



# Executive Summary

The Federal Highway Administration (FHWA) and the Virginia Department of Transportation (VDOT) signed a process streamlining agreement in 2003 that defined the decision-making and approval process to be followed for a tiered environmental study of the Interstate 81 (I-81) corridor in Virginia (see Appendix A). In accordance with the agreement, FHWA and VDOT have prepared a Tier 1 Final Environmental Impact Statement (FEIS) for the *I-81 Corridor Improvement Study*. The Tier 1 FEIS, prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), identifies needs, develops solutions, and evaluates potential impacts associated with conceptual-level improvements along the entire 325-mile I-81 corridor in Virginia, as well as improvements to Norfolk Southern's Shenandoah and Piedmont rail lines in Virginia. The actual impacts of individual projects will be analyzed in detail during Tier 2 as they are advanced.

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## ES.1 NEPA Tiering Process

Tiering is a staged approach to NEPA referenced in the Council on Environmental Quality's (CEQ's) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* and in FHWA's *Environmental Impact and Related Procedures*. Tiering addresses broad programs and issues in initial (Tier 1) or systems level analyses, and analyzes site-specific proposals and impacts in subsequent tier studies. The tiered process supports decision-making on issues that are ripe for decision and provides a means to preserve those decisions. This Tier 1 FEIS is the vehicle for fact-based analyses that supports informed decision-making on corridor-length issues. In accordance with the *Process Streamlining Agreement Between the Virginia Department of Transportation and the Federal Highway Administration on the Interstate 81 Corridor National Environmental Policy Act Process*, upon completion of the Tier 1 study, decisions will be made on:

- The improvement concepts to be advanced;
- Advancing I-81 as a toll pilot under Section 1216(b) of the Transportation Equity Act for the 21st Century (TEA-21);

- Projects with independent utility and logical termini to be studied in Tier 2;
- The types of Tier 2 NEPA document(s);
- The location of the corridor for studying alignments in Tier 2; and
- Possible purchase of certain right-of-way parcels on a case-by-case basis.

In addition to these decisions, the Tier 1 FEIS documents existing and future needs along the corridor.

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## ES.2 Study Area

I-81 in Virginia extends 325 miles in a southwest to northeast direction in Western Virginia from the Tennessee border north to the West Virginia border, passing through 21 cities and towns and 13 counties. Conceptual-level improvements to the entire 325-mile length of I-81 in Virginia were evaluated based on the Purpose and Need (see below). For purposes of characterizing the affected environment, the I-81 study area ranges in width depending on the environmental resource considered, but generally extends 500 feet from either side of the I-81 outside edge of pavement. This width was used because, based on the needs, it is believed to represent the maximum area within which potential highway improvements may be developed.

In addition to addressing the needs with highway improvements, the study evaluates the effectiveness of four rail improvement concepts in meeting the identified needs. Potential improvements to Norfolk Southern's Shenandoah and Piedmont rail lines were evaluated. Since the Piedmont rail line is geographically distant from I-81, a separate rail study area was also created. The rail study area consists of 13 discrete sections along Norfolk Southern's existing Piedmont and Shenandoah rail lines in Virginia. The length of the rail improvement sections range from less than ½ mile to 10 miles long, but most of the sections are between 1 and 2 miles long. For each rail section, environmental resources were generally identified within 500 feet on either side of the rail centerline. This width includes the limits of where potential rail improvements might occur.

Figure ES-1 shows the I-81 and rail study areas.

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## ES.3 Purpose and Need

I-81 is relied upon for local and regional travel and interstate travel in the Eastern United States. Virginia's portion of I-81 is critical to overall national system linkage. For interstate travel, its location provides a connection between the more densely populated Northeastern United States and the mid-Southern states, as well as to other routes that connect to the Mexican border.

**Legend**

-  I-81 Corridor
-  Norfolk Southern Piedmont Line
-  Norfolk Southern Shenandoah Line



**I-81 and Rail Study Areas**

Figure  
**ES-1**

The 325-mile stretch of I-81 within Virginia was originally constructed as a four-lane limited access highway. Since its completion, sections in Bristol, Wytheville and Christiansburg have been widened and reconstructed to accommodate the large increase in traffic. Truck climbing lanes also have been added in some sections.

The Purpose and Need chapter evaluates both existing travel conditions and future needs in the year 2035. Because the potential improvements are on the interstate system, they should have a useful life of at least 20 years from the time that construction is completed. Detailed information on existing and 2035 transportation conditions are provided in the *I-81 Corridor Improvement Study Transportation Technical Report*. Existing and future transportation deficiencies on I-81 are summarized below:

- Capacity
  - Traffic volumes have doubled and, in some cases, tripled since 1978.
  - 2004 traffic volumes are expected to almost double by 2035.
  - Truck traffic is projected to grow at a faster rate than general traffic.
  - Over 90 percent of I-81 is projected to operate below the level of service standard in 2035 (see Figure 2-6 in Chapter 8, *Figures*).
  
- Safety
  - 24 northbound miles and 21 southbound miles (6 percent) experience crash rates more than 25 percent higher than the statewide weighted average.
  - Eight of these miles have crash rates more than twice the statewide weighted crash average.
  - Trucks constitute 29 percent of the total vehicle miles traveled on I-81 between 2000 and 2002, and trucks were involved in 29 and 30 percent of all crashes and fatal crashes, respectively.
  - Safety is a problem at some locations today and will likely worsen by 2035, as traffic volumes increase and existing geometric conditions remain.

The geometric conditions of the highway, when combined with the traffic demands placed on I-81 (including substantial truck traffic), speeds, and weather conditions, may contribute to the safety problems along I-81. Some sections of I-81 in Virginia are more than 40 years old and do not meet current American Association of State Highway Transportation Officials (AASHTO) geometric design criteria. As part of previously completed studies, a review of I-81 showed that geometric conditions that do not meet current AASHTO geometric design criteria include:

- More than two-thirds of I-81 in Virginia have inside shoulder widths that do not meet current AASHTO geometric design criteria, based on the volume of heavy vehicles using the corridor.
- More than 100 locations have sight distances that do not meet current AASHTO geometric design criteria because of the alignment of the highway.

- ❑ Ten locations have steep grades that slow truck traffic to speeds below the minimum for interstate travel.
- ❑ Approximately 53 bridges (42 percent) have vertical clearances less than the criterion of 16.5 feet established in the VDOT Road Design Manual.

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## ES.4 Improvement Concepts

A broad range of reasonable improvement concepts was considered within the guidelines of the Process Streamlining Agreement between FHWA and VDOT. Some concepts emerged from the scoping process, some came from previous studies, and others were developed by the study team. The No-Build Concept and 211 combinations of Transportation System Management (TSM), highway improvements, rail improvements, and various toll scenarios were considered as described below. Additional information is also available in the *I-81 Corridor Improvement Study Concept Development and Analysis Technical Report*.

### Improvement Concepts

**No-Build** – The No-Build Concept is defined as the I-81 roadway as it exists in 2005 plus 16 construction projects included in the *Virginia Transportation Six-Year Improvement Program for Fiscal Years 2006-2011* and Metropolitan Planning Organizations' Long Range Plans that are fully funded through construction. It was assumed that these projects with funding commitments would be completed by 2035.

**Transportation System Management (TSM)** – The TSM concept includes safety improvements (*e.g.*, lengthening acceleration lanes at interchanges), truck climbing lanes, Intelligent Transportation System elements, and Transportation Demand Management (TDM) measures.

**Rail Concepts** – Four rail concepts were studied, all which involved rail lines owned by Norfolk Southern Railroad.

- **Rail Concept 1** – Minor improvements to the Norfolk Southern Piedmont Line from the West Virginia state line to Manassas, including improvements to one of the most congested sections of the Piedmont Line, the section from Front Royal to Manassas.
- **Rail Concept 2** – Improvements to the Norfolk Southern Piedmont Line within the Commonwealth of Virginia, including major improvements to nine sections (*e.g.*, the section from Front Royal to Manassas and others). Proposed in the *Northeast-Southeast-Midwest Corridor Marketing Study* as the Virginia-based investment scenario.
- **Rail Concept 3** – All improvements to the Norfolk Southern Piedmont Line included in Rail Concept 2, as well as minor improvements to the Norfolk Southern Shenandoah Line.



- **Rail Concept 4** – Full-level improvements to the Norfolk Southern Shenandoah Line and new rail freight hauling technology that interfaces with intermodal centers at strategic locations along I-81. This concept was proposed during the scoping process by Rail Solution, a rail advocacy group.

The effects of rail improvements on the diversion of freight from I-81 to rail was modeled. This analysis is detailed in the *I-81 Corridor Improvement Study Freight Diversion and Forecast Report*. The results indicate that the construction of rail improvements alone would only slightly reduce the number of lane miles needed on I-81 in Virginia. Table ES-1 illustrates the percent of trucks that are projected to divert from I-81 in 2035.

**Table ES-1 Rail Truck Diversion Percentages**

Rail Concept #	% Truck Diversion
Rail Concept 1	0.7
Rail Concept 2	2.9
Rail Concept 3	3.5
Rail Concept 4	5.8

**Roadway Concepts** – Roadway concepts were evaluated as consistent corridor-length concepts, which meant they are either made the number of lanes in each direction equal for the entire length of I-81 in Virginia, or added an equal number of lanes to the existing lanes for the entire length of I-81 in Virginia. Each roadway concept was evaluated with five different toll scenarios: 1) no toll, 2) low toll for all vehicles, 3) high toll for all vehicles, 4) low toll for commercial vehicles only, and 5) high toll for commercial vehicles only.

- **Add 1 Lane** – One additional lane in each direction (two lanes total) the entire 325 miles and upgraded shoulders.
- **Add 2 Lanes** – Two additional lanes in each direction (four lanes total) the entire 325 miles and upgraded shoulders.
- **Add 3 Lanes** – Three additional lanes in each direction (six lanes total) the entire 325 miles and upgraded shoulders.
- **Uniform 6 Lanes** – Additional lanes, where necessary, to make the entire corridor a consistent three lanes in each direction and upgraded shoulders.
- **Uniform 8 Lanes** – Additional lanes, where necessary, to make the entire corridor a consistent four lanes in each direction and upgraded shoulders.

**Combination Concepts** – Each of the five roadway concepts described above were combined with Rail Concept 3 to produce a total of five combination concepts. Rail Concept 3 was chosen as the rail concept to use in combination with highway improvements because it provides the most diversion of freight from truck to rail per dollar of investment. Each combination concept was also evaluated with five different toll scenarios.



**Separated Lane Concepts** – Five concepts that involve the separation of lanes (in the same direction of travel) were considered and were divided into two types: those involving exclusive separated lanes and those involving non-exclusive separated lanes. Exclusive lanes are barrier-separated lanes with separate interchange ramps to all the interchanges along the roadway. Non-exclusive lanes provide a rumble strip between the separated lanes and the other lanes, which allow vehicles in the separated lanes to merge into the other lanes and also to use the existing interchange ramps. Separated lane concepts were evaluated with five toll scenarios, with Rail Concept 3, and without Rail Concept 3. In addition, these concepts were considered in combination with the addition of zero, one, and two general purpose lanes in each direction.

Table ES-2 summarizes costs for each of the concepts described above. The *I-81 Corridor Improvement Study Concept Development and Analysis Technical Report* provides a more detailed breakdown of the costs for each improvement concept. These costs may change during Tier 2, based on more site-specific information.

**Table ES-2 Concept Costs**

Concept	Cost	
	2005	2015
No-Build	*	*
TSM	\$0.08 billion	\$0.1 billion
<b>Rail Concepts</b>		
Rail Concept 1	\$0.1 billion	\$0.14 billion
Rail Concept 2	\$0.5 billion	\$0.7 billion
Rail Concept 3	\$0.5 billion	\$0.7 billion
Rail Concept 4	\$3.7 billion	\$5.4 billion
<b>Roadway Concepts</b>		
Add 1 Lane	\$5.1 billion	\$7.5 billion
Add 2 Lanes	\$7.8 billion	\$11.4 billion
Add 3 Lanes	\$11.2 billion	\$16.4 billion
Uniform 6 Lanes	\$4.9 billion	\$7.2 billion
Uniform 8 Lanes	\$7.5 billion	\$11.0 billion



Table ES-2 Concept Costs (Cont'd)

Concept	Cost	
	2005	2015
<b>Combination Concepts</b>		
Add 1 Lane + Rail Concept 3	\$5.6 billion	\$8.2 billion
Add 2 Lanes + Rail Concept 3	\$8.3 billion	\$12.2 billion
Add 3 Lanes + Rail Concept 3	\$11.7 billion	\$17.1 billion
Uniform 6 Lanes + Rail Concept 3	\$5.4 billion	\$7.9 billion
Uniform 8 Lanes + Rail Concept 3	\$8.0 billion	\$11.7 billion
<b>Separated Lane Concepts<sup>1</sup></b>		
Add 1 Exclusive Truck Lane + Add 1 or 2 GP Lanes	\$11.2 – 12.7 billion	\$16.4 – 18.6 billion
Add 2 Exclusive Truck Lanes + Add 0, 1, or 2 GP Lanes	\$11.2 – 13.0 billion	\$16.4 – 19.0 billion
Add 2 Non-Exclusive Truck Lanes + Add 0, 1, or 2 GP Lanes	\$ 9.3 – 10.8 billion	\$13.6 – 15.8 billion
Add 2 Exclusive Car Lanes + Add 0, 1, or 2 GP Lanes	\$11.2 – 13.0 billion	\$16.4 – 19.0 billion
Add 2 Non-Exclusive Car Lanes + Add 0, 1, or 2 GP Lanes	\$11.2 – 13.0 billion	\$16.4 – 19.0 billion

\* The costs necessary to build those improvements (each of which are programmed for construction) can be found in the *Virginia Transportation Six-Year Improvement Program for Fiscal Years 2006-2011*.

<sup>1</sup> Separated lane concepts were evaluated with and without Rail Concept 3.

The concepts' ability to address the capacity portion of the Purpose and Need was identified in the form of the number of miles of I-81 that would continue to operate below level of service standards (described in Chapter 2, *Purpose and Need*) after the concept was built and the number of miles where excess capacity would be provided. Excess capacity was defined as the provision of at least one more lane than the number of lanes required to provide level of service at or above the level of service standards.

Key conclusions reached based on the analysis were as follows:

- The No-Build Concept does not satisfy the Purpose and Need.
- The TSM Concept, as a stand-alone concept, does not satisfy the Purpose and Need.
- As stand-alone concepts, rail improvements only slightly decrease the capacity needs on I-81 in 2035. As such, they do not satisfy the Purpose and Need and do not preclude the need for road improvements.
- No single consistent corridor-length concept satisfies the needs of I-81 in Virginia without providing more lanes than are needed.
- The addition of one lane in each direction satisfies the Purpose and Need for approximately 37 to 64 percent of the corridor, depending upon the toll scenario.



- No concept with two separated lanes in each direction, whether with or without a barrier or designated lane for truck or passenger vehicles, satisfies the Purpose and Need for the entire corridor without providing more lanes than are needed.
- Based on the varying traffic demands, a concept with a variable number of lanes between interchanges of the corridor most efficiently addresses the needs of the roadway. The variable concepts would minimize the social, economic, and environmental impacts from consistent lane concepts, and provide an opportunity to limit cost by not providing more lanes than are needed.

### Tolls

Section 1216(b) of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) established a toll pilot program to allow conversion of a free interstate highway into a toll facility. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) made no revisions to this toll pilot program. A toll impact study was conducted for the purpose of determining the effect of tolls on the I-81 corridor and the effects of traffic diversion to other facilities. The study was not conducted to establish toll rates on I-81. The effect of tolls on trucks and cars, or on just trucks, was estimated by modeling diversions of these vehicles from I-81 to other transportation facilities. The study evaluated tolls for all vehicles, as well as tolls for trucks only. Five toll scenarios were considered: 1) no tolls, 2) low toll for all vehicles, 3) high toll for all vehicles, 4) low toll for trucks, and 5) high toll for trucks. The low and high toll rates were derived from national research and represent a reasonable rate that could be charged. Detailed information is provided in the *I-81 Corridor Improvement Study Toll Impact Study*.

Generally, the higher the toll, the fewer the number of additional lanes required on I-81. However, the inclusion of tolls would only have a slight effect on the I-81 cross-section necessary to meet the 2035 traffic demands. Also, trucks are less likely to divert from I-81 than passenger cars because a commercial trucker’s value of time is higher than that of a passenger car. In other words, the additional time a trucker would need to travel on another facility may be more costly to the trucker than the toll itself. A summary of the average diversion estimates caused by tolls is shown in Table ES-3. These diversion estimates represent the percentage of vehicles diverting from an improved I-81 because of tolls.

**Table ES-3 Summary of Diversion Estimates Caused by Tolls**

	Tolls for All Vehicles		Tolls for All Commercial Vehicles	
	Low Toll	High Toll	Low Toll	High Toll
<b>All Vehicles</b>				
Average Diversion from I-81	8%	16%	2%	9%
<b>Trucks</b>				
Average Diversion from I-81	3%	11%	12%	25%



Between 2005 and 2035, under the No-Build condition, improvements along U.S. Route 11 in Virginia would likely be necessary as traffic volumes are expected to double along a majority of roadway. An expanded I-81 without tolls would generally improve conditions on U.S. Route 11 and other local roadways in the I-81 study area by diverting traffic from these local roadways to the interstate. This is especially true in the more populated and urban areas.

As tolls are introduced, traffic would begin to shift back to the local roadway network as vehicles divert to their original route choices to avoid additional costs. Nearly 50 percent of the traffic diverted from I-81 would be absorbed by U.S. Route 11. The remaining traffic diverted from I-81 would be distributed among other local roads, as well as other interstates (e.g., I-64 and I-95).

The impact of tolls on traffic operations relative to the No-Build condition would not be substantial. Even though about half of the traffic would divert to U.S. Route 11, the resulting increase is slight for this type of roadway (a rural principal arterial) and the overall impact would be low. This is because, while some level of diversion from I-81 to U.S. Route 11 is expected, some local traffic would also divert from U.S. Route 11 to an improved I-81. Under the low toll scenario, in most locations, traffic volumes on local roadways would still be below 2035 No-Build predictions. Areas with a high potential for local roadway impacts would be sporadic throughout the corridor. Implementation of higher tolls on I-81 would slightly increase traffic volumes on U.S. Route 11 as compared to the No-Build condition. However, the actual traffic impact on U.S. Route 11 and other roads from the number of additional vehicles would be low. See the *I-81 Corridor Improvement Study Toll Impact Study* for the estimated impacts to localized sections of U.S. Route 11.

If all vehicles are tolled, an expanded I-81 would decrease truck traffic on local roadways to levels below what are projected under 2035 No-Build conditions.

In accordance with Section 1216(b) of TEA-21, improvements would need to be made to I-81 in order to toll the facility. In addition, the use of tolls collected on I-81 in Virginia to make improvements to other modes of transportation (e.g., railroads) is prohibited under Section 1216(b) of TEA-21. Therefore, concepts that considered tolls, but did not include highway improvements, are not considered viable.

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## ES.5 Environmental Consequences

The potential impacts of the improvement concepts on the natural and human environment were analyzed at a level of detail appropriate for Tier 1.

As previously stated, 211 combinations of concepts were evaluated for their ability to meet the needs on I-81. Because this number is so large, the study evaluated potential impacts associated with the narrowest highway footprint (*i.e.*, the “Minimum Width footprint” and the widest highway footprint (*i.e.*, the “Maximum Width footprint”) that would be required to meet the needs. This methodology is consistent with the tiered approach to this study and captured the range of potential impacts from the various combinations of roadway concepts. Both impact footprints have a variable number of additional lanes for the length of I-81 (ranging from two additional lanes to eight additional lanes) depending on the transportation needs along the corridor.

On sections of I-81 that need one additional lane in each direction, both footprints add a total of two lanes (one lane in each direction). On sections of I-81 that need two lanes in each direction, the need can be met by different means: 1) a total of four additional lanes can be added, or 2) various operational scenarios can be implemented (*e.g.*, separation of general purpose lanes and truck lanes) that would meet the needs, but would require the construction of up to eight additional lanes to operate efficiently. Where at least four lanes are needed, the Minimum Width footprint provides a total of four additional lanes (two lanes in each direction), and the Maximum Width footprint provides a total of eight additional lanes (four in each direction).

When evaluating the number of lanes needed to address the needs along I-81, a “no toll” and “no rail” base condition was assumed for the purpose of developing the footprints. This base condition represents the highest traffic volumes and, therefore, the greatest number of lanes that may be needed on I-81. The width of the variable Minimum Width footprint ranges from roughly 240 feet (where a total of two lanes are added) to 430 feet (where a total of four lanes are added) depending on the location. In comparison, the variable Maximum Width footprint ranges from 240 feet (where a total of two lanes are added) to 540 feet (where a total of eight lanes are added). These widths include existing pavement and new pavement. For the Minimum Width footprint, widening occurs in the median of I-81 to the extent possible. Conversely, the Maximum Width footprint widens to the outside right edge of I-81. The concept proposed to be advanced is a non-separated highway facility that involves constructing no more than two general purpose lanes, where needed, to address 2035 travel demands. This concept is, in essence, a combination of the Add 1 Lane and Add 2 Lanes concepts. The Minimum Width footprint is representative of the potential impacts associated with the proposed Tier 1 decision.

In addition, a footprint was developed to assess potential impacts associated with Rail Concept 3. The footprint, generally 100 feet wide, represents the limits of potential rail construction for the 13 rail sections that comprise Rail Concept 3.

Potential direct impacts were calculated by superimposing the footprints over Geographical Information Systems (GIS) data available for each resource. Each footprint represents the potential limits of construction. Where the footprint and GIS data overlapped, an impact was assumed.

It should be noted that the potential impacts in this Tier 1 study are preliminary, since they are based largely on available GIS resource data and concept-level analyses. The potential impacts may decrease or even be eliminated during Tier 2 as a result of more detailed field investigations, highway design refinements, and avoidance and minimization measures. A reduction or elimination of impacts is especially possible for sensitive resources (e.g., historic properties and wetlands) for which consideration of avoidance and minimization are required pursuant to Federal regulations.

Overall, potential impacts for the “Build” concepts on I-81 are similar and, in many cases, do not vary substantially. The primary reason for this is that a large percent of impacts occur within the 91 interchange areas, and the footprints at interchanges do not vary substantially between “Build” concepts. The Minimum Width footprint generally has less potential impacts than the Maximum Width because the Minimum Width template is slightly narrower in those areas where more than two additional lanes are needed. Some potential effects, however, such as air quality, noise, energy, and economics, may be influenced by other considerations than just the physical footprint of the “Build” concepts. As a result, the Minimum Width footprint has slightly higher potential negative impacts to air quality, energy consumption, and economics because there are fewer travel lanes, resulting in more congestion and less efficient travel. The potential impacts associated with Rail Concept 3 are substantially less than either the Minimum Width or Maximum Width footprints on I-81.

The economics analysis factored in the potential effects of various toll scenarios. Although tolls have slight negative impact on the economy, this is offset by the potential benefits of an improved facility, resulting in a net improvement in the economic conditions in 2035. Even with tolls, the economic conditions are better in 2035 with the “Build” concepts than without the “Build” concepts.

Approximately 50 percent of traffic diverted off of I-81 as a result of tolls would use U.S. Route 11. Based on a qualitative evaluation of the potential effects on the environment from traffic diverting to U.S. Route 11 and other local roads, the impacts are not anticipated to be substantial because the number of vehicles traveling on U.S. Route 11 would not be substantially changed from future No-Build conditions because some local traffic would divert to an improved I-81. About 14 percent of freight traffic diverted off of I-81 would use



I-95 as an alternate route, and approximately 15 percent would use I-65/I-64/I-79. These diversions are not expected to have a measurable impact to traffic operations on parallel interstates. Therefore, the environmental impacts on parallel interstate facilities as a result of toll diversion would be inconsequential.

Table ES-4 summarizes the potential environmental consequences associated with the No-Build Concept and “Build” concepts as described. Detailed information on historic properties and wetlands and water resources is also available in the *I-81 Corridor Improvement Study Historic Properties Technical Report* and the *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report*, respectively.



Table ES-4 Summary of Potential Environmental Consequences<sup>1</sup>

Resource / Issue	No-Build	Minimum	Maximum	Rail
		Width	Width	Concept 3
Consistency with Local Plans	Varies	Varies	Varies	Varies
Developed Land Use (acres)	N/E <sup>2</sup>	7,409	7,556	45
Prime Farmland Impacts (acres)	N/E <sup>2</sup>	1,062	1,420	51
Agricultural/Forestral District Impacts (acres)	N/E <sup>2</sup>	31	141	21
Residential Displacements (#)	N/E <sup>2</sup>	926	1,595	0
Business Displacements (#)	N/E <sup>2</sup>	662	763	1
Community Facilities Impacted (#)	N/E <sup>2</sup>	5	5	0
Minority Population Impacts (# of block groups affected)	N/E <sup>2</sup>	20	20	0
Low-Income Population Impacts (# of block groups affected)	N/E <sup>2</sup>	27	27	0
2035 Employment Growth (increase from 2005)	0%	4.7% <sup>3</sup>	---	---
2035 Gross Regional Product Growth (increase from 2005)	0%	4.2% <sup>3</sup>	---	---
Parks and Recreation Area Impacts (acres)	N/E <sup>2</sup>	119	165	2
Open Space Easement Impacts (acres)	0	12	29	0
Visual Impacts (# of visual resources with view of the road/rail)	N/E <sup>2</sup>	28	28	5
Potential Contamination Sites (#)	N/E <sup>2</sup>	9	9	0
Battlefield Impacts (acres)	N/E <sup>2</sup>	1,238	1,481	13
Impacts to NRHP Listed/Eligible Historic Districts (acres)	N/E <sup>2</sup>	51	58	1
Impacts to NRHP Listed/Eligible Historic Structures (#)	N/E <sup>2</sup>	19	20	2
NRHP Listed Archaeological Sites Impacted (#)	N/E <sup>2</sup>	1	1	0
Wetland Impacts (acres)	N/E <sup>2</sup>	33	51	8
Stream Impacts (miles)	N/E <sup>2</sup>	23.1	29.1	1.4
100-Year Floodplains Impacted (acres)	N/E <sup>2</sup>	361	458	50
Threatened and Endangered Species Impacted (# of species)	N/E <sup>2</sup>	12	12	0
Volatile Organic Compounds (VOCs) (tons/day)	7.43	+ 0.36 <sup>4</sup>	- 1.24 <sup>4</sup>	+ 0.28 <sup>5</sup>
Nitrogen Oxides (NO <sub>x</sub> ) (tons/day)	8.78	+ 0.81 <sup>4</sup>	- 1.15 <sup>4</sup>	+ 5.13 <sup>5</sup>
Particulate Matter (PM <sub>2.5</sub> ) (tons/day)	0.33	+ 0.02 <sup>4</sup>	- 0.05 <sup>4</sup>	+ 0.17 <sup>5</sup>
Noise Sensitive Receptors Impacted (# increase over No-Build)	---	+ 4,015	+ 5,090	+ 137

1 The potential effects in this Tier 1 study are preliminary since they are based largely on available GIS resource data and concept-level analyses. The actual numbers may decrease during Tier 2 as a result of more detailed investigations and highway design. Additionally, the numbers presented above do not include the impacts from potential corridors on new location.

2 NE = Not Evaluated for Tier 1. Each roadway improvement project included in the No-Build has either completed or is currently undertaking the NEPA process independent of the I-81 Corridor Improvement Study. All impacts to resources either have been or will be addressed through those separate documents.

3 While economic effects from the range of "Build" concepts differ, the range of economic effects is extremely small. Therefore, potential economic effects are only reported for the No-Build and the Minimum Width template (with a No Toll scenario and with Rail Concept 3) because it can be considered to be representative of the economic effects from the "Build" concepts in general.

4 Change in emissions from 2035 No-Build highway condition.

5 Change in emissions from 2035 No-Build rail condition. These emissions are based on rail improvements only.

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## ES.6 Tier 1 Decisions

As mentioned previously, upon completion of the Tier 1 study, decisions will be made on:

- The improvement concepts to be advanced;
- Advancing I-81 as a toll pilot under Section 1216(b) of the Transportation Equity Act for the 21st Century (TEA-21);
- Projects with independent utility and logical termini to be studied in Tier 2;
- The types of Tier 2 NEPA document(s);
- The location of the corridor for studying alignments in Tier 2; and
- Possible purchase of certain right-of-way parcels on a case-by-case basis.

FHWA's proposed decisions on each of these items are described below. These decisions will be made with consideration of the information presented or referenced in the Tier 1 EIS and with consideration of the comments received during the Tier 1 NEPA process. Each of these decisions will be documented in the Tier 1 Record of Decision. In a resolution, dated October 11, 2006 (see Appendix D), the Commonwealth Transportation Board (CTB) endorsed a series of actions that are consistent with FHWA's proposed decisions as described in this Tier 1 Final EIS.

### Improvement Concepts

The Tier 1 study indicates that the vast majority of I-81 needs additional highway capacity by 2035, but that no single consistent corridor-length solution meets the needs of future travel demand without providing excess or insufficient capacity in the corridor. In addition, the study indicates that a varying number of general purpose highway lanes would most efficiently address the future travel demand. A variable lane concept minimizes the social, economic, and environmental impacts as compared to consistent lane concepts and provides an opportunity to limit cost by not providing more lanes than are needed. As a result, consistent lane concepts are not proposed to be advanced into Tier 2. Further, the addition of general purpose lanes would cost substantially less than the separated lane concepts in order to achieve the same level of service benefit. In addition, numerous citizens opposed the separated lane concepts. As such, separated lane concepts are also not proposed to be advanced into Tier 2.

The purpose and need for this study was to improve I-81 in Virginia, and as described in Chapter 3, *Improvement Concepts*, rail concepts do very little to address the 2035 traffic needs on I-81. In fact, even if 100 percent of the trucks were removed from I-81 in Virginia and their freight put on to rail, the majority of the roadway – including seven of the eight Sections of Independent Utility (SIUs) – would still need additional highway lanes. In addition, FHWA has no control or responsibility over privately owned rail lines and, pursuant to Title 23 of the United States Code (USC), cannot fund improvements to those lines. Based on the above, FHWA does not propose to advance rail concepts into Tier 2 of this NEPA study.

“Build” Concept. The “Build” concept that is, therefore, proposed to be advanced into Tier 2 is a non-separated highway facility that involves constructing no more than two general purpose lanes in each direction, where needed, to address 2035 travel demands. This concept is, in essence, a combination of the Add 1 Lane and Add 2 Lanes concepts. Subsequent Tier 2 NEPA documents prepared for individual, independent projects along I-81 would address site-specific details before specific design and/or location decisions are made. A context sensitive solutions approach as well as the CTB’s adopted policies pertaining to multi-modal transportation and land use planning will be considered in the development of the improvements. See page ES-xix for the proposed level of environmental document for each SIU.

Along with the “Build” concept proposed to be advanced into Tier 2, there is an immediate need for smaller, independent safety and operational improvements along I-81. These include, but are not limited to, the construction of truck climbing lanes, the extension of entrance and exit ramps at various interchanges, the installation and upgrading of guardrail, and the modification of major interchanges. These short-term improvements were included as part of the Transportation System Management Concept discussed in this Tier 1 FEIS. FHWA proposes to advance these types of short-term improvements independently, including truck climbing lanes from approximately Milepost 195 to Milepost 202 northbound and Mileposts 128 to Milepost 119 southbound with funding identified in SAFETEA-LU.

It should be noted that, even if FHWA decides in Tier 1 to advance certain concepts and improvements, those decisions do not mean that those improvements will occur. Rather, the Tier 2 NEPA process would still need to be completed before the construction of any projects identified in this document. In addition, even though transportation needs have been identified along most of I-81 in Virginia, other factors may outweigh the need for transportation improvements.

#### Multi-State Rail

It is important to first understand the context in which the I-81 study has been conducted. Under the Federal-aid highway program (FAHP), Congress makes funding available to each state for its use in improving the highway system within the state. There are several requirements that the state has to address before Federal-aid highway funds are authorized by FHWA. One of the key requirements is compliance with NEPA, which requires an evaluation of the environmental impacts of Federal actions.

The Tier 1 EIS was prepared pursuant to NEPA. The Tier 1 EIS assesses the current and future transportation needs along the entire 325-mile corridor of I-81 in Virginia and evaluates the effectiveness of a range of concept level improvements in addressing those needs and the potential environmental impacts of those concepts. Because of the strong public interest in studying rail improvements to divert freight (i.e., trucks) off of I-81 in Virginia, FHWA and VDOT evaluated rail improvement concepts as a key part of the



analysis, as evidenced by the lengthy Freight Diversion and Forecast Report. Four rail improvement concepts, including a concept proposed by Rail Solution (referred to as Rail Concept 4), were evaluated to determine the degree to which they would meet the needs on I-81 in Virginia.

According to Federal regulations implementing NEPA [see 40 CFR 1502.14(a)], the key factor in the determination of whether to evaluate an alternative in an EIS is whether the alternative is reasonable. The Council on Environmental Quality, which oversees the implementation of the NEPA process, issued formal guidance that indicates that reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense. In addition, FHWA, as stewards of Federal highway funds, needs to be cognizant of limited transportation funding and is directed by the United States Code [23 USC 109(h)] to make decisions in the best overall public interest. It is not in the best overall public interest to authorize Federal highway funds on the exploration of unreasonable alternatives.

The suggestion that this Tier 1 EIS evaluate in detail a multi-state rail concept was made at the onset of the study during the scoping process. After much research and deliberation, FHWA determined that it was not reasonable for this Tier 1 EIS to evaluate multi-state rail improvements. The reasons for FHWA's determination are specified in a memorandum, dated May 4, 2004, that was included in Appendix B to the Tier 1 DEIS.

While the Tier 1 EIS does not evaluate multi-state rail improvements, the EIS does evaluate the influence of multi-state rail traffic and committed rail improvements in other states on future conditions along I-81 in Virginia. The freight movements considered in the Tier 1 EIS included all movements of freight that use I-81 in Virginia regardless of their origin and destination, including out-of-state origins and destinations. Freight diversion was examined for two separate cases – a macro analysis for trips greater than 500 miles, and a micro analysis for trips less than 500 miles. There was substantial coordination with Norfolk Southern, the Virginia Department of Rail and Public Transportation, and the Federal Railroad Administration.

As previously stated, the traffic analysis that was conducted for the Tier 1 EIS demonstrates that, even if 100 percent of the trucks were removed from I-81 in Virginia and their freight put onto rail, the majority of I-81 in Virginia – including seven of the eight SIUs – would still need additional highway lanes. In addition, FHWA has no control or responsibility over privately owned rail lines and, pursuant to Title 23 USC, cannot fund improvements to those lines. Based on the above, FHWA does not propose to advance rail concepts into Tier 2 of this NEPA study.

Therefore, evaluating out-of-state rail improvements would not alter FHWA's Tier 1 decision to advance conceptual-level improvements to the second tier of study. In the context of FHWA's NEPA responsibilities as part of the FAHP, FHWA reaffirms that it is not reasonable to evaluate the construction of multi-state rail improvements.



As stated in its memorandum, dated May 4, 2004, FHWA encouraged states to begin a dialogue on addressing regional rail needs along the I-81 corridor. In addition, in 2006, the Virginia General Assembly directed that an additional study be conducted to identify improvements and funding mechanisms needed to divert truck traffic off of I-81 and onto rail. As a result, the Virginia Department of Rail and Public Transportation, whose responsibilities include working with the railroad companies to improve freight operations, has initiated a multi-state rail study in cooperation with the Virginia Office of the Secretary of Transportation and Norfolk Southern to expedite short-term rail improvements and to study the potential long-term diversion of truck traffic along I-81 to rail. This study will be referred to as the I-81 Freight Rail Study and is independent of this tiered NEPA process. While a rail concept is not being proposed to be advanced to Tier 2 of this NEPA study, if funded rail improvements emerge from the I-81 Freight Rail Study, FHWA and VDOT would evaluate the effects of those rail improvements on the projections of future travel demand along I-81 as appropriate during Tier 2.

### **Tolls**

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The Tier 1 EIS demonstrates that the impacts on U.S. Route 11 and other roads (both local roadways and other interstate facilities) from traffic that is diverted from I-81 as a result of tolls are low (see Section 3.1.3 and 5.14). In addition, the environmental impacts on other interstate facilities caused by tolling would be inconsequential. FHWA proposes to advance I-81 as a toll pilot facility which would allow tolling to continue to be pursued as a possible funding mechanism for improvements to I-81. If a toll option is considered for a particular Section of Independent Utility (SIU) (see below), the localized effects of toll facilities will be studied for the SIU during Tier 2.

The tolling application process under Section 1216(b) of TEA-21 is independent of NEPA and requires additional Federal approval. In addition, it should be noted that tolls could not be implemented until completion of the Tier 2 NEPA process for a particular SIU.

### **Sections of Independent Utility and Tier 2 Documentation**

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A practical approach to improving I-81 throughout Virginia is to break the entire corridor into sections and undertake more detailed environmental studies on a series of projects that are consistent with the overall purpose and need in this Tier 1 EIS. Based upon traffic exchanges and service demands, each section is independent, useful, and stands on its own merits within the framework of this Tier 1 FEIS. Each of these sections is referred to as a Section of Independent Utility (SIU).

Eight proposed SIUs have been identified for subsequent refinement of the improvements and processing of the environmental documents (see Table ES-5). In addition, smaller, independent safety and operational improvements within these SIUs are proposed to be advanced independently.



Table ES-5 Additional General Purpose Lane Requirements in Sections of Independent Utility

SIU Termini		Number of Additional General Purpose Lanes Needed <sup>1</sup>	
From	To	Northbound	Southbound
1. Tennessee state line	Exit 72 (I-77) near Wytheville	No lanes from Milepost 0 to Exit 3 One lane from Exit 3 to Exit 5 No lanes from Exit 5 to Exit 7 Two lanes from Exit 7 to Exit 19 One lane from Exit 19 to Exit 72	No lanes from Milepost 0 to Exit 7 One lane from Exit 7 to Exit 10 Two lanes from Exit 10 to Exit 17 One lane from Exit 17 to Exit 72
2. Exit 72 (I-77) near Wytheville	Exit 81 (I-77) near Wytheville	One lane from Exit 72 to Exit 81	One lane from Exit 72 to Exit 81
3. Exit 81 (I-77) near Wytheville	Exit 118 (U.S. Route 460) near Christiansburg	Two lanes from Exit 81 to Exit 118	One lane from Exit 81 to Exit 84 Two lanes from Exit 84 to Exit 86 One lane from Exit 86 to Exit 89 Two lanes from Exit 89 to Exit 96 One lane from Exit 96 to Exit 101 Two lanes from Exit 101 to Exit 105 One lane from Exit 105 to Exit 109 Two lanes from Exit 109 to Exit 114 One lane from Exit 114 to Exit 118
4. Exit 118 (U.S. Route 460) near Christiansburg	Exit 143 (I-581) in Roanoke County	Two lanes from Exit 118 to Exit 143	Two lanes from Exit 118 to Exit 143
5. Exit 143 (I-581) in Roanoke County	Exit 221 (I-64) near Staunton	Two lanes from Exit 143 to Exit 162 One lane from Exit 162 to Exit 168 Two lanes from Exit 168 to Exit 221	Two lanes from Exit 143 to Exit 156 One lane from Exit 156 to Exit 167 Two lanes from Exit 167 to Exit 168 One lane from Exit 168 to Exit 191 Two lanes from Exit 191 to Exit 221
6. Exit 221 (I-64) near Staunton	Exit 247 (U.S. Route 33) in Harrisonburg	Two lanes from Exit 221 to Exit 243 One lane from Exit 243 to Exit 245 Two lanes from Exit 245 to Exit 247	Two lanes from Exit 221 to Exit 243 One lane from Exit 243 to Exit 247
7. Exit 247 (U.S. Route 33) in Harrisonburg	Exit 300 (I-66) in Warren County	One lane from Exit 247 to Exit 251 Two lanes from Exit 251 to Exit 257 One lane from Exit 257 to Exit 269 Two lanes from Exit 269 to Exit 273 One lane from Exit 273 to Exit 279 Two lanes from Exit 279 to Exit 300	One lane from Exit 247 to Exit 251 Two lanes from Exit 251 to Exit 264 One lane from Exit 264 to Exit 277 Two lanes from Exit 277 to Exit 300
8. Exit 300 (I-66) in Warren County	West Virginia state line	Two lanes from Exit 300 to Exit 310 One lane from Exit 310 to Exit 313 Two lanes from Exit 313 to Milepost 325	Two lanes from Exit 300 to Exit 310 One lane from Exit 310 to Exit 313 Two lanes from Exit 313 to Milepost 325

<sup>1</sup> The traffic analysis will be updated during Tier 2; therefore, the lane requirements as identified in this document may change slightly.



This Tier 1 EIS provides information on the nature of the “Build” concepts and the potential impacts associated with those concepts. The significance of the actual impacts of the individual SIUs is currently unknown. Therefore, Environmental Assessments (EAs) are proposed as the type of Tier 2 NEPA document for each SIU. The EAs would be the means through which the detailed analyses associated with Tier 2 would be conducted. Based on the detailed information in the EAs, informed decisions would be made on the significance of the impacts of each SIU. If significant impacts are identified, an EIS would be prepared. For the smaller, independent safety and operational improvements within the SIUs, such as projects to construct truck climbing lanes, Categorical Exclusions (CEs) are proposed provided that significant impacts would not occur. Depending on the context of the improvements and nature of the impacts, the Tier 2 NEPA documents may evaluate in detail one “Build” alternative.

#### Location of Corridor for Tier 2 Studies

The location of the corridor for most of the Tier 2 studies will be the existing I-81 highway corridor. However, there are two locations along I-81 where the potential impacts from the I-81 improvement concepts, especially displacements, may rise to the level where a corridor on new location may be prudent. These sections are the I-77 overlap section near Wytheville (Milepost 72 to 81 (SIU #2)) and a section in Harrisonburg (Milepost 243 to 251 within SIUs #6 and #7). At these two locations, FHWA and VDOT propose to evaluate corridors on new location, as well as widening the existing facility during Tier 2.

#### Possible Right-of-Way Purchases

While this Tier 1 FEIS does not include any proposed decisions to purchase specific right-of-way parcels, it provides information to support decisions on hardship acquisitions or protective purchases of specific right-of-way parcels in the future on a case-by-case basis.

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## **ES.7 Agency Coordination and Public Participation Process**

Coordination with local, state, and Federal agencies and the public was conducted during the formal scoping process and throughout the *I-81 Corridor Improvement Study*. The scoping process began at the initial stages of the study with a series of seven public scoping meetings attended by a total of 358 people, meetings with local officials prior to each public meeting, and an agency scoping meeting. These meetings were held in February 2004 and resulted in approximately 1,100 comments from a total of 244 different commenters. The early scoping process was completed in the spring of 2004 and is summarized in the *I-81 Corridor Improvement Study Scoping Summary Report*.



Meetings and correspondence continued with local, state, and Federal agencies, and interest groups throughout the study. Additional forums for discussion throughout the study included three formal Partnering Meetings with Federal resource agencies, interviews with city/county planners and administrators, coordination with the Virginia Department of Rail and Public Transportation as well as Norfolk Southern, and other miscellaneous meetings. Correspondence was received from approximately 16 interest groups such as Rail Solution, Virginians for Appropriate Roads, and the Shenandoah Valley Battlefields Foundation. Information about the progress of the study was provided through press releases, newsletters, and a project Web site, which included a direct e-mail link.

The Tier 1 DEIS was signed on November 28, 2005. It was available for review on VDOT's Web site for six months and was available at public hearings, numerous VDOT offices, and libraries. Six public hearings were held in April 2006. A total of 1,055 people attended, with the largest attendance at the Bridgewater meeting. The Tier 1 DEIS comment period was extended to May 29, 2006 based on a request from interested parties. Approximately 2,600 written comment documents (including tolling application comment sheets) were received during the comment period. The majority of the comments focused on tolling, with approximately 80 percent opposing the use of tolls as a funding source for I-81 improvements. By analyzing the I-81 Corridor Improvement Study Public Hearing comment sheets, the public preferred Rail Improvements (58 percent), followed by Combination of Adding Lanes and Rail (20 percent), Adding Additional Lanes (15 percent), and Spot Improvements (7 percent).