



COMMONWEALTH of VIRGINIA

Commonwealth Transportation Board

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Chairperson

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Agenda item # 1

RESOLUTION OF THE COMMONWEALTH TRANSPORTATION BOARD

December 5, 2018

MOTION

Made By: Mr. Whitworth Seconded By: Dr. Smoot

Action: Motion Carried, Unanimously

Title: Approval of the I-81 Corridor Improvement Plan Required by Chapter 743 of the 2018 Session of the General Assembly

WHEREAS, pursuant to Chapter 743 of the 2018 *Virginia Acts of Assembly*, the General Assembly of Virginia has directed the Commonwealth Transportation Board (Board), to study financing options for improvements to Interstate I-81 (I-81) and with assistance from the Office of Intermodal Planning and Investment (OIPI), to develop and adopt an I-81 Corridor Improvement Plan (Plan); and

WHEREAS, Chapter 743 directs the Virginia Department of Transportation (VDOT), Virginia Department of Motor Vehicles, Virginia State Police and any other state agency to provide technical and other assistance to the Board; and

WHEREAS, Chapter 743 directs that the study shall include financing options for I-81 corridor improvements and shall evaluate the feasibility of using toll financing to improve the corridor; and

WHEREAS, Chapter 743 further provides that the evaluation of toll financing shall not consider options that toll all users of I-81, and shall not consider tolls on commuters using I-81, but may consider high-occupancy toll lanes established pursuant to § 33.2-502 of the *Code of Virginia* and tolls on heavy commercial vehicles; and

Resolution of the Board

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WHEREAS, the General Assembly directed that the Plan shall include the examination of the entire length of I-81 and at a minimum shall:

1. Designate specific segments of I-81 corridor for improvement;
2. Identify a targeted set of improvements for each segment that may be financed or funded in such segment and evaluated using the statewide prioritization process pursuant to § 33.2-214.1 of the Code of Virginia;
3. Ensure that in the overall plan of expenditure and distribution of any toll revenues or other financing means evaluated, each segment's total long-term benefit shall be approximately equal to the proportion of the total of the toll revenues collected that are attributable to such segment divided by the total of such toll revenues collected;
4. Study truck travel patterns along I-81 and analyze policies that minimize the impact on local truck traffic;
5. Identify incident management strategies corridor-wide;
6. Ensure that any revenues collected on I-81 be used only for the benefit of that corridor;
7. Identify actions and policies that will be implemented to minimize the diversion of truck traffic from the I-81 Corridor, including the prohibition of through trucks on parallel routes;
8. Determine potential solutions to address truck parking needs along the I-81 Corridor; and
9. Assess the potential economic impacts on Virginia agriculture, manufacturing, and logistics sector companies utilizing the I-81 Corridor from tolling only heavy commercial trucks; and

WHEREAS, Chapter 743 directed the Board to complete its study meetings by November 30, 2018 and submit an executive summary and report of its findings and recommendations for publication as a House or Senate document, no later than the first day of the 2019 Regular Session of the General Assembly; and

WHEREAS, the Board, OIPI, VDOT, and the Department of Rail and Public Transportation (DRPT), in developing the Plan required by Chapter 743, solicited input from local elected officials, state legislators, citizens and other affected stakeholders through a series of public meetings and hearings held along the I-81 corridor; and

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WHEREAS, the purposes of Chapter 743 have been satisfied and the study conducted pursuant thereto has resulted in development of the I-81 Corridor Improvement Plan, which identifies targeted improvements of the entire I-81 corridor and evaluates financing solutions.

NOW, THEREFORE, BE IT RESOLVED, the Board approves the I-81 Corridor Improvement Plan Executive Summary, attached hereto as Attachment A, as required by Chapter 743 of the Virginia Acts of Assembly and developed by OIPI, VDOT and DRPT; and

BE IT FURTHER RESOLVED, the Board hereby authorizes the Secretary of Transportation to make such modifications to the I-81 Corridor Improvement Plan as deemed appropriate, provided any modifications do not conflict with the Executive Summary, and take all actions necessary to finalize and present the Plan in the form of an executive summary and report to the General Assembly on or before the first day of the 2019 Regular Session of the General Assembly.

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CTB Decision Brief

Adoption of the I-81 Corridor Improvement Plan

Issue: In accordance with Chapter 743 of the 2018 *Virginia Acts of Assembly*, the General Assembly of Virginia directed the Commonwealth Transportation Board (CTB), to study financing options for improvements to Interstate I-81 (I-81) and with assistance from the Office of Intermodal Planning and Investment (OIPI), develop and adopt an I-81 Corridor Improvement Plan (Plan). Further, the General Assembly set forth key components of such Plan, including:

- 1) an examination of the entire length of I-81
- 2) identification of potential improvements and a targeted set of improvements that can be financed
- 3) examination of potential financing options for such improvements
- 4) corridor-wide incident management strategies
- 5) identifying actions and policies that if implemented minimize the diversion of truck traffic
- 6) assess potential economic impacts on Virginia agriculture, manufacturing, and logistics companies from tolling of heavy commercial trucks.

The General Assembly required public meetings to be completed by November 30, 2018.

Facts: OIPI, VDOT, DMV, Department of State Police, and DRPT (study team) conducted extensive stakeholder and public outreach that included 12 public meetings, focus groups and hearings that resulted in attendance by over 900 individuals and received more than 2000 public comments. Public outreach activities were held throughout the corridor which encompasses the Bristol, Salem, and Staunton Districts.

The study team evaluated all 325 miles of I-81 and based on performance, contributing factors and public input, a prioritization methodology was developed. The study team focused first on identifying problem areas based on severity and evaluated each of those segments for safety (crash rate and frequency), congestion (person hours of delay), and resiliency conditions (incident-related delay and multi-hour lane closures). For each of these problem areas a potential improvement was developed, with the exception of areas where transportation improvements could not address the problem(s). Operational improvements were considered first, then capital improvements were evaluated, scored and prioritized. In total, more than \$4 billion in needs were identified.

Beyond minimum criteria identified by the General Assembly, the Plan identifies related issues that are recommended for further study and evaluation. The study team proposes the creation of task forces to develop comprehensive strategies, and long and short-term solutions that address speed enforcement and truck parking, as well as on-going evaluation of potential multimodal improvements in the corridor.

Based on a data driven evaluation methodology similar to SMART SCALE, \$2.04 billion in capital improvements are recommended for implementation during the next 7-10 years. Based on industry input, \$2 billion during the next 7-10 years is a reasonable amount of work that can be supported by the engineering and construction industries.

Additionally, the Plan identifies \$43 million in immediate operations and incident management improvements. The study team excluded operational improvements from prioritization in alignment with CTB policy to address operational issues first, which were assumed a fundamental element.

However, capital projects identified in Salem, Bristol and Staunton districts were evaluated and prioritized based on the following measures:

- safety -- reduction in the number of fatal and injury crashes (40%)
- congestion mitigation -- decrease in person-hours of delay (40%)
- accessibility -- access to jobs (15%)
- access to jobs -- for disadvantaged populations (5%)

106 potential projects were identified for consideration in the three VDOT Districts, 33, 27, and 46 respectively. After applying weighting scenarios and funding distributions, the portfolio of projects was reduced to 63.

A two-step process was followed for determining the improvements. Step one assumed \$2 billion in improvements were divided 50/50 split between a District allocation and a corridor-wide allocation. The first \$1 billion was distributed by amount of I-81 centerline miles in each District and then projects were sorted by benefit-cost scores.

Step two was to allocate the remaining \$1 billion on a corridor-wide basis. All remaining projects were sorted by their respective benefit-cost score until the \$1 billion was allocated. The result of this distribution:

- Salem – 13 projects estimated at \$875 million
- Bristol – 27 projects estimated at \$285 million
- Staunton – 23 projects estimated at \$838 million

Further, the study team analyzed tolling and other financing methods to support the improvements' implementation. Lastly, the plan includes an analysis of economic impacts on Virginia trucks and specifically Virginia agricultural, manufacturing and logistics industries.

Based on the financial analyses completed, two alternatives appear to provide the necessary financing for these projects, a) two regional taxes and/or b) tolling with an Auto annual pass. Potential regional taxes include a 2.1% regional motor vehicle fuels tax and a 0.7% retail sales and use tax. These are the same rates as those imposed in Hampton Roads and Northern Virginia. Four potential tolling options were considered with three meeting the intent of Chapter 743 and generating sufficient revenues to meet the \$2 billion need, with debt financing, in improvements:

- trucks and non-commuters
- variable tolling between daytime and nighttime for trucks and non-commuters
- variable tolling with an Auto annual pass

Detailed financial analysis was conducted on the variable tolling with an Auto annual pass option. The assumed daytime/nighttime toll rates are: 15¢/7.5¢ per mile for Trucks and for Autos, 7.5¢/5¢ per mile with a \$30 Auto annual pass fee. This option generates an estimated \$145 million in 2020 (if implemented for the entire year) which is sufficient to finance the \$2.04 billion in improvements within the next 10 years. An additional \$100 million has been reserved in FY2021 and FY2022 in the financial analysis to address additional costs associated with solutions that are developed by the speed enforcement and truck parking task forces and potential multimodal improvements.

All financing options require General Assembly approval before they can be implemented. Annual revenues in the first year range from \$145 to \$204 million depending on the preferred option selected. If tolling becomes the preferred option adopted by the General Assembly, the study team recommends that the CTB allocate of \$43 million from the Toll Facilities Revolving Account to fund the tolling infrastructure and establishment of associated business processes.

Recommendations: The study team recommends approval of the I-81 Corridor Improvement Plan Executive Summary attached hereto as Appendix A.

Action Required by CTB: The CTB will be presented with a resolution for a formal vote to approve the I-81 Corridor Improvement Plan Executive Summary and subsequently, the final Plan for submission to the House and Senate prior to the first day of 2019 General Assembly Session.

Result, if Approved: If approved, the recommended improvements package in the final Plan will be finalized, posted on the I-81 website by December 21, 2018 and will be submitted to the General Assembly by prior to the first day of the 2019 General Assembly Session. The final Plan will also include economic impact analysis results, truck parking study results and any modifications the Secretary of Transportation deems appropriate, as long as revisions do not conflict with the Executive Summary. If during the 2019 session the General Assembly approves a financing strategy, the CTB and study team will initiate securing necessary federal approvals and operational improvements will commence.

Options: Approve, Deny, or Defer.

Public Comments/Reactions: None

I-81 CORRIDOR IMPROVEMENT PLAN EXECUTIVE SUMMARY



DECEMBER 3, 2018

Office of
INTERMODAL
Planning and Investment

VDOT

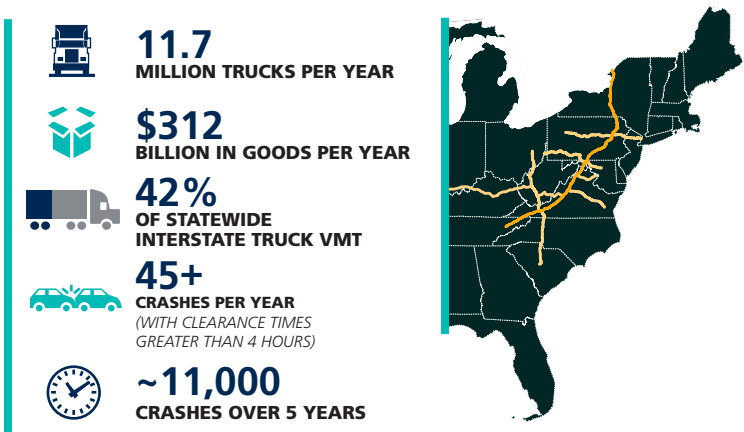
DRPT
Virginia Department of Rail and Public Transportation

I-81 Executive Summary

Overview

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 this 325-mile corridor (*Transearch, 2012*). I-81 has the highest per capita truck volume in Virginia (*VDOT Traffic Monitoring System*). Within Virginia, I-81 connects with five other interstates and traverses 21 cities and towns, 13 counties, and 25 colleges and universities between the Tennessee and West Virginia border. I-81 also runs parallel to the Blue Ridge Parkway, the nation's most visited national park. See **Figure 1** for additional statistics.

Figure 1. I-81 Corridor Significance



These competing travel demands have created a corridor that is plagued by significant safety and reliability issues. There are more than 2,000 vehicle crashes annually with 26% involving heavy trucks, the highest percentage for any interstate in Virginia. The resulting travel delay is unpredictable and impacts both heavy commercial vehicle on-time performance as well as travel for passenger vehicles. For example, in an average year, there are more than 45 major crashes that take more than four hours to clear. The majority of the I-81 corridor is two lanes in each direction—when one lane is blocked there is a 65% reduction in capacity. Contributing factors to the long crash clearance times include: lack of capacity, the rolling terrain, lack of reliable detour routes, and the constrained configuration.

Why the I-81 Corridor Improvement Plan (“the Plan”) is Necessary

I-81 is the main street and key economic artery of western Virginia. Over time, the corridor has been improved to keep up with economic and travel growth. However, in the last decade, as the economy has grown, I-81 has experienced traffic growth, and as a result a degradation in the overall performance of the corridor. It is anticipated that travel will continue to increase on I-81, with truck traffic growing at a faster pace than automobile traffic. Conditions along the corridor are expected to continue to degrade, and by 2040, it is expected that there will be nearly 20 million truck trips carrying three quarters of a trillion dollars' worth of goods every year (*Transearch, 2012*).

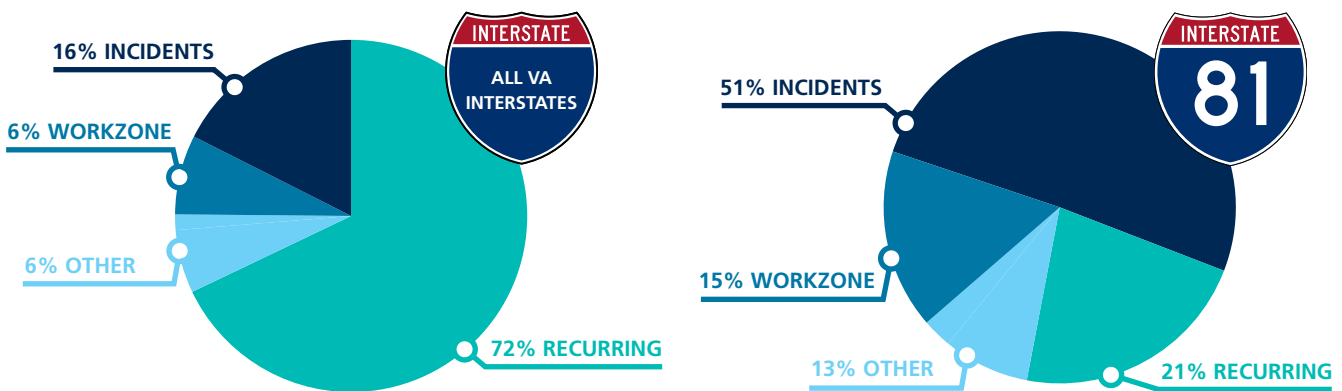
Due to the high percentage of trucks and rolling terrain, I-81 suffers from the highest incident-related delay among interstates in Virginia. Delay is generally classified as recurring delay and non-recurring delay. Recurring delay is typically encountered during the morning or evening commute and people who travel the area frequently know to plan on recurring delay. Non-recurring delay is associated with other planned and/or random factors, such as work zones, incidents (crashes/disabled vehicles on the shoulder), weather, holidays, and/or special events. Travelers cannot plan for non-recurring delay, and therefore such events can be more disruptive to travelers than recurring delay.

Improvements identified in the plan will:

- Reduce annual hours of delay by more than 6 million
- Reduce annual crashes in the corridor by 450

For all other interstates in Virginia, recurring delay comprises approximately 70% and incidents comprise 16% of the delay. For I-81, recurring delay represents just over 20% but incidents comprise more than 50% of the delay. This indicates that most of the motorist delay on I-81 is attributable to a combination of incidents, work zones, and weather (VDOT Operations Planning and VTRC Analysis, 2018). These conditions also lead to highly unreliable travel times on this vital interstate, impacting both citizens’ daily lives and the movement of freight that is essential to our local, state, and national economies. **Figure 2** summarizes the differences between the delay characteristics on I-81 versus all other interstates in Virginia.

Figure 2. Delay Experienced on Virginia Interstates Versus I-81



Chapter 743 and the Plan

With the adoption of Chapter 743 of the 2018 Virginia Acts of the General Assembly, the Commonwealth Transportation Board (CTB) was directed to develop and adopt the Plan including an examination of the entire corridor and methods of financing such improvements. This document addresses the General Assembly’s direction. Since May 2018, the CTB, Office of Intermodal Planning and Investment (OIPI), Virginia Department of Transportation (VDOT), and Virginia Department of Rail and Public Transportation (DRPT) have conducted 12 public meetings and hearings attended by more than 950 individuals, held focus groups, received more than 2,000 public comments, and identified more than \$4.3 billion in recommended improvements in the I-81 corridor. Based on public input, applied prioritization methodology, and available market capacity, this plan recommends implementing \$2.04 billion in improvements during the next 7-10 years. The Plan also identifies \$43 million in immediate operations and incident management improvements (heretofore referred to as operational improvements) and \$2 billion in capital improvements. Methods of financing these improvements are also identified and detailed in **Table 2** and **Table 3** shown on Page 8.

The Plan first identified the top 20% of problem areas along the corridor based on (i) safety, (ii) congestion, and (iii) areas with lane closures greater than one hour. Data was not the only factor in project identification, public comments were also considered. Capital improvements were prioritized based on person-hours of delay, crash frequency, and access to jobs. From an implementation perspective, the critical first step is implementing operational



improvements that can be accomplished within 12 months of the Plan’s legislative approval. The capital improvements are intended to build upon these operational improvements.

Beyond the original scope of this project, the Plan identifies three issues that are recommended for further study—speed enforcement, truck parking, and multimodal transportation options. These topics all require significant coordination with external parties and were not able to be completed prior to submission of this Plan. Speed enforcement and truck parking will be reviewed by task forces, while OIPI and DRPT will finalize the multimodal transportation options. Therefore, \$100 million is reserved in the early years of the Plan to address these issues. For each issue, a comprehensive strategy and implementation plan with funding recommendations will be developed. Finally, potential funding options for the \$2.04 billion Plan are explored as well as the economic impacts as required by Chapter 743.

Public Outreach

Public involvement was encouraged throughout the study and served as a critical component of developing the Plan. Focus groups, public meetings, and hearings were held throughout the corridor, along with CTB updates. A website, www.VA81corridor.org, was created to provide information and to gather input from stakeholders including local governments, the trucking industry, other businesses, and citizens. In addition, an email address was established for receiving comments and a public phone number was made available. During the public meetings and hearings, attendees were able to view maps of the corridor in their respective district, listen to a presentation about the project and its progress, and ask questions. The display boards and presentations were also made available on the website. The website also includes an online mapping tool that allowed comments to be made about a specific location.



Public Outreach

12	Public Input Meetings	2000+	Comments from the Public
5	CTB Briefings		
8	Meetings with Stakeholders	950+	Public Meeting Attendees
1	Project Website		

Operational Improvements Plan

Given the prevalence of non-recurring delay on I-81 and the high level of travel time unreliability, the study team developed a corridor-wide, performance-driven operations and incident management plan (Operational Improvements Plan) with the objective of getting traffic moving again during incidents. The focus of the Operational Improvements Plan is to get traffic moving by detecting, responding, informing travelers of, and clearing incidents. This is an important element, because while many of the capital improvements are intended to reduce incidents, it is not possible to eliminate them entirely. The Operational Improvements Plan serves as the basis for any potential improvement package going forward.

The Operational Improvements Plan developed for the entire I-81 corridor using data-driven and prioritized recommendations with the

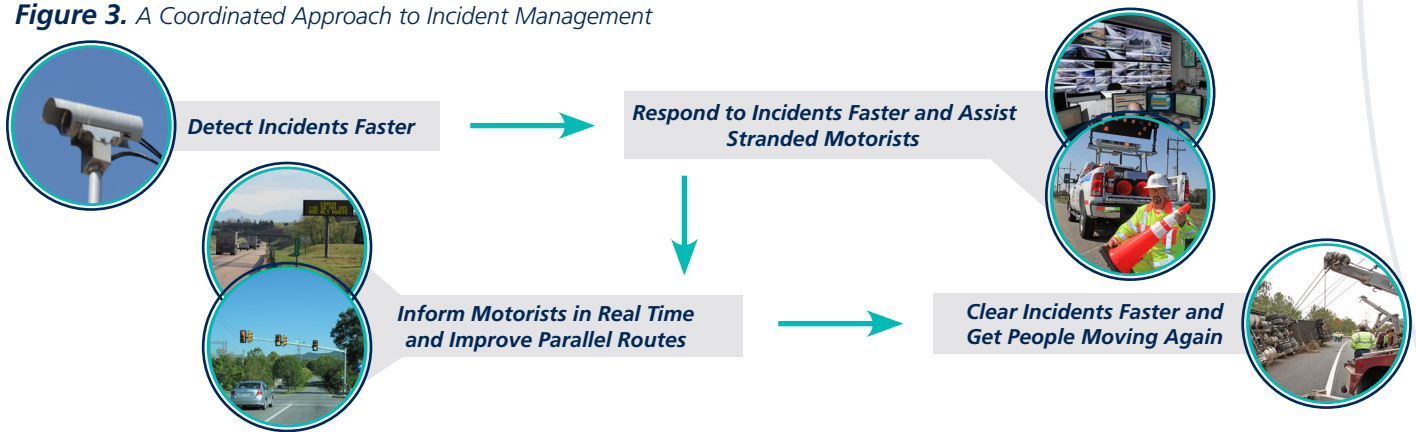


underlying objective of keeping traffic moving. Key components of the Operations Improvement Plan include additional traffic cameras to detect incidents, changeable message signs (CMS) to inform the public, expanded safety service patrols to respond to a crash, contract emergency clearance to remove incidents, and improvements to parallel facilities.

Each of these components contributes to getting traffic moving once an incident occurs, which will significantly improve operations during non-recurring incidents on the I-81 corridor, reduce the time drivers are stuck in congestion, and keep traffic moving along the roadway and the parallel routes.

Figure 3 summarizes the coordinated approach to the enhanced Operational Improvement Plan throughout the corridor.

Figure 3. A Coordinated Approach to Incident Management



Detour Routes and Improvements to Parallel Facilities

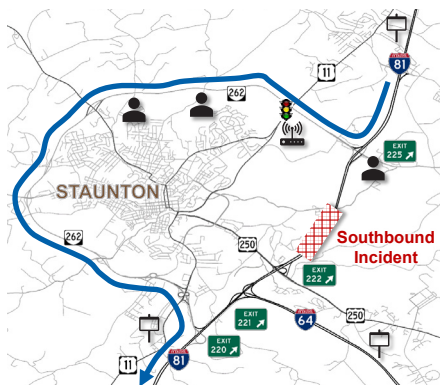
Facilities that are parallel to the I-81 corridor can serve as relief or an alternative route for travelers when there are incidents on the interstate, particularly those requiring lane closures on the mainline. Should the General Assembly pursue a tolling option on the corridor, truck restrictions will likely be placed on parallel routes—it is anticipated that these restrictions would be lifted by law enforcement during emergencies.

Incident Detour Plans (IDPs) were developed for an incident occurring between every exit ramp on the interstate in the northbound and southbound directions as well as directly at each exit. The IDPs identify facilities that are parallel to I-81 that can be used to reroute traffic off the mainline in the case of a lane-closing incident. These plans are intended to alleviate incident delay, secondary crashes, and subsequent congestion. The IDPs primarily propose traffic control personnel and signing recommendations (including portable CMS) necessary to accommodate and guide the detoured traffic. An example IDP is shown in **Figure 4**.

The IDPs were developed in coordination with:

- VDOT (regions, districts, and residencies)
- Virginia State Police
- Local Agencies
 - public works/engineering
 - law enforcement

Figure 4. Sample Detour Plan for a Southbound Incident Between Exit 222 and Exit 225



Message Signs

Inform the public of a change in traffic patterns during an incident



Traffic Control Personnel

Provide manual control of intersections during an incident



Traffic Signal Operations

Provide remote capabilities to traffic signals to adapt to incident traffic patterns

For the sample detour plan shown in **Figure 4**, operational improvements on the detour routes could reduce queues on I-81 by 8 miles and travel time by 45 minutes during a multi-hour full closure

Identification and Prioritization of Capital Improvements

The study team considered performance measures, contributing factors, and public input to develop potential capital improvements. The team also reviewed projects already funded in the CTB's Six-Year Improvement Program (SYIP) to determine how those projects may help improve conditions in the corridor. The study team examined recently constructed projects to determine how those projects may resolve issues in the corridor and whether crashes and delays in those areas may have been due to work zones.

Various capital improvements were recommended in the corridor based on the performance measures and contributing factors (e.g. traffic volume, grade, geometrics, and ramp spacing). The recommendations included:

- ➔ **Auxiliary lanes:** an extra lane constructed to connect on- and off-ramps between closely spaced interchanges to reduce the impacts of traffic entering and exiting the interstate
- ➔ **Truck climbing lanes:** an extra lane to separate trucks and other vehicles on uphill grades. The lane ends on the downhill side of the grade
- ➔ **Widening by one lane:** an extra lane constructed for multiple miles to increase the capacity of the interstate
- ➔ **Acceleration and deceleration lane extensions:** longer lengths to accelerate when entering the interstate and decelerate when exiting the interstate
- ➔ **Shoulder widening:** widening the inside shoulder (to the left of the direction of travel) to 12 feet
- ➔ **Curve improvements:** a variety of improvements that reduce the potential for crashes through horizontal curves, such as LED-lit chevron signs, high-friction surface treatments, and drainage improvements

Chapter 743 requires a targeted set of improvements to be "evaluated using the statewide prioritization process pursuant to § 33.2-214.1 of the Code of Virginia." This process, commonly known as SMART SCALE, was implemented by the CTB in 2015. The SMART SCALE process was not replicated in its entirety for this Plan; rather, the study team implemented practical and applicable measures under the Plan constraints. The operational improvements were assumed to be a stand-alone fundamental element and were excluded from the prioritization.

The following measures were used in the prioritization process:

- ✓ **safety** – reduction in the number of fatal and injury crashes (40%)
- ✓ **congestion mitigation** – decrease in person-hours of delay (40%)
- ✓ **accessibility** – access to jobs (15%) and access to jobs for disadvantaged populations (5%)

The prioritization process determined the projects most appropriate for inclusion in the Plan, which were presented to the public in the October meetings. Following the October public meetings there were refinements to the I-81 prioritized improvement projects based on feedback from the public, direction from the CTB, and a review of potential value engineering opportunities to reduce costs and maximize benefits. **Table 1** summarizes the resulting recommended improvements by district.

The I-81 corridor in Virginia passes through, or is in close proximity to, many important historic and natural resources. During the preliminary engineering phase of project development when the environmental impact analyses are conducted, the impact on these sites will be avoided and/or minimized to the greatest extent possible.

Table 1. Summary of Recommended Capital Improvements by each VDOT District

District	Number of Projects by Type							Total Number of Projects	Total Cost (millions \$)
	Widening	Auxiliary Lane	Truck Climbing Lane	Acceleration Lane Extension	Deceleration Lane Extension	Curve Improvement	Shoulder Widening		
Bristol	1	3	3	6	10	4	0	27	\$285.2
Salem	4	0	0	4	2	3	0	13	\$875.3
Staunton	4	1	2	10	4	1	1	23	\$838.1
Total I-81 Corridor Number of Improvements	9	4	5	20	16	8	1	63	\$1,998.8

Ongoing Initiatives

During the development of the Plan, a few key issues requiring extensive coordination with external parties were highlighted by public feedback and direction from the CTB. These issues included: truck parking, speed enforcement, and multimodal options. Given the need for continuing coordination and advancement of strategies, recommendations include the establishment of two task forces that would meet regularly to identify and address needs in the corridor.

Truck Parking

The I-81 corridor is heavily used as a long-haul route for the movement of goods. Due to the length of the corridor within the Commonwealth, truck drivers often stop for gas and long-term parking. To comply with the federal hours of service regulations, truck drivers must park their vehicles and rest at certain intervals to ensure they are not driving while fatigued. When adequate truck parking is not available, drivers are forced to choose between violating regulations by continuing to drive or by parking in non-designated and often unsafe areas such as highway shoulders, interchange ramps, shopping centers, or vacant lots. These options are not a safe choice. A truck parking evaluation, performed as part of the Plan, identified a 950-truck-parking space deficiency.

Recommended in the Plan is the creation of an I-81 corridor truck parking task force comprised of members representing VDOT, private travel center owners, economic development authorities, trucking associations, and representatives from local and regional governments and planning agencies.



The purpose of the task force would be to:

1. Identify site-specific issues and overcome obstacles to parking development
2. Investigate opportunities to fund the expansion of public and private truck parking facilities in targeted locations
3. Develop a truck parking information system for public rest areas initially and examine opportunities to partner with the private sector
4. Implement mobile technology to assist truck drivers with finding available and reserved parking

Speed Enforcement Initiatives

A theme that emerged during the public outreach process was an overall lack of speed enforcement on the I-81 corridor. Many comments focused on the northern end of the corridor needing additional speed enforcement. During the August public meetings, comments were specifically sought on reducing the posted speed and support for additional speed enforcement on I-81. While only 43% of respondents supported reducing the speed limit, over 70% of respondents indicated that they would support additional speed enforcement.

Recommended in the Plan is the establishment of an I-81 corridor speed enforcement task force comprised of members representing the CTB, Department of State Police, and local law enforcement to determine strategies for enhanced speed enforcement. The task force would examine differences in current speed enforcement practices and evaluate technological solutions to assist in those practices.

Multimodal Options

Another theme that emerged from the public outreach process was the need to consider investments in multimodal enhancements benefitting the I-81 corridor. For multimodal improvements to become a reality, there would need to be cooperation from the railroad industry, Amtrak, local governments, intercity bus operators, and regional planning bodies. Further development of multimodal improvements will be undertaken by OIPI and DRPT.

Financing Options

Chapter 743 of the 2018 General Assembly provided direction on the financing options that were to be considered as part of the Plan. The legislation directed that the CTB evaluate the feasibility of using toll financing and other financing means. In addition, the legislation stated that the Plan could consider tolls on heavy commercial vehicles and High Occupancy Toll (HOT) lanes but could not consider options that toll all users or options that toll commuters. As the study team evaluated financing options, HOT lanes were removed from consideration since there were no pre-existing high occupancy vehicle (HOV) lanes and traffic patterns did not support this option.

As previously discussed, approximately \$2.04 billion in improvements are recommended for the entire I-81 corridor. This includes \$43 million for operational improvements and \$2.0 billion for capital improvements. This \$2.04 billion is in addition to the \$225 million in I-81 and Route 11 improvements already funded in the current SYIP adopted by the CTB. Longer term, an additional \$2.0 billion in capital improvements are recommended to address all identified problems and their contributing factors. The recommended truck parking task force and I-81 speed enforcement task force will likely identify additional costs for addressing short- and long-term solutions as part of their work. Therefore, to ensure that funds are available, \$100 million has been reserved in FY 2021 and FY 2022 for these costs.

Based on the financial analyses, two alternatives appear to provide the necessary financing. These alternatives include two regional taxes and/or tolling an I-81 auto annual pass fee. All financing options require General Assembly approval before they can be implemented. Annual revenues in the first year

range from \$130 to \$204 million depending on the option. If a tolling option is selected, the study team recommends that the CTB allocate \$43 million from the Toll Facilities Revolving Account (TFRA) for implementation of the tolling system, including roadside equipment. TFRA requires a repayment and the Plan's toll financing option assumes this repayment.

The potential tax options are summarized in **Table 2**. The General Assembly has authorized additional motor vehicle fuels tax and retail sales and use taxes in Northern Virginia and Hampton Roads—Planning District Commissions (PDCs) 8 and 23, respectively. If the same additional taxes were imposed in PDCs 3-7, combined, they are forecasted to generate sufficient revenues to pay debt service on the issuance of \$1.5 billion in 35-year bonds and \$502 million in pay-as-you-go revenue to complete the improvements within the 7- to 10-year window.

Table 2. Potential Regional Tax Options for the I-81 Corridor Improvement Plan (in millions)

Regional Tax Option	Rate	Est. Annual Revenue Generated 2020	Est. Annual Revenue Generated 2025	35-Year Bonds Assumed to be Issued
Retail Sales & Use Tax	0.7%	\$105	\$116	
Motor Vehicle Fuels Tax	2.1%	\$60	\$63	
Total		\$165	\$179	\$1,500

Tolling options considered for the I-81 Corridor Improvement Plan include:

1. Trucks only
2. Trucks and non-commuters
3. Variable tolling between daytime and nighttime for trucks and non-commuters
4. Variable tolling with an auto annual pass

Of these four tolling options, options two, three, and four best meet public input, federal and state tolling parameters, and generate enough revenue to meet the \$2.04 billion need with debt financing. Detailed financial analysis for option four is shown in **Table 3** because it is expected to generate the lowest amount of toll revenue.

Table 3. Potential Toll Rates and Resulting Revenue for Tolling Option 4 (in millions)

Toll Option Description	Truck Rate (per mile)	Auto Rate (per mile)	Variable	Auto Annual Pass	Est. Toll Revenue 2020	Est. Toll Revenue 2025
4 Variable Daytime and Nighttime with Auto Annual Pass	15¢ Daytime 7.5¢ Nighttime	7.5¢ Daytime 5¢ Nighttime	Yes	\$30	\$145	\$178

* For the purpose of the analyses, daytime tolling is considered to be the hours between 6:00 a.m. to 9:00 p.m. and nighttime tolling is between the hours of 9:00 p.m. to 6:00 a.m.

This variable tolling option allows for \$1.5 billion in bonds and \$502 million in pay-as-you-go revenues. Long-term revenues will be used to support the on-going costs of the Operational Improvements, tolling costs, and pay debt service on toll revenue bonds. Toll revenue bonds are traditionally issued by the Commonwealth and a general rule of thumb is that \$100 million in 35-year debt can be issued for every \$10 million in annual toll revenue. In later years, additional I-81 improvements can be funded or financed. As discussed previously, another \$2.0 billion is required to fully fund all the I-81 corridor improvements identified during this study (a total of \$4.3 billion).

Economic Impact Analysis

Chapter 743 directs that the Plan will “assess the potential economic impacts on Virginia agriculture, manufacturing, and logistics sector companies utilizing the I-81 corridor from tolling only heavy commercial trucks.” The study team used a three-step process to determine the economic impacts. The first step was to estimate the net reduction to trucking companies’ costs resulting from the future planned improvements on I-81. This involved estimating the reduction in their pecuniary costs due to the capital and operational improvements (such as travel time savings, reductions in vehicle operating costs, etc.) and netting that from the tolls they would have to pay to use I-81. With the recommended \$2.04 billion in operational improvements and capital improvements in place, reductions in trucking costs were estimated using a benefit-cost analysis framework.

The framework assumes all capital and operational improvements are deployed by year 2030. Since tolling on I-81 is assumed to begin in 2020 and continue beyond 2044, the trucking cost reductions were extrapolated to cover a 40-year period of analysis, spanning from 2020 to 2060. The trucking cost reductions are expressed in 2017 dollars. The toll scenario used is the variable tolling with auto annual pass option, with a 15 cents per mile daytime truck toll rate and 7.5 cents per mile nighttime truck toll rate. Any truck toll is an increase in the transportation costs for the trucks that use I-81. The reduction in truck transportation costs are netted out of this increase to generate a net change due to the improvements and the introduction of tolling. The final results are shown in **Table 4**.

Table 4. Economic Impacts Analysis Final Results (in millions)

Share of Transportation Cost Reduction Accruing in Virginia	Share of Toll Impacting Virginia	Net Reduction in Truck Transportation Cost (\$2017)
\$3,419	\$2,303	\$1,116

Based on the measures explained above, throughout the 40-year span of the analysis, the net reduction in truck transportation costs for trucks that serve industries in Virginia is approximately \$1.1 billion or a transportation cost reduction to a toll cost ratio of 1.49. In addition, the analysis indicates that by deploying \$2.04 billion of capital and operational improvements along the I-81 corridor:

- ➔ Annual vehicle hours of delay will be reduced, on average, by more than 6 million
 - ✓ Trucks will capture more than 3.6 million vehicle hours of annual delay reductions
 - ✓ Reductions related to construction of capital improvements are responsible for more than 90% of these results; operational improvements and reductions due to fewer accidents account for remaining share
- ➔ Annual statistical crashes are anticipated to be reduced, on average, by almost 450 crashes across the entire corridor
 - ✓ Approximately 29% of the reduction in annual statistical crashes (representing almost 130 crashes) involve an injury

As directed in Chapter 743, the net change in transportation costs were then transformed into direct economic impacts to the logistics, manufacturing, and agriculture industries within Virginia.

The economic impacts are measured in terms of:

- ➔ **Industry output:** broadest measure, refers to total volume of sales
- ➔ **Value added:** measured as the difference between the amount a company spends to acquire inputs and value of its goods at the time they are sold
- ➔ **Employment:** includes labor income (employee compensation and proprietary income) and jobs (number of jobs created in a year, expressed as job-years)

The analysis involved the estimation of three types of effect, for each of the above impacts. These are referred to as direct effect, indirect effect, and induced effect.

- ✓ **direct effect** – refers to the economic activity occurring as a result of direct spending or hiring by businesses or agencies located in the study area (e.g., number of people employed in industries such as logistics, manufacturing, and agriculture that are affected by improvements and tolling along I-81)
- ✓ **indirect effect** – refers to the economic activity resulting from purchases by local firms who are the suppliers to the directly affected businesses or agencies (e.g., spending by suppliers of industries such as logistics, manufacturing, and agriculture that are affected by improvements and tolling on I-81)
- ✓ **induced effect** – represents the increase in economic activity, over and above the direct and indirect effects, which is associated with increased labor income that accrue to workers—of industries such as logistics, manufacturing, and agriculture that are affected by improvements and tolling along I-81 and all their suppliers—and is spent on household goods and services purchased from businesses within the impact area

These effects (see **Table 5**) are summed to create the total economic impact.

Table 5. *Estimated Economic Impacts*

LOGISTICS					MANUFACTURING				
<i>Impact Metric</i>	<i>Direct</i>	<i>Indirect</i>	<i>Induced</i>	<i>Total</i>	<i>Impact Metric</i>	<i>Direct</i>	<i>Indirect</i>	<i>Induced</i>	<i>Total</i>
Output	\$7.46	\$3.65	\$3.13	\$14.2	Output	\$218.82	\$64.55	\$42.93	\$326.3
Value added	\$3.30	\$2.15	\$1.84	\$7.3	Value added	\$78.30	\$34.63	\$25.25	\$138.2
Labor income	\$2.70	\$1.34	\$1.01	\$5.0	Labor income	\$33.12	\$21.92	\$13.79	\$68.8
Employment	53.9	22.0	21.9	97.8	Employment	466.4	332.2	299.7	1,098.3

AGRICULTURE					ALL-SECTORS (Economy-Wide)				
<i>Impact Metric</i>	<i>Direct</i>	<i>Indirect</i>	<i>Induced</i>	<i>Total</i>	<i>Impact Metric</i>	<i>Direct</i>	<i>Indirect</i>	<i>Induced</i>	<i>Total</i>
Output	\$12.85	\$4.51	\$2.81	\$20.2	Output	\$968.12	\$343.88	\$385.36	\$1,697.4
Value added	\$4.35	\$2.29	\$1.65	\$8.3	Value added	\$582.59	\$206.94	\$231.90	\$1,021.4
Labor income	\$2.43	\$1.22	\$0.90	\$4.6	Labor income	\$359.99	\$127.87	\$143.29	\$631.2
Employment	159.9	29.7	19.6	209.2	Employment	5,893.7	2,093.5	2,346.0	10,333.1

Note: Monetized values are in millions of 2017 dollars./Employment values are in job-years.

It is expected that throughout the 2020-2060 period of analysis the total output of all industries across Virginia will increase by approximately \$1.7 billion because of the net truck transportation cost reductions (i.e., compared to a situation where neither improvements nor tolling occur). Out of that amount, approximately \$326.3 million corresponds to output increases in the manufacturing sector, \$14.2 million to the logistics sector, and \$20.2 million to agriculture.

Next Steps

The following actions will be undertaken by the study team, CTB, and General Assembly:

- ➔ The CTB will be asked to adopt the I-81 Corridor Improvement Plan at their December 5, 2018 action meeting
- ➔ The recommended improvements package and the report will be finalized and the draft final report will be posted on the public website on December 21, 2018. This report will include:
 - \$2B capital improvement package
 - \$43M operational improvement package
 - Funding options recommended for consideration by the General Assembly
 - Economic impact analysis results
 - Truck parking study results
 - Additional recommendations for improvements in the corridor
- ➔ The I-81 Corridor Improvement Plan will be submitted to the General Assembly by January 9, 2019
- ➔ The General Assembly will consider the Plan submitted by the CTB