I-81 Corridor Improvement Plan

Nick Donohue
Deputy Secretary of Transportation
December 4, 2018
I-81 Corridor Overview – Critical to Movement of Goods in Eastern U.S.

- **11.7 MILLION TRUCKS PER YEAR**
- **$312 BILLION IN GOODS PER YEAR**
- **42% OF STATEWIDE INTERSTATE TRUCK VMT**
- **45+ CRASHES PER YEAR (WITH CLEARANCE TIMES GREATER THAN 4 HOURS)**
- **~11,000 CRASHES OVER 5 YEARS**

Includes TRANSEARCH INSIGHT and VDOT data 2012-2016
I-81 Corridor Overview – Terrain has an Impact

LEGEND:
- Red: 3-LANE SECTION
- Light Blue: 2-LANE SECTION

Office of the SECRETARY of TRANSPORTATION
I-81 Corridor Operations Plan
Delay Makes I-81 Unique

16% INCIDENTS
72% RECURRING
6% WORKZONE
6% OTHER

51% INCIDENTS
15% WORKZONE
13% OTHER
21% RECURRING
## Major Interstate Corridor Funding

**SMART SCALE vs. Other Resources**

<table>
<thead>
<tr>
<th>Interstate</th>
<th>SMART SCALE</th>
<th>Regional/Tolls/Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-64</td>
<td>$397</td>
<td>$1,179</td>
</tr>
<tr>
<td>I-66</td>
<td>$0</td>
<td>$2,680</td>
</tr>
<tr>
<td>I-77</td>
<td>$5</td>
<td>0</td>
</tr>
<tr>
<td>I-81</td>
<td>$168</td>
<td>0</td>
</tr>
<tr>
<td>I-85</td>
<td>$0</td>
<td>0</td>
</tr>
<tr>
<td>I-95/I-395</td>
<td>$220</td>
<td>$940</td>
</tr>
</tbody>
</table>

*Figures in millions*
I-81 Corridor Improvement Plan

- Review of top problem areas
- Identification of potential solutions for each problem area and operations plan
- Prioritization of potential solutions and recommended improvement plan
- Development of potential financing options
- Economic impact analysis of tolling
Public Engagement

- 12 public input meetings
  - 950+ attendees
- 5 Commonwealth Transportation Board briefings
- 2000+ comments received from the public
Person Hours of Delay between Interchanges - Average per One Mile Segment

<table>
<thead>
<tr>
<th>Location</th>
<th>Person Hours of Delay (Northbound)</th>
<th>Person Hours of Delay (Southbound)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennessee SL</td>
<td>Bristol</td>
<td>Abingdon</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td></td>
<td>9,000</td>
<td>9,000</td>
</tr>
<tr>
<td></td>
<td>6,000</td>
<td>6,000</td>
</tr>
<tr>
<td></td>
<td>3,000</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Duration of Incident - Related Lane Closures between Interchanges
Equivalent Property Damage Only – One-Mile Segments

![Graph showing Equivalent PDO Crashes for various locations along Tennessee SL and West Virginia SL]

- **Tennessee SL**: Bristol, Abingdon, Chilhowie, Marion, Smyth County, Wytheville, Fort Chiswell, Pulaski, Montgomery, Christiansburg, Roanoke, Buchanan, Lexington, Staunton, Harrisonburg, Woodstock, Winchester, West Virginia SL

Legend:
- EPDO (Northbound)
- EPDO (Southbound)
EPDO per 100M VMT – One Mile Segments

Equivalent PDO Crashes per 100 Million Vehicle Miles Travelled

- EPDO per 100M VMT (Northbound)
- EPDO per 100M VMT (Southbound)
I-81 Operational Improvements

- Focused on corridor segments with the highest incident-related delay
- Identified crash hotspots
- Developed corridor-wide operations and incident management upgrade plan
I-81 Operational Improvements Plan

Key components include—
• Changeable message signs and cameras
• Expanded safety service patrols
• Detour routes and improvements to parallel facilities
• Contract emergency clearance
• Truck parking enhancements
I-81 Operational Improvements Plan
Summary Recommendations

<table>
<thead>
<tr>
<th>Improvement</th>
<th>Estimated Implementation Cost</th>
<th>Estimated Annual O&amp;M Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expand Traffic Cameras &amp; CMS</td>
<td>$10,750,000</td>
<td>$615,600</td>
</tr>
<tr>
<td>Enhanced Safety Service Patrols</td>
<td>$1,663,000</td>
<td>$1,744,200</td>
</tr>
<tr>
<td>Contract Emergency Clearance</td>
<td>$3,500,000</td>
<td>$3,591,000</td>
</tr>
<tr>
<td>Parallel facilities Improvements</td>
<td>$27,100,000</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$43,000,000</td>
<td><strong>$5,950,800</strong></td>
</tr>
</tbody>
</table>

Recommendations:

- Place 24 new CMS on the mainline
- Place 10 new CMS on feeder routes
- Place 37 new cameras at interchanges
- Place 8 new cameras at high incident locations
- Upgrades to parallel routes in key locations
Identifying I-81 Capital Improvements

- Reviewed each problem area identified by performance measures
- Determined contributing factors
- Developed potential solutions based identified contributing factors – a total cost of $4 billion
Prioritization of Potential Capital Improvements

• Focused on capital improvements package of $2 billion based on industry capacity feedback – approximately $\frac{1}{2}$ of cost of all improvements

• Evaluated all potential capital improvements using SMART SCALE-like process with benefits determined as follows:
  – 40% based on person hours of delay
  – 40% based on change in crash frequency
  – 20% based on change in access to jobs
$2 billion in I-81 Plan Capital Improvements

<table>
<thead>
<tr>
<th>District</th>
<th>Widening</th>
<th>Auxiliary Lane</th>
<th>Truck Climbing Lane</th>
<th>Acceleration Lane Extension</th>
<th>Deceleration Lane Extension</th>
<th>Curve Improvement</th>
<th>Shoulder Widening</th>
<th>Total Number of Projects</th>
<th>Total Cost (millions $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bristol District</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>27</td>
<td>$285.2</td>
</tr>
<tr>
<td>Salem District</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>13</td>
<td>$875.3</td>
</tr>
<tr>
<td>Staunton District</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>23</td>
<td>$838.1</td>
</tr>
<tr>
<td>Total I-81 Corridor Number of Improvements</td>
<td>9</td>
<td>4</td>
<td>5</td>
<td>20</td>
<td>16</td>
<td>8</td>
<td>1</td>
<td>63</td>
<td>$1,998.8</td>
</tr>
</tbody>
</table>
Bristol District Recommendations

Highlights

• Widen southbound to three lanes between Exit 10 and Exit 7
• Add northbound truck climbing lane from Exit 32
• Add a southbound truck climbing lane between MM 34 and MM 33
• Add northbound truck climbing lane from Exit 39
• Add SB auxiliary lane between Exit 54 and Smyth Safety Rest Area
• Add SB auxiliary lane between Exit 40 on I-77 and Exit 72 on I-81 and extend acceleration lane
• Add SB auxiliary lane between Exit 73 and Exit 72
Salem District Recommendations

Highlights

• Widen northbound to three lanes from MM 119 to Exit 128

• Widen northbound to three lanes from Exit 128 to Exit 137

• Widen northbound and southbound to three lanes from Exit 137 to Exit 141
  – Links up with SMART SCALE funded improvements from 141 to 143

• Widen northbound and southbound from MM 144 to Exit 150
Staunton District Recommendations Highlights

- Add southbound auxiliary lane between Exit 221 and Exit 220
- Widen northbound and southbound to three lanes between Exit 225 and Exit 221
- Add northbound truck climbing lane between MM 234 & 237.9
- Add southbound truck climbing lane between MM 238 & 235.6
- Widen northbound and southbound to three lanes between Exit 243 and Exit 248
- Widen southbound to three lanes between MM 300.1 and 296.7
- Widen northbound and southbound to three lanes between Exit 313 & Exit 317
Summary Benefit Results from Prioritized Capital Improvements

• By deploying $2 billion of capital 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 responsible for more than 90% of these benefits
  – Annual statistical crashes are anticipated to be reduced, on average, by almost 450 across the entire corridor
    – Approximately 29% of the reduction in annual statistical crashes (representing almost 130 crashes) involve an injury

* Estimated based on the share of vehicle delays generated by projects included in list of $2 B improvements compared to total vehicle delays generated by all improvements considered in the corridor. Estimate includes benefits related to Operational Improvements
On-Going Items

• Establish Truck Parking Task Force

• Establish Speed Enforcement Task Force

• Develop Multimodal Improvements

• Plan sets aside $100M to implement these items
I-81 Financing Options
I-81 Financing Options

• Legislation provided direction on the financing options to be considered
  • Evaluate feasibility of using toll financing
  • Do not consider tolls on commuters
  • May consider tolls on heavy commercial vehicles
  • May consider High Occupancy Toll Lanes
  • Evaluate other financing means

• Financing options presented are sufficient to fund the recommendations through a mix of debt financing and pay-as-you-go funding
## Financing Options

<table>
<thead>
<tr>
<th>Regional Tax Option</th>
<th>Rate</th>
<th>Revenue Generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail Sales and Use Tax</td>
<td>0.7%</td>
<td>$105</td>
</tr>
<tr>
<td>Regional Fuels Tax</td>
<td>2.1%</td>
<td>$60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tolling Option</th>
<th>Rate</th>
<th>Revenue Generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of Day Tolling with I-81 Auto Annual Pass</td>
<td>Variable</td>
<td>$145</td>
</tr>
</tbody>
</table>

* Figures in millions and for FY2020
Key Financial Plan Assumptions
Regional Taxes Like Northern Virginia & Hampton Roads

- Collect motor fuels and/or retail sales & use tax in PDCs 3-7
- Regional authority to manage revenues and financing
Tolling Option Must Meet State Requirements

• § 33.2-309 of the *Code of Virginia* requires any imposition of tolls for use of the interstate system to be for the stated purpose of:
  – Financing interstate construction and reconstruction;
  – Promoting efficiency;
  – Reducing traffic congestion; and
  – Improving air quality.

• For I-81, § 33.2-119 of the *Code* requires General Assembly approval prior to the imposition and collection of any toll for use or all or any portion
## Tolling Option Must Meet Federal Requirements

<table>
<thead>
<tr>
<th>Program</th>
<th>Key Requirements</th>
<th>I-81 Corridor Qualify?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value Pricing Pilot Program</strong></td>
<td>Tolls may be imposed on existing toll-free highways, bridges &amp; tunnels so long as variable pricing is used to manage demand. No formal federal approval process other than NEPA</td>
<td><em>Yes</em>, implement nighttime and daytime toll rates</td>
</tr>
<tr>
<td><strong>Interstate System Reconstruction &amp; Rehab. Pilot Program</strong></td>
<td>Convert existing interstate system into a toll facility in conjunction with needed reconstruction &amp; rehab that is only possible with the collection of tolls. Requires formal federal approval including NEPA</td>
<td><em>Yes</em>, on 10-2-2018 FHWA issued a call for applications for 3 available slots on a first-come, first serve basis</td>
</tr>
<tr>
<td><strong>Section 129 (General Toll Program)</strong></td>
<td>Initial construction of new lanes on highways, bridges, &amp; tunnels and reconstruction, restoration, or rehabilitation as long as number of toll-free lanes are not reduced. Requires formal federal approval including NEPA</td>
<td><em>Yes</em>, as long as toll gantries are near or on reconstructed or rehabilitated bridges</td>
</tr>
<tr>
<td><strong>Section 166 (HOV/HOT Lanes)</strong></td>
<td>Allow toll-paying vehicles that do not meet minimum occupancy standards to use HOV lanes. No formal federal approval process other than NEPA</td>
<td><em>No</em>, no existing HOV lanes</td>
</tr>
</tbody>
</table>
Key Definitions for Financing Options
Heavy commercial vehicle and commuters

- Heavy Commercial Vehicle or “Trucks”
  - No uniform definition of term
  - Study assumed FHWA Classes 6 – 13
  - Surrounding states define similarly but lower axles (Class 5)
- Commuters travel first two gantries free
- Auto Annual Pass could eliminate commuter/non-commuter distinction
Key Financing Options Assumptions

Tolling

• Collect per mile tolls without using a toll booth via:
  • Transponder (E-ZPass)
  • Video (image-based)
  • I-81 Auto Annual Pass

• 6 toll gantries for 325 miles
  • Intersections with other interstates
  • Near state borders
  • Between urbanized areas
  • Closest assumed 2 locations are about 40 miles apart
Toll Financing Option

- Toll rates will vary between Trucks and Autos
  - Trucks – 15¢ per mile during daytime; 7.5¢ per mile during nighttime
  - Autos – 7.5¢ per mile during daytime; 5¢ per mile during nighttime
  - All Autos may purchase $30 Annual Pass and gain unlimited access to I-81 for that year

- Time of Day Tolling
  - Tolls would be variable with higher during ‘daytime’ – roughly 6:00am to 9:00pm and lower from 9:00pm to 6:00am ‘nighttime’
  - Goal is to encourage more efficient use of the corridor
I-81 Traffic by Time of Day

• *Time of Day studies at key locations throughout the corridor
Toll Financing Option
Auto Annual Pass can replace commuter distinction

• **I-81 Auto Annual Pass**
  • $30 annual fee allows "autos" ability to pay an annual fee for unlimited use of the facility
  • Fee could be collected through DMV
  • Pass would be offered to auto commuters and other auto corridor users

• **Users of the corridor without I-81 Auto Annual Pass would pay full auto per mile toll rate**

• **Similar to toll discount programs in other nearby states**
# Toll Financing Option
## Goals and Strategies

<table>
<thead>
<tr>
<th>Goal</th>
<th>Implementation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financing construction and reconstruction</strong></td>
<td>Toll rates generate sufficient revenues to finance the I-81 Corridor Improvement Plan; but is not a revenue maximization strategy</td>
</tr>
<tr>
<td><strong>Reduce traffic congestion</strong></td>
<td>Time of Day Variable tolling modifies driver behavior to encourage Truck off-hour usage; Establish toll rates and other programs that discourage diversion</td>
</tr>
<tr>
<td><strong>Promote efficiency</strong></td>
<td>Time of Day Variable tolling modifies driver behavior; toll collection is through multiple methods that require no stopping</td>
</tr>
<tr>
<td><strong>Equity</strong></td>
<td>Toll rates will be the same no matter how toll is paid (transponder or video toll); Use of video tolling will result in a processing fee because of higher collection costs</td>
</tr>
<tr>
<td><strong>Federal approval</strong></td>
<td>Toll rate setting and implementation with comply with federal requirements</td>
</tr>
<tr>
<td><strong>Consider current toll rates of peers/surrounding entities – per mile toll rate</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>State</strong></td>
</tr>
<tr>
<td></td>
<td>West Virginia Turnpike</td>
</tr>
<tr>
<td></td>
<td>North Carolina Triangle Expressway</td>
</tr>
<tr>
<td></td>
<td>Pennsylvania Turnpike</td>
</tr>
<tr>
<td></td>
<td>Maryland I-95</td>
</tr>
</tbody>
</table>

These states vary toll rates based on method of payment; rates shown are for transponders – the lowest toll rate available.
Economic Impact Analysis
Economic Impact Analysis

• Analyzed reduced transportation costs due to implementation of the Plan and tolling costs for Virginia Trucks

• Reduced transportation costs include
  – Reduced travel times
  – Reduced fuel and labor costs due to travel time savings
  – Reduced monetary costs due to less crashes
### Economic Impact Analysis - Virginia Trucks

<table>
<thead>
<tr>
<th>Share of Transportation Costs Reduction</th>
<th>Share of Tolls</th>
<th>Net Reduction in Transportation Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3,419</td>
<td>$2,303</td>
<td>$1,116</td>
</tr>
</tbody>
</table>

1.49 ratio of transportation cost reduction to toll cost

* Figures in millions and 2017 dollars
Economic Impact Analysis – Agriculture, Logistics and Manufacturing

Net transportation cost reductions were converted into direct economic impacts

<table>
<thead>
<tr>
<th></th>
<th>Output</th>
<th>Value Added</th>
<th>Labor Income</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sectors</td>
<td>$968.1</td>
<td>$582.6</td>
<td>$360.0</td>
<td>$1,910.7</td>
</tr>
<tr>
<td>Agriculture</td>
<td>$12.9</td>
<td>$4.4</td>
<td>$2.4</td>
<td>$19.6</td>
</tr>
<tr>
<td>Logistics</td>
<td>$7.5</td>
<td>$3.3</td>
<td>$2.7</td>
<td>$13.6</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>$218.8</td>
<td>$78.3</td>
<td>$33.1</td>
<td>$330.2</td>
</tr>
</tbody>
</table>
Next Steps

• Board consideration of report at December 5, 2018 Action Meeting

• Report will be finalized and posted on public website

• Report will be submitted to the General Assembly by January 9, 2019