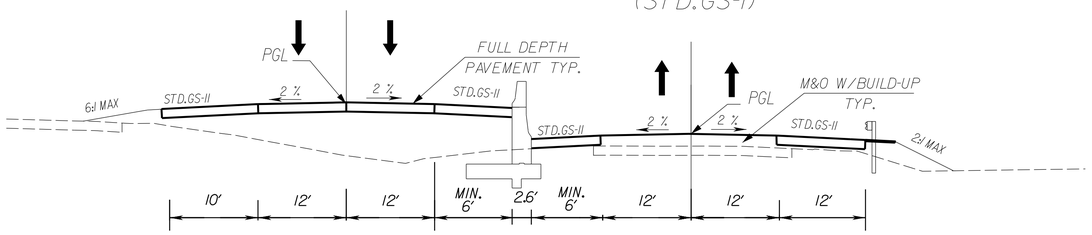
RTE 8 CONSTR. ℄
(STD.GS-5)



SECTION G-G

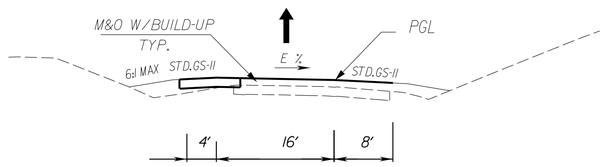
I-81 SB CONSTR. ℄
(STD.GS-I)

I-81 NB CONSTR. ℄
(STD.GS-I)



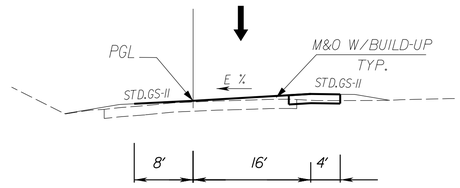
SECTION H-H

RAMP A CONSTR. ℄
(STD.GS-R)



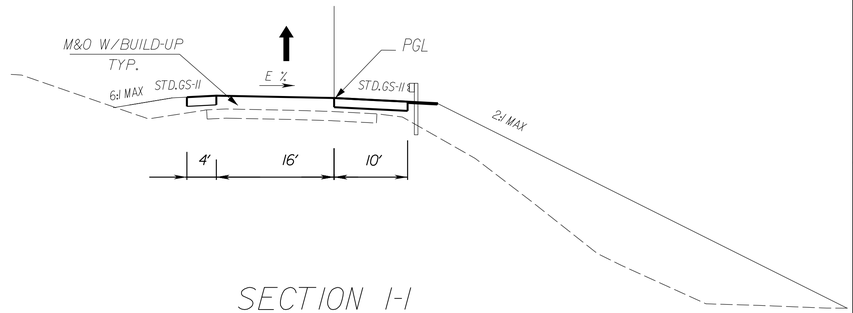
SECTION E-E

RAMP D CONSTR. ℄
(STD.GS-R)



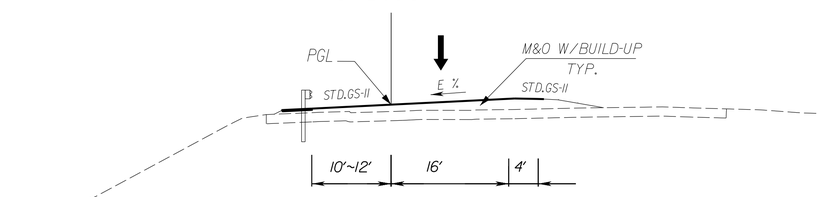
SECTION F-F

RAMP B CONSTR. ℄
(STD.GS-R)



SECTION I-I

RAMP C CONSTR. ℄
(STD.GS-R)



SECTION J-J

N.T.S.

FOR PAVEMENT DESIGN SEE SHEET 9

PRELIMINARY PLANS
THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN BUILDER
BRANCH CIVIL

DESIGNED BY
STV 100 Years

STATE PROJECT NO.
0081-154-733,R201,C501,B601,B616

FEDERAL PROJECT NO.
NHPP-081-2(992)

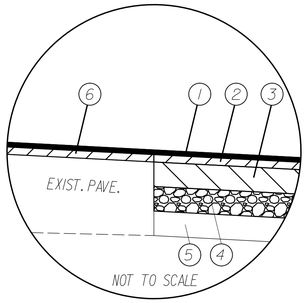
VDOT Virginia Department of Transportation

I-81 BRIDGE REPLACEMENT AT EXIT 114

TYPICAL SECTIONS

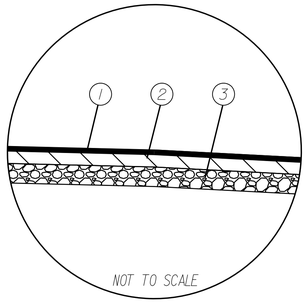
SHEET NO. 8

PAGE NO. 8



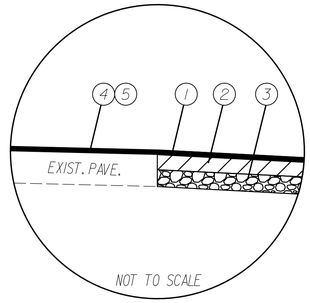
FOR I-81 MAINLINE, SHOULDER & RAMP NEW PAVEMENT AND/OR EXISTING PAVEMENT WIDENING SECTIONS

1. ASPHALT CONCRETE SURFACE COURSE 1.5" TYPE SMA-12.5 (64E-22)
2. ASPHALT CONCRETE INTERMEDIATE COURSE 2.0" TYPE SMA-19.0D
3. 8.0" ASPHALT CONCRETE BASE COURSE TYPE BM-25.0-0.4 (HMHB)
4. 8.0" AGGREGATE BASE MATERIAL TYPE I, NO. 21B
5. 8.0" SELECT MATERIAL, TYPE I, MIN. CBR-30
6. 3.5" PLANING



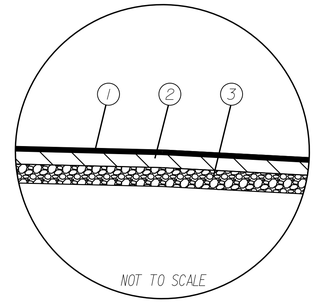
FOR PRIVATE AND COMMERCIAL ENTRANCES & PERMANENT MEDIAN EMERGENCY ACCESS

1. 1.5" ASPHALT CONCRETE SURFACE COURSE TYPE SM-9.5A OR SM-9.5D
2. 4.0" ASPHALT CONCRETE BASE COURSE TYPE BM-25.0A
3. 6.0" AGGREGATE BASE MATERIAL TYPE I, NO. 21B



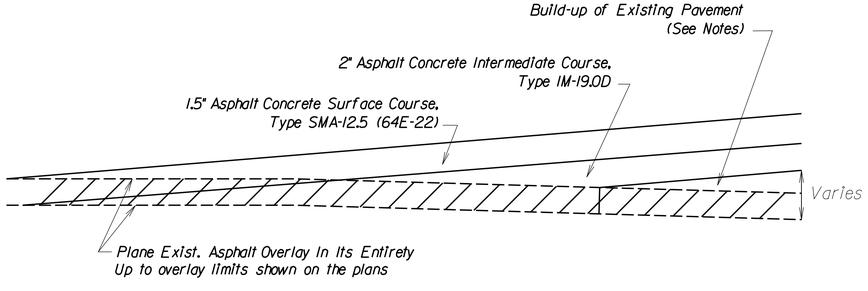
FOR VA ROUTE 8 MAINLINE AND SHOULDERS NEW PAVEMENT AND/OR EXISTING PAVEMENT WIDENING SECTIONS

1. ASPHALT CONCRETE SURFACE COURSE 2.0" TYPE SM-9.5A
2. 6.0" ASPHALT CONCRETE BASE COURSE TYPE BM-25.0A
3. 8.0" AGGREGATE BASE MATERIAL TYPE I, NO. 21B
4. 1.5" PLANING
5. 1.5' ASPHALT CONCRETE SURFACE COURSE TYPE SM-9.5D



FOR TEMPORARY PAVEMENT (ROADWAY & SHOULDER)

1. ASPHALT CONCRETE SURFACE COURSE 1.5" TYPE SM-9.5D
2. 6.0" ASPHALT CONCRETE BASE COURSE TYPE BM-25.0A
3. 8.0" AGGREGATE BASE MATERIAL TYPE I, NO. 21B



MILL AND OVERLAY

ASPHALT CONCRETE BUILD-UP OF ASPHALT PAVEMENT

NOT TO SCALE

NOTES:

MILL EXISTING PAVEMENT WHERE NECESSARY TO CREATE A UNIFORM FINAL PAVEMENT DEPTH TO GRADE.

WHERE MILLING OCCURS, THE DEPTH OF THE OVERLAY SHALL FULLY REPLACE THE REMOVED STRUCTURE.

MAXIMUM AND MINIMUM LIFT THICKNESSES SHALL BE OBSERVED DURING PLACEMENT AS SET FORWARD IN SECTION 315.05(C) OF THE 2016 VDOT ROAD AND BRIDGE SPECIFICATIONS.

0.0 TO 1.0 INCHES BUILD-UP:
MILL EXISTING PAVEMENT TO A UNIFORM DEPTH 4.5-INCHES BELOW THE DESIGN FINAL GRADE. PLACE IM-19.0D TO A POINT 1.5-INCHES BELOW THE DESIGN FINAL GRADE. THEN PLACE SMA-12.5 (64E-22) TO THE DESIGN FINAL GRADE.

1.0 INCHES TO 6.5 INCHES BUILD-UP:
MILL EXISTING PAVEMENT TO A UNIFORM DEPTH 6.5-INCHES BELOW THE DESIGN FINAL GRADE. PLACE BM-25.0D-0.4 (HMHB) TO A POINT 3.5-INCHES BELOW THE DESIGN FINAL GRADE. NEXT, PLACE IM19.0D TO A POINT 1.5-INCHES BELOW THE DESIGN FINAL GRADE. THEN PLACE SMA-12.5 (64E-22) TO THE DESIGN FINAL GRADE.

6.5 INCHES + BUILD-UP:
PLACE BM-25.0D-0.4 (HMHB) TO A POINT 3.5-INCHES BELOW THE DESIGN FINAL GRADE. NEXT, PLACE IM-19.0D TO A POINT 1.5-INCHES BELOW THE DESIGN FINAL GRADE. THEN PLACE SMA-12.5 (64E-22) TO THE DESIGN FINAL GRADE. MILLING IS NOT A MINIMUM REQUIREMENT WHEN BUILD-UP EXCEEDS 6.5-INCHES. THE NEED FOR MILLING IN BUILD-UP SITUATIONS WILL BE ANALYZED DURING THE FINAL DESIGN.

PRELIMINARY PLANS

THESE PLANS NOT TO BE USED FOR CONSTRUCTION

DESIGN BUILDER
BRANCH CIVIL

DESIGNED BY
STV 100 Years

STATE PROJECT NO.
0081-154-733, R201, C501, B601, B616

FEDERAL PROJECT NO.
NHPP-081-2(992)

VDOT Virginia Department of Transportation

I-81 BRIDGE REPLACEMENT AT EXIT 114

PAVEMENT DESIGN AND INSETS

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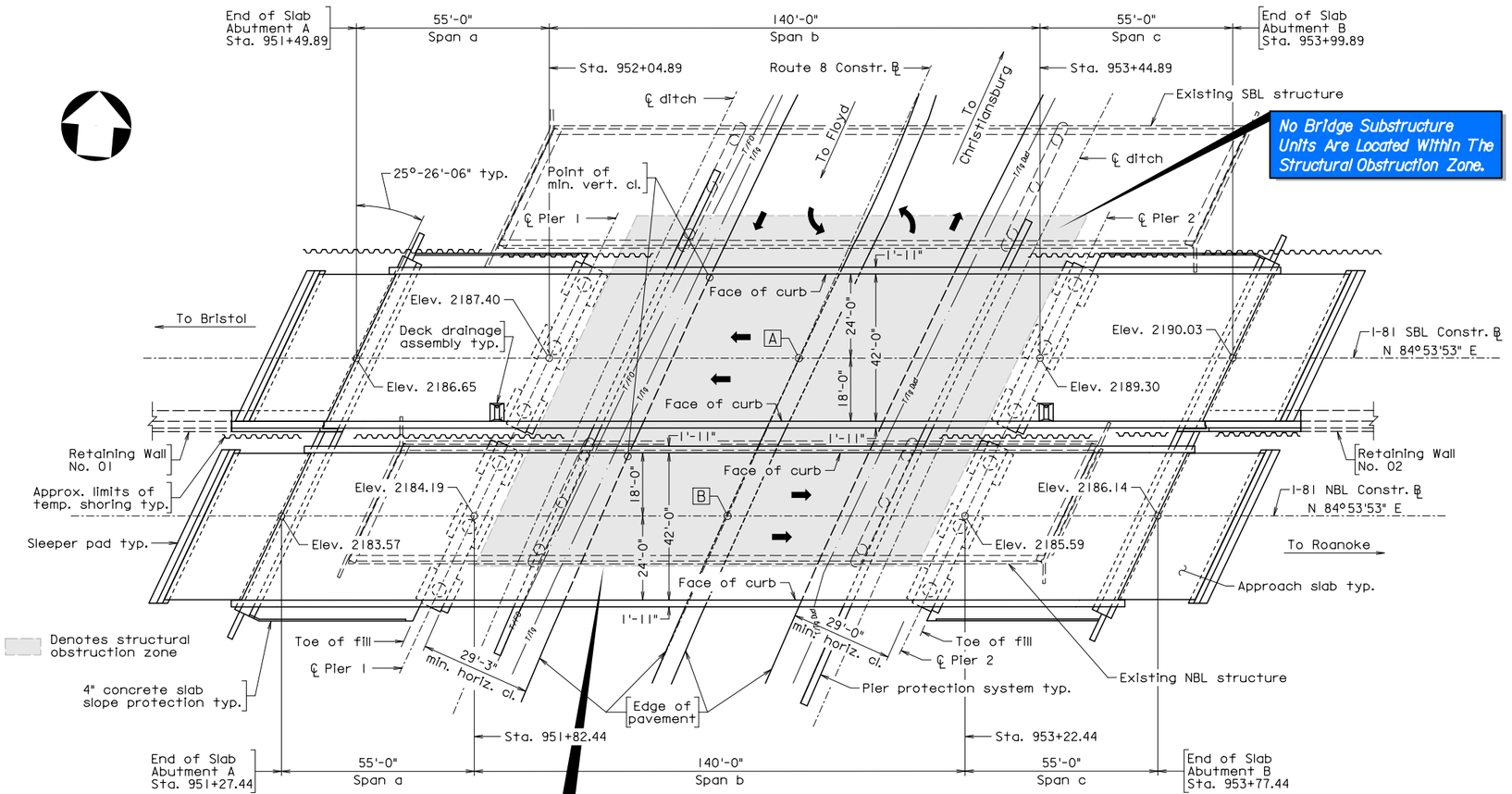
SECTION 4.3.2
CONCEPTUAL STRUCTURAL PLANS



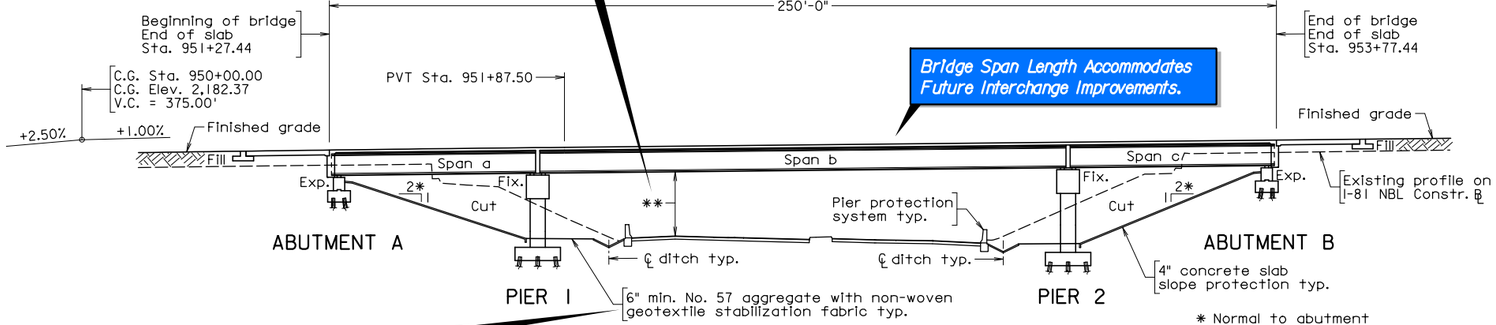
PLAN

A Canopy/Protection Shield Will Be Installed To Protect Pedestrians, Bicyclists, And Vehicular Traffic On Route 8 From Falling Debris Resulting From Bridge Demolition And Repair/Maintenance Work.

Low Maintenance Bridge - Jointless Bridge, Prestressed Concrete Bulb-T Beams, Class III CRR Steel In Superstructure (Bridge Decks, Semi-Integral Backwalls, Closure Diaphragms, And Parapets), Low Permeability Concrete.

Bridges Provide Vertical Clearance For Future Widening of I-81.

Bridge Span Length Accommodates Future Interchange Improvements.



DEVELOPED SECTION ALONG I-81 NBL CONSTR. ℄
SBL Bridge similar.

* Normal to abutment
** Min. vert. clearance:
SBL = 17'-9"
NBL = 17'-2"

The Use Of No.57 Aggregate Over Non-Woven Geotextile Stabilization Fabric Within The SOZ Under The Bridges Reduces Or Eliminates Erosion And Regular Maintenance.

DESIGN EXCEPTION(S):

None

GENERAL NOTES:

Widths: SBL 42'-0" face-to-face of curbs.
NBL 42'-0" face-to-face of curbs.

Span layout: 55'-140'-55' prestressed concrete 69" deep bulb-T beam spans continuous for live load.

Capacity: HL-93 loading.

Specifications:

Construction: Virginia Department of Transportation Road and Bridge Specifications, 2016.

Design: AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014; and VDOT Modifications.

Standards: Virginia Department of Transportation Road and Bridge Standards, 2016; including all current revisions.

These plans are incomplete unless accompanied by the Supplemental Specifications and Special Provisions included in the contract documents.

Bridge Nos. of existing bridges are 2000 (NBL) and 2001 (SBL). Plan No. is 169-15.

The existing structures are designated as Type B structures in accordance with Section 411 of the Specifications.

The existing structures identified positive for Catagory II regulated asbestos containing material (RACM). Abatement of the RACM shall be conducted in accordance with the Special Provisions for Asbestos Removal and NESHAP-Related Demolition Requirements for Structures on Design-Build Projects.

Architectural treatment and concrete staining shall be provided in accordance with the RFP.

Low permeability concrete shall be used, additionaly, Low Shrinkage Class A4 Modified concrete shall be used for bridge decks, semi-integral backwalls, closure diaphragms, and parapets.

Corrosion resistant reinforcing steel shall be utilized in accordance with IIM-S&B-81.7.

Lighting and conduit shall be provided in accordance with the RFP.

Tie stations:

A
POT 952+74.80 I-81 SBL Constr. ℄
POC 1057+95.56 Route 8 Constr. ℄
△ = 115°-33'-33" Rt.

B
POT 952+52.69 I-81 NBL Constr. ℄
POC 1057+45.88 Route 8 Constr. ℄
△ = 114°-36'-37" Rt.

PRELIMINARY PLANS
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BRANCH CIVIL

DESIGNED BY
STV 100 Years

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I-81 BRIDGE REPLACEMENT AT EXIT 114
TITLE SHEET
PLAN, PROFILE, AND GENERAL NOTES

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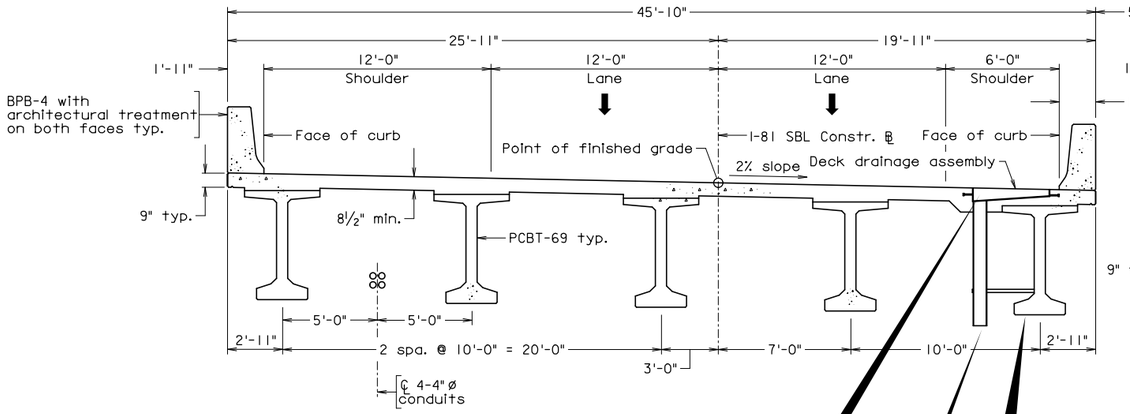
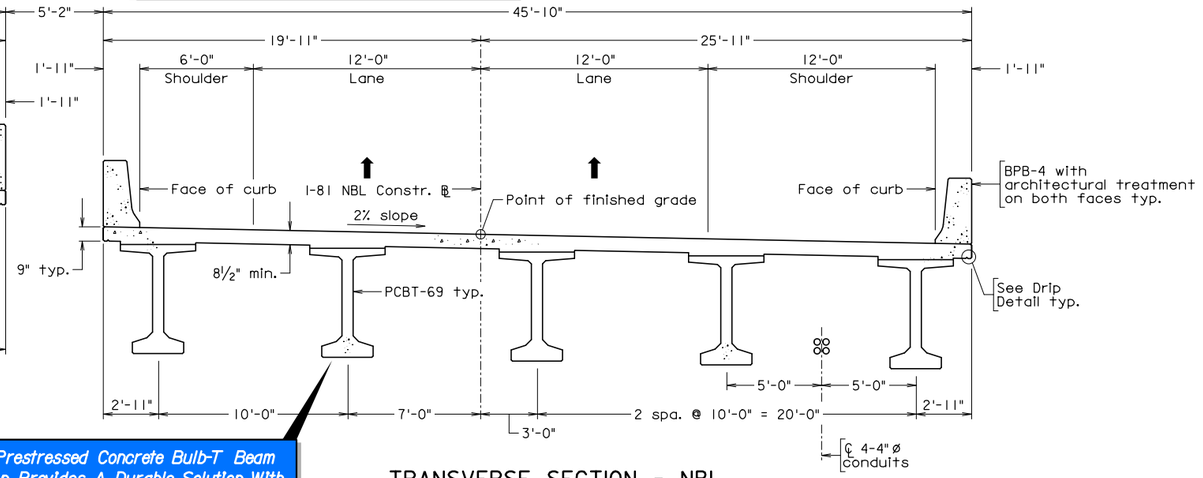
The Minimum Clear Width Between Bridges Exceeds The RFP Requirements.



TRANSVERSE SECTION - SBL
Scale: ¼" = 1'-0"

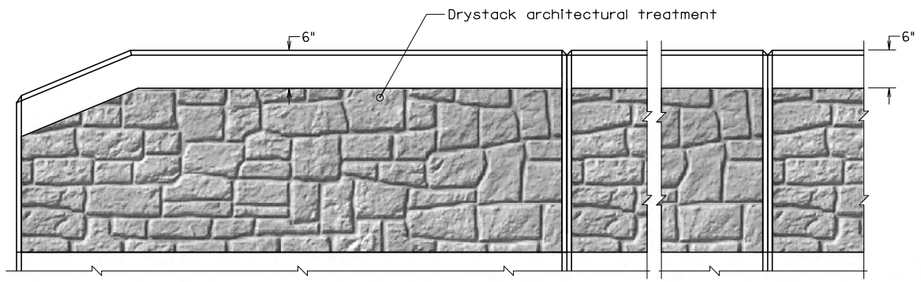


TRANSVERSE SECTION - NBL
Scale: ¼" = 1'-0"

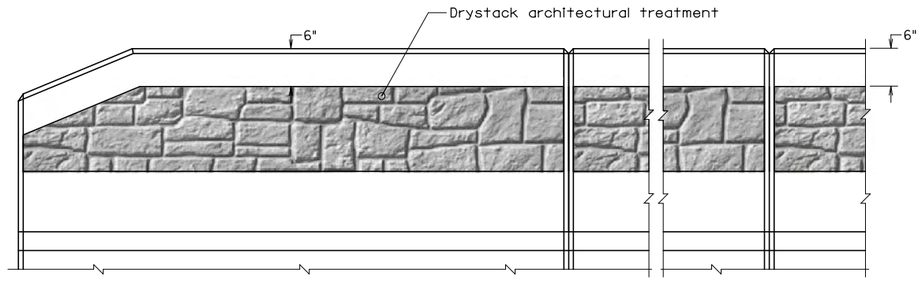
Standard Prestressed Concrete Bulb-T Beam Construction Provides A Durable Solution With Minimal Inspection/Maintenance Requirements.

Large Interstate Bridge Deck Drain Assemblies, As Used On The VDOT I-95 Over Meherrin River Bridge Replacement Project In Emporia, VA, Will Be Used To Control And Drain Water From The SB Bridge Deck. These Large Deck Drain Assemblies Minimize Maintenance Needs And Utilize 8" Diameter Downspouts In Accordance With The RFP.

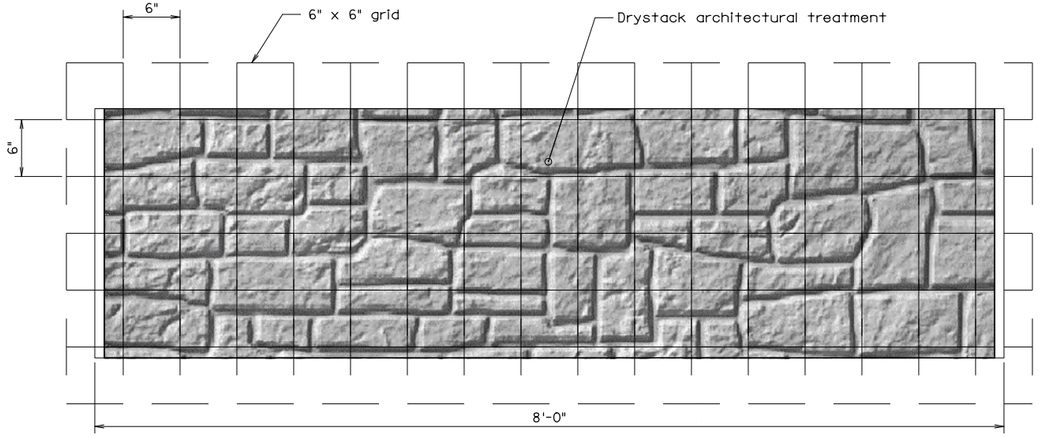
No Drainage Will Be Discharged To Air Over Any Traveled Way (Either Vehicular Or Pedestrian), Unprotected Embankments, Or Other Ground Surfaces Where It Might Cause Erosion Or Undermine The Structural Integrity Of The Bridge.



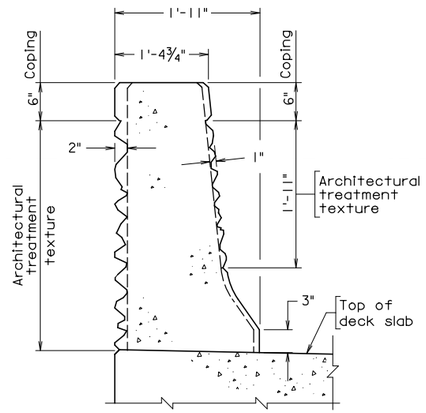
TERMINAL WALL
ELEVATION
Outside Face



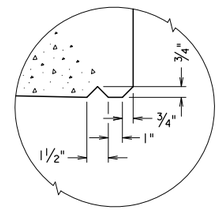
TERMINAL WALL
ELEVATION
Inside Face



DRYSTACK TEXTURE DETAIL
Barrier - Outside Face
(Inside Face similar)



PART TRANSVERSE SECTION
SHOWING ARCHITECTURAL TREATMENT



DRIP DETAIL
Not to scale

PRELIMINARY PLANS
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I-81 BRIDGE REPLACEMENT AT EXIT 114

TRANSVERSE SECTIONS AND DETAILS

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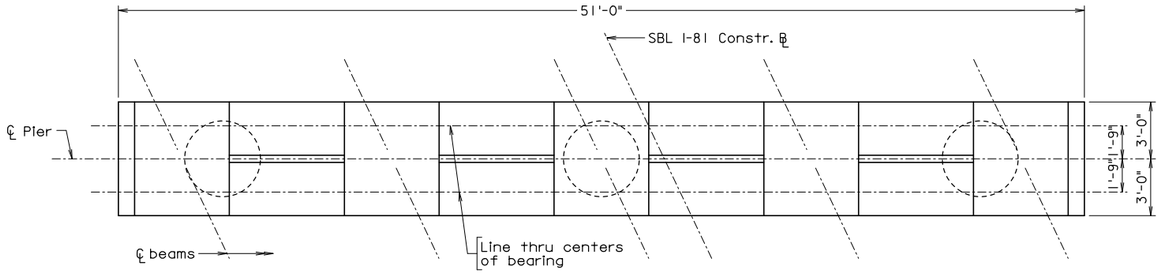
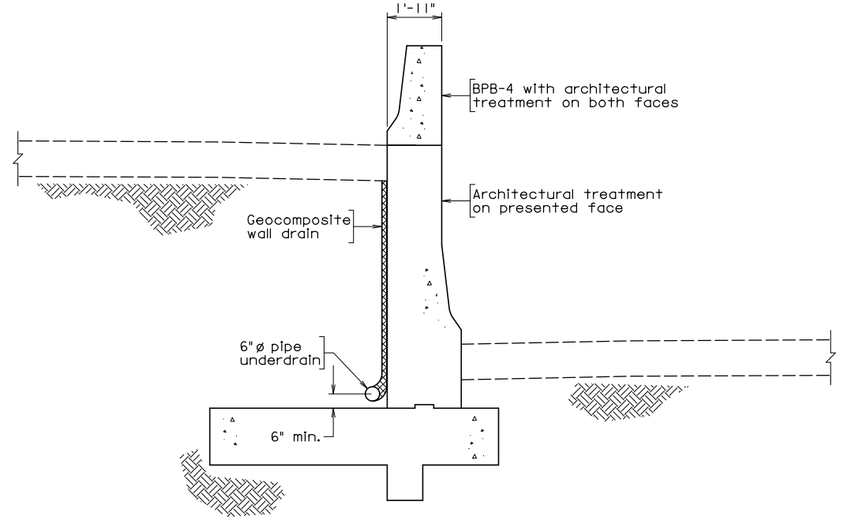
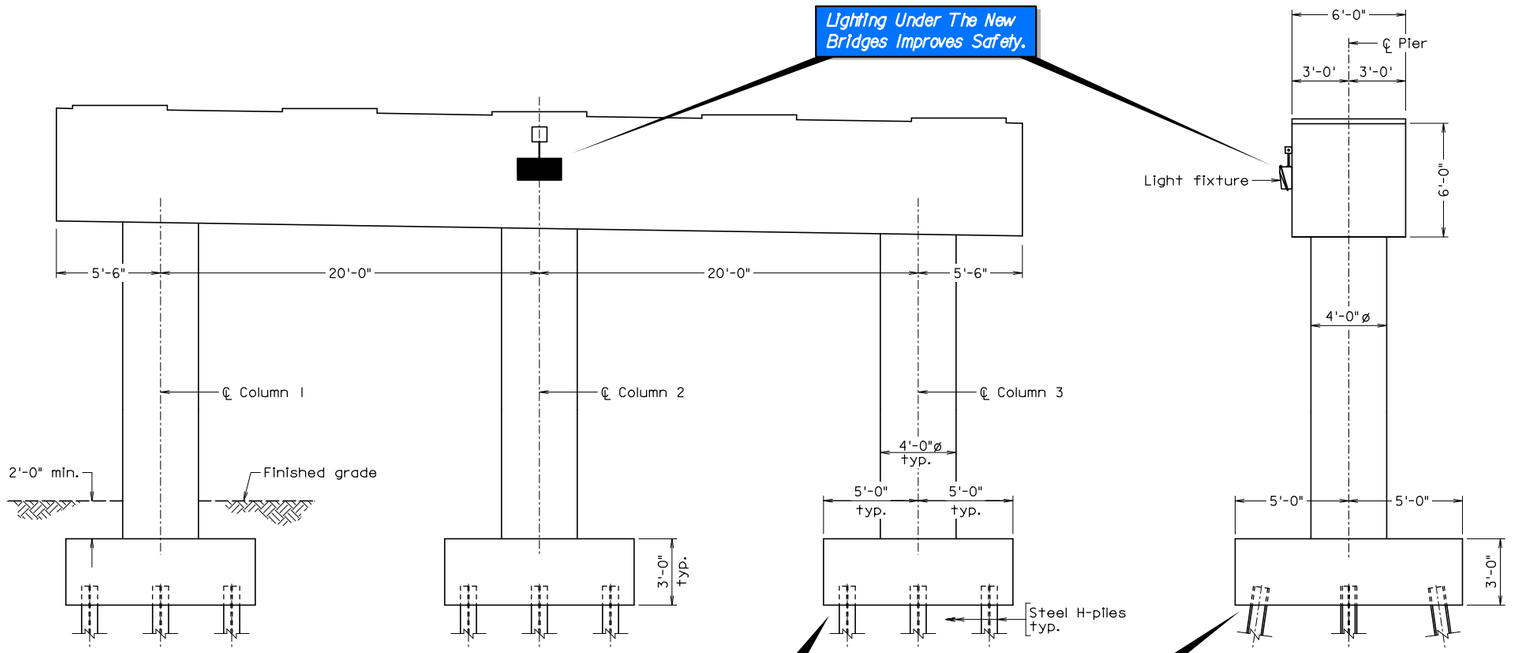


PLAN OF PIER CAP
SBL shown, NBL similar.



TYPICAL RETAINING WALL SECTION
Scale: ⅜" = 1'-0"

Lighting Under The New Bridges Improves Safety.



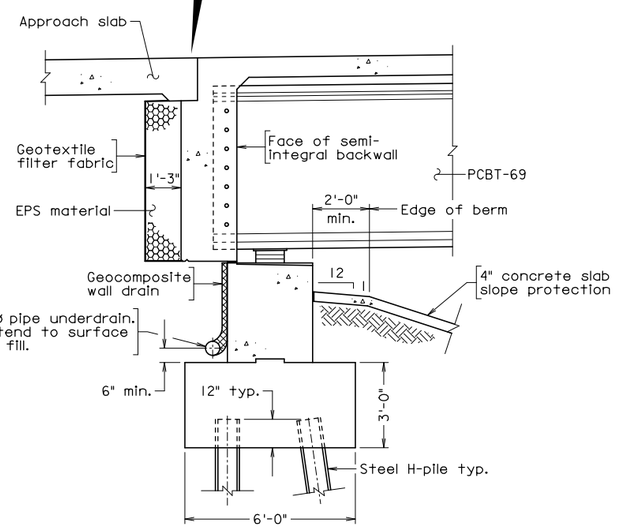
ELEVATION

END VIEW

A Pile Group Efficiency Of 80 Percent Will Be Adopted For The Design In Order To Compensate For The Karst Geologic Conditions.

TYPICAL PIER DETAILS

The Superstructures For Both Bridges Will Conform With VDOT's Jointless Philosophy By Using Semi-Integral Abutments. Elimination Of Joints Will Minimize Inspection And Long-Term Maintenance Needs.



TYPICAL ABUTMENT SECTION
Scale: ⅜" = 1'-0"

Scale: ¼" = 1'-0" unless otherwise noted

PRELIMINARY PLANS
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BRANCH CIVIL

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STV 100 Years

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I-81 BRIDGE REPLACEMENT AT EXIT 114
ABUTMENT, PIER, AND RETAINING WALL DETAILS

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