Virginia's Long-Range Multimodal Transportation Plan

Corridors of Statewide Significance: Western Mountain Corridor

Prepared for:
Commonwealth Transportation Board

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Corridor Overview

1.1 Transportation Facilities

The Western Mountain Corridor is mostly defined by Interstate 77, a multi-lane interstate that runs from Ohio to South Carolina, with the northern terminus at Interstate 90 in Cleveland, Ohio and the southern terminus at Interstate 26 in Columbia, South Carolina. It is a major north-south corridor in the eastern United States, providing a connection between major east-west corridors such as I-20, I-40, I-64, I-70, and I-80. It also connects with Interstate 85 and Interstate 81, which are both north-south corridors. Figure 1 illustrates the entire Western Mountain Corridor in the United States.

In the Commonwealth of Virginia, I-77 serves as an important corridor for the southwestern part of the state, despite significant geographic challenges along its length in Virginia. I-77 travels for approximately 67 miles from the West Virginia State Line to the north to the North Carolina State Line to the south. I-77 traverses mostly mountainous terrain through Virginia and passes through the East River Mountain Tunnel between West Virginia and Virginia, with approximately half of the mile-long tunnel in each state. In addition, I-77 passes through the Big Walker Mountain Tunnel within Virginia. Figure 2 shows the Western Mountain Corridor throughout its length in Virginia along with all modal facilities.

The Western Mountain Corridor passes through three counties in Virginia: Carroll County, Wythe County, and Bland County, all of which are located in the Mount Rogers Planning District. It does not pass through any Metropolitan Planning Organizations, though it does travel through the Town of Wytheville. No direct connections to port facilities are available, though I-77 serves as an important freight corridor, as Norfolk Southern freight rail runs along the corridor where it overlaps with the I-81 corridor.

There are 17 total access points off of I-77 in Virginia, and none of them directly accesses a major metropolitan area. I-77 overlaps with I-81 for approximately 13 miles and also accesses U.S. Highway 58 in southern Virginia and U.S. Highway 460 just north of the Virginia border in West Virginia. The entire length of I-77 through Virginia will eventually be signed as I-74 as well. I-74 is an uncompleted Interstate, running from Iowa to North Carolina. Currently, this Interstate exists only from Iowa to Cincinnati, Ohio as a continuous roadway, though some disconnected sections exist in North Carolina.

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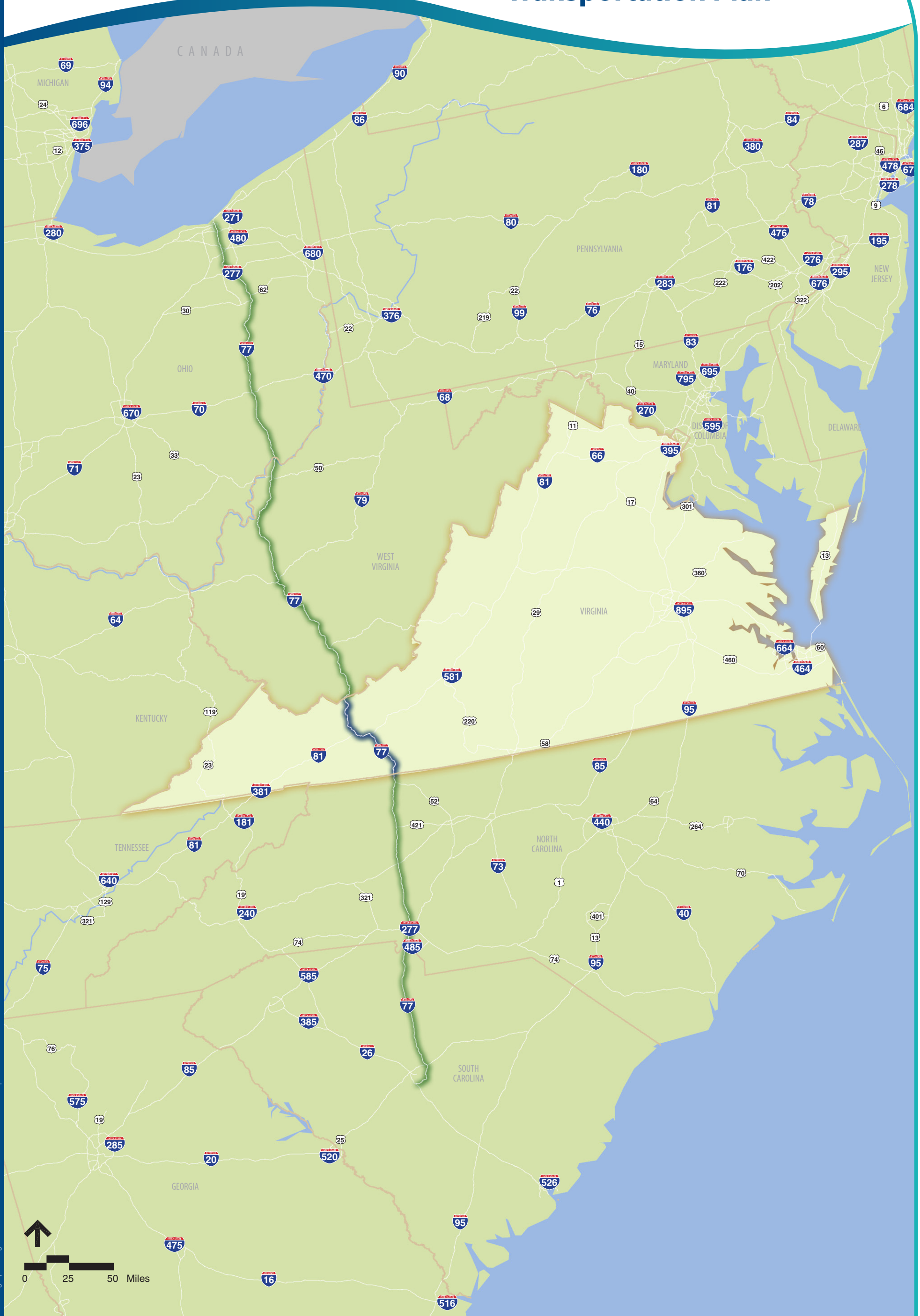

FIGURE 1
Western Mountain Corridor National Context Map

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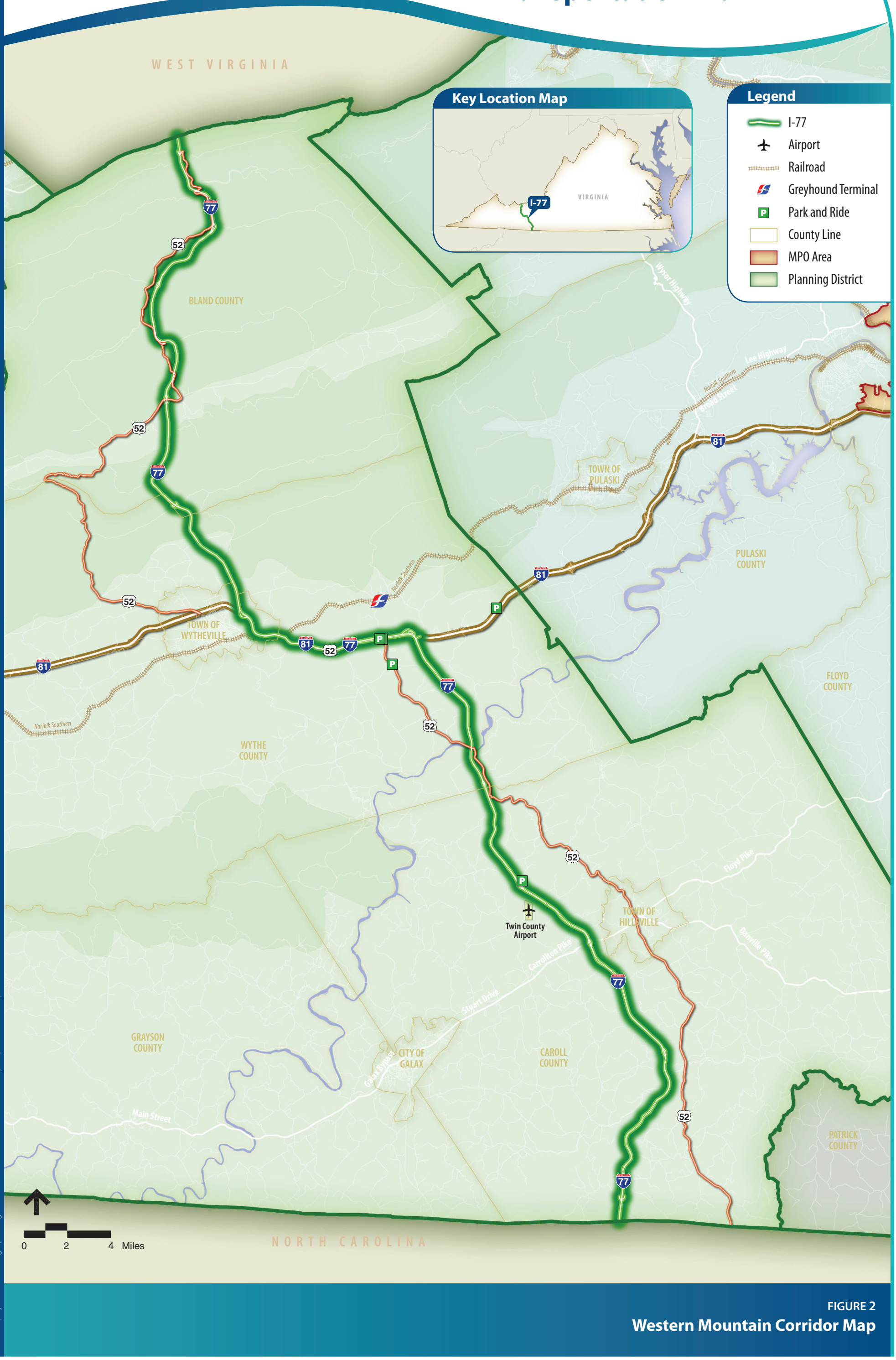

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FIGURE 2
Western Mountain Corridor Map

North of Wytheville in Wythe County, I-77 passes through the Big Walker Mountain Tunnel, which allows vehicles to travel under Big Walker Mountain. The tunnel is approximately four-fifths of a mile long. Twenty miles to the north of the Big Walker Mountain Tunnel is the East River Mountain Tunnel, which is just over a mile long. This tunnel connects Rocky Gap, Virginia with Bluefield, West Virginia and passes through the state line between Virginia and West Virginia.

U.S. Highway 52 parallels I-77 or runs concurrently at times, such as in Wythe County, with it throughout its length in Virginia. U.S. Highway 11 also has a short stretch of overlap with I-77. I-77 also connects with U.S. Highway 58, another Corridor of Statewide Significance, in Carroll County.

Since the Western Mountain Corridor is mostly rural and undeveloped outside of Wytheville, there are few transit opportunities. There is a Greyhound station in Wytheville, which provides bus connections to North Carolina to the south, West Virginia to the north, and to Roanoke. In addition, there are multiple park and ride lots near Wytheville.

There is a single airport facility, the Twin County Airport, which serves as a community general aviation facility, as defined by the Virginia Air Transportation System Plan. It is located south of I-81, near the U.S. 58 interchange in Carroll County. There are no facilities with commercial service located along the Western Mountain Corridor, though I-77 provides access to I-81 north to Roanoke. The two closest facilities with commercial connections available are at Roanoke Regional Airport, to the north along I-81 and Tri-Cities Airport in Tennessee along I-81, just south of the Virginia border. In addition, the Piedmont Triad International Airport is located 95 miles to the south along I-77 in Greensboro, North Carolina.

There are no direct connections to any port facilities along the Western Mountain Corridor, though it is a heavy freight corridor, acting as an alternative to I-81 as well as connecting to it and to the U.S. 58 corridor. There are no direct rail lines along most of the Western Mountain Corridor. However, Norfolk Southern freight lines, specifically the western half of the Crescent Line, run along the part of the corridor that runs concurrently with I-81. Passenger rail along these tracks is not available.

2

Corridor Functions

2.1 Corridor Functions

The Western Mountain Corridor is a short corridor through Virginia that serves primarily as a multi-state connection, linking North Carolina and South Carolina to West Virginia and Ohio and provides connections to the Midwest from the Southeast. I-77 offers an easy north-south connection across the Appalachian Mountains between North Carolina and West Virginia due to the Big Walker Mountain Tunnel and the East River Mountain Tunnel, which is located on the Virginia-West Virginia border. The Western Mountain Corridor is also an important freight connection, linking the important I-81 freight corridor and the Virginia Inland Port with points to the Southeast, such as the Carolinas, Georgia, and Florida. The Western Mountain Corridor also connects to U.S. 58.

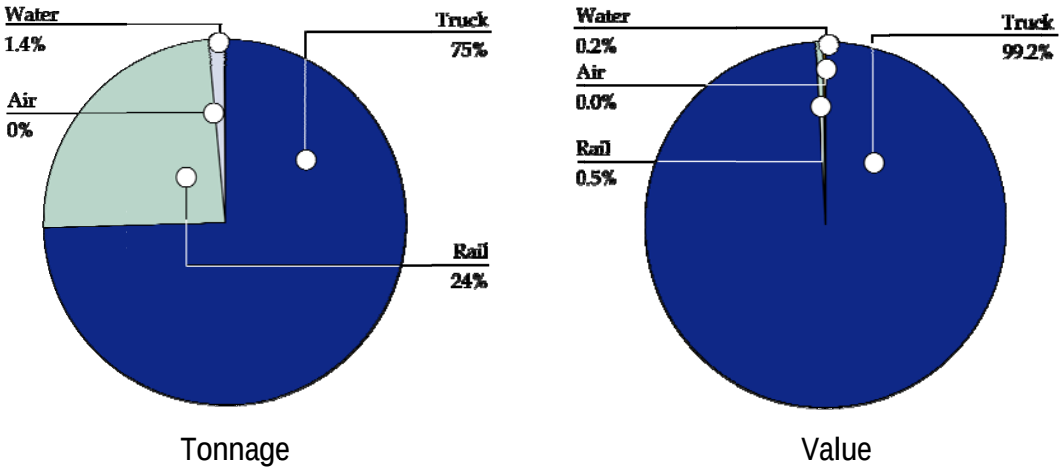
Functions of I-77

- Freight connection to I-81
- Multi-state connection
- Connection to tunnels

2.2 Freight Connection to I-81

The Western Mountain Corridor is an important freight corridor, with most freight movement accomplished via trucking along the highway, though other options exist, including rail and air. Trucking accounts for three-quarters of the freight movement, and freight rail accounts for most of the remainder of the total freight movement, which is along Norfolk Southern rail lines. Figure 3 shows the tonnage and freight value by mode along the I-77.

Figure 3 Total Freight Tonnage and Value by Mode



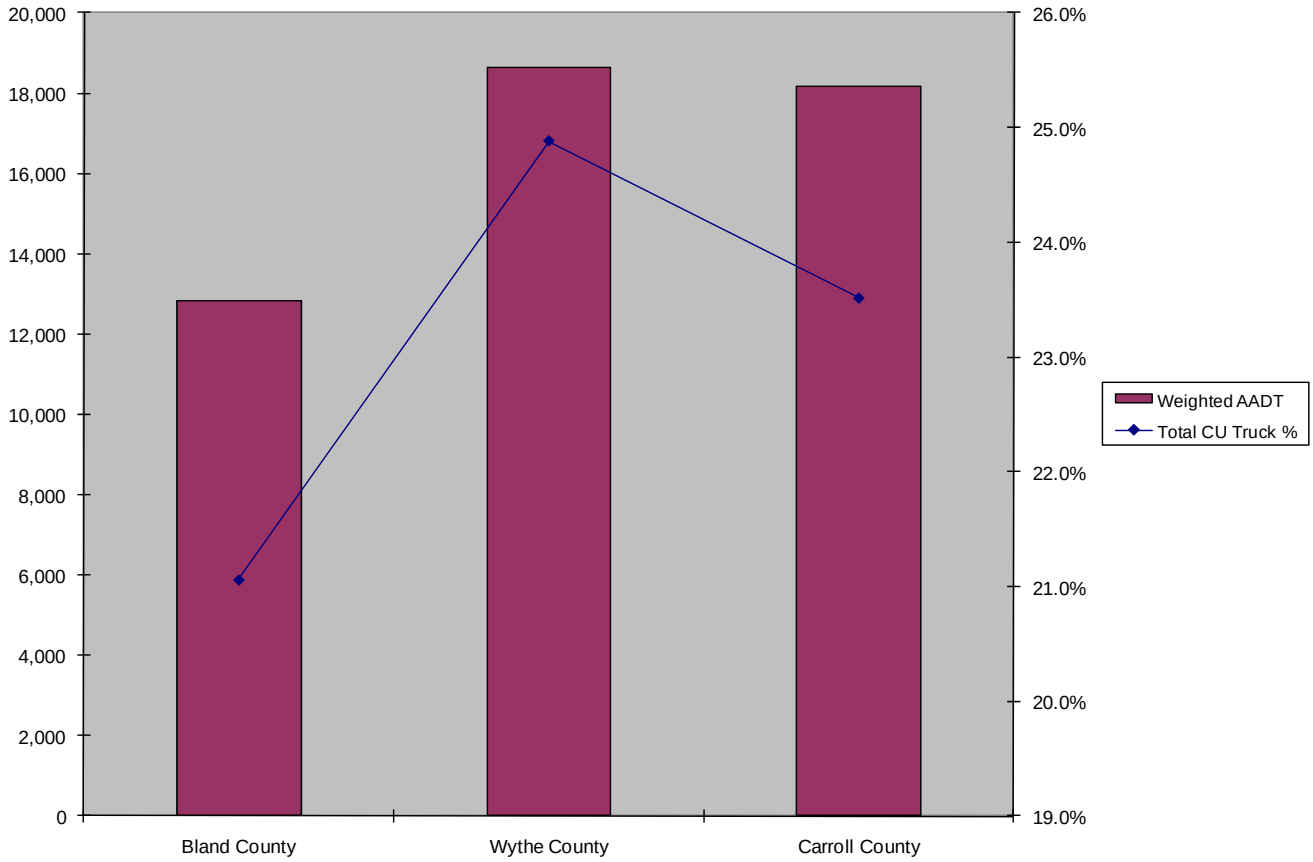
(Source: Statewide Freight Study)

As seen in Figure 3, most freight along the Western Mountain Corridor is handled by truck despite the presence of Norfolk Southern rail lines. While almost three-quarters of the total tonnage is handled by truck, over 99 percent of the total value is handled by truck. Rail handles virtually all freight not handled by truck, as there is very little air or water transport.

Figure 4 illustrates that trucks account for over 20 percent of the total traffic along I-77 through Virginia. This again illustrates the importance of I-77 as a freight corridor and as an alternative to I-81. It also highlights the fact that a large amount of freight is moved by truck.

Total traffic is fairly low along I-77, with the highest volumes occurring through Wythe County, where there is an 8-mile overlap section with I-81. Truck percentages are also highest there, though the percentage is not significantly higher than through either Bland County or Carroll County.

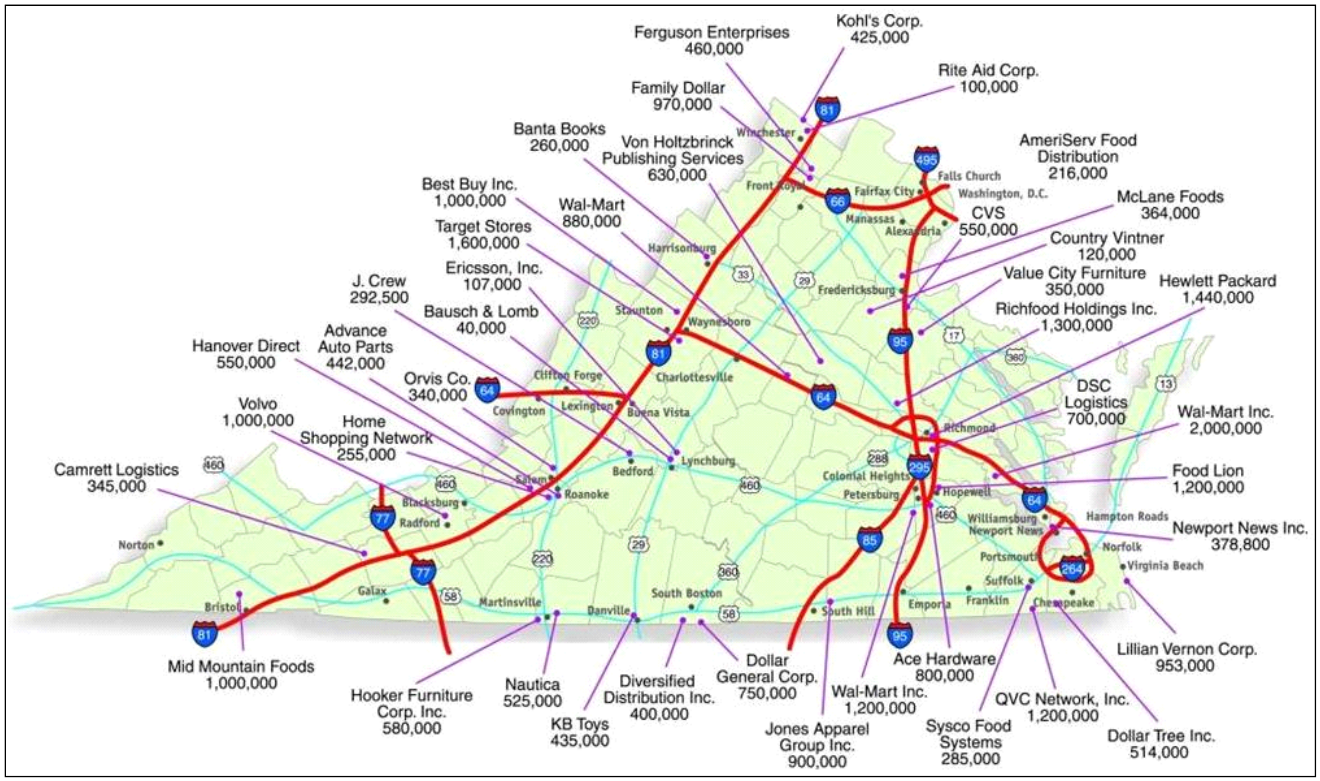
Figure 4 I-77 Average Annual Daily Traffic (AADT) and Commercial Unit (CU) Truck Percentages



(Source: Statewide Freight Study)

Figure 5 shows the major distribution centers in Virginia. As seen in the figure, there are some distribution centers located near I-77 in the southeast part of the state, though most distribution centers in the western part of the state are closer in vicinity to the I-81 corridor.

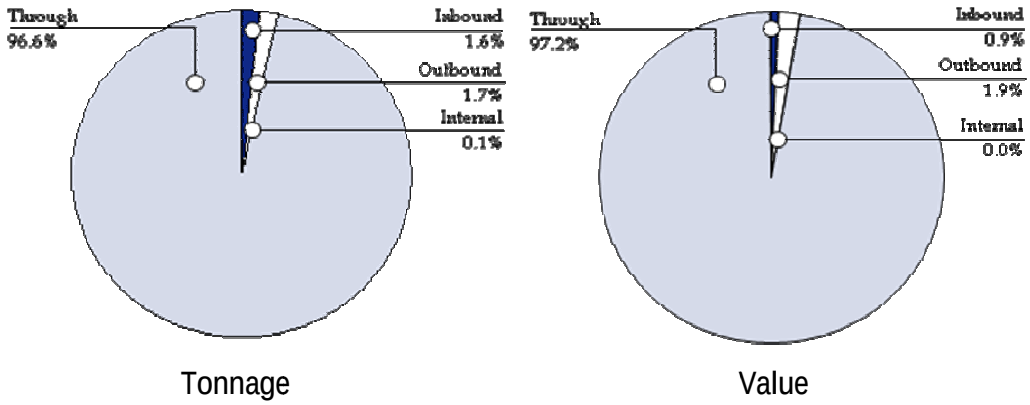
Figure 5 Major Virginia Distribution Centers



(Source: Statewide Freight Study)

Figure 6 shows the freight tonnage and value by direction. As seen in this figure, virtually all freight along I-77 is through freight, as trucks use I-77 to travel between North Carolina, West Virginia and Ohio and avoid the busier, more truck-intensive I-81 corridor. There is very little inbound and outbound freight along the Western Mountain Corridor, and there is virtually no internal movement.

Figure 6 Freight Tonnage and Value by Direction



(Source: Statewide Freight Study)

Freight volumes along the Western Mountain Corridor will continue to grow and will be influenced by a number of factors leading to increased transportation demand. Population growth along the corridor, while less than the overall population growth in Virginia, will play a major role. In addition, changes in national and global logistics patterns and the corridor's evolving industry structure will lead to increased demand for freight along this already heavy freight corridor.

With increases in freight demand, it is important that capacity to carry the expected volumes of freight will exist in the future, not only along the highway facilities but along the rail facilities. There are planned improvements to Norfolk Southern's Crescent Corridor, which runs along the I-81 corridor and briefly along the Western Mountain Corridor. These include expanding single-line tracks to double lines, adding passing sidings, realigning curves, improving connections, and adding track signals and signal systems. These projects will increase capacity for freight in western Virginia. It is important that with these projects, more freight is moved to rail to connect with national markets as well with the Port of Virginia (including the Virginia Inland Port) and the distribution centers. This will improve capacity for both freight traffic and passenger traffic along the I-77 highway facilities and improve safety.

2.3 Multi-State Connection, Connection Through Tunnels

The Western Mountain Corridor serves as a north-south connection between South Carolina and Ohio, traveling through North Carolina, Virginia, and West Virginia. It provides connections to multiple other interstates along the way, including I-20 in South Carolina; I-85, I-40, and I-74 in North Carolina; I-81 in Virginia; I-64 in West Virginia; and I-70, I-80, and I-90 in Ohio. It also connects to U.S. 58, which is another Corridor of Statewide Significance.

I-77 provides access through Big Walker Mountain and East River Mountain via tunnels, allowing for an easier trip through the mountains of southwest Virginia. Prior to construction of the tunnels and I-77, the trip over the mountains, especially into West Virginia was an arduous, winding trip over Route 52. The construction of the tunnels streamlined the journey for travelers and made the connection between the Carolinas and Ohio much smoother. The Big Walker Mountain Tunnel is approximately four-fifths of a mile long and is located just north of the overlap section with I-81. The East River Mountain Tunnel is just over a mile long and is located at the West Virginia border. Both tunnels are two lanes in each direction, and lane changes are allowed within them, though these lane changes are now discouraged.

2.3.1 Population Projections

The Virginia Transportation Research Council (VTRC) completed a report as part of VTrans2035, detailing population and employment trends and projections to 2035 for these socioeconomic factors. Increases in population will impact the amount of traffic on the roadway, impacting all traffic along the roadway, both local and through traffic, and it will impact both passenger and freight traffic along the corridor.

Table 1 details the population projections for 2010 and 2035 based on two different sources, one a private vendor (NPA Data Associates) and one a public source (Virginia Employment Commission - VEC). Projections by both of these sources only extended to 2030, so linear regression was used by VTRC to project to 2035. The data was organized by Planning District. Figure 7 illustrates the population density projections for the year 2010 at the Planning District level along the Western Mountain Corridor, and Figure 8 illustrates the density projections for the year 2035 and the increase in population density from 2010 to 2035. The Western Mountain Corridor passes through only one Planning District, the Mount Rogers PDC.

Table 1 Population Projections to 2035

	2010 Value		Midpoint 2035 Forecast		Percentage Increase		Annual Effective Growth Rate	
PDC	VEC	NPA	VEC	NPA	VEC	NPA	VEC	NPA
Mount Rogers	189,461	190,050	196,549	204,663	3.7%	7.7%	0.1%	0.3%
Statewide Totals	8,010,340	8,057,350	10,278,943	10,926,181	28.3%	35.6%	1.0%	1.2%

Source: Virginia Transportation Research Council

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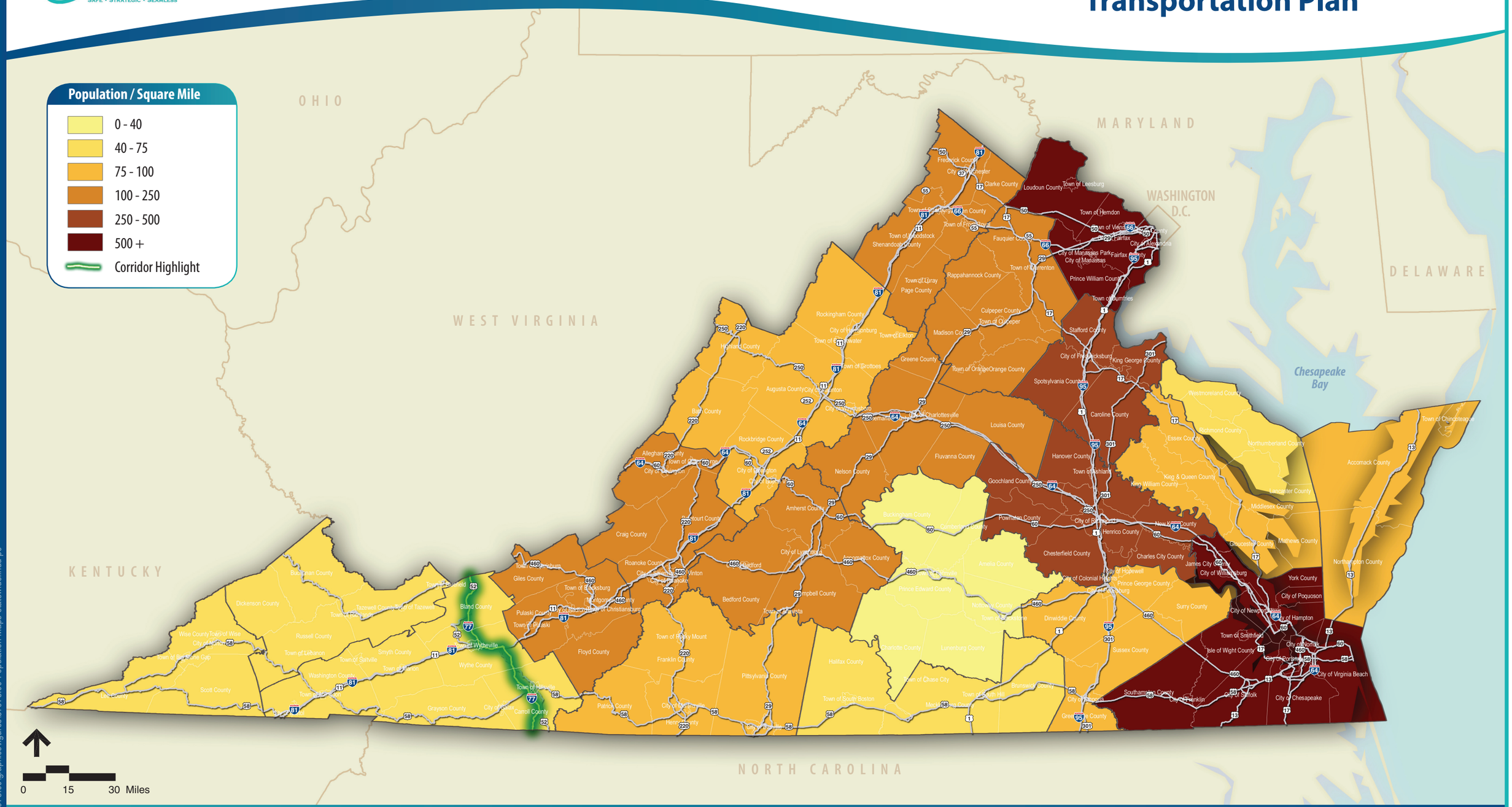

FIGURE 7

Population Density 2010 Projections - Western Mountain Corridor

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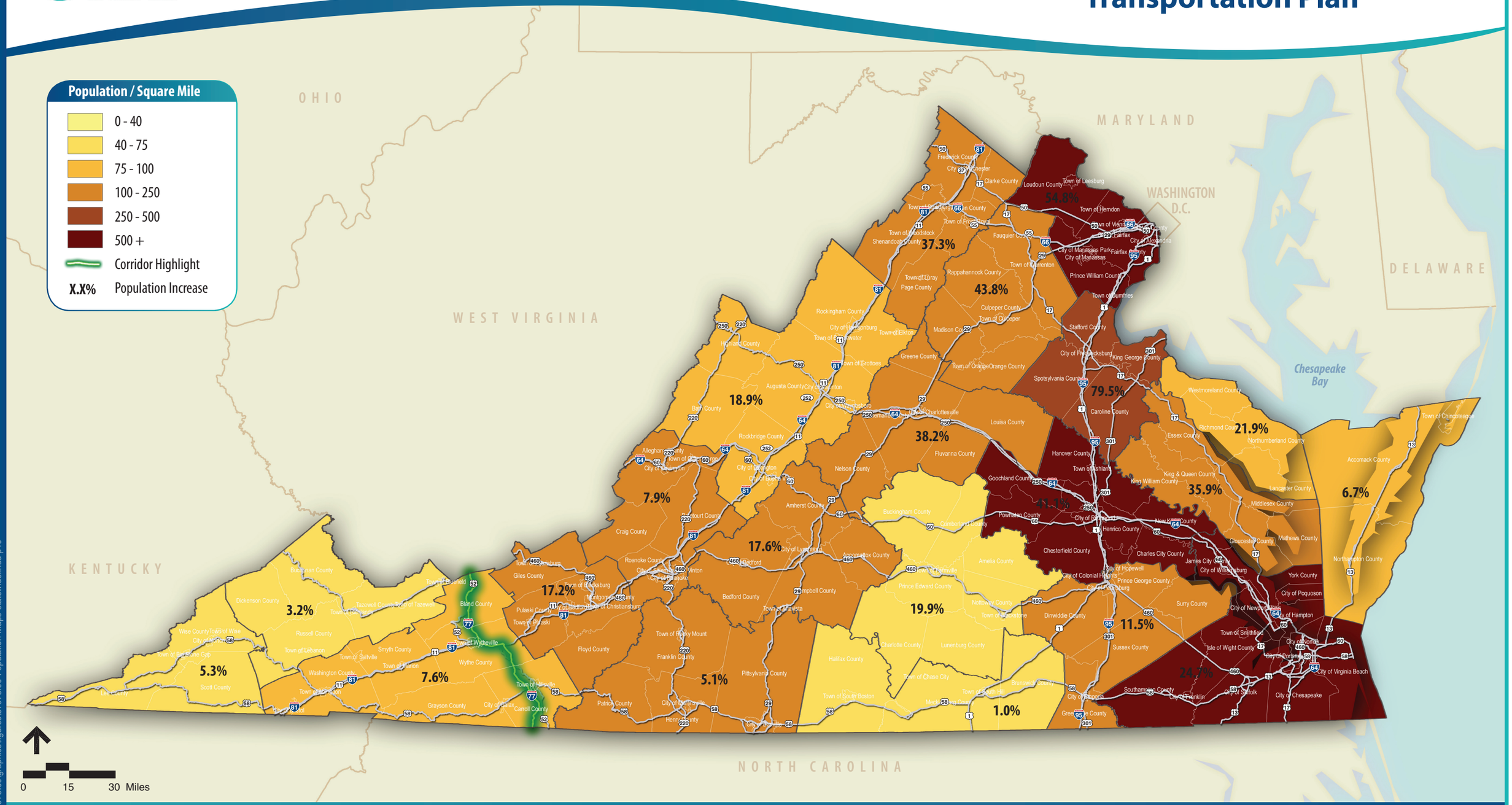

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FIGURE 8
Population Density 2035 Projections -Western Mountain Corridor

2.3.2 Levels of Service

Figure 9 shows the existing levels of service (LOS) along the Western Mountain Corridor, with red areas indicating undesirable levels of service (i.e. LOS 'E' or LOS 'F'). All areas not marked in red are where acceptable levels of service (i.e. LOS 'A' through LOS 'D') currently exist. As seen in Figure 9, there are currently no areas of deficiency along the entire corridor in Virginia.

Figure 10 shows the future levels of service along the Western Mountain Corridor, with the same color coding. As seen in this figure, there are areas that are expected to degrade to undesirable levels of service in the future. One area is the overlap area with the I-81 corridor around the Town of Wytheville. This area has been identified by multiple sources as an area of concern for capacity, as the two interstates meet for eight miles. Without changes, this area is expected to degrade further in the future. In addition, there are expected to be areas of deficiency to the south of Wytheville, including near the North Carolina border. The areas near the Big Walker Mountain Tunnel and the East River Mountain Tunnel, however, are not expected to degrade to unacceptable levels of service.

The future levels of service take into account projects along the roadway that are planned by the Virginia Department of Transportation (VDOT). Even with planned expansions of the roadway and other programmed improvements, the highway facilities of the corridor are expected to degrade by 2035. To combat this, localities, Planning District Commissions (PDC), and Metropolitan Planning Organizations (MPO) should identify the worst areas and plan for improvements to these areas. In addition, multimodal coordination should take place to attempt to remove some single-occupancy vehicles from the highway facilities. The TransDominion Express (TDX) is planned in Virginia to provide passenger service between Bristol and Roanoke along the I-81 corridor, including the section of overlap with the Western Mountain Corridor. (From there, the TDX would connect to Lynchburg, Charlottesville, Richmond, and Washington D.C.) In addition, while studies are underway to identify and choose improvement options for the I-81/I-77 overlap near Wytheville, where levels of service are expected to be undesirable in the future, there are no definite plans for additional capacity at this location as of this time.

2.3.3 High-Crash Rate Areas

Figure 11 illustrates areas along I-77 that have been identified as high-crash rate areas, according to VDOT. As seen in the figure, there are several high-crash rate areas south of I-81 and a few to the north. The junction points at either end of the I-81 overlap are considered high-crash rate areas. Safety improvements should be considered at these high-crash rate areas, especially at the junction points near Wytheville.

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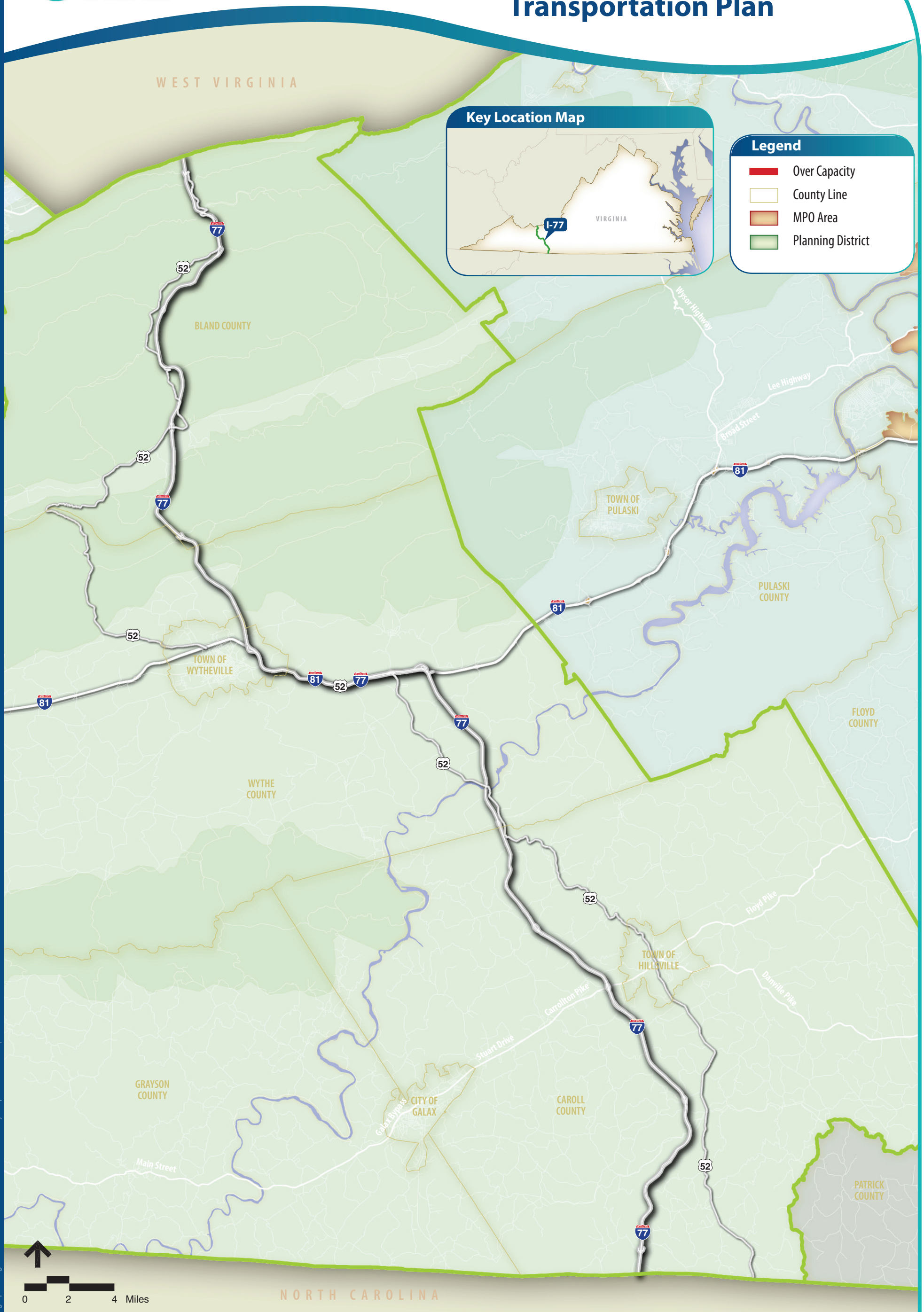

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FIGURE 9
Western Mountain Corridor Existing Conditions

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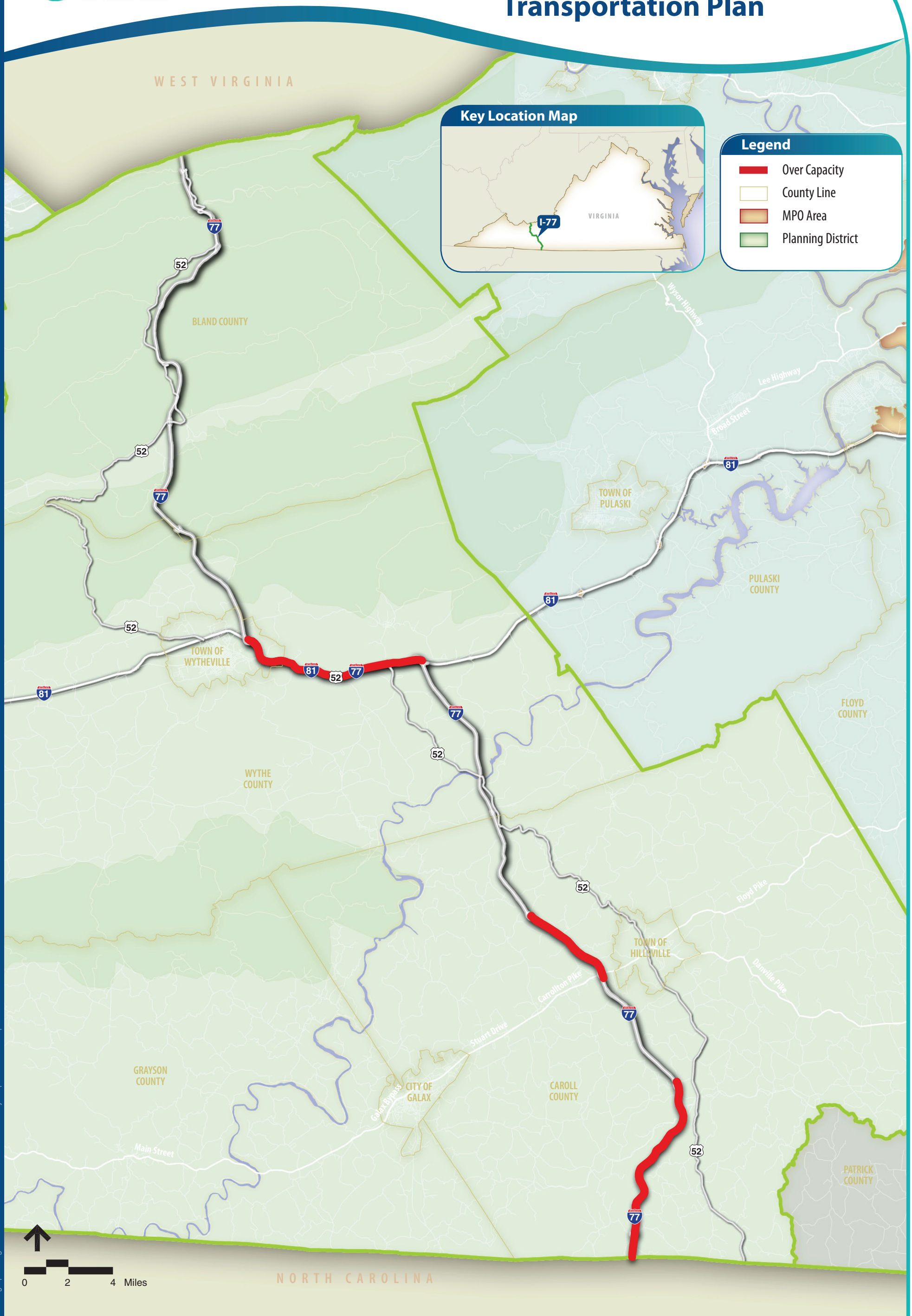

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FIGURE 10
Western Mountain Corridor Future Conditions

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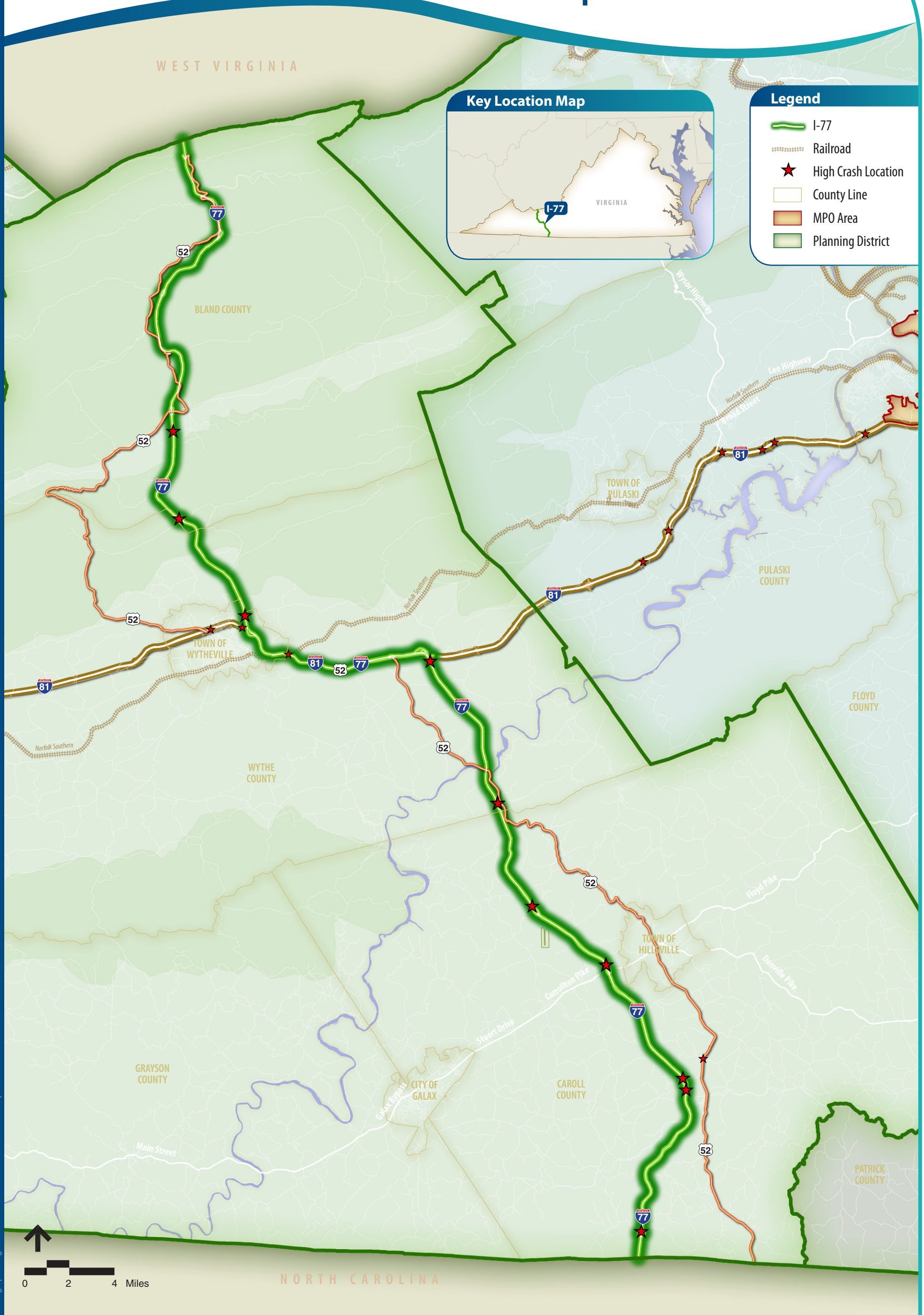

FIGURE 11
Western Moutain Corridor High-Crash Rate Locations Map

3

Corridor Strategies

This section discusses the general corridor strategies for the Western Mountain Corridor, which have been formulated to improve safety, mobility, and capacity along the corridor. The functions of the Western Mountain Corridor are listed below, and Figure 12 presents a matrix that shows how the strategies relate to each function.

Functions of Western Mountain Corridor

- *Freight Connection to I-81*
- *Multi-state connection*
- *Connection through tunnels*

Strategies were formulated based on trends, system performance, issues/challenges, elements of the VDOT Six-Year Program, the Constrained Long-Range Plans for each MPO, visions and plans for the various Planning Districts, and any available Comprehensive Plan visions and strategies for each county and jurisdiction within each corridor. A Regional Planning Forum was held in the spring of 2009 with transportation representatives from across Virginia, including VDOT, Planning Districts and MPOs, transit agencies, the Virginia Airport Authority, the Port of Virginia, and other stakeholders in the Virginia transportation system. Public meetings were held in four locations in June and July of 2009 (Northern Virginia, Richmond, Hampton Roads, and Roanoke). Corridor deficiencies and what could be done to alleviate these deficiencies were discussed, with this information playing a major role in the formulation of these strategies. These strategies are part of a continuing planning process and are designed to be used as a guide for future transportation plans along the corridor within Virginia. They are not the explicit policy of the Commonwealth Transportation Board (CTB), though they are designed to assist the CTB, state and local transportation agencies, and local planning organizations in their planning efforts along the corridor. Specific corridor strategies and improvement recommendations will ultimately be developed as part of subsequent planning analyses at the State and local level.

Figure 12 - Western Mountain Corridor Strategies vs. Functions Matrix

	Functions		
Strategies	**Multi-State Connection**	**Connection through Tunnels**	**Freight Connection to I-81**
Increase roadway capacity of I-77/I-81 overlap near Wytheville.	●	○	●
Increase north-south capacity along the corridor, especially around the Big Walker Mountain Tunnel and the East River Mountain Tunnel.	●	●	●
Implement Intelligent Transportation Systems (ITS) throughout the Western Mountain Corridor as appropriate.	●	●	●

● Strong Correlation ○ Medium Correlation ⊙ Some Correlation

3.1 Strategies for Western Mountain Corridor

Strategy: Increase roadway capacity of I-77/I-81 overlap near Wytheville.

The section of I-77 that overlaps with I-81 near Wytheville has been identified by VDOT, the Town of Wytheville and the Regional Planning Forum participants as being deficient in terms of capacity. It is one of the bottlenecks along both the I-77 and I-81 national corridors. As I-77 northbound approaches I-81, a single lane merges onto I-81 northbound and a single lane merges onto I-81 southbound, causing some merging delays. In addition, if there is an incident along I-77 to the north, such as at the Big Walker Mountain Tunnel, traffic is backed up onto the overlap section with I-81 in one lane. This leads to two lanes traveling at speed while one travels slowly or is stopped, which is a safety issue.

The I-81 Corridor Improvement Study (Tier 2, I-77/I-81 Overlap) has been implemented under the VDOT Six-Year Plan to study various alternatives to improve capacity, including different roadway alignments to separate I-77 traffic from I-81 traffic. The best solution is likely a new alignment for I-77 with no overlap with I-81. This would improve capacity for through traffic between North Carolina and Ohio, and it would greatly improve capacity for freight traffic along these roadway facilities.

Strategy: Increase north-south capacity along the corridor, especially around the Big Walker Mountain Tunnel and the East River Mountain Tunnel.

The Regional Planning Forum identified capacity issues at both the Big Walker Mountain Tunnel and the East River Mountain Tunnel. If there are incidents at the tunnels, severe backups and delays occur along I-77 while the incident is cleared. As stated in the previous strategy, an incident at the Big Walker Mountain Tunnel could affect traffic along the I-77/I-81 overlap near Wytheville. In addition, there are steep grades entering both tunnels northbound, which with heavy truck traffic, leads to backups at times when there is not an incident. Truck climbing lanes should be constructed leading to the tunnels. In addition to providing lanes for slow-climbing trucks, this would also provide an additional lane to store traffic in case of a tunnel incident that closes the tunnel temporarily.

The VDOT Six-Year Plan calls for refurbishments to both tunnels along the Western Mountain Corridor, which could improve safety through the tunnels as well as add some capacity. In addition, stop gates will likely be installed at the entrances to block traffic from entering the tunnels in the case of an incident in the tunnel, allowing for better emergency response and incident management. There is also the potential for additional tubes at the tunnels in the future, though this is a very expensive proposition and a long-term vision at best. However, it would significantly add capacity and allow traffic to continue to flow through the tunnel in case of an incident in another tube. In addition, hazardous materials are currently not regulated at the tunnels. Improved monitoring, regulation, and/or rerouting of these materials should be considered.

There are currently no viable alternate routes to I-77, especially for truck traffic. U.S. 52 runs parallel to I-77 near the Big Walker Mountain Tunnel, and Route 598 (Old Route 52) runs parallel near the East River Mountain Tunnel. However, neither of these two-lane roadways is suitable for truck traffic due to steep grades, curves, and other geometric factors. Traffic usually reroutes to U.S. 460 through Blacksburg and Christiansburg and on to I-81 or to Route 19/460 through Abingdon, which adds a significant amount of travel time and distance. An additional north-south connection between Claypool Hill and Saltville, which would connect Route 19 and U.S. 460 with Route 107 and eventually to I-81 in Marion has been investigated in the past. North-south capacity should be increased in some way, which could include the construction of a new alignment as suggested or another alignment. Another option could include improvements to U.S. 52, which runs directly along I-77, making it more suitable for truck traffic.

Through truck climbing lanes, better incident management, tunnel refurbishments, and/or construction of a new north-south roadway or improvements to U.S. 52, capacity improvements at Big Walker Mountain Tunnel and East River Mountain Tunnel are needed. Improvements at these deficient points would assist in both movement of through traffic and freight traffic.

Strategy: Implement Intelligent Transportation Systems (ITS) throughout the Western Mountain Corridor as appropriate.

ITS could include variable message signs along the highway to warn drivers of incidents. Currently, there are too few of these along the roadway, and they do not give adequate information to drivers concerning incidents at the tunnels, leading to longer backups and not allowing motorists to take alternate routes. More variable message signs closer to the tunnels are necessary along the Western Mountain Corridor.

In addition to variable message signs, other ITS measures could include opening shoulder lanes to traffic in case of an incident or congestion, such as utilized along I-66 in Northern Virginia. Also, potential truck climbing lanes near the tunnels could be opened to all traffic in case of an incident. Near the Fancy Gap area, south of I-81, ITS measures are needed for fog detection and mitigation. However, there is no adequate power supply in this area as it is relatively uninhabited. Power and telecommunications lines would need to be constructed. Various ITS measures would significantly aid in traffic flow, especially with regards to incident management.

3.2 Strategies vs. VTrans2035 Goals

The above strategies relate to the seven goals of VTrans2035, and Figure 13 illustrates a matrix showing this relationship. A discussion of each of the goals is below.

- **Goal 1: Safety and Security—Provide a safe and secure transportation system.** All of the strategies relate to the safety and security of the roadway. In addition, refurbishments to the tunnels and the addition of truck climbing lanes should directly result in greater safety. If backups from the tunnels when there is an incident no longer back up onto the I-77/I-81 overlap, safety along this section of roadway will be greatly enhanced.
- **Goal 2: System Maintenance and Preservation—Preserve and maintain the condition of the existing transportation system.** All of the strategies help to achieve this goal, as the existing transportation system is maintained and preserved, and in each case, improved. While alleviating the capacity issues near Wytheville may include constructing new roadway facilities to bypass I-81, the existing roadway facilities will remain and should have less congestion and be safer.
- **Goal 3: Mobility, Connectivity, and Accessibility—Facilitate the easy movement of people and goods, improve interconnectivity of regions and activity centers, and provide access to different modes of transportation.** All of the strategies promote increased mobility, connectivity, and accessibility. Any increase in capacity along the roadway assists in achieving this goal, especially with regard to mobility in and around Big Walker Mountain Tunnel and East River Mountain Tunnel.
- **Goal 4: Environmental Stewardship—Protect the environment and improve the quality of life for Virginians.** Any increase in roadway capacity that minimizes the amount of time vehicles are on the roadway, leading to fewer emissions, helps to achieve environmental stewardship.
- **Goal 5: Economic Vitality—Provide a transportation system that supports economic prosperity.** With the completion of construction in and around Wytheville to alleviate the capacity issues along the I-81/I-77 overlap, there is potential for increased economic development along any new interstate facilities and at any new interchanges.
- **Goal 6: Coordination of Transportation and Land Use—Facilitate the effective coordination of transportation and land use to promote livable communities.** Any construction to improve capacity should be accomplished in coordination with land use decisions, especially any construction around Wytheville to alleviate capacity concerns at the I-81/I-77 overlap. In addition, local planning efforts should protect airspace and ensure that airports are not compromised by encroachment of incompatible land uses.

Figure 13 - Western Mountain Corridor Strategies vs. Goals Matrix

	Goals					
Strategies	**Safety and Security**	**System Maintenance and Preservation**	**Mobility, Connectivity, and Accessibility**	**Environmental Stewardship**	**Economic Vitality**	**Coordination of Transportation and Land Use**
Increase roadway capacity of I-77/I-81 overlap near Wytheville.	◎	●	●	◎	⊙	●
Increase north-south capacity along the corridor, especially around the Big Walker Mountain Tunnel and the East River Mountain Tunnel.	●	●	●	◎		
Implement Intelligent Transportation Systems (ITS) throughout the Western Mountain Corridor as appropriate.	●	●	●	◎		

● Strong Correlation ◎ Medium Correlation ⊙ Some Correlation