INTERSTATE 85 TECHNICAL MEMORANDUM

OCTOBER 2021

VDOT Virginia Department of Transportation

Michael Baker INTERNATIONAL

PURPOSE

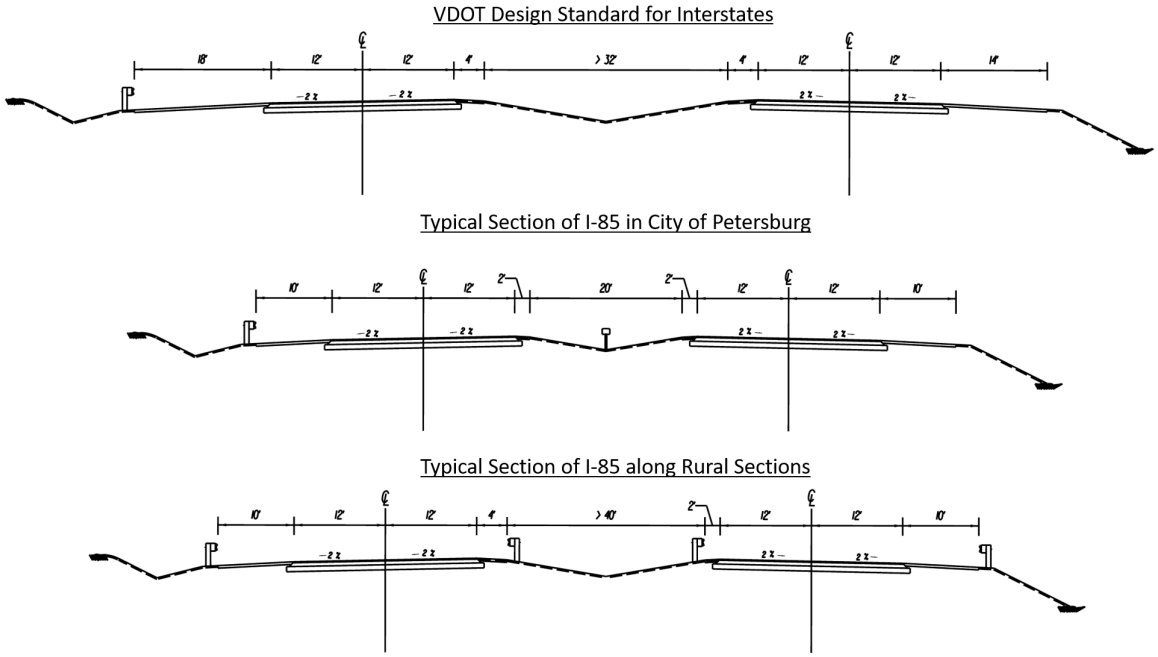
The purpose of this study is to identify a package of targeted capital improvements that are expected to deliver faster, safer, and more reliable travel on I-85 in Virginia. In 2019, the Virginia General Assembly passed House Bill 2718 and Senate Bill 1716 which provides revenues for improvements based on truck miles traveled on Virginia's interstate highways. While Interstates 81, 95, and 64 have higher volumes and allocations, 19.4% of the funding is to be assigned for improvements to other Interstate highway corridors. This interstate corridor study identified capital improvements that may utilize this fund and other available funding sources.

Figure 1. Study Area

I-85 CORRIDOR CHARACTERISTICS

I-85 is a 68-mile long corridor connecting I-95 in the City of Petersburg to the North Carolina State Line. The majority of the corridor traverses rural areas, however, the section between US 460 and I-95 is more urban. The vertical alignment along most of I-85 does not experience any significant elevation changes whereas the horizontal alignment does have locations with large or reverse curves within the area between US 460 and I-95. Furthermore, the cross-section does lack features that are ideal for high-speed interstates. Small median widths within the urban areas, minimal inside shoulders, and long lengths of guardrail provide little room for vehicle recovery. Shoulder rumble strips are provided along the length of the corridor. Figure 2 shows similar typical sections on I-85 in the urban and rural areas that most roadway users may find compared to VDOT Standard.

Figure 2. I-85 Typical vs VDOT Design Standards Typical Sections



The speed limit between the North Carolina border and US 460 is 70 Miles per hour (MPH) and decrease to 55 MPH as you approach the I-95 junction. Available speed data, as shown in Figures 3 and 4 for northbound and southbound I-85, respectively, show that speeds are relatively maintained close to the speed limit.

Figure 3. I-85 Northbound Lanes – Average Travel Speeds

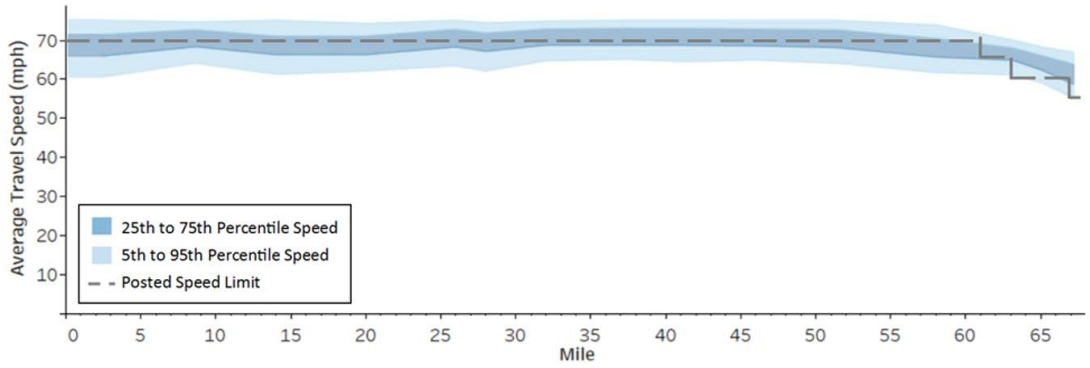
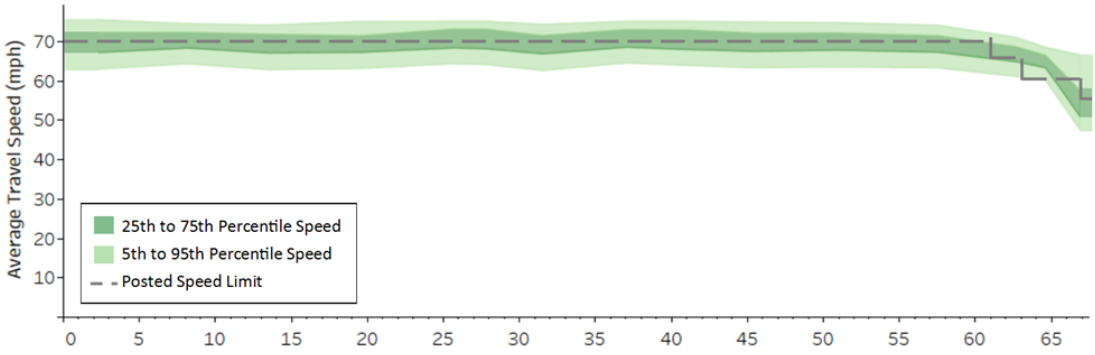


Figure 4. I-85 Southbound Lanes – Average Travel Speeds



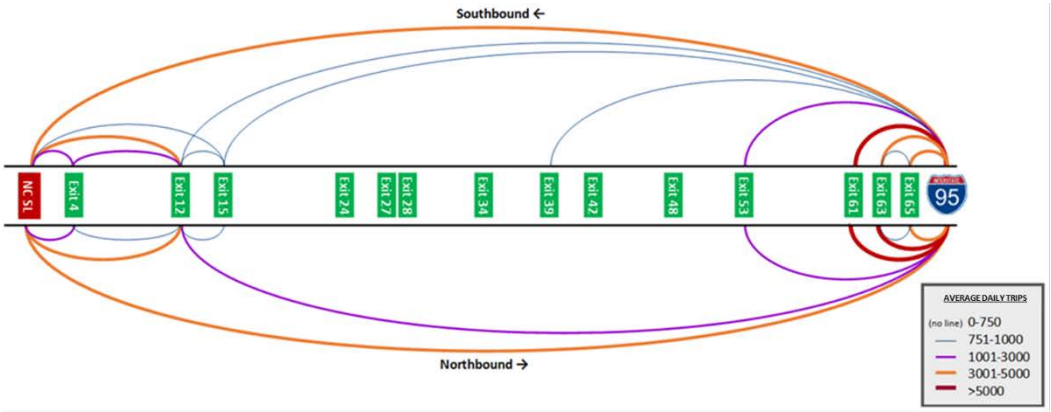
MULTIMODAL

I-85 has no alternative transportation modes between Petersburg and Norlina, North Carolina. This gap was formerly host to the CSX-operated S-Line, which was abandoned in the 1980s. The S-Line corridor is currently the preferred alignment of the Richmond to Raleigh portion of the Southeast High-Speed Rail Corridor. Once completed, the high-speed rail is not likely to make any stops between Petersburg and Raleigh. I-85 also has no active intercity bus lines, with Greyhound preferring the I-95 corridor for connections to Raleigh and Virginia Breeze preferring routes further west. No park and ride lots exist on I-85 today, but one is proposed at the Graham Road loop, the abandoned ramp from S Crater Road to southbound I-95.

ROADWAY VOLUMES AND TRAVEL PATTERNS

As shown in Figure 5, frequently traveled ingress / egress points along the corridor are I-95, City of Petersburg, US 460, Town of South Hill, US 58, and the North Carolina State border.

Figure 5. I-85 Travel Patterns – Origin-Destination Data



EXIT	CROSS ROAD NAME
0	North Carolina State Line
4	Route 903
12	US 58
15	US 1
24	Route 644
27	Route 46 / Christanna Hwy
28	US 1
34	Route 630 / Sturgeon Rd
39	Route 712 / Old Stage Rd
42	Route 40 / McKenney Hwy
48	Route 650 / Hamilton Arms Rd
53	Route 703 / Carson Rd
61	US 460
63	US 1
65	Squirrel Level Rd.
68	Interstate 95/Crater Rd.
69	Washington St./Wythe St.

The travel patterns show that most users are traveling between North Carolina and Exit 12: Town of South Hill / US 58 and North Carolina and I-95. The intra-state travel are important truck routes to locations north of Virginia via I-95 and the port in Hampton Roads Virginia via US 58. Furthermore, other heavy travel patterns frequently used by local roadway users on I-85 are between the City of Petersburg (Exits 61 to Exit 69) and I-95, which is a result of commuters accessing the greater Richmond metro area.

Traffic volumes along I-85 do vary between I-95 and the state border. Table 1 summarizes the Average Annual Daily Traffic (AADT) Volume along I-85.

Table 1. I-85 AADT Volume Summary

Start	End	AADT
City of Petersburg		
I-95	Squirrel Level Road	60,000
Dinwiddie County		
Squirrel Level Road	US Route 1	53,000
US Route 1	US Route 460	42,000
US Route 460	26-703	29,000
26-703	26-650	26,000
26-650	SR 40	25,000
SR 40	Brunswick County Line	24,000
Brunswick County		
Brunswick County Line	Mecklenburg County Line	23,000
Mecklenburg County		
Mecklenburg County Line	US Route 1	23,000
US Route 1	US 58	24,000
US 58	58-903	26,000
58-903	North Carolina State Line	25,000

As shown with the travel patterns along I-85 where most trips occur between City of Petersburg and I-95, the volumes along the corridor show a similar pattern. Volumes between US Route 1 in Dinwiddie County and I-95 are more than 40,000 vehicles a day and drop significantly south of US 460. Daily volumes between US 460 and the North Carolina State Line are primarily stabilized in the mid-to-high 20,000 range.

EXISTING CONDITIONS

In order to understand the operations and safety of the corridor, the study team gathered data from a variety of sources. This data included travel speed, crash data, vehicle delay, and incident data caused by lane-closures. This data was used to determine areas of focus and formulate solutions.

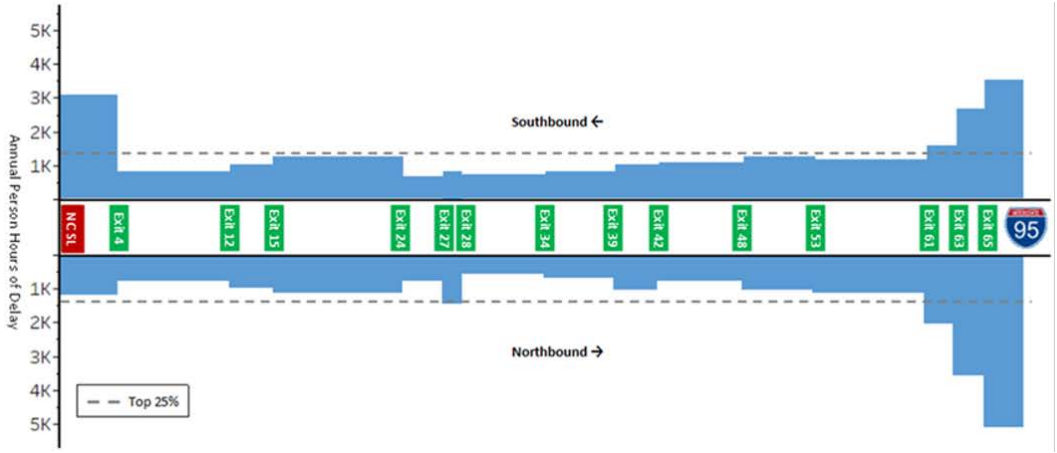
PERFORMANCE MEASURES

The study team utilized previously developed methodology from the I-81 and I-95 corridors to consistently evaluate interstate corridors in Virginia. The team collected and summarized crash and delay data for 4 years, 2015 through 2019, in 1-mile segments. The study team then ranked the 1-mile segments and highlighted the top 25 percent of segments, regardless of direction, to be reviewed for potential improvements. The four performance measures included:

- Crash frequency and severity: the total number of crashes, weighted by severity, using the equivalent property damage only (EPDO) scale. Source: Virginia Department of Transportation (VDOT) Roadway Network System
- Crash severity rate: the total rate of crashes, weighted severity, per 100 million vehicle-miles traveled. Source: VDOT Roadway Network System and VDOT Traffic Monitoring System
- Total delay: the total person-hours of delay caused by the impacts of congestion, incidents, and weather events. Source: INRIX
- Incident delay: the total person-hours of delay caused by incidents (crashes and disabled vehicles) that lead to at least one lane of the interstate to be closed for an hour or more. Source: INRIX and VA Traffic

Figure 6 shows the total annual person hours of delay that occur along a segment on I-85. Annual person hours of delay represent where users may experience the most amount of congestion along I-85.

Figure 6. I-85 Annual Persons Hours of Delay



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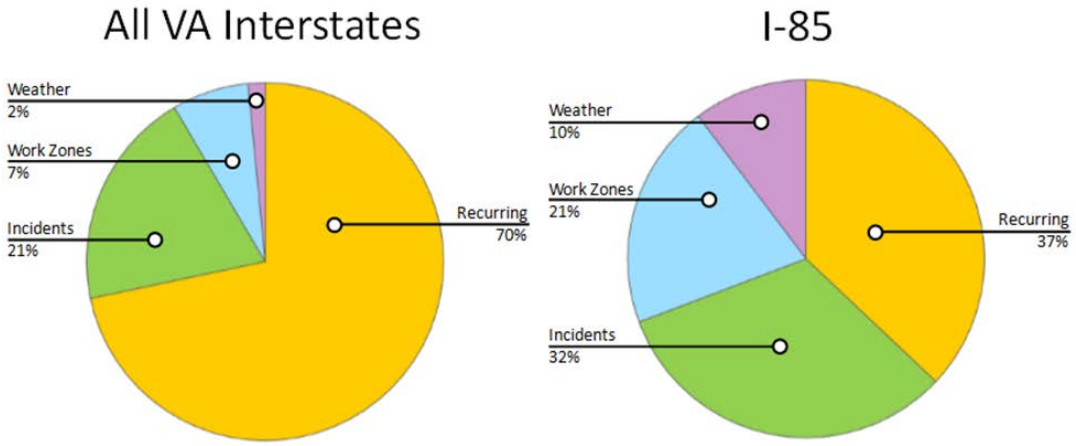
Most delay on I-85 occurs on the segment between Exit 61: US 460 and I-95 and the segment between Exit 4: Route 903 and the North Carolina State Line. I-85 congestion compared to other interstates in Virginia, such as I-81 and I-95, is not as significant. For example, the worst segment on I-85 slightly exceeds 3,000 annual persons hour of delay. Whereas on other interstates in Virginia segments in the top 50% can exceed 200,000 annual persons hour of delay on I-95 or 6,000 annual persons hour of delay on I-81.

The type of delay that is experienced on roadways help further identify ways to address congestion. Figure 7 shows the contributors of delay on all Virginia interstates and I-85.

Figure 7. Delay Type on Virginia Interstates



Incidents and work zone caused delay is more prevalent on I-85 as compared to other interstates in Virginia. As shown in Figure 5, the I-85 segment between Exit 4: Route 903 and the North Carolina State Line, was an area identified with high delay relative to the remainder of I-85. Between late 2016 and 2017, construction work was occurring near the North Carolina State Line and users could have experienced delay three times higher than normal along that segment. As well, in the I-85 segment between US 460 and I-95, roadway users experience frequent incident delay caused by lane impacting incidents. The recurring delay along I-85 occurs mostly on the segment between US 460 and I-95 which can be attributed to increases weaving and merging due to increased interchange density.

TRAFFIC SAFETY

As stated previously, I-85 has typical sections that lack suitable recovery areas and a few segments with greater changes in horizontal alignment. Figure 8 summarizes the type of crashes that frequently occur on I-85. Over 50% of crashes are off road crashes either on the right or left side of the road.

Figure 8. I-85 Crash Type Breakdown

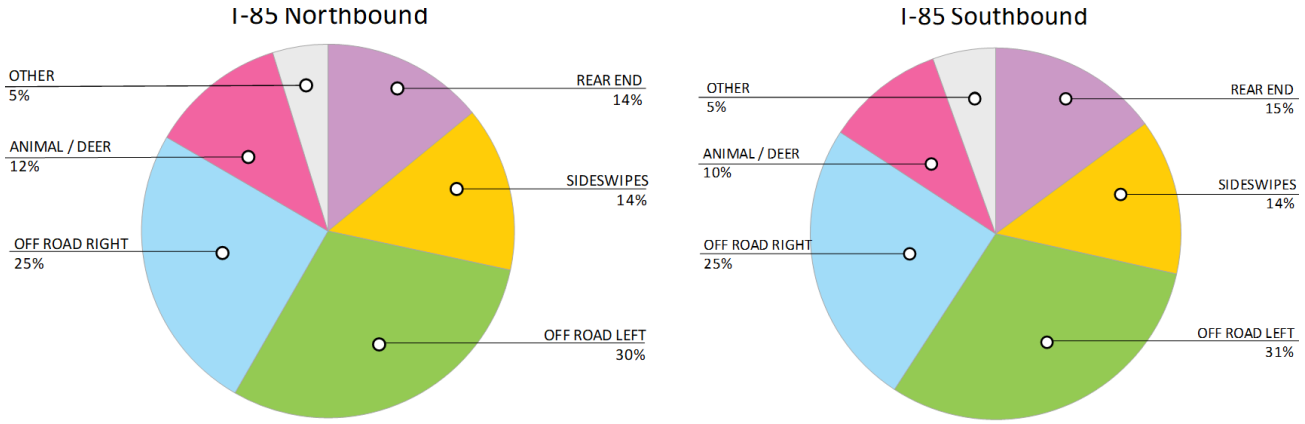
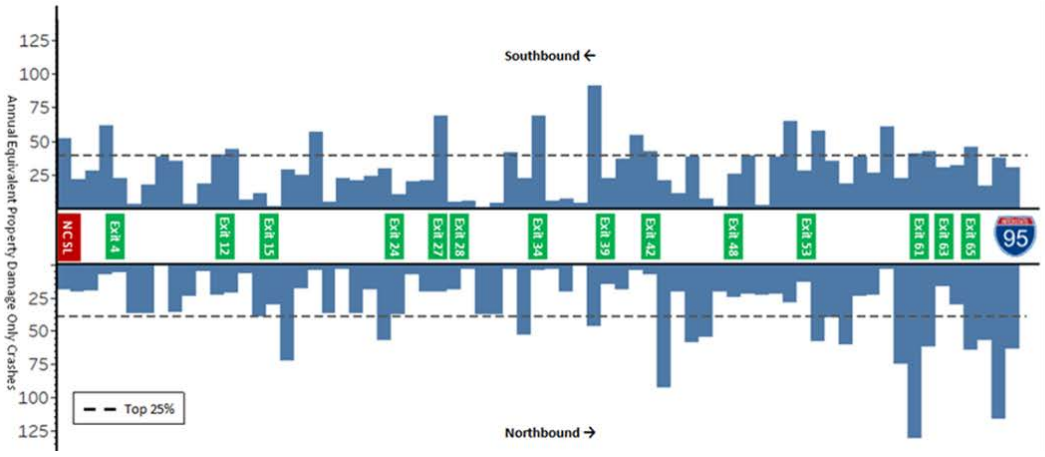


Figure 9 represents the annual Equivalent Property Damage Only (EPDO) for crashes along a 1-mile segment on I-85. EPDO helps represent the severity of the crashes by quantifying fatalities and injuries in terms of property damage. The segments with the highest annual EPDO are on the northbound lanes between US 460 and I-95. This segment has a reverse curve with minimal inside shoulder containing Jersey barrier or box rail. In addition, the segment has below standard right-side recoverable areas with guardrail running most of the length. Off road crashes are more prevalent on I-85 due to the horizontal alignment and weather conditions. However, risk of injury is increased due to physical barriers along both the inside and outside shoulders. This same segment also has over 40% of the total I-85 rear end crashes as result of congestion from the I-95 junction and increased interchange density.

Figure 9. I-85 Annual Equivalent Property Damage Only



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MAINLINE ROADWAY RECOMMENDATIONS

Upon reviewing the performance measures, supplementary data, roadway conditions, and VDOT input, the team developed recommendations for I-85. This study includes both a combination of physical improvements and locations for further study. A summary of the most frequently proposed improvements can be found below:

- Acceleration or Deceleration Lane Extension: Extending existing acceleration or deceleration lanes at interchanges to VDOT Design Standards to improve merging / diverging operations and safety
- Shoulder Widening: Widen the inside or right shoulder via paving and/or grading to VDOT Design Standards in order to reduce off-road crashes and crash severity

Recommendations were developed using the traffic data above, however, valuable input from VDOT was provided during meetings and correspondence to refine and validate the recommendations. Multiple disciplines were involved, such as Traffic Engineering, Location & Design, and Operations, to ensure a wide range of solutions were evaluated. Finally, the consultant team in discussions with VDOT, evaluated the recommendations to ensure solutions were maintainable by VDOT crews, consistent with VDOT Design standards, and achieving desired benefits.

The recommendation estimates developed include preliminary engineering and construction estimates. Construction estimates were developed using VDOT District and Statewide unit price averages, the Statewide Planning Level Estimate (SPLCE) tool, and comparison of similar projects from the Six-Year Plan. Estimates also include a cost for preliminary engineering based on the Richmond District's VDOT Location & Design formula. Although the vast majority of recommendations are not anticipated to have right-of-way impacts, the few that do will be determined at the time of further project development.

Table 2 shows a summary of mainline improvements which include the location, direction, targeted operational and/or safety metric, brief description, and an estimate cost.

Table 2. I-85 Capital Improvement Summary

Improvement Location	Mile Post From:	Mile Post To:	Improvement Type	Target Metric	General Description	Est. Low Cost Limit	Est. High Cost Limit
City of Petersburg							
I-85 Southbound: I-95 Northbound to I-85 Southbound	69.00	69.00	Congestion and Safety	Travel Time Off Road Crashes	Construct flyover ramp from I-95 Northbound to I-85 Southbound	$157.0 M	$191.9 M
Bi-Directional Segment between Route 1 (Exit 63) and I-95	69.00	65.89	Safety	Off Road Crashes	Replace sections of existing median box rail with high-tension cable or median barrier. Median and drainage reconstruction will be necessary in areas where Median Barrier is to be used. Left shoulder widening should occur when feasible in areas where high-tension cable is used	$11.9 M	$12.7 M
Bi-Directional Segment between Milepost 62 and Milepost 63 (Long-Term)	66.50	67.25	Safety	Off Road Crashes	Reconstruct the horizontal curve and bridge to improve horizontal alignment and reduce off-road crashes	$17.0 M	$20.4 M

Improvement Location	Mile Post From:	Mile Post To:	Improvement Type	Target Metric	General Description	Est. Low Cost Limit	Est. High Cost Limit
Dinwiddie County							
I-85 Southbound: Route 1 (Exit 63)	64.02	64.08	Safety	Rear-end and off-road crashes	Extend Deceleration Lane onto Route 1 Northbound (250 foot taper and increase parallel decel length by 150' - 200')	$0.5 M	$0.6 M
I-85 Northbound: Route 1 (Exit 63)	64.02	64.08	Safety	Rear-end, off-road, sideswipes crashes	Extend acceleration Lane from Route 1 Northbound (300 foot taper and increase parallel length by 200'-250')	$0.6 M	$0.7 M
I-85 Northbound: Route 1 (Exit 63)	64.00	64.25	Safety	Rear-end, off-road, sideswipes crashes	Improve Overhead signage with lane use identifiers	$1.1 M	$1.6 M
I-85 Northbound: MP 62.00 to 63.00	62.00	63.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$1.8 M	$2.0 M
I-85 Northbound: MP 61.00 to 61.12	61.00	61.12	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$0.7 M	$0.8 M
I-85 Northbound: MP 61.32 to 62.00	61.32	62.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$1.4 M	$1.6 M
I-85 Northbound: MP 60.00 to 60.20	60.00	60.20	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$0.8 M	$0.9 M
I-85 Northbound: MP 60.30 to 60.80	60.30	60.80	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$1.1 M	$1.2 M
I-85 Northbound: MP 56.20 to 56.46	56.20	56.46	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$0.9 M	$0.9 M
I-85 Northbound: MP 56.54 to 56.79	56.54	56.79	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$0.9 M	$0.9 M
I-85 Northbound: MP 55.00 to 56.00	55.00	56.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4ft Install Pavement Wedge at locations with Guardrail	$1.8 M	$2.0 M
I-85 Southbound: MP 55.75 to 55.00	55.00	55.75	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$1.4 M	$1.6 M
I-85 Northbound: MP 54.00 to 54.40	54.00	54.40	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft and Widen variable Right Shoulder with Guardrail by 4 ft to 6 ft Install Pavement Wedge at locations with Guardrail	$1.5 M	$1.7 M
I-85 Southbound: MP 54.50 to 55.00	54.50	55.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$1.2 M	$1.3 M
I-85 Southbound: MP 54.20 to 53.34	54.20	53.34	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$1.6 M	$1.8 M
I-85 Southbound: MP 52.75 to 52.10	52.10	52.75	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$1.3 M	$1.4 M
I-85 Northbound: MP 45.00 to 46.00	46.00	45.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail (Both Sides)	$1.8 M	$2.0 M
I-85 Northbound: MP 43.78 to 44.00	43.78	44.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$0.8 M	$0.9 M
I-85 Northbound: MP 43.25 to 43.48	43.25	43.48	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$0.8 M	$0.9 M
I-85 Southbound: MP 42.3 to 43.00	42.30	43.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$1.3 M	$1.5 M
I-85 Southbound: MP 41.68 to 42.20	41.68	42.20	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$1.2 M	$1.3 M
I-85 Southbound: MP 41.00 to 41.68	41.00	41.68	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$1.4 M	$1.6 M

Improvement Location	Mile Post From:	Mile Post To:	Improvement Type	Target Metric	General Description	Est. Low Cost Limit	Est. High Cost Limit
Brunswick County							
I-85 Northbound: MP 38.36 to 39.00	38.36	39.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$1.4 M	$1.5 M
I-85 Northbound: MP 38.00 to 38.19	38.00	38.19	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$0.8 M	$0.8 M
I-85 Northbound: MP 31.25 to 32.00	31.25	32.00	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail	$1.5 M	$1.7 M
I-85 Northbound: MP 30.30 to 31.25	30.30	31.25	Safety	Off Road Crashes	Consider installation of Pavement Wedge at locations with Guardrail	-	$1.8 M
I-85 Northbound: MP 30.13 to 30.30	30.13	30.30	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$0.8 M	$0.8 M
I-85 Northbound: MP 23.89 to 24.34	23.89	24.34	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$1.1 M	$1.2 M
I-85 Northbound: MP 23.51 to 23.89	23.51	23.89	Safety	Off Road Crashes	Consider installation of Pavement Wedge at locations with Guardrail	-	$1.1 M
I-85 Northbound: MP 23.07 to 23.51	23.07	23.51	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft	$1.1 M	$1.2 M
Mecklenburg County							
I-85 Southbound: MP 18.00 to 19.00	18.00	19.00	Safety	Off Road Crashes	Consider installation of Pavement Wedge at locations with Guardrail	-	$1.8 M
I-85 Northbound: MP 15.50 to 16.50	15.50	16.50	Safety	Off Road Crashes	Widen Left Shoulder from 2 ft to 4 ft Consider installation of Pavement Wedge at locations with Guardrail (Both Sides)	$1.8 M	$2.0 M
I-85 Southbound: MP 3.10 to 3.56	3.10	3.56	Safety	Off Road Crashes	Widen bridge deck to improve cross-section and allow for wider shoulders Widen approach and departure shoulders	$15.1 M	$16.6 M

Locations that require a study are summarized in Table 3. Further information is required that be accomplished within a more-focused study to appropriately address the interchanges.

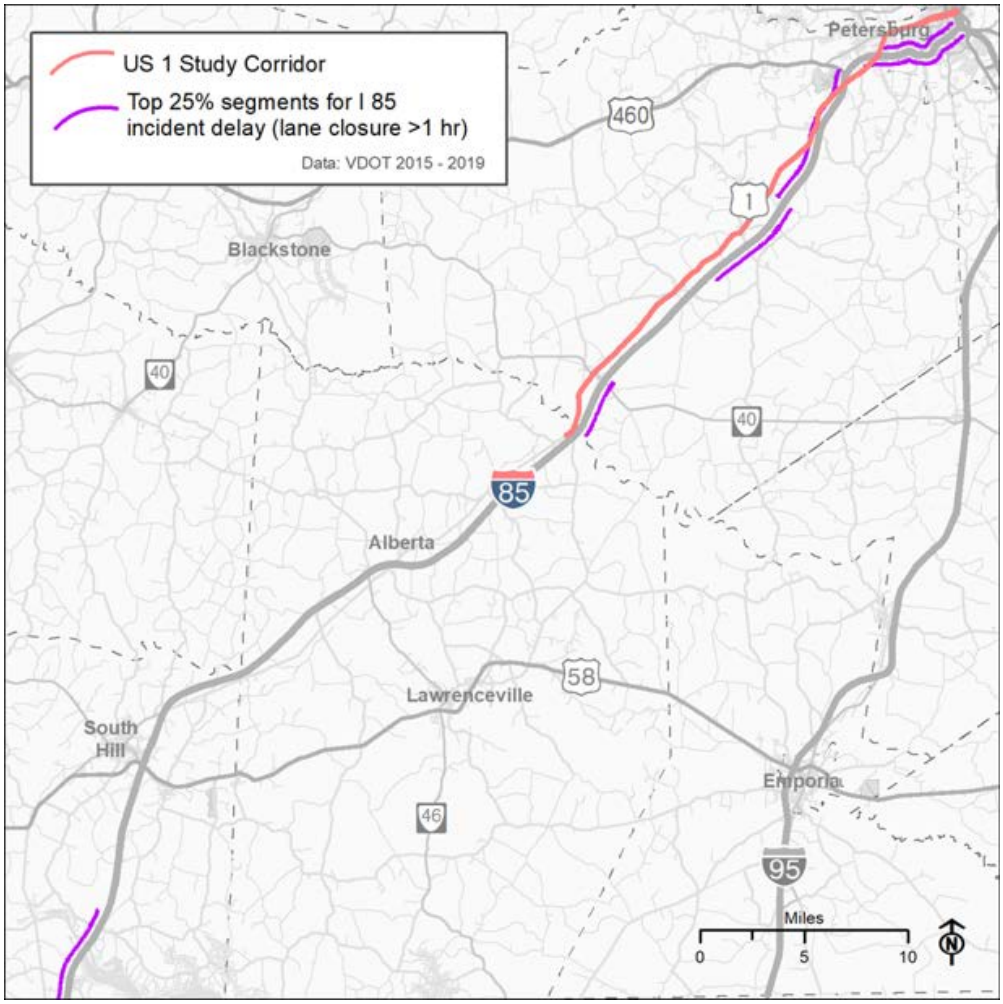
Table 3. I-85 Interchanges Requiring Further Study

Interchange Location	Exit Number	Improvement Type	Target Metric	General Description
City of Petersburg				
I-85 Southbound: I-95 Northbound to I-85 Southbound	-	Congestion and Safety	Travel Time Rear End Crashes	Reevaluate Feasibility Study from 2014 to determine other cost effective alternatives. Study should focus on improving operations on I-85, I-95, and the C-D lanes between I-85/I-95/US 301
Dinwiddie County				
Exit 63: Route 1 Interchange	63	Congestion and Safety	Travel Time and Intersecting Roadway Crashes	Evaluate interchange to improve safety and operations traveling onto and off of US 1 and I-85. Include the US-1 segment between Simmons Avenue and Simpson Road
Exit 61: US 460 Interchange	61	Safety	Intersecting Roadway Crashes	Evaluate intersections on US 460 between the Southbound I-85 ramp node and the intersection of US 1 and US 460. Study should focus on improving safety at the Southbound I-85 ramp node, as well as operations and safety at the intersection of US 460 and US 1

INCIDENT ROUTE: US ROUTE 1

As part of the IOEP policy for Corridor Improvement Plans, parallel routes are included in the analysis near segments of the corridor that experience the worst incident delay. The are the routes where traffic is most likely to be diverted in the case of an incident on the interstate. In those instances, operational upgrades and other low-cost improvements could provide a substantial benefit. US Route 1 is a parallel facility to I-85 that runs from the City of Petersburg to the North Carolina State Line. Most of US Route 1 is a rural two-lane facility with stretches of a two-way turn lane or passing lane. However, there are sections of US Route 1, primarily within the City of Petersburg that have a four-lane cross-section. US Route 1 does serve as the primary route to avoid incidents along I-85 but it also serves as an important commuter route and economic generator for localities. The study team evaluated the section of US Route 1 parallel to the top 25% of where incidents occurred along I-85. Figure 11 shows the portion of US Route 1 that was evaluated and the top 25% of where incidents occurred along I-85.

Figure 10. US Route 1 Study Corridor



Although the I-85 performance metric analysis showed that there was incident delay near the North Carolina border, the study team determined that this was a temporary issue due to the construction on the North Carolina side of I-85. Therefore, only the US Route 1 section between Bank Street in City of Petersburg and Old Stage Road in Warfield was analyzed.

A high-level analysis was performed for the study section using a similar process that was done for I-85. The study team reviewed vehicular volume, crash data, Virginia Transportation Plan (VTrans), and geometrics. Recommendations were developed in the context of benefiting a potential incident route between I-85 interchanges. However, the study team did identify areas that were problematic and should be investigated further by VDOT. The analysis identified the following themes:

- Poor Access Management and Congestion between the City of Petersburg and US 460: The Route 1 segment in this area experiences congestion and intersection related crashes due to traffic signal spacing, poor access management, and mixture of commuter and local traffic avoiding the I-95/I-85 interchange.
- Inconsistent cross-section south of US 460: The cross-section of US Route 1 changes frequently between three-lanes with the center lane as either as a two-way turn lane or passing lane.
- Substandard Shoulders: There are areas where off-road crashes are prevalent, and shoulders are below the VDOT Design Standards.

Table 4 shows a summary of recommendations which include the location, direction, targeted operational and/or safety metric, and brief description. Cost Estimates will be developed at the time of project development or when recommendations are further developed.

Table 4. Route 1 Recommendations

Location	Improvement Type	Target Metric	General Description
ALL	Safety	Driver Understanding	Reevaluate US Route 1 Cross-Section prior to paving and maintenance projects Paint Cross-Section as determined by Study or Engineer
ALL	Safety	Off Road Crashes	Widen Right Shoulders to a minimum 8' paved shoulder and total shoulder to applicable width as determined by VDOT Road Design Manual
City of Petersburg			
US Route 1: I-95 to Atlantic Street	Safety and Operations	Travel Time Angle & Rear End Crashes	Evaluate Segment for Further Study to reduce congestion and improve access management
Dinwiddie County			
US Route 1: Franklin Street to Cox Road	Safety and Operations	Travel Time Angle Crashes	Evaluate Segment for Further Study to reduce congestion at Cox Road and US Route 1 and reduce angle crashes along segment
Northbound US Route 1: Exit 63A to Simmons Ave	Safety and Operations	Travel Time Angle & Rear End Crashes	Evaluate Northbound Route 1 Segment to eliminate confusing lane drop and merge area on Route 1 with I-85
US Route 1: Exit 63A Interchange	Safety	Driver Understanding	Replace Existing Overhead Signage
US Route 1: Exit 63A Interchange	Safety	Turning Radius	Widen and lengthen Northbound Route 1 turn lane onto US I-85 Northbound
US Route 1: Exit 63A to Sterling Road	Safety and Operations	Travel Time Angle & Rear End Crashes	Evaluate Segment for Further Study to improve access management
US Route 1 and US 460	Safety	Angle Crashes Turning Radius	Study Intersection to reduce angle crashes. Re-evaluate clearance intervals, consider innovative intersections, and determine pavement width
US 460 and I-85 Southbound Ramp	Safety	Angle Crashes	Evaluate Multiple Low-Cost Countermeasures and Lighting to reduce angle crashes
US Route 1: Motorsports Park Area	Safety	Angle & Off Road Crashes	Install Advance Warning Signage on for Intersections and Curve
US Route 1: Butler Road and Weather Ridge Pines	Safety	Off Road Crashes	Widen Right Shoulders and Expand Right Side Clear zones Install Rumble Strips

Location	Improvement Type	Target Metric	General Description
Brunswick County			
Old Stage Road and I-85 Southbound Ramp	Safety	Angle Crashes	Monitor Intersection due to recent Angle Crash Increase Consider Multiple Low Cost Countermeasures
US Route 1 and Route 46: Christanna Highway	Safety	Angle Crashes	Reduce Angle Crashes by studying intersection further Consider multiple low-cost countermeasures or innovative solutions such as a roundabout
Town of South Hill			
Mecklenburg Ave and I-85 Southbound Ramp	Safety	Angle Crashes	Reduce Angle Crashes by studying intersection further Consider multiple low-cost countermeasures or innovative solutions such as a roundabout

CONCLUSION

The I-85 targeted improvements will be evaluated at a statewide level against targeted improvements along other corridors, using an evaluation method similar to Virginia's SMART SCALE program. Improvements that score well enough in the evaluation process are prioritized for funding. The prioritized project list is then sent to the Commonwealth Transportation Board for final funding selections.