IMPROVE 81

I-81 Corridor-Wide Design Guide

Issue Date: 02.01.2023 Rev 4

VDOT Virginia Department of Transportation

Document Review and Approval

1) Design Guide Reviews

The following team supporting the I-81 Corridor Improvement Program from VDOT provided input into and reviewed this I-81 Corridor-wide Design Guide.

- Dave Covington, I-81 Program Manager
- Susan Keen, State Location & Design Engineer
- Butch Heishman, Assistant State Location & Design Engineer
- Matthew Yakim, Senior Structural Engineer - Central Office
- Gene Holley, Bristol I-81 CIP Coordinator / Loc. & Des.
- Craig Moore, Assistant District L& D Engineer Salem District
- Scott Alexander, Assistant. District L&D Engineer Staunton District

VDOT therefore authorizes publication and use of this document by VDOT and Consultants / Contractors for projects in the I-81 Improvement Program Corridor.

2) Design Guide Revisions

The following notes revisions to this Design Guide:

Revision Number	Revision Date	Revision Information
0	11/04/2021	Initial Release
1	06/08/2022	Revised Section 3.3 and Added New Appendix F & G
2	07/26/2022	Revised Appendix G
3	11/03/2022	Added New Appendix H
4	02/01/2023	Revised Appendix G, Section “Process”

IMPROVE 81

I-81 Corridor-Wide Design Guide

VDOT
Virginia Department of Transportation

Contents

Section 1: Guide Purpose and Goals 1
1) Introduction 1
2) Guide Purpose and Goals 1
Section 2: I-81 Corridor Project Scoping 2
1) Items for Consideration 2
2) Risk Management 3
3) Modifying Planned Project Elements 3
4) Value Engineering 6
5) Addressing Locality Requests 6
Section 3: I-81 Projects Development 7
1) Practical Design Application - Corridor Considerations 7
2) Lessons Learned / Program Guidance 7
3) Disapproved Items 10
Section 4: Decision Documentation Templates 11

Appendices

Appendix A: DE/DW for Superelevation and Cross Slope 1
Appendix B: DE/DW for Shoulder Width 1
Appendix C: DE/DW for Bridge Clearance 1
Appendix D: Bridge Widening vs. Replacement 1
Appendix E: Stage 1 Bridge Report 1
Appendix F: Replacing Guardrail Within Project Limits 1
Appendix G: Temporary Drainage & Spread at Barrier Wall / Parapet 1
Appendix H: Design of Access to SWM Facilities in Medians 1

Section 1: Guide Purpose and Goals

1) Introduction

The I-81 Corridor Improvement Program consists of innovative, targeted improvements that will have a substantial effect on the safety and reliability of a critical portion of our nation's infrastructure.

As a critical north-south backbone of the East Coast's freight network, the I-81 corridor is vital to the efficient movement of goods through Virginia. More than one-third of all trucks and nearly 50% of the state's value of goods are transported along the 325-mile corridor. I-81 has the highest per capita truck volume in Virginia.

Within Virginia, I-81 connects 30 colleges and universities, 21 cities and towns and 13 counties, and parallels the Blue Ridge Parkway making this program critical to supporting job growth and economic vitality while reducing congestion, enhancing safety and reliability, and improving quality of life for everyone in our region.

The 325-mile long corridor spans across three VDOT districts: Bristol, Salem, and Staunton. There are currently 64 I-81 Corridor Improvement Plan Projects that will consist of both operational and capital improvements. Some of these projects include additional traffic cameras to detect incidents, changeable message signs, speed change lane extensions, curve improvements, as well as adding or widening lanes in some sections of the corridor.

2) Guide Purpose and Goals

The purpose of this document is to provide guidance to assist project teams in decision making for the I-81 Corridor Improvement Plan project elements. This is intended as a guide only and not a mandate of how projects are to be developed or how decisions are to be made.

This guide has three main goals:

a) Decision Making Guidance - Clarify process that the project teams delivering projects in the CIP can use to evaluate and document a variety of project elements that are likely to be encountered on a number of projects in the CIP.
b) Corridor Consistency - Establish templates and guidelines for documentation that will provide consistency amongst the many projects in the CIP so that similar project issues are being evaluated and documented in similar ways.
c) Practical Design – It is expected that projects delivered through the CIP will be based on a design approach built upon Performance Based Practical Design Principles (PBPD, see IIM-LD-255) and Common Sense Engineering (CSE, see IIM-LD-235) . CIP projects should seek to achieve a high return for minimal cost; while seeking to address the purpose and need in a cost-efficient way. Cost effective solutions based on Common Sense Engineering and Performance Based Practical Design lead to good use of program funding across many projects and good stewardship of program funding.

Section 2: I-81 Corridor Project Scoping

1) Items for Consideration

Project scoping is a critical element of project development as it sets the stage (and in many cases sets limitations) for how a project will proceed to final design, construction, and opening day. Scoping will put brackets around several items including budget, milestone schedule, project termini, limits of NEPA analysis, along with project purpose and need. It is suggested that the following items be considered in addition to traditional scoping items, when developing scoping documents for projects within the I-81 Improvement Program:

- Review the I-81 Corridor Improvement Plan
- Evaluate number of crashes and pinpoint problem areas
    - Review known substandard feature locations, such as
        - Shoulder
        - Superelevation
        - Bridge clearance
        - Low friction numbers
    - Review other factors, such as
        - Animal crossing strikes
        - Oncoming glare
        - Vegetation
- Identify reasonable limits of disturbance for NEPA evaluation.
- Don't forget Stormwater Management, constructability considerations in constrained Right-of-way or environmental areas, maintenance access.
    - Consider all potential stormwater management locations – during the early stages
    - Consider outfall channels – there may be a need for improvements and/or restoration
- Evaluate adjacent project limits and/or potential need for extending ramps and accel/decel lanes
- Review need for replacement of large cost existing assets (i.e., bridges, overhead signing) to maximize opportunities to impact highway section only one time.
    - Assess existing and proposed projects (State of Good Repair, Smart Scale, Highway Safety Improvement Program, etc.)
    - Look for opportunities to combine projects with schedule and/or funding
    - Consult with District Structure & Bridge Office
- Evaluate utility relocation requirements, including impacts to schedule and cost
- Evaluate schedule impacts related to coordination with outside entities, such as railroads
- Identify existing substandard features
- Identify whether the project will require Limited Access change
- Determine whether the project requires FHWA oversight (i.e., Projects of Division Interest (PODI)
- Evaluate the level of traffic analysis required
- Allow sufficient time in schedule for Right of Entry notifications for any work outside of right of way

- Consider potential improvements or betterments to crossing routes (i.e., Adding width to typical sections, vertical clearance issues, future improvements)
- Lighting needs and desires
- Landscaping

2) Risk Management

Risk management is an important function of scoping as it becomes the foundation of determining how and what issues designers can address as project development and construction progresses. Project Management Office (PMO) processes must be followed to identify project specific risks, consider how similar risks have been addressed in the overall corridor, and consider whether this project risk is unique and requires a different (performance based) solution. Project teams must recognize that as a project in the I-81 Improvement Program, certain decisions may have far reaching impacts beyond an individual project. Precedents and expectations can be set for the remainder of the program or certain choices may be inconsistent with previous projects or decisions. Individual project teams should identify and raise risk elements to I-81 team management before finalizing scoping as it can become very difficult to make changes post scoping.

3) Modifying Project Elements

As the project team works to close scoping and develop the project, there are items that may be identified requiring a change to the planned I-81 CIP project elements. If a project scope, schedule, or budget is being considered for modification from the original I-81 CIP, project teams must consider if modified project elements are within the goals of the overall I-81 CIP and within the specific project purpose and need.

Once a change is identified, the I-81 Program Manager shall be consulted to ensure the need is within the goals of the overall I-81 CIP before proceeding. Additionally, the I-81 Program Manager will advise what level of documentation is required to approve a particular change. Within this guidance document, there are two classifications of changes: (a) Modifying Original Planned I-81 CIP Project Elements Before Closing Scoping and (b) Modifying I-81 CIP Project Elements after Scoping. The following sections describe each of these situations.

a) Modifying I-81 CIP Project Elements Before Closing Scoping

Before scoping (Activity 22) has been closed in the project schedule, project scope and budget require special consideration and potentially documentation prior to making changes. If the project schedule requires change, the standard review process applies. To confirm and document that an originally planned project element of scope or budget should be modified, the following process is outlined for decision making and documentation:

Scope changes

- Identify the potential for a scope change.
    - Examples might include:
        - Project limits
        - Additional elements
- Address how the project change addresses purpose and need.

    - Example items might include:
        - More detailed analysis of crash data uncovers an item that changes the project intent
        - Traffic and operational analysis at PFI stage identifies additional capacity needs
        - Changes in bridge or other asset condition
- Document the change. (See Section 4 for decision making template).
    - This supports District, Central Office and Program Manager review and approval, as applicable.
    - Provides justification of budget and schedule changes if needed.

Budget changes

- If additional funds above the limits listed below are requested, documentation will be required:
    - Total Project Budget < $5,000,000
        - 20% or greater increase in funding requested
    - $5,000,000< Total Project Budget < $10,000,000
        - $1,000,000 or greater increase in funding requested
    - Total Project Budget > $10,000,000
        - 10% or greater increase in funding requested or above $5,000,000 increase in funding
- Identify the reasons why the budget requires change
    - Examples might include:
        - Project limit changes
        - Additional elements
        - Unit cost increases
- Document the change.
    - This supports District, Central Office and Program Manager review and approval, as applicable.
    - Provides justification of budget and schedule changes if needed.

Approval level will be based upon extent of change required (scope or value/percentage of change in budget) and the following individuals could be involved:

- VDOT Project Manager
- District Preliminary Engineer Manager
- I-81 Program Manager
- Central Office
- CTB

If the modification cannot be fully documented, justified, or funded, it may not be approved for implementation within the program.

b) Modifying I-81 CIP Project Elements After Scoping is Closed

After scoping (Activity 22) has been closed in the project schedule, project scope, schedule and budget all require special consideration prior to making changes. To confirm and document that an originally planned project element of scope, schedule or budget should be modified, the following process is outlined for decision making and documentation:

Scope Change (See above)

Schedule change

- Identify the changes to the project schedule
  - Specific schedule milestones changes with focus on:
    - Approve Willingness or Adopt Location/Design (47,49)
    - Authorize RW & UT Funds (52)
    - Utility Relocation by Others (67U)
    - Acquire Right-of-Way (69)
    - Obtain Environmental Permits (70)
    - Advertise Project (80)
    - Award Contract (84)
    - Administer Contract (91)
  - Early and late starts and finishes for the activities
- Identify the reasons why the schedule requires change
  - Examples might include:
    - Project limit changes
    - Additional elements
    - Environmental requirements
  - Discuss any mitigations to recover schedule
- Document the change.
  - This supports District, Central Office and Program Manager review and approval, as applicable.
  - Provides justification of budget and schedule changes if needed.

Budget Change (See above)

Approval level will be based upon extent of change required (scope or value/percentage of change in budget and/or schedule) and the following individuals could be involved:

- VDOT Project Manager
- District Preliminary Engineer Manager
- I-81 Program Manager
- Central Office
- CTB

If the modification cannot be fully documented, justified, or funded, it may not be approved for implementation within the program.

4) Value Engineering:

Value Engineering (VE) may be required on an I-81 Program Improvement project depending on the value of the project. Recommended changes to the design at this stage should be evaluated for the same elements noted above to confirm applicability to a given project scope. Projects must follow the current VDOT guidance for formal VE based upon project value. Project Managers and Team Members must also review I-81 funding rules, program precedents and other program specific considerations before recommending any potential VE changes, to confirm intent does not deviate from these guideline and requirements.

5) Addressing Locality and Authority Requests

Many of the proposed improvements along the I-81 corridor will have direct or in-direct connections to local roads or other local infrastructure. The following items may need to be considered related to potential requests by localities to included improvements in an I-81 project.

- Is the proposed improvement within the purpose and need of the given I-81 project?
  - If no, then the item would be considered a betterment.
- Is the requested item already covered within another project or planned funding source?
  - If yes, then the item would be considered a betterment.
- Is this a maintenance item that the locality should be covering with local funding?
  - If yes, then the item would be considered a betterment.
- What is the timeline for implementation of the item, and can the item be reasonably be anticipated to occur and/or be required within the I-81 design year horizon?
  - If no, then the item would be considered a betterment.
- Is the proposed improvement part of an approved plan (comprehensive plan, bike and pedestrian plan, etc.)?
  - If no, then the item would be considered a betterment.

If an item is identified as a betterment, the cost of this item will not be included in VDOT project funding associated with the I-81 CIP Projects. If a locality or authority wants to add funds to a project to fully cover the cost of inclusion of the betterment, this should be coordinated with the VDOT Program Manager and VDOT Project Manager. The locality or authority shall make the request prior to closing the project scope and the funds shall be committed from the locality prior to acquiring design approval.

Section 3: I-81 Projects Development

1) Practical Design Application - Corridor Considerations

VDOT has implemented the Location and Design Division Instructional and Informational Memorandum (I&IM) 255 - Performance Based Practical Design (PBPD) and I&IM 235 - Common Sense Engineering (CSE) and Context Sensitive Solutions to Transportation Challenges for use in developing VDOT projects. Per IIM-LD-255 and IIM-LD-, PBPD is a “design approach in which key design decisions are made with consideration of their anticipated effects on aspects of future performance that are relevant to the project purpose and need” and ”the goal of CSE is to produce effective projects that optimize system wide transportation improvements through the use of appropriate design flexibility that provides for essential improvements”, respectively. VDOT aims to utilize Practical Design and Common Sense Engineering approaches across the spectrum of projects planned with the I-81 Program Improvements. There are several items noted below for VDOT and Design Team consideration as Practical Design Applications are considered in the corridor:

- Maintain the existing or improve the safety level of individual projects and specific project elements
- Evaluate adjacent project planned improvements and consider any impacts to the corridor
- Assess performance based needs for upgrading existing elements if not impacted by planned improvements while considering the short term and long-term safety, operational and/or maintenance benefit before proposing upgrades
- Evaluate performance based needs for upgrading existing elements impacted by the project when such element is not a planned I-81 CIP project element.
- Consider other cost and schedule effective solutions that may achieve the project scope

2) Lessons Learned / Program Guidance

VDOT’s Bristol District, Salem District, Staunton District, and Central Office have been developing a variety of projects along the I-81 corridor as part of the Improvement Program. As this program has progressed, there are several items that have been identified as lessons learned. These items are listed below and recommended for consideration during project development:

Schedule

- With the increase in interstate corridor projects, Limited Access change requests are also increasing. Schedules need to include adequate time for CTB approvals after Public Involvement and before Design Approval. Early and frequent coordination with the Central Office is necessary to stay on schedule. Refer to the VDOT Road Design Manual (Chapter 2E) for more information regarding Limited Access changes requirements.
- Project development schedules and advertisement dates should consider adjacent project schedules and potential overlap of work zones/contractors. Coordination between adjacent projects should occur (i.e., staggering schedules) to minimize/avoid negative impacts to either project or to create synergies (i.e., combined work zones) between the projects.

- Include time in the schedule for Programmatic Categorical Exclusions (PCE) and one-time PCEs (OTPCEs) and for preliminary engineering work (e.g., cores/borings, surveys, etc.). Consult with District Environmental for additional guidance for specific activities.
- Include time for NPDES General Construction Permit for land disturbance activities during PE phase (e.g., geotechnical investigations.).

Shoulders

- Shoulder DE/DW flexibility is recommended on bridges to avoid unnecessary structural widening expenses that aren't required to meet project intent.
- The program includes many widening projects, and some require permanent concrete barriers adjacent to reduced shoulders, due to project constraints. Drainage spread adjacent to the barrier must be considered in determining the appropriate minimum shoulder width along the barrier.
- Consider the existing shoulder widths and corridor consistency in decisions of proposed shoulder widths.

Ditch Width / Cut Slope

- Evaluate shoulder widths, ditch widths, and/or cut slope requirements to ensure that slopes aren’t cleared and reworked where there is little to no benefit in doing so.

Removal of Trees and Vegetation

- Removal of trees and/or vegetation lead to perceptions of noise increases by nearby residents despite noise modeling showing vegetation doesn’t dampen noise.
- Consider native tree and shrubs be replanted.

Vertical Curves

- With the increase in design and posted speeds on interstates, some existing vertical curves may not meet stopping sight distance standards. These locations only require reconstruction and correction if there is evidence of associated accident clusters or the feature is identified as a specific part of the project performance needs.

Cross Slope/Superelevation

- While AASHTO policy states that widening should not be designed in a way that slows drainage flow across the cross section (a steeper cross slope flowing to a flatter cross slope), the design team will need to carefully study and evaluate the actual implications and interaction of longitudinal grade on drainage. Consideration should be given to potential constraints that may not allow for correcting such conditions due to compounding effects that may require extensive reconstruction beyond the purpose and need of a given project. It is recommended that the need for or justification for not correcting this condition be clearly documented in the scoping documentation.

- A rolling average cross slope (computed over segment lengths of 500ft) is recommended when analyzing long tangent sections for compliance to normal crown cross slopes. This rolling average would then be utilized to determine whether cross slope correction may be required.
- Existing cross slopes in tangent sections that are consistently flatter than 0.5% for lengths greater than 500 linear feet should be considered for correction.
- Widening may extend the existing cross slope/superelevation or be constructed on a corrected cross slope/superelevation, depending on the specific situation. A combination may be needed to avoid drainage ponding concerns.
- Widening of an existing cross slope/superelevation that slopes opposite of the curve direction is discouraged.
- Cross slope or superelevation correction may not be a beneficial improvement if it results in a substandard bridge clearance.
- The program includes many widening projects that create three lane sections (in one direction) with paved shoulders on both sides of the lanes. Normal crown typical sections that slope all lanes in one direction are typically not desired due to ice/snow concerns from drainage flowing across multiple lanes (and shoulders). However, consideration should be given to constraints that may not allow for such corrections to the typical section due to extensive reconstruction beyond the purpose and need of a given project. It is recommended that the need for or justification for not correcting this condition be clearly documented in the scoping documentation.

Scope/Funding

- I-81 program funding is intended to improve the safety and operations of the interstate corridor. Scope creep to improve connecting facilities or accommodate new facilities that are not funded should not be allowed unless they contribute directly to interstate performance.
- While the I-81 study identified approved projects, the appropriate traffic operational and safety analyses are still required as documentation per TOSAM. It is important that any analyses/reports focus on alternatives that meet the project purpose and need identified rather than encouraging scope creep and improvements beyond the interstate performance.
- I-81 program funding is not intended for maintenance use. Other maintenance funding sources must be used to cover additional maintenance scope features that are beyond the project purpose and need.
- Project limits were determined from a corridor study and will likely require refinement. This refinement must be justified by the project safety and operational analysis and must be consistent with the approved project purpose and need.

FHWA Involvement

- FHWA currently designated major widening projects and Design Build projects along the I-81 corridor as Projects of Divisional Interest (PODIs). For these projects requiring Federal oversight, ensure the FHWA representative is included in major milestones, plan submissions, traffic analysis and major decisions. The PODI determination is subject to change.

Preliminary Engineering Investigations

- Identify stormwater/E&S and environmental clearances needed for preliminary engineering investigations
- OTPCEs for work within the right of way
- Consider bat surveys which may be helpful/necessary prior to tree cutting for preliminary engineering investigations, such as cutting trees for soil borings and bridge inspection and testing
- PCEs for investigations outside of the right of way
- PCEs for other activities within the right of way not covered under an OTPCE
- E&S Plan and Inspections
- General Construction Permit (NPDES) Coverage for land disturbance activities
    - E&S Plan, SWPPP, Posting of Documents, Inspections.

3) Disapproved Items

Several design and construction elements have previously been considered within the I-81 Program and a determination has been made that they are not approved for use in this corridor. Items that will not make it through an approval process are typically vetted during scoping and design progression. Therefore, individual disapproved items will not be listed here, but it is noted that elements which have typically not moved forward in design progress are due to the following considerations:

- Beyond project scope of the I-81 Program and/or funding constraints
- Operational concerns
- Constructability concerns
- Maintenance concerns (What about repairing an existing storm drain pipe? Is this included or excluded.
- Inconsistency with existing or planned corridor features
- Could preclude a future planned improvement
- Inconsistency with local comprehensive plan
- Lack of substantial safety or operational performance benefit

If a Design Team feels that due to the specific circumstances of an individual project that a previously disapproved item should be considered and approved for the project, the PM should follow the guidance in Section 4: Decision Documentation Templates to request approval and deviation from a specific item. This approach should be utilized for identified items within this manual or other I-81 Program guidance.

Section 4: Decision Documentation Templates

The following pages outline a potential template for use in documenting decisions for projects included in the I-81 Improvement Program. Regardless of format, any approved decision documentation should be uploaded into the ProjectWise project folder by the PM.

It is noted that the templates included in this section or in the appendices of this guide do not supersede the need for standard Design Exception, Design Waiver, or other standard documentation. These templates are provided as a means to document decisions made as part of the I-81 Corridor Improvement Program.

I-81 PROGRAM IMPROVEMENT PROJECT DECISION DOCUMENTATION

UPC: Project Name: Project No.:

Issue – This should be 1-2 sentences in simple terms for project/District leadership to easily understand and comprehend quickly.

Decision – Document the decision and provide 1-2 sentences in simple terms for each of the following impacts:

- Decision Description
- Design (DE/DW or policy use/deviation):
- Constructability:
- Cost:
- Schedule:
- Environmental:
- Right-of-Way & Utilities:
- Maintenance:
- Operations:
- Safety:

Prepared by: _____ _____
Name & Title Date

Supporting Documentation Sections

Background – Provide technical background of the issue including any known problems and issues if left unresolved. This should include any relevant applicable design standards, examples of current issues, scale and scope of the issue, limiting elements, constructability concerns, environmental considerations, and consequences of no build.

Alternatives Analysis – Identify each alternative considered as a potential solution for this issue. Include any technical, funding, or other important details relevant to the decision process. Adverse outcomes of each alternative should be part of the discussion. This may require interdisciplinary coordination.

Decision & Justification – Provide discussion on selected alternative and why it was selected. This should include any relevant standard modifications, use of Context Sensitive Solutions, Design Waivers/Exceptions required, and other relevant decision points.

Prepared by – Identify the author of the documentation. This form would typically be prepared by the project team in consultation with the VDOT Program Manager and Central Office.

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix A

VDOT
Virginia Department of Transportation

Appendix A: DE/DW for Superelevation and Cross Slope

Information needs:

- Existing roadway plans showing typical sections and curve data with design superelevation
- Proposed roadway plans showing typical sections and curve data with design superelevation
- Aerial imagery of roadway
- Survey of pavement edge lines and existing lane striping
- Digital terrain model or survey elevations of existing pavement
- Crash history of past 3 years within project limits with crashes geospatially located

References:

- AASHTO Green Book Chapter 4.2.2.1 (Tangent Cross Slope)
- AASHTO Green Book Chapter 3.3.3.2 (Maximum Superelevation)

Process:

- **Curves**
  - Establish the pattern or trend of existing superelevation through all horizontal curves within the project limits
  - Determine both the proposed superelevation rate and required AASHTO minimum superelevation rate for each horizontal curve
  - Populate the Summary of Superelevation Rates spreadsheet as shown in Exhibit A-1 for inclusion as a table in the Design Exception Narrative
  - Calculate the average superelevation of the existing curve between the 1/3 Lr points (1/3 in and 1/3 out)
  - Identify horizontal curves with existing average superelevation rates that are more than 0.5% less than the current design superelevation rate standard (this analysis is for identification and documentation of need for DE/DW and is not for evaluating survey accuracy needs)
  - Conduct ball bank indicator study on curves that do not meet current design standards and document results
  - Establish the shoulder rollover on the opposite side of widening (i.e., if widening to the inside, verify the right shoulder). Flag locations where the rollover exceeds 7% between the existing cross slope of the adjacent lane and the existing shoulder cross slope.
- **Tangents**
  - Populate the Summary of Tangent Cross Slopes spreadsheet as shown in Exhibit A-2 for inclusion as a table in the Design Exception Narrative

- Calculate the rolling average cross slope in tangent sections segmented into segment lengths of 500'
- Identify segments (500') where existing cross slope is less than 1.5% or greater than 2.5%
  - Flag segments where existing cross slope is less than 1.0% or greater than 3.0% (these areas may potentially require mitigation regardless of the results of the crash data analysis)
- If a crown exists, establish the rollover across the crown line. Flag locations where the rollover exceeds 4% between the existing cross slopes of the lanes on either side of the crown.

- **Tangents and Curves**
  - Establish the existing cross slope for each lane throughout the project corridor at a minimum of 50' intervals.
  - Populate the Cross Slope / Superelevation Evaluation spreadsheet as shown in Exhibit A-3.
  - Evaluate 3 years of crash data with specific focus to the areas of superelevation rate and/or tangent cross slope that do not meet current standards.
    - If crash data suggests an existing safety problem that aligns with locations of deficiencies and where the substandard superelevation/cross slope is likely a contributing factor to the crashes, evaluate appropriate mitigation measures and/or corrections
      - Issues to be considered consist of:
        - Impacts to side slopes if variable depth wedging or cross slope correction is applied
        - Constructability and maintenance of traffic
    - If crash data does not suggest an existing safety problem that aligns with locations of deficiencies or there is no discernable crash trend, consider mitigations offered by the proposed project such as widened shoulders, improved drainage infrastructure, rumble strips, etc.
  - Fill out IIM Form LD-440 or LD-448 including supporting documentation.

Supporting Documentation:

Attachment A – Existing roadway plans (Title Sheet and Plan Sheets)

Attachment B – Excerpts from AASHTO and VDOT standards as applicable to the request

Attachment C – Proposed roadway plans (Title Sheet, Typical Sections, and Plan Sheets)*
*Profiles and Sample Cross Sections may be included if needed

Attachment D – Cross Slope / Superelevation Evaluation spreadsheet (as shown in Exhibit A-3)
(*The table format may need to be modified slightly to fit a project specific situation, based on number of lanes and location of widening. Table alignment to follow the proposed typical section in direction of stationing.)*

Attachment E – 3 years of crash data in tabular format and geo-spatial exhibits

Attachment F – Mitigation measures documentation (e.g., ball bank indicator results, etc.)

Attachment G – Miscellaneous Information

Notes:

- Should the calculated cross slopes and/or superelevation show widely varying cross slopes in a given section, the project team should consult with the District Survey Division to confirm if accuracy of aerial survey data is sufficient for design and/or documentation of the existing conditions.

A sample approved DE/DW is attached at the end of this section.

Figure 1: Decision Flowchart for DE/DW for Superelevation

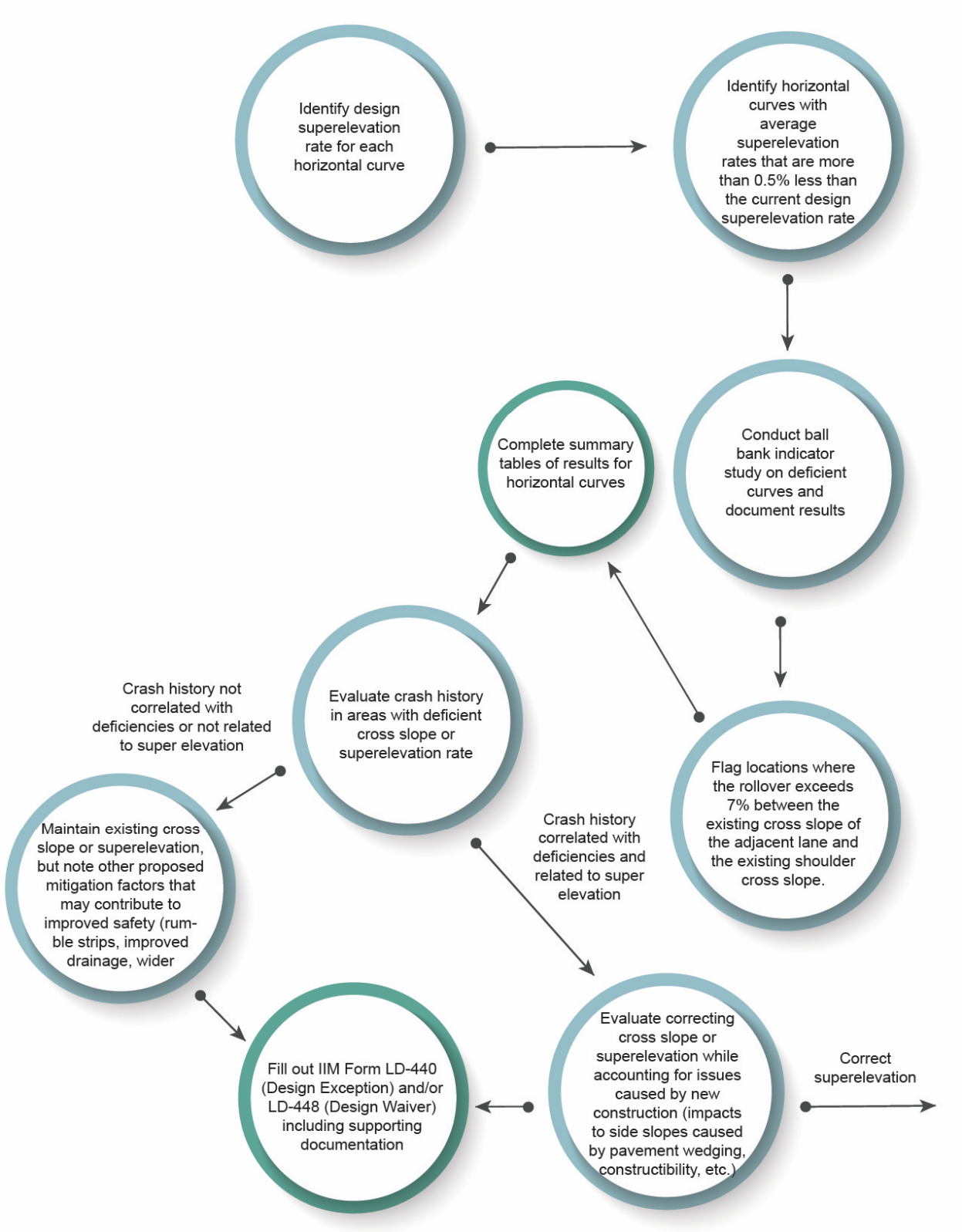
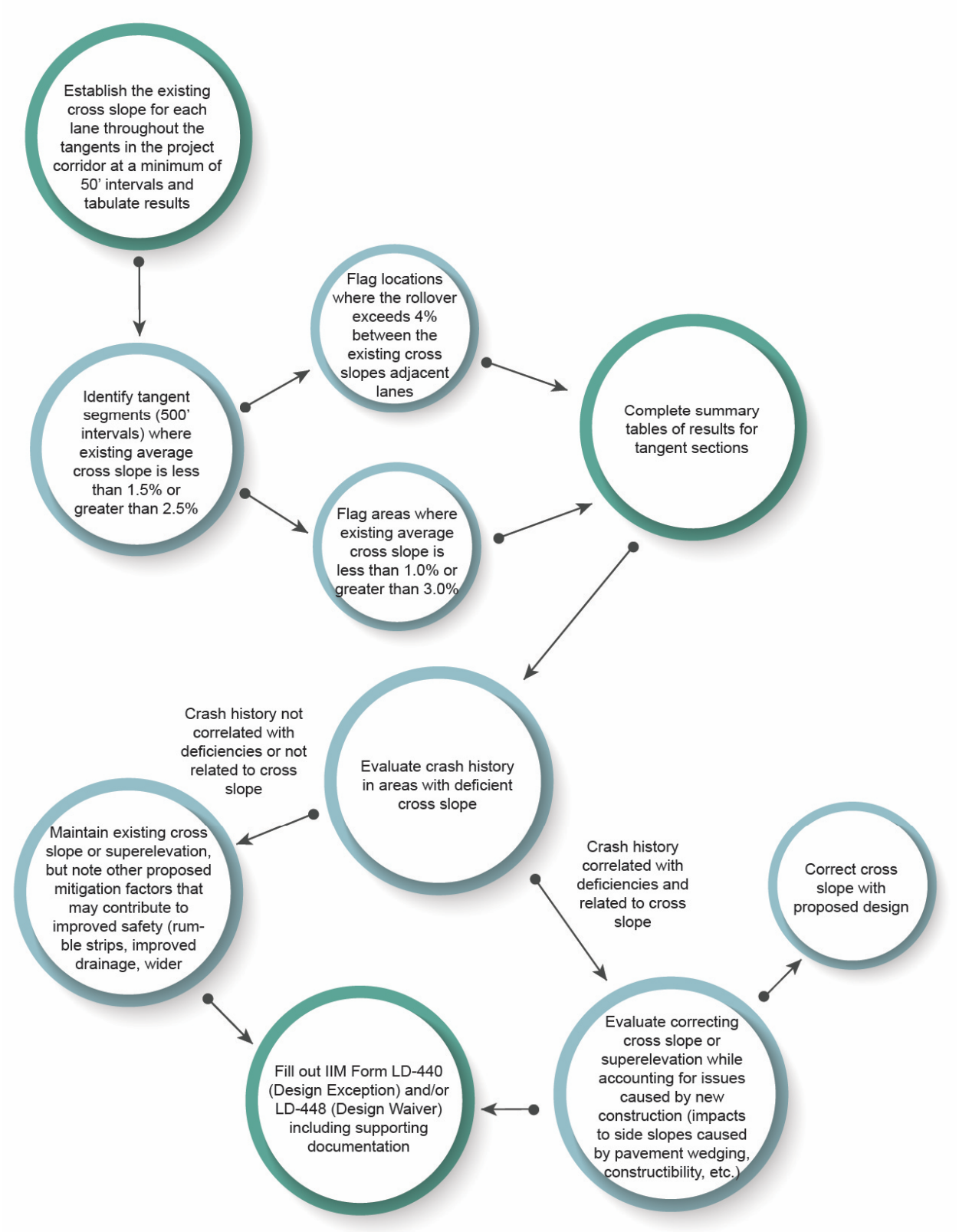


Figure 2: Decision Flowchart for DE/DW for Cross Slope



I-81 Corridor Improvement Plan

Project Name

Date:

Summary of Superelevation Rates

VDOT Project #:

VDOT UPC #:

Curve ID	PC Station	PI Station	PT Station	Length of Curve (ft)	Radius (ft)	Design Speed (mph)	AASHTO Min. Superelevation Rate[1] (%)	Average Exist. Full Superelevation (%)		Approx. Actual Design Speed[2] (mph)
								Outside Lane (%)	Inside Lane (%)	
CURVE 001	*100+00.00*	*110+00.00*	*120+00.00*	*2,000*	*5,725*	*70*	*4.00%*	*0.50%*	*-2.70%*	*45*

Exhibit A-1: Curve Summary

I-81 Corridor Improvement Plan

Project Name

Date:

Summary of Tangent Cross Slopes

VDOT Project #:

VDOT UPC #:

Tangent Station Range			Length of Tangent (ft)	Design Speed (mph)	Crown? (YES/NO)	Average Exist. Cross Slope (%)	
From		To				Outside Lane (%)	Inside Lane (%)
100+00.00	*to*	*105+00.00*	*500*	*70*	*YES*	*0.50%*	*1.00%*

Exhibit A-2: Tangent Summary

I-81 Corridor Improvement Plan

Project Name

Cross Slope / Superelevation Evaluation

VDOT Project #:

VDOT UPC #:

Date:

Station		VDOT/AASHTO (2020) Standard[1]	Southbound Lanes						Northbound Lanes					
			Existing Outside Lane (Right Lane) Cross Slope			Existing Inside Lane (Left Lane) Cross Slope		Proposed Widened Lane (New Left Lane) Cross Slope (%)	Proposed Widened Lane (New Left Lane) Cross Slope (%)	Existing Inside Lane (Left Lane) Cross Slope			Existing Outside Lane (Right Lane) Cross Slope	
			Existing (%)	Required (%)		Existing (%)	Required (%)			Existing (%)	Required (%)		Existing (%)	Required (%)
122+50	Limits of Design Exception Request		-1.00%	-1.00%	Baseline/POFG	-2.60%	-1.50%	-1.50%	-1.80%	-1.80%	-1.80%	Baseline/POFG	-2.00%	-2.00%
123+00		Transition	-1.40%	-1.40%		-0.40%	-1.80%	-1.80%	-1.40%	-1.40%	-1.40%		-1.00%	-1.00%
123+50		Transition	-2.70%	-2.70%		0.60%	-1.40%	-1.40%	-2.70%	-2.70%	-2.70%		0.01%	0.01%
PC 123+73.11														
124+00		Transition	-2.20%	-2.20%		1.70%	-0.90%	-0.90%	-2.20%	-2.20%	-2.20%		1.00%	1.00%
124+50		4.0	-2.30%	-2.30%		0.80%	2.70%	2.70%	-2.30%	-2.30%	-2.30%		1.00%	1.00%
125+00		4.0	-4.00%	-4.00%		0.40%	2.70%	2.70%	-4.00%	-4.00%	-4.00%		1.00%	1.00%
125+50		4.0	-3.20%	-3.40%		-0.10%	2.70%	2.70%	-3.20%	-3.20%	-3.20%		1.00%	1.00%
126+00		4.0	-3.40%	-3.40%		-30.00%	2.70%	2.70%	-2.60%	-2.60%	-2.60%		1.00%	1.00%

Exhibit A-3: Cross Slope and Super Evaluation Rev

VIRGINIA DEPARTMENT OF TRANSPORTATION
LOCATION AND DESIGN/STRUCTURE & BRIDGE
DESIGN EXCEPTION REQUEST
Design Exception Number: (For use by NOVA Only)

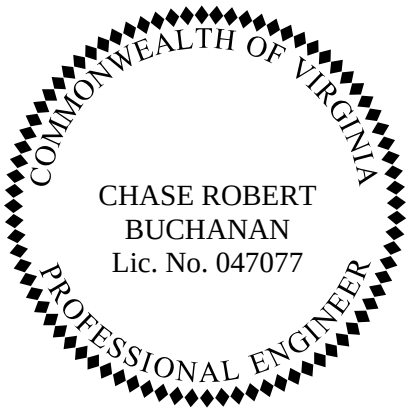
Date: Click to enter a date.		
To:	Vernon Heishman, PE	Assistant State Location and Design Engineer
From:	Tamara Pritchard, PE	District Location and Design Engineer
Subject	DESIGN EXCEPTION REQUEST	

Project Information			
UPC	116156	State Project Number	(FO) 0081-095-829
Federal Project Number	NHPP-081-1(362)	District	Bristol
City/County	Washington	Click to choose an item.	
Start Location (From)	MM 32.197 (NB)		
End Location (To)	MM 33.519 (NB)		
Project Description	I-81 Northbound Truck Climbing Lane		
Funding Source			

Design Exception Request For					
☐	Design Speed	☐	Horizontal Curve Radius	☐	Design Loading Structural Capacity*
☐	Lane Width	☐	Cross Slope	☐	Vertical Clearance*
☐	Shoulder Width	☐	Sight Distance (Stopping)	☒	Superelevation Rate
☐	Maximum Grade	☐	Other		
* These are typically requested by the Bridge designer.					

Road and Traffic Information					
Current ADT	16,040	Design ADT	21,404		
% Trucks	17	Design Speed	75	Posted Speed	70
Reduced Design Speed (if applicable)		Is Project on NHS?	Yes		
Functional Classification	GS-INT INTERSTATE				
Min. AASHTO Standard	4.0%	AASHTO Reference	2011 AASHTO Green Book Table 3-10b (Page 3-47)		

Existing Dimensions	Varies 2.8% min. to 4.0% max. exist. outside lane	Requested Dimensions	Varies 2.8% min. to 4.0% max. exist. outside lane
Total estimated construction cost of project	$ 14,500,000		
(Based on approval of this exception) Cost should include item such as additional grading or paving, widening or replacing structures, acquiring additional right of way, wetland mitigation, etc.			
Additional cost to meet minimum AASHTO standard	$ Please see attached narrative		
Background description of project: (Attach Separate Document)			
(Include a description of the general characteristics of the existing highway focusing on the features relevant to the proposed exception. Provide a brief description of the adjacent highway segments, highlighting existing nonstandard features when relevant to the proposed exception as well as the title sheet, typical section sheet, applicable plan sheets, profiles and cross sections.)			
Design Exception Details			
Purpose and need for exception; why standards cannot be met (include any future plan to upgrade this exception to standard)	Please see attached narrative		
Are there any plans to improve the approach roadway within the next ten (10) years?		Please see attached narrative	
Accident history for the past 3 years, number of crashes, severity of crashes, types of crashes (run- off-the road, rear-ends, sideswipes, head-on, etc.), cause of crashes, the affect the design exception will have on types and number of crashes and a comparison of the statewide average	Please see attached narrative		
Effect of design exception on safety	Please see attached narrative		
Mitigation of the substandard design element(s)	Please see attached narrative		
Has the Responsible District Traffic Engineer reviewed the substandard design and do they agree with the proposed mitigation measures? If not, please explain.	Please see Attachment E		



VDOT Bristol District
Location and Design Division
Roadway Design

Prepared By: Chase Buchanan, PE Date: 4/22/2021
District Roadway Design Manager

Note: The responsible person that prepares the request shall also electronically seal and digitally sign in the block above. **All signatures below shall be digital signatures**.

Remarks:

Recommended For Submission to C.O. By

District Location and Design Engineer

Or

District Structure and Bridge Engineer

Recommended for Approval By
_____ Assistant State Location and Design Engineer Or _____ Assistant State Structure and Bridge Engineer _____ Responsible District Traffic Engineer (For Crossovers Only)

VDOT and FHWA Approval	
VDOT Approval By	_____ State Location and Design Engineer Or _____ State Structure and Bridge Engineer
FHWA Approval By	_____

Cc: Project Manager
Design Engineer
State Geometric Design Engineer

Design Exception – Superelevation Rate
I-81 NB Truck Climbing lane
UPC 116156

DESIGN EXCEPTION NARRATIVE

Background Description of Project:

The project is part of the I-81 Corridor Improvement Program that will provide operational and capital improvements along the 325-mile long corridor that spans across three Virginia Department of Transportation districts: Bristol, Salem, and Staunton.

I-81 is classified as an Interstate and is part of the National Highway System (NHS). The existing typical section through the project limits is a four-lane, divided, rural facility with two 12 ft. lanes, a 7 ft. inside shoulder with 3 ft. paved, and a 15 ft. outside shoulder with 10 ft. paved, in each direction. The northbound and southbound roadways are separated by a grass median that varies 25 ft. to 65 ft. in width. An existing double faced guardrail, predominately located adjacent to the northbound inside shoulder, runs along the median within the project limits. In some locations, standard guardrail is located adjacent to the median shoulders and the outside shoulders for the northbound and southbound directions.

Located north of I-81 Exit 32 between Mile Marker 32.197 (NB) and Mile Marker 33.519 (NB), the project will improve safety and operations by widening the existing northbound roadway to accommodate the addition a 12-foot truck climbing lane with a total outside shoulder width of 12 feet and a paved shoulder width of 10 feet. The truck climbing lane will begin at the end of the existing Exit 32 on-ramp acceleration lane and continue for approximately 4,800 feet. The project's purpose and need does not include any improvements to the existing mainline travel lanes. The existing mainline travel lanes will be resurfaced when construction is complete to obscure pavement markings for a lane shift during construction. The design speed for this section of I-81 is 75 mph (posted 70 mph).

The beginning and end of the project fall within a portion of two existing northbound horizontal curves. In accordance with the *VDOT Road Design Manual Geometric Standard GS-INT*, this section of I-81 should be designed with a maximum superelevation rate of 8%. The original project was classified as a Class I Divided Roadway in Rolling Terrain and designed in accordance with the 1953 Virginia Department of Highways (VDH) Road Design and Standards. All horizontal curves were designed in accordance with Standard TC-2. The curve data on the original plans shows an EB (NB) Centerline radius of 5,729.58 feet for the horizontal curve entering the proposed project limits and an EB (NB) Centerline radius of 5,729.58 feet for the horizontal curve exiting the proposed project limits. In accordance with the 1953 VDH Road Design and Standard TC-2, horizontal curves less than 2^{o} (R > 2,864.79') shall be superelevated by an amount equal to the standard pavement crown of ¼":1'. A copy of the original Title Sheet, Plan Sheets, and 1953 Road Design Standard are presented in Attachment A.

In 2010, the General Assembly of Virginia passed HB 856 to allow the maximum speed limit to be raised from 65 mph to 70 mph on interstates and certain other highways. A copy of HB 856 is included in Attachment B.

Design Exception – Superelevation Rate
I-81 NB Truck Climbing lane
UPC 116156

DESIGN EXCEPTION DETAILS

Purpose and need for exception; why standards cannot be met (include any future plans to upgrade this exception to standard):

Superelevation is the amount by which the outer edge of curve on a roadway is banked above the inner edge to allow fast-moving vehicles to pass through a curved path without overturning or skidding. The maximum rate of superelevation is based on climate conditions, terrain conditions, type of area, and frequency of very slow moving vehicles whose operation might be affected by high superelevation rates.

There are two horizontal curves located within the project limits. Based on a review of existing survey data provided for the project, the horizontal curves were evaluated for compliance with American Association of State Highway and Transportation Officials (AASHTO) criteria for minimum superelevation rates. The results of the evaluation are presented in Table 1. Please refer to the plans provided in Attachment C for horizontal alignments and cross sections including stationing referred to in Table 1.

Table 1 – Summary of Superelevation Rates

Curve No.	PC Station	PI Station	PT Station	Design Speed (mph)	Radius (ft)	AASHTO Min. Superelevation[1] (%)	Existing Superelevation (%)
I-81NB_3	106+66.55	118+39.97	129+81.38	75	5,729.58	4.0	Varies 2.5 to 4.0
I-81NB_6	162+34.08	175+05.48	187+36.34	75	5,729.58	4.0	Varies 2.3 to 4.8

1. AASHTO – A Policy on Geometric Design of Highway and Streets (2011), Section 3.3.5, Table 3-10b

As noted in Table 1, the two existing horizontal curves do not comply with the AASHTO minimum requirements for minimum superelevation rates. The existing conditions approximate a design speed of 65 mph for the I-81NB_3 outside lane and 70 mph for the I-81NB_6 outside lane.

The main objective of the project is to improve safety and operations by widening the existing roadway to accommodate a truck climbing lane. It is outside the project scope to bring the superelevation for each curve up to the current VDOT/AASHTO (2011) standard of 4.0%. Reconstruction of the roadway to achieve a compliant superelevation rate meeting the AASHTO criteria would require modifications to the existing mainline pavement cross slope(s) beyond the project limits and would result in additional grading and paving. It is anticipated that the additional grading and paving would increase the construction cost significantly as well as impacting the construction duration and schedule.

The purpose of this design exception is for the proposed truck climbing lane to match the existing outside lane cross slope which is less than the required 4.0% cross slope on the mainline. As reflected in Table 2 below, the proposed improvements will create a consistent and smooth lane change condition between the proposed truck climbing lane and existing outside lane. Table 2 shows the existing and proposed cross slope for each of the northbound travel lanes and the proposed northbound truck climbing lane. The VDOT/AASHTO (2011) standard would bring the travel lanes up to 4.0%.

Table 2
I-81 Northbound Truck Climbing Lane
Mile Mark 32.197 to Mile Mark 33.519
Cross Slope / Superelevation Evaluation*

Station	Inside (Left) Lane			Outside (Right) Lane		Truck Climbing Lane		VDOT/AASHTO (2011) Standard[1]	
	Existing	Proposed		Existing	Proposed	Existing	Proposed		
118+00	1.0	1.0		-2.9	-2.9	N/A	-2.9	-4.0	LIMITS OF DESIGN EXCEPTION REQUEST
118+50	2.2	2.2		-3.0	-3.0	N/A	-3.0	-4.0	
119+00	1.2	1.2		-3.2	-3.2	N/A	-3.2	-4.0	
119+50	0.5	0.5		-3.1	-3.1	N/A	-3.1	-4.0	
120+00	1.1	1.1		-3.0	-3.0	N/A	-3.0	-4.0	
120+50	1.1	1.1		-3.3	-3.3	N/A	-3.3	-4.0	
121+00	1.5	1.5		-3.2	-3.2	N/A	-3.2	-4.0	
121+50	0.9	0.9		-4.0	-4.0	N/A	-4.0	-4.0	
122+00	0.6	0.6		-3.9	-3.9	N/A	-3.9	-4.0	
122+50	0.2	0.2		-3.8	-3.8	N/A	-3.8	-4.0	
123+00	1.2	1.2		-3.2	-3.2	N/A	-3.2	-4.0	
123+50	0.8	0.8		-2.8	-2.8	N/A	-2.8	-4.0	
124+00	-0.4	-0.4		-2.5	-2.8	N/A	-2.8	-4.0	
124+50	0.0	0.0		-2.9	-2.9	N/A	-2.9	-4.0	
125+00	1.5	1.5		-2.8	-2.8	N/A	-2.8	-4.0	
125+50	1.2	1.2		-2.5	-3.0	N/A	-3.0	-4.0	
126+00	0.2	0.2		-3.3	-3.3	N/A	-3.3	-4.0	
126+50	0.3	0.3		-2.4	-3.1	N/A	-3.1	-4.0	
127+00	1.1	1.1		-3.0	-3.0	N/A	-3.0	-4.0	
127+50	1.0	1.0		-2.9	-2.9	N/A	-2.9	-4.0	
128+00	2.1	2.1		-2.8	-2.8	N/A	-2.8	-4.0	
128+50	0.8	0.8		-3.4	-3.4	N/A	-3.4	-4.0	
129+00	1.1	1.1		-3.9	-3.9	N/A	-3.9	-4.0	
129+50	-0.1	-0.1		-4.3	-4.3	N/A	-4.3	Transition	
PT 129+81.38									
130+00	-0.7	-0.7	BASELINE/POFG	-3.7	-3.7	N/A	-3.7	Transition	TANGENT SECTION PROPOSED CROSS SLOPE WITHIN TOLERANCES PROVIDED BY VDOT CENTRAL OFFICE VIA EMAIL DATED 7/8/2020 (DESIGN EXCEPTION NOT REQUESTED)
130+50	-1.3	-1.3		-3.2	-3.2	N/A	-3.2	Transition	
131+00	-1.4	-1.4		-2.5	-2.5	N/A	-2.5	Transition	
131+50	-1.6	-1.6		-2.2	-2.2	N/A	-2.5	NC	
132+00	-2.9	-2.9		-2.5	-2.5	N/A	-2.5	NC	
132+50	-2.0	-2.0		-2.4	-2.4	N/A	-2.5	NC	
133+00	-3.1	-3.1		-3.1	-3.1	N/A	-2.5	NC	
133+50	-2.7	-2.7		-1.6	-1.6	N/A	-2.5	NC	
134+00	-3.0	-3.0		-2.1	-2.1	N/A	-2.5	NC	
134+50	-2.9	-2.9		-2.5	-2.5	N/A	-2.5	NC	
135+00	-2.6	-2.6		-1.8	-1.8	N/A	-2.5	NC	
135+50	-4.1	-4.1		-2.2	-2.2	N/A	-2.5	NC	
136+00	-4.2	-4.2		-1.9	-1.9	N/A	-2.5	NC	
136+50	-2.2	-2.2		-1.8	-1.8	N/A	-2.5	NC	
137+00	-2.9	-2.9		-1.8	-1.8	N/A	-2.5	NC	
137+50	-2.6	-2.6		-1.9	-1.9	N/A	-2.5	NC	
138+00	-2.7	-2.7		-2.0	-2.0	N/A	-2.5	NC	
138+50	-2.6	-2.6		-1.3	-1.3	N/A	-2.5	NC	
139+00	-1.6	-1.6		-1.4	-1.4	N/A	-2.5	NC	
139+50	-2.3	-2.3		-2.1	-2.1	N/A	-2.5	NC	
140+00	-2.1	-2.1		-2.3	-2.3	N/A	-2.5	NC	
140+50	-2.3	-2.3		-2.5	-2.5	N/A	-2.5	NC	
141+00	-2.7	-2.7		-3.3	-3.3	N/A	-2.5	NC	
141+50	-1.9	-1.9		-2.7	-2.7	N/A	-2.5	NC	
142+00	-2.0	-2.0		-3.0	-3.0	N/A	-2.5	NC	
142+50	-1.5	-1.5		-2.4	-2.4	N/A	-2.5	NC	
143+00	-2.3	-2.3		-2.4	-2.4	N/A	-2.5	NC	
143+50	-2.1	-2.1		-2.8	-2.8	N/A	-2.5	NC	
144+00	-2.3	-2.3		-3.5	-3.5	N/A	-2.5	NC	
144+50	-1.9	-1.9		-2.4	-2.4	N/A	-2.5	NC	
145+00	-3.0	-3.0		-3.1	-3.1	N/A	-2.5	NC	

Design Exception - Superelevation Rate
I-81 NB Truck Climbing Lane
UPC 116156

Station	Inside (Left) Lane			Outside (Right) Lane		Truck Climbing Lane		VDOT/AASHTO (2011) Standard[1]	
	Existing	Proposed		Existing	Proposed	Existing	Proposed		
145+50	-3.6	-3.6	BASELINE/POFG	-2.9	-2.9	N/A	-2.5	NC	TANGENT SECTION PROPOSED CROSS SLOPE WITHIN TOLERANCES PROVIDED BY VDOT CENTRAL OFFICE VIA EMAIL DATED 7/8/2020 (DESIGN EXCEPTION NOT REQUESTED)
146+00	-2.1	-2.1		-2.7	-2.7	N/A	-2.5	NC	
146+50	-3.0	-3.0		-2.8	-2.8	N/A	-2.5	NC	
147+00	-3.1	-3.1		-3.0	-3.0	N/A	-2.5	NC	
147+50	-2.2	-2.2		-3.0	-3.0	N/A	-2.5	NC	
148+00	-2.4	-2.4		-2.5	-2.5	N/A	-2.5	NC	
148+50	-2.1	-2.1		-1.7	-1.7	N/A	-2.5	NC	
149+00	-2.1	-2.1		-2.5	-2.5	N/A	-2.5	NC	
149+50	-2.7	-2.7		-2.1	-2.1	N/A	-2.5	NC	
150+00	-2.7	-2.7		-2.2	-2.2	N/A	-2.5	NC	
150+50	-3.0	-3.0		-2.4	-2.4	N/A	-2.5	NC	
151+00	-3.5	-3.5		-3.4	-3.4	N/A	-2.5	NC	
151+50	-2.0	-2.0		-1.3	-1.3	N/A	-2.5	NC	
152+00	-2.8	-2.8		-1.1	-1.1	N/A	-2.5	NC	
152+50	-3.1	-3.1		-1.8	-1.8	N/A	-2.5	NC	
153+00	-3.0	-3.0		-2.3	-2.3	N/A	-2.5	NC	
153+50	-3.0	-3.0		-3.5	-3.5	N/A	-2.5	NC	
154+00	-2.4	-2.4		-2.6	-2.6	N/A	-2.5	NC	
154+50	-2.9	-2.9		-3.0	-3.0	N/A	-2.5	NC	
155+00	-2.6	-2.6		-3.1	-3.1	N/A	-2.5	NC	
155+50	-2.1	-2.1		-2.5	-2.5	N/A	-2.5	NC	
156+00	-1.6	-1.6		-2.1	-2.1	N/A	-2.5	NC	
156+50	-2.9	-2.9		-2.9	-2.9	N/A	-2.5	NC	
157+00	-2.0	-2.0		-2.9	-2.9	N/A	-2.5	NC	
157+50	-2.1	-2.1		-2.3	-2.3	N/A	-2.5	NC	
158+00	-1.9	-1.9		-2.5	-2.5	N/A	-2.5	NC	
158+50	-1.2	-1.2		-2.3	-2.3	N/A	-2.5	NC	
159+00	-2.0	-2.0		-3.3	-3.3	N/A	-2.5	NC	
159+50	-2.2	-2.2		-3.6	-3.6	N/A	-2.5	NC	
160+00	-1.1	-1.1		-1.8	-1.8	N/A	-2.5	NC	
160+50	-1.7	-1.7		-2.7	-2.7	N/A	-2.5	NC	
161+00	-2.5	-2.5		-2.5	-2.5	N/A	-2.5	Transition	
161+50	-1.8	-1.8		-2.3	-2.3	N/A	-2.5	Transition	
162+00	-1.0	-1.0		-3.2	-3.2	N/A	-2.4	Transition	
PC 162+34.08									
162+50	0.6	0.6		-2.4	-2.4	N/A	-2.4	Transition	LIMITS OF DESIGN EXCEPTION REQUEST
163+00	0.7	0.7		-3.3	-3.3	N/A	-3.3	-4.0	
163+50	0.7	0.7		-3.2	-3.2	N/A	-3.2	-4.0	
164+00	1.6	1.6		-3.0	-3.0	N/A	-3.0	-4.0	
164+50	1.0	1.0		-3.1	-3.1	N/A	-3.1	-4.0	
165+00	0.8	0.8		-3.2	-3.2	N/A	-3.2	-4.0	
165+50	1.6	1.6		-4.2	-4.2	N/A	-4.2	-4.0	
166+00	1.6	1.6		-3.3	-3.3	N/A	-3.3	-4.0	
166+50	2.1	2.1		-2.7	-2.7	N/A	-4.1	-4.0	600' TAPER TO EXISTING LANE (DESIGN EXCEPTIONOT REQESTED)
167+00	0.7	0.7		-4.8	-4.8	N/A	-4.8	-4.0	
167+50	1.1	1.1		-4.5	-4.5	N/A	-4.5	-4.0	
168+00	0.7	0.7		-4.1	-4.1	N/A	-4.1	-4.0	
168+50	1.9	1.9		-2.3	-2.3	N/A	-4.7	-4.0	
169+00	0.8	0.8		-5.3	-5.3	N/A	-5.3	-4.0	
169+50	1.4	1.4		-4.3	-4.3	N/A	-4.3	-4.0	
170+00	1.2	1.2		-4.5	-4.5	N/A	-4.5	-4.0	
170+50	1.1	1.1		-3.5	-3.5	N/A	-3.5	-4.0	
171+00	1.7	1.7		-4.0	-4.0	N/A	-4.0	-4.0	
171+50	1.6	1.6		-4.1	-4.1	N/A	-4.1	-4.0	
172+00	0.7	0.7		-3.2	-3.2	N/A	-3.2	-4.0	

1. AASHTO - A Policy on Geometric Design of Highways and Streets (2011), Section 3.3.5, Table 3-10b
VDOT Road and Bridge Standards (2016), Section 800, Page 803.43

* % cross slope (+/-) is NB direction of travel with baseline POFG

Based on Public Hearing cross sections dated March 13, 2021 (Survey Updated July 2020)

Cost to meet minimum AASHTO Standard:

The improvements to I-81 Northbound that would be necessary to achieve the AASHTO minimum standard for superelevation include but are not limited to earthwork, milling and overlay of the existing lanes beyond the project limits, cross slope correction of the existing lanes through the project limits via asphalt overlays, guardrail replacement, and signing/pavement marking beyond the project limits. A detailed cost estimate of the additional impacts to the project are estimated as follows:

Earthwork: 1,500 CY @ $35/CY =		$ 52,500
Asphalt Concrete TY. SM-12.5E: 6,275 TONS @ $110/TON =		$ 690,250
Mill Existing Pavement (Assumed 2"): 14,250 SY @ $25/SY =		$ 356,250
Guardrail: 5,415 LF @ $30/LF		$ 162,450
Erosion and Sediment Control (~2.5%) =		$ 31,540
Misc. Drainage (~5%) =		$ 63,080
Misc. Signing & Marking (~2.5%) =		$ 31,540
Maintenance of Traffic (~20%) =		$ 252,290
Roadside Development (~2.5%) =		$ 31,540
Construction Surveying & Mobilization =		$ 138,600
Incidentals/Contingencies (~10%) =		$ 167,145
	Total	$ 1,977,185
	Say	***$ 2,000,000***

Are there any plans to improve the approach roadway within the next ten (10) years?

No

Accident history for the past 3 years:

Safety considerations associated with substandard superelevation rates on a freeway are collisions resulting from skidding through a curve and resulting in a run-off-road crash. Crash data was obtained along the project limits for the three-year period from July 1, 2017 to June 30, 2020. Please refer to Attachment D for a map depicting the crash locations and a chart providing details about the crashes.

There were a total of 11 crashes within the project limits with a type distribution shown in the table below. Over half (7 crashes) were single vehicle run-off-the-road crashes. Five of the single vehicle run-off-the-road crashes occurred during a rain event, and one occurred with oil or other fluids located on the road surface.

I-81 Northbound Prevalent crash type	
1. Rear End	2
2. Angle	1
4. Sideswipe – Same Direction	1
9. Fixed Object – Off Road	7
TOTAL	11

Design Exception – Superelevation Rate
I-81 NB Truck Climbing lane
UPC 116156

Effect of design exception on safety:

Since superelevation on the mainline is an existing condition, no adverse impact on the existing capacity and operation of the facility is anticipated if the existing superelevation is maintained.

Any mitigation of the substandard design element(s):

The proposed design will incorporate 6-inch pavement markings and shoulder rumble strips. VDOT Bristol District Traffic Personnel ball banked each curve within the project limits and determined that no additional curve warning signs or advisory speeds were warranted. A copy of the email with the District Traffic Engineer's recommendations is included Appendix E.

Will the exception affect the other controlling criteria?

This request for an exception is for existing substandard superelevation and is not anticipated to have any impact on other controlling criteria.

Attachments:

A. Original Plan Sheets and 1953 Road Design Standards
B. HB 865
C. Title Sheet, Typical Section Sheet, Plan & Profile Sheets, Cross Section Sheets
D. 3-year Crash Summary
E. District Traffic Engineer Concurrence Emails

Attachment A

LIMITED ACCESS HIGHWAY

O.P.R. DIV. NO.	STATE	FEDERAL AID ROUTE	FEDERAL AID PROJECT	ROUTE	PROJECT	SHEET NO.	TOTAL SHEETS
2	VA.		I-81-1(35)33 I-81-1(36)81 I-81-1(38)39 I-81-1(6)32 I-81-1(36)34	81	0081-095-010 RW-1 0081-086-003 RW-1 0081-095-010 P-401 0081-086-003 P-401	1	[illegible]

INDEX OF SHEETS

Sheet		Added Sta.	1-4-60 to Sta.
Sheet 2G	Detail of Water Gates		
Sheet No. 1	Title Sheet		
2 thru 2Z	Summaries & Typical Sections		
3, 3A	Plan & Profile	682+00	698+00
4, 4A	Plan & Profile	697+00	713+00
5, 5A thru 5E	Plan & Profile ℄, Conn. Rte 751, Conn. Rte. 11	712+00	728+00
6, 6A	Plan & Profile	727+00	743+00
7, 7A	Plan & Profile	743+00	759+00
8, 8A, B	Plan & Profile	757+00	773+00
9, 9A, B	Plan & Profile	772+00	788+00
10, 10A	Plan & Profile	787+00	803+00
11, 11A, B	Plan & Profile	802+00	818+00
12, 12A, B	Plan & Profile	818+00	835+00
13, 13A	Plan & Profile	835+00	851+00
14, 14A	Plan & Profile	851+00	867+00
15, 15A	Plan & Profile	866+00	883+00
16, 16A thru C	Plan & Profile ℄, Ramps	882+00	891+00
16D	Profile Conn. Rte 762, Conn. Rte 638, Pvt. Entr.		
17, 17A	Plan & Profile	890+00	906+00
18, 18A	Plan & Profile	905+00	921+00
19, 19A, B	Plan & Profile	920+00	936+00
20, 20A	Plan & Profile	935+00	951+00
21, 21A	Plan & Profile	950+00	966+00
22, 22A, B	Plan & Profile	965+00	981+00
23, 23A	Plan & Profile	980+00	996+00
24, 24A	Plan & Profile	995+00	1011+00
25, 25A	Plan & Profile	1010+00	1026+00
26, 26A, B	Plan & Profile	1025+00	1041+00
27, 27A	Plan & Profile	1040+00	1056+00
28, 28A	Plan & Profile	1055+00	1071+00
29, 29A	Plan & Profile	1070+00	1086+00
30, 30A thru F	Plan & Profile ℄, Ramps, Conn. Rte. 645	1085+00	1101+00
31, 31A, B	Plan & Profile	1100+00	1116+00
32, 32A	Plan & Profile	1115+00	1131+00
33, 33A thru H	Profile All Service Roads		
34, 34A	Proposed Detour Rte. 645 Interchange		
35	Sect. B-626 Spec. Des. Underpass Rte. 81 under Rte. 751		
36	Sect. B-1 Spec. Des. Twin Bridges over Middle Fork Holston River		
37	Sect. B-2 Spec. Des. Twin Bridges over Rte. 762		
38	Sect. B-3 Spec. Des. Twin Bridges over Rte. 638		
39	Sect. B-604 Spec. Des. Underpass Rte. 81 under Rte. 645		

PROJ. 0081-095-010 C-501 (Summaries & Typical Sections)
Sheet Nos. 2H, 2I, 2J, 2K, 2S, 2T, 2U, 2W, 2Z, 2Y

Box Culvert Std's.
BC-1, BBC-1, BC-2A, BC-3A, BC-4A, BC-W1, BC-S.

Cross Sections
Sect. G-1 Sheets 27 - 321
Sheets 349 - 353
Sheet 360
Sheets 391 - 423

PROJ. 0081-095-010 C-501
Sheets 5 thru 29
Sheets 345 thru 348
Sheets 361 thru 366

PROJ. 0081-086-003 C-501
Sheets 322 thru 344
Sheets 354 thru 359
Sheets 367 thru 391

PROJ. 0081-086-003 C-501
Sheet Nos. 2H, 2I, 2J, 2K, 2S, 2T, 2V, 2X, 2Y, 2Z, 2AA
Summaries & Typical Sections

PROJ. 0081-095-010 P-401
PROJ. 0081-086-003 P-401
Sheet Nos. 2H, 2I, 2K, 2L, 2M, 2N, 2O, 2P, 2Q, 2R, 2W, 2X, 2Z, 2AA, 2Y
Summaries & Typical Sections

REVISION DATED FEB. 9, 1961
SHEETS 508 5E DELETED

REVISION DATED OCT. 31, 1961
SHEETS 508 5E ADDED

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED
STATE HIGHWAY

WASHINGTON AND SMYTH COUNTIES
FROM: 0.206 MI. W. INT. RTE. 751
TO: 0.508 MI. E. INT. RTE. 645 (SEVEN MILE FORD)

SCALES { PLAN, 1 IN. = 50 FT. PROFILE HOR. 1 IN. = 50 FT., VERT. 1 IN. = 10 FT. LAYOUT, 1 IN. = 1400 FT.

CHILHOWIE BY-PASS

Washington County:

SECTION B-639
QUAD. 8'×8' BOX CULVERT
E.B.L. & W.B.L. OVER HUTTON CREEK

SECTION B-640
QUAD. 8'×8' BOX CULVERT
SER. RD. & RAMP C OVER HUTTON CREEK

I-81-1(35)33 Contr. I Smyth County:

SECTION B-37
QUAD. 8'×4' BOX CULVERT
E.B.L., W.B.L., & RAMP D, RTE. 762 INTERCHANGE

SECTION B-38
QUAD. 8'×4' BOX CULVERT
RAMP C, RTE. 762 INTERCHANGE

SECTION B-39
TRIPLE 7'×8' BOX CULVERT
E.B.L. & W.B.L. OVER STREAM - STA. 1065

SHEETS 15, 16
REVISED July 29 1962

PROJECT 0081-095-010 RW-1
FROM: 0.206 MI. W. INT. RTE. 751
TO: WASHINGTON-SMYTH COUNTY LINE

SECTION B-626
SPECIAL DESIGN UNDERPASS
ROUTE 81 UNDER RTE. 751

PROJECT 0081-086-003 RW-1
FROM: WASHINGTON-SMYTH COUNTY LINE
TO: 0.508 MI. E. INT. RTE. 645

SECTION B-1 I-81-1(35)33 CONTRACT II
SPECIAL DESIGN TWIN BRIDGES
OVER MIDDLE FORK - HOLSTON RIVER

SECTION B-2 I-81-1(35)33 CONTRACT II
SPECIAL DESIGN TWIN BRIDGES
OVER ROUTE 762

SECTION B-3 I-81-1(35)33 CONTRACT II
SPECIAL DESIGN TWIN BRIDGES
OVER RTE. 638

SECTION B-604 I-81-1(38)39
SPECIAL DESIGN UNDERPASS
ROUTE 81 UNDER ROUTE 645

PROJECT 0081-095-010, G-1 I-81-1(35)33 CONTR. (P-401 I-81-1(36)34)
FROM: 0.800 MI. E. INT. RTE. 751
TO: WASHINGTON-SMYTH COUNTY LINE

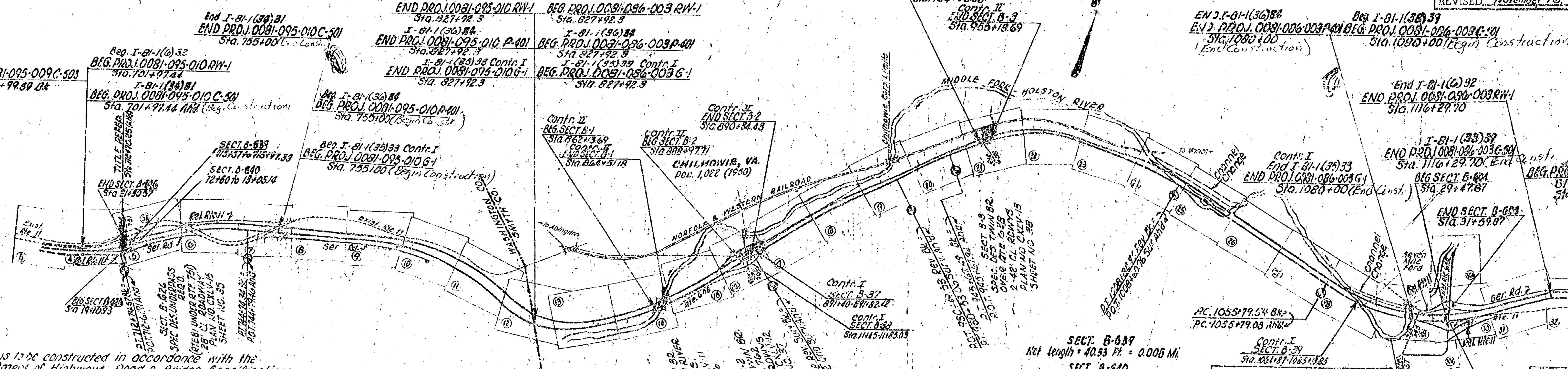
PROJECT 0081-086-003, G-1 (P-401) I-81-1(35)33 CONTR.
FROM: WASHINGTON-SMYTH COUNTY LINE
TO: 0.180 MI. W. INT. RTE. 645 (SEVEN MILE FORD)

PROJECT 0081-095-010 C-501
FROM: 0.206 MI. W. INT. RTE. 751
TO: 0.800 MI. E. INT. RTE. 751

PROJECT 0081-086-003 C-501
FROM: 0.180 MI. W. INT. RTE. 645 (SEVEN MILE FORD)
TO: 0.508 MI. E. INT. RTE. 645 (SEVEN MILE FORD)

X-Sects. 5G, 7, 8, 8A, 8B, 9, 10, 10C, 11-18, 361, 362
SHEETS 5D, 5E, 6, 6A, 7A, 9, 9A, 338
REVISED Oct. 31 1961

SHEETS 2I, 14, 16, 19, 21, 22, 23, 25, 27, 28
REVISED November 16, 1961



SECT. B-639
Net Length = 40.33 Ft. = 0.008 Mi.

SECT. B-640
Net Length = 45.14 Ft. = 0.009 Mi.

This project is to be constructed in accordance with the Virginia Department of Highways Road & Bridge Specifications dated April 1, 1958 & Road Designs & Standards dated November 1, 1953.

All ℄ curves are to be superelevated, transitioned, and widened in accordance with Standard TC-2, except where otherwise noted.

All Ser. Rds., Secondary Conns. & Rel. Rte. 11 are to be superelevated, transitioned, and widened in accordance with Standard TC-3, except where otherwise noted.

All Ramp Curves are to be superelevated as shown on plans.

SHEETS 2K & 9
REVISED Oct. 17 1961

SHEETS 2H, 2X, 2Z
REVISED Aug. 24, 1961

X-Sects 5, 6, 7, 7A, 8, 8A, 8B, 8C, 9B, 10B, 10C, 11, 11A, 12, 13, 14, 15, 17, 18, 361, 362.
SHEETS 4, 5, 5A, 6 (508 5E Deleted)
REVISED Feb. 9 1961

SHEETS 5, 5A, & 6
REVISED October 11, 1961

SHEETS 2I, 2J, 2K, 2X, 2Y
REVISED April 27 1961

SHEETS 5, 5A
REVISED July 20, 1960

SHEETS 6
REVISED June 13, 1960

SHEETS 24
REVISED April 25, 1960

SHEETS 5 & 5A
REVISED April 8, 1960

SHEETS 5A, 5C, 5D, 5E, 29A, 39C, 33, 33A
REVISED March 24, 1960

SHEETS No. 13
REVISED February 3, 1960

X-Sect. 130-136, 142, 143, 146, 155, 166-168, 189, 190, 210, 220, 221, 225-227, 229-234, 236-238, 240, 241, 292, 290, 304, 305)
Sheet 9G Added
1, 2B, 2F, 3, 14, 16, 17, 19A, 20A, 21A, 23, 27A, 28, 29.
SHEETS 23, 24, 24A
REVISED January 4 1960

SHEETS 2, 5-A, 7, 9, 10, 11
REVISED Sept. 10 1959

SHEETS 32, 33A (X-section 358, 389, 390)
REVISED Aug. 25 1959

SHEETS 16, 17 (X-Sect. 110, 112, 113)
REVISED July 1, 1959

SHEETS 19, 23 & 27
REVISED June 11 1959

SHEETS 2, 20, 19, 33D, 33E
REVISED May 29 1959

SHEETS 20, 2E, 24, 24A, 25, 25A
REVISED January 28 1960

SHEETS 29, 30, 32A, 30D
REVISED January 22 1960

PROJ. 0081-095-010 C-501
Equalities = + 7.59'
Total Net Length = 5,310.10 Ft. = 1.006 Miles

PROJ. 0081-086-003 C-501
Equalities - None
Total Net Length = 3,629.70 Ft. = 0.688 Miles

Note: Lengths of this project are based on E.B.L. ℄.

PROJ. 0081-095-010, 0081-086-003, RW-1
Equalities = +520.07 Ft.
Total Gross Length = 41,952.33 Ft. = 7.946 Mi.

PROJ. 0081-095-010 RW-1
Equalities = + 7.54 Ft.
Net Length = 12,602.40 Ft. = 2.387 Mi.

PROJ. 0081-086-003 RW-1
Equalities = +512.53 Ft.
Net Length = 29,349.93 Ft. = 5.559 Mi.

SECT. B-37
Net Length = 42.42 Ft. = 0.008 Mi.

SECT. B-38
Net Length = 40.03 Ft. = 0.008 Mi.

SECT. B-39
Net Length = 26.85 Ft. = 0.005 Mi.

SECT. B-1
Net Length = 237.49 Ft. = 0.045 Mi.

SECT. B-2
Net Length = 136.72 Ft. = 0.026 Mi.

SECT. B-3
Net Length = 107.33 Ft. = 0.020 Mi.

SECT. B-604
Net Length = 212.00 Ft. = 0.040 Mi.

SECT. B-626
Net Length = 219.64 Ft. = 0.042 Mi.

PROJ. 0081-095-010, 0081-086-003 G-1, P-401
Equalities = + 512.53 Ft.
Total Net Length = 33,012.53 Ft. = 6.252 Mi.

PROJ. 0081-095-010 G-1, P-401
Equalities = None
Net Length = 7,292.30 Ft. = 1.381 Mi.

PROJ. 0081-086-003 G-1, P-401
Equalities = + 512.53 Ft.
Net Length = 25,238.69 Ft. = 4.780 Mi.

RECOMMENDED FOR APPROVAL September 23, 1958
LOCATION & DESIGN ENGINEER, DEPARTMENT OF HIGHWAYS

RECOMMENDED FOR APPROVAL Sept. 8 1958
H. H. Harris
ASSISTANT CHIEF ENGINEER, DEPARTMENT OF HIGHWAYS

RECOMMENDED FOR APPROVAL 19
ASSISTANT CHIEF ENGINEER, DEPARTMENT OF HIGHWAYS

RECOMMENDED FOR APPROVAL Oct. 6 1958
ASSISTANT CHIEF ENGINEER, DEPARTMENT OF HIGHWAYS

APPROVED Oct. 6 1958
DEPUTY COMMISSIONER & CHIEF ENGINEER, DEPARTMENT OF HIGHWAYS

APPROVED DATE
DIVISION ENGINEER, BUREAU OF PUBLIC ROADS, DEPARTMENT OF COMMERCE

CONVENTIONAL SIGNS

STATE LINE
COUNTY LINE
CITY, TOWN OR VILLAGE
RIGHT OF WAY LINE
FENCE LINE
UNFENCED PROPERTY LINE
FENCED PROPERTY LINE
TRAVELED WAY
GUARD RAIL
RETAINING WALL
RAILROADS
BASE OR SURVEY LINE
LEVEE OR EMBANKMENT
BRIDGES
CULVERTS
DROP INLET
TROLLEY POLES
POWER POLES
TELEPHONE OR TELEGRAPH POLES
MARSH
HEDGE
WOODS
GROUND ELEVATION
GRADE ELEVATION
POLES WITHIN CONSTRUCTION LIMITS

DESIGNED BY D. D. Harris C. F. Miller Jr. REVISED BY

COMPLETED PLANS	1	9-27-61
ADVANCE PLANS	2	9-29-61
COMPLETED PLANS FOR UTILITIES	2	9-29-61
ADVANCE PLANS	2	9-29-61
COMPLETED PLANS	3	9-29-61
DIST. ENGR.	2	7-14-59
RES. ENGR.	2	7-14-59
CONST. ENGR.	3	9-15-59

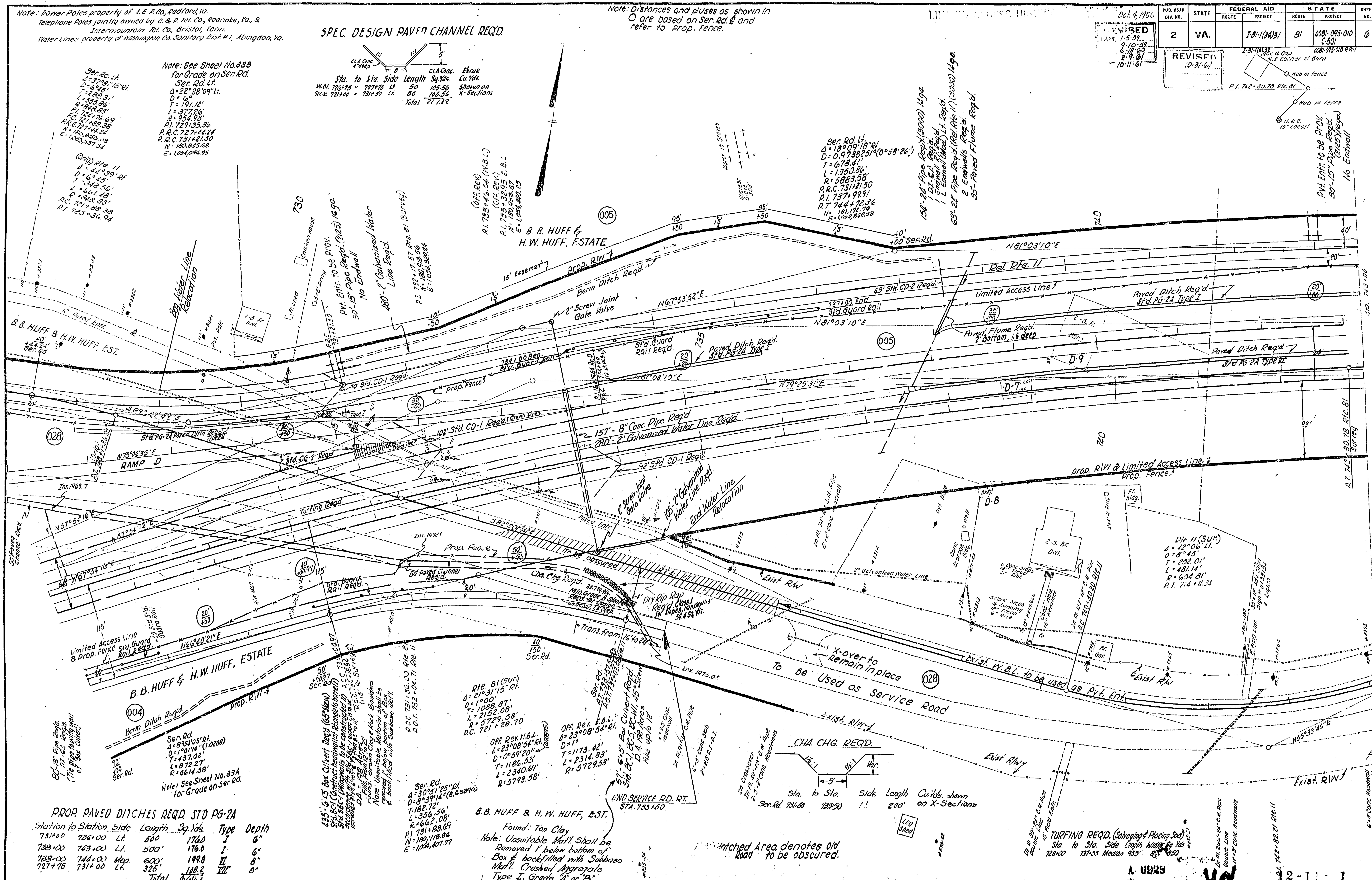
A 6 B

INTERSTATE C. I-D-R V.P.D. 4550 Rte. 751 to Rte. 762 T.T. & B. 390 (1180-M-60) 4900 Rte. 762 to Rte. 645 T.T. & B. 500 (1220-M-60)

A 6 9 2 8 0 0 1

Note: Power Poles property of A.E.P. Co., Radford, Va. Telephone Poles jointly owned by C.& P. Tel. Co. Roanoke, Va. & Intermountain Tel. Co., Bristol, Tenn. Water Lines property of Washington Co. Sanitary Dist. #1, Abingdon, Va.
PUB. ROAD DIV. NO.
STATE
FEDERAL AID
ROUTE
PROJECT
STATE
ROUTE
PROJECT
SHEET NO.
TOTAL SHEETS
2
VA.
I-81-1(6)31
81
0081-095-010 B-626 C-501
5
LIMITED ACCESS HIGHWAY
I-81-1(6)32
0081-095-010 RW-1
REVISED
REVISED 10-31-61
OUTLET DITCH TO BE PROV.
Note: Distances and pluses as shown in ○ are based on the Ser. Rd. ℄ and refer to the Prop. Fence.
CHANNEL CHANGES REQUIRED
Note: Hatched Area denotes Old Road to be obscured.
CHANNEL CHANGE REQ'D.
*Note: If rock is encountered cut slopes may be steepened as directed by the Engineer.
Beg. Water Line Relocation
End Water Line Relocation
I. H. HUFF
B. B. HUFF
B. B. HUFF & H. W. HUFF, EST.
END CONN. RTE. 11 STA. 716+45
END CONSTQ. RAMP "D"
Exist. E.B.L. to be used as Ramp "D"
Limited Access Line
Prop. Fence
Exist. RTE. 11 W.B.L.
Channel Change Req'd. 15' bottom
Channel Cleanout Req'd. 500 Yds.
Channel Change Req'd. 5' Bottom
BEG. REL. RTE. 11 STA. 727+00
Note: See sheet No. 33B for Grade on Rel. Rte. 11
BEG. SECT. B-639 STA. 715+57
END SECT. B-639 STA. 718+97.83
W.B.L.
Survey
Off. Rev. E.B.L.
Turfing Req'd.
64' Std. CD-2 Req'd.
112' Std. CD-1 Req'd.
91' Std. CD-1 Req'd.
Std. UD-1 Underdrain Req'd.
Prop. Paved Ditch Std. PG-2A Type I
Std. Guard Rail Req'd.
250' Taper
Ramp "C"
Ramp D
Berm Ditch Req'd.
Prop. R/W
Note: See Sheet No. 33A for Grade on Ser. Rd.
TURFING REQ'D. (Salvaging & Placing Sod)
PAVED DITCH REQ'D. Std. PG-2A Type I
Channel Change Req'd.
END SECT. B-640 STA. 13+05.10
BEG. SECT. B-640 STA. 12+00

A 692803 6



Station	to Station	Side	Length	Sq. Yds.	Type	Depth
731+00	736+00	Lt.	500	176.0	I	6"
738+00	743+00	Lt.	500'	176.0	I	6"
738+00	744+00	Med.	600'	199.8	VI	8"
727+75	731+00	Lt.	325	108.2	VII	8"
			Total	660.0		

A 6 9 2 8 0 4 2

Oct. 4, 1956

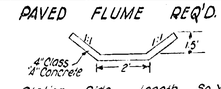
PUB. ROAD DIV. NO.	STATE	FEDERAL AID ROUTE	FEDERAL AID PROJECT	STATE ROUTE	STATE PROJECT	SHEET NO.	TOTAL SHEETS
2	VA.		I-81-1(36) 31 I-81-1(35) 33 I-81-1(36) 34	81	0081-095-010 C-501 0081-095-010 G-1 0081-095-010 RW-1	7	

I-81-1(6) 32 — 0081-095-010 RW-1

Note: Power Poles property of A. E. P. Co., Radford, Va.
Telephone Poles jointly owned by C. & P. Tel. Co., Roanoke, Va., & Intermountain Tel. Co, Bristol, Tenn.
Water Lines property of Washington Co. Sanitary Dist. #1, Abingdon, Va.

Note: Distances and pluses as shown in ( ) are based on Ser. Rd. & and refer to Prop. Fence.

PAVED FLUME REQ'D.



C-501 Proj.	Station	Side	Length	Sq. Yds.
	749+55	Rt.	35'	23.33

REVISED DATE 9-10-59

Note: See Sheet No. 33B for grade on Rel. Rte. 11

Rel. Rte. 11
Δ = 13°09'18" Rt.
D = 0.973825 (10.38826')
T = 678.41
L = 1350.86
R = 5883.58
PRC 731+21.50
P.I. 737+99.91
Super = ½" : 1'

B. B. HUFF & H. W. HUFF ESTATE

2" Screw Joint Gate Valve Reqd.
C-501 Proj. 180'-24" Pipe Reqd. (5000) (Ga. 14) 2 Endwalls Reqd.
C-501 Proj. Prop. U Turn in Median
C-501 Proj. 68'-18" Pipe Reqd. (2400) (16 ga) 1 DI-64 Reqd. 1-18" Flared End Section Reqd. 35' Paved Flume Reqd.
C-501 Proj. 690'-2" Galvanized Water Line Reqd.
C-501 Proj. 288'-42" Pipe Reqd. (7350) (12 ga) Stenciled 2 Endwalls Reqd. D.A. 44 Acres Found Firm Tan Clay
(Under Proj. 0095-095-010 G1) Temporarily 60'-15" Pipe Reqd. (21/25) (16 ga) No Endwalls Under Temporary X-over
70'-15" Pipe Reqd. (21/25) (16 ga) No Endwalls Under Service Road
PC 233+21.36 Rel. Rte. 11
N = 181,937.21 E = 1,056,522.09
Rel. Rte. 11 H. Δ = 25°09'24" Lt. D = 7°30' T = 172.79' L = 339.87' R = 763.94' P.I. 754+94.15 P.O.T. 756+55.10 Rte. 11
End Water Line Relocation
C-501 Proj. ENO REL. RTE. 11 LT. Sta. 759+00 (Rte. 11 Sur.)
Rte. 11 Δ = 22°00'57" Rt. D = 4°59'.77' T = 373.39' L = 743.32' R = 1147.39' P.I. 762+05.63 P.T. 764+88.71
Prop. R/W & Limited Access Line 7
Prop. Fence 1 (G-1 Proj.)
G-1 Proj. Paved Ditch Reqd. Std. VD-1 Underdrain Reqd. 7
THOMAS A. SNAPP (023)
MINNIE P. SNAPP (007)
Fee R/W
Limited Access Line 7
Prop. Fence
Rel. Rte. 11
N 81°03'10" E
Prop. R/W & Limited Access Line 7
Prop. Fence 1
W.B. Lane
E.B. Lane
Paved Ditch Reqd.
186'-8" Conc. Pipe Culvert Reqd. 278'-2" Galvanized Water Line N 79°25'31" E
751+50 Beg. Std. Guard Rail (R.S.R.-Proj.)
Std. Guard Rail Reqd. (R.S.R.-Proj.)
Temp. X-over constructed under Proj. 0081-095-010 G-1
To be removed
Paved Ditch Reqd. Std. PG-2A Type IV
C-501 Proj.
Paved Ditch 2' Bottom
3 Ditch Reqd. (shown on C-501 Proj.) (C-Sect) G-1
Transition from 24' to 16'
N 55°33'46" E
Beg. Never Line Relocation
Exist. R/W
To be Obscured
To be used as Ser. Rd.
1-over to remain in place
2" Galvanized Water Line
Rte. 11
(Survey) Rte. 11 Δ = 42°06' Lt. D = 8°45' T = 481.91' L = 858.91' R = 720' P.C. 742+82.21 P.I. 747+30.20
(Survey) P.I. 744+74.36 Rte. 11
(Survey) P.O.T. 744+74.36 Rte. 11
(Survey) P.O.T. 744+74.36 Rte. 11
PT. Ser. Rd. 744+12.36
PT. 745+00.20 Rte. 11 Bk.
POT 745+05.32 Ahd.
PT. 744+74.36 Rte. 11 Bk.
POT 744+79.46 Ahd.
(Survey) P.O.T. 744+74.36 Rte. 11
(Survey) P.O.T. 744+74.36 Rte. 11
(Proj. 0081-095-010 G1) BEG. SER. RD. STA. 751+53.5
(Proj. 0081-095-010 G1) BEG. SER. RD. STA. 749+00
(Proj. 0081-095-010 G1) END SER. ROAD STA. 752+66
Ser. Rd. Rt. Δ = 25°29'24" Rt. D = 10°20'01" (10.333362819') T = 125.41' L = 246.67' R = 554.46' P.I. 750+28.74
N = 181,739.86 E = 1,056,601.53
Note: See Sheet No. 33C for Grade on Ser. Rd.
B. B. HUFF & H. W. HUFF, EST.
End I-81-1 (36) 31 END PROJ. 0081-095-010, C-501 STA. 755+00
Beg. I-81-1 (36) 34 BEG. PROJ. 0081-095-010 P-401 STA. 755+00
Beg. I-81-1 (35) 33 BEG. PROJ. 0081-095-010 G-1 STA. 755+00
(Proj.) Std. Guard Rail Reqd. (S.G.R.-Proj.)
Beg. Fence (G-1 Proj.)
Prop. Fence (C-501 Proj.)
Paved Ditch Reqd. (C-501 Proj.) Std. PG-2A Type IV
Limited Access Line 7 Prop. Fence
757+50 End Std. Guard Rail (S.G.R.-Proj.)
Std. UD-1 Underdrain Reqd.
Paved Flume Reqd. (G-1 Proj.)
Prop. Fence 2 Limited Access Line 2
757+60 Beg. Std. Guard Rail (S.G.R.-Proj.)
(Survey) 24"-18" Pipe Reqd. (2400) (16 ga) 1 DI-64 Reqd. 1 Flared End Section Rt. (Ser. Rd.) 69'-24" Pipe Reqd. (3000) (16 ga) 1 "L" Endwall Lt. 1 Std. Endwall Rt. Δ = 94°56'.29" 33°36'30"
Note: Cross-Hatched Area denotes Temporary Construction under Proj. 0081-095-010 G-1. This construction is to be removed when Proj. 0081-095-010 C-501 is completed.
Note: Hatched Area denotes Old Road to be obscured. (C-501 Proj.)

RIGHT-OF-WAY MONUMENTS REQD. Std. RM-1
6 Proj. G-1
5 Proj. C-501

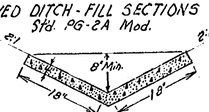
BEAM GUARD RAIL REQ'D., STD. GR-1 or 2

Sta.	to	Sta.	Side	Len.	
750+50	"	755+00	Rt. E.B.L.	450'	C-501 Proj.
751+50	"	755+24	Lt. W.B.L.	374'	C-501 Proj.
755+00	"	757+50	Rt. E.B.L.	250'	P-401 Proj.
755+24	"	757+50	Lt. W.B.L.	226'	P-401 Proj.
755+00	"	759+40	Rt. Ser. Rd.	440'	G-1 Proj.

PAVED DITCH REQ'D. STD. PG-2A

	Sta.	to	Sta.	Type	Length	Depth	Sq. Yds.	
E.B.L.	749+65	"	755+00	IV	535	8"	176.2	(C-501 Proj.)
Lt. Ser. Rd.	751+60	"	755+00	VII	340	8"	112.2	(C-501 Proj.)
						Total	288.4	

PROP. PAVED DITCH - FILL SECTIONS Std. PG-2A Mod.



Sta.	to	Sta.	Len.	Side	Sq. Yds.
755+00	"	756+00	100'	Lt. Ser. Rd.	33 P-401 PROJ.

A 6692

44

12-1-1 (7)

Oct. 4, 1956

PUB. ROAD DIV. NO.	STATE	FEDERAL AID ROUTE	FEDERAL AID PROJECT	STATE ROUTE	STATE PROJECT	SHEET NO.	TOTAL SHEETS
2	VA.		I-81-1(35)33	81	0081-095-010 C-1	9	
			I-81-1(36)34		0081-095-010 P-401		

I-81-1(6)32 0081-095-010 RW-1

Note: Power Poles property of A.E.P. Co, Radford, Va.
Telephone Poles jointly owned by C & P Tel Co, Roanoke, Va, and Intermountain Tel Co, Bristol, Tenn.
Water Lines property of Washington Sanitary Dist. #1, Abingdon, Va.

Note: Distances and pluses as shown in ○ are based on the Service Road ℄ and refer to the Prop. Fence.

REVISED
DATE 9-10-59
10-11-61

T. S. CLARK

Exist R/W

N 78°30'46" E

P.I. 778+21.06, Rte. 11

N. & C. 15" Apple

N. & C. Power pole

74.02'

36.17'

P.O.S.T. 775+80.38

N. & C. 12" W. Cherry

N. & C. Fence Post

3.02'

4.00'

P.I. 787+24.00

SNEAD FARRIS, EST.

S 76°19'14" E

Exist R/W

Rte. 11

Proj. Rte. 11

Rte. 11
Δ = 25°10' Rt.
D = 3°
T = 285.80'
L = 503.33'
R = 1145.92'

1-S.C.B. & Ft. Dwl.

Ft. Bldgs.

Cistern

Ft. Bldg.

2" Galvanized Water Line

P.I. 780+48.89, Rte. 11

B. B. HUFF & H. W. HUFF, EST.

BILL & W. MILLER

130' +50 WBL

Ft. Bldgs.

Ft. Bldg.

Fee R/W

93' +00 WBL

Prop. R/W
Limited Access Line
Prop. Fence

Beg. Water Line Relocation = 355+145

1-S.C.B. Pump House on Bldg. Cont. Valve

2" Water Meter

P.I. 781+53.53, Rte. 11

1½ Story Ft. Dwl.

1½ Pl. Gz. - 24" C.M. Pipe 1½ Cont. Sidewall Ck.

24" Pipes

24'x 10' Pool

Garage

Ft. Bldg.

Ft. Bldg.

Fence Entr.

Fence Entr.

Ft. Bldg.

Exist R/W

Exist R/W

I. H. HUFF

Rte. 11
Δ = 17°20' Lt.
D = 3°30'
T = 249.54'
L = 495.21'
R = 1627.02'
P.I. 787+28.07

P.101
TEMPORARY CONSTRUCTION CROSSING REQUIRED

1½ S. C. B. Dwl.

Underground Service

6"-8" 2 Galvanized Water Line

SALE
L.I.C. 2015

P.I. 789+13.71, Rte. 11

Sur. P.I. 787+24.00
N 18°39'39" E
1,209.16 ft.

Ft. Bldg.

Exist R/W

780

785

790

Fence Entr.

10' Paved Entr.

N 86°20'46" E

(031)

(030)

(029)

(012)

(011)

(013)

(014)

(015)

(016)

Trees & Brush in Fence Row

6°30'

℄ Prop. Fence & Limited Access Line

Sur. ℄ 7

Prop. Paved Ditch 7

Off. Rev. W.B.L. 7

Off. Rev. E.B.L. 7

30"

DI-6A

15"

90'-15" Pipe Req'd

12°

Prop. Paved Ditch 7

(Surv.) N 79°25'31" E Prop. Paved Ditch

Std. UD-1 Underdrain Req'd.

98' Std. CD-1 Req'd

N 81°03'10" E

44'

110'

Limited Access Line, Prop. Fence 7

Std. Guard Rail Req'd. 7

60'

16'

320.74'

N 81°03'10" E

Std. UD-1 Underdrain Req'd.

Std. CD-1 Req'd.

Off. Rev. E.B.L. 7

20' 450

Std. ED-1 Req'd.

40' 450

Prop. Fence

Limited Access Line 7

Std. Guard Rail

DI-6B

33' 100

90'

Ser. Rd. Rt.

N 88°10'48" E

B. B. HUFF & H. W. HUFF, EST.

40' 100 Ser. Rd.

SNEAD FARRIS, EST.

100' 150 Ser. Rd.

40' 150 Ser. Rd.

10' 150 Ser. Rd.

Prop. R/W 7

Fee R/W

Drain Ditch Req'd.

70' 175 Ser. Rd.

Inv. 2068.54

60' 38.29 Ser. Rd.

P.C. 780+58.33

Field Enh. To be Prov.

30"-15" Pipe Req'd. (2@25') (Vert.) No Endwalls

Off. Rev. W. B. L.
P.I. 798+81.30
Δ = 37°18'36" Rt.
D = 1°
T = 1934.34'
L = 3731.00'
R = 5729.58'
N = 182,035.30
E = 1,060,900.01

Off. Rev. E.B.L.
P.I. 790+08.67
Δ = 25°01'21" Rt.
D = 1°
T = 1271.40'
L = 2502.25'
R = 5729.58
N = 181,840.58
E = 1,060,073.49

P.C.C. 784+58.28

Ser. Rd. Rt.
Δ = 7°07' 38 Rt.
D = 1°52'36" (1.87667)
T = 192.12'
L = 379.75'
R = 3052.81'
P.I. 792+48.65
N = 181,613.73
E = 1,059,339.50

Note: See Sheet No. 330 for Grade on Ser. Rd.

Ser. Rd. Rt.
Δ = 9° 4009" Rt.
D = 1°00'57" (1.01596)
T = 477.00'
L = 951.72'
R = 5639.58'
P.C. 789+15.28
N = 181,634.39
E = 1,060,006.34

Grd. Proj.
13 R/w Monuments Req'd

Std UD-1 Underdrain Req'd

Sta.	To	Sta.	Side	Lin. Ft.
W.B.L. 774+50	"	779+50	Lt.	500
E.B.L. 774+50	"	779+50	Rt.	500
			Total	1,000 G-1 Proj.

Std Guard Rail GR-1 or 2 Req'd

Sta.	To	Sta.	Side	Lin. Ft.
Ser. Rd. 779+00	"	782+25	Lt.	925 G-1 Proj.

Std ED-1 Road Edge Delineators Req'd

Sta.	To	Sta.	Side	No.
Ser. Rd. 783+00	"	788+00	Lt.	6 G-1 Proj.

PROP. PAVED DITCH CUT SECTIONS
Std PG-2A Mod.

2:1 4:1 Min. 6" 15" 21"

Station to Station	Side	Length	Sq. Yds.
W.B.L. 776+00 - 779+00	Lt.	300	116
E.B.L. 776+00 - 784+00	Rt.	800	252
W.B.L. 779+00 - 784+25	Med.	525	204
		Total	572 G-1 Proj.

366 - 30" Pipe Req'd. (5750) (4.90) Skewed
2 Endwalls Req'd.

93'-15" Pipe Req'd (2@25) (16.90)
1 Std. DT-6A Left (Min. depth)
1 Std. DT-6C Right

DRAIN DITCH REQ'D.

Orig. Ground 2:1 1:1 4'

Edge Shoulder Service Pavement

Sta.	to	Sta.	Side	Length	Cu. Yds.
784+79		788+14	(Rt. Ser. Rd.)	335'	Shown on X-sects.

A. 6670

49

12 Sheets

9

0049 0862 A

A692805 2

52 12-11-1

EXPLANATION OF TABLES AND INSTRUCTIONS FOR THEIR USE

These tables contain superelevation and widening corrections for all standard pavement widths through a range of curves considered most likely to be used in highway design. Furthermore, a range of transition lengths is provided to afford the locating or designing engineer an appreciable degree of flexibility in fitting his alignment to various conditions. In all cases the longest possible transition (Ls) shall be used.

On sheet 87 will be found the standard symbols used throughout these tables.

On sheet 93 is shown a summary of the range of standard pavement widths (W), transition lengths (Ls), and degrees of curve (Dc) covered herein, together with the maximum widening (w), superelevation rate (e), and the approximate maximum safe speeds (V) afforded thereby.

The number of corrections to be applied is three for each of ten uniformly spaced positions on each transition. The location center line is shifted toward the center of the curve the distances Zc to produce the spiral-like transition. The distances Zt are laid off right and left of the shifted center line to establish the edges of the widened pavement (Zt includes the widening and is identical for both sides), and the outer edge is raised above the location center line grade and the inner edge depressed below the location center line grade the amount S (identical for both edges of pavement). See sheets 90 and 91 for graphical illustrations of the application of these corrections.

To determine the sq. yds. of additional pavement for widening, multiply the figure in the column headed " Sq. Yds. Add. Pave. Per 100 Ft. of Curve " by the entire length of the location center line curve in stations as measured from the P.C. to the P.T.

See sheet 91 for the treatment of curves of less than 2 degrees.

The distance between curves in opposite directions shall be as long as possible and at least long enough to permit using the shortest transition length (Ls) set up in these tables for each of the two curves.

The distance between curves in the same direction shall preferably be long enough to avoid a " broken back " appearance, and at least long enough to permit using the shortest transition length (Ls) set up in these tables for each of the two curves. Curves too close together to meet the latter requirement shall be compounded. Compound curves shall be transitioned at the P.C. and P.T., and a transition at the P.C.C., if necessary, will be designed in the office.

For odd degree curves use the transitions and corrections for the nearest whole or half degree curve found in the tables.

On curves from 2° to 6° inclusive, no widening is to be applied on 24' pavements.

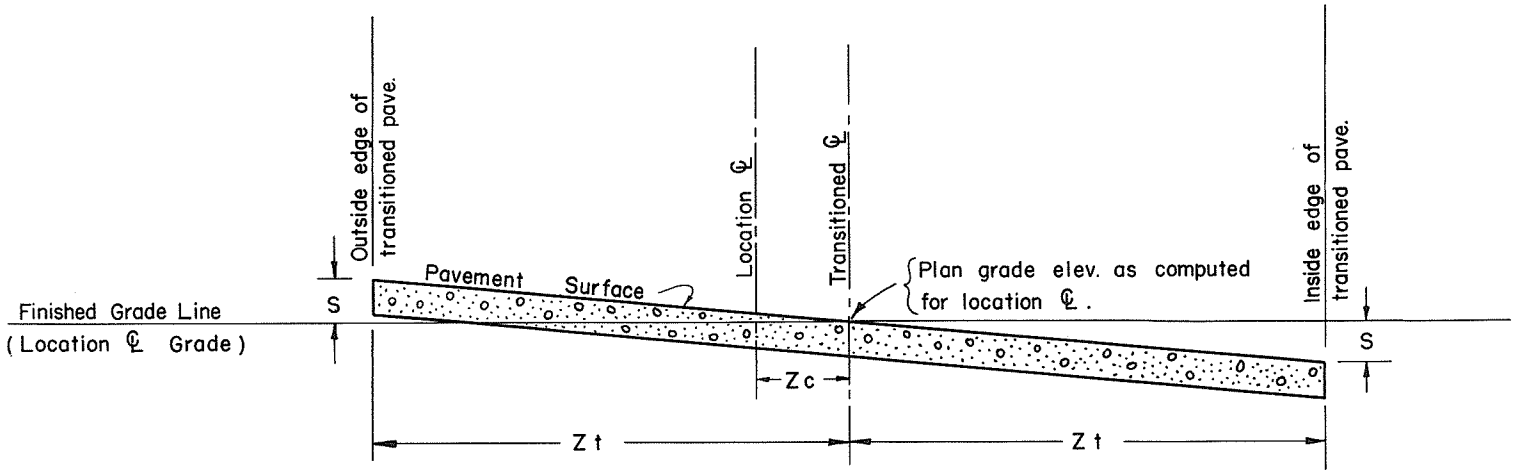
For curves sharper than 30° the tabulated values for 30° curves shall be used.

For minimum design factors for various design speeds see sheet 94.

The longest possible transition shall be used and the length noted along with the curve data, for example, Ls = 300. It should be noted, however, that no transition can be longer than the curve to which it is applied. The standard shift (Zc) shall be kept in mind for its effect on clearance.

(continued)

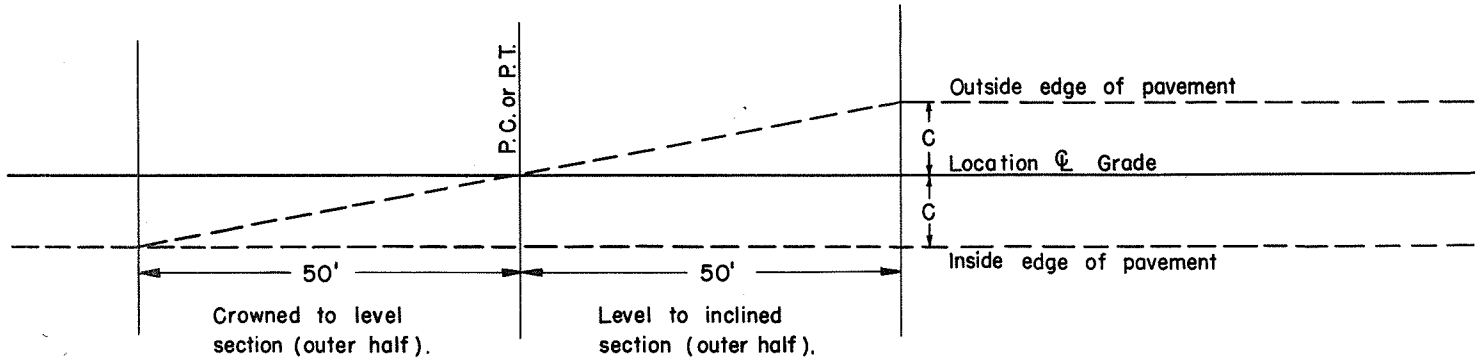
From the T.S. to the S.T. the transitioned pavement center line shall be constructed at the elevation shown on the road plans for the Location center line.



CROSS SECTION THRU TRANSITION

On curves from 0°01' to 0°59' inclusive, no transitions, superelevation, or widening shall be applied unless otherwise noted on plans.

On curves from 1° to 1°59' inclusive, no transitions or widening is required, but they shall be superelevated by an amount equal to the Standard Pave. Crown.



TREATMENT OF CURVES FLATTER THAN 2°00'

Attachment B

2010 SESSION

VIRGINIA ACTS OF ASSEMBLY -- CHAPTER

*An Act to amend and reenact § **46.2-870** of the Code of Virginia, relating to maximum highway speed limits.*

[H 856]

Approved

Be it enacted by the General Assembly of Virginia:

1. That § **46.2-870** of the Code of Virginia is amended and reenacted as follows:

§ **46.2-870**. Maximum speed limits generally.

Except as otherwise provided in this article, the maximum speed limit shall be 55 miles per hour on interstate highways or other limited access highways with divided roadways, nonlimited access highways having four or more lanes, and all state primary highways.

The maximum speed limit on all other highways shall be 55 miles per hour if the vehicle is a passenger motor vehicle, bus, pickup or panel truck, or a motorcycle, but 45 miles per hour on such highways if the vehicle is a truck, tractor truck, or combination of vehicles designed to transport property, or is a motor vehicle being used to tow a vehicle designed for self-propulsion, or a house trailer.

Notwithstanding the foregoing provisions of this section, the maximum speed limit shall be ~~65~~ *70* miles per hour where indicated by lawfully placed signs, erected subsequent to a traffic engineering study and analysis of available and appropriate accident and law-enforcement data, on: (i) interstate highways, (ii) multilane, divided, limited access highways, and (iii) high-occupancy vehicle lanes if such lanes are physically separated from regular travel lanes. ~~The maximum speed limit on Interstate Route 85 shall be 70 miles per hour where indicated by lawfully placed signs, erected subsequent to a traffic engineering study and analysis of available and appropriate accident and law-enforcement data.~~ The maximum speed limit shall be 60 miles per hour where indicated by lawfully placed signs, erected subsequent to a traffic engineering study and analysis of available and appropriate accident and law-enforcement data, on U.S. Route 29, U.S. Route 58, U.S. Route 360, U.S. Route 460, and on U.S. Route 17 between the town of Port Royal and Saluda where they are nonlimited access, multilane, divided highways.

Attachment C

BRISTOL DISTRICT DESIGN UNIT

PROJECT MANAGER: James Jones, L.S. (276) 696-3251 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

FOR INDEX OF SHEETS SEE SHEET 1B

THIS PROJECT WAS DEVELOPED UTILIZING THE DEPARTMENT'S ENGINEERING DESIGN PACKAGE OPENROADS/GEOPAK.
GEOPAK Computer Identification No. UPC 116156

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE OF PROPOSED STATE HIGHWAY

WASHINGTON COUNTY

I-81 NORTHBOUND TRUCK CLIMBING LANE

FROM: MILE MARK 32.197
TO: MILEMARK 33.519

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

FHWA-534 DATA 11103
UPC NO. 116156

STATE	FEDERAL AID PROJECT	STATE ROUTE	STATE PROJECT	SHEET NO.
VA.	NHPP-081-1( ) (SEE TABULATION BELOW FOR SECTION NUMBERS)	81	(FO) 0081-095-829, PE-101, RW-201, C-501 (SEE TABULATION BELOW FOR SECTION NUMBERS)	1

FUNCTIONAL CLASSIFICATION AND TRAFFIC DATA	
SB 1-81 - (GS-INT) INTERSTATE - ROLLING - 75 MPH MIN. DESIGN SPEED	
DESIGN VEHICLE - WB-67	
	Fr: MILE MARK 32.197 To: MILE MARK 33.519
ADT (2018)	16,040
ADT (2045)	21,404
DHV	1,170
D (%) (design hour)	
T (%) (design hour)	17%
V (MPH)	*See Plan and Profile Sheets for Horizontal and Vertical Curve Design Speed*

EXCEPTIONS TO MAINLINE DESIGN SPEED

Sta. To Sta.	Design Speed (mph)	Reasons for Exception	Approval Date
157+94.00	60	Vertical Curve Radius	
118+00.00 to 129+00.00		Superelevation Rate	

PH PLANS

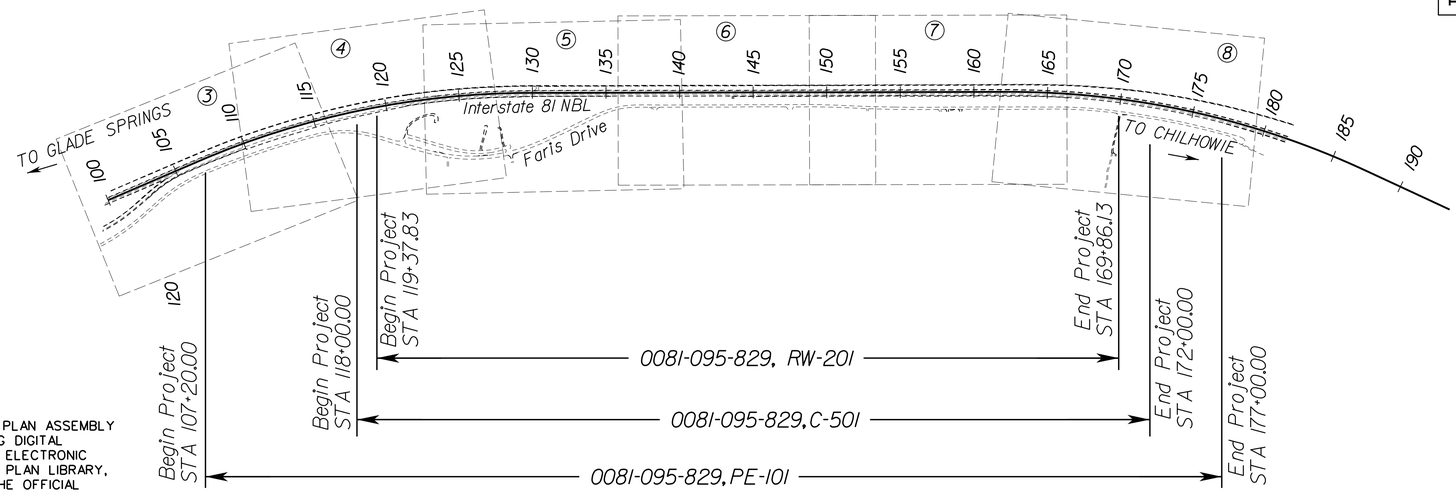
THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

Description Reference
Mile Mark 32.197 I-81 NB Sta.107+20 I-81 NB Constr.BL

CONVENTIONAL SIGNS

STATE LINE
COUNTY LINE
CITY,TOWN OR VILLAGE
RIGHT OF WAY LINE
FENCE LINE
UNFENCED PROPERTY LINE
FENCED PROPERTY LINE
WATER LINE
SANITARY SEWER LINE
GAS LINE
ELECTRIC UNDERGROUND CABLE
TRAVELED WAY
GUARD RAIL
RETAINING WALL
RAILROADS
BASE OR SURVEY LINE

LEVEE OR EMBANKMENT
BRIDGES
CULVERTS
DROP INLET
POWER POLES
TELEPHONE OR TELEGRAPH POLES
TELEPHONE OR TELEGRAPH LINES
HEDGE
TREES
HEAVY WOODS
GROUND ELEVATION
GRADE ELEVATION



THE COMPLETE ELECTRONIC PDF VERSION OF THE PLAN ASSEMBLY AS AWARDED, HAS BEEN SEALED AND SIGNED USING DIGITAL SIGNATURES AND THE OFFICIAL PLAN ASSEMBLY IN ELECTRONIC FORMAT IS STORED IN THE VDOT CENTRAL OFFICE PLAN LIBRARY, INCLUDING ALL SUBSEQUENT REVISIONS, WILL BE THE OFFICIAL CONSTRUCTION PLANS. FOR INFORMATION RELATIVE TO ELECTRONIC FILES AND LAYERED PLANS, SEE THE GENERAL NOTES.

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

THIS PROJECT IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE DEPARTMENT'S 2020 ROAD AND BRIDGE SPECIFICATIONS, 2016 ROAD AND BRIDGE STANDARDS, 2009 MUTCD, 2011 VIRGINIA SUPPLEMENT TO THE MUTCD, 2011 VIRGINIA WORK AREA PROTECTION MANUAL AND AS AMENDED BY CONTRACT PROVISIONS AND THE COMPLETE ELECTRONIC PDF VERSION OF THE PLAN ASSEMBLY.

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

THE ORIGINAL APPROVED TITLE SHEET(S), INCLUDING ORIGINAL SIGNATURES, ARE FILED IN THE VDOT CENTRAL OFFICE PLAN LIBRARY. ANY MISUSE OF ELECTRONIC FILES, INCLUDING SCANNED SIGNATURES, IS ILLEGAL AND ENFORCED TO THE FULL EXTENT OF THE LAW.

Washington County Population 54,402 (2018 Census)

STATE PROJECT NO.	SECTION	FEDERAL AID PROJECT NO.	TYPE CODE	UPC NO.	EQUALITIES	LENGTH INCLUDING BRIDGE(S)		LENGTH EXCLUDING BRIDGE(S)		TYPE PROJECT	DESCRIPTION
					FEET	FEET	MILES	FEET	MILES		
0081-095-829	PE-101	NHPP-081-1(362)		116156		6,980.00	1.322	6,980.00	1.322	PRELIM. ENGR.	Fr: MILE MARK 32.197 To: MILE MARK 33.519
	RW- 201			116156		5,048.30	0.956	5,048.30	0.956	RIGHT OF WAY	Fr: MILE MARK 32.428 To: MILE MARK 33.384
	C-501		1000	116156		5,400.00	1.023	5,400.00	1.023	CONSTR.	Fr: MILE MARK 32.402 To: MILE MARK 33.425

Project Lengths are based on I-81 NBL Construction Baseline.

SCALE
0 500' 1,000'

TIER 2 PROJECT

RECOMMENDED FOR APPROVAL FOR RIGHT OF WAY ACQUISITION
INFRASTRUCTURE INVESTMENT DIRECTOR
STATE LOCATION AND DESIGN ENGINEER
CHIEF FINANCIAL OFFICER
CHIEF ENGINEER

APPROVED FOR RIGHT OF WAY ACQUISITION
CHIEF OF POLICY

RECOMMENDED FOR APPROVAL FOR CONSTRUCTION
INFRASTRUCTURE INVESTMENT DIRECTOR
STATE LOCATION AND DESIGN ENGINEER
STATE STRUCTURE AND BRIDGE ENGINEER
CHIEF FINANCIAL OFFICER

APPROVED FOR CONSTRUCTION
CHIEF ENGINEER

APPROVED
DIVISION ADMINISTRATOR
FEDERAL HIGHWAY ADMINISTRATION
U.S. DEPARTMENT OF TRANSPORTATION

REVISED

3/11/2021
12:14:19 PM

d1161560020d11.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

TYPICAL SECTIONS

MAINLINE I-81 NB

INTERSTATE SYSTEM (GS-INT)

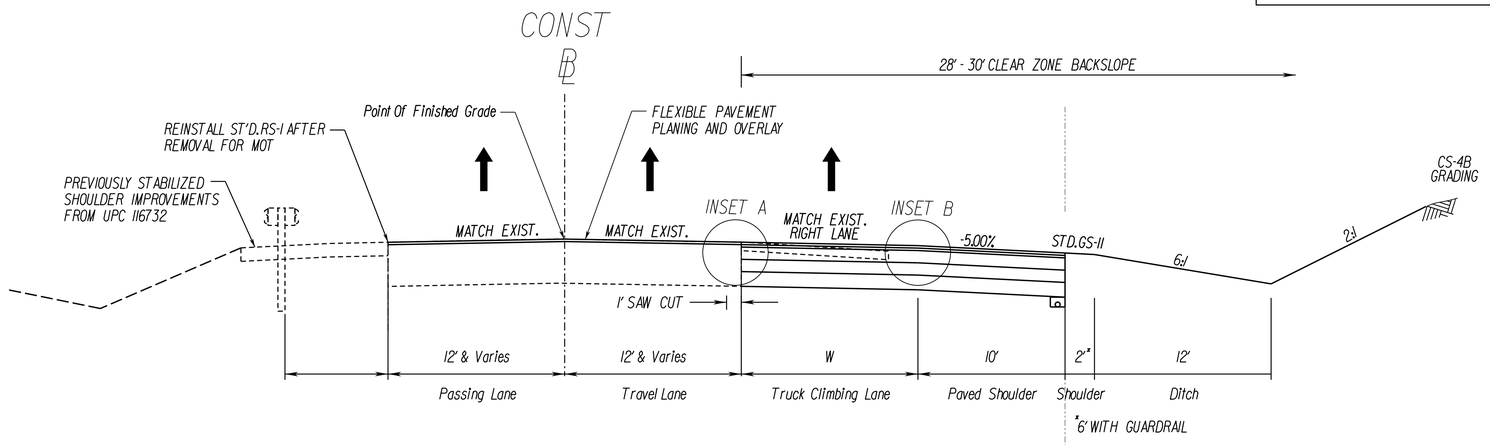
PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

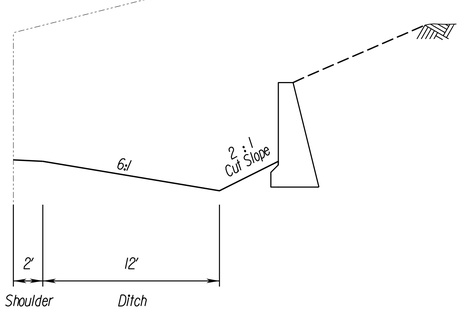
REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829, RW-201 C-501	2A(1)

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

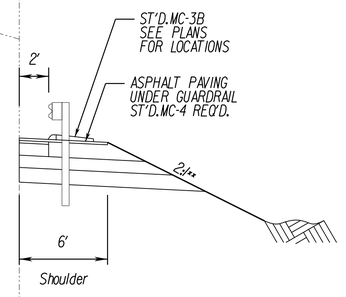
VDOT Materials Bristol, Virginia MATERIALS ENGINEER	VDOT Location & Design Bristol, Virginia ROADWAY ENGINEER



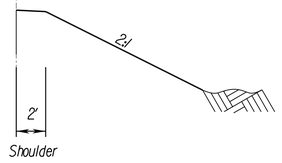
STATION	TO	STATION	W	REMARKS
118+00.00		169+00.00	12'	TRUCK CLIMBING LANE
169+00.00		172+00.00	VARIES 12'-0'	TRANSITION



STATION	TO	STATION
150+50.00		166+50.00



STATION	TO	STATION
118+00.00		122+00.00
126+00.00		144+00.00
166+50.00		172+00.00



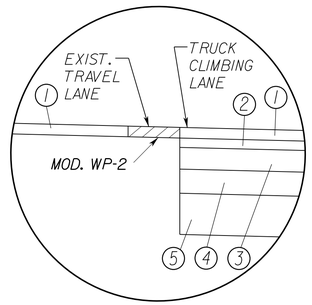
STATION	TO	STATION
122+00.00		126+00.00

** SLOPE RESTRICTIONS
1 1/2:1 FILL SLOPE

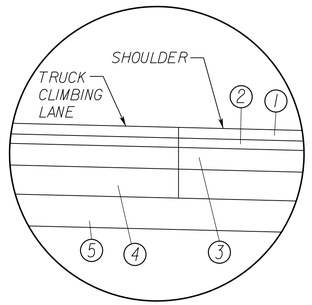
STATION	TO	STATION
133+00.00		143+50.00

SEE CROSS SECTIONS FOR ADDITIONAL INFORMATION.

INSET A



INSET B



NOTE:
VDOT MOD.WP-2 SHALL BE USED WHERE NEW FULL DEPTH PAVEMENT WIDENING MEETS EXISTING PAVEMENT.

LEGEND

① ASPHALT CONCRETE SURFACE COURSE, TYPE SM-12.5E @ 220 LBS. PER S.Y.

② ASPHAL CONCRETE INTERMEDIATE COURSE, TYPE IM-19.0E @ 230 LBS.PER SQ YD

③ 10" ASPHALT CONCRETE BASE COURSE,TYPE BM-25.0A

④ ** 10" AGGREGATE BASE MATERIAL,TYPE 1,NO.21B

⑤ 12" AGGREGATE MATERIAL NO.1

** 2" OF THE 10" IS FOR LEVELING COURSE OVER AGGREGATE MATERIAL NO.1

	PROJECT	SHEET NO.
	0081-095-829	2A(1)

3/12/2021
10:15:57 AM

d116156003.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

VDOT Location & Design Bristol, Virginia HYDRAULIC ENGINEER	VDOT Location & Design Bristol, Virginia ROADWAY ENGINEER

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829, PE-101; RW-201, C-501	3

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

Utility Owners:

Electric:

Appalachian Power
Scarlet Collie
13563 Owens Drive
Glade Spring, VA 24340
(276) 429-4117

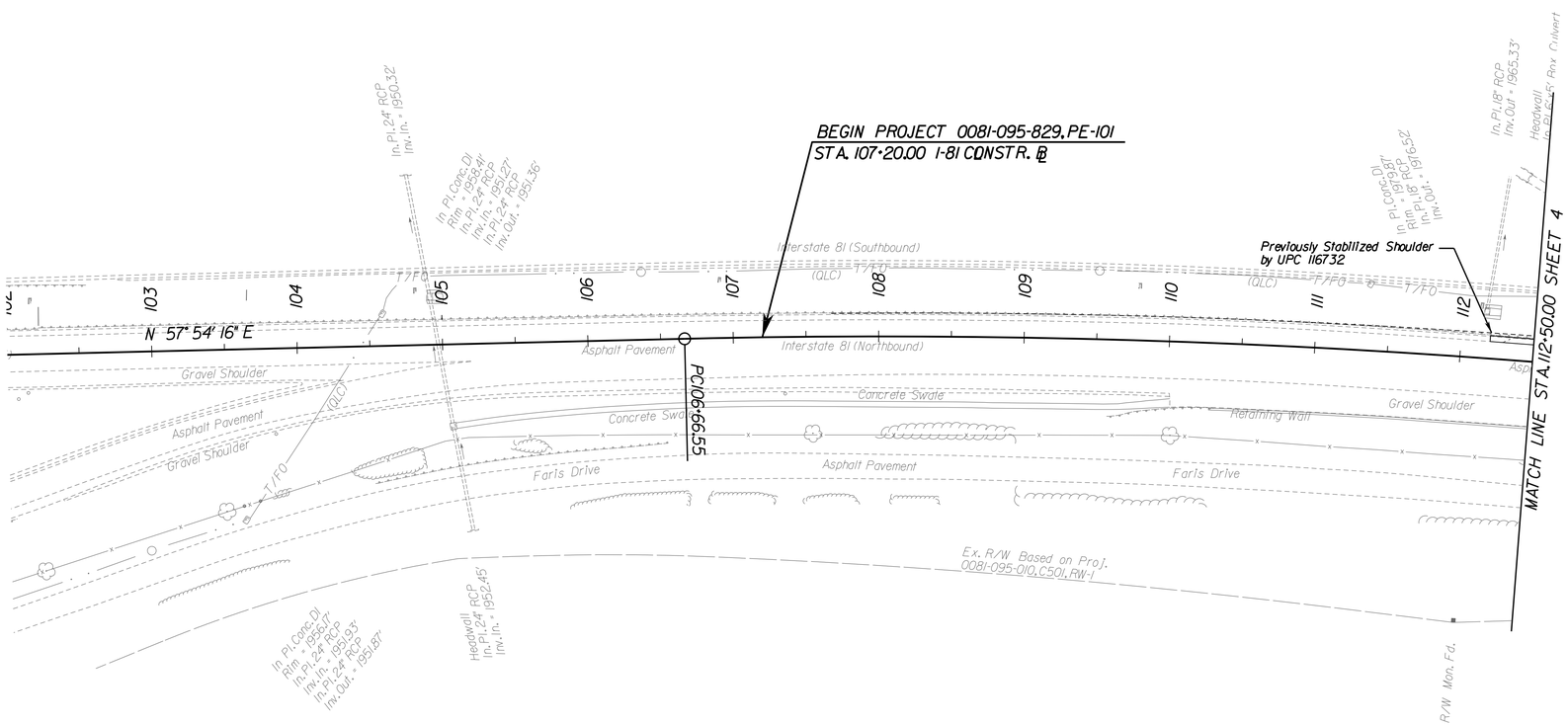
Communication:

Point Broadband
Tim Nutter
15022 Lee Highway
Bristol, VA 24202
(276) 492-1953

CenturyLink
Steve Hastings
175 South 1st Street
Wytheville, VA 24382
(276) 223-6264

Water:

Washington County Service Authority
Kirk Malden
25122 Regal Drive
Abingdon, VA 24211
(276) 676-6773



ROADWAY ITEMS LEGEND

1. ST'D.GR-MGS1 REQ'D.
2. ST'D.GR-MGS2 REQ'D.
3. ST'D.GR-MGS3 REQ'D.
4. ST'D.GR-MGS4 REQ'D.
5. REMOVE EXISTING GUARDRAIL
6. ST'D.GR-10 TYPE II REQ'D.
7. ST'D.GR-MGS1,LONG POST REQ'D.
8. ST'D.MC-3B.ASPHALT CURB AND ASPHALT CONCRETE CURB BACKUP MATERIAL REQ'D.
9. ST'D.UD-4 UNDERDRAIN REQ'D.
10. ST'D.UNDERDRAIN INSPECTION PORT REQ'D.

C — CONSTRUCTION LIMITS IN CUTS
F — CONSTRUCTION LIMITS IN FILLS

XXX — PARCEL NUMBER
X-X — DRAINAGE STRUCTURE
PROPOSED PAVEMENT
PROPOSED FLEXIBLE PAVEMENT PLANING/OVERLAY
DEMOLITION OF PAVEMENT

Curve 181NB_3
PI = 118+39.97
DELTA = 23° 08' 54.00" (RT)
D = 1° 00' 00"
T = 1,173.42'
L = 2,314.83'
R = 5,729.58'
PC = 106+66.55
PT = 129+81.38
V = 75 MPH
E = MATCH EXIST.

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Alignment Data	IG

SCALE	PROJECT	SHEET NO.
0 50' 100'	0081-095-829	3

3/12/2021
10:17:21 AM

d1156004.dgn
Plotted By: eltley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY — By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

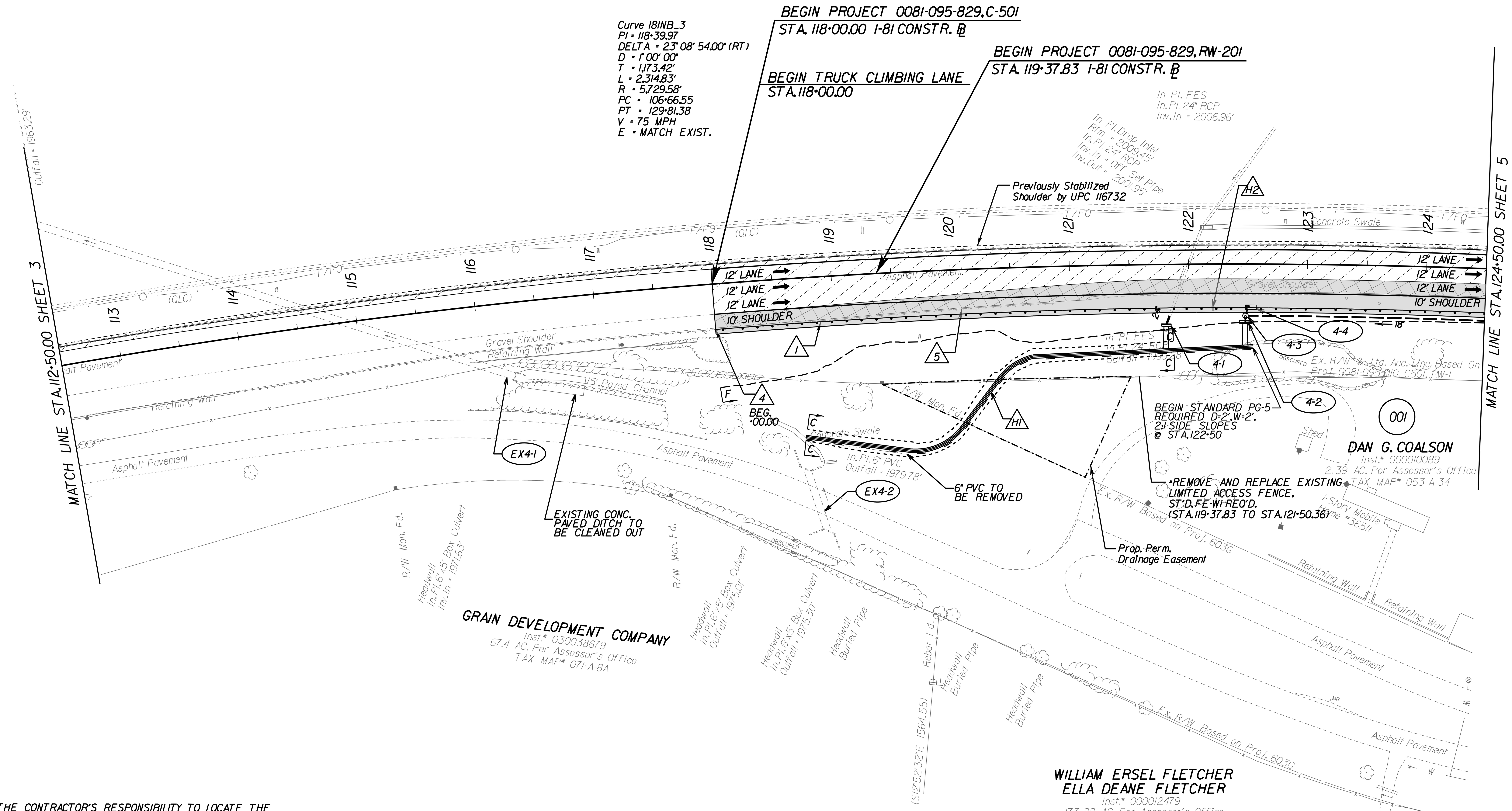
REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	81	0081-095-829, PE-101, RW-201, C-501	4

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

VDOT Location & Design Bristol, Virginia HYDRAULIC ENGINEER	VDOT Location & Design Bristol, Virginia ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



WILLIAM ERSEL FLETCHER
ELLA DEANE FLETCHER
Inst.# 000012479
173.88 AC. Per Assessor's Office
TAX MAP# 071-A-8B

ROADWAY ITEMS LEGEND

1. ST'D. GR-MGS1 REQ'D.
2. ST'D. GR-MGS2 REQ'D.
3. ST'D. GR-MGS3 REQ'D.
4. ST'D. GR-MGS4 REQ'D.
5. REMOVE EXISTING GUARDRAIL
6. ST'D. GR-10 TYPE II REQ'D.
7. ST'D. GR-MGS1, LONG POST REQ'D.
8. ST'D. MC-3B, ASPHALT CURB AND ASPHALT CONCRETE CURB BACKUP MATERIAL REQ'D.
9. ST'D. UD-4 UNDERDRAIN REQ'D.
10. ST'D. UNDERDRAIN INSPECTION PORT REQ'D.

- C — CONSTRUCTION LIMITS IN CUTS
- F — CONSTRUCTION LIMITS IN FILLS
- XXX — PARCEL NUMBER
- X-X — DRAINAGE STRUCTURE
- PROPOSED PAVEMENT
- PROPOSED FLEXIBLE PAVEMENT PLANING/OVERLAY
- DEMOLITION OF PAVEMENT
- DENOTES GRADED "V" DITCH

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Alignment Data	1G
Typical Section	2A(1)
Profile I-81 NB	4A
E & S	4B, 4C
Right Of Way	4RW

*NOTE: IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE THE EXISTING FENCE PRIOR TO CONSTRUCTION. AT NO TIME SHALL THE WORK PROGRESS BEYOND THE EXISTING RIGHT OF WAY. PAY ITEMS FOR FENCE REPLACEMENT HAVE BEEN PROVIDED IN THE CONTRACT. SHOULD THE FENCE NOT NEED TO BE DISMANTLED DURING CONSTRUCTION, THOSE PAY ITEMS CAN BE ELIMINATED.

HYDRAULICS NOTES

- H1 PROPOSED STORMWATER CONVEYANCE CHANNEL STANDARD PG-5 REQUIRED
- H2 REMOVE EXISTING EW-12 STRUCTURE DAYLIGHT CROSS DRAIN / UNDER DRAIN INSTALL PROPOSED STANDARD EW-12

SCALE 0 50' 100'

PROJECT	SHEET NO.
0081-095-829	4

3/11/2021
12:15:34 PM

d1161560004a.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	081	0081-095-829, PE-101, RW-201, C-501	4A

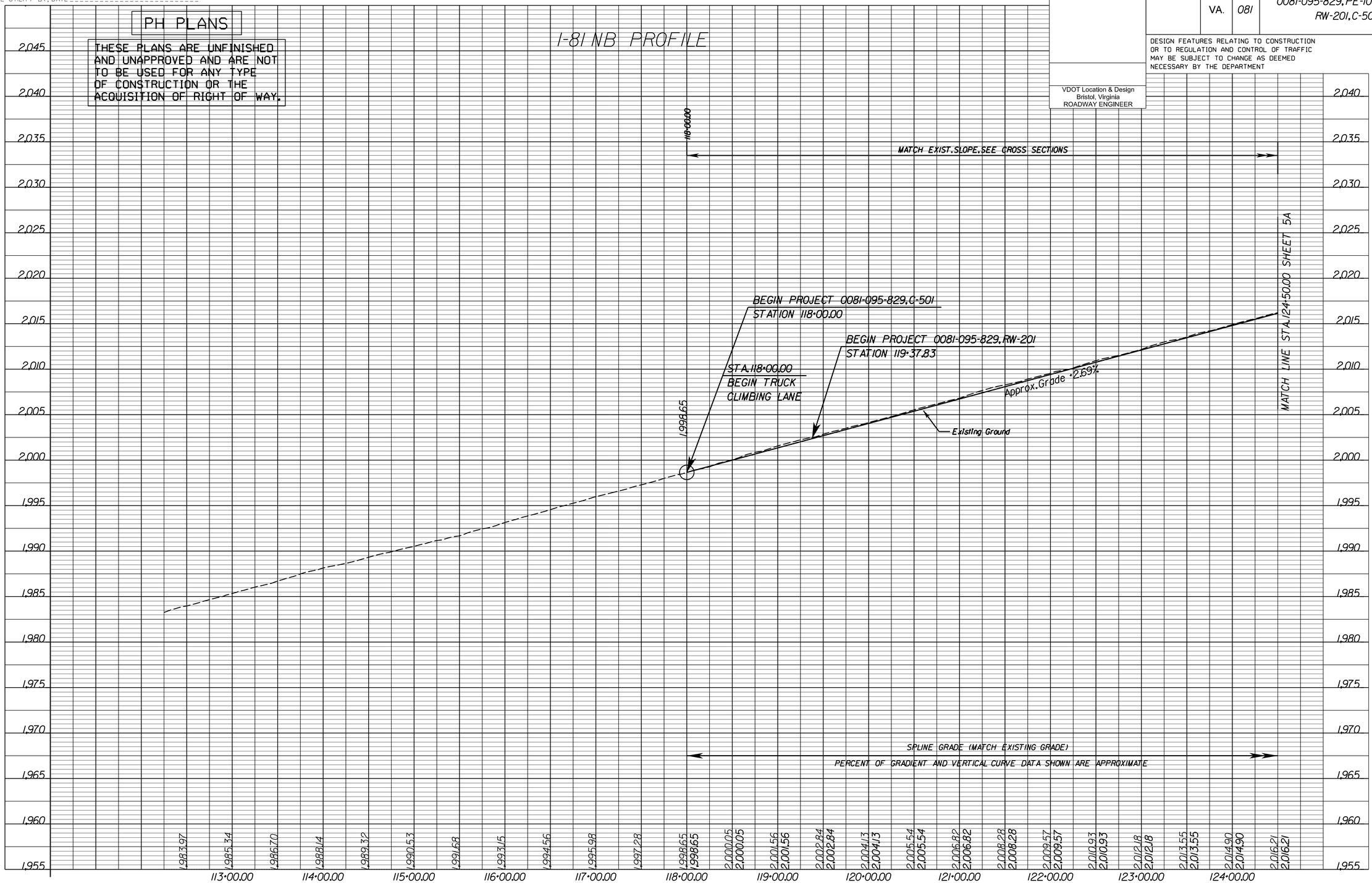
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

VDOT Location & Design
Bristol, Virginia
ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

I-81 NB PROFILE



SCALE: 1" = 50' HORZ. 1" = 5' VERT.	PROJECT	SHEET NO.
	0081-095-829	4A

3/12/2021
8:38:50 AM

dl16156005.dgn
Plotted By: elilley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tomara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829, PE-101; RW-201, C-501	5

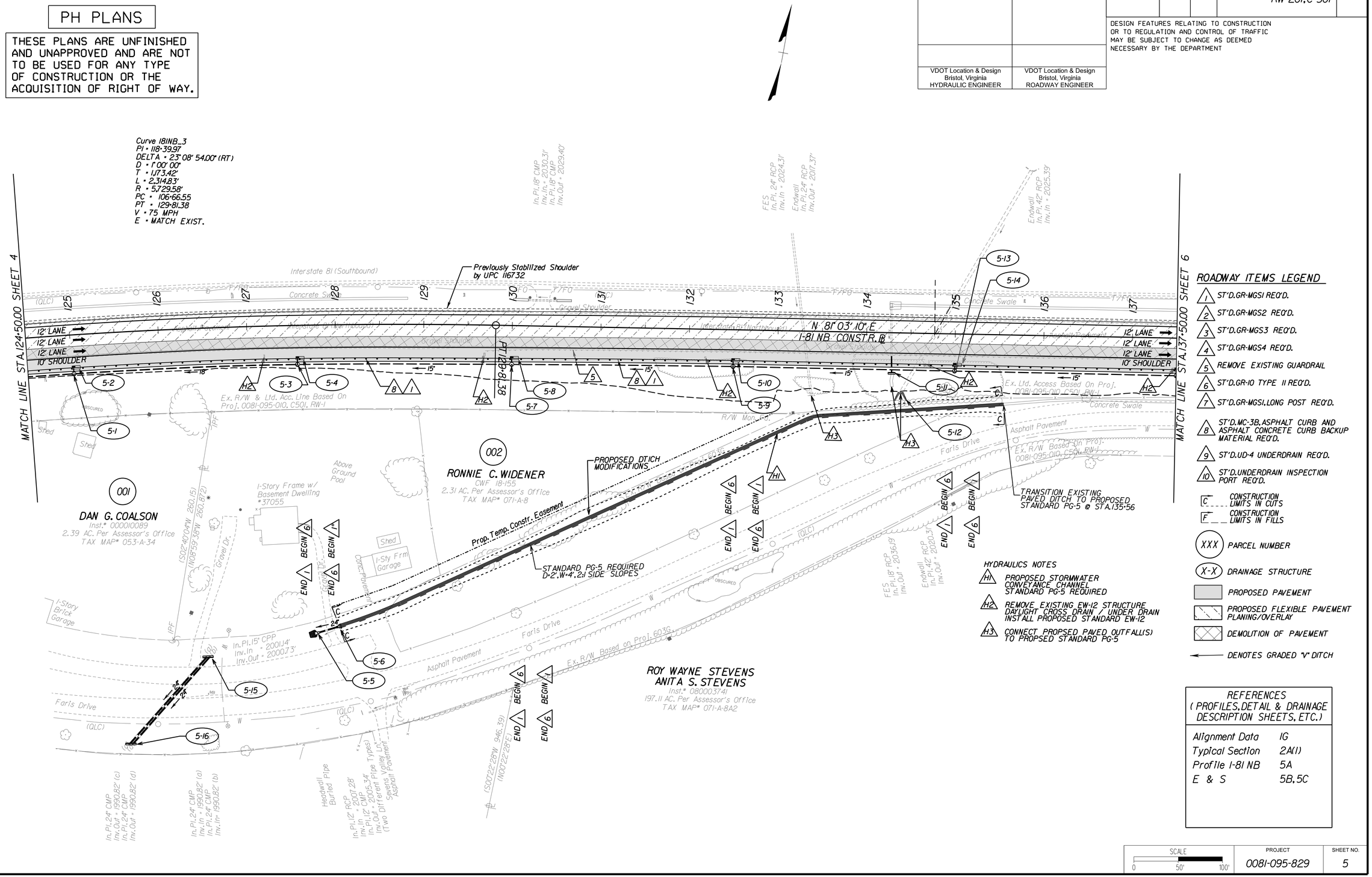
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

VDOT Location & Design Bristol, Virginia HYDRAULIC ENGINEER	VDOT Location & Design Bristol, Virginia ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

Curve 181NB_3
PI = 118+39.97
DELTA = 23° 08' 54.00" (RT)
D = 1° 00' 00"
T = 1,173.42'
L = 2,314.83'
R = 5,729.58'
PC = 106+66.55
PT = 129+81.38
V = 75 MPH
E = MATCH EXIST.



ROADWAY ITEMS LEGEND

1. ST'D.GR-MGS1 REQ'D.
2. ST'D.GR-MGS2 REQ'D.
3. ST'D.GR-MGS3 REQ'D.
4. ST'D.GR-MGS4 REQ'D.
5. REMOVE EXISTING GUARDRAIL
6. ST'D.GR-10 TYPE II REQ'D.
7. ST'D.GR-MGS1, LONG POST REQ'D.
8. ST'D.MC-3B, ASPHALT CURB AND ASPHALT CONCRETE CURB BACKUP MATERIAL REQ'D.
9. ST'D.UD-4 UNDERDRAIN REQ'D.
10. ST'D.UNDERDRAIN INSPECTION PORT REQ'D.

C ---- CONSTRUCTION LIMITS IN CUTS
F - - CONSTRUCTION LIMITS IN FILLS

XXX PARCEL NUMBER
X-X DRAINAGE STRUCTURE
PROPOSED PAVEMENT
PROPOSED FLEXIBLE PAVEMENT PLANING/OVERLAY
DEMOLITION OF PAVEMENT
DENOTES GRADED "V" DITCH

HYDRAULICS NOTES

H1 PROPOSED STORMWATER CONVEYANCE CHANNEL STANDARD PG-5 REQUIRED
H2 REMOVE EXISTING EW-12 STRUCTURE DAYLIGHT CROSS DRAIN / UNDER DRAIN INSTALL PROPOSED STANDARD EW-12
H3 CONNECT PROPSED PAVED OUTFALL(S) TO PROPSED STANDARD PG-5

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Alignment Data	IG
Typical Section	2A(1)
Profile I-81 NB	5A
E & S	5B, 5C

SCALE	PROJECT	SHEET NO.
0 50' 100'	0081-095-829	5

3/11/2021
12:16:40 PM

dl16156005a.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	081	0081-095-829, PE-101, RW-201, C-501	5A

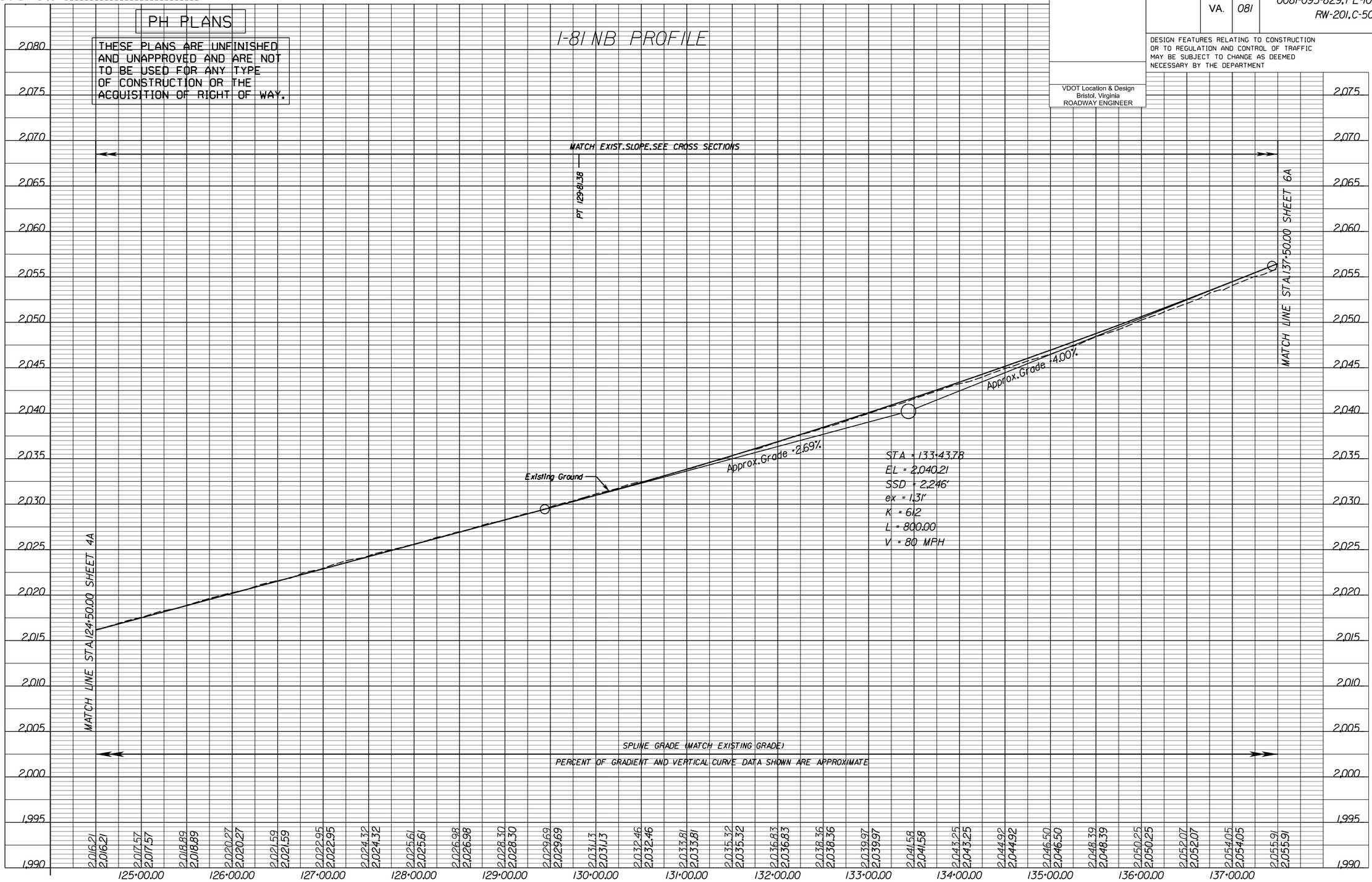
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

VDOT Location & Design
Bristol, Virginia
ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

I-81 NB PROFILE



SCALE: 1" = 50' HORZ. 1" = 5' VERT.	PROJECT	SHEET NO.
	0081-095-829	5A

3/12/2021
8:48:24 AM

d116156006.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

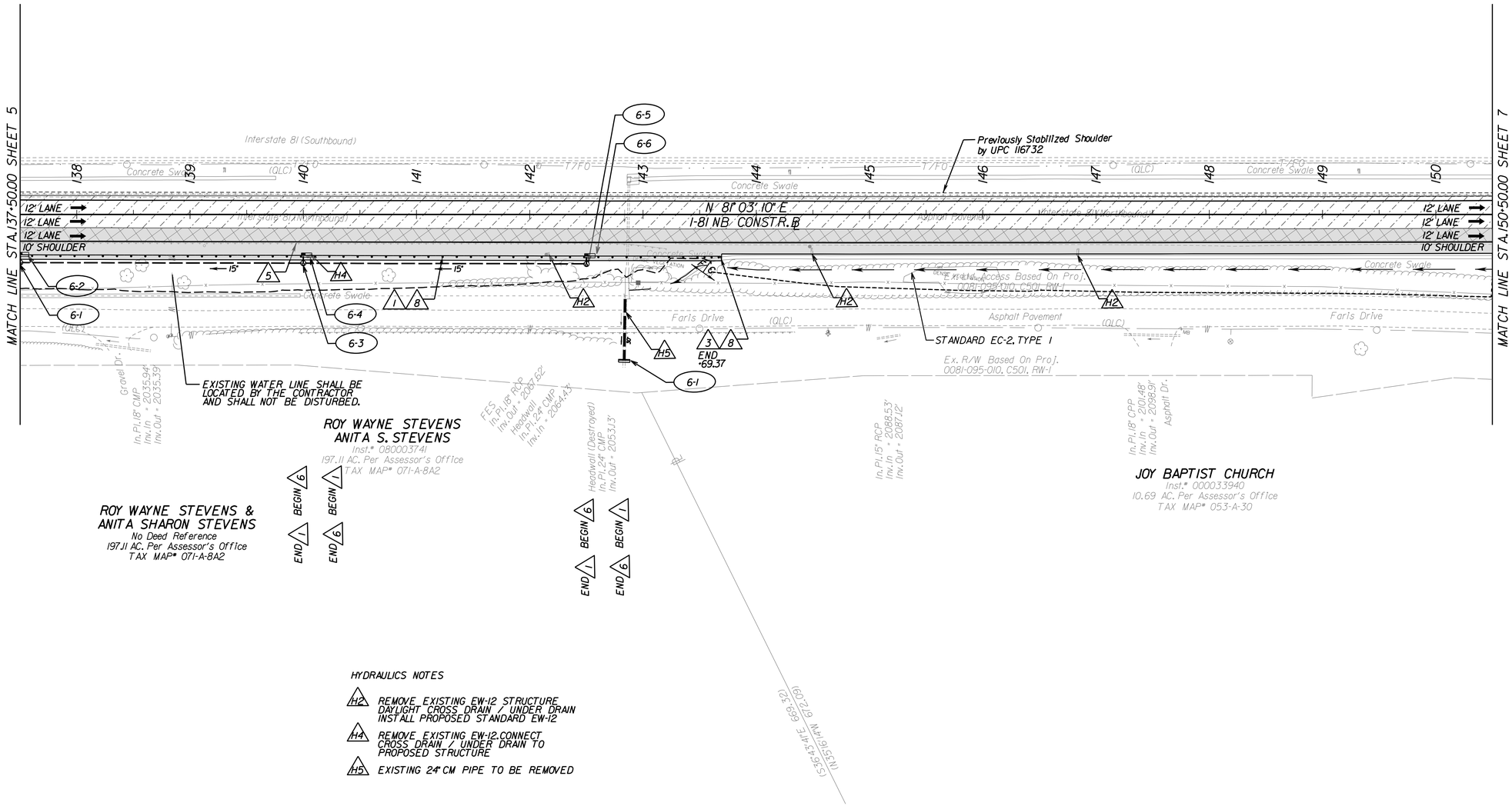
PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829, PE-101; RW-201, C-501	6

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

VDOT Location & Design Bristol, Virginia HYDRAULIC ENGINEER	VDOT Location & Design Bristol, Virginia ROADWAY ENGINEER



ROY WAYNE STEVENS
ANITA S. STEVENS
Inst.# 080003741
197.11 AC. Per Assessor's Office
TAX MAP# 071-A-8A2

ROY WAYNE STEVENS & ANITA SHARON STEVENS
No Deed Reference
197.11 AC. Per Assessor's Office
TAX MAP# 071-A-8A2

JOY BAPTIST CHURCH
Inst.# 000033940
10.69 AC. Per Assessor's Office
TAX MAP# 053-A-30

BEGIN 6 / END 1
BEGIN 1 / END 6

HYDRAULICS NOTES

H2 REMOVE EXISTING EW-12 STRUCTURE DAYLIGHT CROSS DRAIN / UNDER DRAIN INSTALL PROPOSED STANDARD EW-12

H4 REMOVE EXISTING EW-12 CONNECT CROSS DRAIN / UNDER DRAIN TO PROPOSED STRUCTURE

H5 EXISTING 24" CM PIPE TO BE REMOVED

ROADWAY ITEMS LEGEND

1. ST'D.GR-MGS1 REQ'D.
2. ST'D.GR-MGS2 REQ'D.
3. ST'D.GR-MGS3 REQ'D.
4. ST'D.GR-MGS4 REQ'D.
5. REMOVE EXISTING GUARDRAIL
6. ST'D.GR-10 TYPE II REQ'D.
7. ST'D.GR-MGS1, LONG POST REQ'D.
8. ST'D.MC-3B, ASPHALT CURB AND ASPHALT CONCRETE CURB BACKUP MATERIAL REQ'D.
9. ST'D.UD-4 UNDERDRAIN REQ'D.
10. ST'D.UNDERDRAIN INSPECTION PORT REQ'D.

C CONSTRUCTION LIMITS IN CUTS
F CONSTRUCTION LIMITS IN FILLS
XXX PARCEL NUMBER
X-X DRAINAGE STRUCTURE
PROPOSED PAVEMENT
PROPOSED FLEXIBLE PAVEMENT PLANING/OVERLAY
DEMOLITION OF PAVEMENT
DENOTES GRADED "V" DITCH

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Alignment Data	1G
Typical Section	2A(1)
Profile I-81 NB	6A
E & S	6B, 6C

SCALE	PROJECT	SHEET NO.
0 50' 100'	0081-095-829	6

3/11/2021
12:17:53 PM

d:\16156006a.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	081	0081-095-829, PE-101, RW-201, C-501	6A

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

VDOT Location & Design
Bristol, Virginia
ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

I-81 NB PROFILE

MATCH EXIST. SLOPE. SEE CROSS SECTIONS

MATCH LINE STA 150+50.00 SHEET 7A

Existing Ground

Approx. Grade +4.00%

MATCH LINE STA 137+50.00 SHEET 5A

SPLINE GRADE (MATCH EXISTING GRADE)

PERCENT OF GRADIENT AND VERTICAL CURVE DATA SHOWN ARE APPROXIMATE

2,130 2,125 2,120 2,115 2,110 2,105 2,100 2,095 2,090 2,085 2,080 2,075 2,070 2,065 2,060 2,055 2,050 2,045 2,040

138+00.00	139+00.00	140+00.00	141+00.00	142+00.00	143+00.00	144+00.00	145+00.00	146+00.00	147+00.00	148+00.00	149+00.00	150+00.00
2,055.91	2,057.91	2,059.92	2,062.05	2,064.26	2,066.38	2,068.26	2,070.32	2,072.28	2,074.40	2,076.36	2,078.49	2,080.50
2,055.91	2,057.91	2,059.92	2,062.05	2,064.26	2,066.38	2,068.26	2,070.32	2,072.28	2,074.40	2,076.36	2,078.49	2,080.50

2,082.53	2,084.40	2,086.56	2,088.56	2,090.45	2,092.48	2,094.54	2,096.52	2,098.49	2,100.40	2,102.42	2,104.54	2,106.63	2,108.76
2,082.53	2,084.40	2,086.56	2,088.56	2,090.45	2,092.48	2,094.54	2,096.52	2,098.49	2,100.40	2,102.42	2,104.54	2,106.63	2,108.76

SCALE: 1" = 50' HORZ. 1" = 5' VERT.	PROJECT 0081-095-829	SHEET NO. 6A

3/12/2021
8:57:22 AM

dl16156007.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tomara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

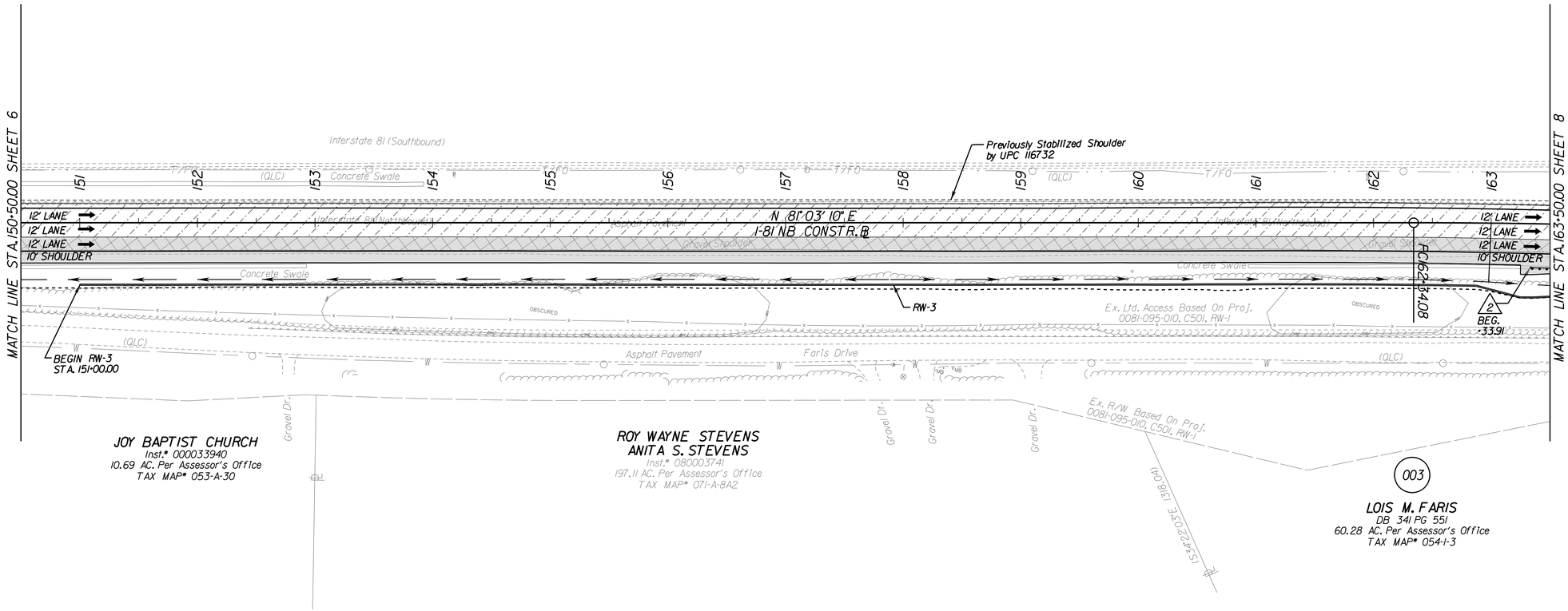
PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829, PE-101; RW-201, C-501	7

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

VDOT Location & Design Bristol, Virginia HYDRAULIC ENGINEER	VDOT Location & Design Bristol, Virginia ROADWAY ENGINEER



ROADWAY ITEMS LEGEND

1. ST'D.GR-MGS1 REQ'D.
2. ST'D.GR-MGS2 REQ'D.
3. ST'D.GR-MGS3 REQ'D.
4. ST'D.GR-MGS4 REQ'D.
5. REMOVE EXISTING GUARDRAIL
6. ST'D.GR-10 TYPE II REQ'D.
7. ST'D.GR-MGS1,LONG POST REQ'D.
8. ST'D.MC-3B,ASPHALT CURB AND ASPHALT CONCRETE CURB BACKUP MATERIAL REQ'D.
9. ST'D.UD-4 UNDERDRAIN REQ'D.
10. ST'D.UNDERDRAIN INSPECTION PORT REQ'D.

C CONSTRUCTION LIMITS IN CUTS
F CONSTRUCTION LIMITS IN FILLS

XXX PARCEL NUMBER

X-X DRAINAGE STRUCTURE

PROPOSED PAVEMENT

PROPOSED FLEXIBLE PAVEMENT PLANING/OVERLAY

DEMOLITION OF PAVEMENT

DENOTES GRADED "V" DITCH

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Alignment Data	1G
Typical Section	2A(1)
Profile I-81 NB	7A
E & S	7B,7C

SCALE	PROJECT	SHEET NO.
0 50' 100'	0081-095-829	7

3/11/2021
12:19:03 PM

d1161560070.dgn
Plotted By: elliley

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

BRISTOL DISTRICT DESIGN UNIT

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	081	0081-095-829, PE-101, RW-201, C-501	7A

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

VDOT Location & Design
Bristol, Virginia
ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

I-81 NB PROFILE

MATCH EXIST. SLOPE. SEE CROSS SECTIONS

STA = 157+94.00
EL = 2,138.22
SSD = 614'
ex = -13.03'
K = 175
L = 1,350.00
V = 60 MPH

PC 162+14.08

Approx. Grade -4.00%

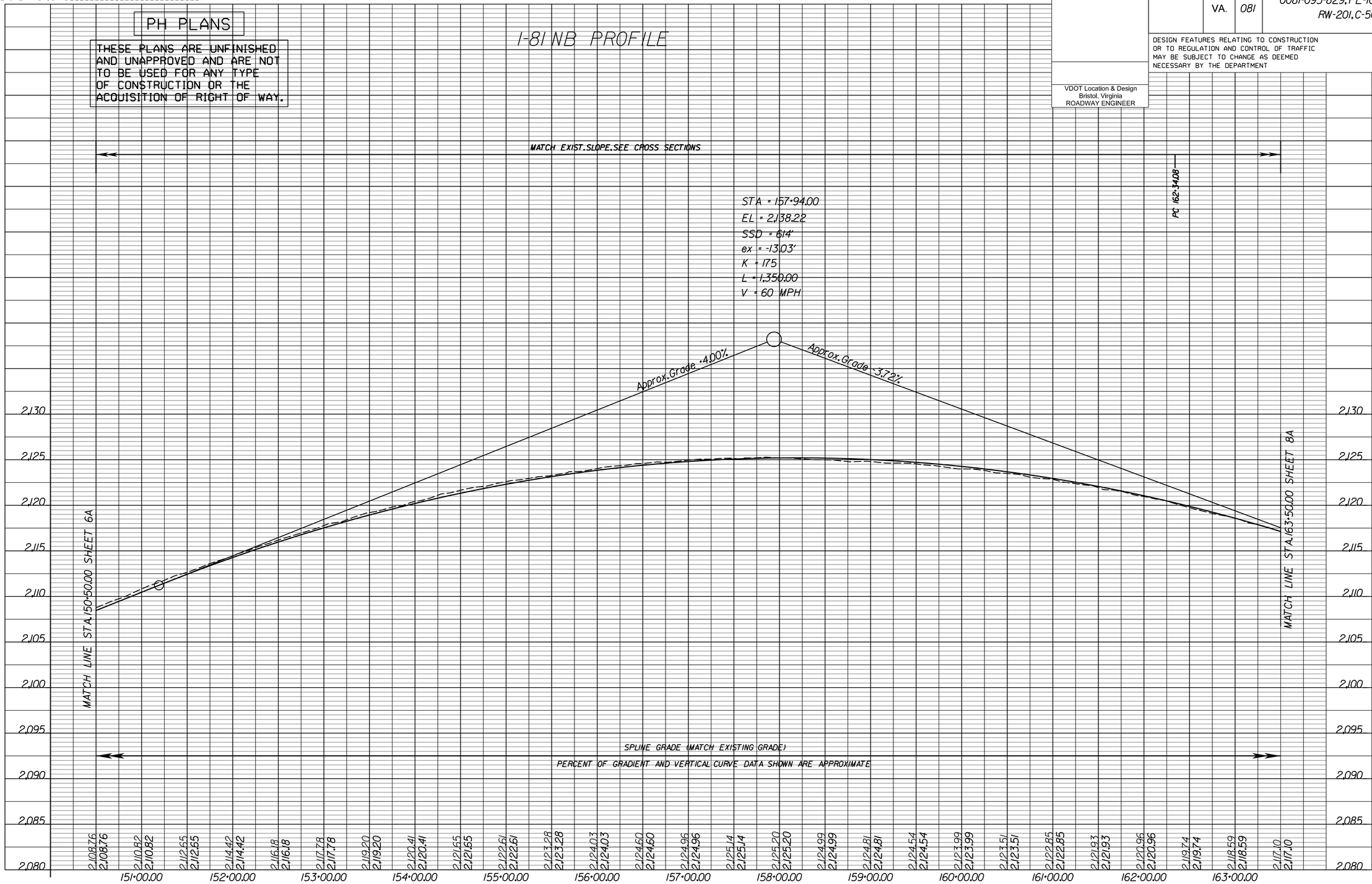
Approx. Grade -3.72%

MATCH LINE STA. 150+50.00 SHEET 6A

MATCH LINE STA. 163+50.00 SHEET 8A

SPLINE GRADE (MATCH EXISTING GRADE)

PERCENT OF GRADIENT AND VERTICAL CURVE DATA SHOWN ARE APPROXIMATE



SCALE: 1" = 50' HORZ. 1" = 5' VERT.	PROJECT 0081-095-829	SHEET NO. 7A

3/12/2021
9:02:42 AM

dll6156008.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc., (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tomara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829, PE-101; RW-201, C-501	8

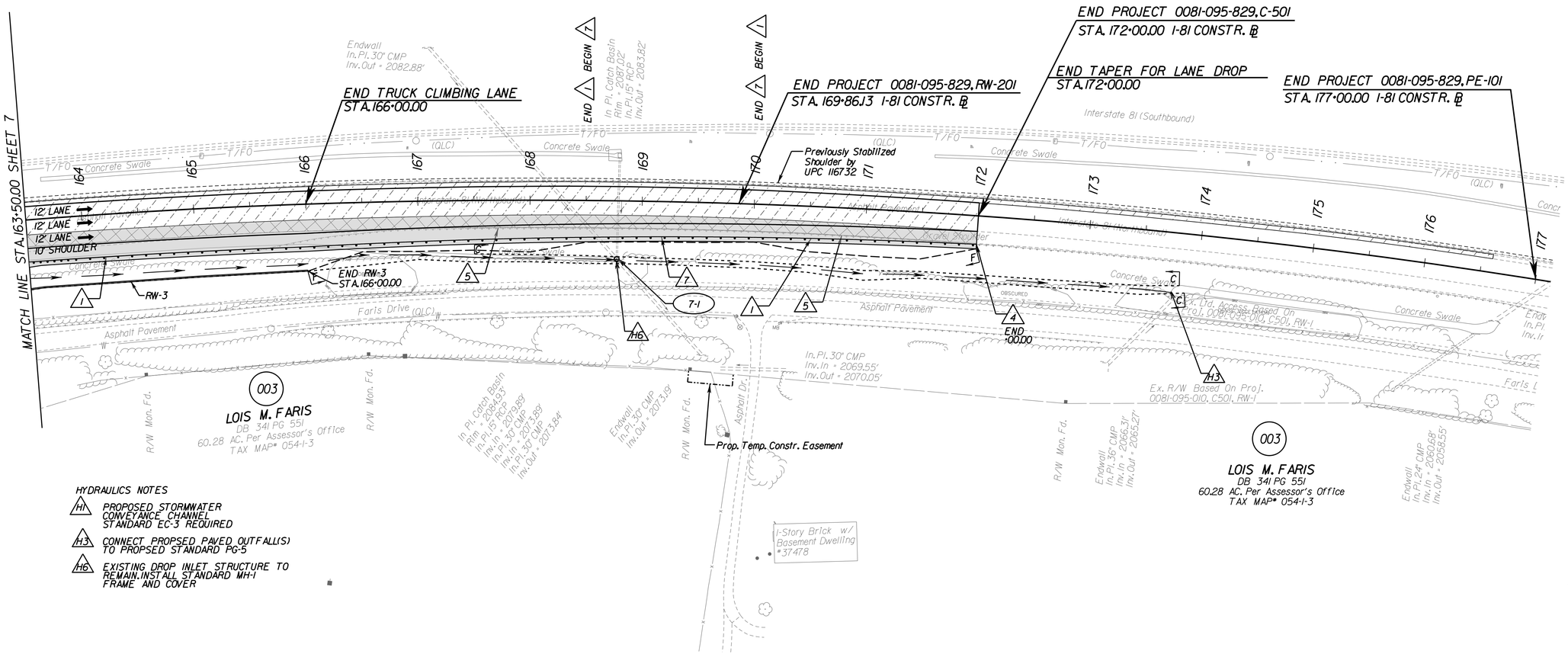
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

VDOT Location & Design Bristol, Virginia HYDRAULIC ENGINEER	VDOT Location & Design Bristol, Virginia ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

Curve 18INB..6
PI = 175+05.48
DELTA = 25° 01' 21.20" (RT)
D = 1° 00' 00"
T = 1,271.40'
L = 2,502.26'
R = 5,729.58'
PC = 162+34.08
PT = 187+36.34
V = 75 MPH
E = MATCH EXIST.



HYDRAULICS NOTES

H1 PROPOSED STORMWATER CONVEYANCE CHANNEL STANDARD EC-3 REQUIRED

H3 CONNECT PROPSED PAVED OUTFALL(S) TO PROPSED STANDARD PG-5

H6 EXISTING DROP INLET STRUCTURE TO REMAIN. INSTALL STANDARD MH-1 FRAME AND COVER

ROADWAY ITEMS LEGEND

1 ST'D.GR-MGS1 REQ'D.
2 ST'D.GR-MGS2 REQ'D.
3 ST'D.GR-MGS3 REQ'D.
4 ST'D.GR-MGS4 REQ'D.
5 REMOVE EXISTING GUARDRAIL
6 ST'D.GR-10 TYPE II REQ'D.
7 ST'D.GR-MGS1,LONG POST REQ'D.
8 ST'D.MC-3B,ASPHALT CURB AND ASPHALT CONCRETE CURB BACKUP MATERIAL REQ'D.
9 ST'D.UD-4 UNDERDRAIN REQ'D.
10 ST'D.UNDERDRAIN INSPECTION PORT REQ'D.

C CONSTRUCTION LIMITS IN CUTS
F CONSTRUCTION LIMITS IN FILLS
XXX PARCEL NUMBER
X-X DRAINAGE STRUCTURE
PROPOSED PAVEMENT
PROPOSED FLEXIBLE PAVEMENT PLANING/OVERLAY
DEMOLITION OF PAVEMENT
DENOTES GRADED "V" DITCH

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Alignment Data	1G
Typical Section	2A(1)
Profile I-81 NB	8A
E & S	8B, 8C

SCALE	PROJECT	SHEET NO.
0 50' 100'	0081-095-829	8

3/11/2021
12:20:08 PM

d1161560008a.dgn
Plotted By: elliley

BRISTOL DISTRICT DESIGN UNIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated October 4, 1956

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	081	0081-095-829, PE-101; RW-201, C-501	8A

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

VDOT Location & Design
Bristol, Virginia
ROADWAY ENGINEER

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

I-81 NB PROFILE

MATCH EXIST. SLOPE. SEE CROSS SECTIONS

172+00.00

MATCH LINE STA. 163+50.00 SHEET 7A

STA. 166+00.00
END TRUCK
CLIMBING LANE

END PROJECT 0081-095-829, RW-201
STATION 169+86.13

Existing Ground

Approx. Grade -3.72%

END PROJECT 0081-095-829, C-501
STATION 172+00.00

STA. 172+00.00
END TAPER
FOR LANE DROP

2,085.81

END PROJECT 0081-095-829, PE-101
STATION 177+00.00

SPLINE GRADE (MATCH EXISTING GRADE)
PERCENT OF GRADIENT AND VERTICAL CURVE DATA SHOWN ARE APPROXIMATE

2,130 2,125 2,120 2,115 2,110 2,105 2,100 2,095 2,090 2,085 2,080 2,075 2,070 2,065 2,060 2,055 2,050

2,117.10 2,115.53 2,113.77 2,112.04 2,110.22 2,108.36 2,106.47 2,104.73 2,102.71 2,100.69 2,098.74 2,096.83 2,094.94 2,093.08 2,091.33 2,089.60 2,087.66 2,085.81 2,084.00 2,082.18 2,080.28 2,078.48 2,076.65 2,074.84 2,072.88 2,071.09 2,069.22 2,067.32

164+00.00 165+00.00 166+00.00 167+00.00 168+00.00 169+00.00 170+00.00 171+00.00 172+00.00 173+00.00 174+00.00 175+00.00 176+00.00 177+00.00

SCALE: 1" = 50' HORZ.
1" = 5' VERT.

PROJECT	SHEET NO.
0081-095-829	8A

3/12/2021
12:24:27 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

SCALE 1 IN. = 10 FT

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

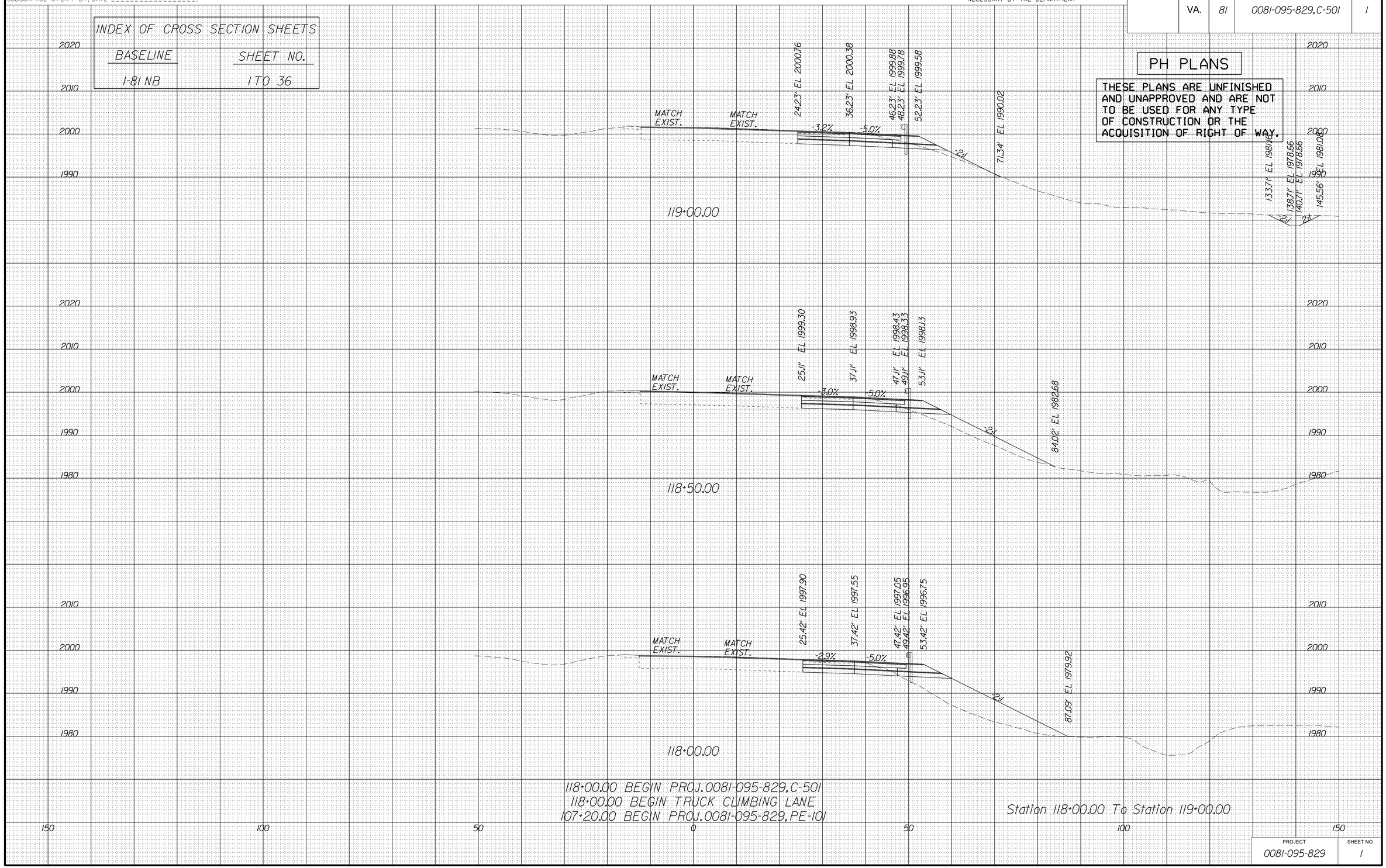
REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	1

INDEX OF CROSS SECTION SHEETS

BASELINE	SHEET NO.
I-81 NB	1 TO 36

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



118+00.00 BEGIN PROJ.0081-095-829,C-501
118+00.00 BEGIN TRUCK CLIMBING LANE
107+20.00 BEGIN PROJ.0081-095-829,PE-101

Station 118+00.00 To Station 119+00.00

PROJECT	SHEET NO.
0081-095-829	1

3/12/2021
12:24:30 PM

PROJECT MANAGER James, Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

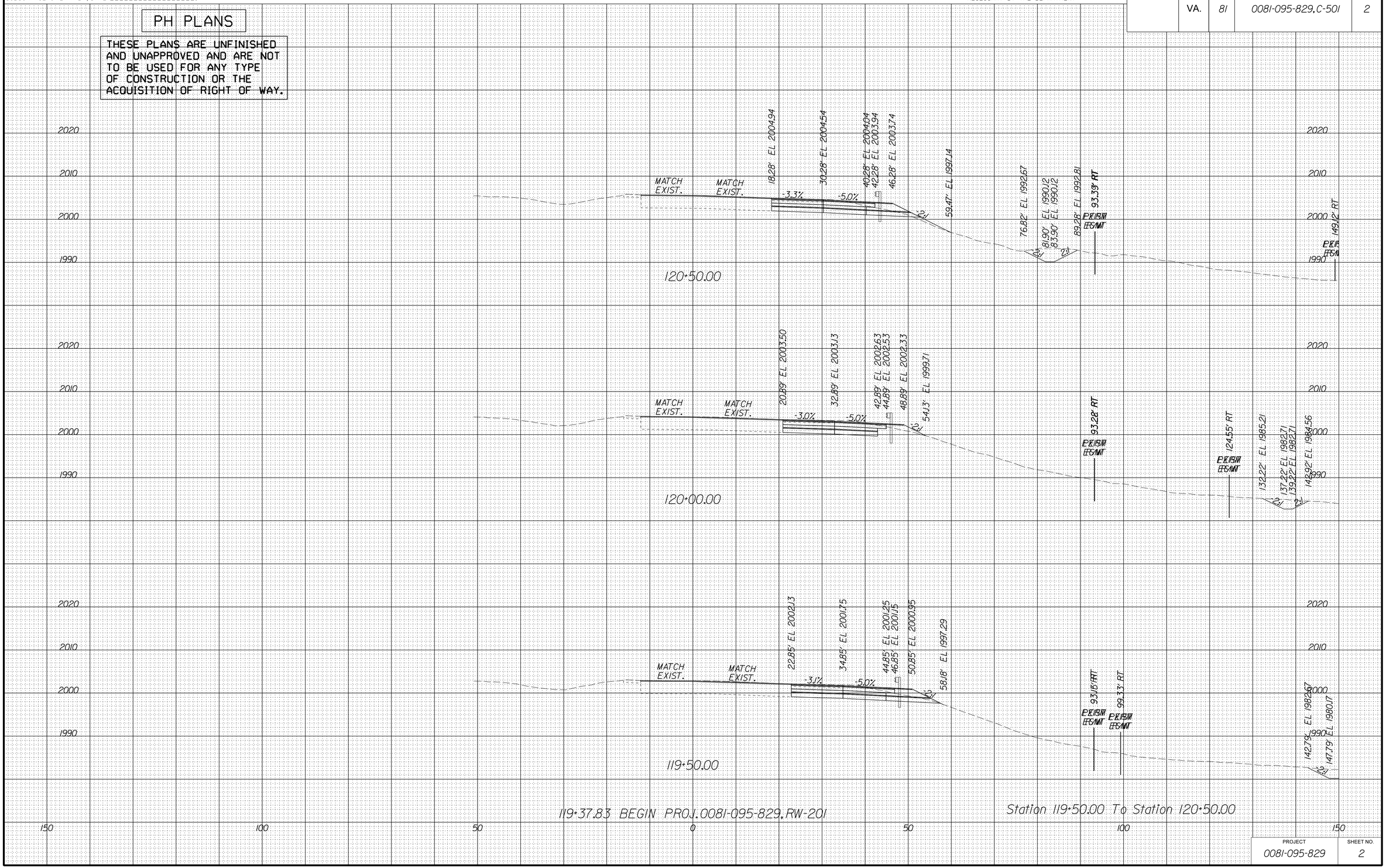
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	2

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	2

3/12/2021
12:24:34 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

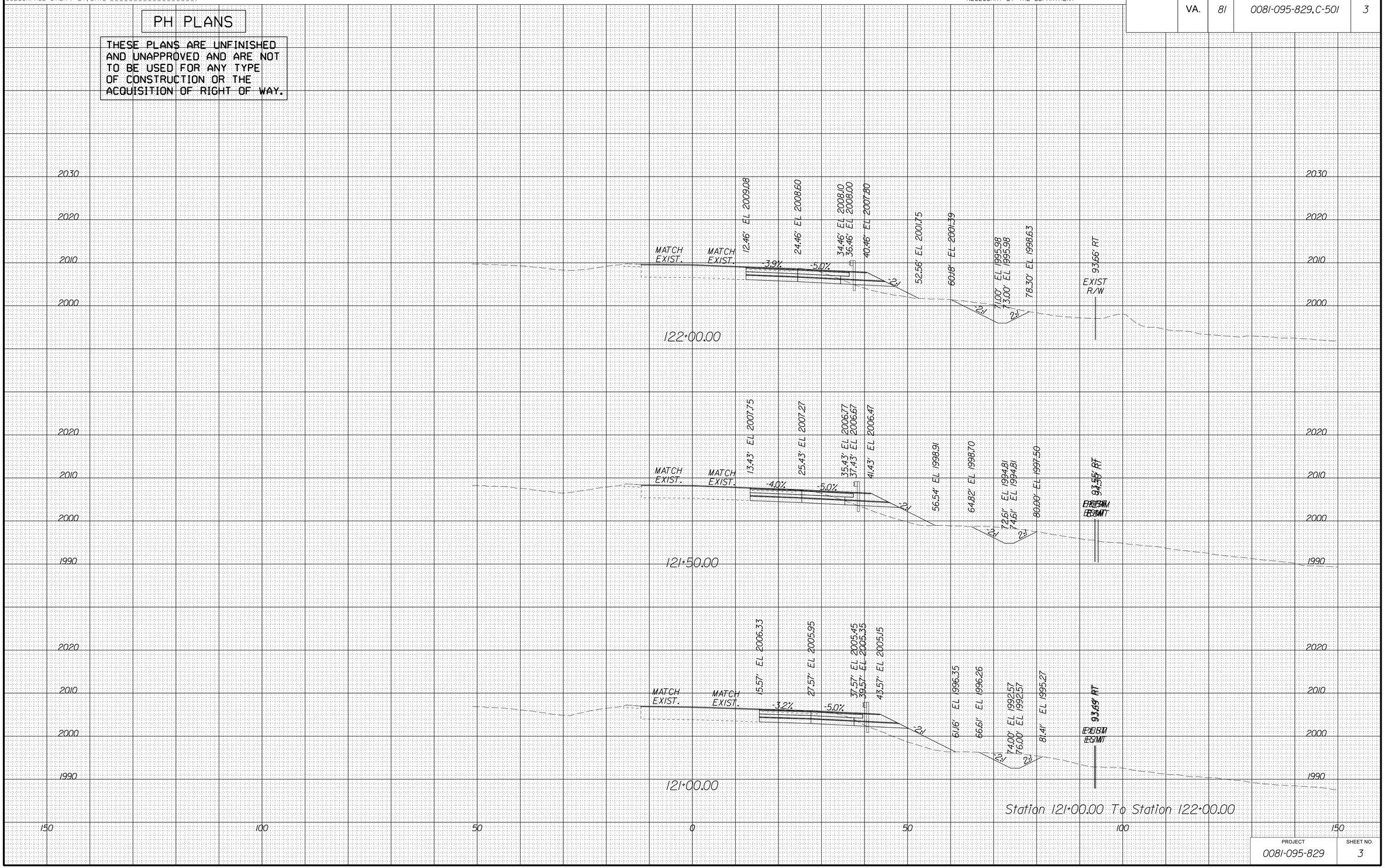
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	3

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 121+00.00 To Station 122+00.00

PROJECT	SHEET NO.
0081-095-829	3

3/12/2021
12:24:37 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE

CROSS SECTIONS

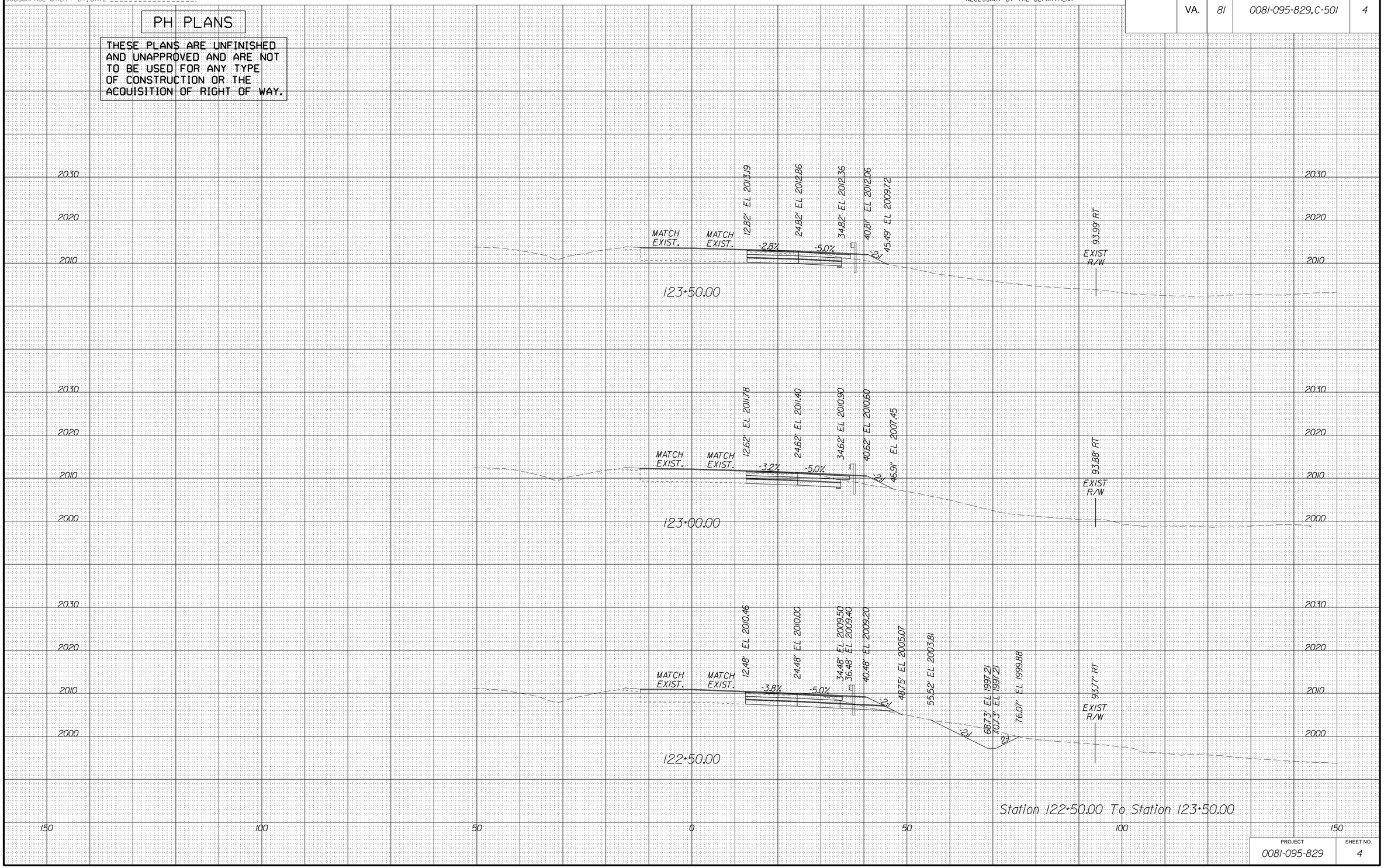
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	4

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 122+50.00 To Station 123+50.00

PROJECT	SHEET NO.
0081-095-829	4

3/12/2021
12:24:40 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

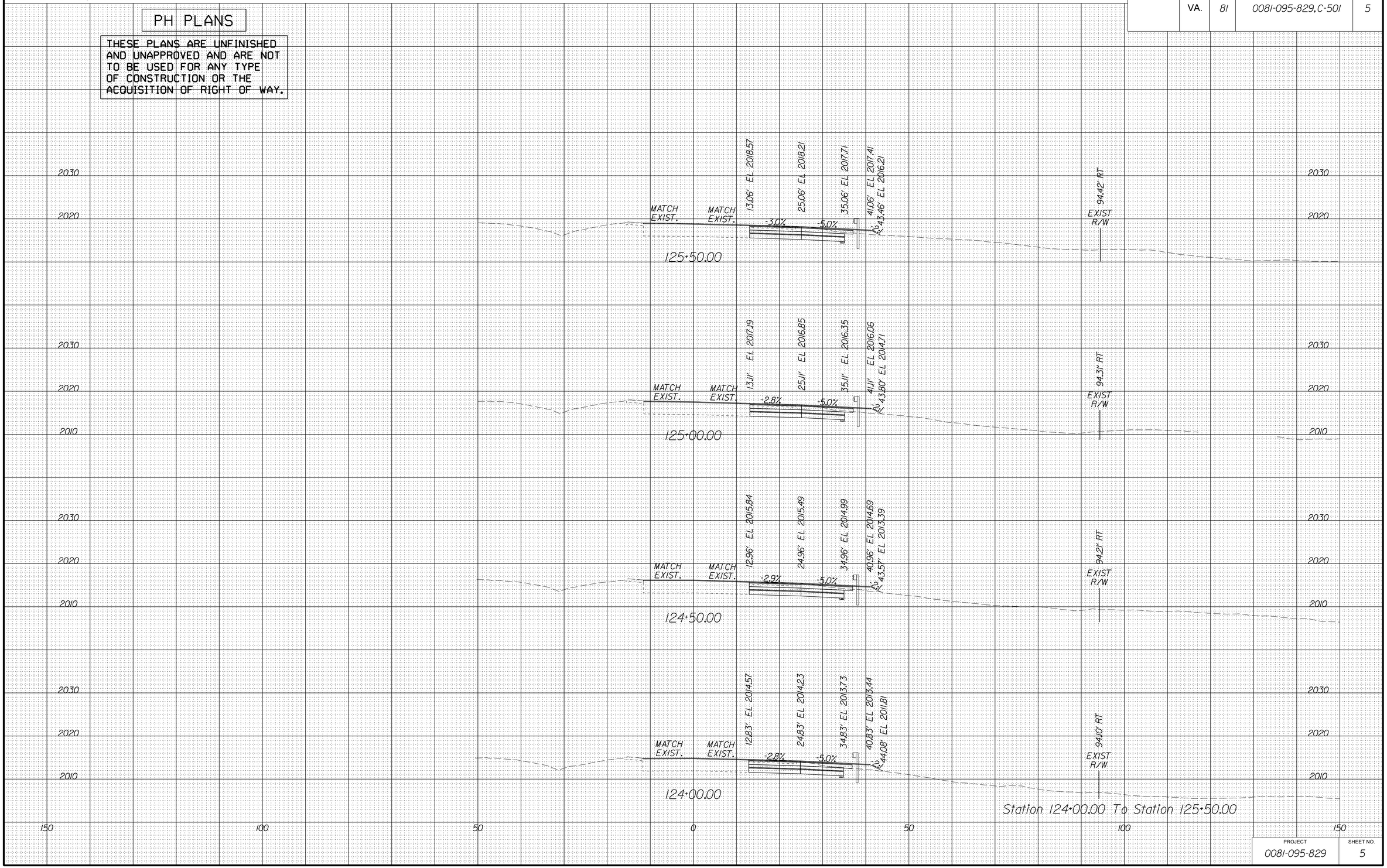
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	5

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 124+00.00 To Station 125+50.00

PROJECT	SHEET NO.
0081-095-829	5

3/12/2021
12:24:43 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

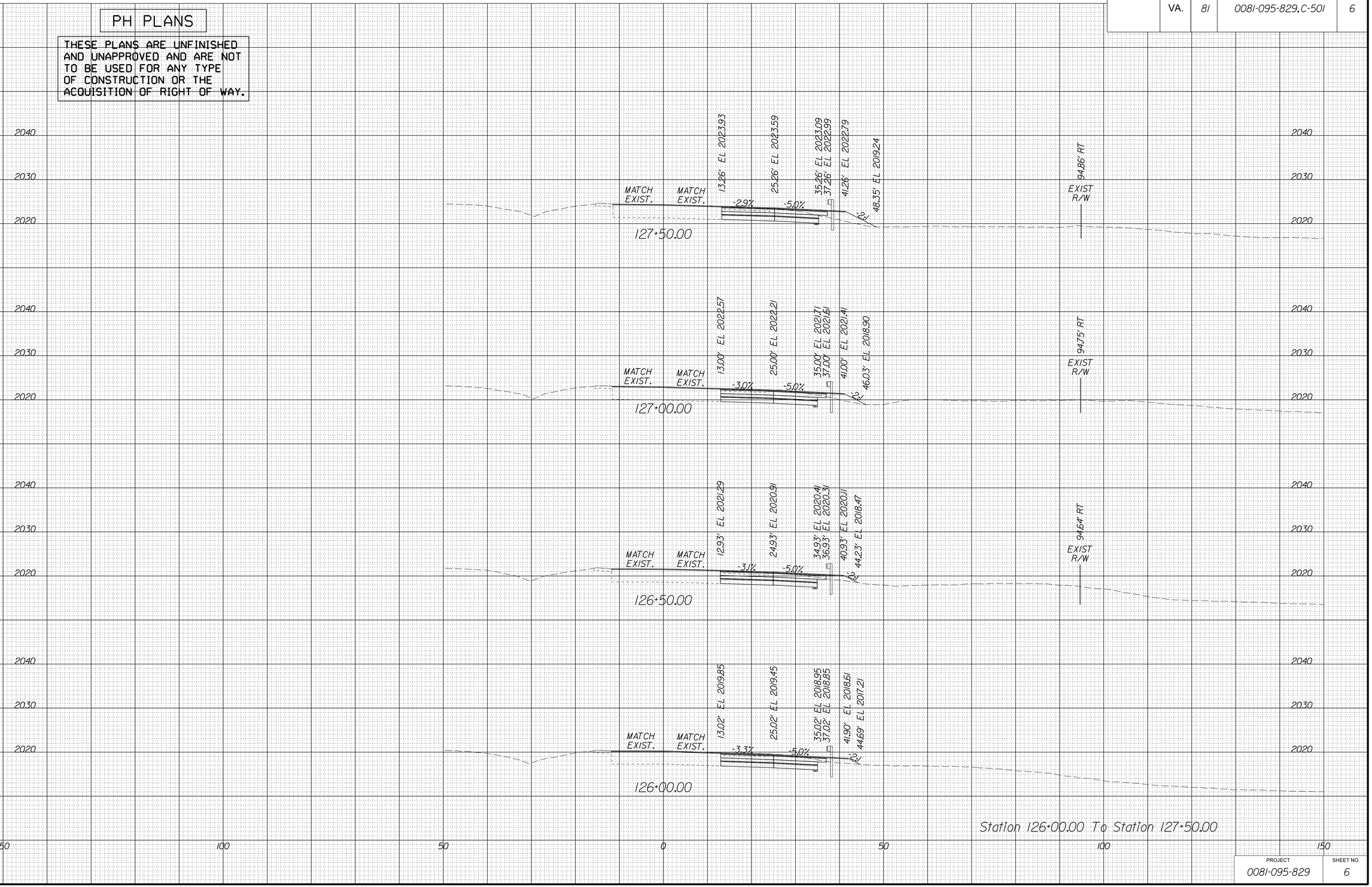
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	6

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	6

3/12/2021
12:24:46 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

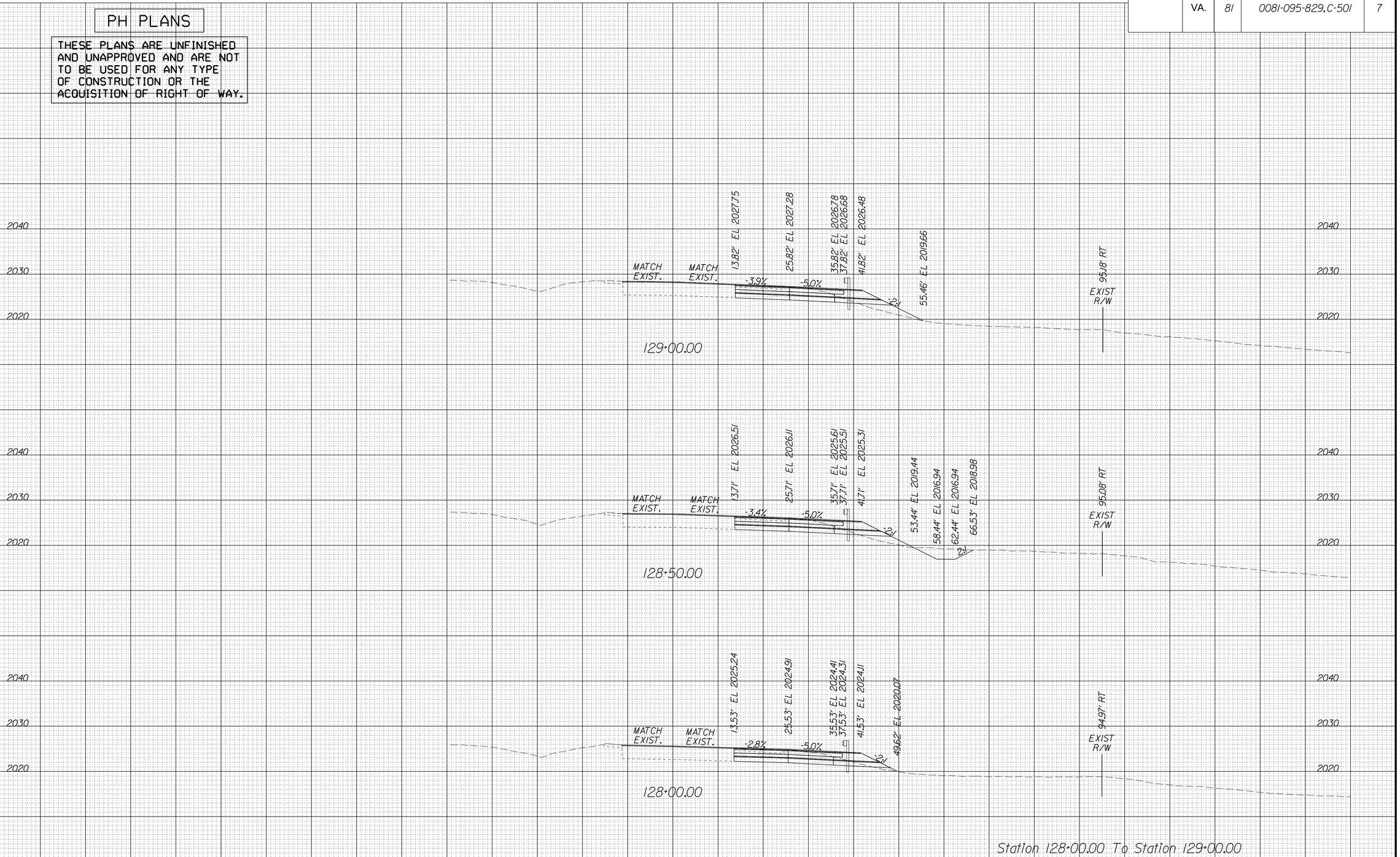
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	7

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 128+00.00 To Station 129+00.00

PROJECT	SHEET NO.
0081-095-829	7

3/12/2021
12:24:49 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

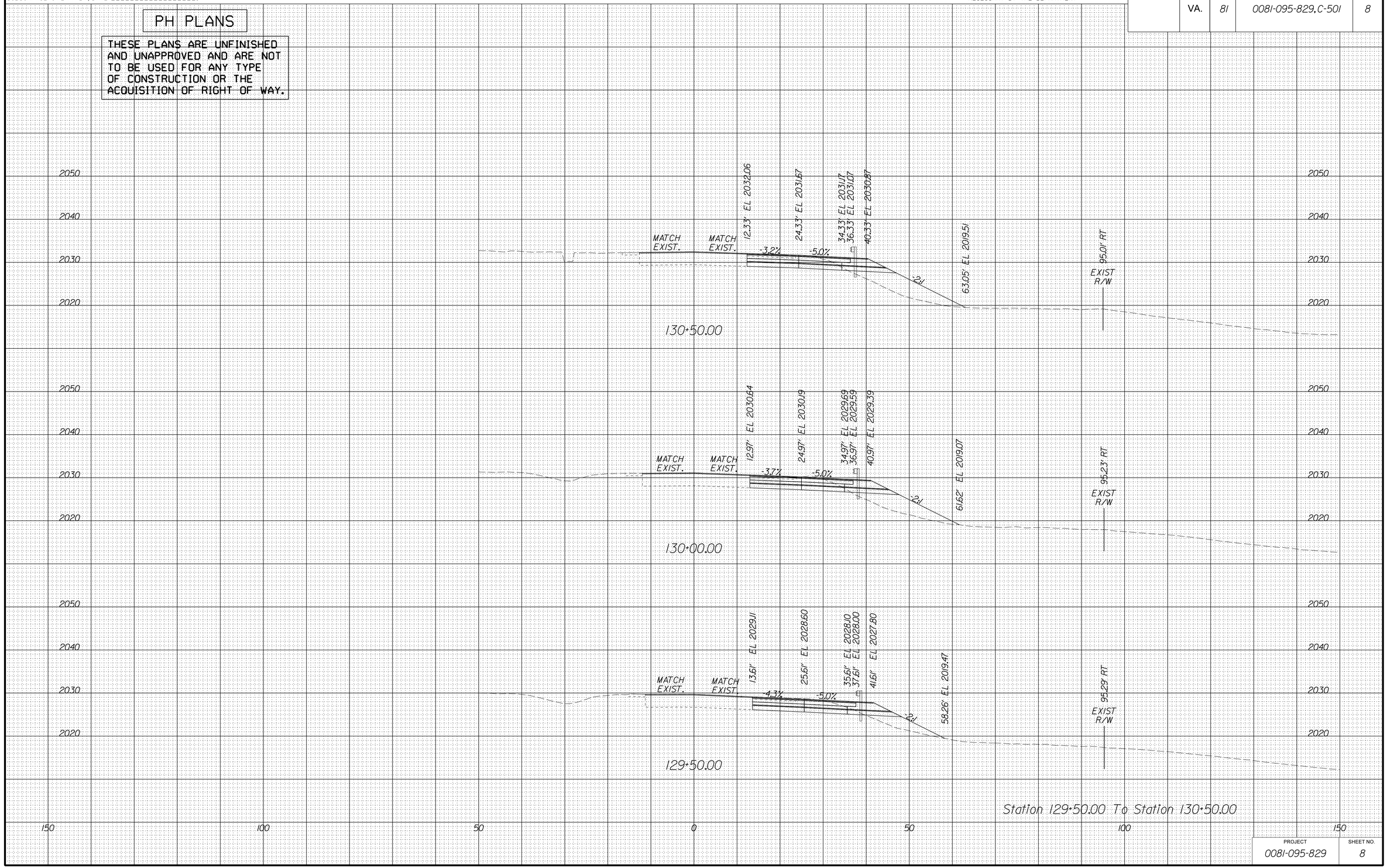
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	8

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	8

3/12/2021

12:24:53 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

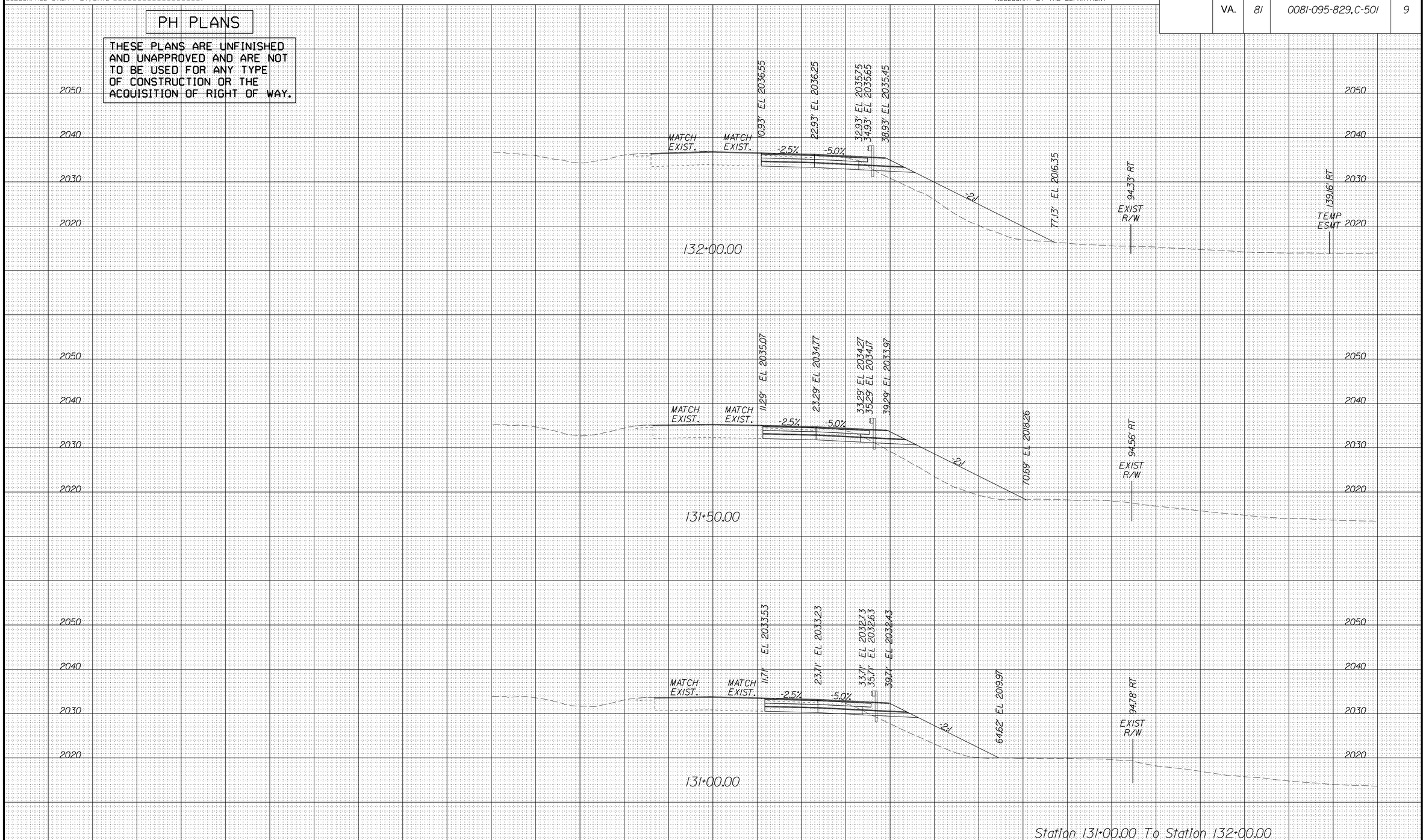
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	9

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	9

3/12/2021
12:24:55 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

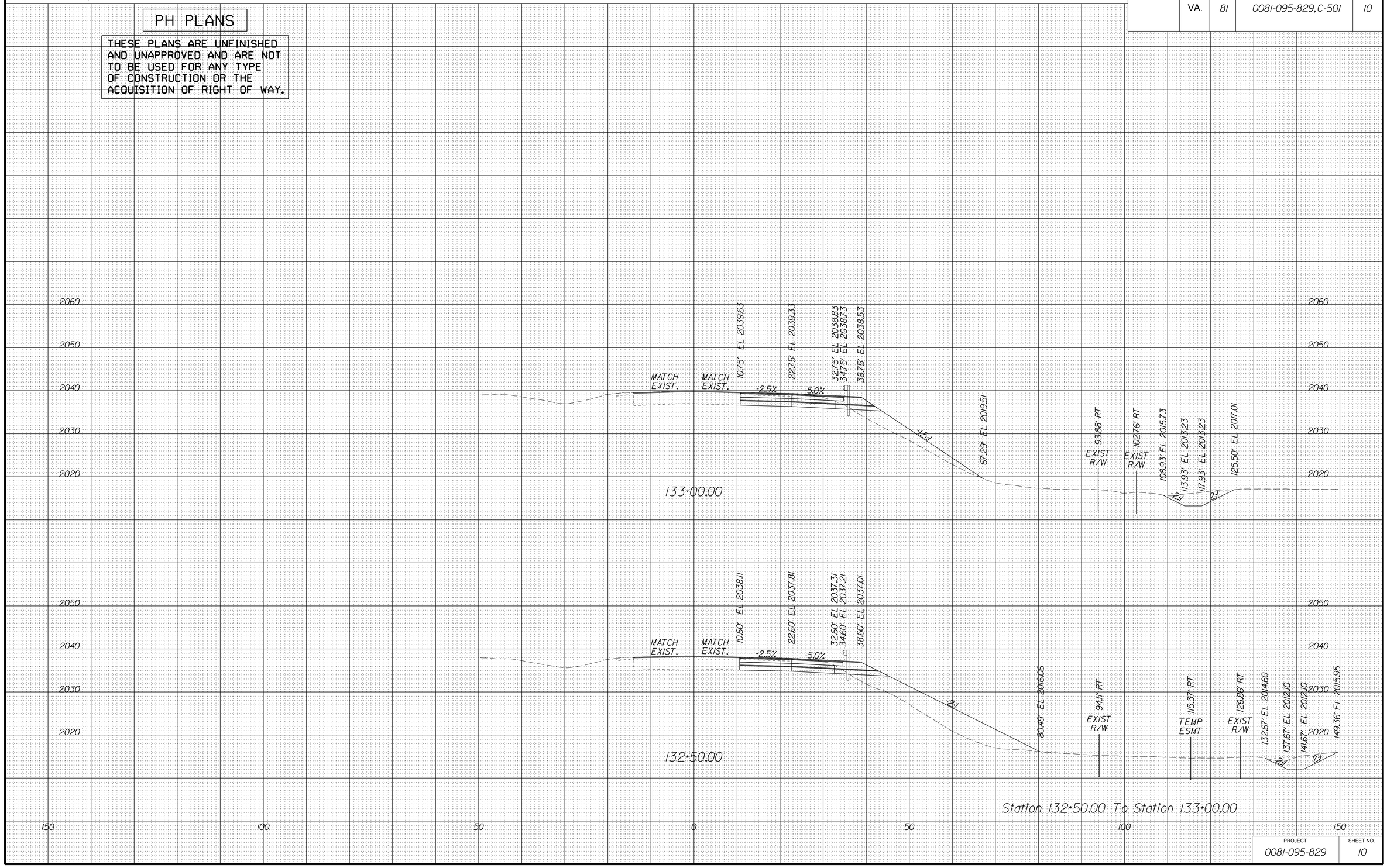
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	10

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 132+50.00 To Station 133+00.00

PROJECT	SHEET NO.
0081-095-829	10

3/12/2021
12:24:59 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

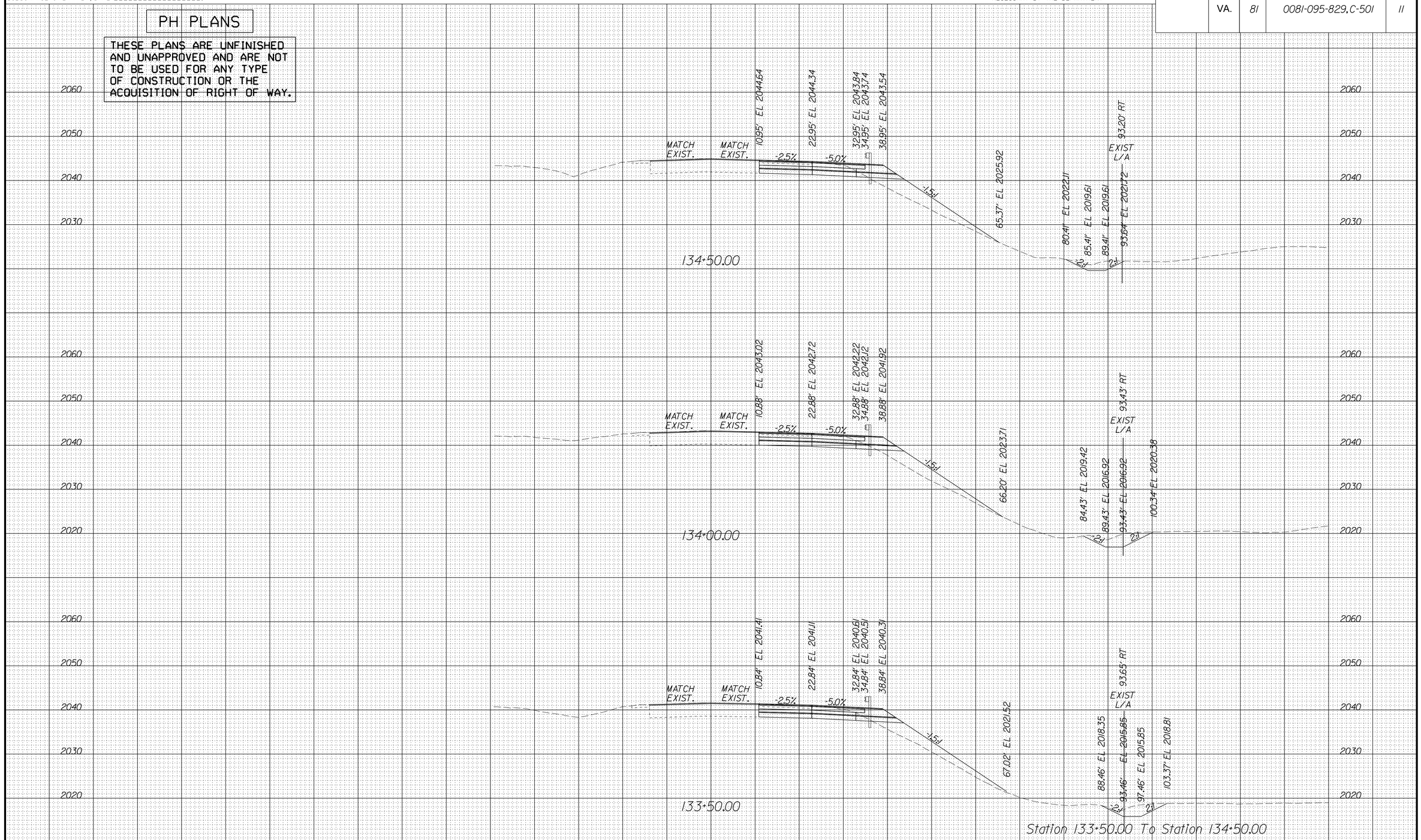
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	11

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 133+50.00 To Station 134+50.00

PROJECT	SHEET NO.
0081-095-829	11

3/12/2021

12:25:02 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

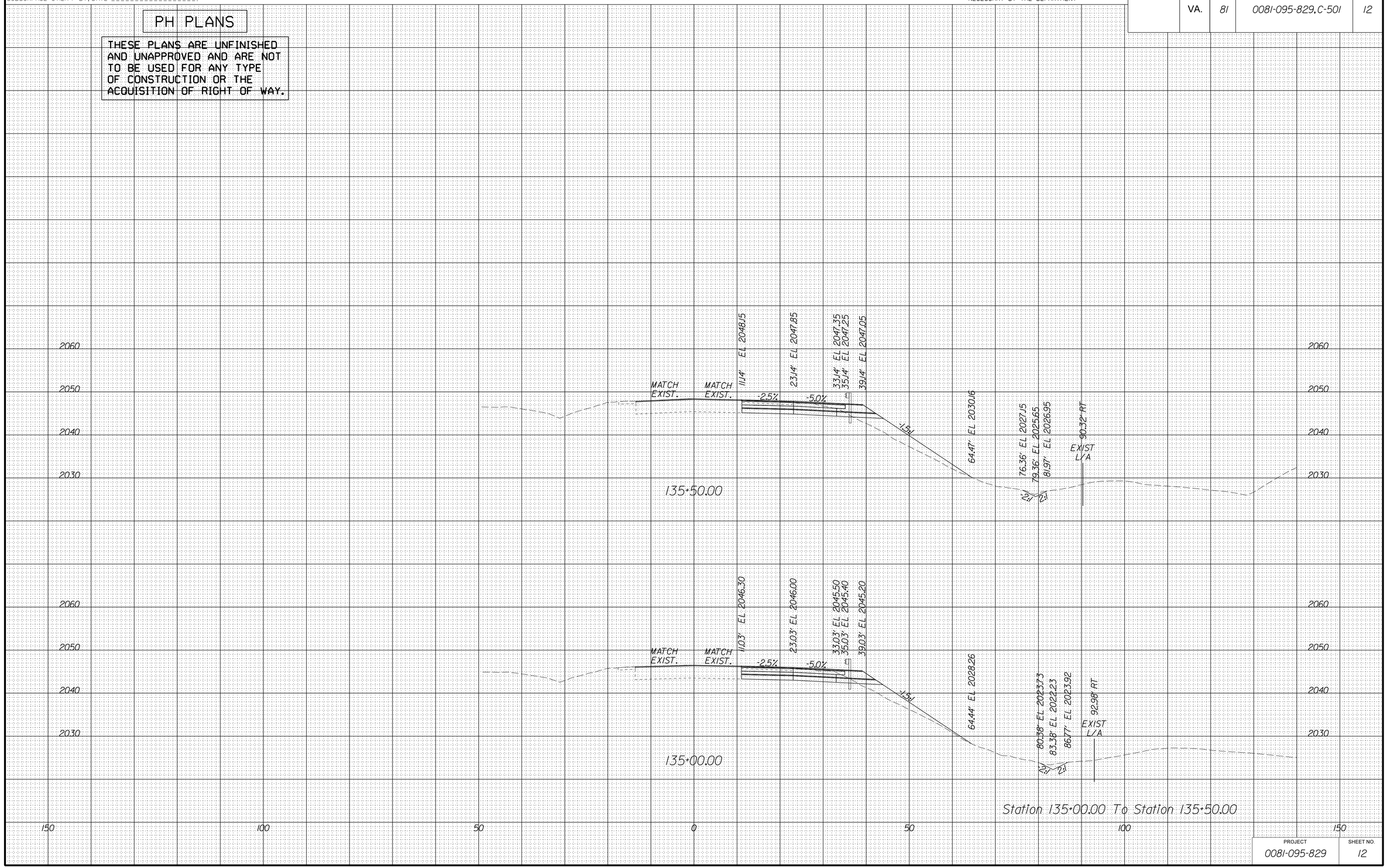
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	12

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 135+00.00 To Station 135+50.00

PROJECT	SHEET NO.
0081-095-829	12

3/12/2021
12:25:05 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

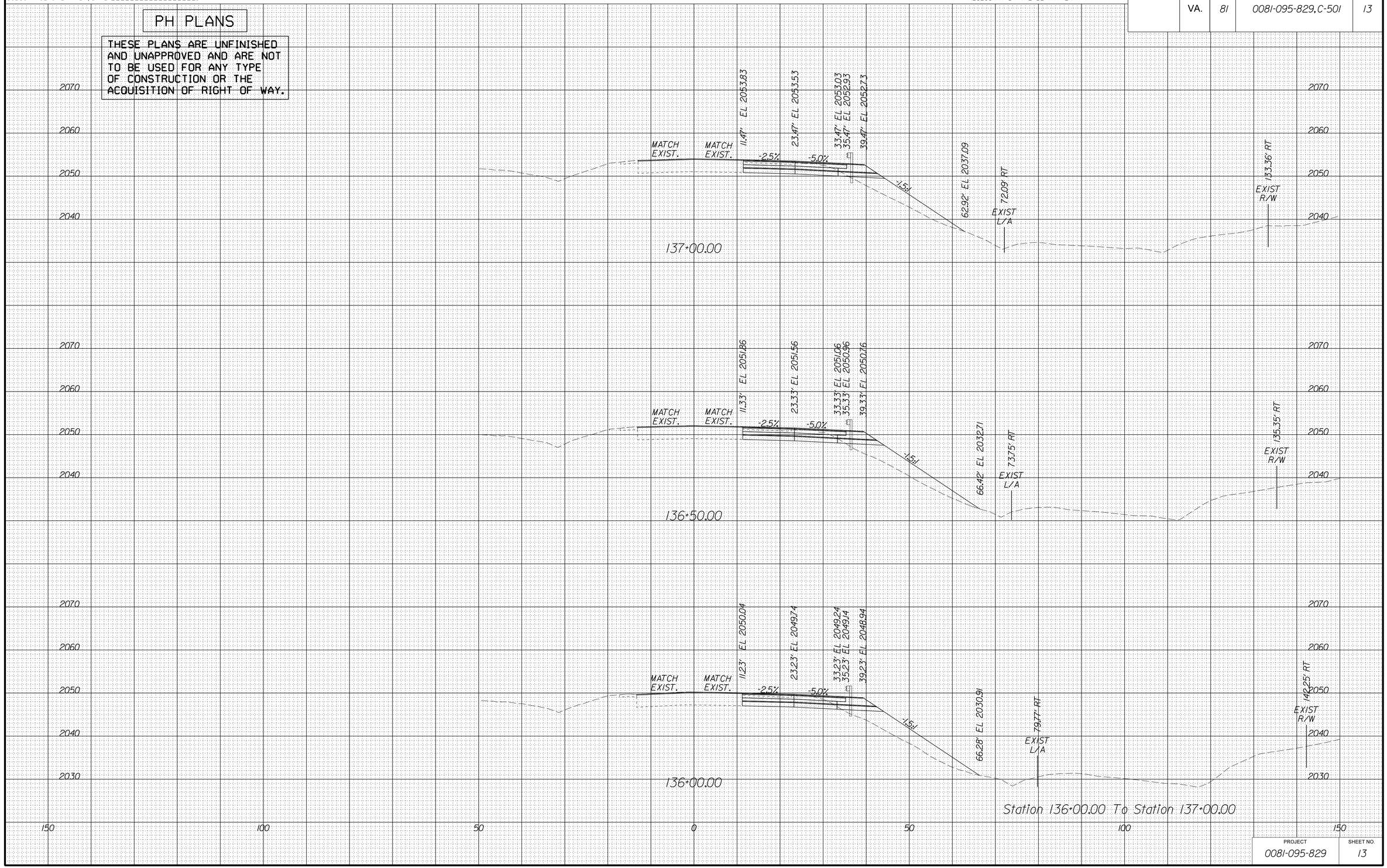
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	13

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 136+00.00 To Station 137+00.00

PROJECT	SHEET NO.
0081-095-829	13

3/12/2021

12:25:08 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

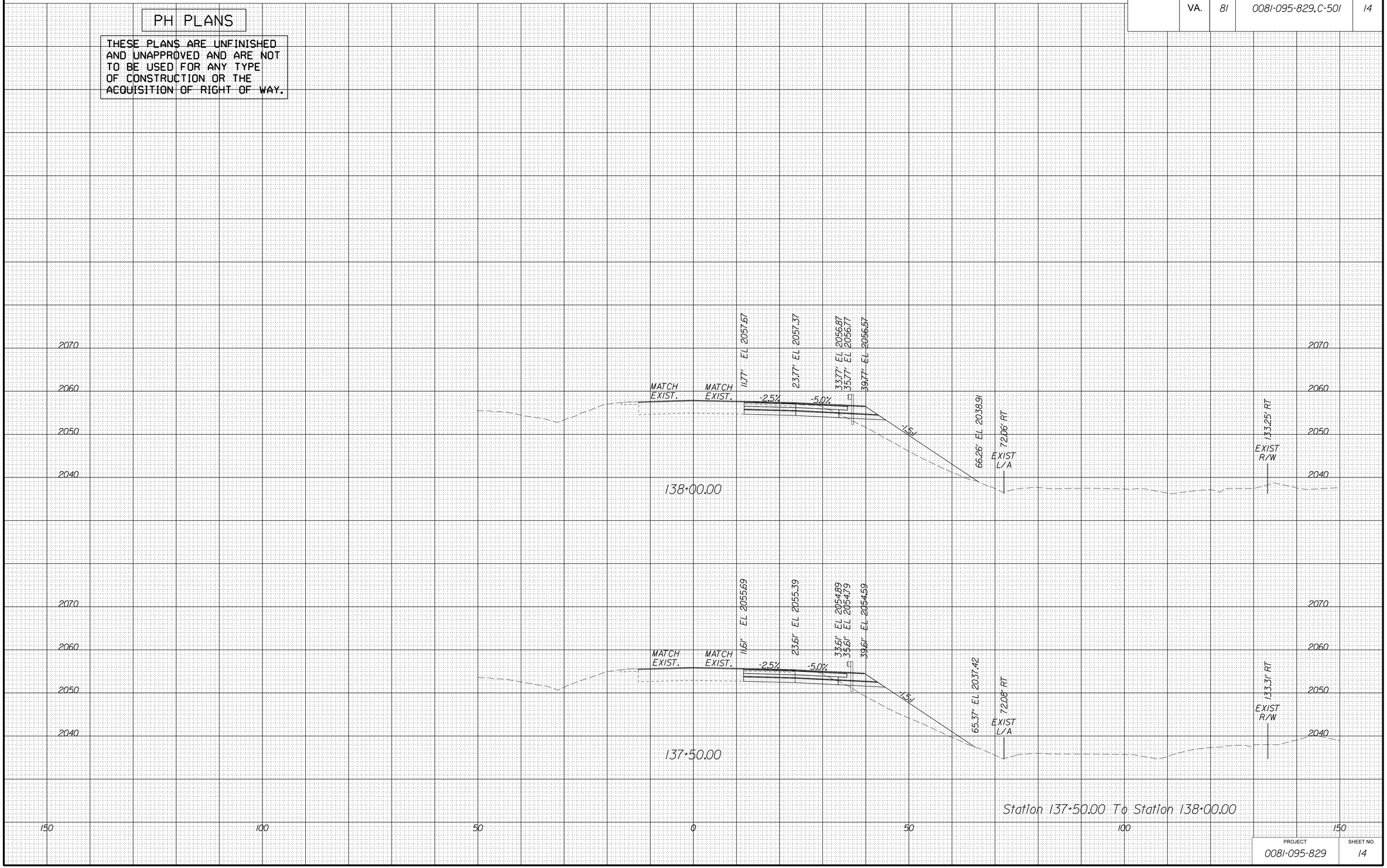
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	14

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	14

3/12/2021
12:25:11 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

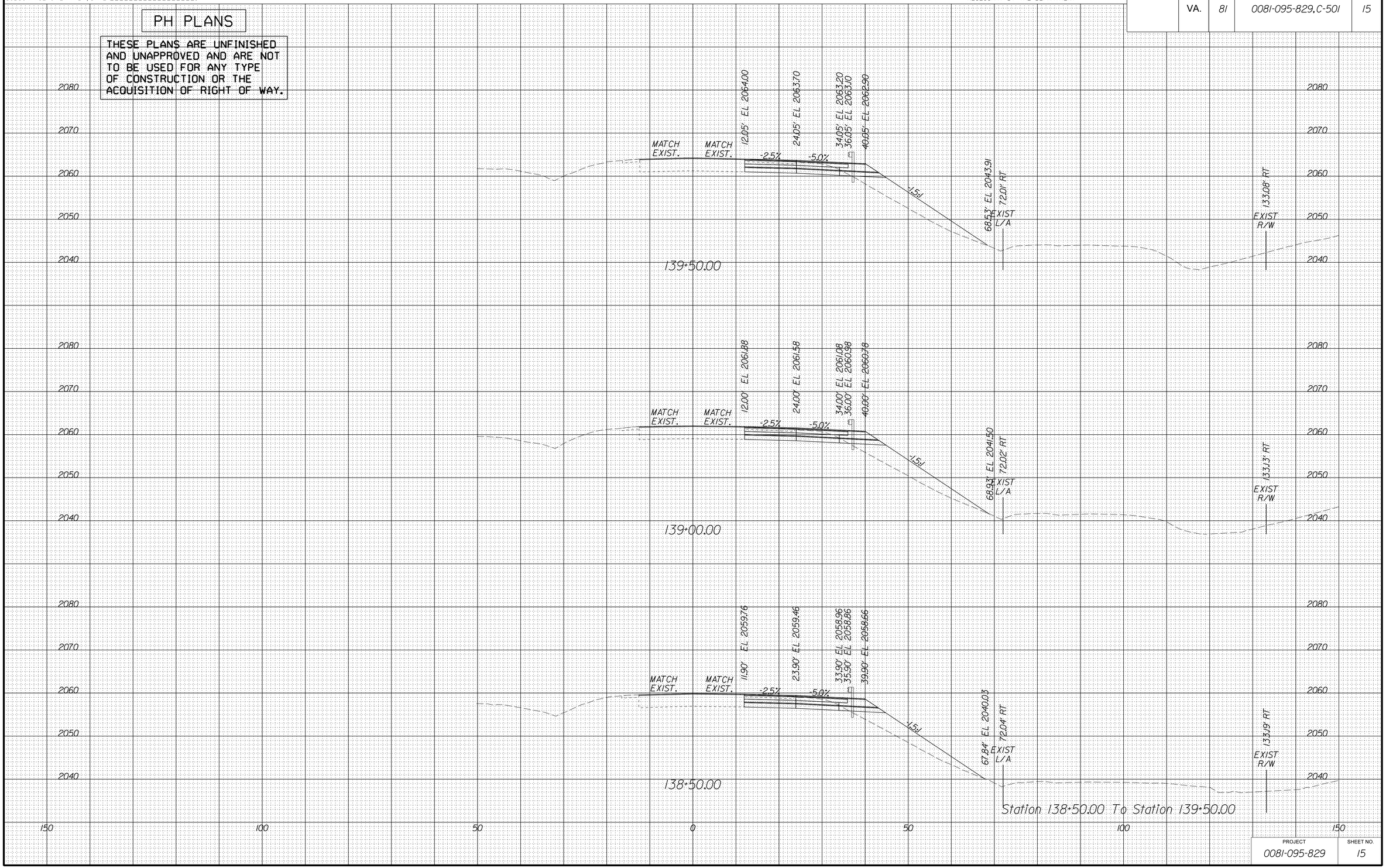
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	15

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 138+50.00 To Station 139+50.00

PROJECT	SHEET NO.
0081-095-829	15

3/12/2021
12:25:4 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

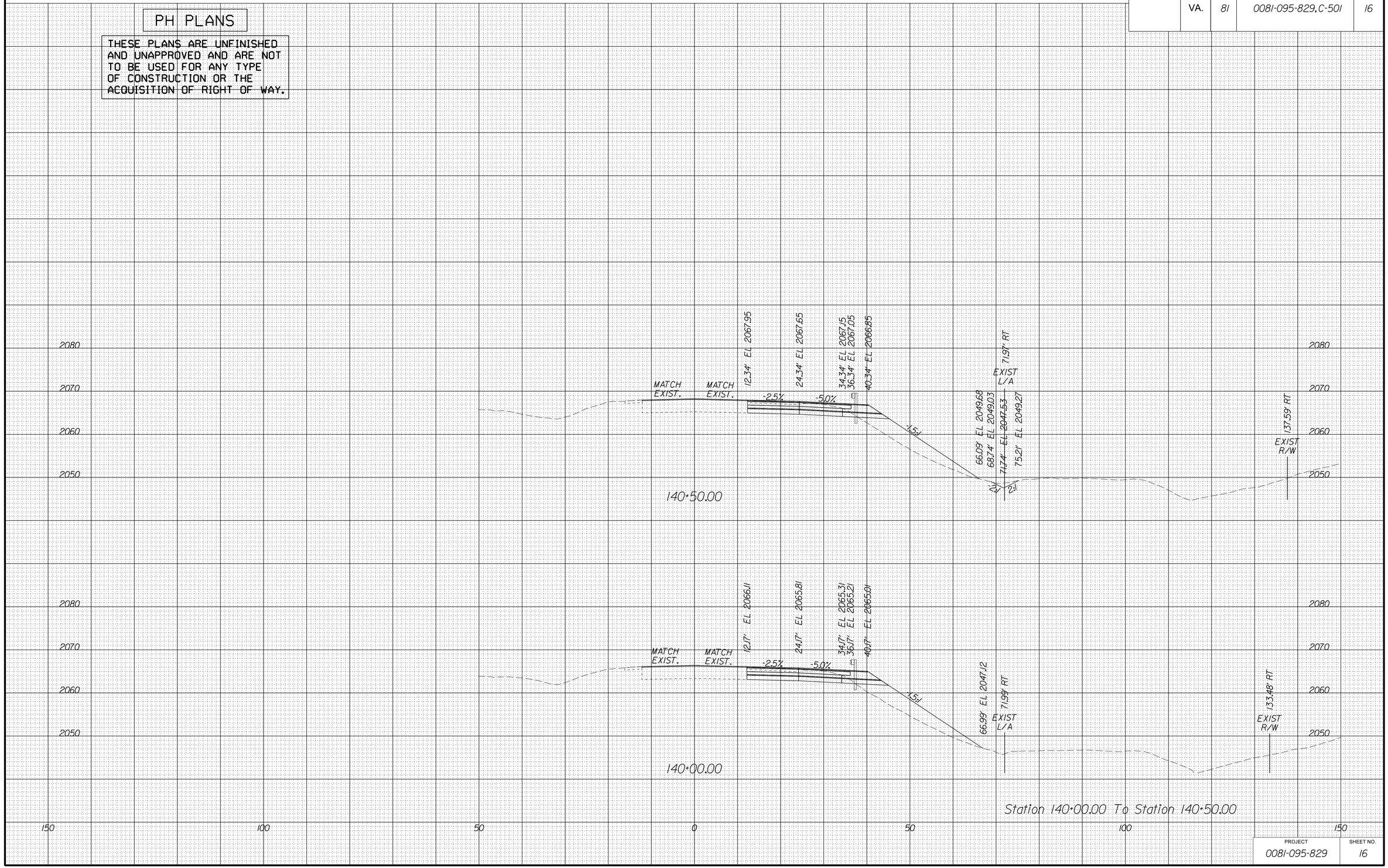
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	16

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	16

3/12/2021
12:25:17 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

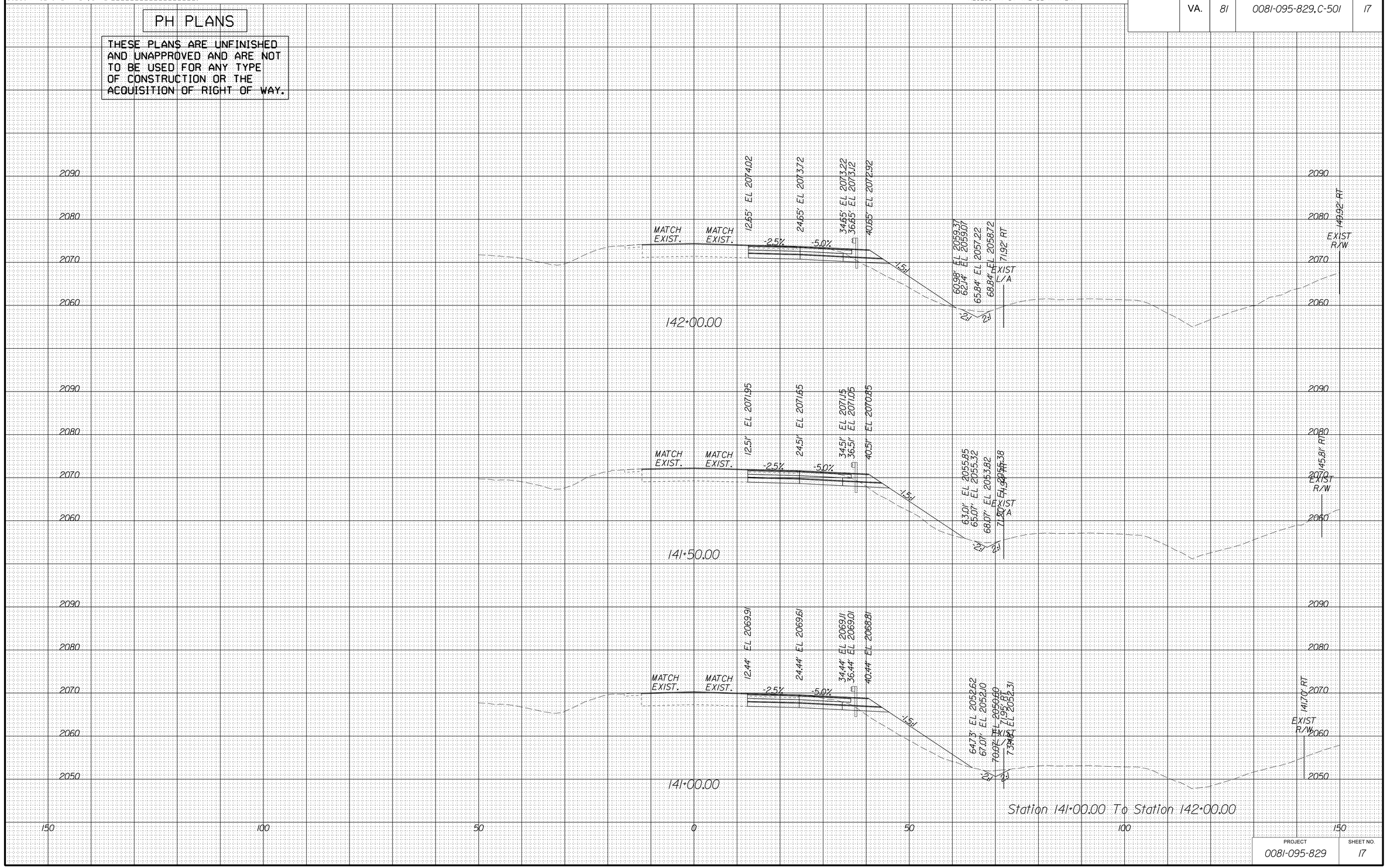
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	17

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 141+00.00 To Station 142+00.00

PROJECT	SHEET NO.
0081-095-829	17

3/12/2021
12:25:21 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

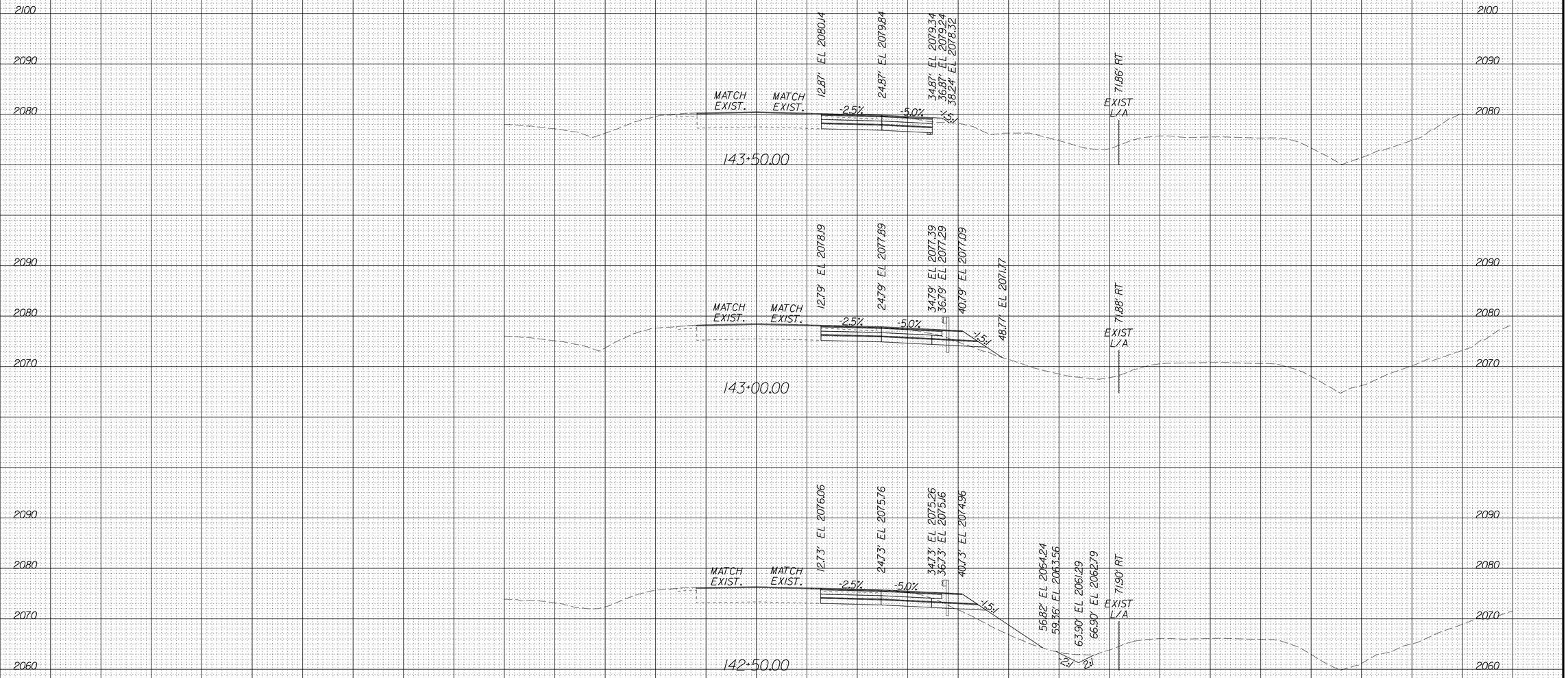
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	18

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 142+50.00 To Station 143+50.00

PROJECT	SHEET NO.
0081-095-829	18

3/12/2021
12:25:24 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

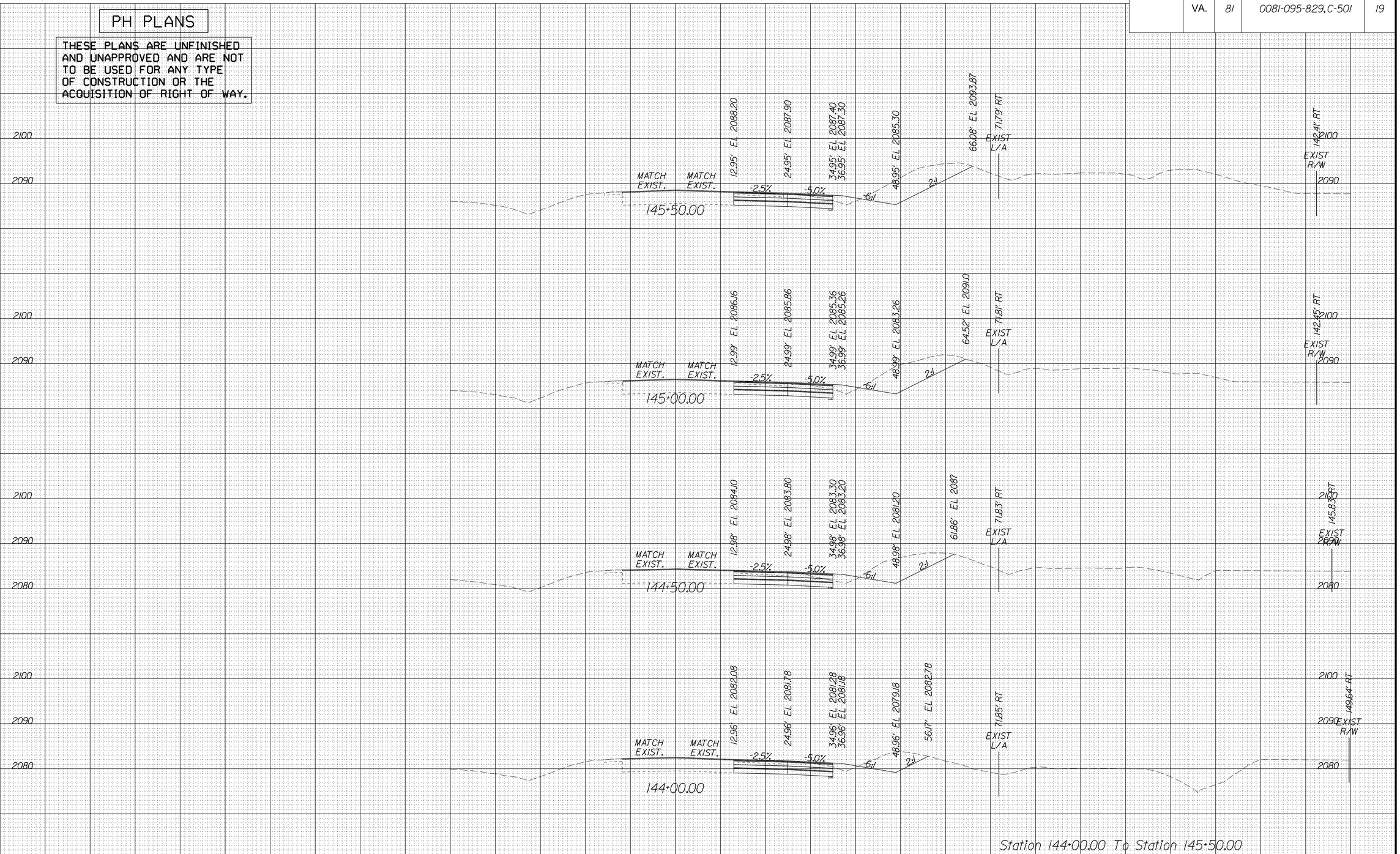
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	19

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 144+00.00 To Station 145+50.00

PROJECT	SHEET NO.
0081-095-829	19

3/12/2021
12:25:27 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

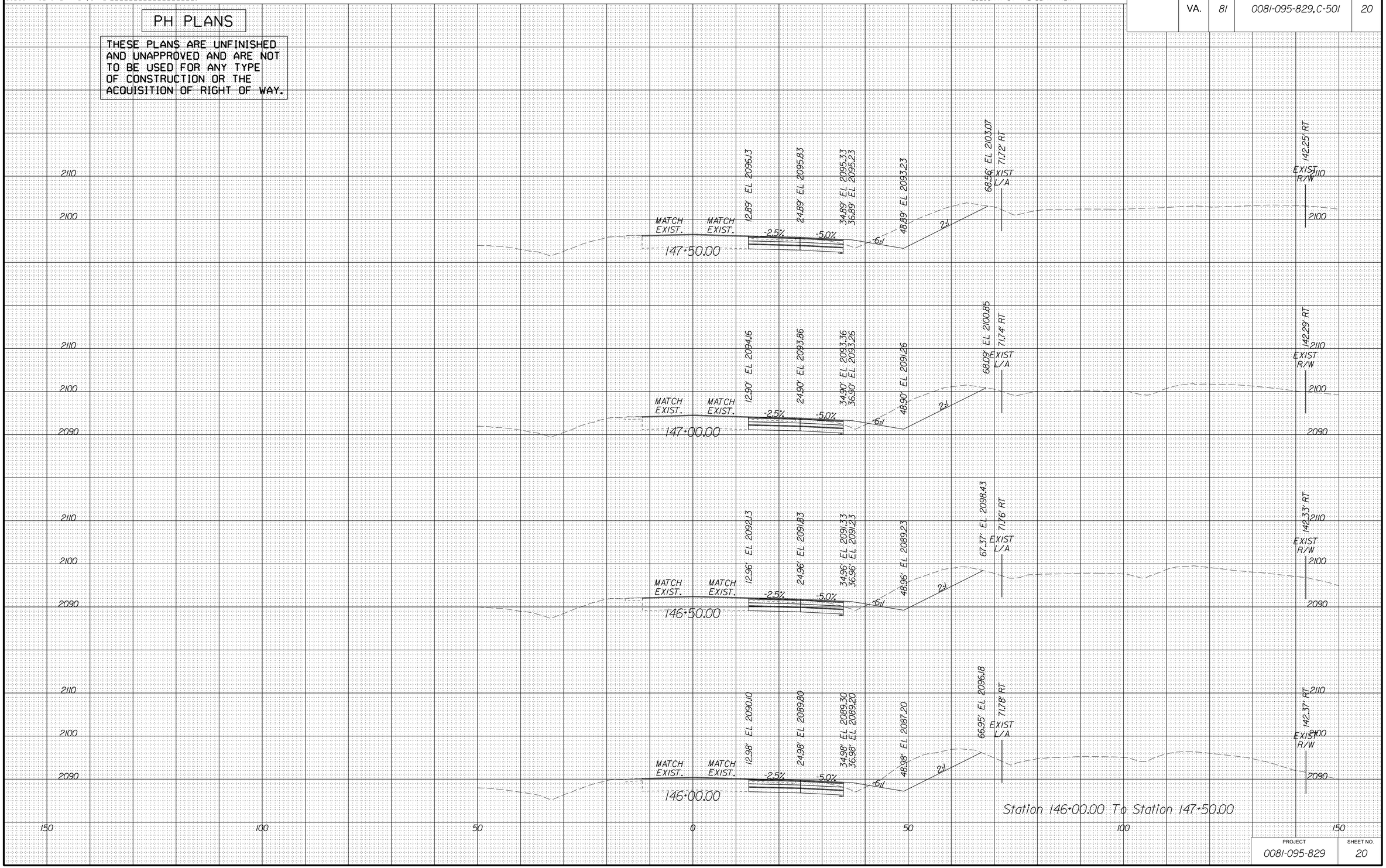
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	20

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	20

3/12/2021
12:25:30 PM

PROJECT MANAGER James, Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

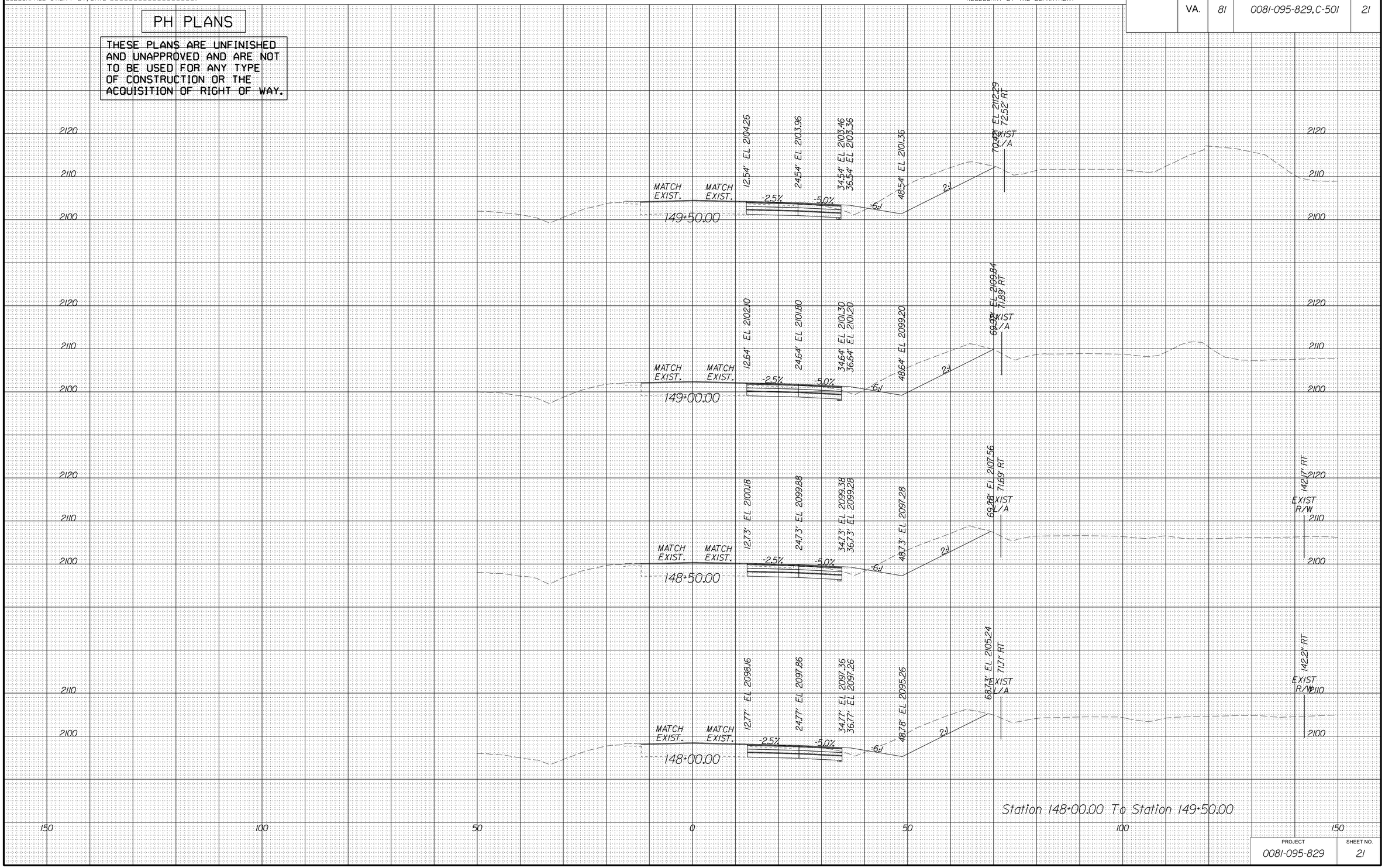
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	21

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 148+00.00 To Station 149+50.00

PROJECT	SHEET NO.
0081-095-829	21

3/12/2021

12:25:33 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

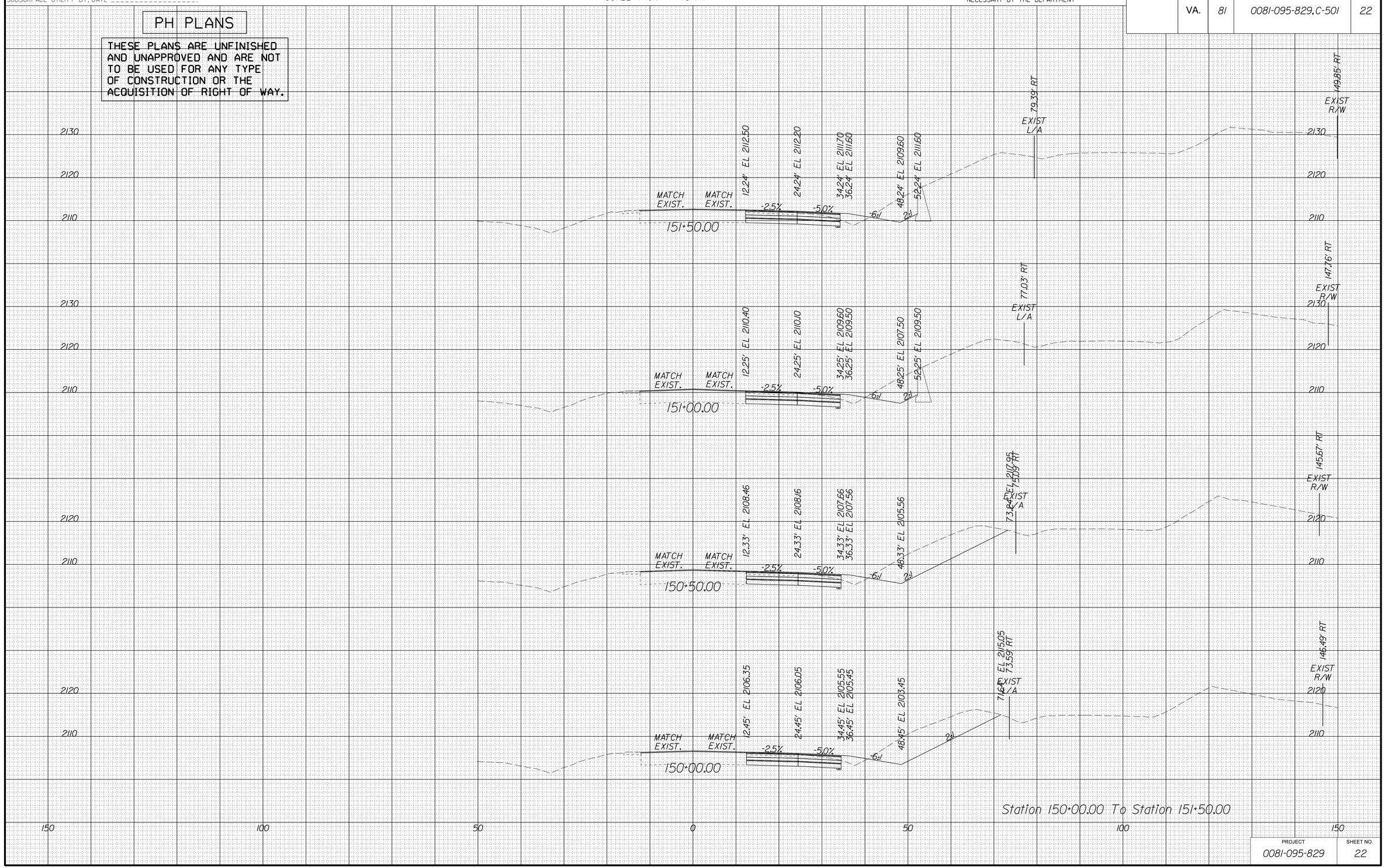
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	22

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 150+00.00 To Station 151+50.00

PROJECT	SHEET NO.
0081-095-829	22

3/12/2021
12:25:36 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

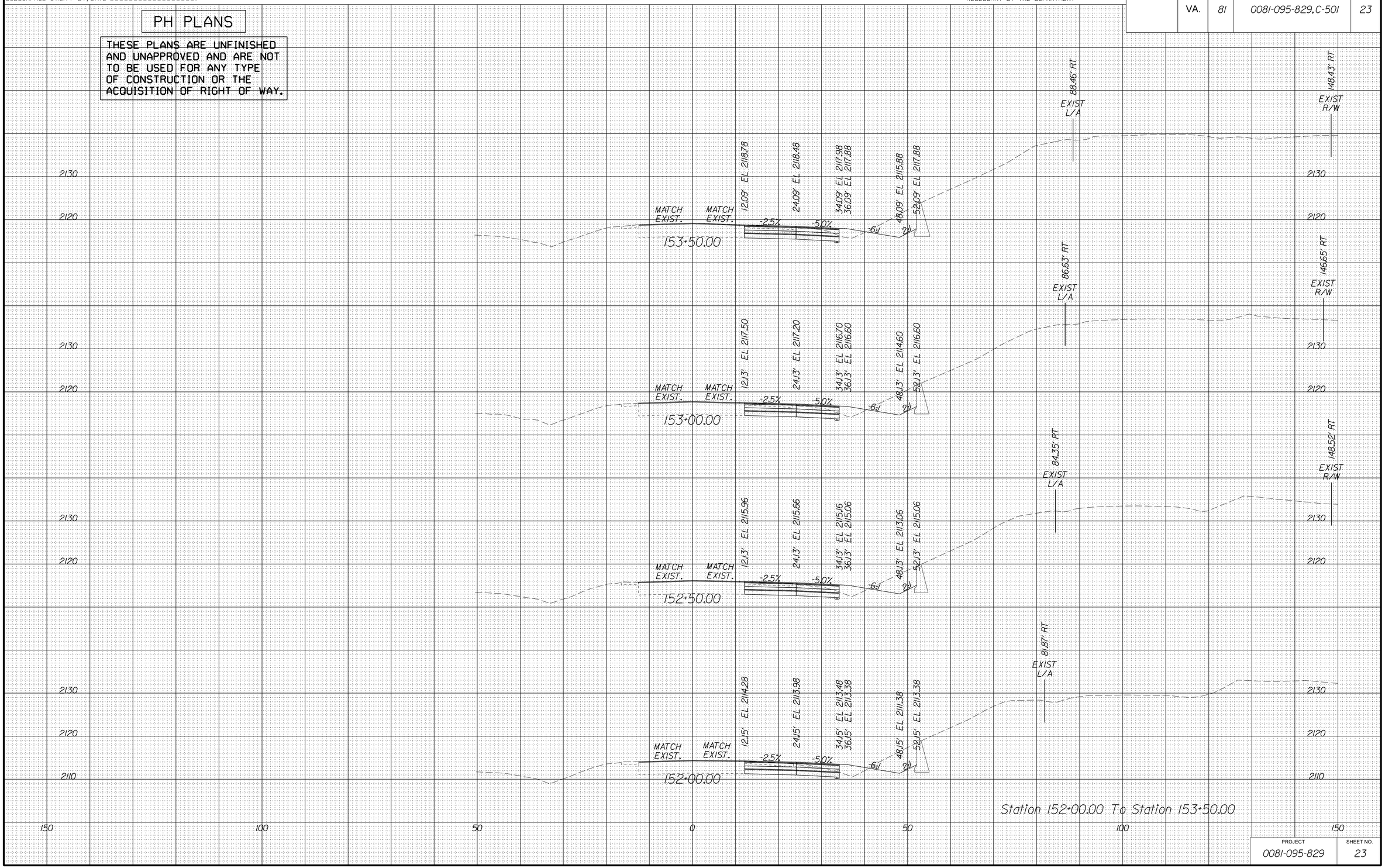
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	23

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 152+00.00 To Station 153+50.00

PROJECT	SHEET NO.
0081-095-829	23

3/12/2021

12:25:39 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

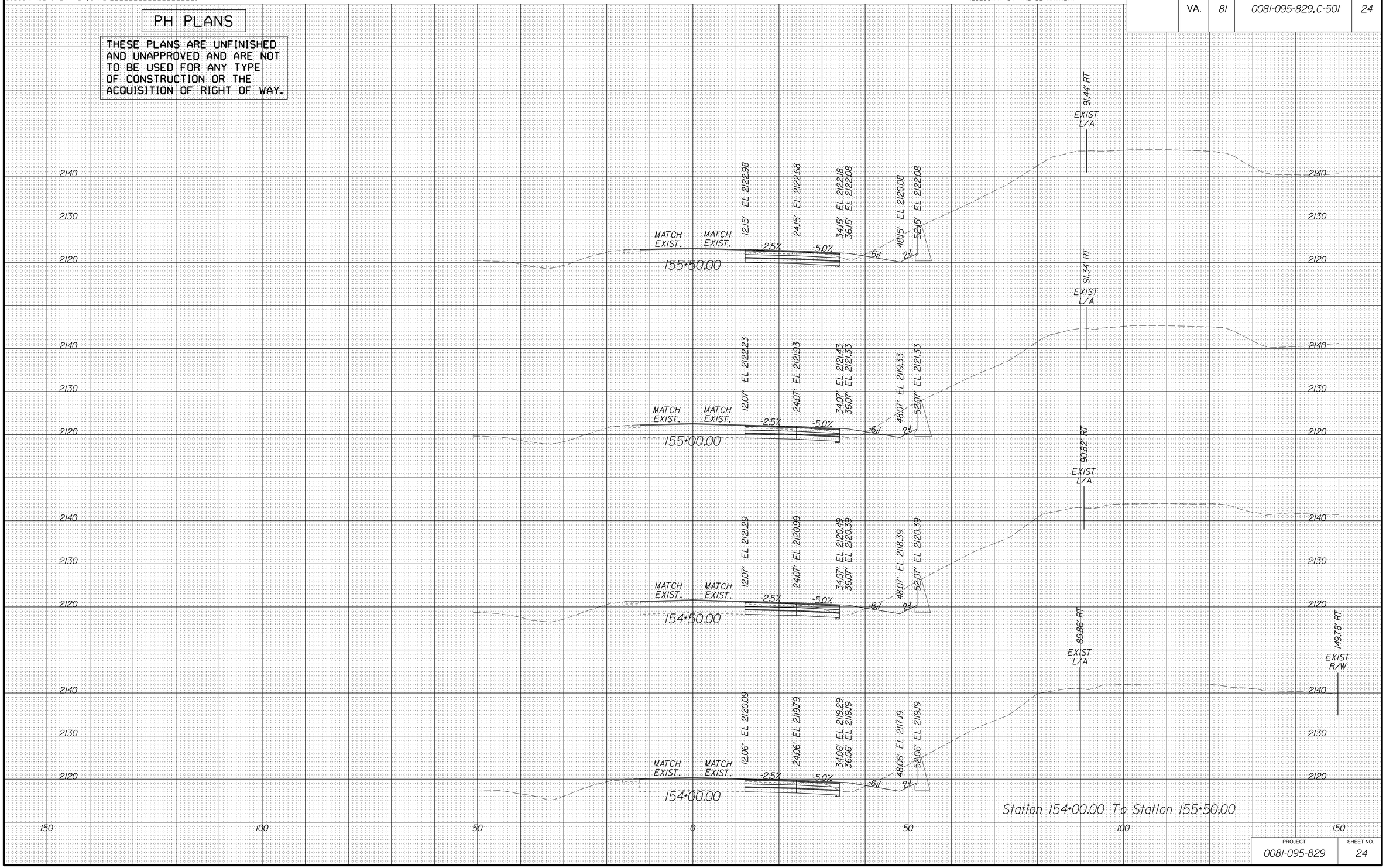
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	24

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 154+00.00 To Station 155+50.00

PROJECT	SHEET NO.
0081-095-829	24

3/12/2021
12:25:43 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara. Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

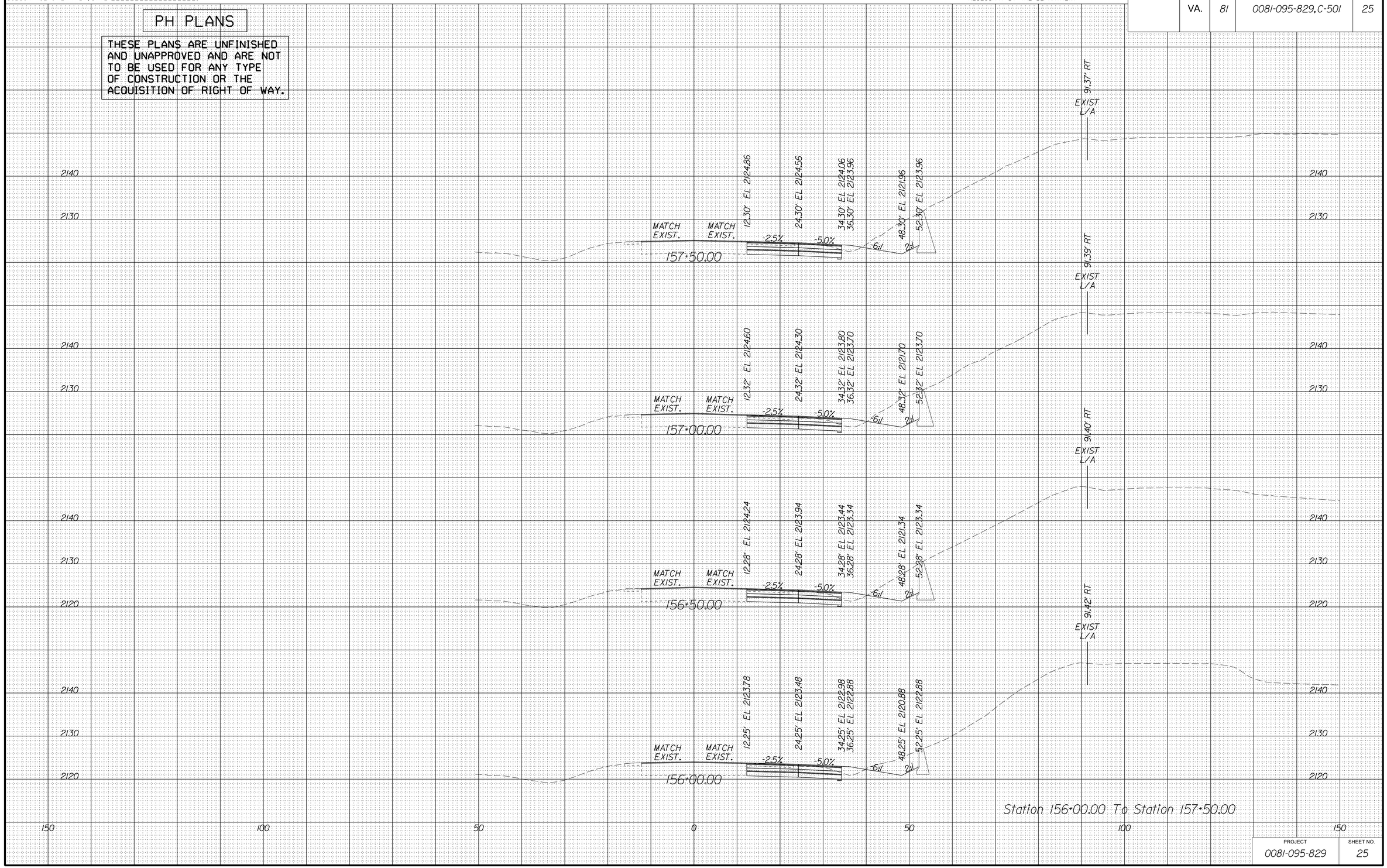
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	25

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 156+00.00 To Station 157+50.00

PROJECT	SHEET NO.
0081-095-829	25

3/12/2021
12:25:46 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

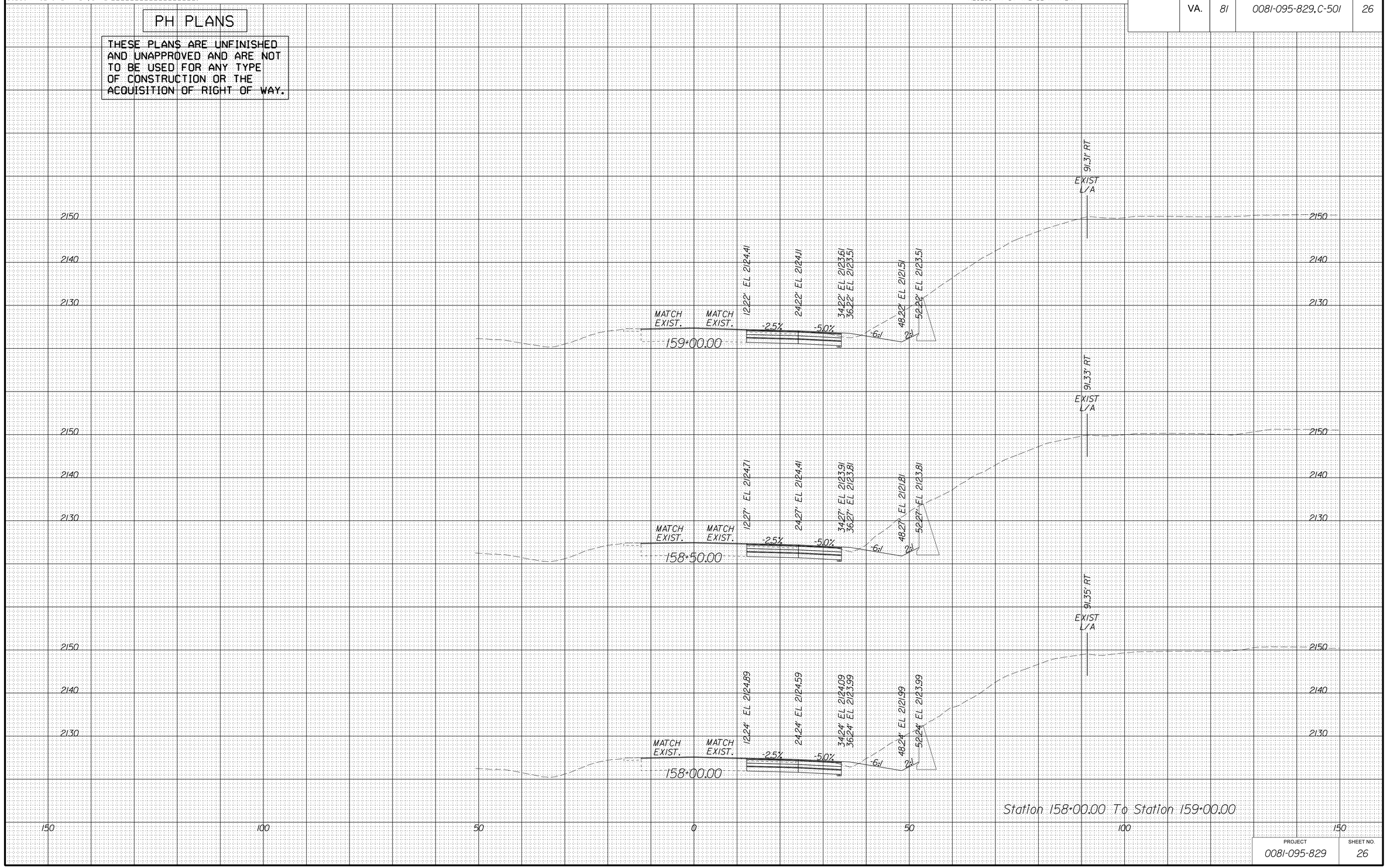
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	26

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 158+00.00 To Station 159+00.00

PROJECT	SHEET NO.
0081-095-829	26

3/12/2021
12:25:49 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

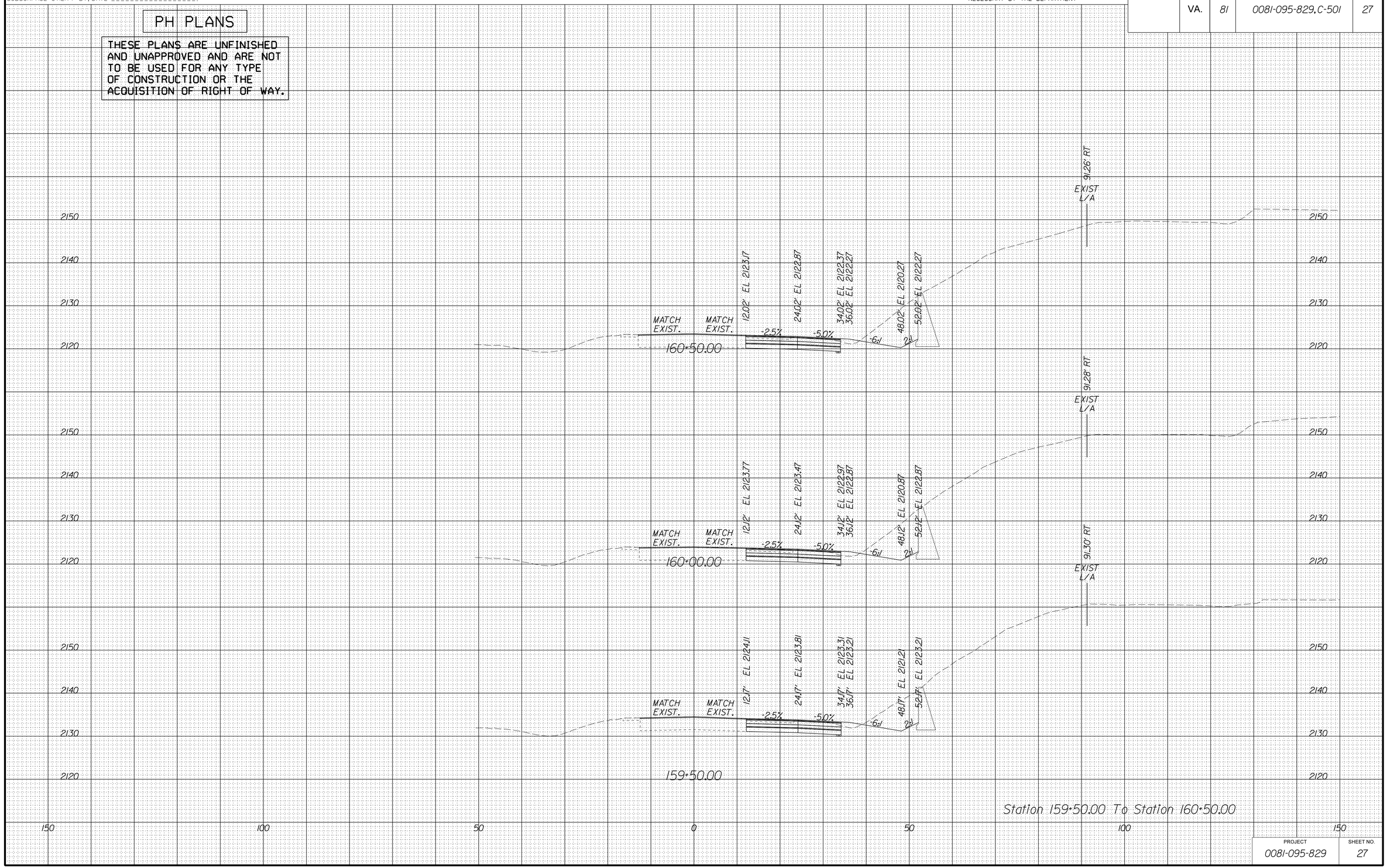
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	27

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 159+50.00 To Station 160+50.00

PROJECT	SHEET NO.
0081-095-829	27

3/12/2021
12:25:52 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

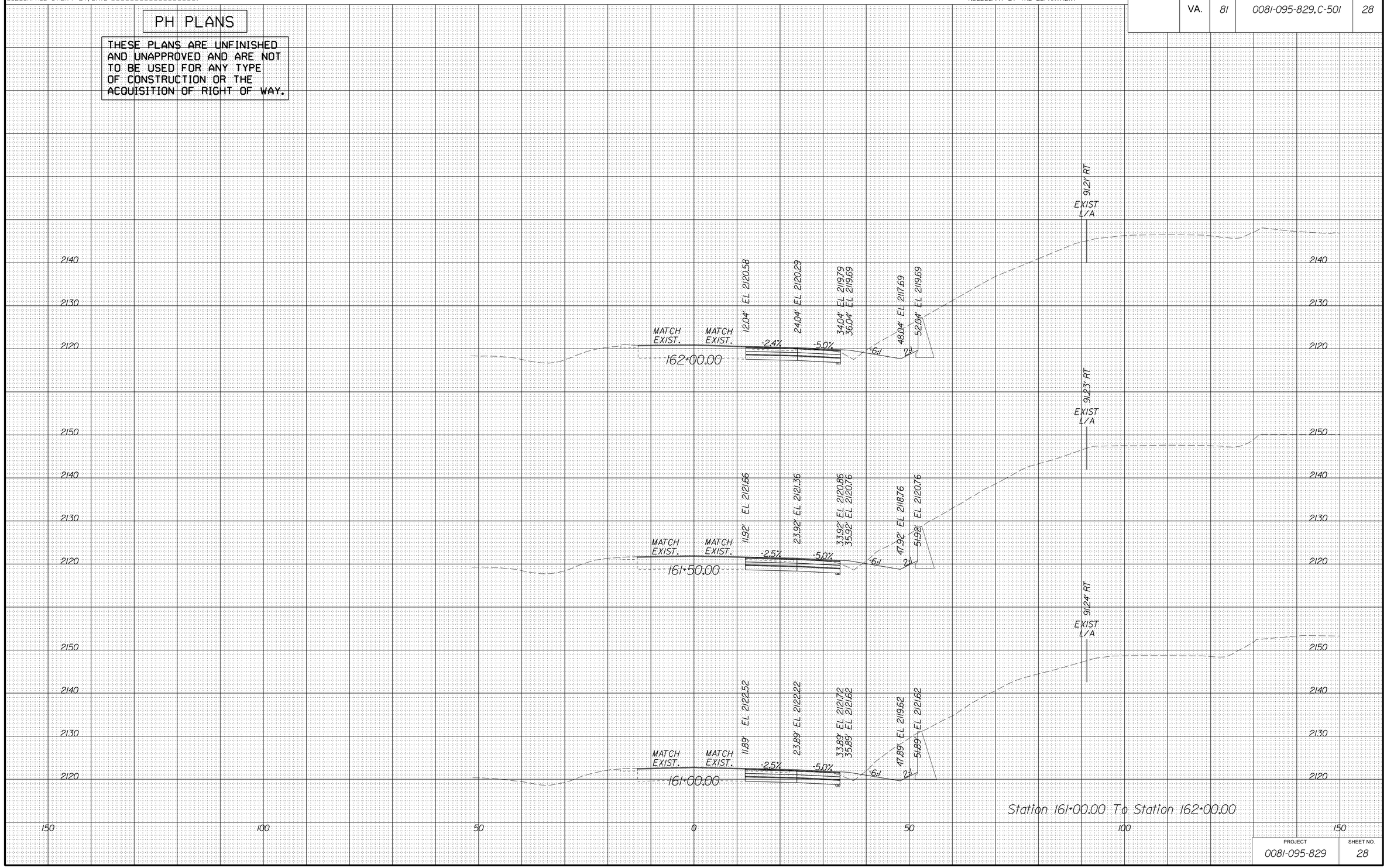
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	28

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	28

3/12/2021
12:25:56 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

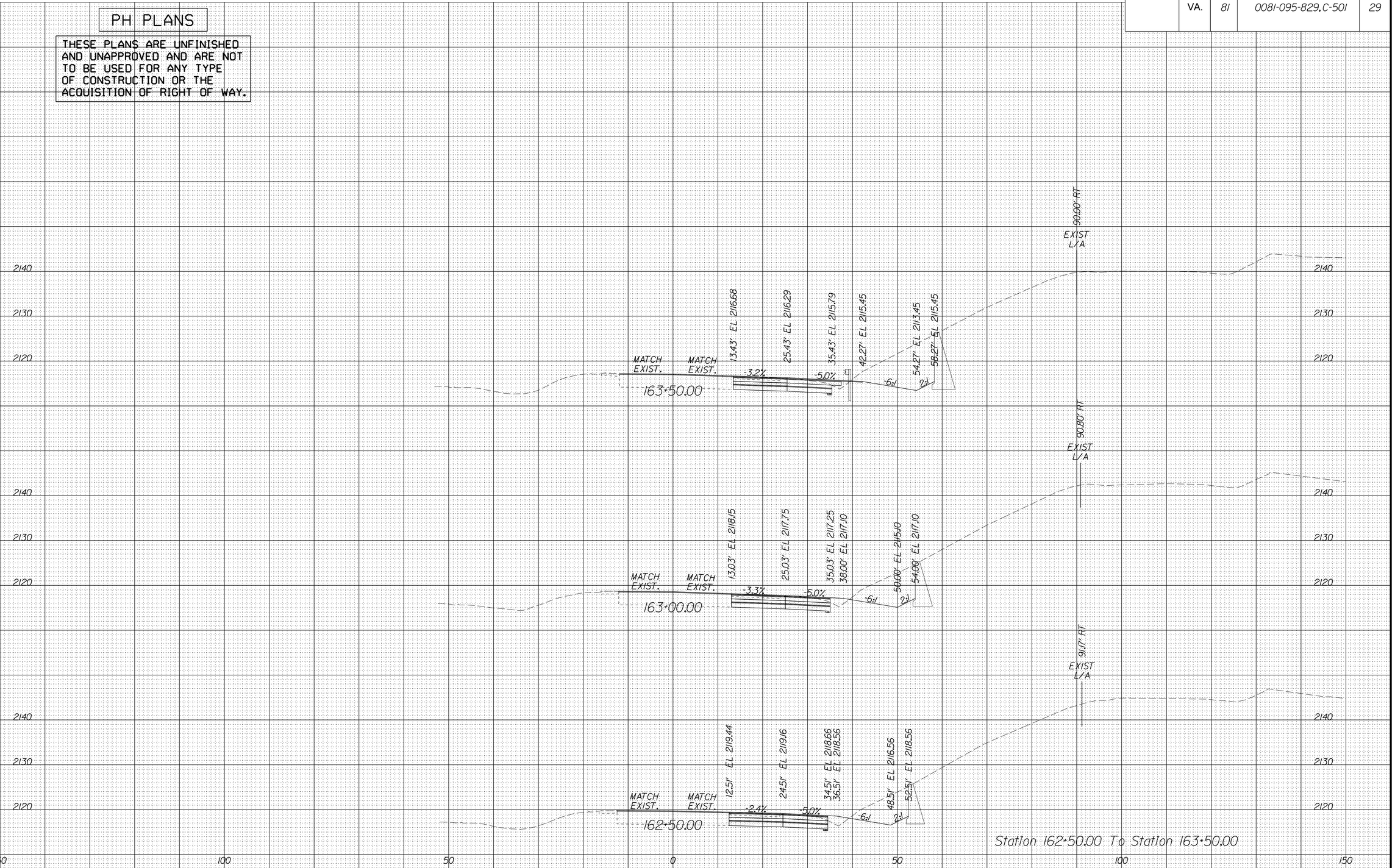
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	29

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 162+50.00 To Station 163+50.00

PROJECT	SHEET NO.
0081-095-829	29

3/12/2021
12:25:59 PM

PROJECT MANAGER James, Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

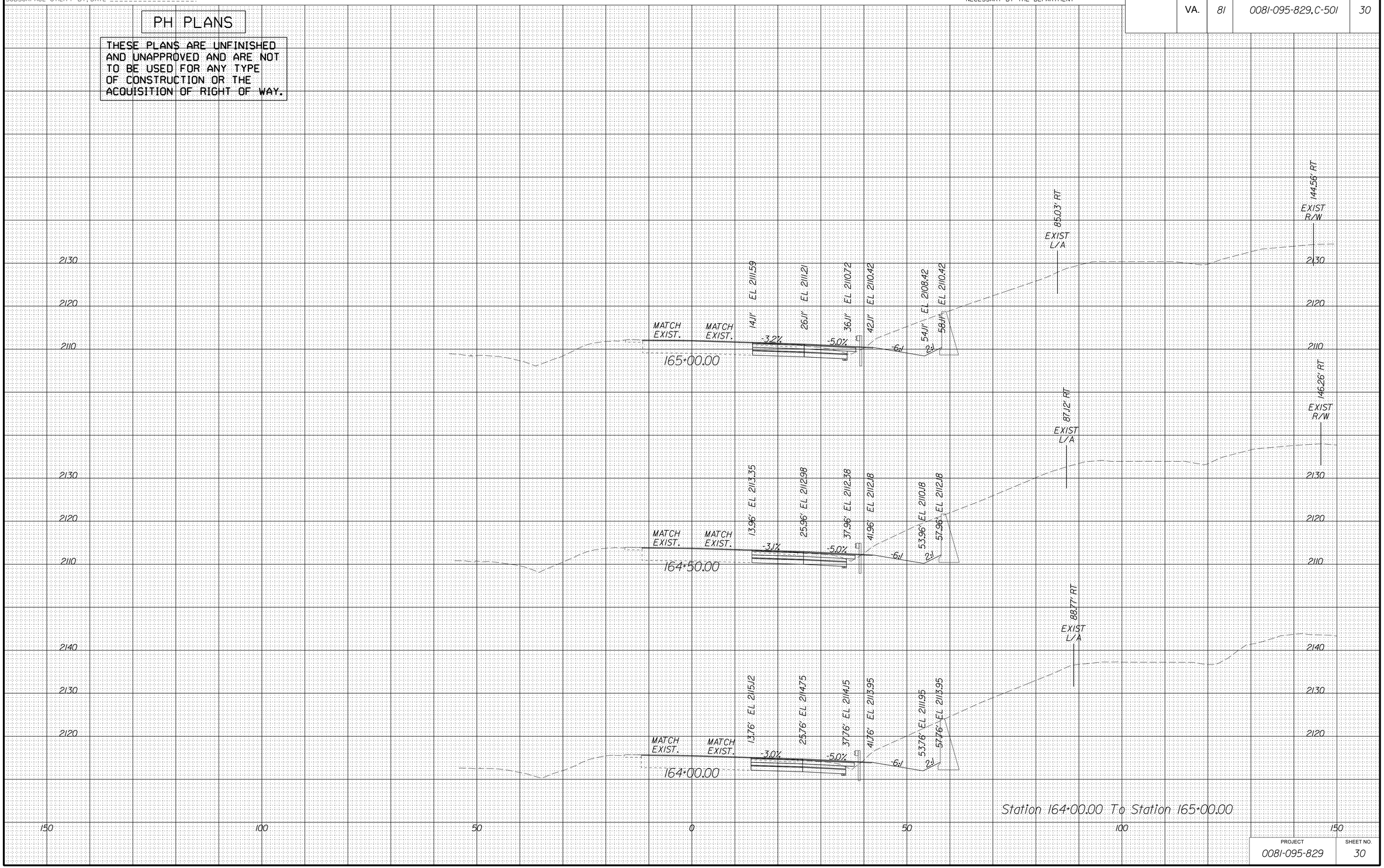
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	30

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 164+00.00 To Station 165+00.00

PROJECT	SHEET NO.
0081-095-829	30

3/12/2021
12:26:02 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019)
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol)
SUBSURFACE UTILITY BY, DATE _____

CROSS SECTIONS

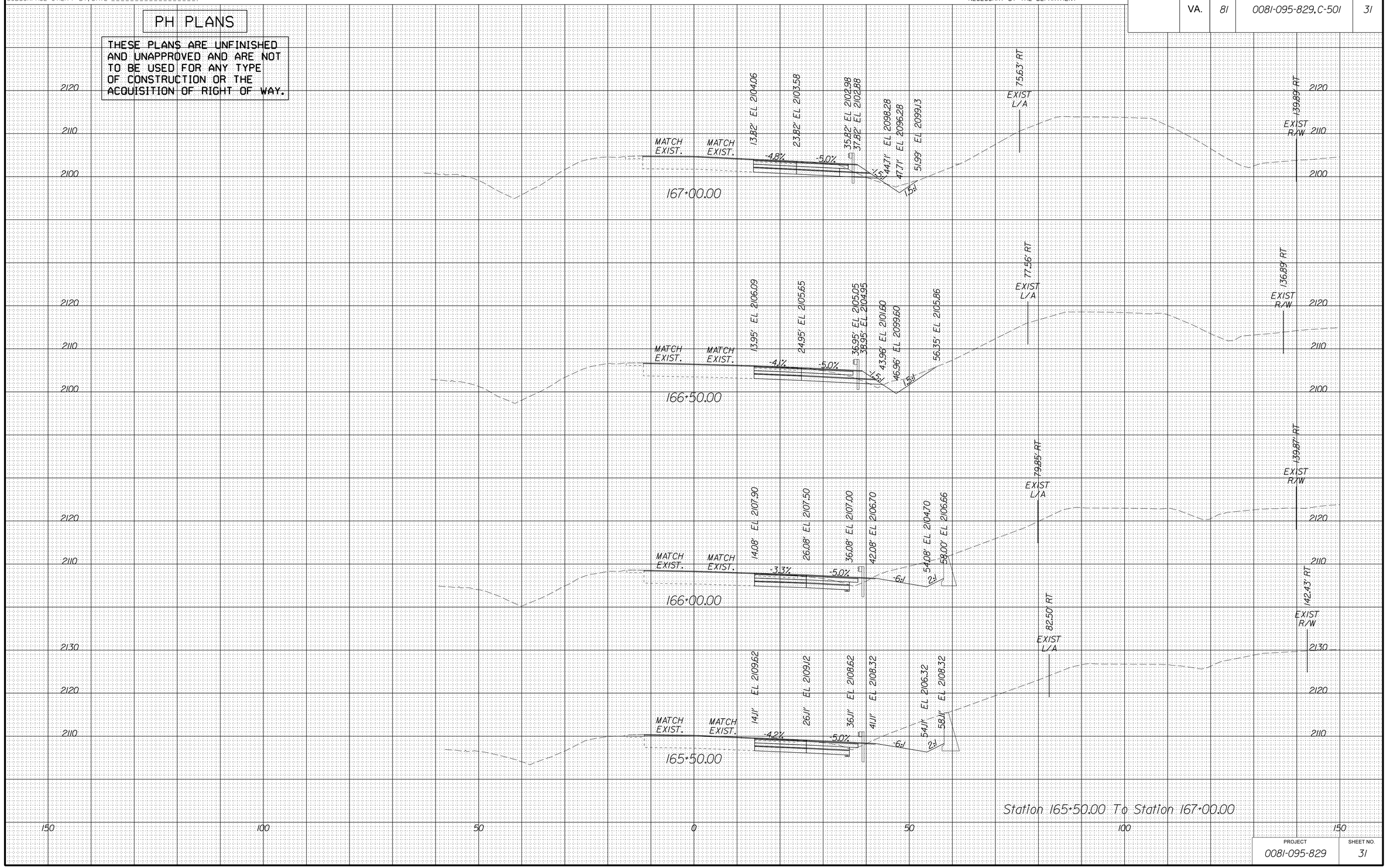
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	31

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 165+50.00 To Station 167+00.00

PROJECT	SHEET NO.
0081-095-829	31

3/12/2021
12:26:05 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

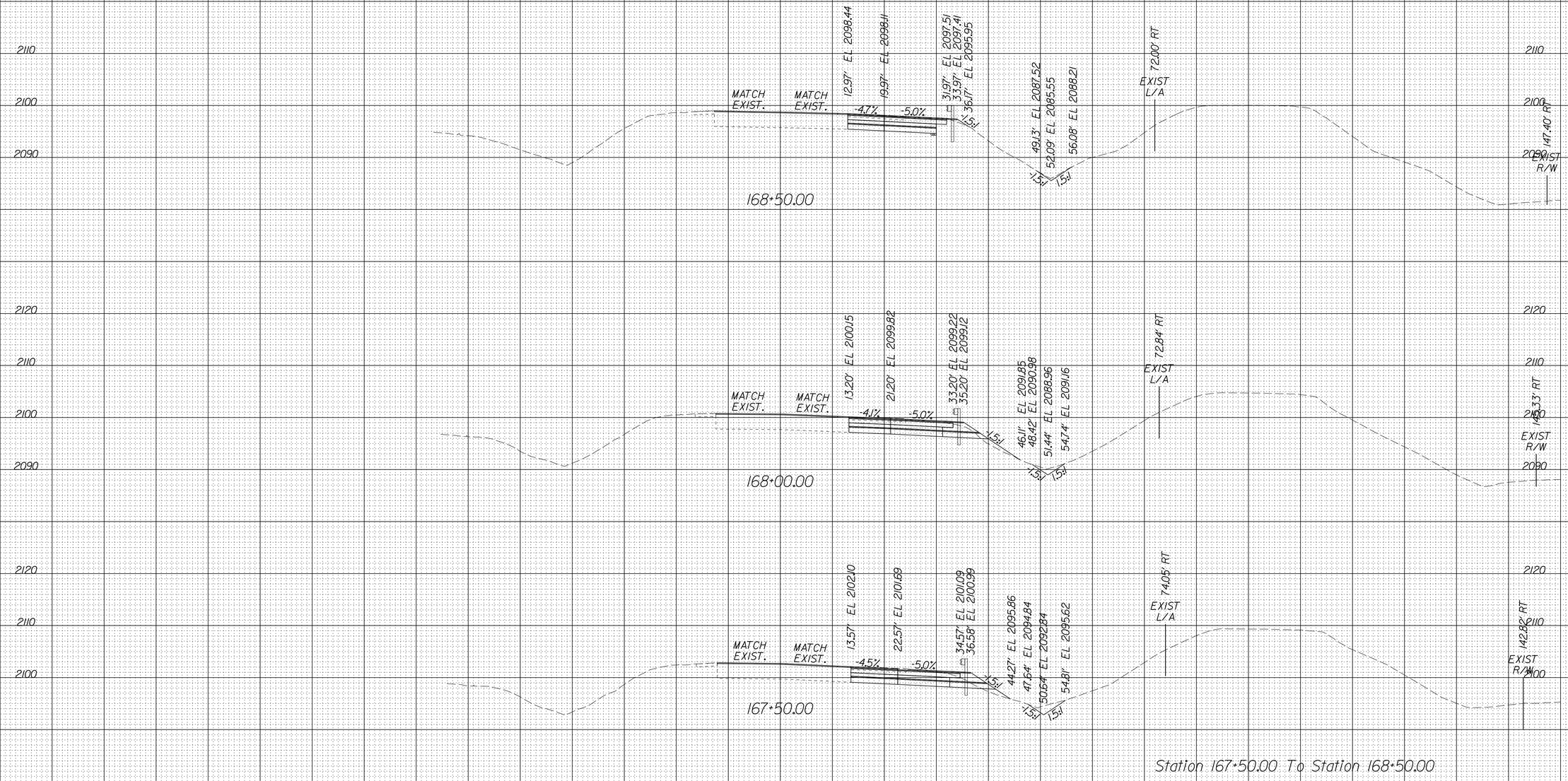
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	32

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 167+50.00 To Station 168+50.00

PROJECT	SHEET NO.
0081-095-829	32

3/12/2021
12:26:08 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

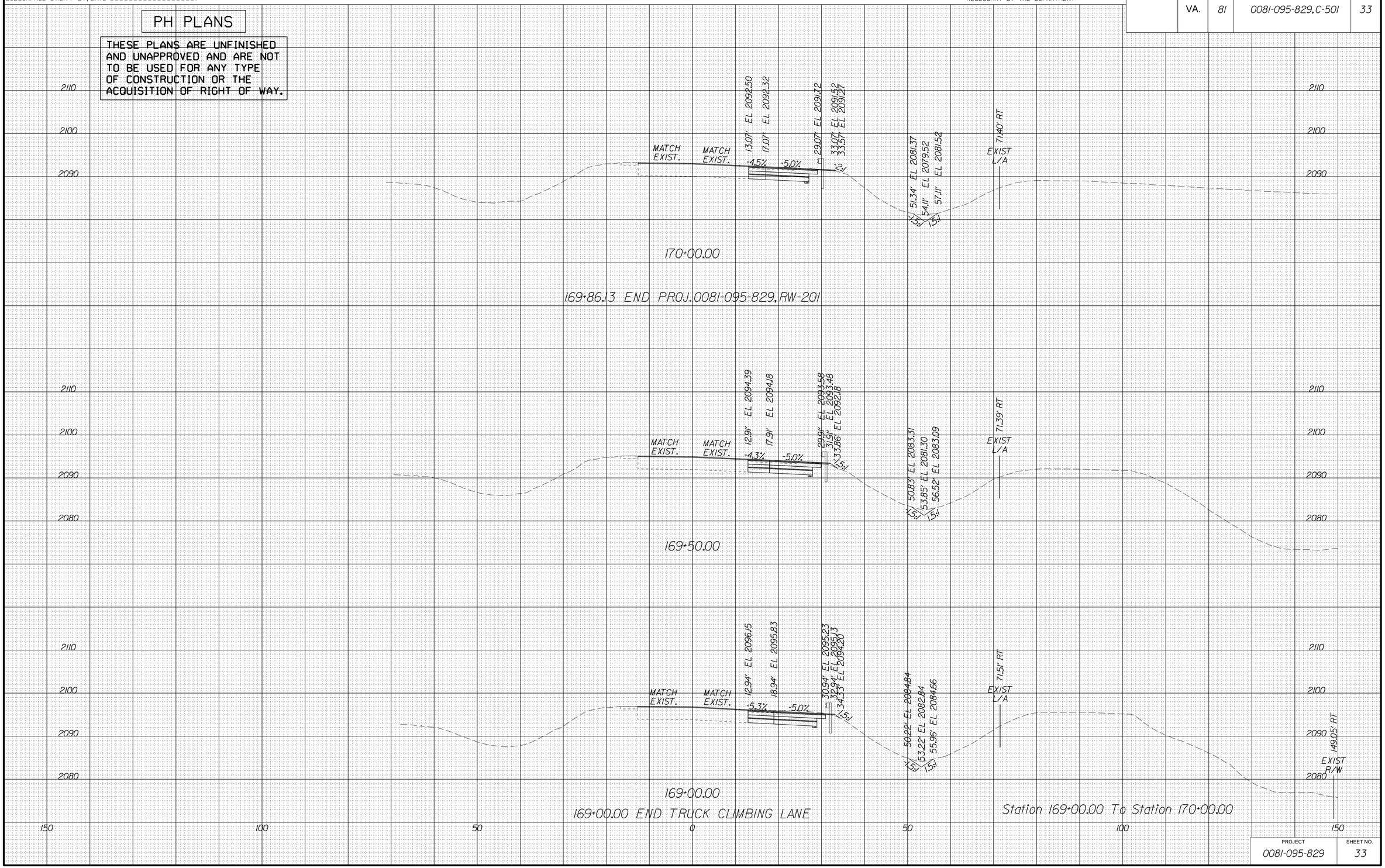
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	33

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	33

3/12/2021
12:26:11 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

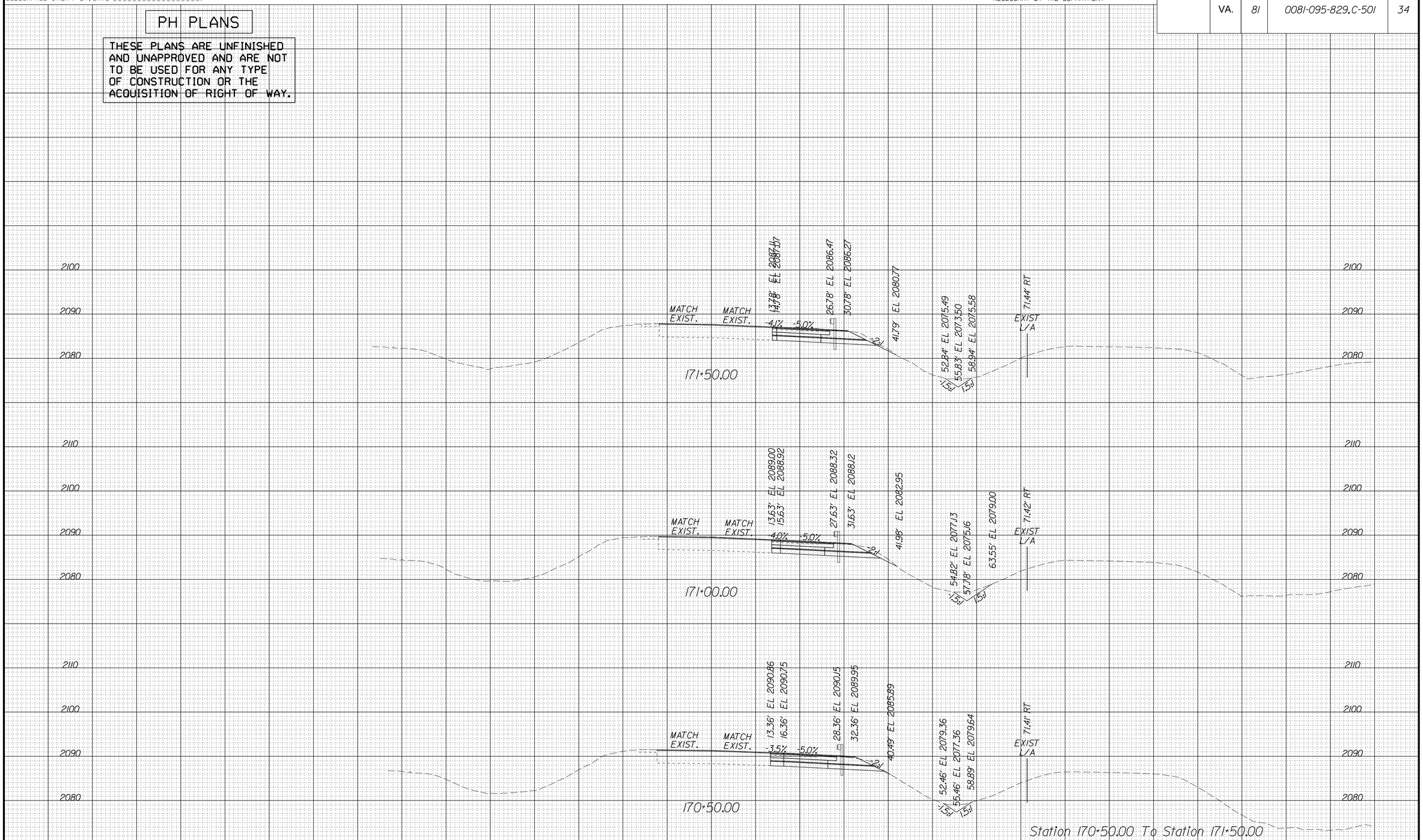
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	34

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



PROJECT	SHEET NO.
0081-095-829	34

3/12/2021

12:26:15 PM

PROJECT MANAGER James. Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

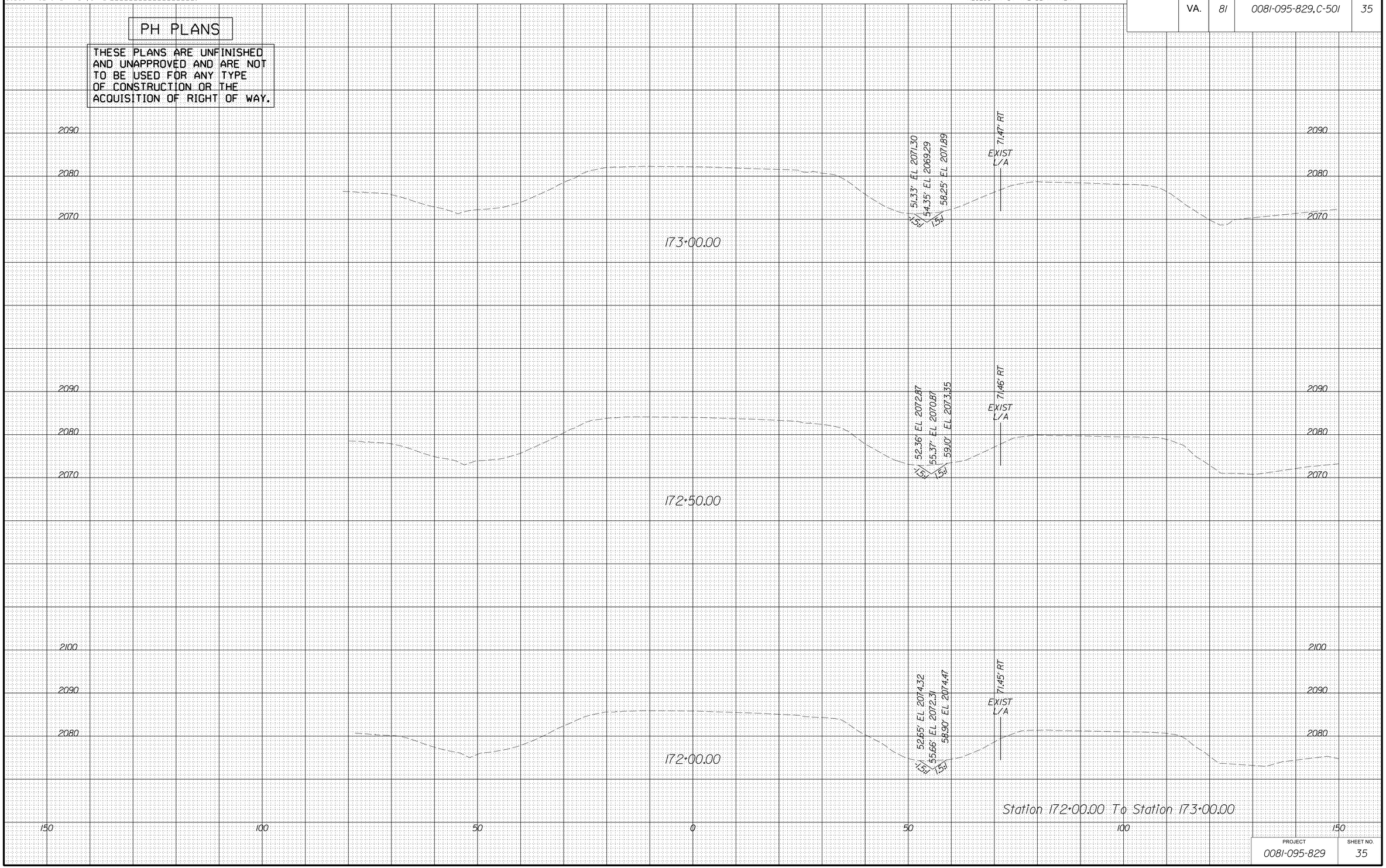
SCALE 1 IN. = 10 FT

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

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	35

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.



Station 172+00.00 To Station 173+00.00

PROJECT	SHEET NO.
0081-095-829	35

3/12/2021

12:26:17 PM

PROJECT MANAGER James Jones, L.S. (276) 696-3257 (Bristol)
SURVEYED BY, DATE Woolpert Inc. (757) 549-3549 (Nov. 24, 2019).
DESIGN BY Tamara Pritchard, P.E. (276) 696-3249 (Bristol).
SUBSURFACE UTILITY BY, DATE _____.

CROSS SECTIONS

SCALE 1 IN. = 10 FT

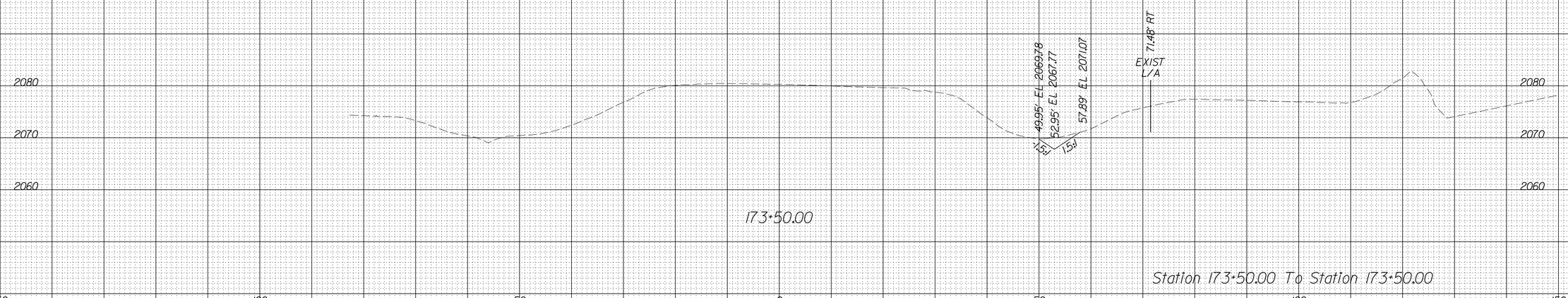
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-095-829,C-501	36

PH PLANS

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

173+78.68 END PROJ.0081-095-829,RE-101
173+78.00 END PROJ.0081-095-829,C-501
172+00.00 END TAPER FOR LANE DROP



Station 173+50.00 To Station 173+50.00

PROJECT	SHEET NO.
0081-095-829	36

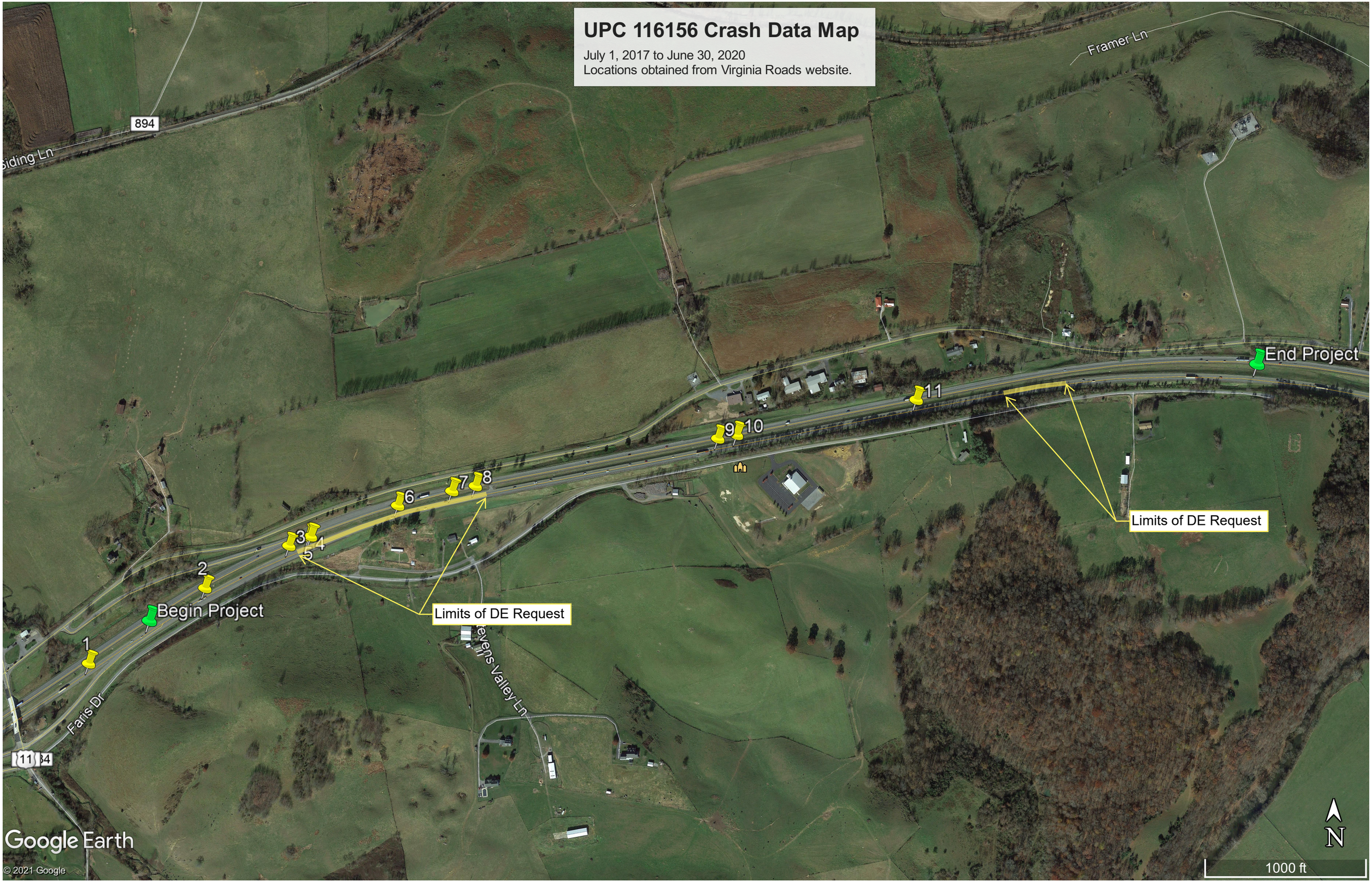
Attachment D

UPC 116156 Crash Data
July 1, 2017 to June 30, 2020
Data obtained from Virginia Roads Website

OBJECTID	CRASH_YEAR	CRASH_DT	CRASH_MILITARY_TM	PERSONS_INJURED	VEH_COUNT	COLLISION_TYPE	WEATHER_CONDITION	LIGHT_CONDITION	ROADWAY_SURFACE_COND	ROADWAY_ALIGNMENT	FIRST_HARMFUL_EVENT	FIRST_HARMFUL_EVENT_LOC	DISTRACTED_NOTDISTRACTED	RNS_MP
1	2020	2020/03/03	700	0	1	9. Fixed Object - Off Road	5. Rain	1. Dawn	2. Wet	4. Grade - Curve	1. Bank Or Ledge	2. Shoulder	No	32.21
2	2018	2018/07/15	2003	1	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	2. Wet	4. Grade - Curve	11. Jersey Wall	2. Shoulder	No	32.37
3	2019	2019/10/24	952	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	1. Dry	1. Straight - Level	5. Guard Rail	2. Shoulder	Yes	32.47
4	2019	2019/10/06	1830	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	2. Wet	4. Grade - Curve	5. Guard Rail	3. Median	No	32.5
5	2019	2019/02/21	1200	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	6. Oil/Other Fluids	4. Grade - Curve	5. Guard Rail	2. Shoulder	No	32.5
6	2020	2020/04/19	1700	1	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	1. Dry	1. Straight - Level	20. Motor Vehicle In Transport	1. On Roadway	Yes	32.6
7	2018	2018/04/15	2020	0	1	9. Fixed Object - Off Road	5. Rain	5. Darkness - Road Not Lighted	2. Wet	4. Grade - Curve	4. Fence Or Post	2. Shoulder	No	32.67
8	2019	2019/10/07	1825	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	2. Wet	4. Grade - Curve	5. Guard Rail	2. Shoulder	No	32.7
9	2019	2019/01/02	1200	0	2	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	1. Dry	3. Grade - Straight	20. Motor Vehicle In Transport	1. On Roadway	No	32.99
10	2019	2019/12/02	1848	1	2	1. Rear End	6. Snow	5. Darkness - Road Not Lighted	2. Wet	3. Grade - Straight	20. Motor Vehicle In Transport	1. On Roadway	No	33.01
11	2020	2020/01/19	1434	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	1. Dry	3. Grade - Straight	20. Motor Vehicle In Transport	1. On Roadway	Yes	33.22

UPC 116156 Crash Data Map

July 1, 2017 to June 30, 2020
Locations obtained from Virginia Roads website.



Attachment E

Stroupe, Rebekah

From: Pritchard, P.E., Tamara <tamara.pritchard@vdot.virginia.gov>
Sent: Tuesday, April 6, 2021 1:45 PM
To: Stroupe, Rebekah
Subject: Fwd: UPC 116156 DE for Stopping Sight Distance and Superelevation

FYI

---------- Forwarded message ---------
From: **Brian Holt, P.E., PTOE** <brian.holt@vdot.virginia.gov>
Date: Tue, Apr 6, 2021 at 1:35 PM
Subject: RE: UPC 116156 DE for Stopping Sight Distance and Superelevation
To: Pritchard, P.E., Tamara <tamara.pritchard@vdot.virginia.gov>
Cc: Chase Buchanan <chase.buchanan@vdot.virginia.gov>, Gene Holley <gene.holley@vdot.virginia.gov>

We went out and ball banked the two curves and they ball banked good. So we do not need any curve warning signs or advisory speeds.

I would put this in the DE to show that we investigated mitigation strategies.

Brian Holt, P.E., PTOE

District Traffic Engineer /Bristol District

Virginia Department of Transportation

276-696-3414

Brian.Holt@VDOT.Virginia.gov

Commonwealth of Virginia

Buchanan, Chase <chase.buchanan@vdot.virginia.gov>

Re: UPC 116156 - DE for Superelevation Rates

1 message

Brian Holt, P.E., PTOE <brian.holt@vdot.virginia.gov> Wed, Apr 21, 2021 at 7:08 PM
To: "Buchanan, Chase" <chase.buchanan@vdot.virginia.gov>
Cc: James Jones <jamesr.jones@vdot.virginia.gov>, "Tamara Pritchard, P.E." <tamara.pritchard@vdot.virginia.gov>

I concur with this DE.

On Wed, Apr 21, 2021 at 5:03 PM Buchanan, Chase <chase.buchanan@vdot.virginia.gov> wrote:

> Brian,
>
> Please review the attached design exception package for superelevation on UPC 116156. If you do not have any comments, please concur with the DE. Please let me know if you have any questions.
>
> Thank you,
>
> --
>
> **Chase Buchanan, P.E.**
>
> **VDOT | Senior Roadway Engineer | Bristol District Location & Design**
>
> **Bristol District | 870 Bonham Road | Bristol, VA 24201**
>
> **Office: 276-696-3251 | Mobile: 540-460-5437**
>
> 116156 Superelevation DE Package.pdf

--

Brian Holt, P.E., PTOE
District Traffic Engineer / Bristol District
Virginia Department of Transportation
276-696-3414
Brian.Holt@VDOT.Virginia.gov

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix B

VDOT
Virginia Department of Transportation

Appendix B: DE/DW for Shoulder Width

Information needs:

- Existing roadway plans showing typical sections and plan sheets
- Proposed roadway plans showing typical sections and plan sheets
- Survey of guardrail locations and paved shoulder limits
- Digital terrain model or survey elevations to determine graded shoulder limits
- Crash history of past 3 years within project limits with crashes geospatially located

References:

- VDOT Road Design Manual Appendix A-1, page A1-15
- AASHTO Green Book Chapter 8.2.4
- AASHTO Policy on Design Standards – Interstate System, Table 3

Process:

- Establish the existing width of paved shoulder and total shoulder throughout the project limits
- Establish the proposed width of paved shoulder and total shoulder throughout the project limits
- Conduct constraints analysis identifying unique project constraints locations in context of the entire corridor
- Tabulate the locations with paved shoulder width less than the minimum allowed per AASHTO standards (Design Exception) in the Summary of Non-Standard Paved Shoulder Widths spreadsheet as shown in Exhibit B.1 for inclusion as a table in the Design Exception Narrative
- Tabulate the locations with total shoulder width less than the minimum allowed per VDOT standards (Design Waiver) in the Summary of Non-Standard Total Shoulder Widths spreadsheet as shown in Exhibit B.2 for inclusion as a table in the Design Waiver Narrative
- Review and document constraints and purpose and need of exception (e.g., overhead bridge piers or abutment, deep fills or cuts, and/or other constraints)
- Evaluate 3 years of crash data with specific focus on the areas of shoulder widths that do not meet current standards
    - If crash data suggests an existing safety problem that aligns with locations of deficiencies and where the substandard shoulder is likely a contributing factor, evaluate appropriate mitigation measures and/or corrections
        - Issues to be considered consist of:
            - Widening shoulders
            - Underdrain

        - Effect on ditches and slopes
        - Constructability and maintenance of traffic
    - If crash data does not suggest an existing safety problem that aligns with locations of deficiencies or there is no discernable crash trend, consider mitigations offered by the proposed project such as widened shoulders, improved drainage infrastructure, rumble strips, etc.
        - Mitigation strategies may include:
            - Rumble strips
            - Wider edge line markings
            - Roadside barrier
            - Emergency pull off areas
- In either scenario above, use the crash data to develop a qualitative crash analysis by applying an approved CMF for the improvement (such as widening from a certain number of lanes to a new number of lanes).
- Fill out IIM Form LD-440 (Design Exception) and/or LD-448 (Design Waiver) including supporting documentation.

Supporting Documentation:

Attachment A – Existing roadway plans (Title Sheet and Plan Sheets)

Attachment B – Excerpts from AASHTO and VDOT standards as applicable to the request

Attachment C – Proposed roadway plans (Title Sheet, Typical Sections, and Plan Sheets)

Attachment D – Summary of Non-Standard Paved Shoulder Widths (as shown in Exhibit B-1) (*The table format may need to be modified slightly to fit a project specific situation, based on number of lanes and location of widening.*

Attachment E – 3 years of crash data in tabular format and geo-spatial exhibits

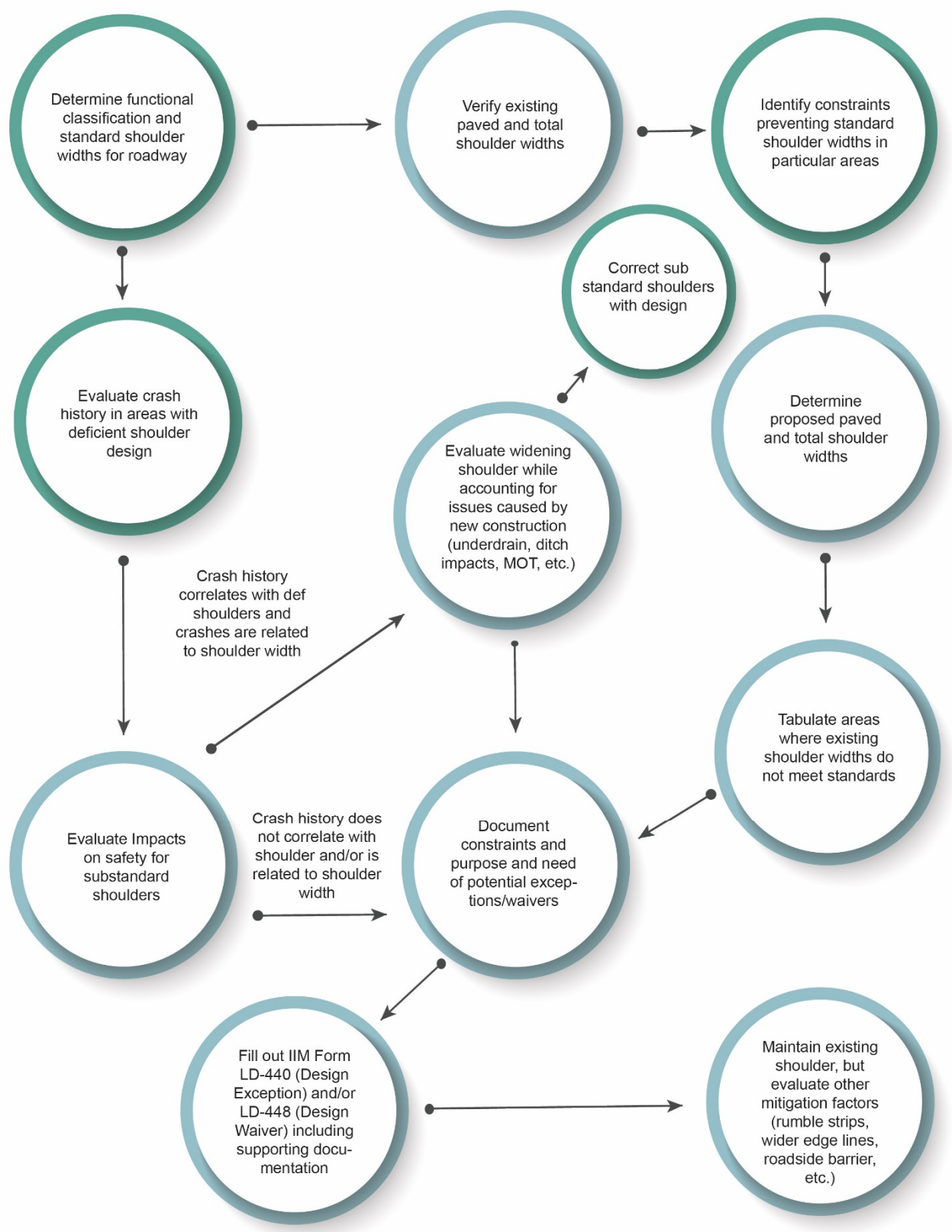
Attachment F – Shoulder width safety analysis

Attachment G – Miscellaneous information in support of request

Notes:

A sample approved DE/DW is attached at the end of this section.

Figure 2: Decision Flowchart for DE/DW for Shoulder Width



I-81 Corridor Improvement Plan

Project Name

Date:

Summary of Deficient Paved Shoulder Widths

VDOT Project #:

VDOT UPC #:

Station Range of Deficient Paved Shoulder Section			Side of Travelway (LT/RT)	Urban/Rural?	Terrain Type	Guardrail? (YES/NO)	Truck Traffic[1] (DDHV)	AASHTO Min. Paved Shoulder Width[2] (ft)	Average Exist. Paved Shoulder Width (ft)	Proposed Paved Shoulder Width (ft)	Notes
From		To									
100+00.00	*to*	*110+00.00*	*RT*	*Rural*	*Rolling*	*NO*	*200*	*10*	*6*	*8*	

Table B-1: Paved Shoulder Width

I-81 Corridor Improvement Plan

Project Name

Date:

Summary of Deficient Total Shoulder Widths

VDOT Project #:

VDOT UPC #:

Station Range of Deficient Total Shoulder Section			Side of Travelway (LT/RT)	Urban/Rural?	Terrain Type	Guardrail? (YES/NO)	Truck Traffic[1] (DDHV)	VDOT Min. Total Shoulder Width[2] (ft)	Average Exist. Total Shoulder Width (ft)	Proposed Total Shoulder Width (ft)	Notes
From		To									
100+00.00	*to*	*110+00.00*	*RT*	*Rural*	*Rolling*	*NO*	*200*	*12*	*8*	*10*	

Table B-2: Total Shoulder Width

VIRGINIA DEPARTMENT OF TRANSPORTATION
LOCATION AND DESIGN/STRUCTURE & BRIDGE
DESIGN EXCEPTION REQUEST
Design Exception Number: (For use by NOVA Only)

Date: 9/16/2020		
To:	Butch Heishman, P.E.	Assistant State Location and Design Engineer
From:	Alex Price, P.E.	District Location and Design Engineer
Subject	DESIGN EXCEPTION REQUEST	

Project Information			
UPC	116203	State Project Number	0081-080-946
Federal Project Number	NHPP-0812(323)	District	Salem
City/County	Roanoke County/City of Salem	Click to choose an item.	
Start Location (From)	0.0189 Mi. North Rt. 641		
End Location (To)	0.349 Mi. North Rt. 419		
Project Description	I-81 Widening MM 136.6 to 141.8		
Funding Source	Federal		

Design Exception Request For					
☐	Design Speed	☐	Horizontal Curve Radius	☐	Design Loading Structural Capacity*
☐	Lane Width	☐	Cross Slope	☐	Vertical Clearance*
☒	Shoulder Width	☐	Sight Distance (Stopping)	☐	Superelevation Rate
☐	Maximum Grade	☐	Other		

* These are typically requested by the Bridge designer.

Road and Traffic Information					
Current ADT	27,296 NB / 23,149 SB	Design ADT	31,882 NB / 27,038 SB		
% Trucks	28.2%	Design Speed	65 MPH	Posted Speed	60 MPH
Reduced Design Speed (if applicable)	N/A	Is Project on NHS?	Yes		
Functional Classification	GS-INT INTERSTATE				

Min. AASHTO Standard	10’	AASHTO Reference	A Policy on Design Standards – Interstate System - Cross Section Elements – Table 3
Existing Dimensions	Varies 2’ – 12’ (See Table 1 in attached narrative)	Requested Dimensions	Varies 4’ to 10’ (See Table 1 in attached narrative)
Total estimated construction cost of project	$ 300 Million		
(Based on approval of this exception) Cost should include item such as additional grading or paving, widening or replacing structures, acquiring additional right of way, wetland mitigation, etc.			
Additional cost to meet minimum AASHTO standard	$ 26 – 35 Million (See attached narrative)		
Background description of project: (Attach Separate Document)			
(Include a description of the general characteristics of the existing highway focusing on the features relevant to the proposed exception. Provide a brief description of the adjacent highway segments, highlighting existing nonstandard features when relevant to the proposed exception as well as the title sheet, typical section sheet, applicable plan sheets, profiles and cross sections.)			
Design Exception Details			
Purpose and need for exception; why standards cannot be met (include any future plan to upgrade this exception to standard)	See attached narrative.		
Are there any plans to improve the approach roadway within the next ten (10) years?	No		
Accident history for the past 3 years, number of crashes, severity of crashes, types of crashes (run- off-the road, rear-ends, sideswipes, head-on, etc.), cause of crashes, the affect the design exception will have on types and number of crashes and a comparison of the statewide average	See attached narrative.		
Effect of design exception on safety	See attached narrative.		
Mitigation of the substandard design element(s)	See attached narrative.		
Has the Responsible District Traffic Engineer reviewed the substandard design and do they agree with the proposed mitigation measures? If not, please explain.	District Traffic Engineer has reviewed and concurs with design exception intent.		

RS&H, Inc
Glen Allen, Virginia
Roadway Engineer

Prepared By: Tyler Gill, P.E. - RS&H, Inc. Date: 9/16/2020
Consultant (P.E.'s Name and Company Name)

Note: The responsible person that prepares the request shall also electronically seal and digitally sign in the block above. **All signatures below shall be digital signatures**.

Remarks:

Recommended For Submission to C.O. By

District Location and Design Engineer

Or

District Structure and Bridge Engineer

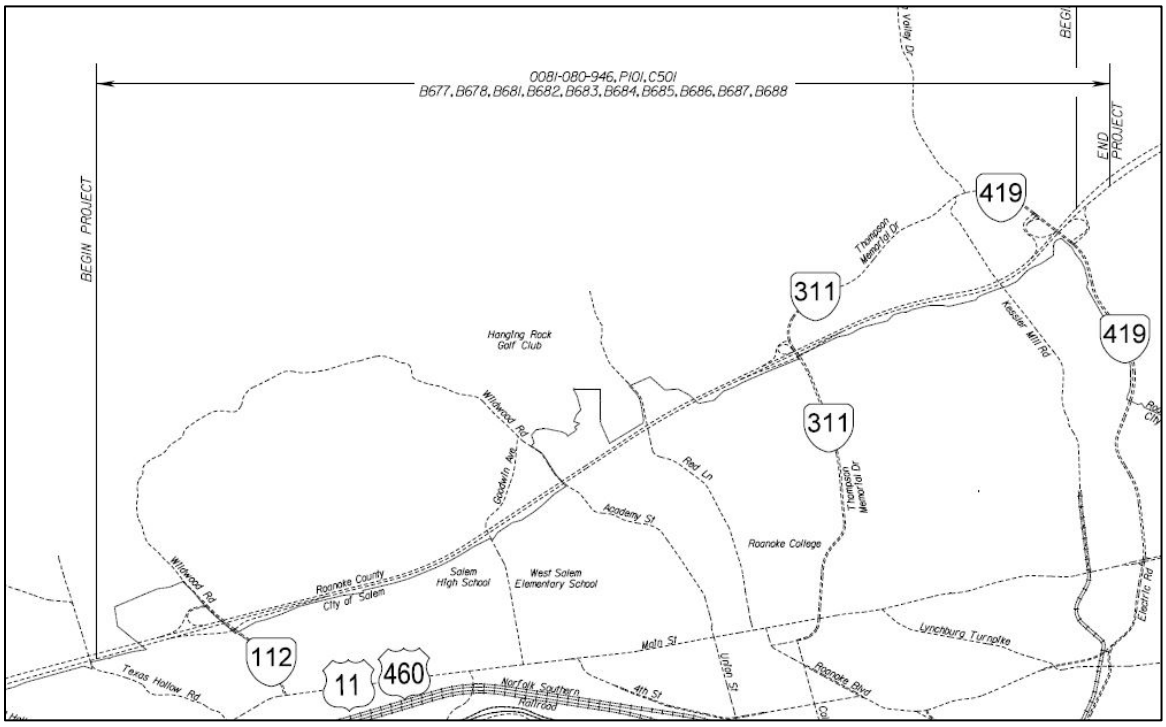
Recommended for Approval By
_____ Assistant State Location and Design Engineer Or _____ Assistant State Structure and Bridge Engineer _____ Responsible District Traffic Engineer (For Crossovers Only)

VDOT and FHWA Approval	
VDOT Approval By	_____ State Location and Design Engineer Or _____ State Structure and Bridge Engineer
FHWA Approval By	_____

Cc: Project Manager
Design Engineer
State Geometric Design Engineer

Background/Project Description

UPC 116203 proposes to widen NB and SB I-81 by a single lane in each direction between mile marker 136.6 and 141.8, approximately 5.2 miles. This project begins about 3,000 feet south of the I-81/Rt. 112 (Wildwood Rd.) interchange (Exit 137) near the I-81 over Rt. 641 (Texas Hollow Rd.) bridges and ends about 1,800' north of the I-81/Rt. 419 (North Electric Rd.) interchange. The project is located within Roanoke County and the City of Salem, as the corporate limits straddle I-81 through this portion of the corridor.



Three interchanges are found within the project: (1) Exit 137 – I-81/Rt. 112 – Partial Cloverleaf/Folded Diamond, (2) Exit 140 – I-81/Rt. 311 – Partial Cloverleaf/Folded Diamond, and (3) Exit 141 – I-81/Rt. 419 – Partial Cloverleaf. In addition to the interchanges, there are three underpasses (Rt. 635 – Goodwin Ave., Rt. 619 – Wildwood Rd./Academy St., Rt. 630 – Kessler Mill Rd.) and one overpass (Rt. 705 – Red Ln.). Included in UPC 116203 is the replacement of the bridge structures at Rt. 112 (Exit 137), Rt. 635, and Rt. 619. The Rt. 311 (Exit 140) bridges will be widened to accommodate the additional thru lane. No proposed widening or replacement work will occur on the Rt. 705, Rt. 630, or Rt. 419 (Exit 141) bridges.

The proposed widening scheme generally follows constructing an additional lane to the outside in the SB direction and to the inside in the NB direction. The typical section is mainly comprised of three 12' lanes and two 12' total shoulders per direction.

UPC 116203 was identified as Project ID #39A and 39B in the 2018 'I-81 Corridor Improvement Plan, with the goal to provide additional capacity, reduce congestion, and improve safety.

Immediately to the north of this project another, UPC 108906, is currently under construction to widen and connects the auxiliary lanes together between Exits 141 and 143. The proposed design for UPC 116203 will tie into UPC 108906 at the northern terminus.

Interstate 81 between MM 136.6 and 141.8 is classified as Urban Interstate System (GS-INT) with a design speed of 65 MPH and a posted of 60 MPH.

This design exception seeks a reduction in the required paved shoulder width of 10', as presented in the 2016 AASHTO *A Policy on Design Standards - Interstate System* Table 3, for two general locations within the project corridor. For reference the AASHTO table is shown in Figure 1. Specifically, Locations (1) and (2) are associated with the SB I-81 lane shift/lane drop/Exit 137 and Locations (3) to (6) are due to the existing Rt. 419 overpass crossing. Individual station ranges of each are identified in Table 1 below. Associated project plan sheets are provided in Appendix A.

Multiple alternatives/concepts were explored during initial project development. These centered around the location of interstate widening (inside/outside). A detailed discussion and preferred widening strategy recommendation is included in Appendix G.

Figure 1: Table 3 from the AASHTO Policy on Design Standards – Interstate System

Shoulders

Minimum paved shoulder widths in each direction of travel as a function of terrain and the number of through lanes shall be in accordance with the following table:

Table 3. Minimum Paved Shoulder Widths

One-Direction-al No. Through lanes	Terrain	Left Shoulder (ft)	Right Shoulder (ft)	Left Shoulder (m)	Right Shoulder (m)
2-lane	Level or Rolling	4	10	1.2	3.0
3-lane or more	Level or Rolling	10	10	3.0	3.0
2 or 3-lane	Mountainous	4	8	1.2	2.4
4-lane or more	Mountainous	8	8	2.4	2.4

Where truck traffic exceeds 250 DDHV, additional shoulder width may be beneficial. Refer to AASHTO's *Green Book* for more information. Additional guidance on shoulder widths for tunnels and long bridges [overall length over 200 ft (60 m)] is provided later in this document.

Table 1: Total Paved Shoulder Width Locations <10'

Location	Proposed Paved Shoulder Width	Existing Shoulder Width	Notes
(1) NB I-81 sta. 137+00 to 152+00 - Median	Varies 10' to 6.15'	Varies 2' to 4' (2' -4' paved)	SB lane shift/drop
(2) SB I-81 sta. 536+50 to 552+00 - Median	Varies 10' to 6.15'	Varies 5'-6' (2'-3' paved)	SB lane shift/drop
(3) NB I-81 sta. 349+00 to 361+00 - Median	Varies 10' to 6.4'	Varies 5'-9' (4'-8' paved)	Rt. 419 (N. Electric Rd.)
(4) NB I-81 sta. 355+00 to 359+50 - Outside	Varies 10' to 6.58'	Approx. 12' (11' paved)	Rt. 419 (N. Electric Rd.)
(5) SB I-81 sta. 748+00 to 760+50 - Median	Varies 10' to 4.04'	Varies 5'-7' (4'-5' paved)	Rt. 419 (N. Electric Rd.)
(6) SB I-81 sta. 756+50 to 760+00 - Outside	Varies 10' to 7.8'	Approx. 12' (11' paved)	Rt. 419 (N. Electric Rd.)

General Existing Roadway Characteristics

The existing characteristics of I-81 through the project limits are individual horizontal and vertically bifurcated alignments consisting of two 12' travel lanes, 2'-4' paved/4'-6' total inside shoulders, and 10'-12' paved/12'-14' total outside shoulders. Median widths (travel lane to travel lane) vary throughout the project, with the widest median of approximately 100' located near the southern project terminus and a typical median width between 40' and 60'.

Pertaining specifically to this design exception, in the area of the SB I-81 lane shift/lane drop/Exit 137, the existing NB I-81 inside shoulders vary 2'-4' with the majority paved. The SB I-81 inside shoulders have double sided guardrail and average 5'-6' to the face of rail of which 2'-3' is paved.

At the Rt. 419 overpass, the NB I-81 inside shoulder widens from 5' to 9' with guardrail present near the bridge. The paved portion of this shoulder varies from 4' to 8' over the same distance. The NB and SB I-81 outside shoulder generally maintains an 11' paved section with 12' to the face of existing roadside barrier. In the SB direction the inside shoulder is adjacent to guardrail the entire length with a 5'-7' offset to the face of barrier and a paved distance of 4'-5'. The existing deceleration lane taper for the NB I-81 Exit 141 to Rt. 419 Electric Rd. loop begins immediately north of the Rt. 419 overpass.

Purpose and Need for Exception

The established design criteria cannot be met at the locations in Table 1 due to various existing horizontal and vertical constraints. Each location is detailed below.

Locations (1) & (2)

The proposed NB and SB paved inside shoulder width through this area is below standard, varying from 10' to a minimum of 6.15', to accommodate the added thru lane on I-81 without modifying the interchange at Exit 137. This location has a reduced existing median width, including existing substandard inside shoulder widths of 2'-4' (NB) and 5'-6' (SB), and is constrained due to terminating the added southbound lane prior to the Texas Hollow Rd. bridge. To provide full width shoulders, SB I-81 widening needs to occur to the outside through the Rt. 112 interchange. However, a severely

substandard existing deceleration lane to Rt. 112 requires lengthening as well, meaning 24' of additional width is needed on the new bridge. Accomplishing all widening to the outside will result in major impacts to the existing interchange configuration and require a modification. The proposed design balances the roadway impacts at this location by providing the new thru lane to the inside (median) and the auxiliary lane to the outside while minimizing the construction footprint at the interchange.

To reduce construction impacts to Exit 137, the proposed design achieves the additional thru lane widening to the inside by incorporating a horizontal lane shift through a section of tangent north of the interchange. The location of the horizontal lane shift provides an optimal solution for reducing associated bridge, interchange, geotechnical, and constructability impacts.

Accomplishing the shift north of the SB I-81 over Rt. 112 bridge decreases the construction footprint at Exit 137, specifically that of the SB loop ramp, which would require major reconstruction should the deceleration lane be an additional 12' west. The existing reduced horizontal geometrics of this loop currently contribute to a high volume of crashes at this location. Any further widening to the west would require interchange reconfiguration or aggressive geometry barely meeting standard (or requiring additional design waivers/exceptions) to tie, the former being out of the scope of this project and the latter being suboptimal.

Additionally, other realized aspects of the proposed design include: improved shoulder widths over existing; reduced need to continue to raise the SB I-81 vertical alignment as outside widening at Exit 137 requires further elevation increase to achieve a 16'6" vertical clearance; balanced/maximized (similar) inside shoulder widths between NB and SB I-81; reduced cut and potential need for retaining structures or large right of way acquisition adjacent to Skyview Rd. (frontage road); reduced/eliminated large impacts to the acid producing soils that are present in the existing cut slope between Exit 137 and the Texas Hollow Rd. bridges; maintaining the crowned roadway section improving constructability at all points south of the shift; and future accommodation of an inside/inside widening concept moving south on the I-81 corridor.

A more detailed summary of the SB I-81 lane shift is captured in Appendix H.

Locations (3), (4), (5), & (6)

The Rt. 419 bridge has a condition rating of fair, provides vertical clearances over I-81 greater than 16' 6", and according to the most recent inspection report does not have evidence of strikes/hits. Therefore, replacement or reconstruction of the Rt. 419 overpass is not considered a high priority element and thus outside the scope of this project. However, the existing span arrangement does not adequately accommodate three 12' thru lanes, one 12' deceleration lane, and two 10' paved shoulders (inside and outside) in each direction. This constraint results in reduced inside and outside paved shoulders at this location. Specifically, the NB inside and outside paved shoulders will vary from 10' to 6.4' and 10' to 6.58' and the SB inside and outside paved shoulders will vary from 10' to 4.04' and 10' to 7.8', respectively. Appendix E contains a portion of the project scope document referencing intent to leave the Rt. 419 structure in its existing location. Further, Appendix F documents the decisions/design direction agreed to between VDOT and FHWA at the project Bridge Strategy Determination Discussion. Among the items are leaving the Rt. 419 bridge in its existing configuration.

The Rt. 419 overpass pier locations and the existing vertical clearance restricts small to moderate profile and cross slope adjustments, the proposed NB and SB horizontal alignments were located to maximize and balance the paved shoulder widths on either side of I-81 to the extent practical.

Another feature resulting in reduced paved shoulder width is the extension of the NB deceleration lane for the loop ramp to Rt. 419 to meet standard. Currently, this deceleration lane is less than half the AASHTO required length of 500' and does not begin until just north of the bridge. Providing additional auxiliary lane length will improve operations at this loop and increase safety.

In the SB direction, the proposed design ties directly to the southern terminus of UPC 108906. Due to its proximity to the Rt. 419 overpass, this tie condition does not allow room for a meaningful horizontal alignment shift thus the resultant reduced outside paved shoulder.

Ultimately, providing standard inside and outside shoulders along I-81 would necessitate bridge replacement of the Rt. 419 overpass. This effort was explicitly restricted from this project.

Crash History

VDOT provided crash data for the project corridor using the most recent three year period. A total of 326 crashes occurred within the project limits, of which fourteen (4.3% of the total) took place within the Table 1 areas. There were no fatalities and three injuries associated with those crashes. Of the collisions; six were rear-end, three fixed object, three were sideswipe, one angle, and one non-collision. The three fixed object and one non-collision crash all were run of the road crashes, with two occurring in both Location (1) and (3). Location (1) and (3) each had one crash that occurred on the inside shoulder and one that impacted both. No crashes occurred in Location (4) or (6). The individual crash data and a summary table are attached as Appendix B for reference.

Within the project, not just the locations in Table 1, the NB I-81 crash rate is 30% higher than the statewide and 60% higher than the district averages. The SB I-81 crash rate is higher by 8% and 35% when compared to the statewide and district averages, respectively.

Effects of Design Exception on Safety

Even with the reduced paved shoulder width design exception locations, the proposed roadway improvements are expected to provide a safer condition over existing. The addition of a third travel lane in each direction through the project will provide higher capacity, thus reducing congestion which is a major contributor to the volume of crashes in the corridor. In addition, there are many cases where the proposed paved shoulder width is greater than the existing.

At Locations (1) and (2) the proposed total and paved shoulder widths will exceed the existing widths for the entirety of the substandard section. This wider shoulder is expected to increase safety over the existing conditions.

A review of the existing crash history at Locations (3) to (6) does not indicate a wider shoulder would reduce crash frequency.

To study the effects of the proposed roadway improvements on crash rates (specifically the inside shoulder width), a safety analysis was performed using the crash data provided by VDOT and crash modification factors. Findings from this analysis determined the following safety benefits:

- Crashes are expected to be reduced by 30% when widening from 4 lanes to 6 lanes (CMF = 0.7)
- Fatality/injury crashes (KABC) would reduce by 13% when the inside shoulder is widened from 4' to 12' (CMF = 0.87) and 4% when widened from 4' to 6' (CMF = 0.96)
- Property Damage crashes (PDO) would reduce by 12% when widening the inside shoulder from 4' to 12' (CMF = 0.88) and 3% when widening from 4' to 6' (CMF = 0.97)

This analysis is located in Appendix C for reference.

Mitigation of the Substandard Design Elements

FHWA's Technical Report on Mitigation Strategies for Design Exceptions suggests several measures for mitigating reduced shoulder width. Among these are rumble strips, wider pavement markings, paved shoulders, and roadside barrier.

The proposed design incorporates shoulder rumble strips and 6" edge line markings through the entire corridor, which the FHWA's document says encourages the driver's ability to stay within the travel lane both visually and audibly. In addition, at all 6 reduced paved width shoulder locations full depth paved shoulder is proposed to the face of the adjacent roadside barrier. This maximizes the paved width to the extent practical for the traveling public. Further, proper roadside barrier (guardrail, concrete median barrier, or bridge pier protection system) is provided to adequately shield vehicles from roadside hazards.

Each location is the result of a localized constraint that requires a reduction in paved shoulder width and not a consistent corridor wide approach. The total proposed reduced paved shoulder length on I-81 is roughly 6,300', this represents approximately 6% of the total shoulder length (inside and outside) of the entire project. The remaining 94% of the project contains paved shoulder widths in excess of 10'.

Additional Cost to Meet Minimum AASHTO Standard

Due to available funding being constrained, project cost increases have severe consequences to overall project viability. Given current project cost estimates are very near the allocated SYIP funds, further cost increases jeopardize the project. The current construction estimate for this project is near $300 million.

The estimated construction costs for a non-exception condition for each location are shown below.

Locations (1) & (2)

To provide full width total shoulders in this area requires moving the lane shift south of the I-81 over Rt. 112 bridges. Additional construction elements include pavement widening, raising SB I-81 and the SB bridge structure, lengthening barrier wall along SB I-81 inside shoulder, extending ramp/loop roadway improvements, culvert extensions, added retaining structure adjacent to Skyview Rd., and increased cut/fill slope impacts. The construction cost is estimated to increase approximately $9-13 million to include these design changes.

Locations (3), (4), (5), & (6)

Increasing the paved shoulder width at the Rt. 419 interchange to meet VDOT standard involves replacement of the Rt. 419 over I-81 bridge, I-81 roadway widening, loop/ramp impacts, and roadway

enhancements to Rt. 419. The construction cost is estimated to increase approximately $17 - 22 million to include these design changes.

In aggregate, the estimated total cost to meet the GS-INT standard is **$26 - 35 million**, approximately a 9% increase over the current project construction estimate. The design fee associated with these additional improvements for UPC 116203 could add $2-3 million to the overall project cost. Associated right of way, utility, and owner cost impacts are not included in this estimate.

Appendices

Included as appendices to this design exception are:

- Appendix A: RFP Plan Sheets (including title sheet and typical sections) with Design Exception locations denoted
- Appendix B: Crash Data within DE Areas (Excludes Collisions with Deer)
- Appendix C: Inside Shoulder Width Safety Analysis
- Appendix D: LD-104 – I-81 Traffic Data for Scoping Report and Design Purposes
- Appendix E: Excerpt from project scoping document communicating desire to not impact the Rt. 705 and Rt. 419 overpasses
- Appendix F: Bridge Strategy Memo
- Appendix G: Concept Summary Recommendation Memo
- Appendix H: I-81 Southbound Lane Shift Memo

8/20/2020
7:41:35 AM

d1162030Odgn
Plotted By: GIIIT

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated Oct. 4, 1956

Appendix A

FOR INDEX OF SHEETS SEE SHEET 1B

FHWA 534 DATA 31103

STATE	FEDERAL AID PROJECT	STATE ROUTE	STATE PROJECT	SHEET NO.
VA.	SEE TABULATION BELOW FOR SECTION NUMBERS	81	0081-080-946 SEE MAP BELOW FOR PROJECT NUMBERS AND LOCATIONS	1

THIS PROJECT WAS DEVELOPED UTILIZING THE DEPARTMENT'S ENGINEERING DESIGN PACKAGE (GEOPAK).
GEOPAK Computer Identification No. 116203

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF TRANSPORTATION

PLAN AND PROFILE OF PROPOSED STATE HIGHWAY

I-81 WIDENING MM 136.6 TO 141.8 DB PROJECT
RFP PLANS
ROANOKE COUNTY / CITY OF SALEM

FUNCTIONAL CLASSIFICATION AND TRAFFIC DATA	
	INTERSTATE 81
From: To:	0.237 MI. NORTH INT. RT 641 0.349 MI. NORTH RT. 419
FUNCTIONAL CLASSIFICATION	INTERSTATE-URBAN
MIN. DESIGN SPEED	65 MPH
ADT (2020)	72,100
ADT (2043)	92,750
DHV	7,720
D (%) (design hour)	52%
T (%) (design hour)	19.5%
V (MPH)	65 MPH
TC STD.	TC-5.11R
GEOMETRIC STD.	GS-INT

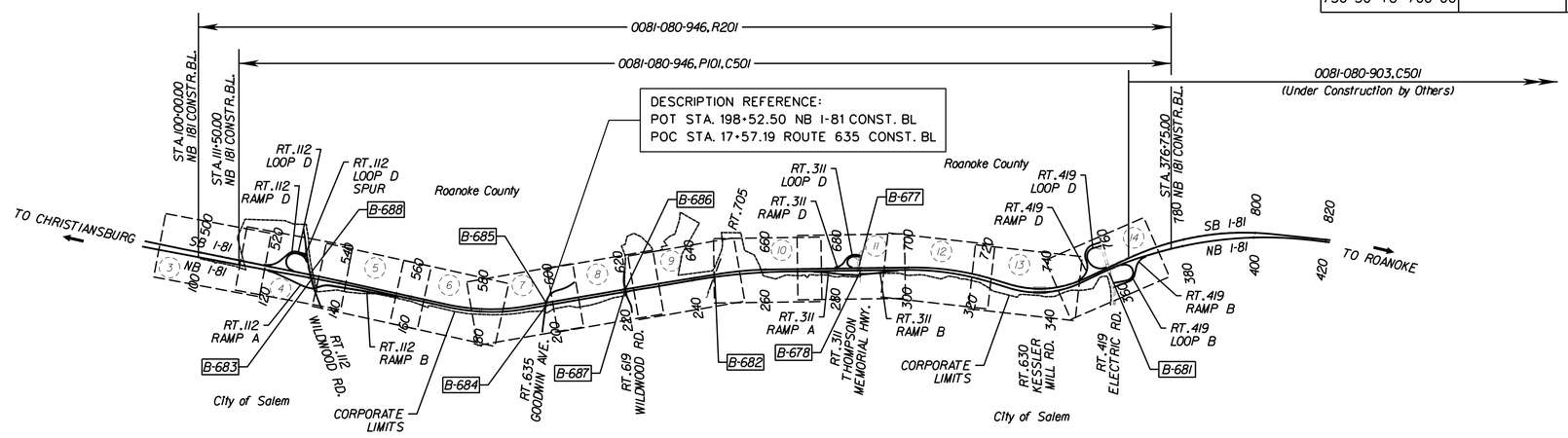
DESIGN EXCEPTIONS			
STA. TO STA.	DESIGN SPEED (MPH)	EXCEPTION FOR:	APPROVAL DATE
NB I-81 139+00 TO 151+00 349+50 TO 360+50 355+50 TO 359+50 SB I-81 538+00 TO 550+00 748+50 TO 760+00 756+50 TO 760+00	65 MPH	SHOULDER WIDTH	AUGUST XX, 2020

RFP PLANS
For Information Only

DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.



CONVENTIONAL SIGNS

STATE LINE
COUNTY LINE
CITY,TOWN OR VILLAGE
RIGHT OF WAY LINE
FENCE LINE
UNFENCED PROPERTY LINE
FENCED PROPERTY LINE
WATER LINE
SANITARY SEWER LINE
GAS LINE
ELECTRIC UNDERGROUND CABLE
TRAVELED WAY
GUARD RAIL
RETAINING WALL
RAILROADS
BASE OR SURVEY LINE

LEVEE OR EMBANKMENT
BRIDGES
CULVERTS
DROP INLET
POWER POLES
TELEPHONE OR TELEGRAPH POLES
TELEPHONE OR TELEGRAPH LINES
HEDGE
TREES
HEAVY WOODS
GROUND ELEVATION
GRADE ELEVATION

ROANOKE COUNTY POPULATION 92,376 (2010 CENSUS) / CITY OF SALEM POPULATION 24,802 (2010 CENSUS)

STATE PROJECT NO.	SECTION	FEDERAL AID PROJECT NO.	TYPE CODE	UPC NO.	EQUALITIES	LENGTH INCLUDING BRIDGE(S)		LENGTH EXCLUDING BRIDGE(S)		BRIDGE PLAN NO.	TYPE PROJECT	DESCRIPTION	Stations	
					FEET	FEET	MILES	FEET	MILES				BEGIN	END
0081-080-946	P101	NHPP-0812(323)		116203		26525.00	5.024	25566.74	4.84		PRELIMINARY ENGINEERING	FR: 0.237 MI. NORTH INT. RT 641 TO: 0.349 MI. NORTH RT. 419	111+50.00	376+75.00
	C501		1000	116203		26525.00	5.024				CONSTRUCTION	FR: 0.237 MI. NORTH INT. RT 641 TO: 0.349 MI. NORTH RT. 419	111+50.00	376+75.00
	B677		X241	116203		144.00	0.027				BRIDGE	SB I-81 OVER ROUTE 311	685+39.51	686+83.51
	B678		X241	116203		144.00	0.027				BRIDGE	NB I-81 OVER ROUTE 311	285+94.72	287+38.72
	B681		X241	116203		73.68	0.014				BRIDGE	ROUTE 419 OVER I-81	357+96.10	358+69.78
	B682		X241	116203		33.25	0.006				BRIDGE	ROUTE 705 OVER I-81	245+95.98	246+29.23
	B683		X241	116203		135.42	0.026				BRIDGE	NB I-81 OVER ROUTE 112	131+28.41	132+63.83
	B684		X241	116203		85.75	0.016				BRIDGE	NB I-81 OVER ROUTE 635	198+09.71	198+95.46
	B685		X241	116203		85.75	0.016				BRIDGE	SB I-81 OVER ROUTE 635	597+67.53	598+53.28
	B686		X241	116203		60.41	0.011				BRIDGE	SB I-81 OVER ROUTE 619	620+17.51	620+77.92
	B687		X241	116203		60.58	0.011				BRIDGE	NB I-81 OVER ROUTE 619	220+88.39	221+48.97
	B688		X241	116203		135.42	0.026				BRIDGE	SB I-81 OVER ROUTE 112	530+50.80	531+86.22

SCALE
0' 2,000' 4,000'

PROJECT LENGTHS ARE BASED ON NB I-81 CONSTRUCTION BASELINE

PROJECT	SHEET NO.
0081-080-946	1

PROJECT MANAGER Craig Moore, P.E. (540) 525-2420 (Salem District)
SURVEYED BY, DATE
DESIGN BY RS&H, Inc (804) 422-5075
SUBSURFACE UTILITY BY, DATE

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated Oct. 4, 1956

Appendix A

PROJECT MANAGER Craig_Moore,_P.E._VDOT._Salem_District,(540)_525-2420
SURVEYED BY, DATE Hurt & Proffitt,(540) 552-5592_August 31,2020
DESIGN BY BS&H, Inc.(804)422-5075
SUBSURFACE UTILITY BY, DATE

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-080-946,C-501	2A(1)

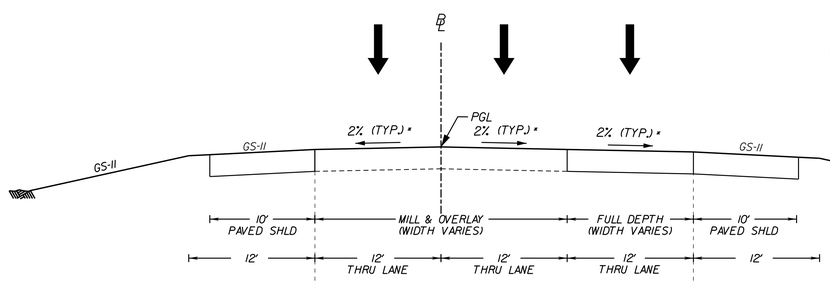
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

TYPICAL SECTIONS

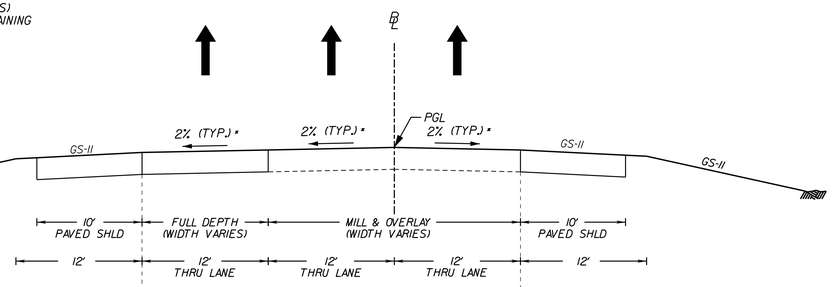
NOTE: SEE RFP FOR PROPOSED PAVEMENT STRUCTURE

* SEE PLANS FOR SUPER ELEVATION RATES
** PVD.SHLDR WIDTH VARIES (SEE PLANS)
*** SEE RFP FOR SPECIAL DESIGN RETAINING WALLS/BARRIER REQUIREMENTS
**** WHEN MEDIAN IS <15', SEE RFP FOR MEDIAN TREATMENT REQUIREMENTS

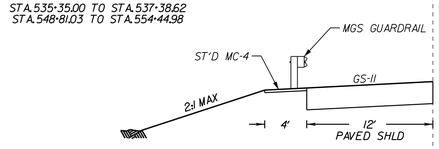
I-81 SB
WIDEN TO INSIDE
STA.511+10.00 TO STA.554+44.98



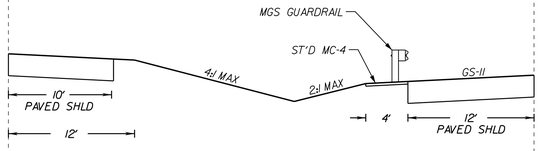
I-81 NB
WIDEN TO INSIDE
STA.111+50.00 TO STA.154+83.29



STA.535+35.00 TO STA.537+38.62
STA.548+81.03 TO STA.554+44.98

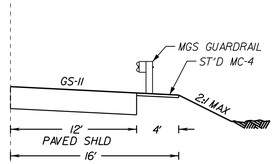


STA.526+30.96 TO STA.526+59.01

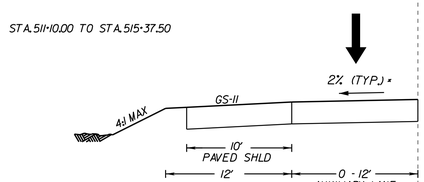


STA.111+69.77 TO STA.127+00.00

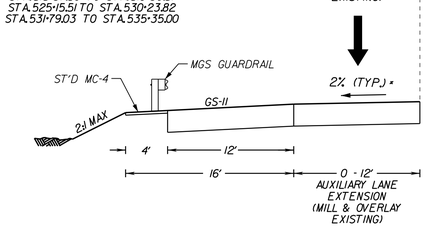
STA.124+04.40 TO STA.131+30.03
STA.132+85.24 TO STA.148+30.41



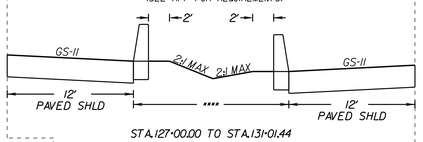
STA.511+10.00 TO STA.515+37.50



STA.515+37.50 TO STA.519+30.51
STA.525+15.51 TO STA.530+23.82
STA.531+79.03 TO STA.535+35.00

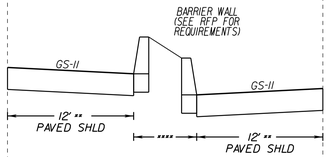


BARRIER WALL
(SEE RFP FOR REQUIREMENTS)



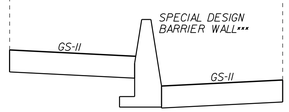
STA.127+00.00 TO STA.131+01.44

BARRIER WALL
(SEE RFP FOR REQUIREMENTS)



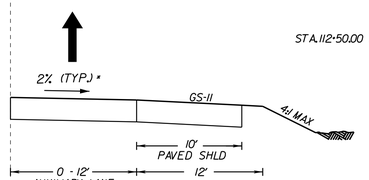
STA.132+56.65 TO STA.136+68.71 **
STA.152+29.94 TO STA.154+83.29

SPECIAL DESIGN
BARRIER WALL***

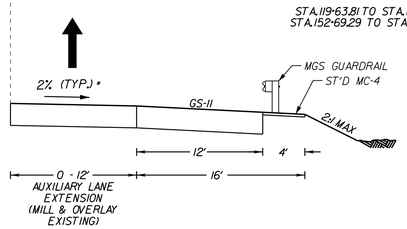


STA.136+68.71 TO STA.152+29.94 **

STA.112+50.00 TO STA.119+63.81



STA.119+63.81 TO STA.122+09.98
STA.152+69.29 TO STA.154+83.29



RFP PLANS
For Information Only
DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.

NOT TO SCALE	PROJECT	SHEET NO.
	0081-080-946	2A(1)

LIMITED ACCESS HIGHWAY By Resolution of Highway Commission dated Oct. 4, 1956

Appendix A

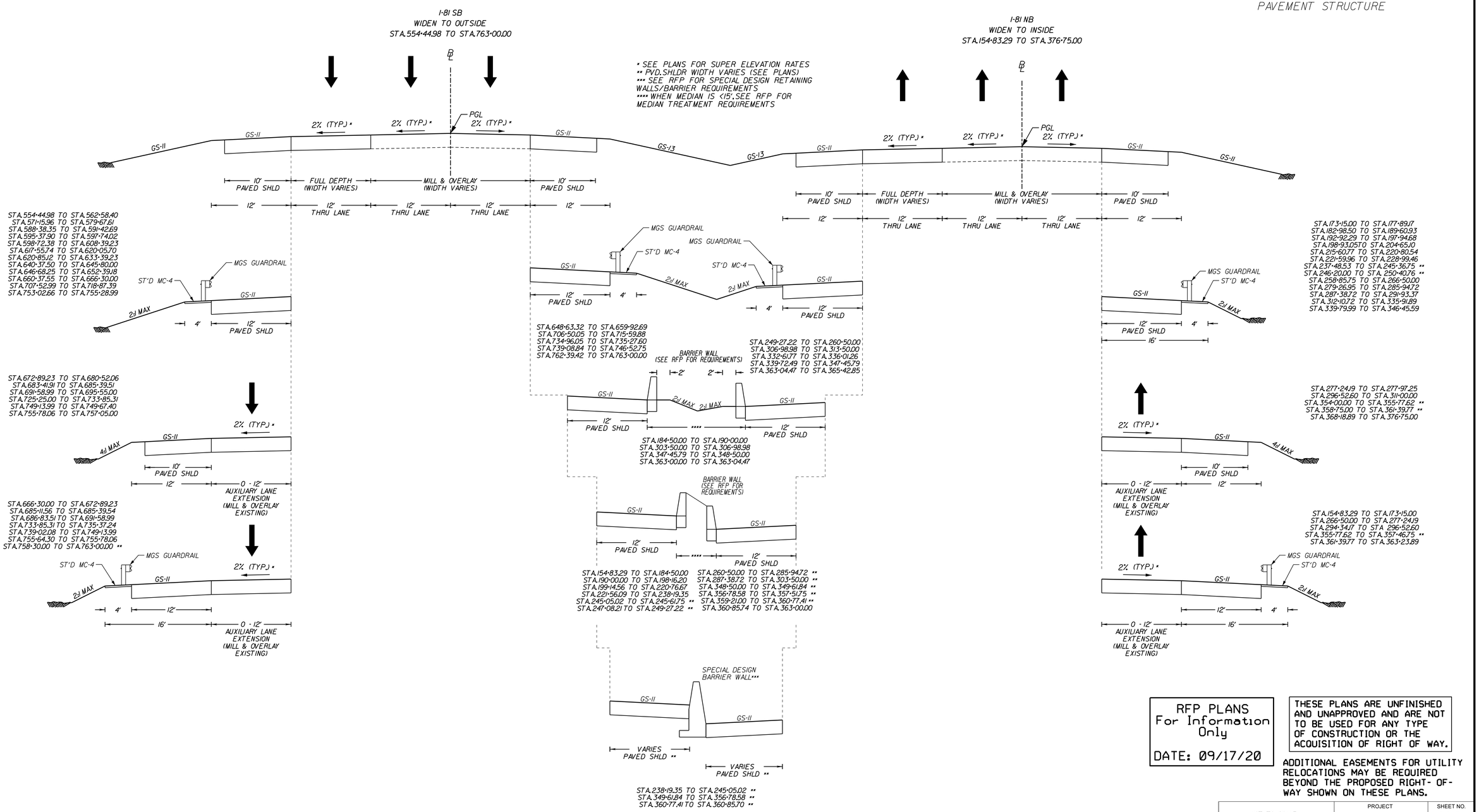
PROJECT MANAGER Craig Moore, P.E. VDOT Salem District (540) 525-2420
SURVEYED BY, DATE Hurt & Proffitt (540) 552-5592 August 31, 2020
DESIGN BY BS&H, Inc. (804) 422-5075
SUBSURFACE UTILITY BY, DATE

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	81	0081-080-946, C-501	2A(2)

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

TYPICAL SECTIONS

NOTE: SEE RFP FOR PROPOSED PAVEMENT STRUCTURE



RFP PLANS
For Information Only
DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.

NOT TO SCALE	PROJECT 0081-080-946	SHEET NO. 2A(2)

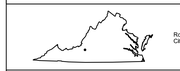
Virginia Department of Transportation

PLAN ROLL
I-81 WIDENING MM 136.6 TO 141.8

Appendix A

SHEET NO. 4

Project Location



Roanoke County / City of Salem

North Arrow & Scale

N

SCALE 0 50' 100'

Legend

- Proposed Full Depth Pavement
- Proposed Planing and Resurfacing/Build-Up
- Demolition of Pavement
- Low Maintenance Median Treatment
- C ..... Proposed Limits of Construction - Cut
- F _ _ _ _ Proposed Limits of Construction - Fill
- Potential Location of Stormwater Facility
- Existing Right of Way
- Existing Easements
- Proposed Right of Way
- Proposed Permanent Drainage Easement
- Proposed Temporary Construction Easement
- Property Line
- B Proposed Concrete Median Barrier
- C Proposed Curbing
- G Proposed Guardrail
- W Proposed Retaining Wall

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Utility Owners	IF(2)
Construction Alignment Data	IG(1) - IG(9)
Profile Rolls	4A - 4B
Structural Obstruction Zone	4SOZ

RFP PLANS
For Information Only
DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.

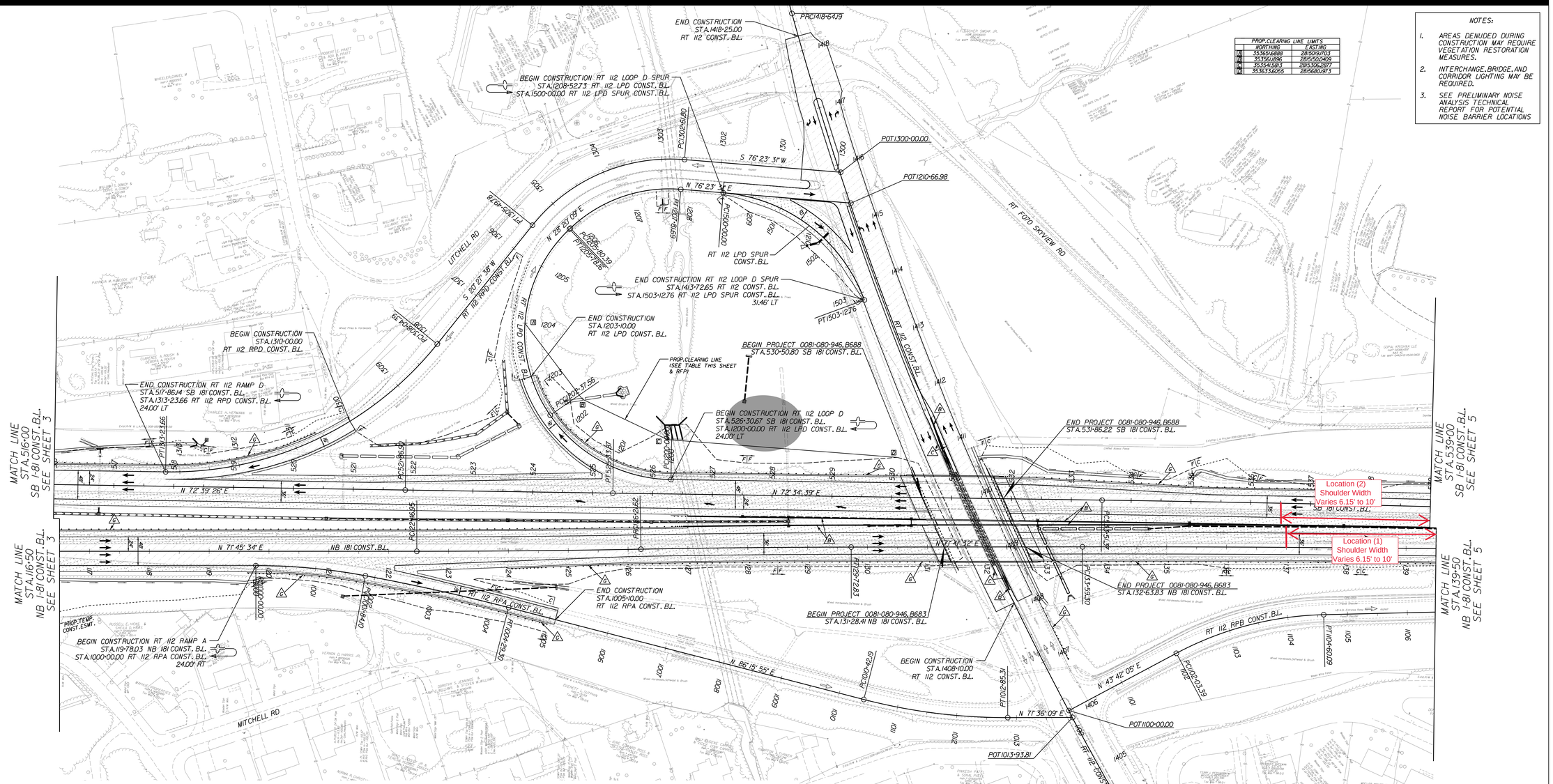
Contact Information

Craig Moore, PE
Project Manager / Assistant District L&D Engineer
Virginia Department of Transportation
731 Harrison Avenue
Salem, VA 24153

Comments may also be sent to:
181-MM136-141@vdot.virginia.gov

I-81 Widening MM 136.6 to 141.8
Roanoke County / City of Salem, Virginia

0081-080-946, P101, R201, C501
UPC 116203
Federal Project Number



NB 181 CURVE DATA

Curve TG2	Curve TG3	Curve TG4
PI = 124+34.29	PI = 127+97.23	PI = 141+27.66
DELTA = 7°04' 24.07" (LT)	DELTA = 7°00' 22.1" (RT)	DELTA = 1°57' 23.12" (RT)
D = 0°11' 11"	D = 0°11' 11"	D = 0°01' 38"
T = 187.34'	T = 175.56'	T = 768.35'
L = 374.67'	L = 351.21'	L = 1,536.57'
R = 2,030.00'	R = 2,060.00'	R = 45,000.00'
PC = 122+46.95	PRC = 126+21.62	PC = 133+59.30
PRC = 126+21.62	PT = 129+72.83	PT = 148+95.87
DS = 65 MPH	DS = 65 MPH	DS = 65 MPH
E = NC	E = NC	E = NC

SB 181 CURVE DATA

Curve TG17	Curve TG18
PI = 523+60.39	PI = 537+73.53
DELTA = 17°04' 46.27" (LT)	DELTA = 17°58' 03.03" (RT)
D = 1°01' 23"	D = 1°01' 53"
T = 173.48'	T = 422.11'
L = 346.98'	L = 844.3'
R = 2,150,000.00'	R = 5,000.00'
PC = 521+86.90	PC = 533+51.37
PT = 525+33.87	PT = 541+95.68
DS = 65 MPH	DS = 65 MPH
E = NC	E = NC

RT 112 RAMP A CURVE DATA

Curve TG47	Curve TG48	Curve TG49
PI = 1000+92.31	PI = 1003+06.75	PI = 1011+64.42
DELTA = 10°32' 54.31" (RT)	DELTA = 5°57' 26.48" (RT)	DELTA = 14°39' 45.33" (LT)
D = 5°43' 46"	D = 1°36' 50"	D = 6°01' 52"
T = 56.31'	T = 122.65'	T = 132.23'
L = 184.10'	L = 245.13'	L = 243.11'
R = 1,000.00'	R = 3,550.00'	R = 950.00'
PC = 1000+00.00	PCC = 1001+84.10	PC = 1010+42.19
PCC = 1001+84.10	PT = 1004+29.30	PT = 1012+85.31
DS = 45 MPH	DS = 45 MPH	
E = 6.80%	E = 2.80%	

RT 112 RAMP B CURVE DATA

Curve C1
PI = 1103+34.12
DELTA = 26°44' 28.05" (RT)
D = 10° 25' 03"
T = 130.73'
L = 256.70'
R = 550.00'
PC = 1102+03.39
PT = 1104+60.09

RT 112 CURVE DATA

Curve RTE1121	Curve RTE1122
PI = 1403+80.39	PI = 1420+05.00
DELTA = 18° 37' 27.30" (RT)	DELTA = 4° 47' 32.11" (LT)
D = 1° 59' 57"	D = 1° 42' 17"
T = 940.39'	T = 140.81'
L = 1,864.91'	L = 281.45'
R = 5,735.00'	R = 3,365.00'
PC = 1400+00.00	PRC = 1418+64.19
PRC = 1418+64.19	PT = 1421+45.64

RT 112 LOOP D CURVE DATA

Curve C3	Curve C4	Curve C5
PI = 1201+28.61	PI = 1204+43.68	PI = 1206+87.39
DELTA = 54° 26' 40.24" (RT)	DELTA = 81° 18' 48.87" (RT)	DELTA = 48° 03' 22.32" (RT)
D = 22° 55' 06"	D = 23° 52' 24"	D = 23° 52' 24"
T = 1,016.6'	T = 2,106.12'	T = 1,017.00'
L = 1,237.56'	L = 3,406.8'	L = 1,201.30'
R = 250.00'	R = 240.00'	R = 240.00'
PC = 1200+00.00	PCC = 1202+37.56	PC = 1205+80.39
PCC = 1202+37.56	PT = 1206+78.06	PT = 1207+81.69
DS = 30 MPH	DS = 30 MPH	
E = 8.00%	E = 8.00%	

RT 112 RAMP D CURVE DATA

Curve C6	Curve C7
PI = 1304+18.43	PI = 1310+83.61
DELTA = 55° 55' 52.92" (LT)	DELTA = 52° 11' 47.76" (RT)
D = 19° 25' 20"	D = 10° 03' 01"
T = 156.63'	T = 279.22'
L = 287.98'	L = 519.27'
R = 295.00'	R = 570.00'
PC = 1302+61.80	PC = 1308+04.39
PT = 1305+49.78	PT = 1313+23.66
	DS = 40 MPH
	E = 7.80%

RT 112 LOOP D SPUR CURVE DATA

Curve RT112LPD_SPUR1
PI = 1501+75.75
DELTA = 65° 09' 48.89" (RT)
D = 20° 51' 05"
T = 175.75'
L = 312.76'
R = 275.00'
PC = 1500+00.00
PT = 1503+12.76
DS = 20 MPH
E = 3.00%

SHEET NO. 4

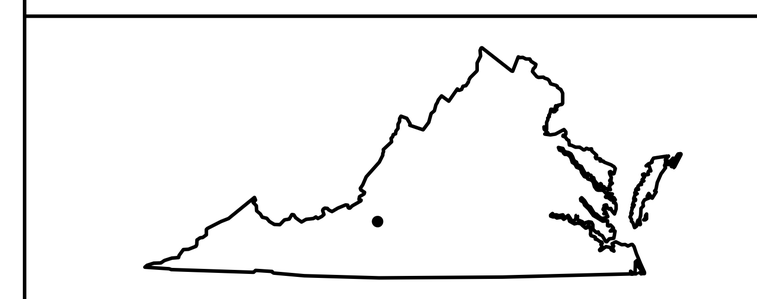
VDOT Virginia Department of Transportation

PLAN ROLL
I-81 WIDENING MM 136.6 TO 141.8

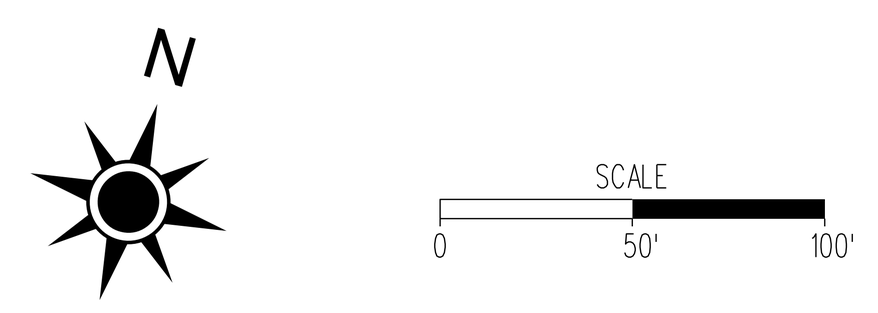
Appendix A

SHEET NO. 5

Project Location



North Arrow & Scale



Legend

- Proposed Full Depth Pavement
- Proposed Planing and Resurfacing/Build-Up
- Demolition of Pavement
- Low Maintenance Median Treatment
- Proposed Limits of Construction - Cut
- Proposed Limits of Construction - Fill
- Potential Location of Stormwater Facility
- Existing Right of Way
- Existing Easements
- Proposed Right of Way
- Proposed Permanent Drainage Easement
- Proposed Temporary Construction Easement
- Property Line
- Proposed Concrete Median Barrier
- Proposed Curbing
- Proposed Guardrail
- Proposed Retaining Wall

REFERENCES
(PROFILES,DETAIL & DRAINAGE DESCRIPTION SHEETS,ETC.)

Utility Owners	IF(2)
Construction Alignment Data	IG(1) - IG(9)
Profile Rolls	5A

RFP PLANS
For Information Only
DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.

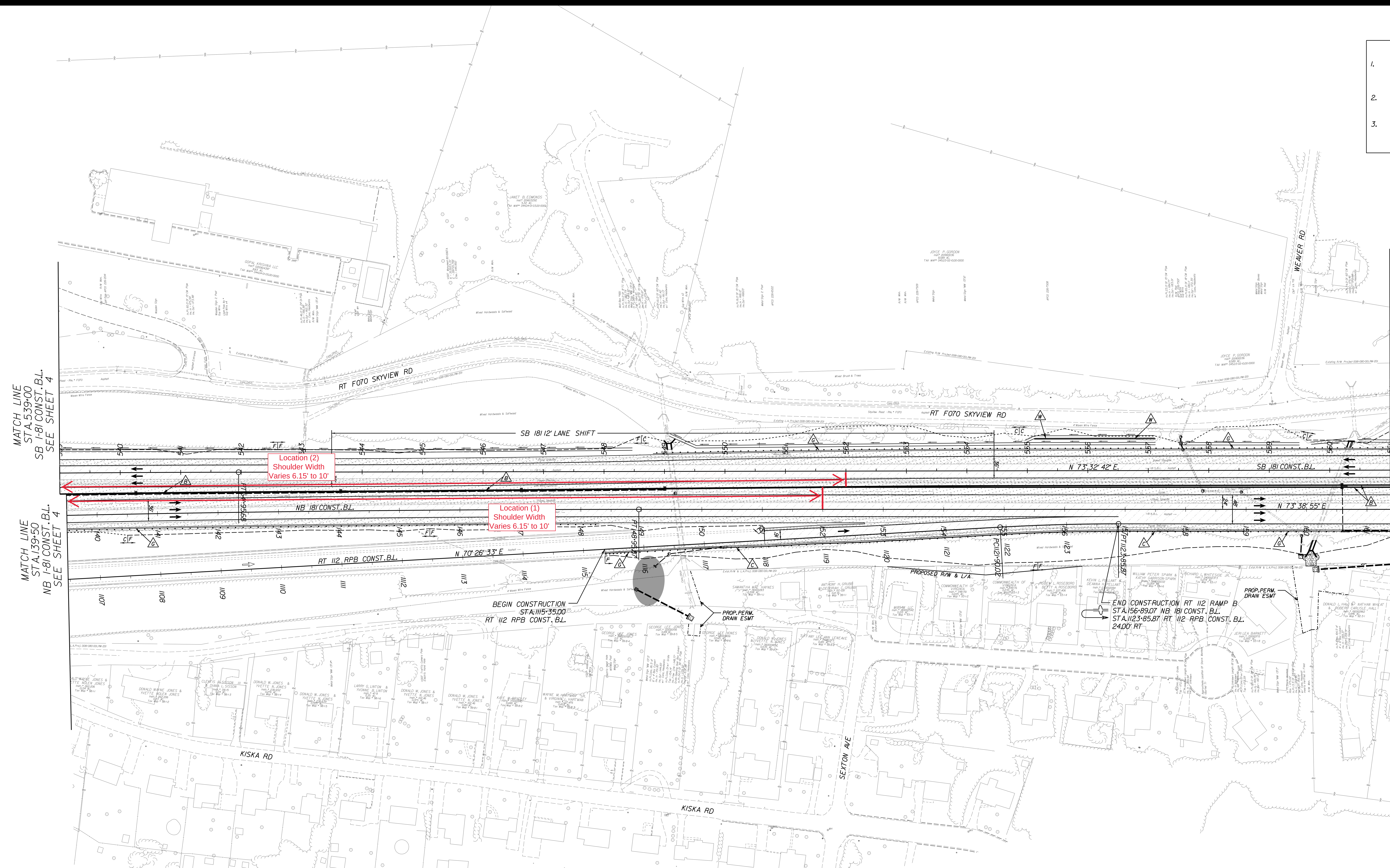
Contact Information

Craig Moore. PE
Project Manager / Assistant District L&D Engineer
Virginia Department of Transportation
731 Harrison Avenue
Salem, VA 24153

Comments may also be sent to:
I81-MM136-141@vdot.virginia.gov

I-81 Widening MM 136.6 to 141.8
Roanoke County / City of Salem, Virginia

0081-080-946, P101, R201, C501
UPC 116203
Federal Project Number



NOTES:

1. AREAS DENUDED DURING CONSTRUCTION MAY REQUIRE VEGETATION RESTORATION MEASURES.
2. INTERCHANGE, BRIDGE, AND CORRIDOR LIGHTING MAY BE REQUIRED.
3. SEE PRELIMINARY NOISE ANALYSIS TECHNICAL REPORT FOR POTENTIAL NOISE BARRIER LOCATIONS.

NB I81 CURVE DATA	SB I81 CURVE DATA	RT 112 RAMP B CURVE DATA
Curve TG4	Curve TG18	Curve C2
PI = 141+27.66	PI = 537+73.53	PI = 1122+87.97
DELTA = 1° 57' 23.12" (RT)	DELTA = 0° 58' 03.03" (RT)	DELTA = 3° 12' 22.20" (RT)
D = 0° 07' 38"	D = 0° 06' 53"	D = 1° 38' 13"
T = 768.36'	T = 422.17'	T = 97.95'
L = 1,536.57'	L = 844.31'	L = 195.85'
R = 45,000.00'	R = 50,000.00'	R = 3,500.00'
PC = 133+59.30	PC = 533+51.37	PC = 1121+90.02
PT = 148+95.87	PT = 541+95.68	PT = 1123+85.87
DS = 65 MPH	DS = 65 MPH	DS = 45 MPH
E = NC	E = NC	E = 2.80%

Virginia Department of Transportation

PLAN ROLL
I-81 WIDENING MM 136.6 TO 141.8

Appendix A

SHEET NO. 14

Project Location

North Arrow & Scale

Legend

- Proposed Full Depth Pavement
- Proposed Planing and Resurfacing/Build-Up
- Demolition of Pavement
- Low Maintenance Median Treatment
- C — Proposed Limits of Construction - Cut
- F — Proposed Limits of Construction - Fill
- Potential Location of Stormwater Facility
- Existing Right of Way
- Existing Easements
- Proposed Right of Way
- Proposed Permanent Drainage Easement
- Proposed Temporary Construction Easement
- Property Line
- B — Proposed Concrete Median Barrier
- C — Proposed Curbing
- G — Proposed Guardrail
- W — Proposed Retaining Wall

NOTES:

1. AREAS DENUDED DURING CONSTRUCTION MAY REQUIRE VEGETATION RESTORATION MEASURES.
2. INTERCHANGE, BRIDGE, AND CORRIDOR LIGHTING MAY BE REQUIRED.
3. SEE PRELIMINARY NOISE ANALYSIS TECHNICAL REPORT FOR POTENTIAL NOISE BARRIER LOCATIONS

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Utility Owners	IF(2)
Construction Alignment Data	IG(1) - IG(9)
Profile Rolls	14A - 14B

RFP PLANS
For Information Only

DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.

Contact Information

Craig Moore, PE
Project Manager / Assistant District L&D Engineer
Virginia Department of Transportation
731 Harrison Avenue
Salem, VA 24153

Comments may also be sent to:
I81-MM136-141@vdot.virginia.gov

I-81 Widening MM 136.6 to 141.8
Roanoke County / City of Salem, Virginia

0081-080-946, P101, R201, C501
UPC 116203
Federal Project Number

MATCH LINE STA.746+00 SB I-81 CONST.B.L. SEE SHEET 13

MATCH LINE STA.347+00 NB I-81 CONST.B.L. SEE SHEET 13

MATCH LINE STA.371+50 NB I-81 CONST.B.L. SEE INSET THIS SHEET

MATCH LINE STA.371+50 NB I-81 CONST.B.L. SEE INSET THIS SHEET

END PROJECT 0081-080-946, P101, R201, C501
END CONSTRUCTION STA.376+75.00 NB 181 CONST. B.L.
FOR INFORMATION ONLY DESIGN REFERENCED FROM 0081-080-903, C501 (Under Construction by Others)

END CONSTRUCTION STA.748+33.52 181 SB CONST. B.L.
STA.3314+31.25 RT 419 RPD CONST. B.L. 36.00' LT

BEGIN CONSTRUCTION STA.3311+75.00 RT 419 RPD CONST. B.L.

PROP. TEMP. CONST. ESMT.

RT 419 RPD CONST. B.L.

RT 419 LPD CONST. B.L.

END CONSTRUCTION STA.3203+00.00 RT 419 LPD CONST. B.L.

DO NOT DISTURB EXISTING MARKER/ MEMORIAL

RT 419 N ELECTRIC RD

BEGIN CONSTRUCTION STA.757+05.71 181/SB CONST. B.L.
STA.3200+00.00 RT 419 LPD CONST. B.L.

Location (5) Shoulder Width Varies 4.04' to 10'

Location (6) Shoulder Width Varies 7.8' to 10'

Location (3) Shoulder Width Varies 6.4' to 10'

Location (4) Shoulder Width Varies 6.58' to 10'

SB 181 CONST. B.L.

NB 181 CONST. B.L.

N 35° 30' 54" E

N 35° 06' 10" E

N 45° 36' 06" E

N 44° 47' 56" E

BEGIN PROJECT 0081-080-946, B681
STA.357+96.10 NB 181 CONST. B.L.

BEGIN CONSTRUCTION STA.362+04.09 181 NB CONST. B.L.
STA.3000+00.00 RT 419 LPB CONST. B.L. 24.00' RT

END PROJECT 0081-080-946, B682
STA.358+69.78 NB 181 CONST. B.L.

END CONSTRUCTION STA.3002+50.00 RT 419 LPB CONST. B.L.

POTENTIAL MODIFICATION OF BMP (UPC 108906)

RT 419 LPB CONST. B.L.

RT 419 RPB CONST. B.L.

BEGIN CONSTRUCTION STA.3111+00.00 RT 419 RPB CONST. B.L.

END CONSTRUCTION STA.369+43.82 181 NB CONST. B.L.
STA.3113+50.53 RT 419 RPB CONST. B.L. 24.00' RT

END CONSTRUCTION STA.763+00.00 SB 181 CONST. B.L.

FOR INFORMATION ONLY DESIGN REFERENCED FROM 0081-080-903, C501 (Under Construction by Others)

LOCH HAVEN DR

RT 780 COVE RD NW

S 50° 25' 36" W

N 40° 24' 08" E

N 18° 12' 01" W

POTENTIAL MODIFICATION OF BMP (UPC 108906)

EDWARD ROSE DEVELOPMENT COMPANY LLC
1001 ROSEWOOD
ANN ARBOR, MI 48103-0000
TAX MAP# 039J-D-042A0000

NB 181 CURVE DATA

Curve TG11
PI • 339+93.14
DELTA • 43° 04' 54.62" (LT)
D • 2° 05' 55"
T • 107.63'
L • 214.97'
R • 273.00'
PC • 329+15.51
PT • 349+68.25
DS • 65 MPH
E • 6.00%

Curve TG45
PI • 358+06.17
DELTA • 5° 13' 30.29" (RT)
D • 1° 29' 54"
T • 32.51'
L • 64.51'
R • 1150.00'
PC • 354+82.43
PCC • 36+29.74
DS • 65 MPH
E • 2.00%

Curve TG46
PI • 365+48.22
DELTA • 8° 03' 51.85" (RT)
D • 1° 43' 31"
T • 46.47'
R • 850.17'
R • 7.90.00'
PCC • 361+29.74
PT • 369+65.91
DS • 65 MPH
E • 2.40%

RT 419 LOOP B CURVE DATA

Curve C28
PI • 3001+04.11
DELTA • 43° 38' 37.64" (RT)
D • 22° 02' 13"
T • 104.11'
L • 198.05'
R • 260.00'
PC • 3000+00.00
PCC • 3001+98.05
DS • 25 MPH
E • 6.80%

Curve C29
PI • 3001+06.79
DELTA • 133° 13' 42.82" (RT)
D • 26° 02' 37"
T • 508.74'
L • 51.56'
R • 220.00'
PCC • 3000+98.05
PCC • 3001+09.61
DS • 25 MPH
E • 7.30%

Curve C30
PI • 3001+42.83
DELTA • 14° 16' 49.84" (RT)
D • 16° 36' 27"
T • 43.22'
L • 85.99'
R • 345.00'
PCC • 3001+09.61
PT • 3001+95.60

RT 419 LOOP D CURVE DATA

Curve C23
PI • 3204+28.51
DELTA • 96° 10' 33.78" (RT)
D • 14° 52' 55"
T • 428.31'
L • 646.26'
R • 385.00'
PC • 3200+00.00
PCC • 3206+46.26
DS • 25 MPH
E • 5.80%

Curve C24
PI • 3209+00.60
DELTA • 93° 19' 22.79" (RT)
D • 23° 52' 24"
T • 254.34'
L • 390.91'
R • 240.00'
PCC • 3206+46.26
PT • 3210+37.17

SB 181 CURVE DATA

Curve TG26
PI • 745+10.88
DELTA • 19° 40' 37.17" (LT)
D • 1° 54' 08"
T • 522.35'
L • 1034.61'
R • 3.01.20'
PCC • 739+88.53
PT • 750+22.94
DS • 65 MPH
E • 5.60%

Curve TG27
PI • 768+56.32
DELTA • 7° 45' 13.39" (RT)
D • 0° 42' 30"
T • 548.61'
L • 1094.53'
R • 8.088.00'
PCC • 763+08.22
PCC • 774+0275

RT 419 RAMP B CURVE DATA

Curve C21
PI • 3105+90.33
DELTA • 56° 36' 08.85" (LT)
D • 21° 13' 14"
T • 145.39'
L • 266.73'
R • 270.00'
PC • 3104+44.95
PT • 3107+11.68

Curve C22
PI • 3111+61.66
DELTA • 60° 50' 20.09" (RT)
D • 14° 19' 26"
T • 234.86'
L • 424.74'
R • 400.00'
PC • 3109+25.79
PT • 3113+50.53
DS • 35 MPH
E • 7.30%

RT 419 RAMP D CURVE DATA

Curve C25
PI • 3305+55.79
DELTA • 91° 35' 12.49" (LT)
D • 17° 54' 18"
T • 328.99'
L • 514.52'
R • 320.00'
PC • 3302+26.81
PT • 3307+38.32

Curve C26
PI • 331+97.35
DELTA • 88° 34' 12.76" (RT)
D • 13° 58' 28"
T • 399.89'
L • 633.80'
R • 410.00'
PC • 3307+97.46
PT • 3314+31.25
DS • 35 MPH
E • 7.80%

SHEET NO. 14

Appendix B

I-81 Crash Summary Within Design Exception Areas

DE Location	Station [1]	Mile Marker	Direction	Vehicle 1 [a]	Vehicle 2 [b]	Crash Location [e]	Crash ID	Type of Collision	Injury
1	139+50	137.4	NB	Car [c]	Car [c]	Inside Lane/Shoulder	15861977	Sideswipe - Same Direction	None
	142+00	137.4	NB	Car [c]	Car [c]	Inside Lane	15547702	Angle	None
	149+00	137.5	NB	Car [c]	-	Inside Shoulder	15114196	Fixed Object - Off Road	Minor
	149+00	137.5	NB	Car [c]	Car [c]	Inside Lane	15473621	Rear End	None
	151+00	137.5	NB	Car [c]	Car [c]	Inside Lane/Shoulder	15576327	Rear End	None
	153+00	137.6	NB	Heavy Truck [d]	-	Both	15153806	Non-Collision - Overturned	Minor
2	538+50	137.3	SB	Heavy Truck [d]	Heavy Truck [d]	Inside Lane/Outside Shoulder	15436048	Rear End	None
	541+00	137.4	SB	Car [c]	Heavy Truck [d]	Inside Lane/Shoulder	15622911	Sideswipe - Same Direction	None
3	350+00	141.3	NB	Car [c]	Car [c]	Inside Lane	15851709	Sideswipe - Same Direction	None
	354+50	141.4	NB	Car [c]	Car [c]	Inside Lane/Shoulder	15031606	Rear End	None
	355+00	141.4	NB	Car [c]	-	Both	15304083	Fixed Object - Off Road	Minor
	355+50	141.4	NB	Car [c]	Car [c]	Inside Lane	15432784	Rear End	None
	356+50	141.4	NB	Car [c]	-	Inside Lane/Shoulder	15850924	Fixed Object - Off Road	None
5	747+50	141.3	SB	Car [c]	Car [c]	Inside Lane	15065990	Rear End	None

Notes

(1) All stations are approximated based on the GPS coordinates provided in the crash report.

(2) Any additional vehicles involved in the accident are not included in this table.

(3) Collisions with deer not included within this summary.

Definitions:

(a) Vehicle 1 - Vehicle most at fault

(b) Vehicle 2 - Vehicle less or not at fault

(c) Car - Passenger vehicle weighing less than 10,000 lbs.

(d) Heavy Truck - Vehicle weighing more than 10,000 lbs.

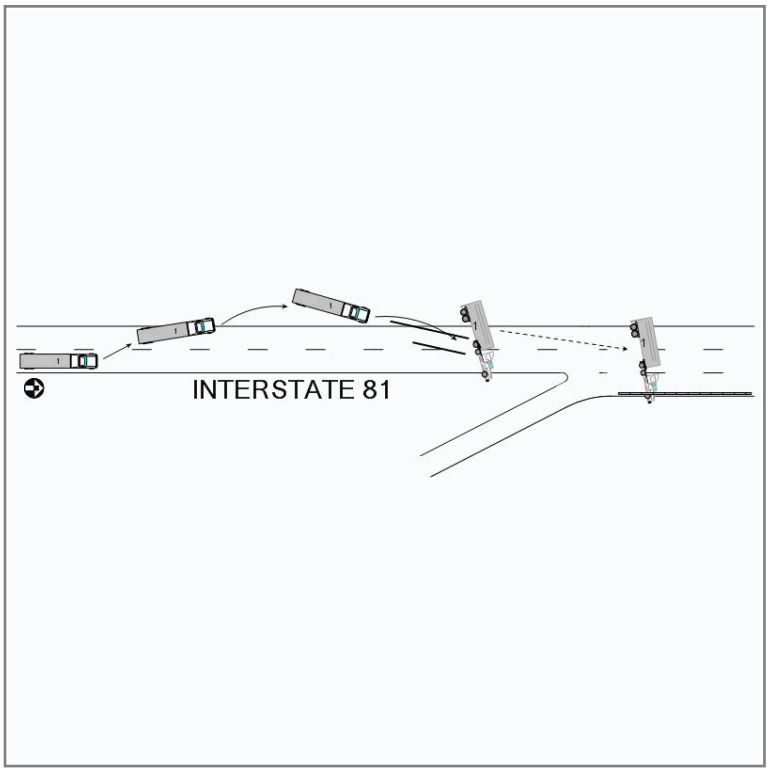
(e) Crash Location - Indicates the side of roadway the vehicle crashed.

'Both' indicates vehicle ran off to once side of the road, and swerved across the travel lanes to the other side of the road.

Crash Report

Document Number	170085018			Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	0			County of Crash	Roanoke	37.295260	-80.092690
Crash Date	Friday	01/06/2017	105	Landmarks at Scene			
City / Town of				Railroad Crossing ID			
Location of Crash	INTERSTATE 81 No - At Intersection With or 0.10 Miles North of x					Mile Marker Number 137.40	Number of Vehicles 1

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	1
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	3. Median	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	1. Main-Line Roadway
Light Condition	5. Darkness - Road Not Lighted	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	3. Grade - Straight	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	8. Non-Collision

Crash Description

VEHICLE 1 MADE AN ERRATIC LANE CHANGE AND WENT INTO THE MEDIAN. THE OPERATOR OVER-CORRECTED AND LOST CONTROL CAUSIN VEHICLE TO OVERTURN AND STRUCK THE GUARD RAIL.

Crash Report

Driver Information 10/15/1989 Age 27

Driver's Action	40. Fail to Maintain Proper Control
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	6. Unknown
Method of Alcohol Determination	Not Applicable
Drug Use	3. Unknown
Driver's License	
Commercial Driver's License	Yes
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	3. Minor/Possible Injury
EMS Transport	Yes
Summons Issued	1. Yes

Vehicle Information 1

Vehicle Maneuver	14. Changing Lanes
Skidding Tire / Mark	2. After Application of Brakes
Vehicle Body Type	23. Truck - Single Unit Truck (3 Axles or More)
Vehicle Damage	6. Totaled
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	Yes
Towed	Yes
Oversized	No
Cargo Spill	No
Override	No
Underride	No
Initial Impact Area	9. Left side - middle
Direction of Travel	North
Crash Events: 1.	28. Ran Off Road
2.	30. Overturn (Rollover)
3.	5. Guard Rail
4.	Not Provided
Most Harmful	30. Overturn (Rollover)

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
65	60	60	0	0	0	0

Weight over 10,000 lbs: Yes | Seats 9 or more: No | Hazardous Materials Placard: No

Commercial Motor Vehicle Section

Vehicle Configuration	9. Tractor/Semi-trailer (One Trailer)		
Cargo Body Type	3. Van/Enclosed Box	License Class	
GVWR/GCWR	3. Greater Than 26,000 lbs.	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	No	HM Class	
HM 4-Digit		HM Cargo Present	No
HM Placard Name		HM Cargo Released	No

Carrier Identification

Commericial Motor Carrier Name	FONTANA
US DOT# / State	
Commercial / Non-Commercial	1. Interstate Carrier

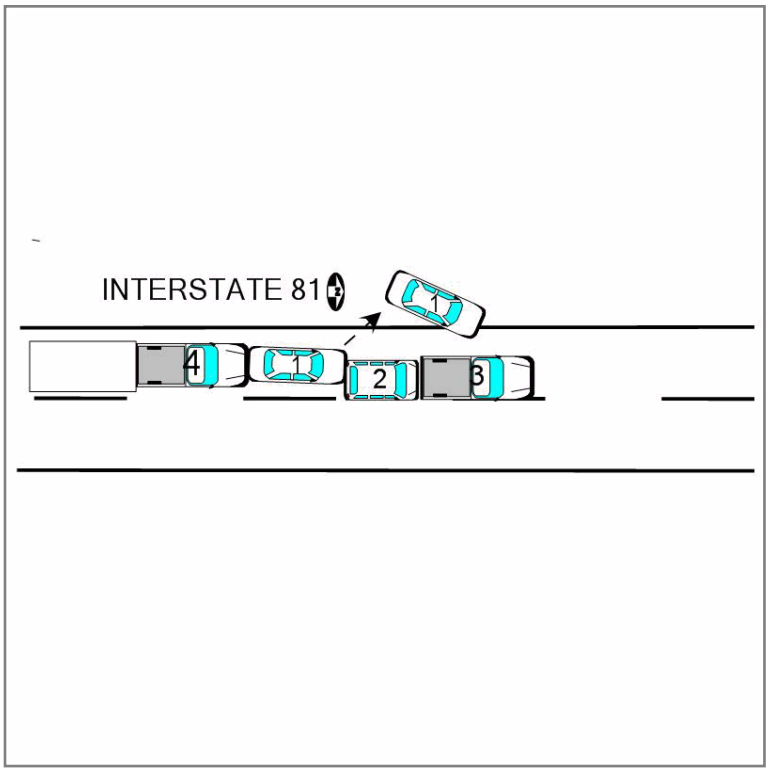
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	171885317	Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	0	County of Crash	Roanoke	37.323340	-80.034460
Crash Date	Friday 07/07/2017 1520	Landmarks at Scene			
City / Town of		Railroad Crossing ID			
Location of Crash	INTERSTATE 81 HSC No - At Intersection With or 100.00 Feet South of ROUTE 419			Mile Marker Number 141.40	Number of Vehicles 4

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	1. Main-Line Roadway
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	1. Rear End

Crash Description

VEHICLE #3 WAS SLOWING FOR HEAVY TRAFFIC. VEHICLE #1 STRUCK VEHICLE #2 AND PUSHED VEHICLE #2 INTO VEHICLE #3. VEHICLE #4 T
STRUCK VEHICLE #1 IN THE REAR.

Crash Report

Driver Information 07/08/1994 Age 22

Driver's Action	12. Following Too Close
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Vehicle Information 1

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	1. Passenger car
Vehicle Damage	6. Totaled
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	20. Motor Vehicle In Transport
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
60	60	40	0	0	0	0

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided
Cargo Body Type	Not Provided
GVWR/GCWR	Not Provided
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	
HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Driver Information 11/28/1967 Age 49

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	5. Slowing or Stopping
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	2. No

Vehicle Body Type	1. Passenger car
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No
Commercial Motor Vehicle	No
Towed	No
Oversized	No
Override	No
Initial Impact Area	6. Rear
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	20. Motor Vehicle In Transport
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill	No
Underride	No

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
40	60	40	1	1	0	1

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Driver Information 12/30/1975 Age 41

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed

Vehicle Information 3

Vehicle Maneuver	5. Slowing or Stopping
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	2. Truck - Pick-up/Passenger Truck
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No

Crash Report

Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	No
Date of Death		Towed	No
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	6. Rear
Summons Issued	2. No	Direction of Travel	North
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
40	60	40	0	0	0	0

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Driver Information

11/28/1959 Age 57

Driver's Action	12. Following Too Close
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	Yes
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Vehicle Information

4

Vehicle Maneuver	1. Going Straight Ahead		
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark		
Vehicle Body Type	2. Truck - Pick-up/Passenger Truck		
Vehicle Damage	8. Other		
Vehicle Condition	1. No Defects		
Spec. Function Motor Vehicle	1. No Special Function		
EMV in service	Not Applicable		
Truck Cover	Not Applicable		
Vehicle Disabled	No		
Commercial Motor Vehicle	No		
Towed	No		
Oversized	No	Cargo Spill	No
Override	No	Underride	No
Initial Impact Area	12. Front		
Direction of Travel	North		
Crash Events: 1.	20. Motor Vehicle In Transport		

Crash Report

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
60	60	40	0	1	0	1

2. Not Provided
3. Not Provided
4. Not Provided

Most Harmful 20. Motor Vehicle In Transport

Weight over 10,000 lbs No

Seats 9 or more No

Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration Not Provided

Cargo Body Type Not Provided

GVWR/GCWR Not Provided

License Class

Commercial Endorsement

Hazardous Material

Hazardous Material Placard

HM 4-Digit

HM Placard Name

HM Class

HM Cargo Present

HM Cargo Released

Carrier Identification

Commericial Motor Carrier Name

US DOT# / State

Commercial / Non-Commercial Not Provided

Passenger Information

EMS Transport

Date of Death

Position In / On Vehicle

Safety Equip Used

Airbag Deployment Type

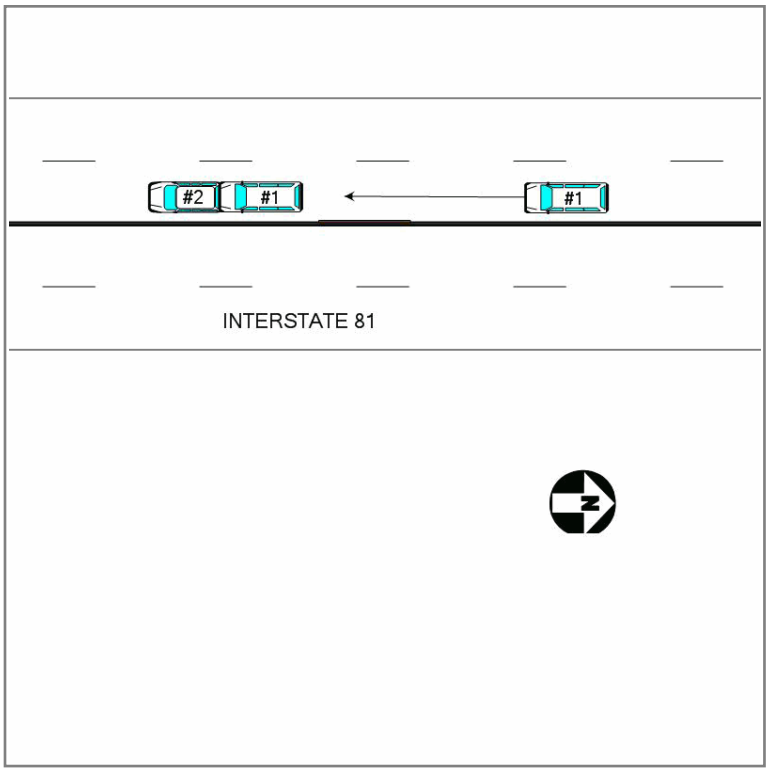
Ejected from Vehicle Type

Injury Type

Crash Report

Document Number	172335215	Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	0	County of Crash	Roanoke	37.322160	-80.035540
Crash Date	Sunday 08/20/2017 1035	Landmarks at Scene			
City / Town of		Railroad Crossing ID			
Location of Crash	INTERSTATE 81 No - At Intersection With or 0.20 Miles South of ROUTE 419			Mile Marker Number	Number of Vehicles: 2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	1. Main-Line Roadway
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	6. Traffic Lanes Marked	Work Zone Workers Present	Not Provided
Roadway Alignment	7. Dip - Straight	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	1. Rear End

Crash Description

VEHICLE #2 WAS STOPPED IN THE TRAVEL LANE DUE TO ANOTHER MOTOR VEHICLE ACCIDENT. VEHICLE #1 THEN RAN INTO THE BACK OF VEHICLE #2. VEHICLE #1, FRONT END DAMAGE. VEHICLE #2, DAMAGE TO THE RIGHT REAR.

Crash Report

Driver Information 04/13/1970 Age 47

Driver's Action	12. Following Too Close
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
40	60	0	2	0	0	0

Vehicle Information 1

Vehicle Maneuver	5. Slowing or Stopping
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	3. Van
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	South
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided
Cargo Body Type	Not Provided
GVWR/GCWR	Not Provided
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	
HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Driver Information 07/09/1946 Age 71

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	8. Stopped in Traffic Lane
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction	Vehicle Body Type	22. Truck - Sport Utility Vehicle (SUV)
Drinking	1. Had Not Been Drinking		
Method of Alcohol Determination	Not Applicable	Vehicle Damage	8. Other
Drug Use	2. No	Vehicle Condition	1. No Defects
Driver's License		Spec. Function Motor Vehicle	1. No Special Function
Commercial Driver's License	NotProvided	EMV in service	Not Applicable
Safety Equipment Used	3. Lap and Shoulder Belt	Truck Cover	Not Applicable
Air Bag	2. Not Deployed	Vehicle Disabled	Yes
Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	No
Date of Death		Towed	Yes
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	6. Rear
Summons Issued	2. No	Direction of Travel	West
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
0	60	0	0	0	0	0

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

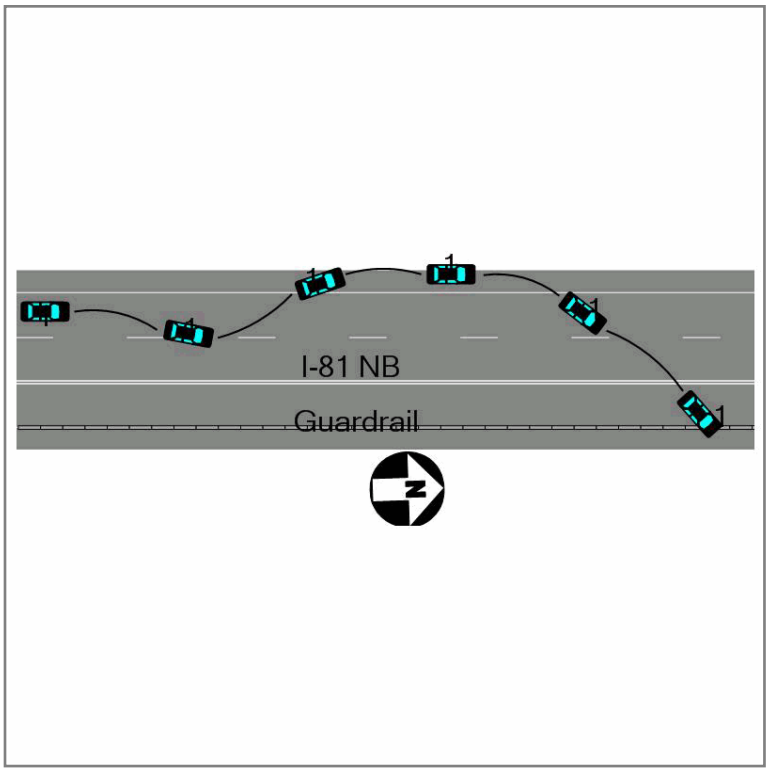
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	170725106	Jurisdiction	City of Salem	GPS Lat.	GPS Long.
Revised Report	0	County of Crash		37.323570	-80.034170
Crash Date	Friday 03/10/2017 1200	Landmarks at Scene			
City / Town of	Salem	Railroad Crossing ID			
Location of Crash	I-81 NB (HSC) No - At Intersection With or 0.10 Miles South of x			Mile Marker Number 141.50	Number of Vehicles 1

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	1
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	1. Main-Line Roadway
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	9. Fixed Object - Off Road

Crash Description

DRIVER OF VEHICLE 1 LOST CONTROL OF VEHICLE CAUSING HER TO RUN OFF THE LEFT SIDE OF THE ROAD, THEN RAN OFF THE RIGHT SIDI ROAD AND STRUCK A GUARDRAIL.

Crash Report

Driver Information 11/14/1996 Age 20

Driver's Action	40. Fail to Maintain Proper Control
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	3. Minor/Possible Injury
EMS Transport	Yes
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
60	60	60	1	0	0	0

Vehicle Information 1

Vehicle Maneuver	10. Ran Off Road - Left
Skidding Tire / Mark	1. Before Application of Brakes
Vehicle Body Type	1. Passenger car
Vehicle Damage	6. Totaled
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	North
Crash Events: 1.	28. Ran Off Road
2.	28. Ran Off Road
3.	5. Guard Rail
4.	Not Provided
Most Harmful	5. Guard Rail

Cargo Spill No

Underride No

Weight over 10,000 lbs No

Seats 9 or more No

Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

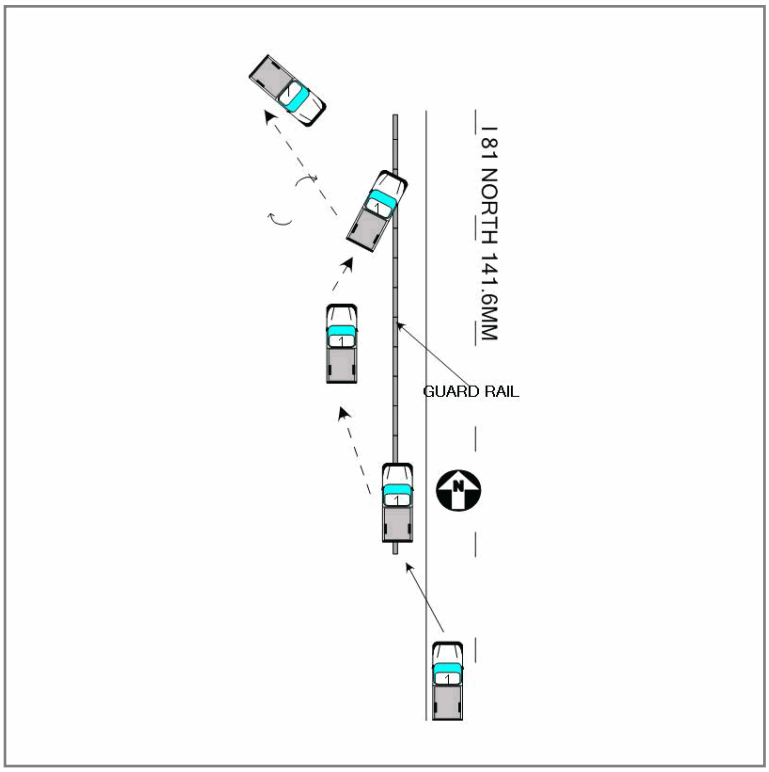
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	192555012	Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	0	County of Crash	Roanoke	37.323990	-80.033980
Crash Date	Wednesday 09/11/2019 518	Landmarks at Scene			
City / Town of		Railroad Crossing ID			
Location of Crash	I 81 SOUTH No - At Intersection With or 50.00 Feet South of RT 419			Mile Marker Number 141.60	Number of Vehicles 1

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	3. Median	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	5. Darkness - Road Not Lighted	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	9. Fixed Object - Off Road

Crash Description

VEHICLE #1 STRUCK GUARD RAIL, LOST CONTROL THEN STRUCK GUARD RAIL AGAIN

Crash Report

Driver Information 02/08/1965 Age 54

Driver's Action	40. Fail to Maintain Proper Control
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	NotProvided
Summons Issued	1. Yes

Vehicle Information 1

Vehicle Maneuver	10. Ran Off Road - Left
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	2. Truck - Pick-up/Passenger Truck
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	2. No
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Cargo Spill	No
Override	No
Underride	No
Initial Impact Area	11. Left side - front corner
Direction of Travel	North
Crash Events: 1.	28. Ran Off Road
2.	5. Guard Rail
3.	5. Guard Rail
4.	Not Provided
Most Harmful	5. Guard Rail

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
60	60	60	0	0	0	0

Weight over 10,000 lbs No

Seats 9 or more No

Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided
Cargo Body Type	Not Provided
GVWR/GCWR	Not Provided
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	
HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

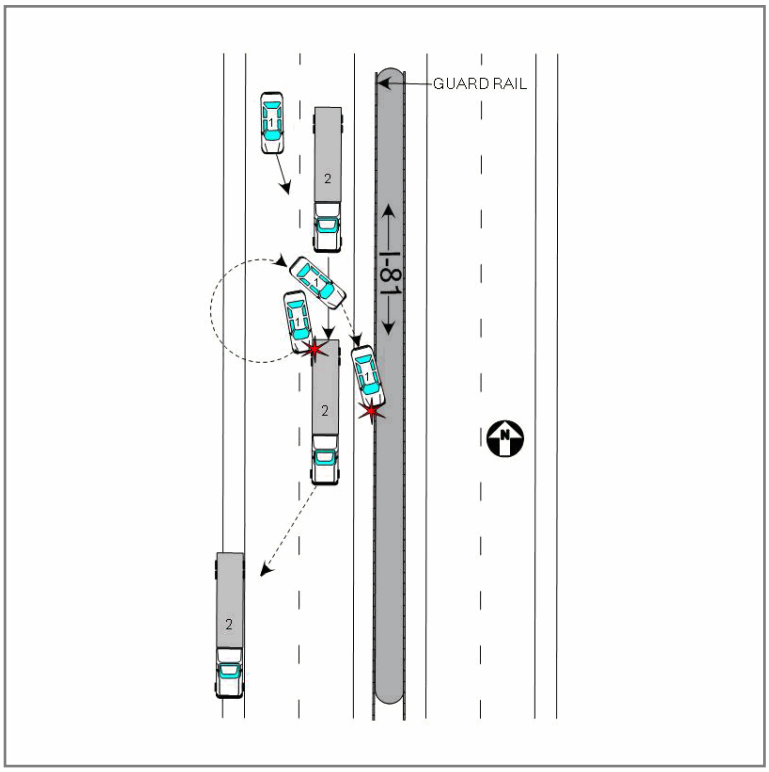
Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Crash Report

Document Number	183555288			Jurisdiction	City of Salem	GPS Lat.	GPS Long.
Revised Report	0			County of Crash		37.294370	-80.096820
Crash Date	Tuesday	12/18/2018	835	Landmarks at Scene			
City / Town of	Salem			Railroad Crossing ID			
Location of Crash	I-81					Mile Marker Number	Number of Vehicles
	No - At Intersection With or 0.30 Miles North of EXIT 137					137.30	2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	1. Main-Line Roadway
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	4. Sideswipe - Same Direction

Crash Description

V1 ATTEMPTED A LANE CHANGE STRIKING V2 CAUSING SAME DIRECTION SIDESWIPE DAMAGE, V1 THEN LOST CONTROL STRIKING THE GUA ON THE LEFT SHOULDER.

THE ONLY DAMAGE TO V2 WAS THE DOT BUMPER ON THE TRAILER.
TRAILER REGISTRATION: 2128646 STATE: ME
VIN # 1DW1A5321DS362533

Crash Report

Driver Information 09/10/1978 Age 40

Driver's Action	42. Improper or Unsafe Lane Change
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	No
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
50	60	60	0	0	0	0

Vehicle Information 1

Vehicle Maneuver	14. Changing Lanes
Skidding Tire / Mark	1. Before Application of Brakes
Vehicle Body Type	1. Passenger car
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Cargo Spill	No
Override	No
Underride	No
Initial Impact Area	11. Left side - front corner
Direction of Travel	South
Crash Events: 1.	20. Motor Vehicle In Transport
2.	28. Ran Off Road
3.	5. Guard Rail
4.	Not Provided
Most Harmful	5. Guard Rail

Weight over 10,000 lbs	Yes	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Driver Information 05/08/1966 Age 52

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction	Vehicle Body Type	23. Truck - Single Unit Truck (3 Axles or More)
Drinking	1. Had Not Been Drinking		
Method of Alcohol Determination	Not Applicable	Vehicle Damage	8. Other
Drug Use	2. No	Vehicle Condition	1. No Defects
Driver's License		Spec. Function Motor Vehicle	1. No Special Function
Commercial Driver's License	Yes	EMV in service	Not Applicable
Safety Equipment Used	3. Lap and Shoulder Belt	Truck Cover	1. Yes
Air Bag	2. Not Deployed	Vehicle Disabled	No
Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	Yes
Date of Death		Towed	No
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	5. Right side - rear corner
Summons Issued	2. No	Direction of Travel	South
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
60	60	60	0	0	0	0

Weight over 10,000 lbs	Yes	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	9. Tractor/Semi-trailer (One Trailer)		
Cargo Body Type	15. Other Cargo Body (Not Listed Above)	License Class	
GVWR/GCWR	2. 10,001-26,000 lbs.	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	No	HM Class	
HM 4-Digit		HM Cargo Present	No
HM Placard Name		HM Cargo Released	No

Carrier Identification

Commericial Motor Carrier Name	ROARING SPRING
US DOT# / State	
Commercial / Non-Commercial	1. Interstate Carrier

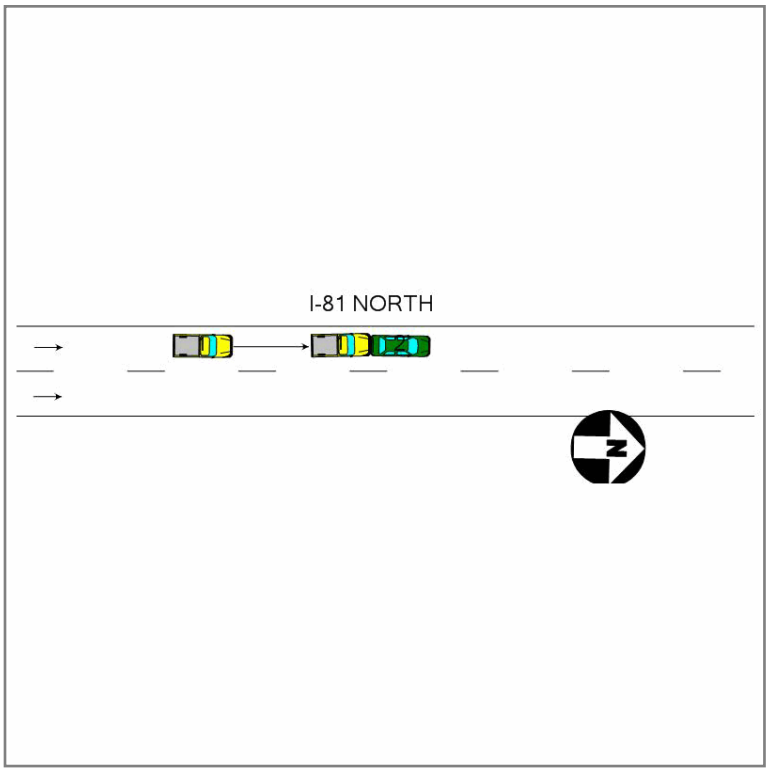
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	182265107			Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	0			County of Crash	Roanoke	37.323950	-80.033940
Crash Date	Monday	08/13/2018	900	Landmarks at Scene			
City / Town of				Railroad Crossing ID			
Location of Crash	I-81 NORTH No - At Intersection With or 200.00 Feet South of RT. 419 ELECTRIC RD					Mile Marker Number 141.60	Number of Vehicles 2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	6. Traffic Lanes Marked	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	1. Rear End

Crash Description

VEHICLE 2 STOPPED IN ROADWAY DUE TO TRAFFIC AND WAS STRUCK BY VEHICLE 1.

Crash Report

Driver Information 01/17/1950 Age 68

Driver's Action	12. Following Too Close
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
45	60	0	0	0	0	0

Vehicle Information 1

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	2. Truck - Pick-up/Passenger Truck
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No
Commercial Motor Vehicle	No
Towed	No
Oversized	No
Override	No
Initial Impact Area	6. Rear
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Driver Information 09/22/1960 Age 57

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	8. Stopped in Traffic Lane
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction	Vehicle Body Type	1. Passenger car
Drinking	1. Had Not Been Drinking		
Method of Alcohol Determination	Not Applicable	Vehicle Damage	8. Other
Drug Use	2. No	Vehicle Condition	1. No Defects
Driver's License		Spec. Function Motor Vehicle	1. No Special Function
Commercial Driver's License	NotProvided	EMV in service	Not Applicable
Safety Equipment Used	3. Lap and Shoulder Belt	Truck Cover	Not Applicable
Air Bag	2. Not Deployed	Vehicle Disabled	No
Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	No
Date of Death		Towed	No
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	12. Front
Summons Issued	2. No	Direction of Travel	North
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
0	60	0	0	0	0	0

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No
Cargo Spill	No				
Underride	No				

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

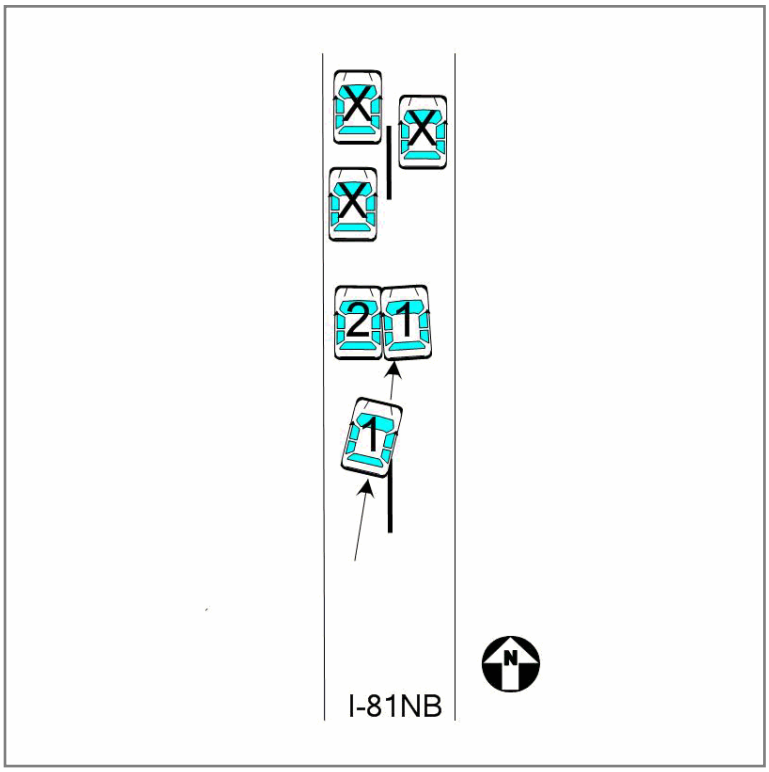
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	192565021	Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	0	County of Crash	Roanoke	37.322150	-80.035550
Crash Date	Wednesday 09/11/2019 1730	Landmarks at Scene			
City / Town of		Railroad Crossing ID			
Location of Crash	I-81NB No - At Intersection With or 0.20 Miles South of RT 419			Mile Marker Number 141.40	Number of Vehicles 2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	4. Sideswipe - Same Direction

Crash Description

VEH 2 SLOWING FOR BACKED UP TRAFFIC (VEH'S X). VEH 1 CHANGING LANES, LOST CONTROL AND STRUCK SIDE OF VEH 2.

Crash Report

Driver Information 07/15/1998 Age 21

Driver's Action	40. Fail to Maintain Proper Control
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
50	60	40	2	0	0	1

Vehicle Information 1

Vehicle Maneuver	14. Changing Lanes
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	1. Passenger car
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No
Commercial Motor Vehicle	No
Towed	No
Oversized	No
Override	No
Initial Impact Area	9. Left side - middle
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Driver Information 07/17/1991 Age 28

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	5. Slowing or Stopping
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction	Vehicle Body Type	2. Truck - Pick-up/Passenger Truck
Drinking	1. Had Not Been Drinking		
Method of Alcohol Determination	Not Applicable	Vehicle Damage	8. Other
Drug Use	2. No	Vehicle Condition	1. No Defects
Driver's License		Spec. Function Motor Vehicle	1. No Special Function
Commercial Driver's License	NotProvided	EMV in service	Not Applicable
Safety Equipment Used	3. Lap and Shoulder Belt	Truck Cover	2. No
Air Bag	2. Not Deployed	Vehicle Disabled	No
Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	No
Date of Death		Towed	No
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	4. Right side - rear
Summons Issued	2. No	Direction of Travel	North
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Cargo Spill: No
Underride: No

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
40	60	40	0	0	0	0

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name			
US DOT# / State			
Commercial / Non-Commercial	Not Provided		

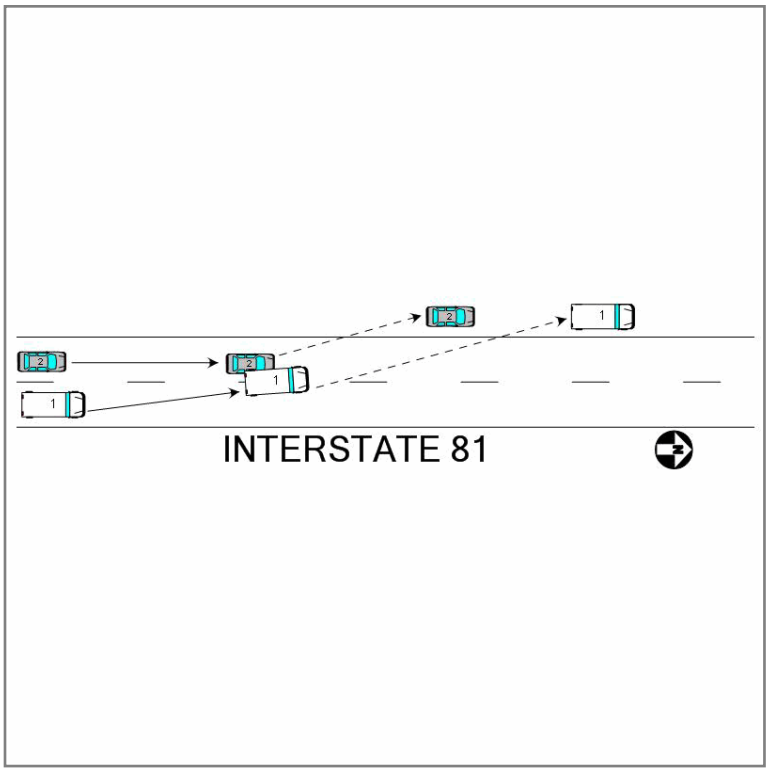
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	192695384		Jurisdiction	Roanoke County		GPS Lat.	GPS Long.
Revised Report	1		County of Crash	ROANOKE COUNTY		37.294081	-80.097282
Crash Date	Monday	09/23/2019 1325	Landmarks at Scene				
City / Town of			Railroad Crossing ID				
Location of Crash	INTERSTATE 81 No - At Intersection With or 0.20 Miles North of ROUTE 112				Mile Marker Number 137.30		Number of Vehicles 2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	1. Main-Line Roadway
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	3. Grade - Straight	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	4. Sideswipe - Same Direction

Crash Description

VEHICLE 2 WAS TRAVELING NORTH IN THE LEFT LANE. VEHICLE 1 CHANGED LANES FROM RIGHT TO LEFT AND STRUCK VEHICLE 2.

Crash Report

Driver Information 02/12/1962 Age 57

Driver's Action	42. Improper or Unsafe Lane Change
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	No
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
65	60	60	0	0	0	0

Vehicle Information 1

Vehicle Maneuver	14. Changing Lanes
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	4. Truck - Single Unit Truck (2-Axles)
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No
Commercial Motor Vehicle	Yes
Towed	No
Oversized	No
Override	No
Initial Impact Area	8. Left side - rear
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs Yes
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	5. Single Unit Truck (2 Axles, 6 Tires)
Cargo Body Type	3. Van/Enclosed Box
GVWR/GCWR	2. 10,001-26,000 lbs.
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	No
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	No
HM Cargo Released	No

Carrier Identification

Commericial Motor Carrier Name	MOUNT AIRY
US DOT# / State	
Commercial / Non-Commercial	1. Interstate Carrier

Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Driver Information 09/11/1988 Age 31

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction	Vehicle Body Type	1. Passenger car
Drinking	1. Had Not Been Drinking		
Method of Alcohol Determination	Not Applicable	Vehicle Damage	8. Other
Drug Use	2. No	Vehicle Condition	1. No Defects
Driver's License		Spec. Function Motor Vehicle	1. No Special Function
Commercial Driver's License	NotProvided	EMV in service	Not Applicable
Safety Equipment Used	3. Lap and Shoulder Belt	Truck Cover	Not Applicable
Air Bag	2. Not Deployed	Vehicle Disabled	Yes
Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	No
Date of Death		Towed	Yes
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	3. Right side - middle
Summons Issued	2. No	Direction of Travel	North
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
70	60	60	0	0	0	0

Weight over 10,000 lbs	Yes	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name			
US DOT# / State			
Commercial / Non-Commercial	Not Provided		

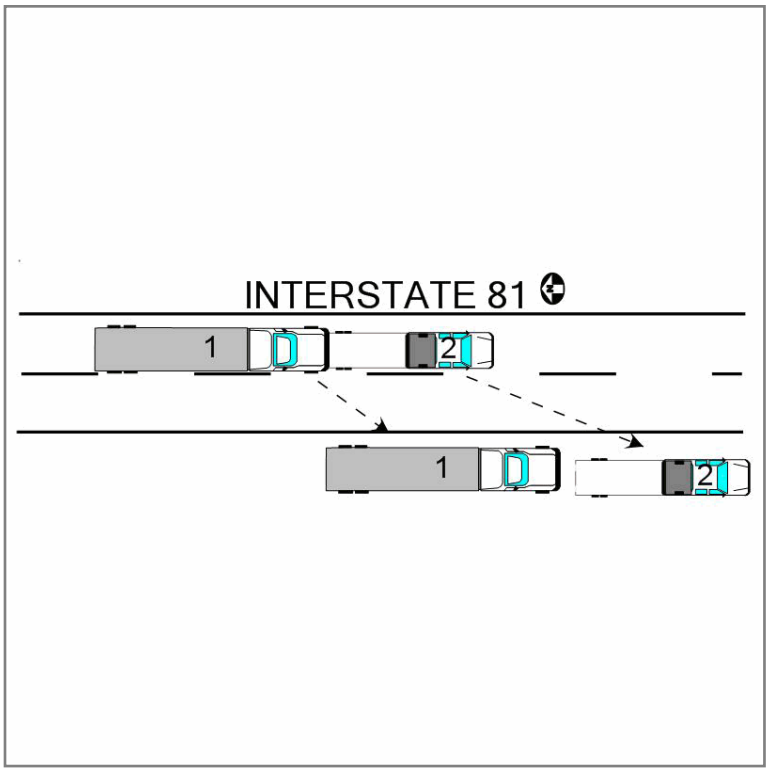
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	182295165			Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	0			County of Crash	Roanoke	37.294130	-80.097700
Crash Date	Friday	08/17/2018	934	Landmarks at Scene			
City / Town of				Railroad Crossing ID			
Location of Crash	INTERSTATE 81 (HSC) No - At Intersection With or 0.10 Miles North of ROUTE 112					Mile Marker Number 137.00	Number of Vehicles 2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	3. Grade - Straight	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	2. Two-Way, Divided, Unprotected Median	Type of Collision	1. Rear End

Crash Description

VEHICLE #2 SLOWED FOR TRAFFIC AHEAD, VEHICLE #1 STRUCK THE TRAILER THAT VEHICLE #2 WAS TOWING.
DRIVER OF VEHICLE #1 ADVISED THAT HE WAS LOOKING AT HIS MIRROR ON THE RIGHT WHEN HE STRUCK THE OTHER VEHICLE.

Crash Report

Driver Information 01/09/1984 Age 34

Driver's Action	12. Following Too Close
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	11. Other
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	Yes
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
65	60	60	0	0	0	0

Vehicle Information 1

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	23. Truck - Single Unit Truck (3 Axles or More)
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	1. Yes
Vehicle Disabled	No
Commercial Motor Vehicle	Yes
Towed	No
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	South
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Driver Information 06/29/1990 Age 28

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	5. Slowing or Stopping
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	Yes
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	2. No

Vehicle Body Type	4. Truck - Single Unit Truck (2-Axles)
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No
Commercial Motor Vehicle	No
Towed	No
Oversized	No
Override	No
Initial Impact Area	6. Rear
Direction of Travel	South
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill	No
Underride	No

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
60	60	60	0	0	0	0

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

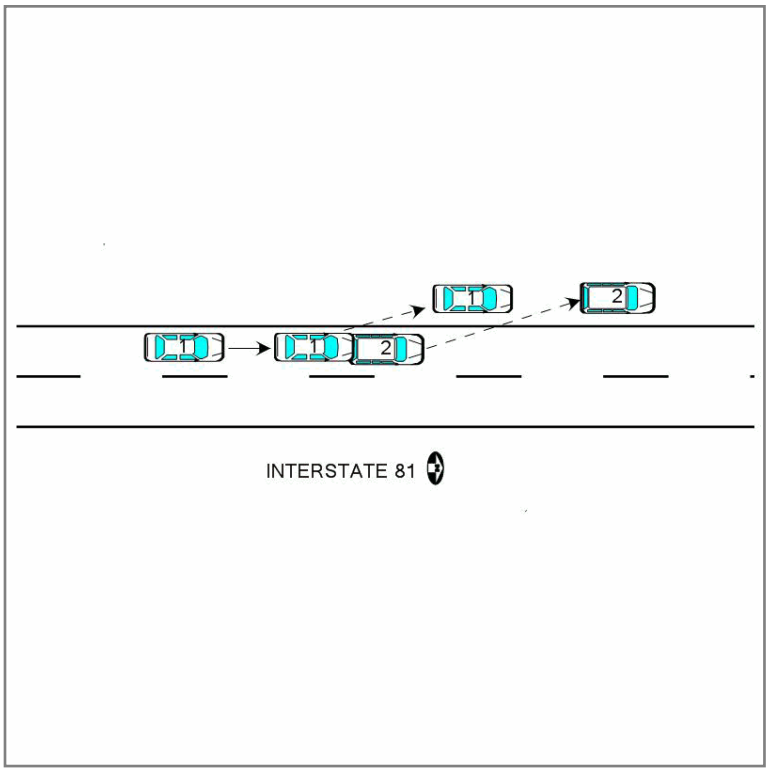
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	183265115	Jurisdiction	City of Salem	GPS Lat.	GPS Long.
Revised Report	0	County of Crash		37.295280	-80.092530
Crash Date	Wednesday 11/21/2018 1245	Landmarks at Scene			
City / Town of	Salem	Railroad Crossing ID			
Location of Crash	INTERSTATE 81 (HSC) No - At Intersection With or 0.10 Miles North of ROUTE 112			Mile Marker Number 137.00	Number of Vehicles 2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	2. Two-Way, Divided, Unprotected Median	Type of Collision	1. Rear End

Crash Description

VEHICLE #2 STOPPED FOR TRAFFIC, VEHICLE #1 STRUCK VEHICLE #2 IN THE REAR.

Crash Report

Driver Information 07/03/1996 Age 22

Driver's Action	12. Following Too Close
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	1. Deployed - Front
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
60	60	0	0	0	0	0

Vehicle Information 1

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	1. Passenger car
Vehicle Damage	6. Totaled
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided
Cargo Body Type	Not Provided
GVWR/GCWR	Not Provided
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	
HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Driver Information 12/23/1982 Age 35

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	8. Stopped in Traffic Lane
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	2. No

Vehicle Body Type	22. Truck - Sport Utility Vehicle (SUV)
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No
Commercial Motor Vehicle	No
Towed	No
Oversized	No
Override	No
Initial Impact Area	6. Rear
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill	No
Underride	No

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
0	60	0	0	0	0	0

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

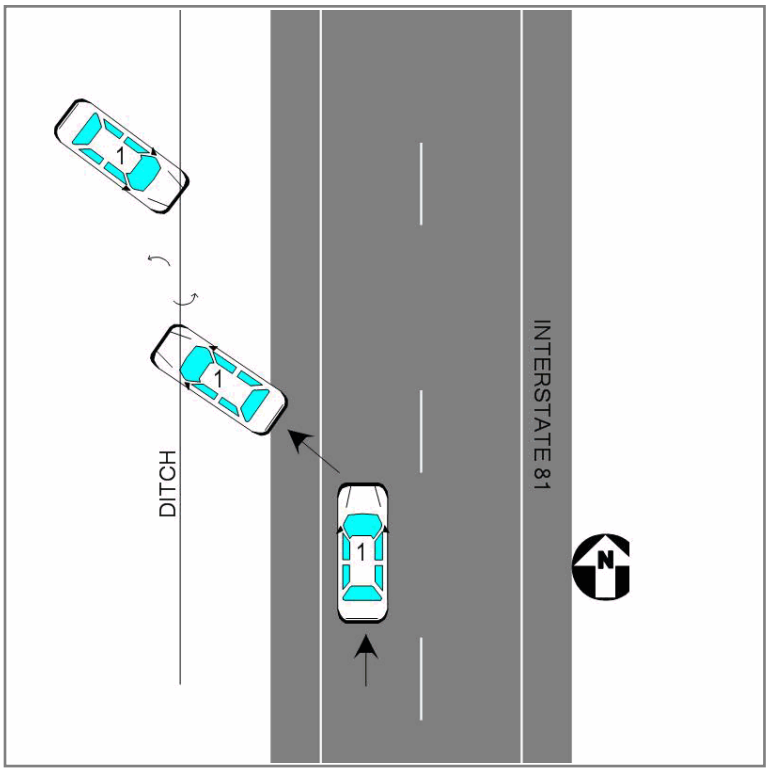
Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	172835338	Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	1	County of Crash	Roanoke	37.295190	-80.092950
Crash Date	Wednesday 10/04/2017 1315	Landmarks at Scene			
City / Town of		Railroad Crossing ID			
Location of Crash	INTERSTATE 81 No - At Intersection With or 0.10 Miles North of ROUTE 112			Mile Marker Number 137.20	Number of Vehicles 1

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	1
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	9. Fixed Object - Off Road

Crash Description

VEHICLE 1 RAN OFF ROAD TO LEFT HITTING A DITCH.

Crash Report

Driver Information 03/07/1941 Age 76

Driver's Action	40. Fail to Maintain Proper Control
Condition of Driver Contributing to	6. Fatigued
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	2. Driver Fatigue
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	3. Minor/Possible Injury
EMS Transport	Yes
Summons Issued	1. Yes

Vehicle Information 1

Vehicle Maneuver	10. Ran Off Road - Left
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	1. Passenger car
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	North
Crash Events: 1.	28. Ran Off Road
2.	14. Ditch
3.	Not Provided
4.	Not Provided
Most Harmful	14. Ditch

Cargo Spill No
Underride No

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
60	60	60	0	0	0	0

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided
Cargo Body Type	Not Provided
GVWR/GCWR	Not Provided
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	
HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

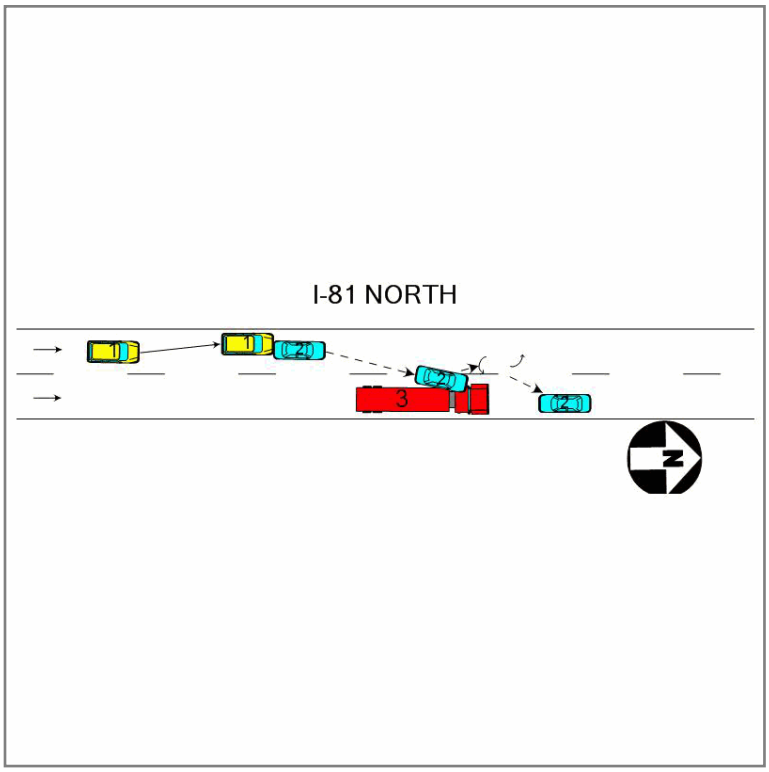
Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Crash Report

Document Number	182565133	Jurisdiction	Roanoke County	GPS Lat.	GPS Long.
Revised Report	1	County of Crash	Roanoke	37.294890	-80.093940
Crash Date	Wednesday 09/12/2018 1734	Landmarks at Scene			
City / Town of		Railroad Crossing ID			
Location of Crash	I-81 NORTH No - At Intersection With or 0.40 Miles North of RT. 112 WILDWOOD RD			Mile Marker Number 137.50	Number of Vehicles 3

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	17. Highway Safety Corridor	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	1. Rear End

Crash Description

VEHICLE 2 STOPPED IN ROADWAY DUE TO TRAFFIC AND WAS STRUCK BY VEHICLE 1. VEHICLE 2 WAS PUSHED INTO THE SIDE OF VEHICLE 3 SPUN AROUND COMING TO A REST IN THE RIGHT LANE FACING BACK SOUTH.

Crash Report

Driver Information 12/29/1987 Age 30

Driver's Action	12. Following Too Close
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	7. Eyes Not on Road
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	1. Deployed - Front
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
55	60	0	0	0	0	0

Vehicle Information 1

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	2. After Application of Brakes
Vehicle Body Type	22. Truck - Sport Utility Vehicle (SUV)
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs Yes
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided
Cargo Body Type	Not Provided
GVWR/GCWR	Not Provided
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	
HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Driver Information 08/07/1987 Age 31

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	8. Stopped in Traffic Lane
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	8. Deployed - Combination
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	2. No

Vehicle Body Type	1. Passenger car
Vehicle Damage	6. Totaled
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	Yes
Commercial Motor Vehicle	No
Towed	Yes
Oversized	No
Override	No
Initial Impact Area	6. Rear
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	20. Motor Vehicle In Transport
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill: No
Underride: No

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
0	60	0	0	0	0	0

Weight over 10,000 lbs: Yes
Seats 9 or more: No
Hazardous Materials Placard: No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided
Cargo Body Type	Not Provided
GVWR/GCWR	Not Provided
License Class	
Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	
HM 4-Digit	
HM Placard Name	
HM Class	
HM Cargo Present	
HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport	
Date of Death	
Position In / On Vehicle	
Safety Equip Used	
Airbag Deployment Type	
Ejected from Vehicle Type	
Injury Type	

Driver Information 03/10/1957 Age 61

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	Yes
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed

Vehicle Information 3

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	23. Truck - Single Unit Truck (3 Axles or More)
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No

Crash Report

Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	Yes
Date of Death		Towed	No
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	8. Left side - rear
Summons Issued	2. No	Direction of Travel	North
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
25	60	0	0	0	0	0

Weight over 10,000 lbs	Yes	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	9. Tractor/Semi-trailer (One Trailer)		
Cargo Body Type	8. Auto Transporter	License Class	
GVWR/GCWR	3. Greater Than 26,000 lbs.	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard	No	HM Class	
HM 4-Digit		HM Cargo Present	No
HM Placard Name		HM Cargo Released	No

Carrier Identification

Commericial Motor Carrier Name	TUPELO
US DOT# / State	
Commercial / Non-Commercial	1. Interstate Carrier

Passenger Information

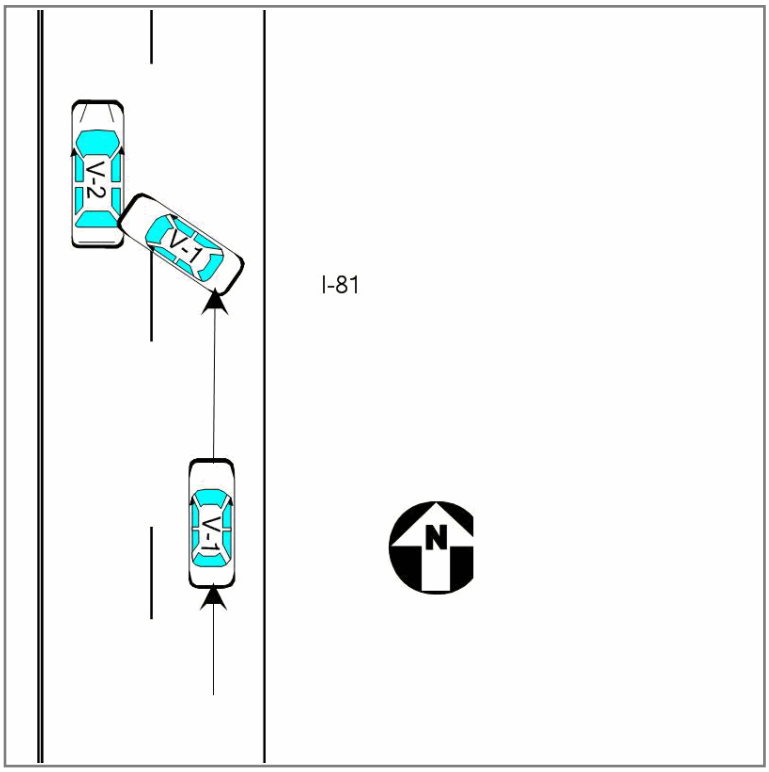
EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Crash Report

Document Number	183205570			Jurisdiction	City of Salem	GPS Lat.	GPS Long.
Revised Report	0			County of Crash		37.294180	-80.096780
Crash Date	Friday	11/16/2018	1520	Landmarks at Scene			
City / Town of	Salem			Railroad Crossing ID			
Location of Crash	I-81						
	No - At Intersection With or 800.00 Feet North of WILDWOOD RD						

Mile Marker Number	Number of Vehicles
137.60	2

Crash Image



Fatalities Non-Pedestrian	0
Fatalities Pedestrian	0
Injuries Non-Pedestrian	0
Injuries Pedestrian	0

Crash Information

Location of First Harmful Event	1. On Roadway	Roadway Defects	1. No Defects
Weather Condition	1. No Adverse Condition (Clear/Cloudy)	Relation to Roadway	8. Non-Intersection
Light Condition	2. Daylight	Intersection Type	1. Not at Intersection
Traffic Control Mechanical Device	1. Yes - Working	Work Zone Related	2. No
Traffic Control Type	6. Traffic Lanes Marked	Work Zone Workers Present	Not Provided
Roadway Alignment	1. Straight - Level	Work Zone Location	Not Provided
Roadway Surface Condition	1. Dry	Work Zone Type	Not Provided
Roadway Surface Type	2. Blacktop, Asphalt, Bituminous	School Zone	3. No
Roadway Description	3. Two-Way, Divided, Positive Median Barrier	Type of Collision	2. Angle

Crash Description

VEHICLE # 2 HAD STOPPED FOR TRAFFIC, VEHICLE # 1 ATTEMPTED TO STOP LOST CONTROL AND STRUCK VEHICLE # 2.

Crash Report

Driver Information 06/29/1984 Age 34

Driver's Action	40. Fail to Maintain Proper Control
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured
Type of Driver Distractions	14. No Driver Distraction
Drinking	1. Had Not Been Drinking
Method of Alcohol Determination	Not Applicable
Drug Use	2. No
Driver's License	
Commercial Driver's License	NotProvided
Safety Equipment Used	3. Lap and Shoulder Belt
Air Bag	2. Not Deployed
Ejected from Vehicle	1. Not Ejected
Date of Death	
Injury Type	6. No Injury (driver only)
EMS Transport	No
Summons Issued	1. Yes

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count < 8	8-17	18-21	> 21
60	60	0	0	0	0	0

Vehicle Information 1

Vehicle Maneuver	1. Going Straight Ahead
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark
Vehicle Body Type	1. Passenger car
Vehicle Damage	8. Other
Vehicle Condition	1. No Defects
Spec. Function Motor Vehicle	1. No Special Function
EMV in service	Not Applicable
Truck Cover	Not Applicable
Vehicle Disabled	No
Commercial Motor Vehicle	No
Towed	No
Oversized	No
Override	No
Initial Impact Area	12. Front
Direction of Travel	North
Crash Events: 1.	20. Motor Vehicle In Transport
2.	Not Provided
3.	Not Provided
4.	Not Provided
Most Harmful	20. Motor Vehicle In Transport

Cargo Spill No
Underride No

Weight over 10,000 lbs No
Seats 9 or more No
Hazardous Materials Placard No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

Driver Information 03/10/1998 Age 20

Driver's Action	1. No Improper Action
Condition of Driver Contributing to	1. No Defects
Driver Vision Obscured	1. Not Obscured

Vehicle Information 2

Vehicle Maneuver	8. Stopped in Traffic Lane
Skidding Tire / Mark	4. No Visible Skid Mark/Tire Mark

Crash Report

Type of Driver Distractions	14. No Driver Distraction	Vehicle Body Type	1. Passenger car
Drinking	1. Had Not Been Drinking		
Method of Alcohol Determination	Not Applicable	Vehicle Damage	8. Other
Drug Use	2. No	Vehicle Condition	1. No Defects
Driver's License		Spec. Function Motor Vehicle	1. No Special Function
Commercial Driver's License	NotProvided	EMV in service	Not Applicable
Safety Equipment Used	3. Lap and Shoulder Belt	Truck Cover	Not Applicable
Air Bag	2. Not Deployed	Vehicle Disabled	No
Ejected from Vehicle	1. Not Ejected	Commercial Motor Vehicle	No
Date of Death		Towed	No
Injury Type	6. No Injury (driver only)	Oversized	No
		Override	No
EMS Transport	No	Initial Impact Area	4. Right side - rear
Summons Issued	2. No	Direction of Travel	North
		Crash Events: 1.	20. Motor Vehicle In Transport
		2.	Not Provided
		3.	Not Provided
		4.	Not Provided
		Most Harmful	20. Motor Vehicle In Transport

Speed Before Crash	Speed Limit	Maximum Safe Speed	ALL Passengers Age Count			
			< 8	8-17	18-21	> 21
0	60	0	0	0	0	0

Weight over 10,000 lbs	No	Seats 9 or more	No	Hazardous Materials Placard	No

Commercial Motor Vehicle Section

Vehicle Configuration	Not Provided		
Cargo Body Type	Not Provided	License Class	
GVWR/GCWR	Not Provided	Commercial Endorsement	

Hazardous Material

Hazardous Material Placard		HM Class	
HM 4-Digit		HM Cargo Present	
HM Placard Name		HM Cargo Released	

Carrier Identification

Commericial Motor Carrier Name	
US DOT# / State	
Commercial / Non-Commercial	Not Provided

Passenger Information

EMS Transport		Safety Equip Used	
Date of Death		Airbag Deployment Type	
Position In / On Vehicle		Ejected from Vehicle Type	
		Injury Type	

T3 Design Corporation
10340 Democracy Ln #305
Fairfax, Virginia 22030
Phone 703.359.5861 ▪ Fax 703.359.5863
Visit us at www.t3design.us

TECHNICAL MEMORANDUM

DATE: May 28, 2020
TO: Mr. Tyler Gill, PE.
FROM: Asma Ali, PhD, P.E., PTOE
RE: I-81 Widening MM 136.6 to 141.8 Design-Build Project

Introduction

This technical memorandum presents safety analysis results for the I-81 Widening Design-Build project in Roanoke County/City of Salem, VA. The Project limits extend 3,000 feet south of I-81 and Route 112 (Wildwood Road) interchange near mile marker 136.6 to 1,500 north of the I-81 and Route 419 (North Electric Road) interchange near mile marker 141.8. The study segment also includes the interchange of I-81 at Thompson Memorial Drive.

Currently, I-81 operates as a four-lane road with two lanes in the northbound (NB) direction and two lanes in the southbound (SB) direction. The I-81 widening project involves adding one mainline lane in each direction as well as widening the inside shoulder from 4-foot to 12-foot. The project build-out year is 2024 and design year is 2045.

Safety analysis of the I-81 mainline segment was performed to determine the impacts of the proposed design (3-lanes in each direction and a 12-foot inside shoulder) and an alternative concept (3-lanes in each direction and a 6-foot inside shoulder) for future crash mitigation. Three-year crash data, from January 1, 2017 through December 31, 2019, was downloaded from VDOT Traffic Engineering Department (TED) Online Crash Tableau. Table 1 presents a summary of crash trend by type, severity, lighting, surface conditions, and time of day.

Crash Data Summary

As detailed in Table 1, a total of 326 crashes occurred on I-81 during the three-year period. Out of 326 crashes, 182 (56%) occurred on I-81 NB and 144 (44%) occurred on I-81 SB. The crash frequency increased by 10% from 2017 to 2018 and by 4% from 2018 to 2019.

The most prevalent crash type in both directions was rear-end crashes (139 out of 326 of 42.64%), followed by fixed object off-road (70 out of 326 or 21.5%), and sideswipe same direction crashes (55 out of 326 or 21.47%). Rear-end and sideswipe same direction crashes typically occur on freeways with closely spaced interchanges where vehicles are either in a continuous "stop and go" condition or engage in sudden lane changes at the merge and diverge areas. Speeding is reported as one of the potential causes for 59% (82 out of 139) rear-end crashes.

Out of the total 70 fixed object off-road crashes, 42 (60%) involved vehicles running off to the left side of the road. The proposed widening of the inside shoulder from 4-foot to 12-foot is expected to mitigate future fixed object off-road crashes by providing adequate distance to the errant vehicles to decelerate and stop on the shoulder. Of the 70 crashes, 35 (50%) occurred under wet surface conditions, 28 (40%) occurred during darkness, and 30 (42%) involved speeding. Adverse weather conditions and speeding appear to be the causal factors for the existing roadway departure crashes in both directions.

Out of 326 total crashes, three (3) crashes resulted in fatalities, of which two (2) occurred on I-81 NB and one (1) occurred on I-81 SB. On I-81 NB, both fatality related crashes involved fixed object off-road collisions and

T3 Design Corporation
10340 Democracy Ln #305
Fairfax, Virginia 22030
Phone 703.359.5861 ▪ Fax 703.359.5863
Visit us at www.t3design.us

the fatality crash on I-81 SB involved a rear-end crash. There were a total of 49 injury crashes which involved 65 injuries.

Thirty-three (33) percent of the total crashes occurred under wet surface conditions and 30% occurred during darkness when the roadway was not lighted. About 28% (90 out of 326) of the total crashes occurred during the PM peak period, from 3:00 PM to 6:00 PM, of which 73 were rear-end and sideswipe same direction crashes. Both rear-end and sideswipe same direction are considered congestion related crashes and typically occur during the peak periods. GIS crash maps by type and severity are provided in **Appendix A**.

Table 1 – I-81 Crash Summary (2017 – 2019)

		I-81 NB		I-81 SB		I-81 NB & SB	I-81 NB & SB
	Crash Type	No. of Crashes	% of Total Crashes	No. of Crashes	% of Total Crashes	Total Crashes	% of Total Crashes
Crash Year	2017	50	27.47%	33	22.92%	83	25.46%
	2018	62	34.07%	53	36.81%	115	35.28%
	2019	70	38.46%	58	40.28%	128	39.26%
	Total	**182**	**100.00%**	**144**	**100.00%**	**326**	**100.00%**
Crash Type	Rear End	78	42.86%	61	42.36%	139	42.64%
	Fixed Object - Off Road	37	20.33%	33	22.92%	70	21.47%
	Sideswipe - Same Direction	37	20.33%	18	12.50%	55	16.87%
	Deer	16	8.79%	20	13.89%	36	11.04%
	Angle	11	6.04%	6	4.17%	17	5.21%
	Non-Collision	2	1.10%	3	2.08%	5	1.53%
	Other	1	0.55%	3	2.08%	4	1.23%
	Total	**182**	**100.00%**	**144**	**100.00%**	**326**	**100.00%**
Crash Severity	Fatal Injury	2	1.10%	1	0.69%	3	0.92%
	Severe Injury	3	1.65%	0	0.00%	3	0.92%
	Visible Injury	21	11.54%	18	12.50%	39	11.96%
	Nonvisible Injury	4	2.20%	3	2.08%	7	2.15%
	Property Damage Only	152	83.52%	122	84.72%	274	84.05%
	Total	**182**	**100.00%**	**144**	**100.00%**	**326**	**100.00%**
Lighting	Dawn	2	1.10%	3	2.08%	5	1.53%
	Daylight	126	69.23%	87	60.42%	213	65.34%
	Dusk	1	0.55%	4	2.78%	5	1.53%
	Darkness - Road Lighted	1	0.55%	1	0.69%	2	0.61%
	Darkness - Road Not Lighted	52	28.57%	49	34.03%	101	30.98%
	Total	**182**	**100.00%**	**144**	**100.00%**	**326**	**100.00%**
Surface Cond.	Dry	147	80.77%	104	72.22%	251	76.99%
	Wet	31	17.03%	35	24.31%	66	20.25%
	Snowy	4	2.20%	5	3.47%	9	2.76%
	Total	**182**	**100.00%**	**144**	**100.00%**	**326**	**100.00%**
Time of Day	12:00 AM - 6:00 AM	23	12.64%	16	11.11%	39	11.96%
	6:00 AM - 9:00 AM	18	9.89%	12	8.33%	30	9.20%
	9:00 AM - 12:00 PM	17	9.34%	23	15.97%	40	12.27%
	12:00 PM - 3:00 PM	38	20.88%	25	17.36%	63	19.33%
	3:00 PM - 6:00 PM	59	32.42%	31	21.53%	90	27.61%
	6:00 PM - 9:00 PM	17	9.34%	17	11.81%	34	10.43%
	9:00 PM - 12:00 AM	10	5.49%	20	13.89%	30	9.20%
	Total	**182**	**100.00%**	**144**	**100.00%**	**326**	**100.00%**

T3 Design Corporation
10340 Democracy Ln #305
Fairfax, Virginia 22030
Phone 703.359.5861 ▪ Fax 703.359.5863
Visit us at www.t3design.us

Crash Rate

Table 2 presents a comparison of the total crash, injury crash and fatality crash rates for each direction with the statewide and districtwide rates. The total crash, injury crash and fatality rates were calculated as per 100 million vehicle miles (per 100 MVM).

On I-81 NB, the crash rate is 30% higher than the statewide rate and 60% higher than the districtwide crash rate. The injury crash rate on I-81 NB is lower than the statewide rate but 23% higher than the districtwide rate. The fatality crash rate on I-81 NB is over 100% higher than both statewide and districtwide rates.

On I-81 SB, the crash rate on the study segment is 8% higher than the statewide rate and 35% higher than the districtwide rate. The injury crash rate on the study segment is lower than both statewide and districtwide rates. The fatality crash rate on I-81 SB is 2 to 3 times higher than the statewide and districtwide rates.

Table 2: Crash/Injury/Fatality Crash Rates

	Crash Rate (Per 100 MVM)	Injury Crash Rate (Per 100 MVM)	Fatality Crash Rate (Per 100 MVM)
I-81 NB	108.94	16.76	1.2
I-81 SB	90.2	13.15	0.63
Statewide Rate	83.45	21.43	0.01
Districtwide Rate (Salem)	66.26	13.55	0.34

Crash Mitigation

As stated earlier, the project proposes to add one lane in each direction and widen the inside shoulder. The proposed improvements were examined further using crash modification factors (CMFs) which can be used to determine the potential safety benefits of the proposed improvements. CMFs were chosen from the Virginia State Preferred CMF List. CMFs were applied to the following scenarios:

- Proposed Design – 4- Lane to 6-Lane freeway and widening inside shoulder from 4-foot to 12-foot.
- Alternative Concept – 4- Lane to 6-Lane freeway and widening inside shoulder from 4-foot to 6-foot.

Table 3 presents the applicable CMFs and their potential safety benefits.

T3 Design Corporation
10340 Democracy Ln #305
Fairfax, Virginia 22030
Phone 703.359.5861 ▪ Fax 703.359.5863
Visit us at www.t3design.us

Table 3: Projected Reduction in Crashes

	Widen from 4 Lanes to 6 Lanes	Widen Paved Inside Shoulder from X Feet to Y Feet	
		CMF (KABC) e^0.0172*(x-y)	CMF (PDO) e^0.0153*(x-y)
		From 4' to 12' shoulder CMF = 0.87	From 4' to 12' shoulder CMF = 0.88
	CMF 0.7	From 4' to 6' shoulder CMF = 0.96	From 4' to 6' shoulder CMF = 0.97
	Total Crashes = 326	KABC Crashes = 52	PDO Crashes = 274
Roadway Design	**Crash Reduction**		
Proposed Design	98	7	32
Alternative Concept	98	2	8

The CMFs indicates a potential 30% reduction in total crashes when a freeway is widened from four to six lanes. As in the proposed design, due to the widening of the inside paved shoulder from 4-foot to 12-foot, a potential reduction of 13% fatality and injury (KABC) crashes (CMF = 0.87), and 12% reduction in Property Damage Only (PDO) crashes (CMF = 0.88) is expected. As in the alternative concept, with the widening of the paved inside shoulder from 4-foot to 6-foot, a potential reduction of 4% KABC crashes (CMF = 0.96) and 3% reduction in PDO crashes (CMF = 0.7) is expected. In terms of crash reduction, the proposed design has a four times higher safety benefit over the alternative concept.

Conclusion

A three-year (2017 to 2019) crash history was reviewed for the study segment of northbound and southbound I-81. A total of 326 crashes occurred during three years with 56% crashes in the northbound direction and 44% in the southbound direction. The most prevalent crash type was rear-end collisions followed by fixed object off-road crashes. The total crash and fatality crash rates in both directions are higher than the statewide and districtwide rates. The Virginia State preferred CMFs indicate four times higher safety benefits of the proposed design over the alternative concept. In the proposed design (widening the inside shoulder from 4-foot to 12-foot), the expected reduction of fatality and injury crashes is 13% and PDO crashes is 12%, whereas for the alternative concept (widening the inside shoulder from 4-foot to 6-foot), the expected crash reduction of fatality and injury crashes is 4% and PDO crashes is 3%.

APPENDIX A – GIS CRASH MAPS

I-81 Mainline & Ramps
Crashes by Type and Severity
MP 136.60 to MP 137.48
2017-2019
Sheet 1 of 7

VDOT Virginia Department of Transportation

I-81

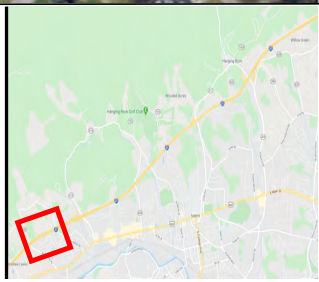
0 200 400 800 1,200 Feet

Crash Type

- Rear End
- Angle
- Sideswipe
- Fixed Object
- Deer
- Other

Crash Severity

- FATAL
- INJURY
- PROPERTY DAMAGE ONLY



I-81 Mainline & Ramps
Crashes by Type and Severity
MP 137.48 to MP 137.81
2017-2019
Sheet 2 of 7

Virginia Department of Transportation
I-81

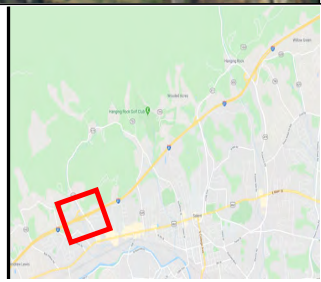
0 200 400 800 1,200 Feet

Crash Type

- Rear End
- Angle
- Sideswipe
- Fixed Object
- Deer
- Other

Crash Severity

- FATAL
- INJURY
- PROPERTY DAMAGE ONLY



Shoulders requiring Design Exception

I-81 Mainline & Ramps
Crashes by Type and Severity
MP 137.81 to MP 139.00
2017-2019
Sheet 3 of 7

Virginia Department of Transportation
I-81

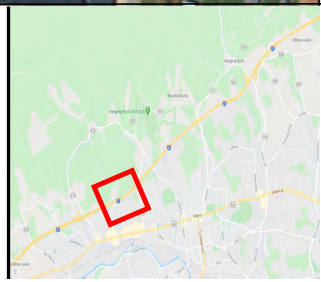
0 200 400 800 1,200 Feet

Crash Type

- Rear End
- Angle
- Sideswipe
- Fixed Object
- Deer
- Other

Crash Severity

- FATAL
- INJURY
- PROPERTY DAMAGE ONLY



I-81 Mainline & Ramps
Crashes by Type and Severity
MP 139.00 to MP 139.96
2017-2019
Sheet 4 of 7

VDOT Virginia Department of Transportation

Virginia Department of Transportation
I-81

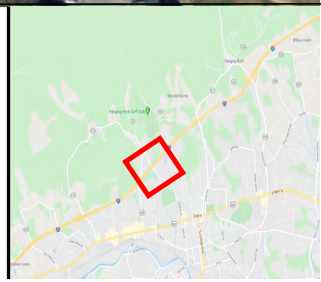
0 200 400 800 1,200 Feet

Crash Type

- Rear End
- Angle
- Sideswipe
- Fixed Object
- Deer
- Other

Crash Severity

- FATAL
- INJURY
- PROPERTY DAMAGE ONLY



I-81 Mainline & Ramps
Crashes by Type and Severity
MP 139.96 to MP 140.79
2017-2019
Sheet 5 of 7

VDOT Virginia Department of Transportation

Virginia Department of Transportation
I-81

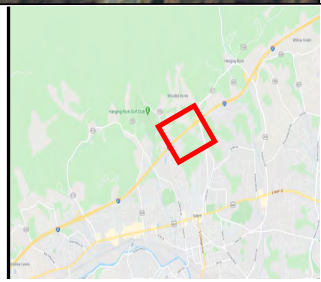
0 200 400 800 1,200 Feet

Crash Type

- Rear End
- Angle
- Sideswipe
- Fixed Object
- Deer
- Other

Crash Severity

- FATAL
- INJURY
- PROPERTY DAMAGE ONLY



I-81 Mainline & Ramps
Crashes by Type and Severity
MP 140.79 to MP 141.29
2017-2019
Sheet 6 of 7

Virginia Department of Transportation
I-81

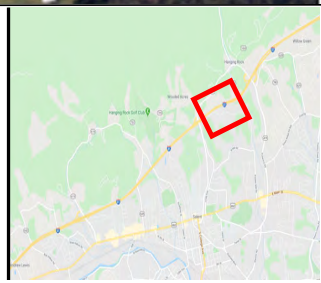
0 200 400 800 1,200 Feet

Crash Type

- Rear End
- Angle
- Sideswipe
- Fixed Object
- Deer
- Other

Crash Severity

- FATAL
- INJURY
- PROPERTY DAMAGE ONLY



I-81 Mainline & Ramps
Crashes by Type and Severity
MP 141.29 to MP 141.80
2017-2019
Sheet 7 of 7

Virginia Department of Transportation
I-81

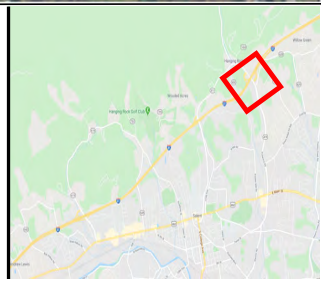
0 200 400 800 1,200 Feet

Crash Type

- Rear End
- Angle
- Sideswipe
- Fixed Object
- Deer
- Other

Crash Severity

- FATAL
- INJURY
- PROPERTY DAMAGE ONLY



Shoulders Requiring Design Exception

Appendix D

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
731 HARRISON AVENUE
SALEM, VIRGINIA 24153

Stephen Brich, P.E.
COMMISSIONER

June 15, 2020

To: Craig Moore
Design Engineer

From: Carol J.L. Moneymaker
Planning Specialist

Subject: Traffic Data for Scoping Report and Design Purposes
Route: I-81
Project: 0081-080-946
UPC: 116203
Location: Roanoke County
From: Overpass of Route 641 (MP 136.85)
To: 0.3 MI north of Route 419 Overpass (MP 141.91)

Listed below is the requested data for the project referenced above. For mainline counts, text in *italics* indicates data derived from counts taken in 2017; all other mainline data is calculated from counts taken in 2019. All ramp data is calculated from counts taken in 2017.

I-81 Between Exits 132 and 137	Northbound	Southbound	Combined
Current ADT (2019)	27,296	23,149	50,445
Design Year ADT (2043):	31,882	27,038	58,920
Design Hourly Volume (DHV):	N/A	N/A	5,503
Directional DHV (Trucks):	N/A	N/A	901
Existing AM Peak Hour Traffic:	*1,745*	*1,603*	*3,342*
Existing AM Peak Hour Period	*7:15 - 8:15*	*7:30 - 8:30*	*7:15 - 8:15*
Existing PM Peak Hour Traffic:	*2,235*	*2,303*	*4,507*
Existing PM Peak Hour Period:	*4:15 - 5:15*	*4:30 - 5:30*	*4:30 - 5:30*
*AM Directional Distribution Factor**	*1,745 (52%)*	*1,597 (48%)*	*3,342*
*PM Directional Distribution Factor**	*2,204 (49%)*	*2,303 (51%)*	*4,507*
Peak Hour Factor:	*0.98*	*0.93*	*0.97*

Truck Percentage (Northbound)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*4.0%*	*18.3%*	*22.3%*
	% Daily	*4.1%*	*25.8%*	*29.9%*

Truck Percentage (Southbound)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*2.5%*	*14.3%*	*16.8%*
	% Daily	*4.1%*	*22.4%*	*26.5%*

Truck Percentage (Combined)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*3.0%*	*16.4%*	*19.4%*
	% Daily	*4.1%*	*24.1%*	*28.2%*

I-81 Between Exits 137 and 140	Northbound	Southbound	Combined
Current ADT (2019)	31,659	31,765	63,424
Design Year ADT (2043):	41,537	41,676	83,212
Design Hourly Volume (DHV):	N/A	N/A	6,823
Directional DHV (Trucks):	N/A	N/A	922
Existing AM Peak Hour Traffic:	*2,100*	*1,981*	*4,081*
Existing AM Peak Hour Period	*7:30 - 8:30*	*7:30 - 8:30*	*7:30 - 8:30*
Existing PM Peak Hour Traffic:	*2,596*	*2,869*	*5,458*
Existing PM Peak Hour Period:	*4:15 - 5:15*	*4:45 - 5:45*	*4:45 - 5:45*
*AM Directional Distribution Factor**	*2,100 (51%)*	*1,981 (49%)*	*4,081*
*PM Directional Distribution Factor**	*2,589 (47%)*	*2,869 (53%)*	*5,458*
Peak Hour Factor:	*0.98*	*0.94*	*0.97*

Truck Percentage (Northbound)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*3.2%*	*16.8%*	*19.9%*
	% Daily	*4.0%*	*23.2%*	*27.2%*

Truck Percentage (Southbound)	*Class 4-5*	*Class 6-7*	*Class 8-13*	*Total*
% Peak	*1.0%*	*0.7%*	*12.8%*	*14.4%*
% Daily	*1.7%*	*1.2%*	*20.0%*	*22.9%*

Truck Percentage (Combined)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*2.2%*	*14.6%*	*16.8%*
	% Daily	*3.5%*	*21.5%*	*25.0%*

I-81 Between Exits 140 and 141	Northbound	Southbound	Combined
Current ADT (2019)	33,436	33,587	67,023
Design Year ADT (2043):	43,066	43,260	86,326
Design Hourly Volume (DHV):	N/A	N/A	7,856
Directional DHV (Trucks):	N/A	N/A	1,064
Existing AM Peak Hour Traffic:	2,626	2,361	5,005
Existing AM Peak Hour Period	7:30 - 8:30	7:15 - 8:15	7:15 - 8:15
Existing PM Peak Hour Traffic:	2,703	2,762	5,436
Existing PM Peak Hour Period:	4:00 - 5:00	4:30 - 5:30	4:15 - 5:15
AM Directional Distribution Factor*	2,644 (53%)	2,361 (47%)	5,005
PM Directional Distribution Factor*	2,679 (49%)	2,757 (51%)	5,436
Peak Hour Factor:	0.97	0.96	0.97

Truck Percentage (Northbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	2.1%	0.8%	18.1%	21.0%
% Daily	2.0%	1.2%	24.1%	27.3%

Truck Percentage (Southbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.4%	1.4%	14.4%	17.3%
% Daily	2.1%	1.5%	22.1%	25.7%

Truck Percentage (Combined)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.8%	1.2%	16.3%	19.2%
% Daily	2.0%	1.3%	23.1%	26.5%

I-81 Between Exits 141 and 143	Northbound	Southbound	Combined
Current ADT (2019)	36,787	36,368	73,155
Design Year ADT (2043):	47,382	46,842	94,224
Design Hourly Volume (DHV):	N/A	N/A	8,603
Directional DHV (Trucks):	N/A	N/A	1,056
Existing AM Peak Hour Traffic:	3,088	2,786	5,874
Existing AM Peak Hour Period	7:15 - 8:15	7:15 - 8:15	7:15 - 8:15
Existing PM Peak Hour Traffic:	3,068	3,074	6,142
Existing PM Peak Hour Period:	4:15 - 5:15	4:15 - 5:15	4:15 - 5:15
AM Directional Distribution Factor*	3,088 (53%)	2,786 (47%)	5,874
PM Directional Distribution Factor*	3,068 (50%)	3,074 (50%)	6,142
Peak Hour Factor:	0.96	0.94	0.97

Truck Percentage (Northbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.5%	0.7%	14.7%	16.9%
% Daily	1.8%	1.2%	21.9%	24.9%

Truck Percentage (Southbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.6%	0.8%	14.2%	16.7%
% Daily	2.0%	1.2%	20.4%	23.6%

Truck Percentage (Combined)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.6%	0.8%	14.5%	16.8%
% Daily	1.9%	1.2%	21.1%	24.2%

Ramp 1 - Exit 137: I-81 NB Exit Ramp to Route 112 (Wildwood Road)

Current ADT (2017):	2,590		
Design Year ADT (2043):	3,061		
Design Hourly Volume (DHV):	301		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.0%	0.0%	0.0%
% Daily	3.6%	4.9%	8.5%
Existing Peak Hour Traffic:	A.M.: 171	(7:00 AM - 8:00 AM)	
	P.M.: 213	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.92		

Ramp 2 - Exit 137: I-81 NB Entrance Ramp from Route 112 (Wildwood Road)

Current ADT (2017):	7,232		
Design Year ADT (2043):	8,548		
Design Hourly Volume (DHV):	676		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.6%	0.9%	1.5%
% Daily	4.3%	5.9%	10.2%
Existing Peak Hour Traffic:	A.M.: 587	(7:15 AM - 8:15 AM)	
	P.M.: 645	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.92		

Ramp 3 - Exit 137: I-81 SB Exit Ramp to Route 112 (Wildwood Road)

Current ADT (2017):	6,729		
Design Year ADT (2043):	7,954		
Design Hourly Volume (DHV):	764		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.7%	1.0%	1.7%
% Daily	4.7%	6.0%	10.8%
Existing Peak Hour Traffic:	A.M.: 492	(7:30 AM - 8:30 AM)	
	P.M.: 679	(4:45 PM - 5:45 PM)	
Peak Hour Factor:	0.92		

Ramp 4 - Exit 137: I-81 SB Entrance Ramp from Route 112 (Wildwood Road)

Current ADT (2017):	2,349		
Design Year ADT (2043):	2,777		
Design Hourly Volume (DHV):	243		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.3%	0.8%	1.0%
% Daily	4.1%	4.2%	8.2%
Existing Peak Hour Traffic:	A.M.: 189	(7:15 AM - 8:15 AM)	
	P.M.: 191	(4:45 PM - 5:45 PM)	
Peak Hour Factor:	0.90		

Ramp 5 - Exit 140: I-81 NB Exit Ramp to Route 311 (Thompson Memorial Drive)

Current ADT (2017):	2,608		
Design Year ADT (2043):	3,489		
Design Hourly Volume (DHV):	435		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	1.0%	0.0%	1.0%
% Daily	4.4%	2.0%	6.4%
Existing Peak Hour Traffic:	A.M.: 245	(7:00 AM - 8:00 AM)	
	P.M.: 243	(5:00 PM - 6:00 PM)	
Peak Hour Factor:	0.89		

Ramp 6 - I-81 NB Entrance Ramp from Route 311 (Thompson Memorial Drive)

Current ADT (2017):	4,303		
Design Year ADT (2043):	5,757		
Design Hourly Volume (DHV):	646		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.3%	0.1%	0.4%
% Daily	2.6%	1.0%	3.6%
Existing Peak Hour Traffic:	A.M.: 410	(7:30 AM - 8:30 AM)	
	P.M.: 480	(5:30 PM - 6:30 PM)	
Peak Hour Factor:	0.85		

Ramp 7 - I-81 SB Exit Ramp to Route 311 (Thompson Memorial Drive)

Current ADT (2017):	4,291		
Design Year ADT (2043):	5,741		
Design Hourly Volume (DHV):	640		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.1%	0.0%	0.1%
% Daily	2.3%	1.0%	3.3%
Existing Peak Hour Traffic:	A.M.: 389	(7:30 AM - 8:30 AM)	
	P.M.: 442	(5:45 PM - 6:45 PM)	
Peak Hour Factor:	0.80		

Ramp 8 - I-81 SB Entrance Ramp from Route 311 (Thompson Memorial Drive)

Current ADT (2017):	2,412		
Design Year ADT (2043):	3,227		
Design Hourly Volume (DHV):	344		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.4%	0.7%	1.1%
% Daily	3.9%	2.8%	6.6%
Existing Peak Hour Traffic:	A.M.: 198	(7:15 AM - 8:15 AM)	
	P.M.: 271	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.90		

Ramp 9 - I-81 NB Exit Ramp to Route 419 (Electric Road)

Current ADT (2017):	2,725		
Design Year ADT (2043):	3,645		
Design Hourly Volume (DHV):	370		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	1.5%	0.0%	1.5%
% Daily	5.3%	4.8%	10.0%
Existing Peak Hour Traffic:	A.M.: 231	(7:30 AM - 8:30 AM)	
	P.M.: 270	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.86		

Ramp 10 - I-81 NB Entrance Ramp from Route 419 (Electric Road)

Current ADT (2017):	6,214		
Design Year ADT (2043):	8,314		
Design Hourly Volume (DHV):	826		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.3%	0.2%	0.6%
% Daily	3.1%	1.9%	5.0%
Existing Peak Hour Traffic:	A.M.: 582	(7:15 AM - 8:15 AM)	
	P.M.: 612	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.85		

Ramp 11 - I-81 SB Exit Ramp to Route 419 (Electric Road)

Current ADT (2017):	6,262		
Design Year ADT (2043):	8,380		
Design Hourly Volume (DHV):	959		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.6%	0.4%	1.0%
% Daily	3.2%	1.8%	5.0%
Existing Peak Hour Traffic:	A.M.: 629	(7:15 AM - 8:15 AM)	
	P.M.: 590	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.85		

Ramp 12 - I-81 SB Entrance Ramp from Route 419 (Electric Road)

Current ADT (2017):	2,902		
Design Year ADT (2043):	3,882		
Design Hourly Volume (DHV):	355		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.4%	0.7%	1.1%
% Daily	4.6%	4.6%	9.2%
Existing Peak Hour Traffic:	A.M.: 239	(7:15 AM - 8:15 AM)	
	P.M.: 277	(4:45 PM - 5:45 PM)	
Peak Hour Factor:	0.94		

Route 112 (Wildwood Road) from NCL Salem to I-81

Current ADT (2019):	20,360				
Design Year ADT (2043):	24,406				
Design Hourly Volume (DHV):	2,060				
Directional DHV (Trucks):	17				
Truck Percentage:	Class 4-5		Class 6-7	Class 8-13	Total
% Peak	Cannot be calculated with available count data.				
% Daily	1.2%		0.1%	0.2%	1.5%
Directional Distribution Factor:	A.M.:	1,804	N: 870 (48%)	S: 934 (52%)	
	P.M.:	1,801	N: 828 (46%)	S: 973 (54%)	
Existing Peak Hour Traffic:	A.M.:	1,804	(7:15 AM - 8:15 AM)		
	P.M.:	1,801	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.90				

Route 112 (Wildwood Road) from I-81 to FR 70

Current ADT (2019):	908				
Design Year ADT (2043):	1,017				
Design Hourly Volume (DHV):	127				
Directional DHV (Trucks):	2				
Truck Percentage:	Class 4-5		Class 6-7	Class 8-13	Total
% Peak	1.5%		0.5%	0.0%	2.0%
% Daily	1.4%		0.6%	0.1%	2.1%
Directional Distribution Factor:	A.M.:	82	N: 18 (22%)	S: 64 (78%)	
	P.M.:	101	N: 63 (62%)	S: 38 (38%)	
Existing Peak Hour Traffic:	A.M.:	82	(7:15 AM - 8:15 AM)		
	P.M.:	101	(5:15 PM - 6:15 PM)		
Peak Hour Factor:	0.90				

UR8051 (Academy Street) from W. Carrolton Avenue to Route 619 (Wildwood Road)

Current ADT (2019):	1,950			
Design Year ADT (2043):	2,225			
Design Hourly Volume (DHV):	240			
Directional DHV (Trucks):	2			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.5%	0.0%	0.0%	0.5%
% Daily	1.2%	0.1%	0.1%	1.4%
Directional Distribution Factor:	A.M.: 218	N: 70 (32%)	S: 148 (68%)	
	P.M.: 186	N: 113 (61%)	S: 73 (39%)	
Existing Peak Hour Traffic:	A.M.: 218	(7:15 AM - 8:15 AM)		
	P.M.: 186	(5:00 PM - 6:00 PM)		
Peak Hour Factor:	0.88			

Route 619 (Wildwood Road) from Route 733 to UR 8051 (Academy Street)

Current ADT (2019):	1,190			
Design Year ADT (2043):	1,333			
Design Hourly Volume (DHV):	154			
Directional DHV (Trucks):	1			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.4%	0.4%	0.7%	1.4%
% Daily	0.9%	0.4%	0.2%	1.5%
Directional Distribution Factor:	A.M.: 112	E: 82 (73%)	W: 30 (27%)	
	P.M.: 140	E: 63 (45%)	W: 77 (55%)	
Existing Peak Hour Traffic:	A.M.: 112	(7:15 AM - 8:15 AM)		
	P.M.: 140	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.78			

Route 311 from Rose Ln to NCL Salem

Current ADT (2019):	13,707			
Design Year ADT (2043):	15,352			
Design Hourly Volume (DHV):	1,640			
Directional DHV (Trucks):	17			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.7%	0.1%	0.5%	1.2%
% Daily	1.0%	0.3%	0.7%	2.0%
Directional Distribution Factor:	A.M.: 1,462	N: 604 (41%)	S: 858 (59%)	
	P.M.: 1,580	N: 875 (55%)	S: 705 (45%)	
Existing Peak Hour Traffic:	A.M.: 1,462	(7:15 AM - 8:15 AM)		
	P.M.: 1,580	(4:30 PM - 5:30 PM)		
Peak Hour Factor:	0.94			

Route 311 from NCL Salem to Route 419

Current ADT (2019):	5,934			
Design Year ADT (2043):	6,646			
Design Hourly Volume (DHV):	750			
Directional DHV (Trucks):	8			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.7%	0.1%	0.5%	1.2%
% Daily	1.0%	0.3%	0.7%	2.0%
Directional Distribution Factor:	A.M.: 486	N: 162 (33%)	S: 324 (67%)	
	P.M.: 603	N: 349 (58%)	S: 254 (42%)	
Existing Peak Hour Traffic:	A.M.: 486	(7:15 AM - 8:15 AM)		
	P.M.: 603	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.94			

Route 419 from NCL Salem to I-81

Current ADT (2019):	12,773			
Design Year ADT (2043):	14,306			
Design Hourly Volume (DHV):	1,702			
Directional DHV (Trucks):	45			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.4%	0.3%	1.3%	2.0%
% Daily	1.4%	0.8%	2.6%	4.8%
Directional Distribution Factor:	A.M.: 1,428	N: 640 (45%)	S: 788 (55%)	
	P.M.: 1,511	N: 827 (55%)	S: 684 (45%)	
Existing Peak Hour Traffic:	A.M.: 1,428	(7:15 AM - 8:15 AM)		
	P.M.: 1,511	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.95			

Route 419 from I-81 to Route 311

Current ADT (2019):	9,353			
Design Year ADT (2043):	10,475			
Design Hourly Volume (DHV):	983			
Directional DHV (Trucks):	30			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.4%	0.3%	1.3%	2.0%
% Daily	1.4%	0.8%	2.6%	4.8%
Directional Distribution Factor:	A.M.: 958	N: 271 (28%)	S: 687 (72%)	
	P.M.: 1,078	N: 672 (62%)	S: 406 (38%)	
Existing Peak Hour Traffic:	A.M.: 958	(7:00 AM - 8:00 AM)		
	P.M.: 1,078	(4:30 PM - 5:30 PM)		
Peak Hour Factor:	0.95			

If you have questions or need additional information, please contact me at (540) 387-5228.

cc: Alex Vandyke, Joyce Barkley, Bruce Penner, Jason Henry, L.J. Muchenje, Anne Booker, Alex Price, Ray Varney, Michael Gray

1.7 Project Assumptions & Understandings

Certain aspects surrounding the project affect the scope of work detailed in Section 2. These assumptions and current understandings are outlined below.

- VDOT has NO desire to replace or reconstruct any bridges passing over I-81; Red Lane overpass and North Electric Road (419) may require some type of waiver or exception along I-81 to meet this goal
- VDOT is considering replacing affected bridges along I-81; VDOT desires the RS&H Team evaluate this decision and make recommendations regarding widening/reconstruction verses

4235 Innslake Drive, Suite 105 Glen Allen, VA 23060
804.422.5075

Memorandum I-81 MM 136.6 to 141.8 D-B
UPC 116203

To: File

From: Tyler Gill

CC: VDOT Project Team

RS&H Design Team

Date: May 15, 2020

Re: RFP Bridge Strategy Determination Meeting Notes/Design Direction

---

This memo documents the decisions/design direction that was agreed to at the Bridge Strategy Determination Discussion on 2020-05-08. The meeting was held virtually via MS Teams and included VDOT Salem District, VDOT CO, FHWA, and RS&H Design Team staff. An attendee list is included as an attachment.

The design team will incorporate the directives noted below in the development of the RFP plans.

NB (B683) & SB (B688) I-81 Over Rt. 112 (Wildwood Rd.)

The RFP bridge strategy for this location:

- REPLACE both bridge structures (as recommended by PRIME AE Group (PRIME AE) and concurred with by VDOT and FHWA)
- Adjust vertical grades to achieve a 16' 6" minimum vertical clearance (as recommended by PRIME AE and concurred with by VDOT and FHWA)

Additional elements for RFP plan and document development:

- Accommodate an additional single lane widening on I-81 (in addition to this project; 4 total thru lanes) with a vertical clearance of 16' 6" (Ch. 6 S&B Manual)
- Anticipate DB Offeror revising bridge span arrangement – Design Team to consider single span and 2 span alternatives with closed abutments for RFP. Update roadway and bridge plans and estimate as needed.
- Design Team to account for potential Rt. 112 widening (additional single lane in each direction) in span arrangement (Ch. 17 S&B Manual)
    - Develop an ultimate Rt. 112 typical section and 'Structural Obstruction Zone' (SOZ) (similar to I-81 Exit 114 DB project) to gain concurrence from team members
    - VDOT has ability to waive this requirement
- Technical Requirement language to require replacement, minimum vertical clearance, and accommodation of Rt. 112 widening. SOZ sheet can be included.

- Technical Requirement language to not preclude grade adjustments/improvements to Rt. 112
- Design Team to determine if lighting underneath bridge will be required
- Include pier protection on Rt. 112 if required
- VDOT to explore City of Salem's desire for aesthetic treatment. RFP plans and estimate to be updated accordingly.

Other items:

- RFQ Replacement Concept (submitted 2020-04-24) is sufficient for RFQ Plans
- FHWA request - Add cost of fatigue prone details
- FHWA request – No need to update LCCA for replacement option

NB (B684) & SB (B685) I-81 Over Rt. 635 (Goodwin Ave.)

The RFP bridge strategy for this location:

- REPLACE both bridge structures (as recommended by PRIME AE and concurred with by VDOT and FHWA)
- Design Team to explore three vertical clearance options:
    - Adjust vertical grades to achieve a 16' 6" minimum vertical clearance
    - Adjust vertical grade to achieve 15' 8" minimum vertical clearance (to match existing NB bridge clearance)
    - Adjust vertical grade to achieve a 14' 6" minimum vertical clearance

Additional elements for RFP plan and document development:

- VDOT willing to entertain vertical clearance below 16' 6"
    - Design Waiver required for vertical clearance above 14' 6" but below 16' 6"
    - Design Team to provide cost estimates for all vertical clearance options for comparison/assisting in bridge clearance determination
- VDOT to explore including an RFP bid option for DB Offerors to provide a 16' 6" vertical clearance
- Accommodate an additional single lane widening on I-81 (in addition to this project; 4 total thru lanes) meeting the vertical clearance selected
- Pursue waiver for potential Rt. 635 widening accommodation (Ch. 17 S&B Manual)
- VDOT to vet potential 'no bridge' alternative (cul-de-sac Rt. 635) internally and with local officials

  - If feasible – Design Team to explore existing condition analysis (geometric and traffic) to determine if upgrades /improvement will be needed to other routes

  - If feasible – VDOT needs to begin coordination with localities/public as DB Offerors could view securing approvals as a high risk item

- Design Team to explore high level existing conditions analysis (geometric and traffic) to determine if upgrades/improvements will be needed to 'detour' routes during construction.

- Technical Requirement language to require replacement and minimum vertical clearance. If permanent closure of Rt. 635 not feasible, reinforce with TR language. May need to add TR section communicating concurrent work restrictions on Rt. 635 and Rt. 619 bridges.

- Include pier protection on Rt. 635 if required

- VDOT to explore City of Salem's desire for aesthetic treatment. RFP plans and estimate to be updated accordingly.

Other Items:

- RFQ Replacement Concept (submitted 2020-04-24) is sufficient for RFQ Plans

- FHWA will not approve design exception for vertical clearance less than 14' 6"

- Rt. 635 classified as Urban Minor Collector which requires minimum vertical clearance of 14' 6"

- Achieving 14' 6" and/or 15' 8" vertical clearance can largely be obtained via lowering Rt. 635

NB (B687) & SB (B686) I-81 Over Rt. 619 (Wildwood Rd./Academy St.)

The RFP bridge strategy for this location:

- REPLACE both bridge structures (as recommended by PRIME AE and concurred with by VDOT and FHWA)

- Provide a 16' 6" minimum vertical clearance (as recommended by PRIME AE and concurred with by VDOT and FHWA)

Additional elements for RFP plan and document development:

- Accommodate an additional single lane widening on I-81 (in addition to this project; 4 total thru lanes) with a vertical clearance of 16' 6" (Ch. 6 S&B Manual)

- Anticipate DB Offeror revising bridge span arrangement – Design Team to consider single span alternative with closed abutments for RFP. Update roadway and bridge plans and estimate as needed.

- Design Team to account for potential Rt. 619 widening (additional single lane in each direction) in span arrangement (Ch. 17 S&B Manual)

  - Develop an ultimate Rt. 619 typical section and 'Structural Obstruction Zone' (SOZ) (similar to I-81 Exit 114 DB project) to gain concurrence from team members
  - VDOT has ability to waive this requirement

- Technical Requirement language to require replacement, minimum vertical clearance, accommodation of Rt. 619 widening, and potential minimum width between structures. SOZ sheet can be included. May need to add TR section communicating concurrent work restrictions on Rt. 635 and Rt. 619 bridges as well as allowable closures/minimum MOT typical sections.
- Include pier protection on Rt. 619 if required
- VDOT to explore City of Salem's desire for aesthetic treatment. RFP plans and estimate to be updated accordingly.

Other Items:

- RFQ Replacement Concept (submitted 2020-04-24) is sufficient for RFQ Plans
- Potential location for DB Offeror incentive

Rt. 705 (Red Ln.) (B682) Over NB & SB I-81

The RFP bridge strategy for this location:

- Existing bridge structure to remain
- Proposed design to provide a 16' 6" minimum vertical clearance
- Provide pier protection

Additional elements for RFP plan and document development:

- VDOT to investigate if required repair work is needed to this structure. If so, include in Technical Requirements.

Other Items:

- Substructure condition rated a 5.

NB (B678) & SB (B677) I-81 Over Rt. 311 (Thompson Memorial Hwy.)

The RFP bridge strategy for this location:

- WIDEN both bridge structures (as recommended by PRIME AE and concurred with by VDOT and FHWA)
- Provide a 16' 6" minimum vertical clearance (as recommended by PRIME AE and concurred with by VDOT and FHWA)

Additional elements for RFP plan and document development:

- Design Team to analyze proposed inside shoulder width
    - Affects distance between structures
    - If less than 12' a design waiver is required
- Design Team to determine if lighting underneath bridge will be required
- Technical Requirement language to require widening (at a minimum), minimum vertical clearance, and potential minimum width between structures. Require any widening aesthetics match existing.
- Include pier protection on Rt. 311 if required
- VDOT to explore City of Salem's desire for aesthetic treatment. RFP plans and estimate to be updated accordingly.

Other Items:

- RFQ Widening Concept (submitted 2020-04-24) is sufficient for RFQ Plans
- FHWA request – Using ultrasonic peening (or other methods) address all fatigue prone details (extend fatigue life of the details to service life of the bridge), include cost for fatigue peening
- Future maintenance project being developed, to include painting and aesthetic features. Anticipate complete prior to 116203 begin construction.

NB & SB I-81 Over Rt. 630 (Kessler Mill Rd.)

The RFP bridge strategy for this location:

- Existing bridge structure to remain

Additional elements for RFP plan and document development:

- If preference in method/how bridge will be restriped, include in Technical Requirements.

Rt. 419 (Electric Rd.) (B681) Over NB & SB I-81

The RFP bridge strategy for this location:

- Existing bridge structure to remain
- Proposed design to provide a 16' 6" minimum vertical clearance
- Provide pier protection

Additional elements for RFP plan and document development:

- VDOT to investigate if required repair work is needed to this structure. If so, include in Technical Requirements.

- Proposed inside and outside shoulders require Design Exceptions for width

    - Design Team to develop DE document prior to RFP. Coordinate with VDOT and FHWA (S. Clausen)

    - Design Team to review crash data at overpass location to determine if specific mitigation measures may be warranted

Other Items:

- Minimum shoulder widths: NB – 6.4’ (inside); SB – 4.04’ (inside)

- Pier Protection barrier height will be 54”

4235 Innslake Drive, Suite 105 Glen Allen, VA 23060
804.422.5075

Memorandum I-81 MM 136.6 to 141.8 D-B
UPC 116203

To: Craig Moore (VDOT)

From: Tyler Gill

CC: Alex Price, Alex Vandyke, Tony Dodson (VDOT)

John Vandergriff, Kyle Faby (RS&H)

Date: June 3, 2020

Re: Summary of Concepts and Preferred Concept Recommendation

This memo serves to capture key attributes of the considered concepts for UPC 116203. The memo documents key elements of each concept as presented as part of a the RFQ strategy work session with VDOT. The RS&H Team explored constructability, SOC, construction schedule, ROW impacts, MOT, bridge replacement/widen strategy, bifurcation effects, median width, and other significant factors during the concept evaluations.

Project Goals

The primary project goals which guide the design concepts are:

- Increase operational capacity of mainline I-81 by one lane in each direction
- Consider the complexity of construction of each concept for both the traveling public and the builder
- Apply common sense geometric and cross-sectional design features to maintain or improve the safety of mainline I-81

Widening Strategies

Initially RS&H evaluated two basic alternatives for the I-81 Widening MM 136.6 to 141.8 DB Project – inside widening and outside widening. In simplest form, the inside widening concept proposes to add a third travel lane to both northbound and southbound I-81 within the existing median. The outside widening concept proposes the same lane addition, locating the additional lane to the outside in each direction. Following the initial examination of these concepts, RS&H determined a combination of inside and outside widening strategies should also be explored.

Four preliminary widening concepts were advanced to an RFQ Strategy Work Session for discussion with the project team. Each are summarized below.

1. Inside-Inside Concept (II) – widening to median in each direction
2. Outside-Outside Concept (OO) – widening to outside in each direction
3. NB Inside-SB Outside Concept (SBO) – widening northbound to median (west) and southbound to outside (west)

4. NB Outside-SB Inside Concept (NBO) – widening northbound to outside (east) and southbound to median (east)

1 Inside-Inside Concept (II)

Proposed Inside-Inside concept considers the viability of widening I-81 in each direction within the existing median with minimal roadway improvements to the outside lanes. As shown in Figure 1.1 below, the II Concept adds the proposed lane by extending the negative cross slope and holds the existing crown (generally in the center of the NB/SB lanes) for the majority of the project reducing the need to perform pavement wedging. ROW impacts associated with concept II widening are minimized but still exist for various elements like SWM, noise walls, and other elements. Interchange improvements to the existing ramps and loops are less significant and consist mainly of tie in work.

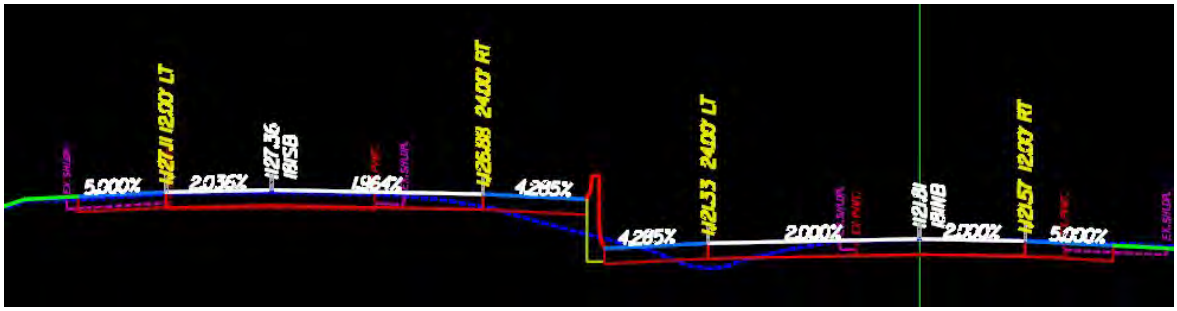


Figure 1.1

The variable width existing bifurcated median constrains this concept. Approximately one half of the widening project necessitates sub-standard inside shoulder widths which requires associated design waivers/exceptions. The existing bifurcation through the corridor greatly increases construction complexity, requires special design barrier/retaining structures, and constructability is further complicated should bridge replacement be selected.

As typical in Figure 1.1. certain proposed features of concept II prove sub-optimal for the length of the project:

- Cross sectional features do not conform to VDOT/AASHTO standards (2.3 miles of substandard shoulder width)
- 2.3 miles of median barrier, of which about 2 miles are special design (soil retaining) barriers
- Complex storm sewer systems and complex interface with existing transverse culverts
- Limited workspace and difficult hauling routes within the median area due to wall construction / bifurcation
- Complicated erosion and sediment control due to bifurcation/proposed walls
- Complicated construction access due to bifurcation / proposed walls
- I-81 has large % truck traffic and bifurcated retaining walls pose safety challenges for errant trucks breaking thru rigid barriers on the high side of bifurcation. The proximity of the lower (elevation) opposing travel way poses increased probability for severe accidents.

Additionally, constructability varies greatly depending on the selected bridge strategy - widening or replacement. A widening strategy for the existing bridge structures to the inside is preferred with the II Concept as the median width can accommodate the additional lanes with reduced shoulders at all

locations. Bridge construction can generally occur by shifting traffic onto the existing shoulders to accomplish this. SOC/MOT for bridge replacement Concept II is likely very difficult due to the bifurcation, existing median width, and the requirement to maintain two lanes of traffic in each direction at all times across the existing bridge. Complicated bridge sequencing includes potential splitting of traffic (same direction), multiple bridge cuts, and additional construction phases.

2 Outside-Outside Concept (OO)

Proposed Outside-Outside (OO) Concept widens I-81 in each direction to the outside of the existing lanes largely preserving the existing graded median and generally adhering to VDOT/AASHTO cross sectional element standards. Like the II concept, Concept OO generally maintains the existing crown location for the majority of the project limits, reducing pavement wedging. Additional positive attributes include simplified mainline construction, preservation of existing median widths, and simplified drainage conveyance.

Certain suboptimal attributes of Concept OO are readily apparent like:

- This is the most impactful concept
- Substantial impacts to the eastern and more populated portion of the alignment requiring right of way acquisitions and residential relocations
- Significant impacts to the existing interchanges on the eastern portion of the alignment where this portion of the topography is lower in elevation requiring steep ramp grades
- A more complex sequence of construction resulting from the impacts to the interchanges both on the east (more populated) and west (less populated) side of mainline I-81
- Frontage road relocations will be necessary and retaining walls in interchange and frontage roads areas are likely

Constructability varies depending on the selected bridge strategy, widening or replacement. Widening of the existing bridge structures to the outside can be accommodated by shifting traffic onto the existing inside shoulders.

While bridge replacement would not be as complex as other concepts, bridge replacement may require the need to 'over build' to the outside to maintain two lanes of traffic in each direction during construction. Wider bridge decks will require further raising of the I-81 grade at bridge locations with substandard existing vertical clearance.

3 NB Inside-SB Outside Concept (SBO)

The SBO concept is a hybrid of the II and OO Concepts wherein the SBO Concept adds an additional thru lane to the inside of NB I-81 (median) and outside of SB I-81 (west) as shown in Figure 3.1 below.

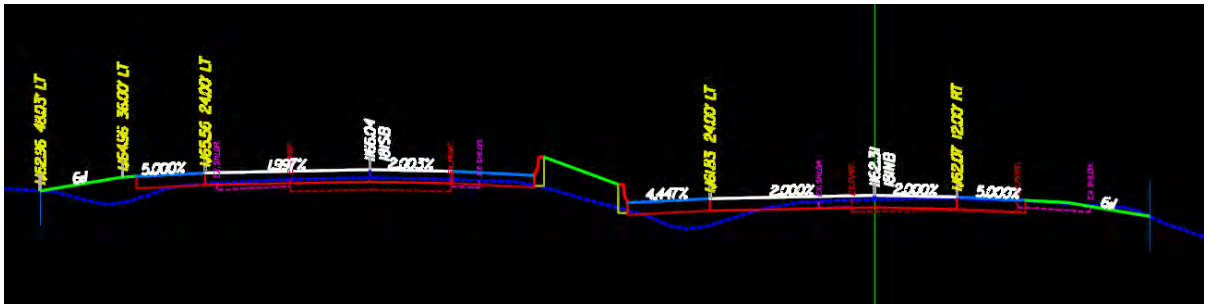


Figure 3.1

By comparison, the roadway improvements associated with the SBO and II Concepts are similar from the Kessler Mill Rd. bridge to the northern project termini. The SBO Concept optimizes several aspects associated with I-81 widening such as:

- SBO provides a more reasonable level of construction complexity, as the entire median may be used for construction of only a single lane
- Concept SBO reduces the adverse constraints resulting from the existing bifurcation by accomplishing half of the widening (SB direction) to the outside
- This concept alleviates most constraints for the inside shoulders allowing for proper shoulder widths that meet VDOT/AASHTO standards. (existing overpasses are likely exception)
- The same as II and OO, the location of the existing crown is maintained where possible within the project.
- The more difficult portions of the interchanges to reconstruct are largely on the east side of the corridor and concept SBO largely avoids reconstruction of the east side (outside) northbound interchanges.
- ROW impacts for roadway widening are anticipated along SB I-81, where residential density is lower.
- As the project topography slopes west to east, SBO affords the maximum space for the location of SWM facilities and ESC measures on the downstream side of the project.
- Likely noise walls will be placed adjacent to NB I-81 and while there could still be ROW impacts associated with noise walls, the SBO concept minimizes property impacts by shifting the roadway improvements to the inside (median) along the northbound direction.

Permanent median barrier will still be needed for concept SBO; however, the amount of special design barrier/retaining structure will be dramatically reduced.

As with the other concepts, SOC/MOT is dependent on the bridge improvement strategy. If bridge replacement is selected for multiple bridge pairs, SBO allows for phased bridge construction without the need for 'over build', interchange ramp/loop closures, and large numbers of traffic shifts. The bridges are able to be replaced by constructing a portion of one structure in the median and using it as a reversible 'diversion' to sequence the remaining structural elements. This approach reduces bridge cuts and allows for one structure to potentially be constructed completely outside of traffic.

4 NB Outside-SB Inside Concept (NBO)

NBO is the inverse of the SBO concept, with roadway widening occurring outside of NB I-81 (east) and the inside of SB I-81 (median). The same features of maximized inside shoulders that generally conform to VDOT/AASHTO standards, improved constructability, minimized effects of the existing bifurcation, and maintaining the existing crown that are realized with SBO, apply to NBO, as well. However, the sub-optimal impacts are most significant on the east side of the northbound lanes namely:

- Concept NBO involves a scenario where roadway widening, SWM devices, and potential noise walls all are east of I-81. Locating these major project components adjacent to the City of Salem and a highly residential area will result in a more involved ROW process and expense

- This alternative is the second most impactful alternative in terms of adjoining personal property.
- As the project topography slopes west to east, NBO encroaches on available space for SWM facilities on the downstream side of the project
- The eastern half of interchanges will require significant reconstruction with challenging vertical alignments and exacerbated bifurcation between steep exit/entrance ramps and northbound lanes

Concept NBO does reduce the amount of earthwork as compared to SBO, but at the expense of property impacts.

Again, the bridge improvement strategy drives the MOT/SOC approach. If replacement of bridges is preferred, it is expected the NBO concept will follow the same phasing approach as SBO. However, the reversible 'diversion' could be longer with NBO where I-81/bridges are raised to meet vertical clearance requirements and NB I-81 traffic will need to be put on a portion of the new SB I-81 structure temporarily, due to the bifurcation.

Preferred Strategy

RS&H recommends the SBO concept as the preferred alternative to progress to RFQ/RFP plan development.

The OO and NBO concepts are easily discounted due to high impacts east of I-81, including interchange ramps, residential and City of Salem properties, increased noise wall lengths, and hydraulic concerns. Concepts II and SBO were deemed feasible as compared to OO and NBO. Hence, a direct comparison was warranted for SBO vs. II is shown in Table 1 below. In an effort to examine attributes which benefit the corridor and traveling public well beyond initial capital costs, Table 1 lists important features beyond customary design or construction attributes. SBO is "better" than II for all but three features.

Table 1 – Concept Comparison Chart

Category	Feature	SBO	II
Construction	Complexity of roadway sequence of construction	Better	Worse
Construction	Maintenance of Traffic	Better	Worse
Construction	Complexity of bridge sequence of construction	Better	Worse
Construction	Complexity of retaining wall type	Better	Worse
Construction	Erosion and Sediment Control complexity	Better	Worse
Construction	Storm Sewer System Complexity	Better	Worse
Construction	Sound wall expense	Similar	Similar
Construction	Earthwork balancing / reduction in borrow	Better	Worse
Construction	Order of Magnitude Construction cost	Similar	Similar
Construction	Design Exceptions	Better	Worse
Incident Mgmt.	Routing of vehicles on paved surface during accidents	Better	Worse
Incident Mgmt.	Access by tow / haul / accident cleanup vehicles	Better	Worse
Maintenance	Snow Removal - pushed snow melts across roadway	Better	Worse
Maintenance	Long term wall maintenance / Wall accessibility	Better	Worse

Category	Feature	SBO	II
Maintenance	Routine and long term storm sewer system	Better	Worse
Maintenance	Bridge maintenance and inspection	Better	Worse
Maintenance	MOT for maintenance work and general work area for routine maintenance	Better	Worse
Noise	Noise generation / noise reception	Similar	Similar
Right of Way	Number of parcels affected	Worse	Better
Safety	Total Shoulder Widths - all shoulders	Better	Worse
Safety	Paved Shoulder Widths - all shoulders	Better	Worse
Safety	Clear Distance to Infrastructure Obstructions	Better	Worse
Safety	Errant Truck into opposing lanes	Better	Worse
Safety	Recoverable area available for errant vehicles	Better	Worse
Safety	Truck breakdown areas available	Better	Worse
Safety	Speed enforcement locations for law enforcement	Better	Worse
Safety	Access by first responders during accidents	Better	Worse

Concept SBO marries the best features of the investigated concepts namely:

- Limits the impacts to interchanges and properties along the eastern portion of the corridor (City of Salem).
- Reduces the design complexity and construction of median barrier wall including associated drainage elements.
- More inclusive of safety components for this corridor given the **high truck volume (20-25%)** and existing 'highway safety corridor' designation.
    - Produces improved crash modification factors (CMF) compared to II
    - Largely provides the standard inside and outside shoulders giving more recovery area for errant vehicles and potentially reducing 'run off road' and 'rear-end' type accidents
    - Limits length of walls with large vertical drops for errant trucks and cars in opposing directions
    - Allows first responders improved access to accidents and additional space to conduct investigations, cleanup efforts, and incident management traffic control
- Allows a more simplified/optimal construction sequence.
    - Improves operational elements by increasing available work area in the median so a larger amount of construction can occur in a single phase
    - Maintains the existing crown location for longer distances, reducing the need to shift the roadway crown throughout the corridor via pavement wedging. This reduces MOT steps/phases by eliminating the number of traffic shifts and lane closures needed during construction and eases impact to the traveling public.

  - Affords phased bridge construction by constructing the NB bridges in two phases and the SB bridges potentially in a single phase without the need for 'over build', interchange ramp/loop closures, and large numbers of traffic switches.

  - With regard to bridges, employing other concepts increases difficulty, as the bridges are and will continue to be independent structures due to bifurcation and horizontal clearance requirements, and current bridge/median width does not accommodate the construction of two new lanes in each direction (in the median). To maintain two travel lanes during construction, adequate new bridge width in a single direction needs to be provided within the median which requires at least one direction of I-81 to be widening to the outside at each bridge replacement location.

- Improves certain operational elements for the corridor including ultimate use, incident management scenarios, and maintenance activities.

  - Improves driver comfort by providing inside and outside shy line offset/distance for 65-70 MPH the majority of project length

  - More room to route traffic through incident areas via shoulders and travel lanes, reducing queue and delay times, potentially lessening the number of vehicles that divert to other routes and the impacts associated

  - Realization of greater flexibility and reduced impact to users during routine and major maintenance operations

- Increase in available room and accessibility for maintenance activities including snow removal, bridge inspection, bridge repair, median wall/enclosed drainage repair/cleaning, among others.

- Offers greater flexibility for the industry during procurement and final design. SBO's larger footprint (than II) gives Design Build offerors room to tailor a concept that may reduce impacts based on individual contractor means and methods. Providing a more constrained and complex RFP alternative to construct could result in cost and schedule risk as Design Builder innovation could be reduced.

- A more consistent typical section that generally conforms to VDOT/AASHTO cross sectional features specific to the inside shoulder widths. With only three localized exceptions, full width (12') inside shoulders are able to be provided through the corridor. Increased shoulder width was not a driving factor in the alternative selection, it is simply a realized benefit to the project and the corridor.

4235 Innslake Drive, Suite 105 Glen Allen, VA 23060
804.422.5075

Memorandum I-81 MM 136.6 to 141.8 D-B
UPC 116203

To: Craig Moore (VDOT)

From: Tyler Gill

CC: Tony Dodson, Alex Vandyke (VDOT)

Kyle Faby (RS&H)

Date: June 10, 2020

Re: SB I-81 Lane Shift (sta. 543+50 to 554+50)

Per request, this memo serves to document the design/construction related aspects of the SB I-81 12' lane shift between station 543+50 to 554+50.

Design Background

The RFP concept employs widening SB I-81 to the outside. As the project approaches the southern terminus in this direction, the need arises to terminate the added thru lane prior to the Texas Hollow Road bridge. Given, VDOT's preference is to 'drop' the third lane from the inside (median) the location of the baseline and/or lane configuration must be adjusted to tie to existing.

To accomplish this, the inside lane of SB I-81 is superelevated to create a planar roadway section north near sta. 554+50. Once planar, through large radius horizontal curves the location of the travel lanes are shifted 12' toward the median. After the shift, SB I-81 returns to a normal crown section with only a single lane west of the baseline.

The corresponding roadway plan sheet and typical sections are attached for reference.

Design Features

The following features/aspects are realized with the proposed lane shift.

- Lessens impacts to the Rt. 112 interchange, specifically the southbound loop ramp
- Reduces the need to further raise SB I-81 to achieve a 16'6" vertical clearance over Rt. 112
- Moves SB I-81 further away from Skyview Rd. and the associated cut slope thus reducing or eliminating the need for retaining structures or large right of way acquisition
- Allows the SB on ramp to utilize the existing auxiliary lane infrastructure
- Reduces/eliminates large impacts to the acid producing soils that are present in the cut slope between Exit 137 and the Texas Hollow bridges
- Provides flexibility in location of where the thru lane is truncated
- Maintains a crowned roadway section, easing constructability at all points south of the shift

- Eases spread concerns at the Rt. 112 bridge by returning to a normal crown cross section prior to the structure
- Accommodates an inside/inside widening concept moving south
- Results in a reduced inside shoulder for approximately 1500', requiring a design waiver/design exception

Attachments

- RFQ Plan Sheet 5
- RFQ Typical Section Sheets 2A(1-2)

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix C

VDOT
Virginia Department of Transportation

Appendix C: DE/DW for Bridge Clearance

Information needs:

- Most recent Vertical Clearance (VC) figures from the last bridge inspection report
- Existing roadway plans showing typical section and vertical curve/grade information at the structure
- Survey data of existing low chord of bridge and corresponding ground elevation of under-route
- Crash history of any over height bridge impacts
- VC of adjacent structures up and down stream of project
- Traffic volumes, including any truck percentages and adjacent sites requiring truck access
- Comprehensive Plan (Future land-use Map)

References:

- AASHTO Green Book
- VDOT S&B Manual Part 1
- VDOT S&B Manual Part 2, Ch 6
- VDOT IIM-LD-227/IIM-S&B-70

Process:

- Determine existing route classification of both over and under routes
- Verify existing VC
- Interpolate proposed VC given
  - Width of widening
  - Proposed cross slope in direction of widening
  - Existing beam/deck depth
  - Proposed under-route geometrics
- Review new VC against S&B requirements
- If VC greater than minimum for route, process complete
- If VC less than minimum for route per S&B guidance, consider:
  - Can superstructure (beams) be made shallower to accommodate minimum?
    - If yes – Incorporate into design, no DE/DW required
  - Can superstructure (beams) be made shallower to meet or exceed existing VC for structure or twin structures?
    - If yes – Consider crash history of any over height impacts and produce DE/DW
      - Further consideration may be needed if over height impacts are significant
    - If no – DE/DW will be required and should consider:

- Crash history of any over height impacts
- VC up and down stream of structure(s)
- Any future projects/studies for either route
- Conceptual cost of lowering under route
- Conceptual costs of superstructure jacking or bearing replacement including cost of associated roadway leveling
- Conceptual cost of a superstructure/bridge replacement as a last resort

DE/DW Formatting:

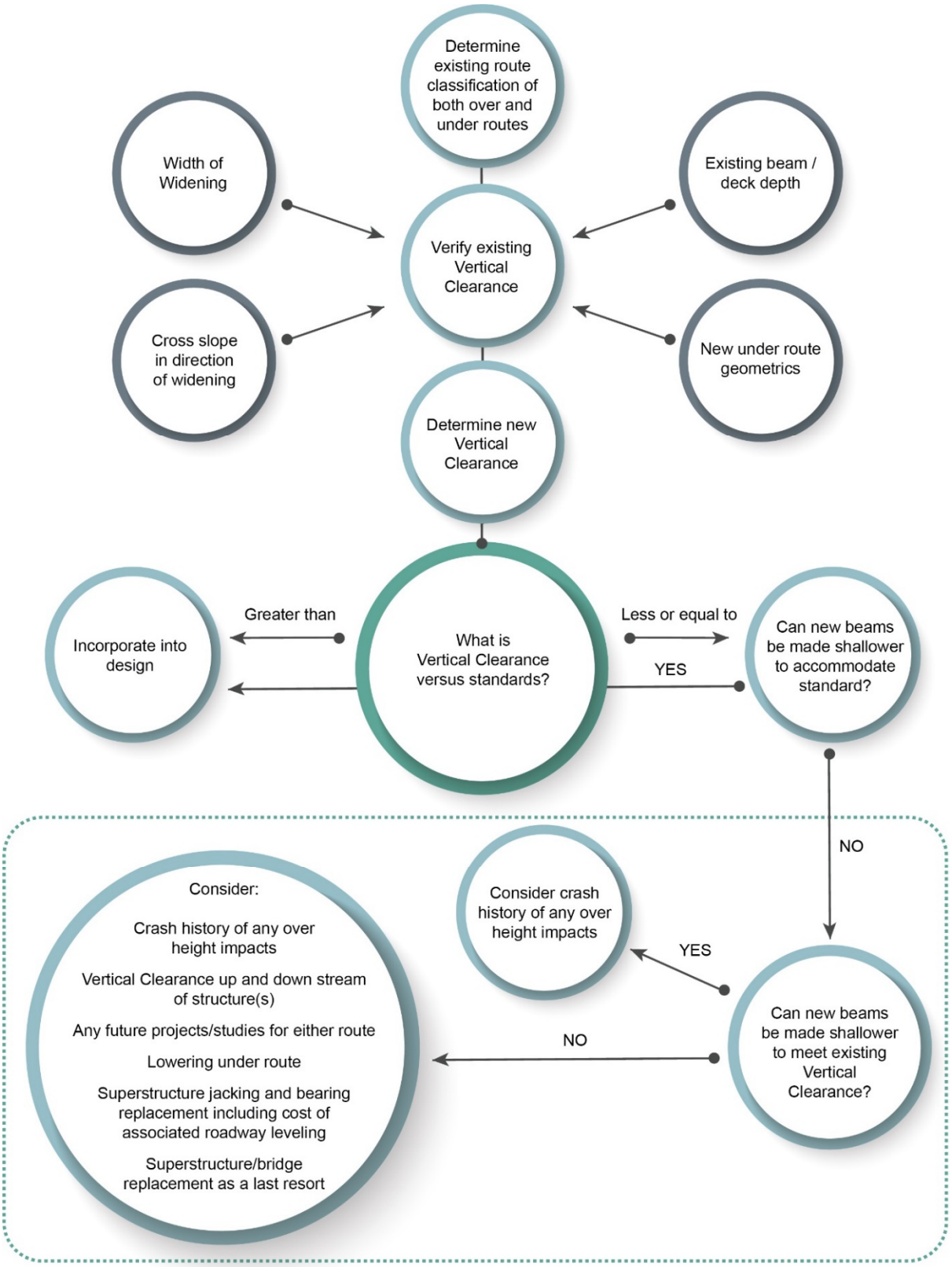
- All DE/DWs should be addressed to State S&B Engineer.
- Verify proper forms (LD-440 or LD-448) based upon Chapter 6 of S&B manual for corresponding clearance and roadway classification.
- Cost data provided can be rough order of magnitude (ROM) level for justification of DE/DW.
- ROM costs should include potential for additional RW, utility and environmental impacts.
- Writeup sections (background, design criteria, justifications, etc.) should be provided as an attachment to the appropriate form.
- Roadway plans, bridge layouts or VC sketches, traffic projections should be included as part of an appendix.

Notes:

- Initial determination can be made without survey data, but final design should incorporate.
- If final design yields different VC than DE/DW, team should discuss with S&B for need to modify DE/DW.
- All VC DE/DWs require State S&B Engineer approval regardless of roadway classification.

A sample approved DE/DW is attached at the end of this section.

Figure 3: Decision Flowchart for DE/DW for Bridge Clearance



VIRGINIA DEPARTMENT OF TRANSPORTATION
LOCATION AND DESIGN/STRUCTURE & BRIDGE
DESIGN WAIVER REQUEST
(See IIM-LD-227 for the definition of Design Waiver)
Design Waiver Number: (For Use by NOVA Only)

Date: 9/8/2020		
To:	Kendal Walus, PE	State Structure and Bridge Engineer
From Project Designer (L&D, S&B or Consultant):	Daniel G Davis, PE - PRIME AE Group	

Project Information			
UPC	116203	State Project Number	0081-080-946, B684, B685
Federal Project Number	NHPP-0812(323)	District	Salem
City/County	Roanoke County/City of Salem		
Project Description	I-81 Widening MM 136.6 to 141.8		
Start Location (From)	0.237 Mi. North Rt. 641		
End Location (To)	0.349 Mi. North Rt. 419		
Funding Source	Federal		

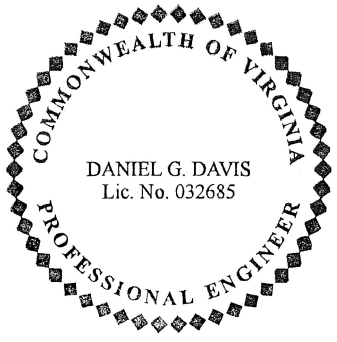
Road Information			
Functional Classification	GS-7 URBAN COLLECTOR STREET	Minimum VDOT GS St'd	GS-7
Min. VDOT Standard	16'-6"	VDOT Reference Location	BDM 06.02-010
Design Speed	35 mph (Roanoke County) / 30 mph (City of Salem)	Posted Speed	35 mph (Roanoke County) 25 mph (City of Salem)

Design Waiver Request For The Following					
☐	Minimum Radius	☐	Lane Shift/Tapers	☐	Total Shoulder Width
☐	Buffer Strip Width	☐	Ditch Width	☐	Bike & Ped Accommodations Compliance (See IIM-LD-55 & RDM)
☐	Paved Shoulder Width	☐	Superelevation	☐	Guardrail GR-9/GR-2
☐	Curb and Gutter	☐	Intersection Sight Distance		
☒	Other		Vertical Clearance		

Design Waiver request must address the following:

- Established design criteria versus proposed and existing criteria (including traffic data, design speed and posted speed)
- Reason the appropriate design criteria cannot be met
- Justification for the proposed criteria
- Any background information which documents, supports or justifies the request
- Any mitigation that will be provided to further support or justify the request
- Cost to meet standard versus project cost

Attach all supporting documentation to this exhibit including crash history (past three years). Design waivers for the use of GR-9 terminals or GR-2 guardrails as described in the Memorandum dated January 3, 2018 Clarification of MASH guardrail requirements, do not require the following information listed above for the design waver: GS standard, traffic data, crash history, design speed , or posted speed.



PRIME AE Group, Inc.
Richmond, Virginia
Structure and Bridge Engineer

Prepared By: Daniel G Davis, PE Date: 9/10/2020

Click to choose an item.

Note: The responsible person that prepares the request shall also electronically seal and digitally sign in the block above. **All signatures below shall be digital signatures.**

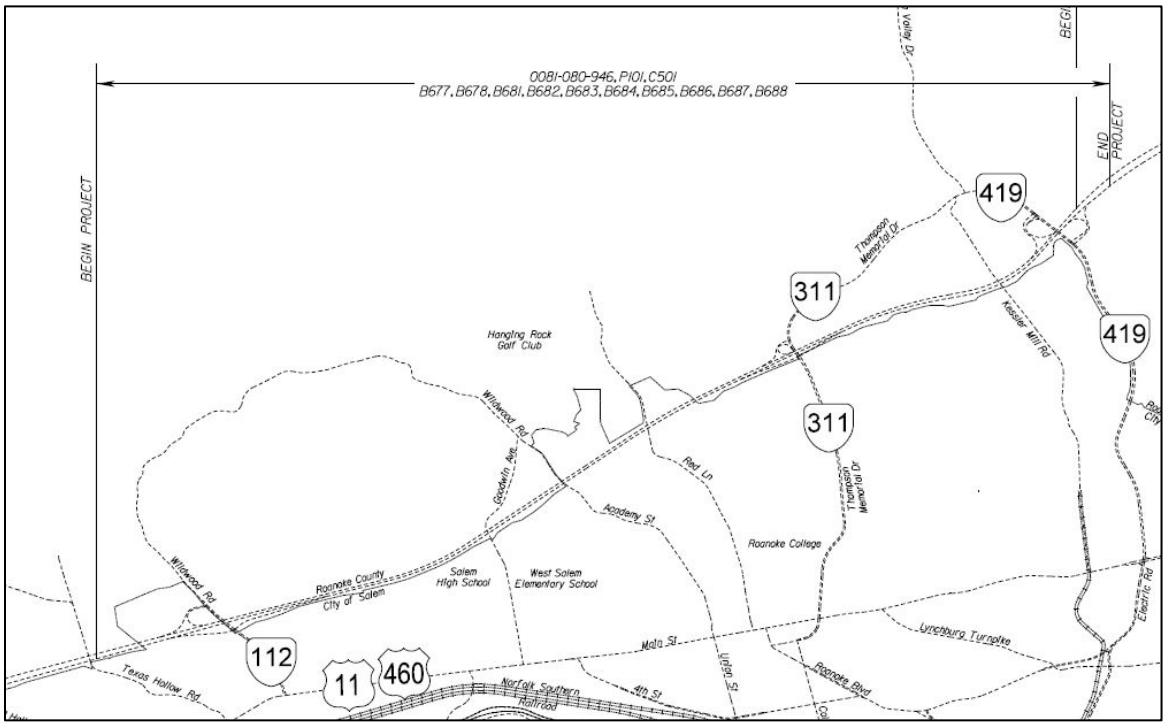
VDOT Approved By: _____

Click to choose an item.

CC: Appropriate Assistant State Location and Design Engineer
Project Manager
State Geometric Design Engineer
State Structure and Bridge Engineer
Assistant State Traffic Engineer – Traffic Control Devices

Background/Project Description

UPC 116203 proposes to widen NB and SB I-81 by a single lane in each direction between mile marker 136.6 and 141.8, approximately 5.2 miles. This project begins about 3,000 feet south of the I-81/Rt. 112 (Wildwood Rd.) interchange (Exit 137) near the I-81 over Rt. 641 (Texas Hollow Rd.) bridges and ends about 1,800 feet north of the I-81/Rt. 419 (North Electric Rd.) interchange. The project is located within Roanoke County and the City of Salem, as the corporate limits straddle I-81 through this portion of the corridor.



Three interchanges are found within the project: (1) Exit 137 – I-81/Rt. 112 – Partial Cloverleaf/Folded Diamond, (2) Exit 140 – I-81/Rt. 311 – Partial Cloverleaf/Folded Diamond, and (3) Exit 141 – I-81/Rt. 419 – Partial Cloverleaf. In addition to the interchanges, there are three underpasses (Rt. 635 – Goodwin Ave., Rt. 619 – Wildwood Rd./Academy St., Rt. 630 – Kessler Mill Rd.) and one overpass (Rt. 705 – Red Ln.). Included in UPC 116203 is the replacement of the bridge structures at Rt. 112 (Exit 137), Rt. 635, and Rt. 619. The Rt. 311 (Exit 140) bridges will be widened to accommodate the additional thru lane. No proposed widening or replacement work will occur on the Rt. 705, Rt. 630, or Rt. 419 (Exit 141) bridges.

The proposed widening scheme generally follows constructing an additional lane to the outside in the SB direction and to the inside in the NB direction. The typical section is mainly comprised of three 12' lanes and two 12' total shoulders per direction.

UPC 116203 was identified as Project ID #39A and 39B in the 2018 'I-81 Corridor Improvement Plan', with the goal to provide additional capacity, reduce congestion, and improve safety.

Immediately to the north of this project another, UPC 108906, is currently under construction to widen and connects the auxiliary lanes together between Exits 141 and 143. The proposed design for UPC 116203 will tie into the UPC 108906 at the northern terminus.

This design waiver seeks a reduction in the required vertical clearance from 16'-6" to 15'-8" for the NB and SB I-81 bridges over Route 635 (Goodwin Ave.), as presented in the RDM GS-7 and BDM 06.02-09-10.

Established Design Criteria

Route 635 (Goodwin Ave) between Route 11/460 (West Main Street) and Route 619 (Wildwood Road) is classified as an Urban Collector Street (GS-7) with a design/posted speed of 35 MPH within Roanoke County and a design speed of 30 MPH (posted of 25 MPH) within the City of Salem.

The 2043 forecasted traffic volumes for Route 635 is 990 ADT while the design year traffic volumes is 875 vehicle per day with 2% trucks (See Table 1).

Route 635	
From: To:	NCL Salem Route 619
ADT (2020)	875
ADT (2045)	990
DHV	115
D (% Design Hour)	79
T (% Design Hour)	2%

Table 1: Route 635 Traffic Data

Interstate 81 between MM 136.6 and 141.8 is classified as Urban Interstate System (GS-INT) with a design speed of 65 MPH and a posted of 60 MPH.

The 2043 forecasted traffic volumes for NB I-81 is 31,882 ADT while the design year traffic volumes for SB I-81 is 27,038 ADT. See Appendix D for the project LD-104 report.

According to BDM 06.02-10, urban collector streets (GS-7) shall have a minimum vertical clearance of 14'-6" and the desirable minimum vertical clearance of 16'-6". Vertical clearances between these values require a design waiver.

Proposed Design Criteria

Provide a minimum 15'-8" vertical clearance for the NB and SB I-81 bridges over Route 635, meeting the existing vertical clearance of the NB I-81 over Route 635 bridge.

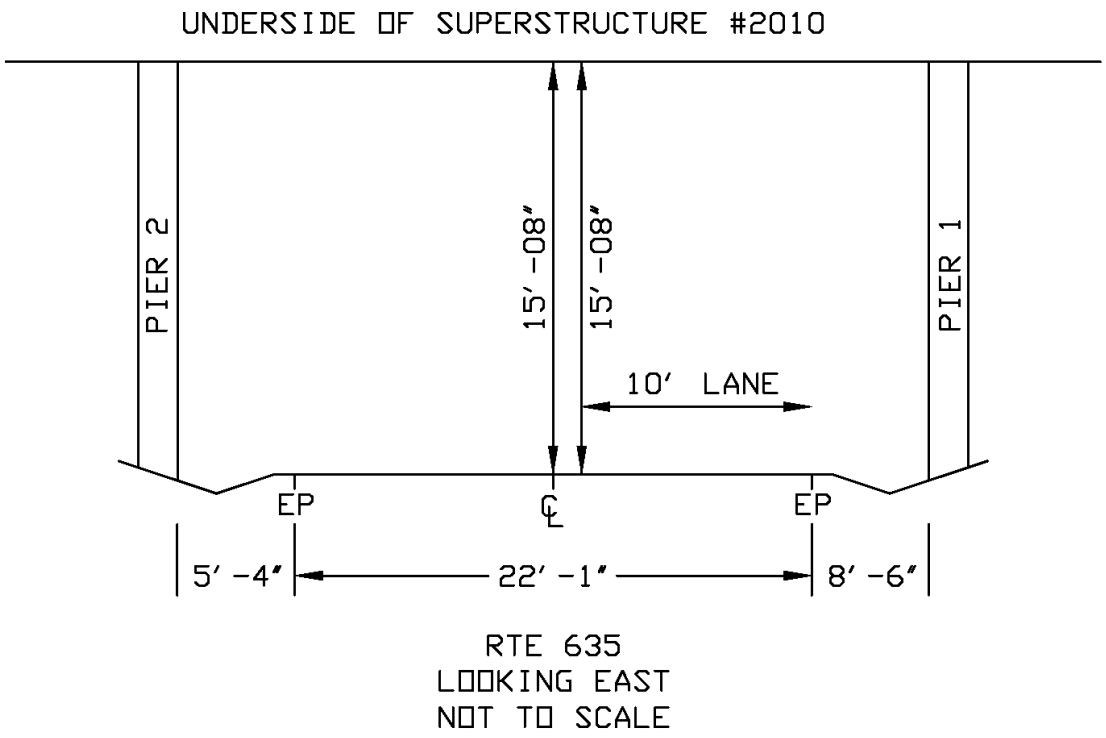
Reason The Established Design Criteria Cannot Be Met

The existing I-81 and Route 635 vertical alignments do not accommodate a proposed 16'-6" vertical clearance without significant impacts to the grades of I-81 and Route 635. Both the NB and SB I-81 bridges over Rt. 635 have existing sub-standard vertical clearances denoted in the figures below from the inspection reports. As depicted, the existing vertical clearance for the NB I-81 bridge over Route 635 is 15'-8" while the SB I-81 bridge over Route 635 is 13'-7".

Adjusting the I-81 vertical alignments to provide a 16'-6" vertical clearance requires raising the existing SB I-81 grade approximately 3' and the NB I-81 grade 10" which results in larger asphalt build-up depths, increased full depth pavement replacement, wider construction limits, additional right of way/easement needs, taller bridge structures, and affects the location of SWM BMPs. Given two lanes of I-81 must be maintained in each direction during construction, these features coupled with the existing bifurcation and narrow median increase overall MOT/SOC complexity, duration, and impact to the traveling public throughout this phase of the project. In addition, as this project adds another thru lane in each direction to I-81, the proposed vertical alignments need to be raised further to accommodate the cross slope of a third lane.

Attempting to increase the vertical clearance at these crossings by lowering the existing Route 635 vertical alignment is met with its own challenges. Among them are steep existing vertical grades that complicate profile adjustment, additional right of way/easement needs in a high residential area east of I-81 and steep cut slope west of I-81, potential right of way impacts to 'paper streets' depicts on subdivision plats west of I-81, and culvert replacement and environmental/stream impacts east of I-81.

CLEARANCE SHEET

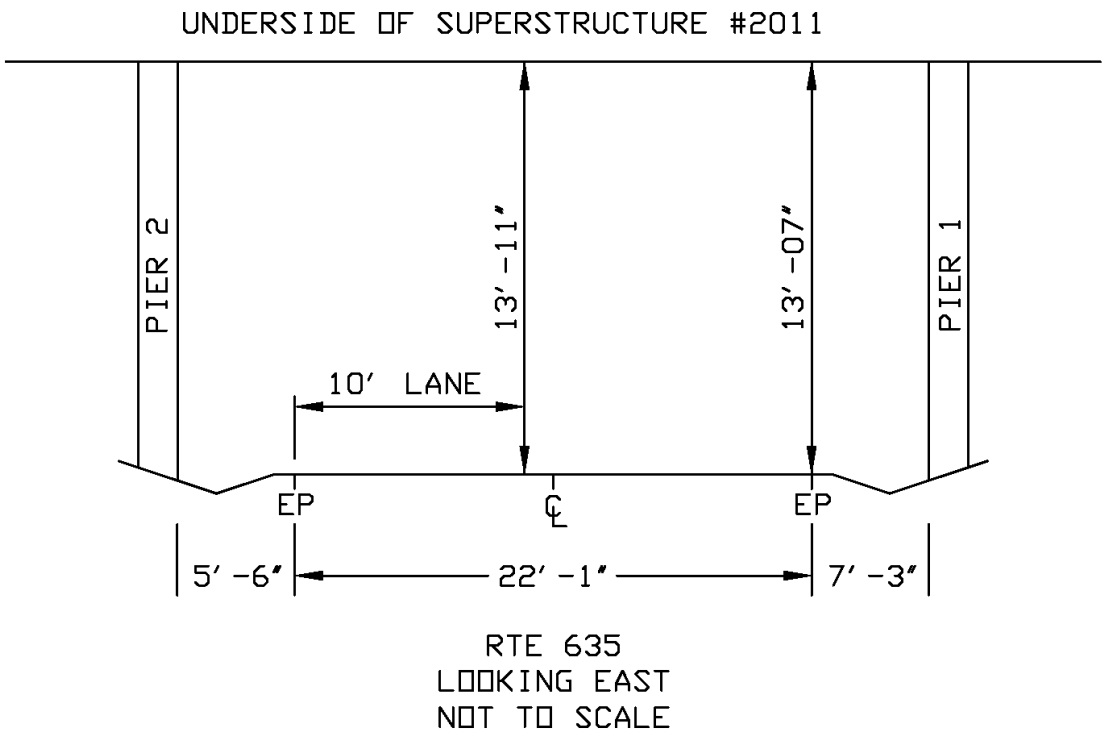


LEGEND:
EP = EDGE OF PAVEMENT
* = EDGE OF PAVED SHOULDER
FC = FACE OF CURB

ROUTE:	I-81 NBL
OVER:	RTE 635
COUNTY:	ROANOKE
STRUCT. NO.:	2010
INITIALS:	JEP
CADD DWG.:	80-2010 VC

Figure 1: Sketch from 2019 Bridge Inspection Report Route I-81 NBL over Route 635

CLEARANCE SHEET



LEGEND:
EP = EDGE OF PAVEMENT
* = EDGE OF PAVED SHOULDER
FC = FACE OF CURB

ROUTE:	I-81 SBL
OVER:	RTE 635
COUNTY:	ROANOKE
STRUCT. NO.:	2011
INITIALS:	JEP
CADD DWG.:	80-2011 VC

Figure 2: Sketch from 2019 Bridge Inspection Report Route I-81 SBL over Route 635

Justification For The Proposed Design Criteria

To reduce overall construction impacts to I-81 and Route 635, the proposed design employs a hybrid approach through the lowering of the Route 635 and raising of the I-81 profiles to achieve a 15'-8" vertical clearance at both bridges. This provides an optimal solution for reducing bridge, right of way, environmental, and constructability impacts.

With this approach, the NB and SB I-81 vertical alignments are able to mimic the existing grades more closely through this crossing, drastically reducing the required amount of full depth pavement and utilizing a more constructable mill and overlay application. The proposed I-81 profiles allow for improved side slope ties thus reducing right of way/easement needs associated with grade changes in this area. On Route 635, the proposed profile gains valuable vertical clearance under the bridges while not impacting the culvert/stream east of I-81 and the steep cut slope west of I-81.

Additionally, a review of the Route 635 existing ADT shows low volumes that are not expected to exceed 1000 vehicles per day by the design year and a truck volume of only 2%. Further study of this area identifies Route 619 (Wildwood Rd./Academy St.) as a viable alternative route for vehicle with heights exceeding 15'-8". Route 619 is within 0.5 miles of the Route 635/I-81 crossing and provides an existing (and proposed) vertical clearance of more than 20'.

Further, the 2019 I-81 over Route 635 Bridge Inspection Reports note evidence of a vehicle strike to the SB I-81 structure (13'-7" vertical clearance) but not to the NB I-81 bridge (15'-8" vertical clearance). It should be noted, however, that there are no records of vehicle strikes to either of these existing bridges.

The proposed design incorporates a context sensitive approach to these bridge structures by balancing constructability, route usage, and proposed vertical clearance to deliver a design that improves the existing condition while exceeding the AASHTO minimum of 14'-6".

Background Information

Included as appendices to this design waiver are:

- Appendix A: RFP Plan and Profile Sheets for I-81 Crossing Route 635
- Appendix B: Satellite view of Route 619 as alternate truck route
- Appendix C: Rt. 635 Goodwin Ave Vertical Clearance Alternative Discussion Memo
- Appendix D: LD-104 – I-81 Traffic Data for Scoping Report and Design Purposes

Mitigation That Will Be Provided To Further Support Or Justify The Request

FHWA's Technical Report on Mitigation Strategies for Design Exceptions identifies the use of advance warning signs for vertical clearance.

The proposed design will include advance warning signage to alert drivers of the 15'-8" vertical clearance approaching the I-81/Route 635 crossing in both directions.

Cost To Meet Standard Versus Project Cost

Due to available funding being constrained, project cost increases have severe consequences to overall project viability. Given current project cost estimate are very near the allocated SYIP funds, further cost increases jeopardize the project. The current construction estimate for this project is $300 million.

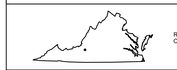
The additional cost to meet a 16'-6" vertical clearance would require approximately an additional $1-2 million in associated roadway and bridge construction costs as compared to the 15'-8" option, resulting in an increase of approximately 1% in total construction cost. However, other cost impacts such as design fees, right of way, environmental, and owner costs are not included in this estimate.

Virginia Department of Transportation

PLAN ROLL
I-81 WIDENING MM 136.6 TO 141.8

Appendix A

Project Location



North Arrow & Scale

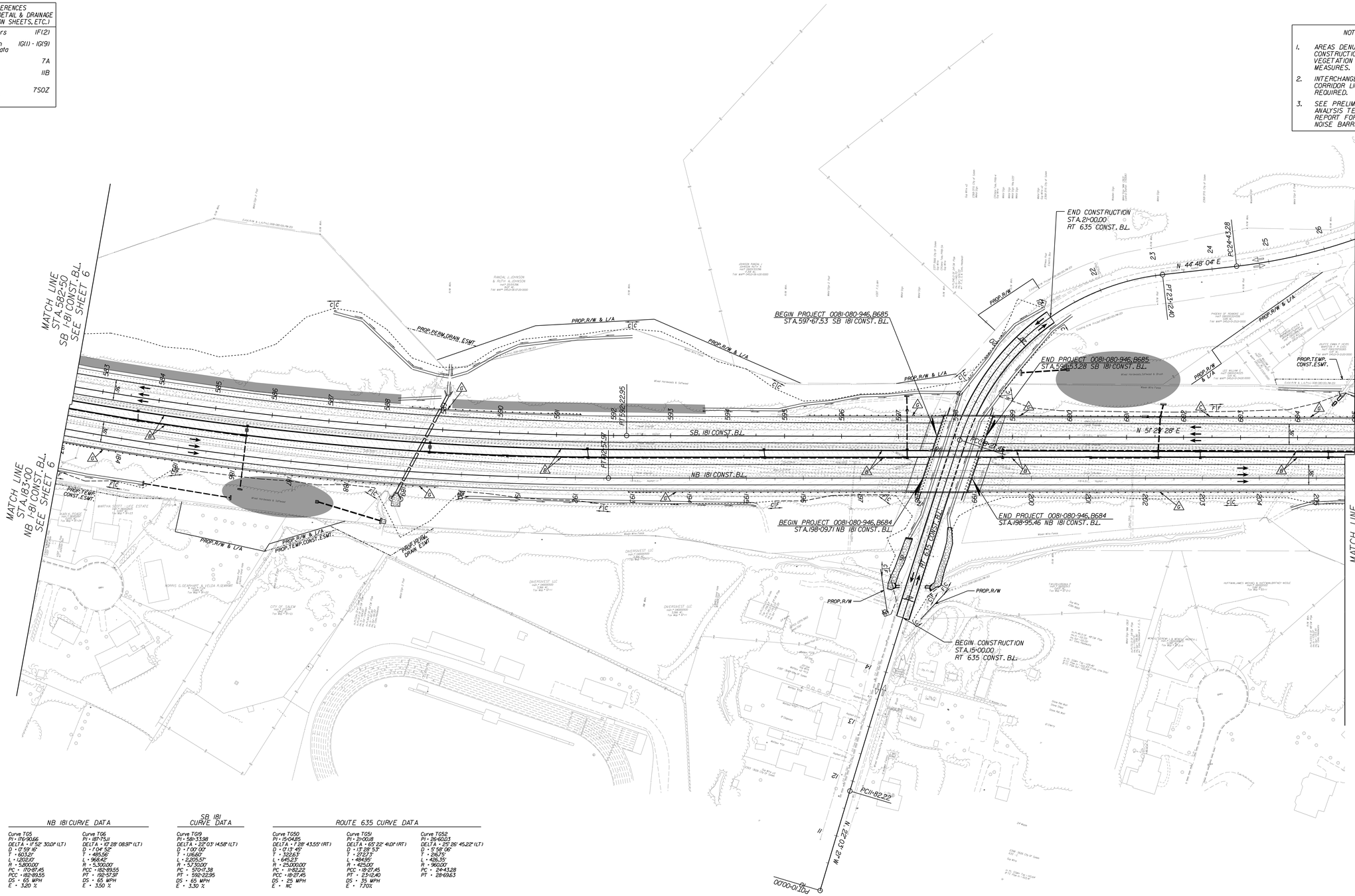
Legend

- Proposed Full Depth Pavement
- Proposed Planing and Resurfacing/Build-Up
- Demolition of Pavement
- Low Maintenance Median Treatment
- C — Proposed Limits of Construction - Cut
- F — Proposed Limits of Construction - Fill
- Potential Location of Stormwater Facility
- Existing Right of Way
- Existing Easements
- Proposed Right of Way
- Proposed Permanent Drainage Easement
- Proposed Temporary Construction Easement
- Property Line
- B — Proposed Concrete Median Barrier
- C — Proposed Curbing
- G — Proposed Guardrail
- W — Proposed Retaining Wall

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Utility Owners	1F(2)
Construction Alignment Data	1G(1) - 1G(9)
I-81 Profile	7A
Rt. 635 Profile	11B
Structural Obstruction Zone	7SOZ

NOTES:

1. AREAS DENUDED DURING CONSTRUCTION MAY REQUIRE VEGETATION RESTORATION MEASURES.
2. INTERCHANGE, BRIDGE, AND CORRIDOR LIGHTING MAY BE REQUIRED.
3. SEE PRELIMINARY NOISE ANALYSIS TECHNICAL REPORT FOR POTENTIAL NOISE BARRIER LOCATIONS



NB 181 CURVE DATA

Curve TG5	Curve TG6
PI • 176+90.66	PI • 187+75.11
DELTA • 17° 52' 30.01" (LT)	DELTA • 10° 28' 08.91" (LT)
D • 0° 59' 16"	D • 1° 04' 52"
T • 933.27'	T • 485.56'
L • 1,202.10'	L • 968.42'
R • 5,800.00'	R • 5,300.00'
PC • 170+97.45	PC • 182+89.55
PCC • 182+89.55	PT • 192+57.97
DS • 65 MPH	DS • 65 MPH
E • 3.20 %	E • 3.50 %

SB 181 CURVE DATA

Curve TG9
PI • 581+33.98
DELTA • 22° 03' 14.58" (LT)
D • 1° 00' 00"
T • 1,116.62'
L • 2,205.57'
R • 5,730.00'
PC • 570+17.38
PT • 592+22.95
DS • 65 MPH
E • 3.30 %

ROUTE 635 CURVE DATA

Curve TG50	Curve TG51	Curve TG52
PI • 15+04.85	PI • 2+00.18	PI • 26+60.03
DELTA • 1° 28' 43.55" (RT)	DELTA • 65° 22' 41.02" (RT)	DELTA • 25° 26' 45.22" (LT)
D • 0° 13' 45"	D • 13° 28' 53"	D • 5° 58' 06"
T • 3.32.63'	T • 272.73'	T • 216.76'
L • 645.23'	L • 484.95'	L • 426.35'
R • 25,000.00'	R • 425.20'	R • 960.00'
PC • 11+82.22	PC • 1+27.45	PC • 24+43.28
PCC • 18+27.45	PT • 2+12.40	PT • 28+69.63
DS • 25 MPH	DS • 35 MPH	
E • NC	E • 7.70%	

RFP PLANS
For Information Only

DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.

Contact Information

Craig Moore, PE
Project Manager / Assistant District L&D Engineer
Virginia Department of Transportation
731 Harrison Avenue
Salem, VA 24153

Comments may also be sent to:
I81-MM136-141@vdot.virginia.gov

I-81 Widening MM 136.6 to 141.8
Roanoke County / City of Salem, Virginia

0081-080-946, P101, R201, C501
UPC 116203
Federal Project Number

Virginia Department of Transportation

PROFILE ROLL
I-81 WIDENING MM 136.6 TO 141.8

Appendix A

SHEET NO. 7A

Project Location

Roanoke County / City of Salem

Scale

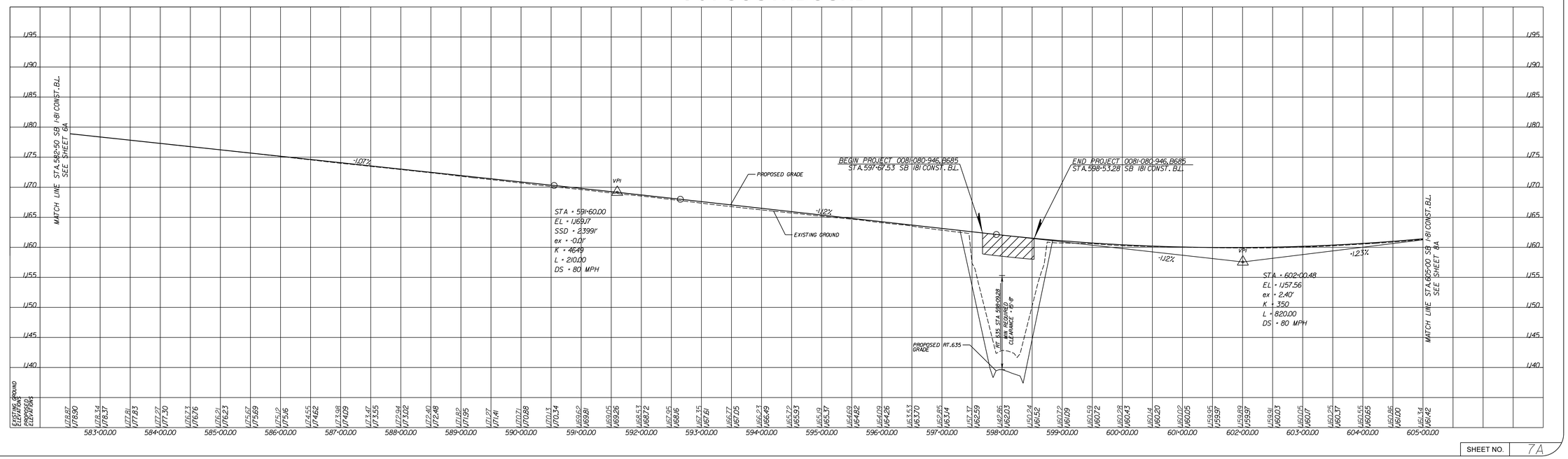
5'
0
50'

Legend

Proposed Bridge

I-81 NORTHBOUND

I-81 SOUTHBOUND



RFP PLANS
For Information Only

DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT- OF-WAY SHOWN ON THESE PLANS.

Contact Information

Craig Moore, PE
Project Manager / Assistant District L&D Engineer
Virginia Department of Transportation
731 Harrison Avenue
Salem, VA 24153

Comments may also be sent to:
I81-MM136-141@vdot.virginia.gov

I-81 Widening MM 136.6 to 141.8
Roanoke County / City of Salem, Virginia

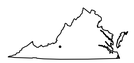
0081-080-946, P101, R201, C501
UPC 116203
Federal Project Number

Virginia Department of Transportation

PROFILE ROLL
I-81 WIDENING MM 136.6 TO 141.8

Appendix A

Project Location



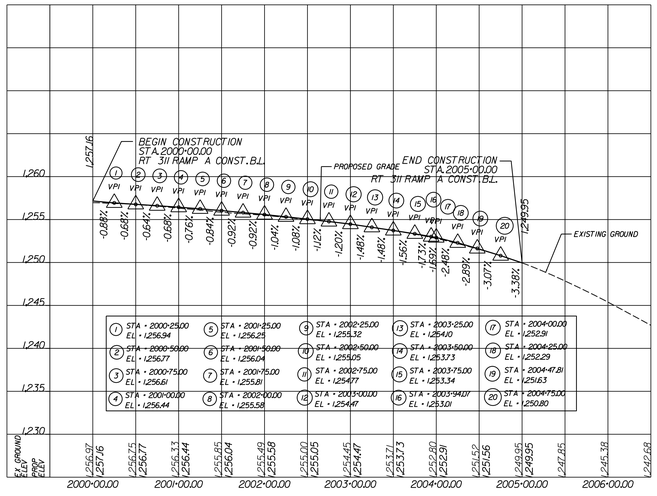
Roanoke County / City of Salem

Scale

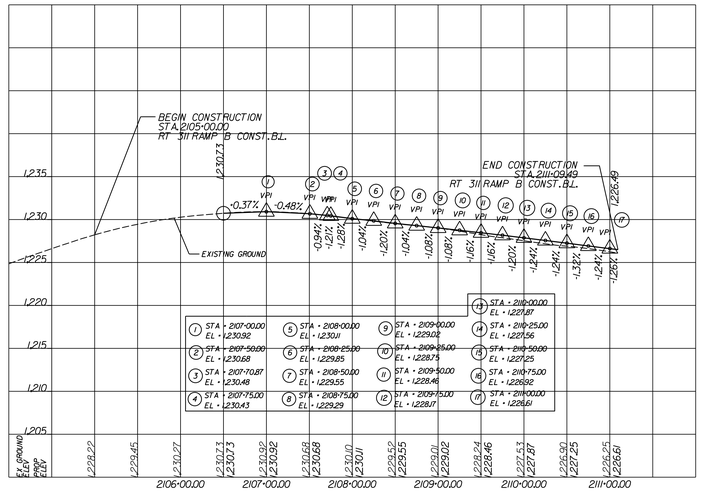
Legend

Proposed Bridge

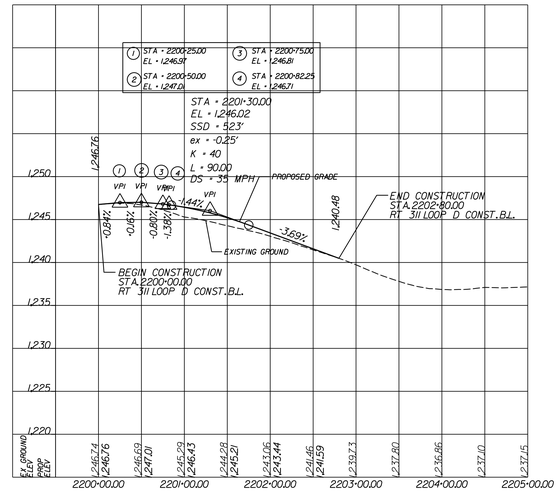
RT. 311 RAMP A



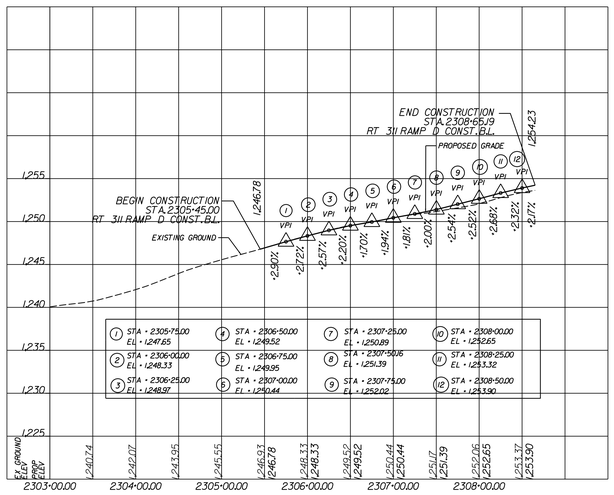
RT. 311 RAMP B



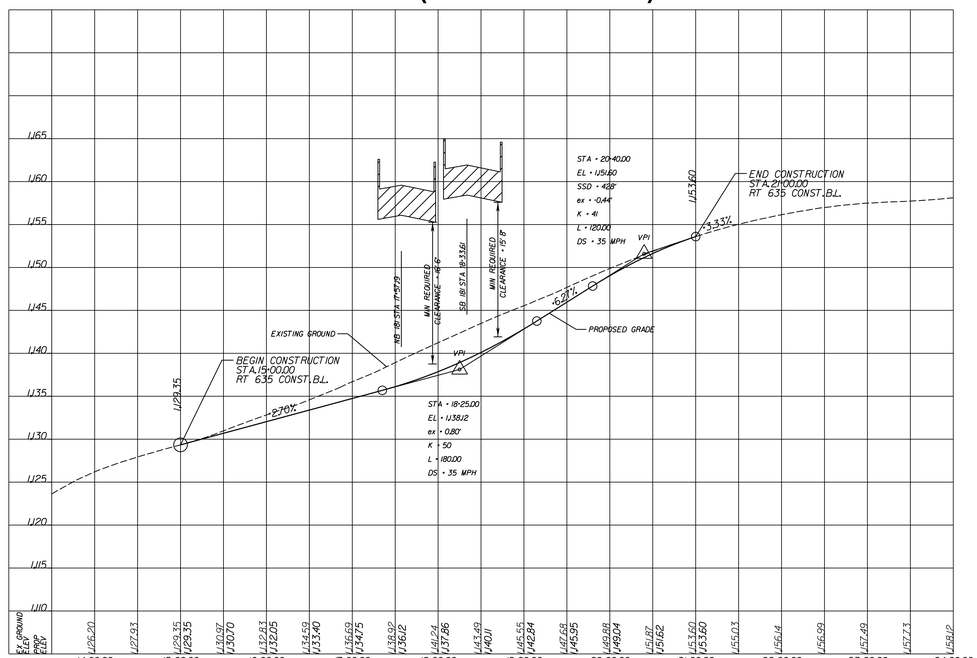
RT. 311 LOOP D



RT. 311 RAMP D



RT. 635 (GOODWIN AVE.)



RFP PLANS
For Information Only

DATE: 09/17/20

THESE PLANS ARE UNFINISHED AND UNAPPROVED AND ARE NOT TO BE USED FOR ANY TYPE OF CONSTRUCTION OR THE ACQUISITION OF RIGHT OF WAY.

ADDITIONAL EASEMENTS FOR UTILITY RELOCATIONS MAY BE REQUIRED BEYOND THE PROPOSED RIGHT-OF-WAY SHOWN ON THESE PLANS.

Contact Information

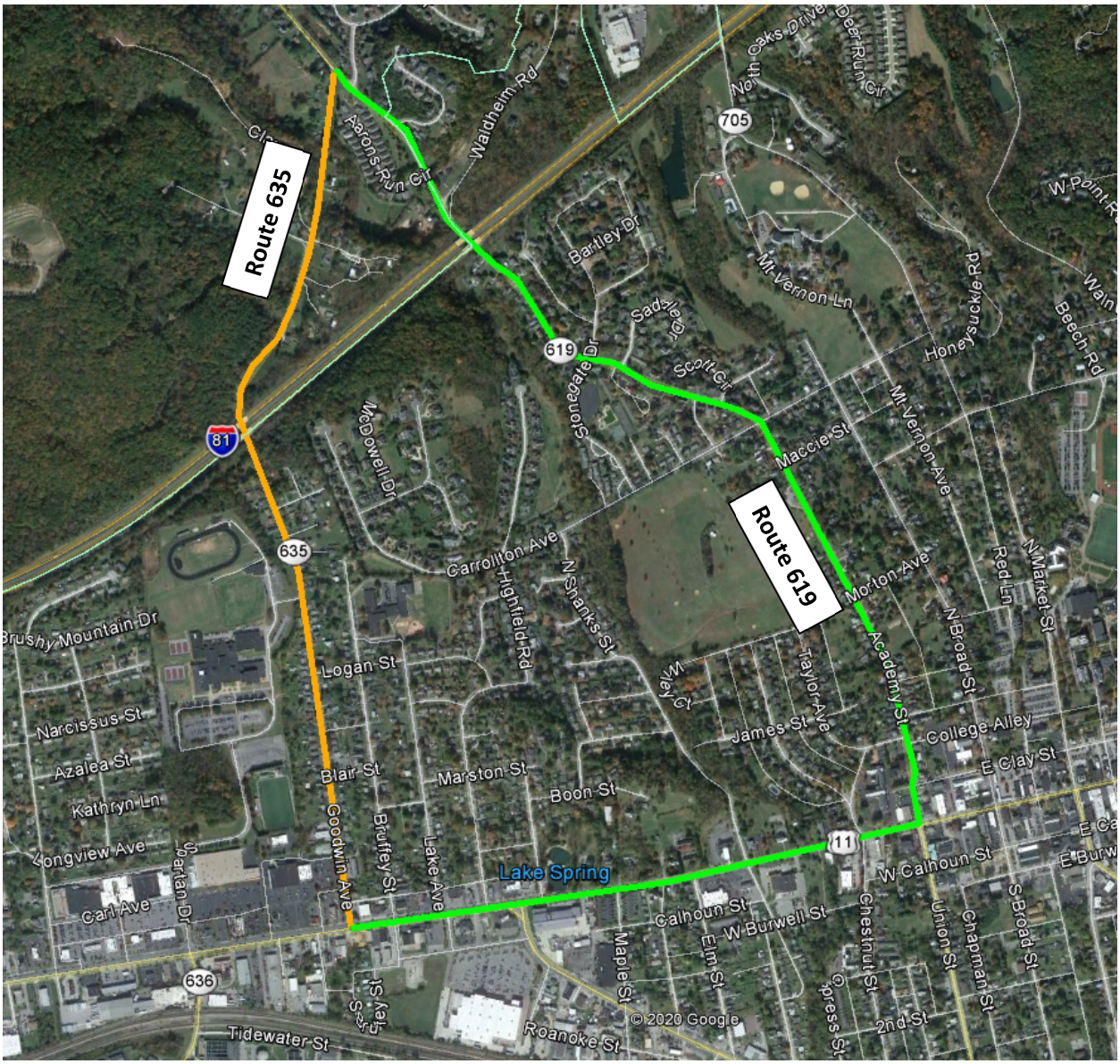
Craig Moore, PE
Project Manager / Assistant District L&D Engineer
Virginia Department of Transportation
731 Harrison Avenue
Salem, VA 24153

Comments may also be sent to:
I81-MM136-141@vdot.virginia.gov

I-81 Widening MM 136.6 to 141.8
Roanoke County / City of Salem, Virginia

0081-080-946, P101, R201, C501
UPC 116203
Federal Project Number

Appendix B
Alternate Truck Route



4235 Innslake Drive, Suite 105 Glen Allen, VA 23060
804.422.5075

Memorandum I-81 MM 136.6 to 141.8 D-B
UPC 116203

To: File

From: Tyler Gill

CC: VDOT Project Team

RS&H Design Team

Date: July 2, 2020

Re: Meeting Notes/Design Direction: Rt. 635 Goodwin Ave Vertical Clearance Alternative Discussion

---

This memo documents meeting notes and design direction that was agreed to at the 'Rt. 635 Goodwin Ave Vertical Clearance Alternative Discussion' on 2020-07-01. The meeting was held virtually via MS Teams and included VDOT Salem District, VDOT CO, VDOT APD, and RS&H Design Team staff. An attendee list is included as Appendix A.

Meeting Minutes/Notes

The goal of this meeting was to determine the vertical clearance to be accommodated at the I-81 over Rt. 635 crossing for inclusion into the RFP plans and technical requirements.

Craig Moore provided a brief background and introduction of the alternatives:

- 16' 6" – Meets VDOT minimum vertical clearance
- 15' 8" – Holds vertical clearance currently provided by the NB I-81 structure (requires design waiver)
- 14' 6" – Meets AASHTO minimum vertical clearance (requires design waiver)

Mr. Moore communicated that the localities were not supportive of an alternative that closed Goodwin on each side of I-81.

RS&H (Tyler Gill) presented each alternative in greater detail, discussing the Vertical Clearance Analysis (attached for reference in Appendix B) that was completed and the effect each alternative had on the NB I-81, SB I-81, and Rt. 635 vertical alignments as well as the corresponding cost estimate impacts.

The group had discussion that included constructability, construction sequencing, technical requirement language, DBT incentives, infrastructure protection, and DBT approach to optimizing bridge structures and vertical clearances.

VDOT S&B noted that only the SB I-81 structure had evidence of bridge strikes and thus was supportive of a 15' 8" clearance.

Vertical Clearance Decision

All parties agreed to providing **a minimum 15' 8" vertical clearance** for the I-81 structures crossing Rt. 635 (B684 & B685)

The design team will incorporate the 15' 8" vertical clearance into the development of the RFP plans. Technical requirement language will specify the required minimum clearance at this location.

Appendix D

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
731 HARRISON AVENUE
SALEM, VIRGINIA 24153

Stephen Brich, P.E.
COMMISSIONER

June 15, 2020

To: Craig Moore
Design Engineer

From: Carol J.L. Moneymaker
Planning Specialist

Subject: Traffic Data for Scoping Report and Design Purposes
Route: I-81
Project: 0081-080-946
UPC: 116203
Location: Roanoke County
From: Overpass of Route 641 (MP 136.85)
To: 0.3 MI north of Route 419 Overpass (MP 141.91)

Listed below is the requested data for the project referenced above. For mainline counts, text in *italics* indicates data derived from counts taken in 2017; all other mainline data is calculated from counts taken in 2019. All ramp data is calculated from counts taken in 2017.

I-81 Between Exits 132 and 137	Northbound	Southbound	Combined
Current ADT (2019)	27,296	23,149	50,445
Design Year ADT (2043):	31,882	27,038	58,920
Design Hourly Volume (DHV):	N/A	N/A	5,503
Directional DHV (Trucks):	N/A	N/A	901
Existing AM Peak Hour Traffic:	*1,745*	*1,603*	*3,342*
Existing AM Peak Hour Period	*7:15 - 8:15*	*7:30 - 8:30*	*7:15 - 8:15*
Existing PM Peak Hour Traffic:	*2,235*	*2,303*	*4,507*
Existing PM Peak Hour Period:	*4:15 - 5:15*	*4:30 - 5:30*	*4:30 - 5:30*
*AM Directional Distribution Factor**	*1,745 (52%)*	*1,597 (48%)*	*3,342*
*PM Directional Distribution Factor**	*2,204 (49%)*	*2,303 (51%)*	*4,507*
Peak Hour Factor:	*0.98*	*0.93*	*0.97*

Truck Percentage (Northbound)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*4.0%*	*18.3%*	*22.3%*
	% Daily	*4.1%*	*25.8%*	*29.9%*

Truck Percentage (Southbound)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*2.5%*	*14.3%*	*16.8%*
	% Daily	*4.1%*	*22.4%*	*26.5%*

Truck Percentage (Combined)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*3.0%*	*16.4%*	*19.4%*
	% Daily	*4.1%*	*24.1%*	*28.2%*

I-81 Between Exits 137 and 140	Northbound	Southbound	Combined
Current ADT (2019)	31,659	31,765	63,424
Design Year ADT (2043):	41,537	41,676	83,212
Design Hourly Volume (DHV):	N/A	N/A	6,823
Directional DHV (Trucks):	N/A	N/A	922
Existing AM Peak Hour Traffic:	*2,100*	*1,981*	*4,081*
Existing AM Peak Hour Period	*7:30 - 8:30*	*7:30 - 8:30*	*7:30 - 8:30*
Existing PM Peak Hour Traffic:	*2,596*	*2,869*	*5,458*
Existing PM Peak Hour Period:	*4:15 - 5:15*	*4:45 - 5:45*	*4:45 - 5:45*
*AM Directional Distribution Factor**	*2,100 (51%)*	*1,981 (49%)*	*4,081*
*PM Directional Distribution Factor**	*2,589 (47%)*	*2,869 (53%)*	*5,458*
Peak Hour Factor:	*0.98*	*0.94*	*0.97*

Truck Percentage (Northbound)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*3.2%*	*16.8%*	*19.9%*
	% Daily	*4.0%*	*23.2%*	*27.2%*

Truck Percentage (Southbound)	*Class 4-5*	*Class 6-7*	*Class 8-13*	*Total*
% Peak	*1.0%*	*0.7%*	*12.8%*	*14.4%*
% Daily	*1.7%*	*1.2%*	*20.0%*	*22.9%*

Truck Percentage (Combined)		*Class 4-7*	*Class 8-13*	*Total*
	% Peak	*2.2%*	*14.6%*	*16.8%*
	% Daily	*3.5%*	*21.5%*	*25.0%*

I-81 Between Exits 140 and 141	Northbound	Southbound	Combined
Current ADT (2019)	33,436	33,587	67,023
Design Year ADT (2043):	43,066	43,260	86,326
Design Hourly Volume (DHV):	N/A	N/A	7,856
Directional DHV (Trucks):	N/A	N/A	1,064
Existing AM Peak Hour Traffic:	2,626	2,361	5,005
Existing AM Peak Hour Period	7:30 - 8:30	7:15 - 8:15	7:15 - 8:15
Existing PM Peak Hour Traffic:	2,703	2,762	5,436
Existing PM Peak Hour Period:	4:00 - 5:00	4:30 - 5:30	4:15 - 5:15
AM Directional Distribution Factor*	2,644 (53%)	2,361 (47%)	5,005
PM Directional Distribution Factor*	2,679 (49%)	2,757 (51%)	5,436
Peak Hour Factor:	0.97	0.96	0.97

Truck Percentage (Northbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	2.1%	0.8%	18.1%	21.0%
% Daily	2.0%	1.2%	24.1%	27.3%

Truck Percentage (Southbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.4%	1.4%	14.4%	17.3%
% Daily	2.1%	1.5%	22.1%	25.7%

Truck Percentage (Combined)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.8%	1.2%	16.3%	19.2%
% Daily	2.0%	1.3%	23.1%	26.5%

I-81 Between Exits 141 and 143	Northbound	Southbound	Combined
Current ADT (2019)	36,787	36,368	73,155
Design Year ADT (2043):	47,382	46,842	94,224
Design Hourly Volume (DHV):	N/A	N/A	8,603
Directional DHV (Trucks):	N/A	N/A	1,056
Existing AM Peak Hour Traffic:	3,088	2,786	5,874
Existing AM Peak Hour Period	7:15 - 8:15	7:15 - 8:15	7:15 - 8:15
Existing PM Peak Hour Traffic:	3,068	3,074	6,142
Existing PM Peak Hour Period:	4:15 - 5:15	4:15 - 5:15	4:15 - 5:15
AM Directional Distribution Factor*	3,088 (53%)	2,786 (47%)	5,874
PM Directional Distribution Factor*	3,068 (50%)	3,074 (50%)	6,142
Peak Hour Factor:	0.96	0.94	0.97

Truck Percentage (Northbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.5%	0.7%	14.7%	16.9%
% Daily	1.8%	1.2%	21.9%	24.9%

Truck Percentage (Southbound)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.6%	0.8%	14.2%	16.7%
% Daily	2.0%	1.2%	20.4%	23.6%

Truck Percentage (Combined)	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.6%	0.8%	14.5%	16.8%
% Daily	1.9%	1.2%	21.1%	24.2%

Ramp 1 - Exit 137: I-81 NB Exit Ramp to Route 112 (Wildwood Road)

Current ADT (2017):	2,590		
Design Year ADT (2043):	3,061		
Design Hourly Volume (DHV):	301		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.0%	0.0%	0.0%
% Daily	3.6%	4.9%	8.5%
Existing Peak Hour Traffic:	A.M.: 171	(7:00 AM - 8:00 AM)	
	P.M.: 213	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.92		

Ramp 2 - Exit 137: I-81 NB Entrance Ramp from Route 112 (Wildwood Road)

Current ADT (2017):	7,232		
Design Year ADT (2043):	8,548		
Design Hourly Volume (DHV):	676		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.6%	0.9%	1.5%
% Daily	4.3%	5.9%	10.2%
Existing Peak Hour Traffic:	A.M.: 587	(7:15 AM - 8:15 AM)	
	P.M.: 645	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.92		

Ramp 3 - Exit 137: I-81 SB Exit Ramp to Route 112 (Wildwood Road)

Current ADT (2017):	6,729		
Design Year ADT (2043):	7,954		
Design Hourly Volume (DHV):	764		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.7%	1.0%	1.7%
% Daily	4.7%	6.0%	10.8%
Existing Peak Hour Traffic:	A.M.: 492	(7:30 AM - 8:30 AM)	
	P.M.: 679	(4:45 PM - 5:45 PM)	
Peak Hour Factor:	0.92		

Ramp 4 - Exit 137: I-81 SB Entrance Ramp from Route 112 (Wildwood Road)

Current ADT (2017):	2,349		
Design Year ADT (2043):	2,777		
Design Hourly Volume (DHV):	243		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.3%	0.8%	1.0%
% Daily	4.1%	4.2%	8.2%
Existing Peak Hour Traffic:	A.M.: 189	(7:15 AM - 8:15 AM)	
	P.M.: 191	(4:45 PM - 5:45 PM)	
Peak Hour Factor:	0.90		

Ramp 5 - Exit 140: I-81 NB Exit Ramp to Route 311 (Thompson Memorial Drive)

Current ADT (2017):	2,608		
Design Year ADT (2043):	3,489		
Design Hourly Volume (DHV):	435		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	1.0%	0.0%	1.0%
% Daily	4.4%	2.0%	6.4%
Existing Peak Hour Traffic:	A.M.: 245	(7:00 AM - 8:00 AM)	
	P.M.: 243	(5:00 PM - 6:00 PM)	
Peak Hour Factor:	0.89		

Ramp 6 - I-81 NB Entrance Ramp from Route 311 (Thompson Memorial Drive)

Current ADT (2017):	4,303		
Design Year ADT (2043):	5,757		
Design Hourly Volume (DHV):	646		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.3%	0.1%	0.4%
% Daily	2.6%	1.0%	3.6%
Existing Peak Hour Traffic:	A.M.: 410	(7:30 AM - 8:30 AM)	
	P.M.: 480	(5:30 PM - 6:30 PM)	
Peak Hour Factor:	0.85		

Ramp 7 - I-81 SB Exit Ramp to Route 311 (Thompson Memorial Drive)

Current ADT (2017):	4,291		
Design Year ADT (2043):	5,741		
Design Hourly Volume (DHV):	640		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.1%	0.0%	0.1%
% Daily	2.3%	1.0%	3.3%
Existing Peak Hour Traffic:	A.M.: 389	(7:30 AM - 8:30 AM)	
	P.M.: 442	(5:45 PM - 6:45 PM)	
Peak Hour Factor:	0.80		

Ramp 8 - I-81 SB Entrance Ramp from Route 311 (Thompson Memorial Drive)

Current ADT (2017):	2,412		
Design Year ADT (2043):	3,227		
Design Hourly Volume (DHV):	344		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.4%	0.7%	1.1%
% Daily	3.9%	2.8%	6.6%
Existing Peak Hour Traffic:	A.M.: 198	(7:15 AM - 8:15 AM)	
	P.M.: 271	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.90		

Ramp 9 - I-81 NB Exit Ramp to Route 419 (Electric Road)

Current ADT (2017):	2,725		
Design Year ADT (2043):	3,645		
Design Hourly Volume (DHV):	370		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	1.5%	0.0%	1.5%
% Daily	5.3%	4.8%	10.0%
Existing Peak Hour Traffic:	A.M.: 231	(7:30 AM - 8:30 AM)	
	P.M.: 270	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.86		

Ramp 10 - I-81 NB Entrance Ramp from Route 419 (Electric Road)

Current ADT (2017):	6,214		
Design Year ADT (2043):	8,314		
Design Hourly Volume (DHV):	826		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.3%	0.2%	0.6%
% Daily	3.1%	1.9%	5.0%
Existing Peak Hour Traffic:	A.M.: 582	(7:15 AM - 8:15 AM)	
	P.M.: 612	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.85		

Ramp 11 - I-81 SB Exit Ramp to Route 419 (Electric Road)

Current ADT (2017):	6,262		
Design Year ADT (2043):	8,380		
Design Hourly Volume (DHV):	959		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.6%	0.4%	1.0%
% Daily	3.2%	1.8%	5.0%
Existing Peak Hour Traffic:	A.M.: 629	(7:15 AM - 8:15 AM)	
	P.M.: 590	(4:30 PM - 5:30 PM)	
Peak Hour Factor:	0.85		

Ramp 12 - I-81 SB Entrance Ramp from Route 419 (Electric Road)

Current ADT (2017):	2,902		
Design Year ADT (2043):	3,882		
Design Hourly Volume (DHV):	355		
Truck Percentage:	Class 4-7	Class 8-13	Total
% Peak	0.4%	0.7%	1.1%
% Daily	4.6%	4.6%	9.2%
Existing Peak Hour Traffic:	A.M.: 239	(7:15 AM - 8:15 AM)	
	P.M.: 277	(4:45 PM - 5:45 PM)	
Peak Hour Factor:	0.94		

Route 112 (Wildwood Road) from NCL Salem to I-81

Current ADT (2019):	20,360			
Design Year ADT (2043):	24,406			
Design Hourly Volume (DHV):	2,060			
Directional DHV (Trucks):	17			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	Cannot be calculated with available count data.			
% Daily	1.2%	0.1%	0.2%	1.5%
Directional Distribution Factor:	A.M.: 1,804	N: 870 (48%)	S: 934 (52%)	
	P.M.: 1,801	N: 828 (46%)	S: 973 (54%)	
Existing Peak Hour Traffic:	A.M.: 1,804	(7:15 AM - 8:15 AM)		
	P.M.: 1,801	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.90			

Route 112 (Wildwood Road) from I-81 to FR 70

Current ADT (2019):	908			
Design Year ADT (2043):	1,017			
Design Hourly Volume (DHV):	127			
Directional DHV (Trucks):	2			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	1.5%	0.5%	0.0%	2.0%
% Daily	1.4%	0.6%	0.1%	2.1%
Directional Distribution Factor:	A.M.: 82	N: 18 (22%)	S: 64 (78%)	
	P.M.: 101	N: 63 (62%)	S: 38 (38%)	
Existing Peak Hour Traffic:	A.M.: 82	(7:15 AM - 8:15 AM)		
	P.M.: 101	(5:15 PM - 6:15 PM)		
Peak Hour Factor:	0.90			

UR8051 (Academy Street) from W. Carrolton Avenue to Route 619 (Wildwood Road)

Current ADT (2019):	1,950			
Design Year ADT (2043):	2,225			
Design Hourly Volume (DHV):	240			
Directional DHV (Trucks):	2			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.5%	0.0%	0.0%	0.5%
% Daily	1.2%	0.1%	0.1%	1.4%
Directional Distribution Factor:	A.M.: 218	N: 70 (32%)	S: 148 (68%)	
	P.M.: 186	N: 113 (61%)	S: 73 (39%)	
Existing Peak Hour Traffic:	A.M.: 218	(7:15 AM - 8:15 AM)		
	P.M.: 186	(5:00 PM - 6:00 PM)		
Peak Hour Factor:	0.88			

Route 619 (Wildwood Road) from Route 733 to UR 8051 (Academy Street)

Current ADT (2019):	1,190			
Design Year ADT (2043):	1,333			
Design Hourly Volume (DHV):	154			
Directional DHV (Trucks):	1			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.4%	0.4%	0.7%	1.4%
% Daily	0.9%	0.4%	0.2%	1.5%
Directional Distribution Factor:	A.M.: 112	E: 82 (73%)	W: 30 (27%)	
	P.M.: 140	E: 63 (45%)	W: 77 (55%)	
Existing Peak Hour Traffic:	A.M.: 112	(7:15 AM - 8:15 AM)		
	P.M.: 140	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.78			

Route 311 from Rose Ln to NCL Salem

Current ADT (2019):	13,707			
Design Year ADT (2043):	15,352			
Design Hourly Volume (DHV):	1,640			
Directional DHV (Trucks):	17			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.7%	0.1%	0.5%	1.2%
% Daily	1.0%	0.3%	0.7%	2.0%
Directional Distribution Factor:	A.M.: 1,462	N: 604 (41%)	S: 858 (59%)	
	P.M.: 1,580	N: 875 (55%)	S: 705 (45%)	
Existing Peak Hour Traffic:	A.M.: 1,462	(7:15 AM - 8:15 AM)		
	P.M.: 1,580	(4:30 PM - 5:30 PM)		
Peak Hour Factor:	0.94			

Route 311 from NCL Salem to Route 419

Current ADT (2019):	5,934			
Design Year ADT (2043):	6,646			
Design Hourly Volume (DHV):	750			
Directional DHV (Trucks):	8			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.7%	0.1%	0.5%	1.2%
% Daily	1.0%	0.3%	0.7%	2.0%
Directional Distribution Factor:	A.M.: 486	N: 162 (33%)	S: 324 (67%)	
	P.M.: 603	N: 349 (58%)	S: 254 (42%)	
Existing Peak Hour Traffic:	A.M.: 486	(7:15 AM - 8:15 AM)		
	P.M.: 603	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.94			

Route 419 from NCL Salem to I-81

Current ADT (2019):	12,773			
Design Year ADT (2043):	14,306			
Design Hourly Volume (DHV):	1,702			
Directional DHV (Trucks):	45			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.4%	0.3%	1.3%	2.0%
% Daily	1.4%	0.8%	2.6%	4.8%
Directional Distribution Factor:	A.M.: 1,428	N: 640 (45%)	S: 788 (55%)	
	P.M.: 1,511	N: 827 (55%)	S: 684 (45%)	
Existing Peak Hour Traffic:	A.M.: 1,428	(7:15 AM - 8:15 AM)		
	P.M.: 1,511	(4:45 PM - 5:45 PM)		
Peak Hour Factor:	0.95			

Route 419 from I-81 to Route 311

Current ADT (2019):	9,353			
Design Year ADT (2043):	10,475			
Design Hourly Volume (DHV):	983			
Directional DHV (Trucks):	30			
Truck Percentage:	Class 4-5	Class 6-7	Class 8-13	Total
% Peak	0.4%	0.3%	1.3%	2.0%
% Daily	1.4%	0.8%	2.6%	4.8%
Directional Distribution Factor:	A.M.: 958	N: 271 (28%)	S: 687 (72%)	
	P.M.: 1,078	N: 672 (62%)	S: 406 (38%)	
Existing Peak Hour Traffic:	A.M.: 958	(7:00 AM - 8:00 AM)		
	P.M.: 1,078	(4:30 PM - 5:30 PM)		
Peak Hour Factor:	0.95			

If you have questions or need additional information, please contact me at (540) 387-5228.

cc: Alex Vandyke, Joyce Barkley, Bruce Penner, Jason Henry, L.J. Muchenje, Anne Booker, Alex Price, Ray Varney, Michael Gray

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix D

VDOT
Virginia Department of Transportation

Appendix D: Bridge Widening vs. Replacement

Information needs:

- Last bridge inspection report or previous two reports
- Current load rating
- Testing if time allows
  - Half Cell Potential
  - Chloride ion profile
  - Depth of cover survey
  - Visual assessments of top and bottom of deck
  - Delamination survey

References:

- VDOT S&B Manual Part 2, Ch 32

Basic Terms:

- Bridge – For VDOT, anything that has a clear span above 20 feet or has a hydraulic opening greater than 36 square feet is considered a *bridge*.
- Condition State – General assessment of the quantity of a major bridge component assigned by bridge inspection ranging from 1 (good) to 4 (poor). Related to, but not explicitly tied to, GCR. Typically expressed as a percentage rating for each component.
- Culvert – A conveyance for water (or animals) that can be either a box culvert (with or without a bottom), a series of closely spaced pipes (metal or concrete) or an engineered system (i.e., Conspan).
- Deck – Roadway surface carrying traffic that is assigned a GCR.
- General Condition Rating (GCR) – The controlling rating assigned by the bridge inspection team for a specific bridge element. A total of 3 GCRs are assigned to a bridge and 1 GCR is assigned to a culvert. A bridge with **all** GCRs > 6 is in *Good* condition. A bridge with **any** GCRs < 5 is considered *Structurally Deficient*.
- Hydro-demolition – Milling technique utilizing high pressure water to remove concrete deck. Shallow = Type A = 1/2” below the milled surface; Deep = Type B = 1” below top mat of rebar across entire deck surface
- Superstructure – Supporting elements directly below the deck that is assigned a GCR. Sometimes referred to as beams or girders.
- Substructure – Supporting elements directly below the superstructure that is assigned a GCR. Sometimes referred to as piers, bents, abutments, and foundations.

- Foundation – Supporting elements that are part of the substructure but are typically beneath the ground surface. Typical elements are footings or piles.
- NBIS – National Bridge Inspection Standards (NBIS) defines how bridges are inspected. Sometimes, GCRs are referred to NBIS ratings.

Process:

1. Evaluate the potential bridge repairs
   - Decks
     - GCRs > 6 **and** no more than 4% of the deck is in Condition State 2 or greater only minor patching required.
     - GCR <5, deck replacement is required
       - Possible to perform testing and if results favorable, hydro-demolition could be substituted
     - All other GCRs and require hydro-demolition and rigid overlay
       - GCR > 6, Patch and apply flexible overlay
       - GCR = 6, shallow hydro-demolition and rigid overlay required *unless*
         - Testing is completed and results favorable for standard milling and flexible or rigid overlay
       - GCR = 5, deep hydro-demolition and rigid overlay required *unless*
         - Testing is completed and results favorable for shallow hydro-demolition and rigid overlay
     - Expansion joints shall be evaluated against existing structure capacities to determine maximum joint closure opportunities using *link slabs*
     - For parapets on non-widening side, only poor condition or bolt-down style need be replaced
     - Bridge drainage shall be considered, and new drains added as needed
     - Wingwall transitions shall be evaluated for non-widened side
   - Superstructure
     - Evaluate Vertical Clearance including any future widening considerations
     - Strengthening may be required for structures with an existing load positing based upon the current load rating.
     - Repair all damage to beams/girders that are to remain
     - For steel girders, full painting is required unless more than 95% of the existing coating system is in Condition State 1. Otherwise, spot/zone painting applies
   - Substructure
     - Repair all damage to elements that are to remain
     - Evaluate any scour concerns and address with countermeasures
     - If abutment modification is in scope, consider Virginia micro-abutment in lieu of traditional Virginia Abutment
     - Approach slab may require replacement or extension onto shoulder
   - Culvert
     - Steel culverts require flow lines unless hydraulic characteristics are not acceptable
     - Concrete culverts require repair as needed
2. Evaluate repair cost versus new bridge cost

- If repairs plus widening are >65% of replacement, additional discussions and justification will be required if replacement is not selected
- Consider all costs including MOT, RW, utilities, environmental, etc.

3. Justify and document decision

Notes:

- Recommend consultation with District S&B office

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix E

VDOT
Virginia Department of Transportation

Appendix E: Stage 1 Bridge Report

Stage I Bridge Report

For instructions, click here.

Facility Carried:

Project Name:		**Submittal Date:**
Federal Project Number:		**Fed Structure ID (New):**
State Project Number:		**Fed Structure ID (Existing):**
District:	**UPC:**	**Maintenance Authority:**
County:	**VA Struc. #:**	**Funding Source:**
Fed. Oversight: NFONFONFO		**Programmed for Federal Aid:**

Prepared for the Virginia Department of Transportation
Structure and Bridge

Role	Name	Title	Email	Phone
S&B POC				
Project Manager				

Submitted by:

Role	Name	Title	Email	Phone
Designer				
POC & PM				

Roadway Coordination Data Summary

☐Data not shown is provided on roadway plans provided as supplementary data

Based on Roadway Plans dated:

On Bridge

Current ADT(year):		**Design ADT(year):**	
Design Speed:	mph	**Posted Speed(mph):**	mph
% Trucks:		**Profile type**	
Reduced Design Speed (if applicable)	mph	**Is the road carried on the NHS?**	
Functional Classification:		**Min. Design Standard:**	
Existing Dimensions (If applicable)		**Proposed Dimensions**	
Max Grade			

(if applicable) **Under Bridge -**

Current ADT(year):		***Design ADT(year):***	
% Trucks:		***Posted Speed(mph)***	*mph*
Design Speed:	*mph*	***Profile type***	
Reduced Design Speed (if applicable)	*mph*	***Is the road carried on the NHS?***	
Functional Classification:		***Min. Design Standard:***	
Existing Dimensions		***Proposed Dimensions***	
Max Grade			

Coordination with Central Office:

Copy the first two lines of the bridge description on the TS&L cover sheet here.

Project Name: Enter the name of the ProjectEnter the name of the ProjectEnter the name of the Project		**Submittal Date:** Click here for date.Click here for date.Click here for date.
Federal Project Number: Enter Federal Project #Enter Federal Project #Enter Federal Project #		**Fed Structure ID (New):** Federal ID for Proposed or N/A
State Project Number: Enter State Project #, BXXXEnter State Project #, BXXXEnter State Project #, BXXX		**Fed Structure ID (Existing):** Federal ID for Existing, N/A
District: Enter DistrictEnter DistrictEnter District	**UPC:** Enter UPC #.	**Maintenance Authority:** Choose an item.
County: Enter CountyEnter CountyEnter County	**VA Struc.#:** VA Struc. #.	**Funding Source:** Choose SourceChoose SourceChoose Source
Fed. Oversight: NFONFONFO		**Programmed for Federal Aid:** Choose an item.Choose an item.Choose an item.

Work related to the complex items or areas including, but not limited to, Analysis, Design, Detailing, Construction, including Staged Construction, and Special Provisions shall be coordinated with the VDOT Central Office Structure and Bridge Division Complex Bridge and ABC Support Section during Stage II.

The following items are designated as complex items or areas in the approved bridge concept:

List complex item/area here
List complex item/area here

The following items require a waiver to be completed:	Before Stage I approval	Before PAC	Before Field Inspection (FI)
List item requiring a waiver.	☐	☐	☐
List item requiring a waiver.	☐	☐	☐

Note: The waiver shall describe a plan to be followed to ensure the complex items are wholly thought out and will be analyzed with the appropriate level of detail, designed to applicable specifications, are constructible, and will be low maintenance elements in the new bridge.

Approval of Recommended Bridge:

Copy the first two lines of the bridge description on the TS&L cover sheet here.

Project Name: Enter the name of the ProjectEnter the name of the ProjectEnter the name of the Project		**Submittal Date:** Click here for date.Click here for date.Click here for date.
Federal Project Number: Enter Federal Project #Enter Federal Project #Enter Federal Project #		**Fed Structure ID (New):** Federal ID for Proposed or N/A
State Project Number: Enter State Project #, BXXXEnter State Project #, BXXXEnter State Project #, BXXX		**Fed Structure ID (Existing):** Federal ID for Existing, N/A
District: Enter DistrictEnter DistrictEnter District	**UPC:** Enter UPC #.	**Maintenance Authority:** Choose an item.
County: Enter CountyEnter CountyEnter County	**VA Struc.#:** VA Struc. #.	**Funding Source:** Choose SourceChoose SourceChoose Source
Fed. Oversight: NFONFONFO		**Programmed for Federal Aid:** Choose an item.Choose an item.Choose an item.

Recommend for approval by:	**Designer.**	**Date:**	
Recommend for approval by:	**POC&PM.**	**Date:**	
Remarks :			

APPROVAL STATUS: ☒ Approved
District Structure and Bridge Engineer:
Remarks:

APPROVAL STATUS: ☒ Approved
Assistant State Structure and Bridge Engineer:
Remarks:

APPROVAL STATUS:: ☒ Approved
State Structure and Bridge Engineer:
Remarks:

APPROVAL STATUS:: ☒ Approved

FHWA Virginia Division Bridge Engineer

Remarks:

Contents

1.0 Superstructure 8
1.1 Span Layout 9
1.2 Superstructure Geometrics 9
1.3 Railings, Bike & Pedestrian Facilities 10
1.4 Longitudinal and Transverse Joints 10
1.5 Ability to Inspect and Maintain Superstructure 10
2.0 Substructure 12
2.1 Abutments 13
2.2 Piers 13
2.3 Substructure Protection 13
2.4 Proposed Foundations 13
2.5 Fills and Retaining Walls 13
2.6 Geotechnical Description 14
2.7 Ability to Inspect and Maintain Substructure 14
3.0 Site Description 15
3.1 Project Location 15
3.2 Adjacent Projects, Structures, Businesses & Residences 15
3.3 Environmental 16
3.4 Railroad, WMATA, other Rail type 17
3.5 Constructability Issues 17
3.7 Coast Guard Issues 17
3.8 Utilities 17
3.9 Aesthetic Considerations 18
3.10 Traffic Engineering 18
3.11 Drainage 18
3.12 Hydrologic and Hydraulic 18
4.0 Future Considerations of Proposed Structure 18
4.1 Future widening Considerations: 18

4.2 Future Deck Replacement Considerations: 18
4.3 Bridge Inspection Considerations 18
4.4 Bridge Maintenance Considerations 18
4.5 Other Considerations 19
5.0 Bridge Preliminary Recommendation 19
6.0 Alternative Bridge Recommendation 19
7.0 Engineer's Cost Estimate for each Alternative 19
8.0 Schedule 19
9.0 Appendix 19
9.1 Bridge Plans (to include Sequence of Construction) 19
9.2 Roadway Plans 19
9.3 Existing Bridge Plans 19
9.4 Preliminary Geotechnical Report 19
9.5Preliminary Hydrologic and Hydraulic Report 19
9.6 Data Sources 19

1.0 Superstructure

Design Exceptions, Waivers, or Alternative Technical Concepts are required: ☐ **Yes, see Table 1 below** ☐**No**

Table 1.0: Applicable Design Exception/ Waiver/ATC for Superstructure and Superstructure Elements

Bridge Element	**Check if violated**						
	Tech. Reqs (DB & P3 Only)	**S&B Design Manual**	**I&IM's**	**AASHTO**	**Supporting Documentation***	**Approved**	**Date**
Proposed shoulders	☐	☐	☐	☐			
Bike and or Ped. facilities	☐	☐	☐	☐			
Parapet, Rail, and Ped Fence	☐	☐	☐	☐			
Median geometrics	☐	☐	☐	☐			
Soundwalls (size,location, material)	☐	☐	☐	☐			
Sight Distance (Horiz. & Vert.)	☐	☐	☐	☐			
Deck Width Limitation for Longitudinal Joints	☐	☐	☐	☐			
Proposed Transverse Joints	☐	☐	☐	☐			
Hor. And Vert. clearances	☐	☐	☐	☐			
Other:	☐	☐	☐	☐			

Table 1 Superstructure Applicable Design Exception/Waiver/ATC *see related section below for justification and data

* Indicate the name of the Exception/Waiver/ATC and guidance as to where it is stored via hyperlink, description or other.

NOTE: All citations shall include a specific reference:

1. Technical Requirement including section number and paragraph
2. Structure & Bridge Instructional and Information Memoranda (I&IM's) including the version, year and section.
3. Department S&B Design Manual including File Number and page
4. Department Road and Bridge Specifications: Section and Subsections
5. AASHTO including Document Title & Edition chapter and section
6. All other references shall include a detailed citation

1.1 Span Layout

The structure is jointless as described in S&B Design Manual: ☐ **Yes** ☐**No, refer to Table 1 and Table 1.4 Expansion Joints**

Table 1.1 Span Layout

Unit #	**# Spans per Unit**	**Span Length(s)**	**Skew**		**Unit Type**
			Begin span	End span	

1.2 Superstructure Geometrics

The following VDOT S&B shoulder requirements have been selected based on a functional roadway classification of . For additional geometrics considerations see narrative below.

Table 1.2.a Superstructure Geometrics

From:	**Dimension**
Width is Face to Face of	

**Width include widening (of on left of traffic (and) on right of traffic.)

The structure provides lane(s) that

Vertical clearances provided exceed minimum required vertical clearance: ☐ **Yes** ☐**No, see description below**

Table 1.2.b Vertical Clearances

List all spans numerical order	**Controlling Feature**	**Minimum Vertical Clearance Provided** (ft.-in)
Span 1		

1.3 Railings, Bike & Pedestrian Facilities

Table 1.3 Minimum required railing test level selection

Railing Location		Test Level Req'd	Test Level Prov'd	Proposed Railing Type
Exterior (S&B Design Manual File 25.02)				
Interior(S&B Design Manual File 6.04)	Median:			
	Shared Use Path:			

1.4 Longitudinal and Transverse Joints

Table 1.4 Joint Index Table

Transverse Joint Location	Transverse Joint Type	Waiver/ATC
		☐ Yes, Refer to Table 1 ☐No

Longitudinal deck joint Choose an item. required; deck width Choose an item. to S&B Design Manual 10.01-1D. Refer to Table 1

1.5 Ability to Inspect and Maintain Superstructure

Table 1.5 Access for Inspection and Maintenance

Location	Description	Waiver/ATC
Vertical and Horizontal AlignmentsVertical and Horizontal AlignmentsVertical and Horizontal Alignments	• Req'd. horiz. clr. ☐ IS ☐ IS NOT provided. • Req'd. vert.[1] clr. ☐ IS ☐ IS NOT provided. • Access to adjacent element ☐ IS ☐IS NOT restricted for inspection and maintenance by industry standard equipment. • TRs ☐ HAVE ☐ HAVE NOT been violated	☐ Yes, Refer to Table 1 ☐No
Maintenance Jacking and Blocking (future)Maintenance Jacking and Blocking (future)Maintenance Jacking and Blocking (future)	• Req'd. horiz. clr. ☐ IS ☐ IS NOT provided. • Req'd. vert. clr. ☐ IS ☐ IS NOT provided. • Access to adjacent element ☐ IS ☐IS NOT restricted for inspection and maintenance by industry standard equipment. • TRs ☐ HAVE ☐ HAVE NOT been violated	☐ Yes, Refer to Table 1 ☐No
	• Req'd. horiz. clr. ☐ IS ☐ IS NOT provided.	☐ Yes, Refer to Table 1 ☐No

	• Req'd. vert. clr. ☐ IS ☐ IS NOT provided. • Access to adjacent element ☐ IS ☐IS NOT restricted for inspection and maintenance by industry standard equipment. • TRs ☐ HAVE ☐ HAVE NOT been violated	

1.0 2.0 Substructure

Design Exceptions, Waivers, or Alternative Technical Concepts are required: ☐ **Yes, see Table 2 below** ☐**No**

Table 2.0: Applicable Exception/Design Waiver/ATC for Substructure and Substructure elements

Bridge Element	**Check if violated**						
	Tech. Reqs (DB & P3 Only)	**S&B Design Manual**	**I&IM's**	**AASHTO**	**Supporting Documentation**	**Approved**	**Date**
Abutment Selection TypeAbutment Selection TypeAbutment Selection Type	☐	☐	☐	☐			
Strength of ConcreteStrength of ConcreteStrength of Concrete	☐	☐	☐	☐			
Other:	☐	☐	☐	☐			

Table 2 Substructure Applicable Design Exception/Waiver/ATC *see related section below for justification and data

NOTE: All citations shall include a specific reference:

1. Technical Requirement including section number and paragraph
2. Structure & Bridge Instructional and Information Memoranda (I&IM's) including the version, year and section.
3. Department S&B Design Manual including File Number and page
4. Department Road and Bridge Specifications: Section and Subsections
5. AASHTO including Document Title & Edition chapter and section
6. All other references shall include a detailed citation

2.1 Abutments

Table 2.1: Abutment Type Selection

Abutment	Type	Minimum Provided Horizontal Clearance* (ft.-in)	Abutment conforms to S&B Design Manual Chapter 17	Abutment conforms to other requirements (AREMA, etc.)
Abutment A			☐Yes ☐No, see discussion below	☐Yes ☐No, see discussion below
Abutment B			☐Yes ☐No, see discussion below	☐Yes ☐No, see discussion below

2.2 Piers

Table 2.2: Pier Type Selection

Pier Number	Type	Minimum Provided Horizontal Clearance* (ft.-in)	Pier conforms to S&B Design Manual Chapter 15	Pier Designed for Collision
Pier 1			☐Yes ☐No, see discussion below	☐Yes ☐No, see discussion below

2.3 Substructure Protection

Table 2.3: Substructure Protection

Proposed Protection for	Type	Minimum Provided Horizontal Clearance to Bridge Item* (ft.-in)	Exception/Waiver/ATC
			☐Yes, refer to Table 1 ☐No

Adjust table as necessary, refer to Road and Bridge plan sheets for more detail
*Minimum gap distance provided between substructure unit and protection.

2.4 Proposed Foundations

Table 2.4: Substructure Foundation Selection

Proposed Foundation for	Type

2.5 Fills and Retaining Walls

New fill(s) impact(s) adjacent facilities: ☐Yes, see narrative description below ☐No impact is foreseen

New retaining wall(s) impact(s) adjacent facilities: ☐Yes, see narrative description below ☐No impact is foreseen

2.6 Geotechnical Description

Table 2.6: Substructure Foundation Selection

Existing Foundation for	Type

Proposed settlement criteria and mitigation:

Geotechnical material description:

Existing structure plans are attached ☐**Yes, see appendix** ☐**No, existing structure information not available**

2.7 Ability to Inspect and Maintain Substructure

Table 2.7 Access to Substructure for Inspection and Maintenance

Location	Description	Waiver/ATC
Vertical and Horizontal AlignmentsVertical and Horizontal AlignmentsVertical and Horizontal Alignments	• Req'd. horiz. clr. ☐ IS ☐ IS NOT provided. • Req'd. vert.[1] clr. ☐ IS ☐ IS NOT provided. • Access to adjacent element ☐ IS ☐IS NOT restricted for inspection and maintenance by industry standard equipment. • TRs ☐ HAVE ☐ HAVE NOT been violated	☐ Yes, Refer to Table 1 ☐No
	• Req'd. horiz. clr. ☐ IS ☐ IS NOT provided. • Req'd. vert. clr. ☐ IS ☐ IS NOT provided. • SAFE access to element ☐ IS ☐IS NOT provided for inspection and maintenance by industry standard equipment. • Access platform ☐ HAS ☐HAS NOT been provided. • TRs ☐ HAVE ☐ HAVE NOT been violated	☐ Yes, Refer to Table 1 ☐No

2.0 3.0 Site Description

3.1 Project Location

The project is located in INSERT COUNTY near prominent easily identifiable location.on type of terrain.. The structure carries route # over insert feature intersected. The bridge is on new or existing alignment.

3.2 Adjacent Projects, Structures, Businesses & Residences

The project has impacts to adjacent structures, : ☐Yes, see narrative description below ☐No

3.3 Environmental

Environmental Impact(s) to project
Wetlands, flood plains, floodways, tidal | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Historical properties | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
4F properties | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Agricultural district properties | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Northern Long-Eared Bats | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Dredging | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Potential hazardous material sites | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Nesting and migrating birds | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Migrating fish | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Soundwall requirements | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Cofferdams | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
SWM facilities | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Construction access restrictions | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Temp. causeway or work bridge restrictions | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
EA/EIS requirements | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Time of Year Restrictions | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A
Other, specified below | ☐ Yes, confirmed impact ☐ No impact, confirmed ☐ Investigation Underway ☐ N/A

The environmental permit

3.4 Railroad, WMATA, other Rail type

3.4.1 Railroad

Table 3.4: Railroad Considerations

Railroad	Number of existing tracks	Number and location of future track requirements	Shoring required	Crashwall required	Flagging required	Pedestrian Fence required
			☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No

3.4.2 WMATA

Washington Metropolitan Area Transit Authority, future and existing conditions, Choose an item. in the project location. A description of special requirements, clearances, construction constraints and all other that apply to WMATA Choose an item. highlighted below.

3.4.3 Other Rail Type

3.5 Constructability Issues

Sensitive structures, utilities, businesses and/or residences are located within the zone of influence (ZOI) of vibration inducing construction activities: ☐Yes, see narrative description below. ☐ No mitigation required.

3.7 Coast Guard Issues

3.8 Utilities

Table 3.8: Utility Considerations (Document all utilities which may be impacted by construction at this site.)

Type of Utility	Location of Utility	Company	Description of Utility provided Below
			☐Yes ☐No

Insert a narrative description for utilties and proposed mitigation; if necessary to clarify information provided and justify requests for any Design waivers/Exception. If applicable specify authority to perform utility work, payment authority and any other type of agreement that could be related to a utility item.

3.9 Aesthetic Considerations

3.10 Traffic Engineering

3.11 Drainage

Deck drains Choose an item..

3.12 Hydrologic and Hydraulic

Executive Summary from the preliminary H&H report: ☐**Included in appendix** ☐**In development** ☐**Not required/applicable**

Table 3.12: Hydraulic

H&H Item	**H&H Data**
FHWA construction/scour code	
Drainage Area in ft^2	
Design Flood elev.	
Historic flood elev. (Date)	
Min. bridge length and skew req'd	

Scour susceptibility and required countermeasures:

3.0 4.0 Future Considerations of Proposed Structure

4.1 Future widening Considerations:

4.2 Future Deck Replacement Considerations:

4.3 Bridge Inspection Considerations

4.4 Bridge Maintenance Considerations

4.5 Other Considerations

4.0 5.0 Bridge Preliminary Recommendation

5.0 6.0 Alternative Bridge Recommendation

6.0 7.0 Engineer's Cost Estimate for each Alternative

7.0 8.0 Schedule

8.0 9.0 Appendix

9.1 Bridge Plans (to include Sequence of Construction)
9.2 Roadway Plans
9.3 Existing Bridge Plans
9.4 Preliminary Geotechnical Report
9.5Preliminary Hydrologic and Hydraulic Report
9.6 Data Sources
Data from the following sources was considered in the development of this report

Environmental Sources			
☐CE	☐EA	☐EIS	☐Other
L&D Sources			
☐	Roadway Design Plans		
☐	Traffic Engineering Reports		
Surveys			
☐	Bridge Situation Plan		
☐	Topographic survey and bathymetric/hydraulic datum references		
☐	Hydraulics/Hydrology		
☐	Utility Survey		
☐	Other Survey (scour, etc.)		
Bridge Sources			
☐	Existing Bridge Plans		
☐	Existing Bridge Inspection Report(s)		
☐	Other		
Geotechnical sources			

☐	Existing Geotechnical Information (From project site, nearby bridges, roadway borings, geologic maps, etc.)
☐	Project Specific Geotechnical
Meeting(s) (Localities, District, Residency, etc.) (dates on for these are critical)	
☐	Localities
☐	District
☐	Residency
☐	Other
Other Sources	
☐	FHWA Recommendation (Rehabilitation vs. Replacement)
☐	Site Visit
☐	Other
☐	

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix F

VDOT
Virginia Department of Transportation

Appendix F: Replacing Guardrail Within Project Limits

Information needs:

- Existing roadway plans showing typical sections and guardrail placements
- Proposed roadway plans showing typical sections and guardrail placements
- Aerial imagery of roadway
- Survey of pavement edge lines, slope contours and existing lane striping
- Guardrail assessment on existing guardrails where potential to remain exists
- Existing roadway crash data and analysis

References:

- AASHTO Green Book Chapter 4.4.2 (Shoulder Width)
- VDOT Road Design Manual (RDM) (Appendix J)
- VDOT Road & Bridge Standards
- VDOT I&IM IIM-LD-222/ IIM-TE-358 - NCHRP 350 Test Requirements
- VDOT I&IM IIM-TE-366 - Barrier Systems

Process:

- Conduct constraints analysis identifying unique project constraint locations in context of the entire corridor.
- Follow current VDOT policy outlined in Appendix J of the Road Design Manual which requires replacement of all deficient guardrail within project limits.
- Assess and evaluate guardrail replacement needs
  - **Upgrading Existing**
    - Determine what runs of guardrail are directly impacted by construction activities.
      - For example, an inside shoulder run would not be directly impacted by construction if a project is solely an outside widening.
    - Determine existing shoulder width.
    - Determine existing guardrail deficiency through guardrail assessment utilizing VDOT I&IM IIM-TE-366
    - If deficient, determine if more than 60% of the existing substandard run of guardrail is within the project limits as per RDM Appendix J.
      - If limits not exceeded, replace only deficient sections directly impacted by construction. No DE/DW is required for substandard shoulder offsets in areas not directly impacted by construction.
      - If limits exceeded, replace the entire run of guardrail including the end terminals for runs directly impacted by construction. Upgrading a substandard shoulder for areas not directly impacted by construction in runs

being upgraded is not required **except** when required for an end terminal. Additionally, no DE/DW is required for substandard shoulder offsets in areas not directly impacted by construction.

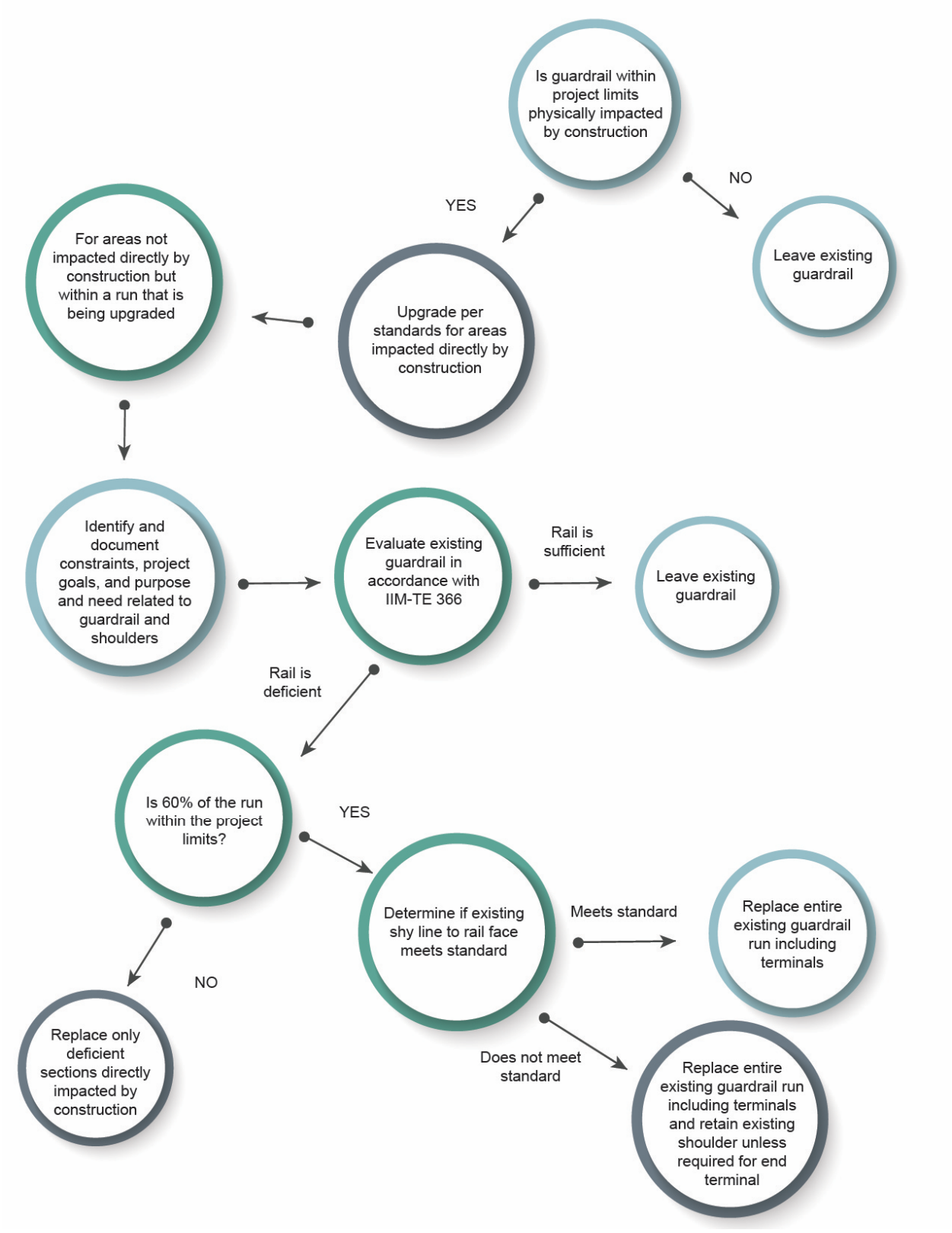
- Upgrades to substandard guardrail in areas not directly impacted by the construction are not required regardless of the 60% threshold. No DE/DW is required for substandard shoulder offsets in areas not directly impacted by construction.
- If a decision is made to upgrade deficient guardrail outside sections directly impacted by construction, consider limiting the scope of the upgrade to the guardrail system and not including shoulder widening that otherwise would not be included within the project scope. No DE/DW is required for substandard shoulder offsets. The overall project budget should be considered when making these decisions.
- Consideration for upgrading/replacing outside the limits of the project and the 60% threshold should be a data driven decision. If prioritization is needed to decide, crash data should be used to support any decision.
- If the data driven process is used, consider what is leading to guardrail hits at a high frequency. Are there pavement issues that could be corrected? Is there a cross-slope issue that can be resolved? These alternative solutions may prove to be more cost effective and may provide a safer facility.

- **Length of Need**
  - Evaluate length of need (LON) for existing guardrail runs.
  - Meet minimum standards for LON and consider additional widening costs for closing gaps between adjacent runs of less than 200 feet.
  - Utilize long post installations as appropriate to minimize additional shoulder widening.
- **Shoulder Strengthening**
  - The I-81 Program has established guidance that paving beneath guardrail as per Road & Bridge Standard MC-4 is generally not required or preferred.
  - Under guardrail paving versus asphalt curbing should be evaluated in locations where a high probability of shoulder washout exists.
  - Any areas for under guardrail paving should be reviewed with the I-81 Program Manager or his designee.
  - Unnecessary shoulder strengthening or paving to meet requirements should be avoided in areas outside the project limits.
  - When traffic shifts are utilized, shoulder strengthening should be limited to only areas of need within the shifted lanes.

Other Considerations:

- Utilize long post guardrail wherever practical and possible to avoid impacting areas that were not planned to be impacted by the project and would only negligibly improve safety.
- Do not provide additional pavement beneath the guardrail outside areas directly impacted by construction to deter grass and weed growth. VDOT has contracts to mow the interstate which includes mechanical methods of removing grass and weeds around guardrail. The extension of pavement under the guardrail is not anticipated to enhance safety or operational characteristics of the interstate system.
- The MGS2 terminals shall be installed with the full site prep as shown on standard 506.07 and not the limited use site prep.

- At the discretion of the VDOT project manager, trench widening or underdrains can be considered to extend to meet new guardrail installations and provide for future use, but only with the following in place:
  - High confidence in the construction cost estimate and schedule.
  - Project has budget available for additional upgrades.
  - Consider including in the contract directly or as a bid additive/alternate.


Is guardrail within project limits physically impacted by construction
NO
Leave existing guardrail
YES
Upgrade per standards for areas impacted directly by construction
For areas not impacted directly by construction but within a run that is being upgraded
Identify and document constraints, project goals, and purpose and need related to guardrail and shoulders
Evaluate existing guardrail in accordance with IIM-TE 366
Rail is sufficient
Leave existing guardrail
Rail is deficient
Is 60% of the run within the project limits?
YES
Determine if existing shy line to rail face meets standard
Meets standard
Replace entire existing guardrail run including terminals
NO
Replace only deficient sections directly impacted by construction
Does not meet standard
Replace entire existing guardrail run including terminals and retain existing shoulder unless required for end terminal

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix G

VDOT
Virginia Department of Transportation

Appendix G: Temporary Drainage & Spread at Barrier Wall / Parapet

Information needs:

- Existing roadway plans showing typical sections and drainage features
- Proposed roadway plans showing typical sections and drainage features
- Proposed Traffic Management Plan (TMP) typical sections
- Aerial imagery of roadway
- Survey of pavement edge lines and existing lane striping
- Digital terrain model or survey elevations of existing grades
- Existing bridge or structure plans

References:

- VDOT Drainage Manual (Chapter 9)
- VDOT Manual of the Structure & Bridge Division
- VDOT Road Design Manual (RDM) (Appendix J)
- VDOT Road & Bridge Standards

Process:

- Design must consider new requirements for spread in both temporary and permanent conditions as per the VDOT Drainage Manual (Ch. 9.5).
- Evaluate all planned stages of Maintenance of Traffic for constrained conditions and lane widths where spread will encroach into lanes beyond allowable per above.
- Develop solutions to decrease spread.
    - Potential solutions for consideration may include, but are not limited to the following
        - Add drainage inlets to existing or new bridge decks
            - This may require adding collector pipe under the bridge deck to capture runoff and release to point locations.
        - Modify proposed lane and shoulder widths
        - Adding slot drains to barrier wall / parapet should be considered a last resort and are unlikely to be approved.
- Solutions must be reviewed and approved by the appropriate disciplines (i.e., Drainage, S&B, L&D, etc.)
    - Spread of up to one foot into the travel lane may be approved on existing bridges for temporary maintenance of traffic shifts required for phased construction where other potential mitigations are not feasible.
- Drainage holes may be considered on a case-by-case basis for an existing bridge if the situation is temporary and the bridge will eventually be demolished. A Design Approval shall be requested from the District Bridge Engineer.

- If holes are placed in bridge decks, care must be taken:
  - Avoid top flanges of girders
  - Maximum size ≤ six inches
- If spread requirements cannot be met, a Design Waiver should be pursued through L&D.
- Any areas where overbuilding a structure to address temporary drainage is chosen should be reviewed with the I-81 Program Manager or his designee.

Other Considerations

- Temporary drainage should not be the only reason to overbuild a structure. Other considerations including future widening or sight distance mitigation may provide opportunities to address temporary drainage in addition to the other considerations. Overbuilding on bridges should be considered as a last resort.

For phases of MOT beyond the first stage, cross slope correction and grade adjustments should also be considered in reducing potential spread concerns.

IMPROVE 81

I-81 Corridor-wide Design Guide

Appendix H

VDOT
Virginia Department of Transportation

Appendix H: Design of Access to SWM Facilities in Medians

Information needs:

- Existing roadway plans showing typical sections and drainage features
- Proposed roadway plans showing typical sections, drainage features, and SWM facilities
- Aerial imagery of roadway
- Survey of pavement edge lines and existing lane striping
- Digital terrain model or survey elevations of existing grades
- Hydrology & Hydraulics Report

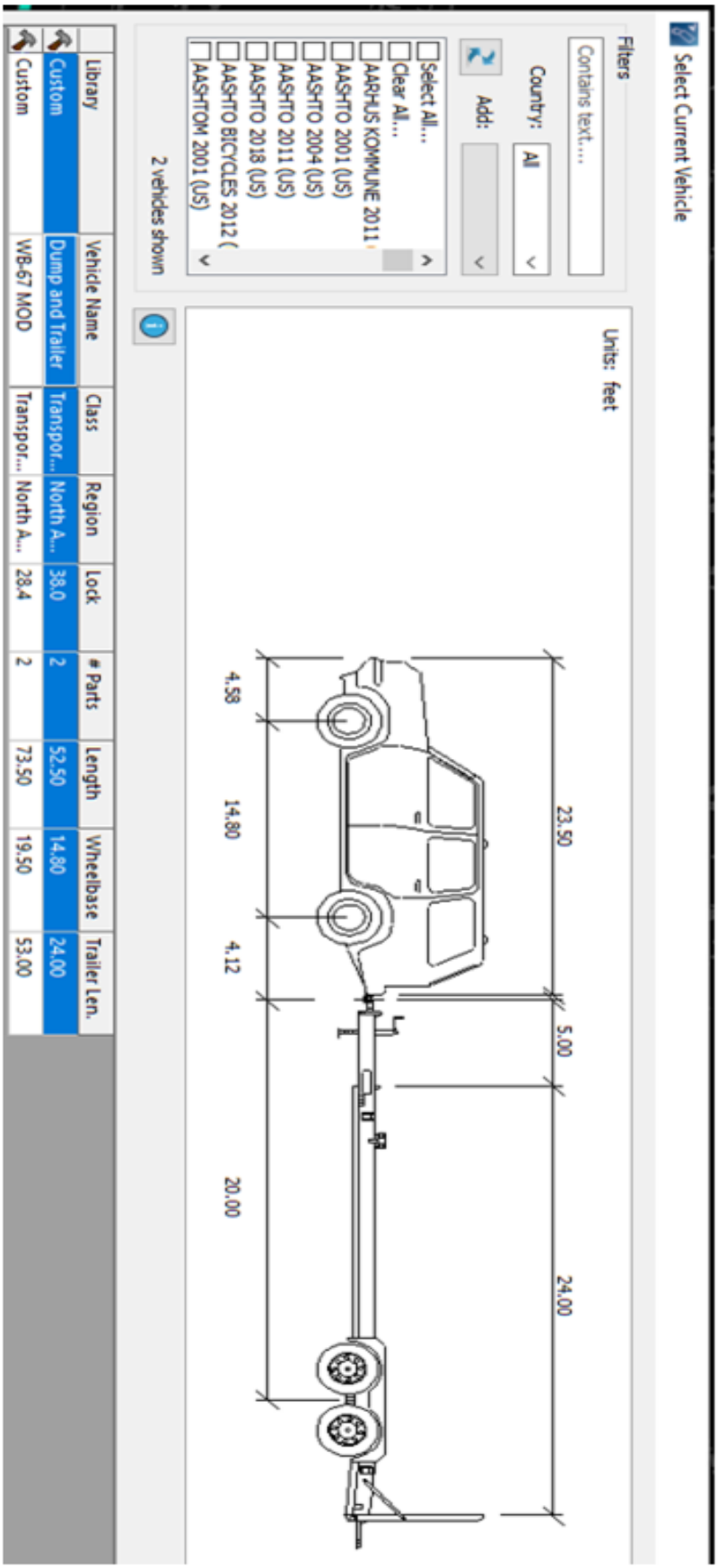
References:

- VDOT Drainage Manual (Chapter 11)
- VDOT BMP Maintenance Manual
- Virginia Stormwater Management Handbook
- VDOT Road Design Manual (RDM)
- VDOT Road & Bridge Standards

Process:

- Design must consider access for routine maintenance and corrective maintenance
    - Typical routine maintenance activities include: inspections, mowing and vegetation management, and litter and debris removal
    - Corrective maintenance activities include: structural repair, partial rehabilitation or rebuild, and significant sediment or debris removal
- Access from travel lanes to SWM facilities within medians to be based on VDOT typical interstate median crossover design, utilizing the following guidance:
    - VDOT Road and Bridge Standards, CR-1
    - VDOT Road Design Manual Appendix F, Median Crossovers
- Evaluate sight distance for ingress/egress to the median SWM facilities and consider the need for wider shoulder or accel/decel lanes. Accel/decel lanes are not typically appropriate for SWM access but may be considered on a case-by-case basis based on site specific characteristics or safety concerns.
- Consider access requirements, design vehicle for routine maintenance activities, and extent of access to and around the SWM facility
    - Potential items for consideration may include, but are not limited to the following
        - Access point and parking location for vehicle transporting the routine maintenance equipment
        - Unloading and loading of maintenance equipment

  - Turning movements for maintenance equipment traversing the access road around the SWM facility
  - "Dump and Trailer" vehicle modified to simulate the characteristics of a single axle dump truck to be modeled in AutoTurn to confirm turning movements (below is a screen show of vehicle and trailer dimensions for typical maintenance design or the I-81 corridor). A different design vehicle may be considered based on site specifics, specific maintenance requirements, or type of proposed BMP facility.
  - Evaluate horizontal and vertical alignment of maintenance access road. The Standard PE-1 details shown in VDOT's Road and Bridge Standards should be used for maintenance access road. When practical, grades along the access roads should not exceed 10%.
  - Surface material for access road
  - Corrective maintenance equipment and access requirements
- Document traffic control requirements during routine maintenance activities
- Consider time of day restrictions for maintenance activities
- Document routine maintenance schedule, inspection, performance requirements, and maintenance of traffic requirements
- Evaluate separation between adjacent lane and limits of SWM facility to confirm clear zone and access requirements are accommodated sufficiently
- Location of SWM facilities and proposed access must be coordinated between the appropriate disciplines (i.e., Drainage, L&D, Interstate Maintenance, Residency, etc.)


Select Current Vehicle
Filters
Contains text....
Country:
All
Add:
Select All...
Clear All...
AARHUS KOMMUNE 2011
AASHTO 2001 (US)
AASHTO 2004 (US)
AASHTO 2011 (US)
AASHTO 2018 (US)
AASHTO BICYCLES 2012 (
AASHTOM 2001 (US)
2 vehicles shown
Units: feet
4.58
14.80
4.12
20.00
23.50
5.00
24.00
Library
Vehicle Name
Class
Region
Lock
Parts
Length
Wheelbase
Trailer Len.
Custom
Dump and Trailer
Transpor...
North A...
38.0
2
52.50
14.80
24.00
Custom
WB-67 MOD
Transpor...
North A...
28.4
2
73.50
19.50
53.00