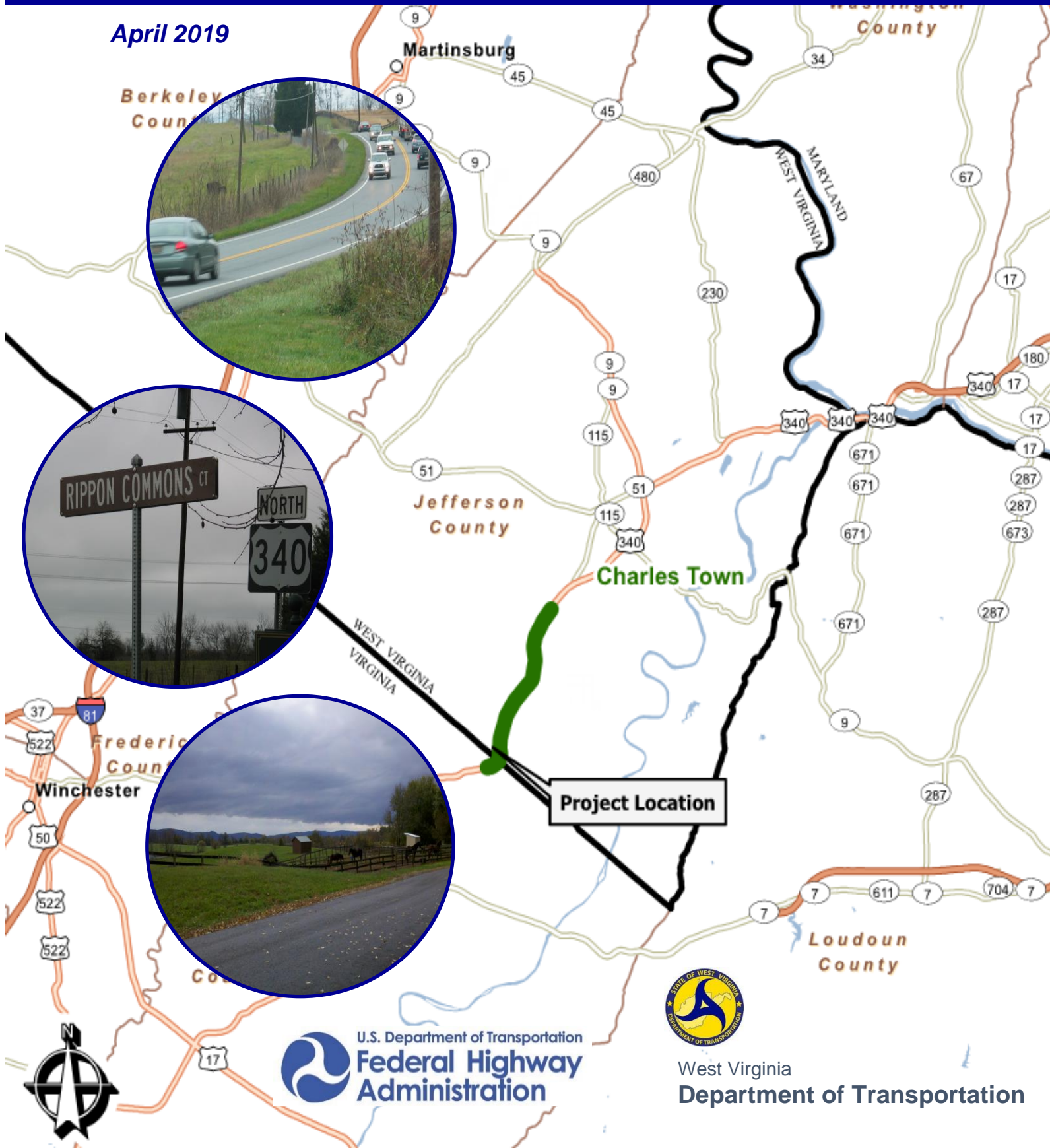


Final Environmental Impact Statement

US 340 Improvement

Jefferson County, West Virginia

April 2019



SECTION II

Project Purpose and Need

II. PROJECT PURPOSE AND NEED

WVDOH in conjunction with the FHWA, is proposing to improve the existing two-lane section of US 340 in Jefferson County, West Virginia from 1,000 feet south of the state line between Virginia and West Virginia to approximately two (2) miles north of the community of Rippon in Jefferson County. The total project length is approximately 4.5 miles. The project is included within the Hagerstown/Eastern Panhandle Metropolitan Planning Organization. Exhibit II-1 shows the location of the proposed project.

The project is being funded in its entirety by federal and state monies administered by the WVDOH. An Interstate Agreement between the West Virginia Department of Transportation, Division of Highways and the Commonwealth of Virginia and the Virginia Department of Transportation (VDOT) has been drafted to address the responsibilities with regard to construction, maintenance, and funding of the proposed US 340 Improvements. In general, it states that WVDOH will be the lead agency in the preparation of construction plans and related documents. It will be responsible for construction of the project including all construction inspection and material testing. Plans and documents related to the Virginia side of the state line will be subject to the review of VDOT. The two states will bear the cost of construction of the portion of the highway that lies in their respective states and will assume responsibilities for maintenance and repair upon completion and acceptance of the project. WVDOH will initially bear all the costs for the project and will invoice VDOT annually for a period of ten years for their share of the costs incurred by WVDOH after the project is successfully let and awarded.

Communication with resource agencies in both West Virginia and Virginia has occurred. For a list of these agencies and their responses, please refer to Section VII and Appendix B, respectively.

The existing facility within the project area is a two-lane rural arterial highway with numerous access points from both residential and commercial properties. The adjoining segments of US 340 north and south of the project area are four-lane divided highways. Roadway deficiencies, such as limited sight distance, narrow travel lanes and shoulder widths, steep side slopes, and unprotected fixed objects, can make driving the existing two-lane section of US 340 hazardous. The proposed project is needed to improve traffic operations, increase capacity, eliminate deficiencies, and improve safety.

The project area is composed of gentle to low-lying hills and ridges. An unnamed tributary to Long Marsh Run and Bullsken Run are crossed by the existing roadway within the project study area. Open fields, row crops, orchards, and livestock grazing areas border US 340 within the project area. Exhibit II-2 shows the project study area.

The project area is rural with sporadic development concentrated around the communities of Rippon and Wheatland. Development consists mainly of residential properties and farm complexes. Commercial properties consisting of a few restaurants and small businesses exist along the project area.

Approaching the project area from the south in Virginia, US 340 is a four-lane divided facility. Approximately 1,000 feet south of the West Virginia state line in Clarke County, Virginia, the four-lane roadway transitions to a two-lane facility. Continuing north on US 340, travelers pass the Rainbow Road Club, John's Family Restaurant, Chapman's Trailer Park, and B & G Painting. Along US 340 in the community of Rippon are private residences, a church, old storage buildings, the Rippon Grocery, an antique store, the Rippon Post Office, St. John's Episcopal Church, and the entrance to the historic Ripon Lodge. Development immediately north of Rippon is sparse and consists of single family homes and farms. As US 340 continues north, it passes through the community of Wheatland where Dave's Auto Service, the Rainbow Diner Truck Stop, Thomas B. Kern, Inc., the Briggs Animal Adoption Center, and a seasonal produce stand are located adjacent to the road. Leaving the project area, two-lane US 340 transitions back to a four-lane facility and continues north to Charles Town, West Virginia.

The purpose and need for the proposed improvements to US 340 is to address traffic operations and improve safety deficiencies along the existing facility. Currently, US 340 in the project area operates at an unacceptable Level of Service (LOS) E. By the design year of 2033, travel conditions will continue to deteriorate as traffic volumes continue to increase. Existing roadway elements, which would be considered substandard using current design standards, also create undesirable driving conditions along this section of US 340. These deficient roadway elements include variable shoulder widths, narrow travel lanes, limited passing zones, steep side slopes, lack of turn lanes, and unprotected fixed objects such as culvert headwalls and trees. The existing facility within the project area is a two-lane rural arterial highway with numerous access points from both residential and commercial properties. The proposed project is needed to improve traffic operations and safety.

A. PROJECT STATUS

The WVDOH has recognized the potential need for improvements to the two-lane portion of US 340 in southern Jefferson County. As a result, it has initiated the US 340 Improvement Study. WVDOH began coordination with state and federal agencies in order to investigate and evaluate planning issues, environmental constraints, and areas of special concern.

Upon reviewing comments received from agencies contacted during the scoping process, a *Purpose and Need Report* was prepared in October 1996 illustrating the need to improve the two-lane section of US 340 from 0.5 mile south of the Virginia/West Virginia state line to the existing four-lane section just south of the Charles Town Bypass. Traffic operational and safety factors were taken into consideration and then presented for review and comment by agencies, who concurred with the proposed purpose and need.

The *Draft Environmental Impact Statement (DEIS)* was approved on November 9, 2001. The DEIS was circulated to the participating resource agencies for review and comments. Eight build alternates (Alternates 1-8) were presented in the DEIS and six (Alternates 1, 3-6, and 8) were evaluated in detail. Alternates 6 and 8 were presented at a Public Hearing in January 2002 as the recommended alternates for implementation. A copy of the original approved DEIS is provided in Portable Document Format (PDF) on a compact disc that can be found inside the back cover of this document.

In response to public input received from the January 15, 2002 hearing, an additional concept, Alternate 9, was developed. An Informational Public Workshop was conducted on July 23, 2002 to present Alternate 9 along with Alternates 6 and 8.

Following the July 23, 2002 Workshop, further evaluations related to the federally-protected historic resources west of US 340 were completed. The Bullskin Run Rural Historic District and Shenandoah Valley Railroad (Norfolk Southern Railroad) were found to be eligible for the National Register of Historic Places. Alternate 6 was eliminated due to the total number of business and residential relocations (10) and the impacts on historic resources including Rippon Lodge, Wheatland Farm, Kabletown Rural Historic District, and the Bullskin Run Rural Historic District. The elimination of Alternate 8 was due to total number of business and residential relocations (8), the impacts on historic resources, including Kabletown Rural Historic District, Bullskin Run Rural Historic District, William Grubb Farm, and the Norfolk Southern Railroad, and the high costs of both construction and long-term maintenance

associated with two grade separation structures over the railroad. Alternate 9 was eliminated from further consideration due to having a high number of business and residential relocations (14 total), impacts on historic resources, including Kabletown Rural Historic District, Bullskin Run Rural Historic District, William Grubb Farm, and the Norfolk Southern Railroad, and the high cost of construction due to relocating 17,000 feet of the Norfolk Southern Railroad. Every Build Alternate, including those previously eliminated, will impact historic properties and/or districts, therefore all alternates were once again reviewed. Alternate 4, originally eliminated due to its impact on the Kabletown Rural Historic District, was chosen as the Preferred Alternate. A public workshop was held on November 18, 2003 to present Alternate 4 as the Preferred Alternate.

As a result of decreased available funding, the US 340 project was placed on hold. During this time, the project area experienced residential growth and development. Due to the growth and development within the area of Alternate 4, and a desire to potentially further minimize impacts to historic resources, two modifications of Alternate 4 (Alternates 4A and 4B) were developed. These modifications include a slight westerly shift of Alternate 4, identified as Alternate 4A, to further minimize impacts to the Byrdland Historic Property and residential properties, as well as an easterly shift of Alternative 4, identified as Alternative 4B, to further minimize impacts to the Village of Rippon Historic District and residential properties. A public information workshop was held on September 24, 2012, to present these modifications to Alternative 4 to the public, update the public on the project status, and gather input and feedback from the public. Verbal and written comments received at the workshop expressed opposition to Alternates 4, 4A, and 4B due to their impacts to the Ryan's Glen subdivision and the proposed Rippon Commons subdivision and a desire by the public for all previous alternates to be re-evaluated using current data and conditions.

Additional build alternates (Alternates 4C, 10A, 10B, and 11) were created in response to public input received at the September 24, 2012 workshop. These alternates, along with Alternates 4, **4A (Preferred)**, and 4B, were presented at a public hearing on June 3, 2013. WVDOH and FHWA have agreed that these alternates should be discussed in a *Supplemental Draft Environmental Impact Statement* (SDEIS).

In July 2016, the SDEIS was approved by the West Virginia Division of Highways and the Federal Highway Administration. Alternate 4A was presented as the Preferred Alternate on the basis of relocations, new right of way required, impacts on historic resources, and overall costs.

A combined public workshop/public hearing was held in Charles Town on August 30, 2016. There were 65 attendees and nine speakers at the formal public hearing. Overall, there was general support for the improvements and, in particular, Alternate 4A. Public meeting materials, comments received, and a transcript of the public hearing can be found in Section VIII.

The project is located within the Hagerstown/Eastern Panhandle Metropolitan Planning Organization.

B. SYSTEM LINKAGE

US 340 is a north-south transportation facility that connects the panhandle of West Virginia to Maryland and Virginia. Traveling north on US 340 from the project area leads to Frederick, Maryland and I-70, a major east-west regional freeway facility. Continuing east, I-70 connects to Baltimore, Maryland. To the south of the project area, US 340 connects to VA Route 7, US 17, US 50, US 522, and I-66 in Virginia. Traveling west of the project area leads to I-81, one of the principal north-south freeway facilities in the eastern United States. East of the project area is I-95, a national north-south freeway facility, which traverses the Washington DC/Northern Virginia metropolitan area. Traffic from the Baltimore area destined for I-81 in Virginia uses I-70, US 340, and VA Route 7 to avoid congestion in and around the Washington DC area. Exhibit II-3 illustrates the relationship of US 340 to the regional transportation network.

Within Jefferson County, US 340 is the major north-south facility. North of the project area and east of Charles Town, US 340 connects to WV 51, an east-west facility. From US 340, WV 51 extends to the west through Charles Town and into Berkeley County where it connects to I-81. US 340 also connects to WV 9 east of Charles Town. WV 9 is another north-south facility in Jefferson County. North of its intersection with US 340, WV 9 extends to Martinsburg and I-81 in Berkeley County. To the south of US 340, WV 9 extends across the Shenandoah River, into Virginia, and ties to VA Route 7 near Leesburg. US 340 northeast of Charles Town leads to Harpers Ferry and continues into Virginia and Maryland. Exhibit II-4 illustrates the relationship of US 340 to the transportation network in and around Jefferson County.

The approximate 4.5 miles of two-lane US 340, between the existing four-lane sections of US 340 north and south of the project area disrupts the continuity of the roadway in this area. This discontinuity affects system linkage along US 340 between Virginia and West Virginia as drivers adapt and make adjustments transitioning from a four-lane road to a two-lane road.

C. CAPACITY AND TRANSPORTATION DEMAND

Capacity is defined as the maximum number of vehicles capable of traveling along a section of roadway during the peak travel period in the absence of restrictive conditions such as highway geometry, traffic volumes, and other environmental factors. When traffic volumes approach or exceed the capacity of the roadway, travel conditions deteriorate and congestion results. The *Highway Capacity Manual 2010* (HCM) defines the capacity of a two-lane highway as 1,700 passenger cars per hour (pc/h) with a limit of 3,200 pc/h in the two directions.

The methodologies prescribed in Chapter 15/Two-Lane Highways of the HCM were applied to analyze travel conditions along US 340 within the project limits. US 340 was assigned as a Class I two-lane highway since motorists should expect to travel at high speeds. This two-lane section of highway connects to a four-lane divided highway at both ends of the project giving travelers the sense that high travel speeds can be maintained although the speed limit is reduced to 40 mph through Rippon. In the case of Class I two-lane highways, HCM uses two measures of effectiveness to determine the automobile level of service (LOS):

1. *Average Travel Speed (ATS)* is defined as the segment length of highway divided by the average travel time it takes vehicles to travel that length,
2. *Percent of Time Spent Following (PTSF)* slower vehicles and represents the freedom to maneuver, the comfort and convenience of travel, and the percentage of vehicles traveling in platoons.

LOS is defined in terms of both ATS and PTSF for Class I two-lane highways. The LOS is a qualitative measure that describes operational conditions of a traffic stream along a roadway or at an intersection of two roadways. For two-lane highway segments, levels of service are assigned a letter designation from A to E, with LOS A representing optimal travel conditions and LOS E representing the worst travel conditions with average travel speeds well below expectations and restrictive opportunities for passing. Table II-1 defines LOS on two-lane highways.

Exhibit II-5 describes the characteristics of the traffic stream for each Level of Service. WVDOH has established the minimum desirable level of service for US 340 during peak periods to be LOS D.

Table II-1: LOS for Two-lane Highways

LOS	Class I Highways	
	ATS (mi/h)	PTSF (%)
A	>55	≤35
B	>55-50	>35-50
C	>45-50	>50-65
D	>40-45	>65-80
E	≤40	>80

Source: Highway Capacity Manual 2010, Chapter 15/Two-lane Highways

The WVDOH Traffic Demand/Analysis Unit of the Planning Division provided traffic volumes for years 2011/2012 and 2033. The project begins 1000 FT south of the Virginia/West Virginia state line in Clarke County, VA where the existing 4-lane highway transitions down to a 2-lane highway. Because of this, no coordination with VDOT was necessary to obtain traffic data for the project. The existing average daily traffic (ADT) volumes were based on traffic count data collected along US 340. Historic traffic data in the corridor suggests an annual background traffic growth rate of 1.60%. Future year (2033) traffic volumes were derived by applying the annual background traffic growth factor to the 2011/2012 traffic volumes. ADT along this stretch of US 340 is in the range of 11,700 to 15,200 vehicles per day in 2011/2012. The projected ADT for design year 2033 ranges from 16,600 to 21,600 vehicles per day. The Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO) has also been consulted to provide traffic volumes for this project. According to the Executive Director of the HEPMPPO, the HEPMPPO generally relies on state DOTs to provide project level traffic volumes based on their traffic counting programs. However, HEPMPPO does maintain a regional travel demand model using a baseline year of 2010. A comparison of the traffic volumes received from WVDOH and HEPMPPO can be summarized as follows:

- At the VA/WV border, WVDOH provides a 2011/2012 ADT of 11,700. The HEPMPPO traffic model shows a 2010 ADT of 13,100. Another resource, the *2013 Virginia Department of Transportation Daily Traffic Volume Estimates Including Vehicle Classification Estimates, Jurisdiction Report 21* reports an ADT of 11,000 south of the VA/WV state border.
- At CR 340/2 (Wheatland Road), the ADT provided by both WVDOH (for 2011-12) and HEPMPPO (for 2010) are within 100 vehicles per day (vpd).

- The growth rates differ between the two agencies. WVDOH information suggests a growth rate of 1.60% whereas HEPMPO data shows a growth rate of 0.8%.
- At the VA/WV state border, WVDOH provides a 2033 ADT of 16,600 which compares to an ADT of 16,000 from the HEPMPO regional travel demand model.
- At CR 340/2 (Wheatland Road), the 2033 ADT provided by WVDOH is approximately 19,150 compared to an ADT of 16,600 from the HEPMPO regional travel demand model.

Based on the summary above, the WVDOH traffic data provided was used for the analysis. For the base year (2011/2012), it is consistent with information available from VDOT and for the horizon year of 2033, it provides a conservative, worst case approach with slightly higher traffic volumes. Regardless of the source of the traffic volumes, the results of the level of service analysis presented below would be similar. This statement is backed by the fact that the LOS for the two-lane highway is unacceptable using WVDOH traffic data for 2011/2012 and the HEPMPO model uses equal or higher initial traffic volumes. If the existing two-lane highway exhibits unacceptable operational performance (level of service) in 2011/2012, then it stands to reason that the level of service will remain unacceptable until such time that improvements are made. However, improved traffic operations, or Level of Service, that results from the US 340 Improvement project, is just one component of the project's need. Additional components are also addressed in this section. The WVDOH ADT volumes for 2011/2012 and 2033 are shown in Exhibit II-6.

A traffic analysis was completed to evaluate the existing traffic conditions in the year 2011/2012 as well as no-build conditions in the design year 2033. The traffic evaluation consisted of two-lane highway analysis as described in the *Highway Capacity Manual 2010, Fifth Edition*. Highway Capacity Software (HCS) was used to analyze capacity of two-lane highway segments along US 340.

Existing operating conditions along US 340 are LOS E in the base year and design year (see Table II-2).

Without improvements to US 340, motorists will continue to contend with undesirable travel conditions (LOS E) during peak travel periods throughout the entire project area. Levels of service for existing (2011/2012) and design year (2033) no-build conditions along US 340 are shown on Exhibit II-6.

Table II-2: Level of Service (Two-lane Highway)

US 340 Segment	Dir.	2011/2012			2033 No-Build		
		ATS (mph)	PTSF (%)	LOS	ATS (mph)	PTSF (%)	LOS
Shepherds Mill Rd to CR 38 (Smith Rd)	NB	38.7	80.5	E	35.3	88.2	E
	SB	39.1	73.5	E	35.5	81.6	E
CR 38 (Smith Rd) to CR 340/1 (Lewisville Rd)	NB	30.7	80.2	E	27.1	88.4	E
	SB	31.0	74.2	E	27.2	82.4	E
CR 340/1 (Lewisville Rd) to Scooter La	NB	39.3	80.0	E	35.8	88.2	E
	SB	39.6	74.3	E	36.0	82.6	E
Scooter La to CR 21 (Meyerstown Rd)	NB	21.1	80.4	E	17.4	89.2	E
	SB	21.5	74.6	E	17.6	83.3	E
CR 21 (Meyerstown Rd) to CR 19 (Withers Larue Rd)	NB	20.1	86.4	E	14.7	92.7	E
	SB	22.2	74.7	E	15.0	88.4	E
CR 19 (Withers Larue Rd) to CR 340/2 (Wheatland Rd)	NB	29.4	82.9	E	25.2	90.1	E
	SB	29.7	76.1	E	25.2	85.4	E
CR 340/2 (Wheatland Rd) to CR 340/3 (Roper N. Fork Rd)	NB	36.8	82.6	E	32.6	90.2	E
	SB	37.0	76.1	E	32.8	85.5	E

The next step of the analysis was to determine the LOS for a 4-lane divided highway; the proposed typical section for this project. Chapter 14 in the HCM defines the capacity of a multilane highway by looking at free-flow speed (FFS) and density expressed as passenger cars per mile per lane (pc/mi/ln). For multilane highways, levels of service are assigned a letter designation from A to F, with LOS A representing free-flow conditions and LOS F representing heavily congested conditions with a complete breakdown of uninterrupted flow. Table II-3 defines the level of service for multilane highways.

The multilane highway analysis is described in Chapter 14 of the HCM. Highway Capacity Software (HCS) was used to determine the LOS of multilane highway segments along US 340. The results of the analysis are presented in Table II-4.

Table II-4 clearly shows that the proposed 4-lane highway will accommodate travel demand in the corridor into the design year and beyond.

Table II-3: LOS for Multilane Highways

LOS	FFS (mph)	Density (pc/mi/ln)
A	All	>0-11
B	All	>11-18
C	All	>18-26
D	All	>26-35
E	60	>35-40
	55	>35-41
	50	>35-43
	45	>35-45
F	Demand Exceeds Capacity	
	60	>40
	55	>41
	50	>43
	45	>45

Source: Highway Capacity Manual 2010, Chapter 14/Multilane Highways

Table II-4: Level of Service (Multilane Highway)

US 340 Segment	Dir.	2033 Build		
		FFS (mph)	Density (pc/m/ln)	LOS
Shepherds Mill Rd to CR 38 (Smith Rd)	NB	53.3	10.2	A
	SB	53.3	8.3	A
CR 38 (Smith Rd) to CR 340/1 (Lewisville Rd)	NB	54.0	10.4	A
	SB	54.0	8.5	A
CR 340/1 (Lewisville Rd) to Scooter La	NB	54.5	10.5	A
	SB	54.3	8.6	A
Scooter La to CR 21 (Meyerstown Rd)	NB	54.5	10.8	A
	SB	54.5	8.8	A
CR 21 (Meyerstown Rd) to CR 19 (Withers Larue Rd)	NB	54.5	13.3	B
	SB	54.5	10.8	A
CR 19 (Withers Larue Rd) to CR 340/2 (Wheatland Rd)	NB	54.0	11.8	B
	SB	54.0	9.7	A
CR 340/2 (Wheatland Rd) to CR 340/3 (Roper N. Fork Rd)	NB	52.8	11.7	B
	SB	52.8	9.5	A

D. SOCIAL DEMANDS AND ECONOMIC DEVELOPMENT

Current land use and zoning in the project area includes agriculture, residential, and sparse commercial and industrial districts. There are also a number of historic districts in and near the project area. Outside of the immediate project area, land use bordering US 340 includes incorporated towns, such as Charles Town, industrial-commercial districts, and residential growth districts. Exhibit II-7 shows the existing and future land use for the project area.

The *Envision Jefferson 2035 Comprehensive Plan* cites the lack of road improvements as a major restraint on the economic growth of the County. Jefferson County is bypassed by the interstate highway system. Because of its geographic location, the county has the potential to become a point of distribution for several metropolitan areas located within a 300-mile radius. Better access via interstate highways and other four-lane roadway facilities could make Jefferson County even more attractive to prospective businesses and industries. Improving this section of US 340 would serve to support the *Envision Jefferson 2035 Comprehensive Plan*.

With the increase in population in the last three decades, Jefferson County's roads have had to bear the combined burden of increased traffic volume and heavier commercial vehicles. As a result, the deficiencies of the highway and road systems have become more critical.

The *Envision Jefferson 2035* plan recognizes that land use decisions of adjacent counties including Frederick County, MD, and Loudoun County, VA, will affect development in the vicinity of US 340. As Frederick, Leesburg, and the Dulles area become major employment centers in their own right, the US 340 project area is a viable residential option within a reasonable commute of these locations. Demand for housing in the vicinity of US 340, increased travel, and tourism throughout the area have resulted in substantial sources of income. History, culture, and the rural nature of the area attract residents from the nearby metropolitan areas. Major attractions in the area include the Charles Town Races, Harpers Ferry National Historical Park, Jefferson County Mountain Heritage Arts and Crafts Festival, the National Fisheries Center, Summit Point Raceway, and other recreational activities such as hiking and whitewater rafting. All of these activities can be accessed via US 340 and connecting roadways. As a result of improving US 340 and providing better access to these facilities, tourism could become even more important to the local economy. Exhibit II-8 illustrates the major attractions near the project area.

The quality of life and cost of living available in Jefferson County and the surrounding area are part of its positive attributes. The area enjoys significantly lower housing costs and an overall lower cost of living than other nearby areas. The area's natural environment and smaller population also make it an attractive place to live. Additionally, provisions in the West Virginia Tax Code have made the area an attractive retirement location for military veterans. The improvement of the roadway through this area will affect all of these characteristics.

E. MODAL INTER-RELATIONSHIPS

The Norfolk Southern Corporation and the CSX Transportation System provide rail access through the county. The Norfolk Southern is oriented north-south through Jefferson County and is located along the western edge of the project area. To the north, the railroad connects to Hagerstown, Maryland. To the south, this railroad extends to Front Royal, Virginia where it connects to the Virginia Inland Port. The CSX Transportation System has railroad facilities that extend from Harpers Ferry west through the county. The more southern route extends from Harpers Ferry southwest to Winchester, Virginia. The more northern route extends from Harpers Ferry to Martinsburg.

The Virginia Inland Port is located in Warren County, Virginia along US 340/US 522. This facility provides truck to rail transfer for the Norfolk Southern and the CSX Transportation System. The port is accessible to trucks traveling via US 340, VA Route 7, and I-81 south.

Air transportation in Jefferson County is provided by the Eastern West Virginia Regional Airport located in Martinsburg along WV 9, approximately 15 miles west of Charles Town. The airport's primary business is charter flights. The most frequently flown charter flight is to Charleston, West Virginia. The nearest large scale airport is Dulles International. It is located in northern Virginia approximately 50 miles to the east of the project area. Air cargo service, domestic commercial service, and international air travel is available at this airport.

Commuter bus and rail services are part of the transportation network of Jefferson County. Public bus service is provided by the Eastern Panhandle Transit Authority (PanTran). PanTran serves the Martinsburg area and various areas throughout Berkeley and Jefferson Counties, utilizing US 340 north of the project area. Regular stops include Charles Town, Harpers Ferry, and Shepherdstown. In addition to regular stops, PanTran makes stops off the regular route if it has been requested in advance by a rider. Commuter rail service is provided from Martinsburg to Washington DC with stops at Duffields and Harpers Ferry by the Maryland Area

Rail Commute (MARC). This program is supported by the Maryland Department of Transportation.

F. ROADWAY CHARACTERISTICS

The existing US 340 entering Jefferson County, WV from Clarke County, VA is a two-lane rural highway for approximately 4.5 miles. It transitions to a 4-lane highway south of Charles Town, WV. There are several issues with the existing two-lane section of US 340 when compared to standards set forth in the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets (2011)*. These issues can generally be grouped into the following categories:

Highway Geometry – this group characterizes the alignment and cross-sectional elements of the roadway.

- *Posted Speed* – The existing two-lane US 340 has a posted speed of 55 MPH except through Rippon, WV where the posted speed limit is 40 MPH. The reduced speed limit through Rippon represents 20% of the project length.
- *Travelway* – The lane widths along US 340 within the project limits range from 10.5 FT to 11.5 FT. With an Average Daily Traffic (ADT) volume well above the 2000 vehicles per day (vpd) threshold in AASHTO, a 12 FT lane width is required for all design speeds, including the 40 MPH posted speed through Rippon. This suggests that the lane width throughout the project limits is 100% substandard.
- *Shoulders* - The average usable shoulder width is approximately 5.5 feet within the project limits. The shoulder generally consists of 2.5 feet of pavement and 3 feet of gravel or turf. This falls below the required usable shoulder width of 8 FT according to AASHTO. This analysis suggests that the usable shoulder width along the entire project length is substandard.
- *Horizontal Alignment* – There are nine horizontal curves within the project limits. Two of the curves are in Rippon, WV where the posted speed limit is 40 MPH. If the cross-slopes met the requirements set forth for superelevation rates according to AASHTO, six out of nine horizontal curves would satisfy the criteria. The radii of existing curves range from 1,000 FT to 4,700 FT in the sections posted at 55 MPH. The minimum

radius for curves using a design speed of 60 MPH (posted 55 MPH) with an 8% maximum superelevation rate is 1,200 FT. Three curves or 50% of the horizontal curves in the 55 MPH sections fall below the minimum radius as specified by AASHTO. The curves in the 40 MPH section through Rippon range from 750 FT to 3,000 FT which meet the AASHTO criteria for minimum radii.

- *Passing Zones* – Passing zones are directly related to design speed and decision sight distance and should be provided where practical for two-lane highways. Along existing US 340 within the project limits, there are five northbound (NB) and four southbound (SB) passing zones. The NB passing zones range in length from 460 FT to 1,020 FT representing 18% of the length of the project (82% no passing zone). The SB passing zones range from 575 FT to 940 FT which represents just 12% of the project length (88% no passing zone). AASHTO recommends a minimum passing sight distance of 1,000 FT for a design speed of 60 MPH. Only one of the nine, or 11%, of the passing zones could meet this criteria.

Access – this category describes the number, type, and control at the access points along the highway. There are 14 roads and 55 driveways that intersect US 340 within the project limits. The intersecting roads are stop-sign controlled but no supplemental pavement markings (stop bars) were observed. There are no traffic signals along the two-lane section of US 340. The intersection angle with the mainline or skew is another intersection design element. It is desirable to have intersections at a skew angle between 75° and 90°. Most of the intersecting roadways meet this criteria with the exception of Long St. which intersects US 340 at a 42° skew. Several of the drives are several hundred feet wide along the US 340 road frontage. With more formalized entrances and exits to adjacent commercial uses, a more orderly, safer traffic flow can be expected. Some specific examples of poor access include:

- The Rainbow Road Club, located on the west side of US 340, has two entrance/exit locations for the club's parking lot. The drive is approximately 300 FT wide along the US 340 frontage and located on the inside of a substandard (less than a 1,200 FT radius) horizontal curve. The entrance has limited sight distance to the south and poor visibility to the north due to a crest vertical curve in the roadway.

- John's Family Restaurant is located on the west side of US 340 between CR 38 and US 340/1. The access extends along US 340 for approximately 400 feet. There is limited sight distance to the north resulting from a crest vertical curve on US 340.
- At the intersection of US 340 and CR 19 (Withers Larue Road), there is limited sight distance to the north because of building locations and a stone retaining wall along US 340.
- The Rainbow Diner is located on the west side of US 340 north of CR 340/2. There is nearly 600 FT of frontage to pull off and park. There are also two other commercial drives and one residential drive within this area.

Roadside Design – in this category, elements beyond the travelway are described such as steep side slopes and unprotected fixed objects. AASHTO's *Roadside Design Guide (4th Edition 2011)* is the design guide resource that sets the criteria and design considerations. Examples in this category are discussed below as traversed from south to north:

- There is a 4-foot diameter concrete culvert with a protective headwall that directs an unnamed tributary of Long Marsh Run under US 340 just south of CR 38. The side slopes from the shoulder of US 340 down to the tributary are steep and without the protection of guardrail.
- An unprotected inlet with a drop-off of approximately 3 feet is located in the northeast corner of the intersection and is a potential concern to vehicles on CR 38 turning right (northbound) onto US 340 and for errant vehicles on US 340.
- At the intersection of US 340 and CR 19 (Withers Larue Road), the close proximity of the stone wall and buildings to the US 340 travel lanes provides a constricted travel corridor for all motorists. The stone wall to wall clearance is approximately 44 feet, separated from the travel lanes by a 5-foot paved shoulder, concrete curb and gutter, and narrow sidewalk on either side. Much of the curb face in Rippon has deteriorated.
- Unprotected pipe culvert headwalls are a common occurrence north of Rippon along the roadway. In particular, an unprotected headwall is located approximately 1,600 feet south of Bullsken Creek on the northbound side of the road. The headwall is located just above ground level and approximately 6.5 feet away from the edge of the travel

lane. Another location occurs along US 340 at the Bullsken Creek crossing. These headwalls are close to the roadway and represent an unprotected hazard for motorists.

G. SAFETY

Roadway characteristics, as defined in the previous section, combined with uncontrollable factors, such as inclement weather conditions and animals crossing the road, can make for undesirable travel along existing US 340 within the project area. Accident data was provided by WVDOH. Due to the minor extent of the project located in Virginia, VDOT accident data has not been incorporated into the analysis. None of the public or stakeholder involvement over the course of the project has indicated a crash concern with the VA segment of the project that would suggest it should be explored further. A review of the WVDOH accident data from January 2013 through December 2013 for this section of US 340 revealed that a total of 29 accidents occurred from south of the state line between Virginia and West Virginia to the existing four-lane section of the Charles Town Bypass. This compares to 21 total accidents in 2008 and 29 accidents back in 2003. Twelve of the 29 accidents during 2013 involved injuries. None of the accidents involved fatalities. The type of accidents was dominated by rear end collisions, which accounted for 59% of the total. The next largest category was sideswipes, which were 21% of the total. The chart presented in Exhibit II-9 displays the mix of accident types in the corridor.

Surface conditions affect the ability of a driver to keep a vehicle under control. If there are inadequate shoulders and narrow travel lanes, such as along the existing two-lane section of US 340, and no exclusive turn lanes, a driver has little room to recover from mishaps related to poor sight distance, slowing and turning vehicles, and poor road conditions due to inclement weather. Eliminating substandard roadway design features will reduce the number of accidents and provide better traffic flow.

1. Accident Rates

By taking the number of accidents per segment of roadway and converting the actual number to an accident rate, the roadway can be compared to other regional and statewide averages. The most common accident rate is defined as the number of accidents on a section of highway per 100 million vehicle miles (ACC/HMVM) of travel. The formula used to determine the accident rate is as follows:

$$\text{ACC/HMVM} = ((N(100,000,000))/(T)(L)(A))$$

Where: N = number of accidents in the time period

T = time period in days

L = one-way length of roadway in miles

A = average daily traffic in the time period

The injury accident and fatal accident rates can also be determined by using the accident rate above and substituting the total number of injury accidents or the total number of fatal accidents for the total number of accidents (N).

In order to identify areas of concern, the project area was separated into eight segments, labeled A through H. These segments were determined by intersection locations along US 340. By separating the roadway into segments and calculating separate rates for each segment, the degree of hazard for each section can be determined. Exhibit II-10 shows the segments used in this analysis as well as the locations and types of each accident within each segment. Table II-5 shows the accident rate, injury rate and fatality rate for each segment, the total project area, the local area, and the state. The highest accident rate and highest injury accident rate occurred in Segment A with accidents clustered near the Rainbow Road Club. This segment resulted in crash rates higher than the average for all state-maintained highways throughout the state. Contributing factors to the excessive crash rates could include lack of formal ingress/egress, substandard horizontal curvature on US 340, and poor sight distance. Segment A had the highest accident rate and injury rate by far compared to other segments. Exhibit II-10 illustrates the location of reported crashes, illustrating the dispersed nature of events in other segments.

2. Severity Index

Severity index is representative of the relative danger of any given road, segment of road, or spot location. As the index for a location rises, the likelihood of a severe accident involving injury or death increases. This severity index (SI) is calculated using the following formula:

$$\text{SI} = (\text{NI} + \text{NF})/(\text{Nt})$$

Where: NI = number of injury accidents

NF = number of fatal accidents

Nt = number of total accidents

Table II-5: Accident Rates

Highway Section (Segment)	No. of Crashes ¹ (Each)	Segment Length (Miles)	Accident Rate ¹ (HMVM)	Injury Rate ¹ (HMVM)	Fatality Rate ¹ (HMVM)
A	13	0.30	1009	621	0.0
B	5	0.60	194	39	0.0
C	1	0.30	78	0	0.0
D	0	0.40	0	0	0.0
E	0	0.40	0	0	0.0
F	3	0.60	105	35	0.0
G	3	0.70	85	28	0.0
H	4	0.70	113	28	0.0
Total All Segments	29	4.00	157	65	0.0
Statewide – US & WV ² Routes (non-municipal)	N/A	N/A	199	42	1.6

Sources: 1) 2013 crash data provided by WVDOH
 2) 2013 Statewide Crash Rates provided by WVDOH

The severity index was calculated for each segment of the roadway that is identified in Exhibit II-10. The severity index calculated for the State of West Virginia represents the data for all traffic accidents in the state. Table II-6 shows the calculated severity index for each segment, the severity index for the total project area, and the state severity index (calculated using all crash data). Again, Segment A has the highest severity index, nearly double the statewide average. Segments F and G has a severity index equal to the statewide average. While segments F and G had three accidents each during the reporting period, Segment A had a total of 13 accidents in the same reporting period.

Table II-6: Severity Index

Highway Section (Segment)	Severity Index ¹
A	0.62
B	0.20
C	0.00
D	N/A
E	N/A
F	0.33
G	0.33
H	0.25
Total All Segments	0.41
Statewide Average ²	0.33

Sources: 1) 2013 crash data provided by WVDOH
2) WVDOH 2003 Crash Data

3. Safety Summary

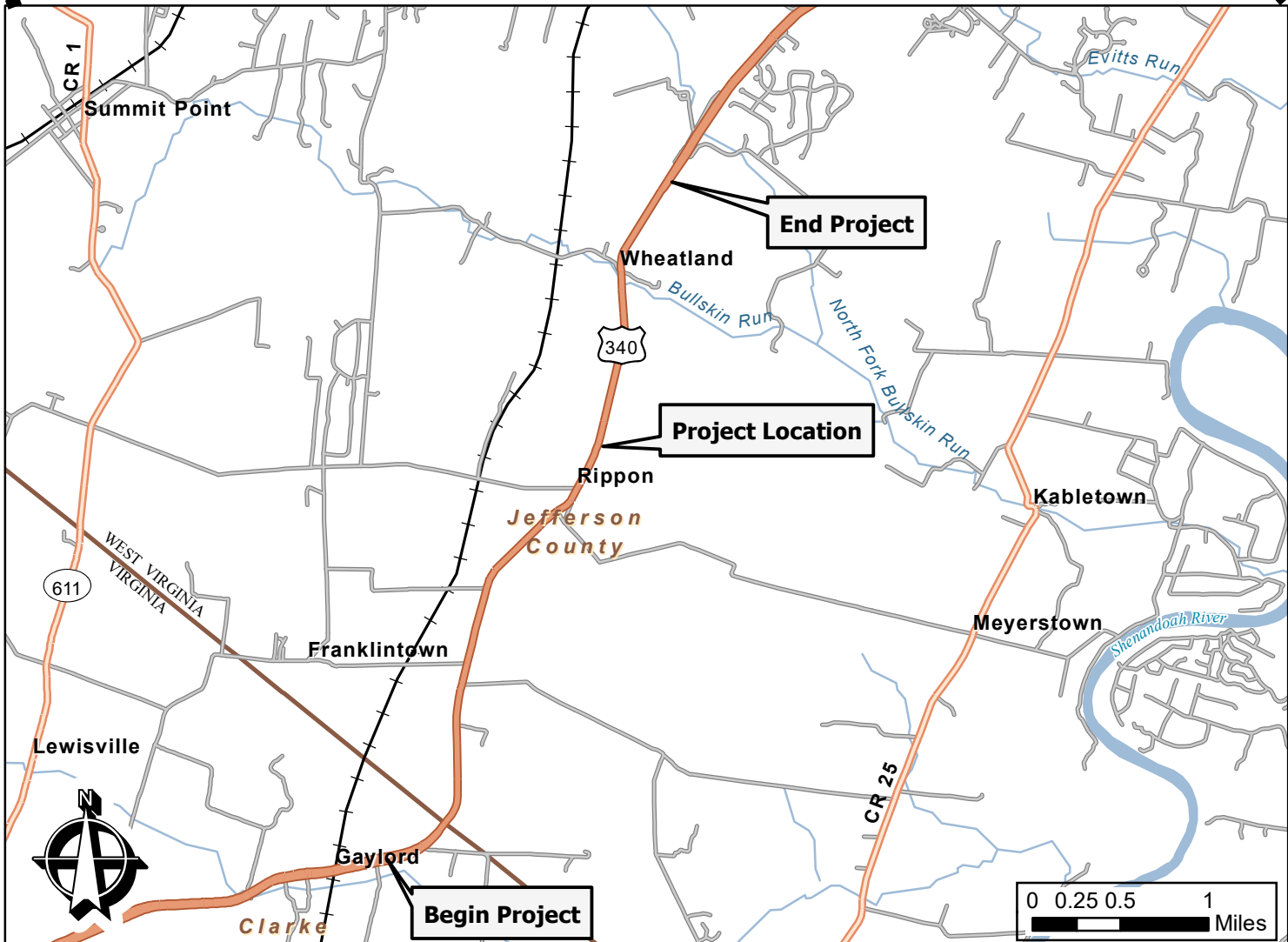
Segment A clearly exhibits the need for improvements. The number of accidents is more than double that in any other segment that was reviewed, the Accident Rate is nearly five times more than the statewide average, the Injury Rate is over ten times the statewide average, and the Severity Index is nearly double the statewide average. This can be compared to Segment B (the segment with the next highest number of accidents) that has an Accident Rate and Injury Rate nearly equal to the statewide average. However, it has a Severity Index nearly half of the statewide average and one third of the Severity Index for Segment A meaning that Segment B is a much less dangerous stretch of road than is Segment A. Based on the Severity Index, Segments F and G are more dangerous than is Segment B although Segment B had the higher number of accidents. The remaining segments fall below the statewide averages in all categories and present no safety concerns.

H. CONCURRENCE WITH PURPOSE AND NEED

The *Purpose and Need Report* for this project is on file with the WVDOH. In accordance with the procedures for the combined NEPA/Section 404 process, resource agencies were provided the opportunity to review the Purpose and Need Report in October 1996. A complete listing of the

agencies receiving the Purpose and Need Report is contained in Section VIII of this document. The West Virginia Division of Environmental Protection concurred with the purpose and need on October 22, 1996. On November 7, 1996, the US Army Corps of Engineers concurred with the purpose and need for improvements to US 340 in the project area. Concurrence was received on November 21, 1996, from the West Virginia Division of Culture and History. The United States Environmental Protection Agency concurred with the purpose and need on January 23, 1997. Other agencies chose not to respond. Concurrence is assumed for these agencies.

The original Purpose and Need for the project is reaffirmed with the information presented in this FEIS.

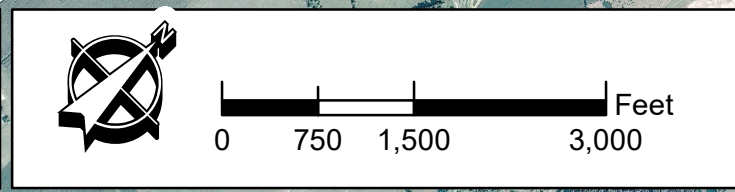


**US 340
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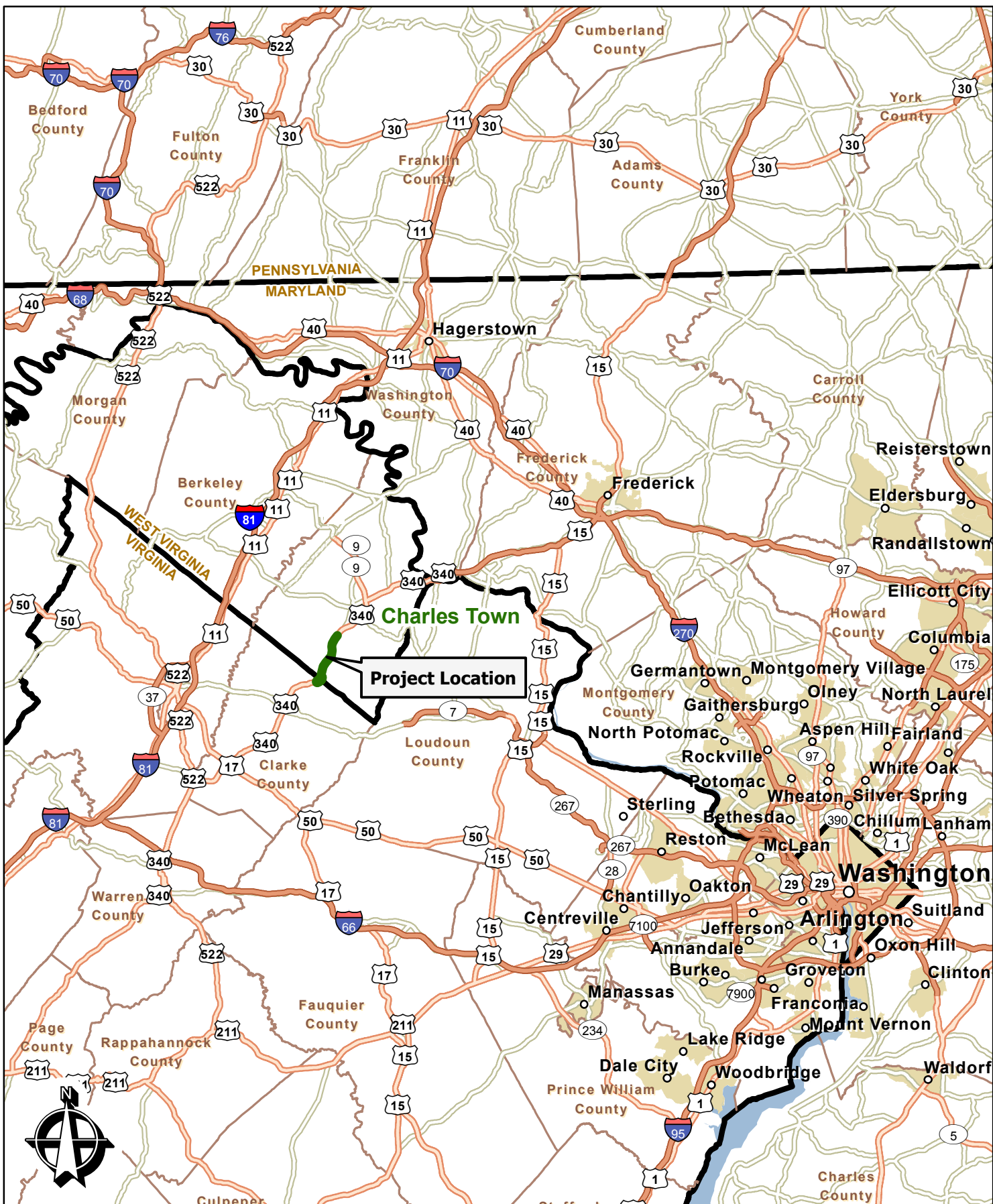
Project Vicinity



**US 340
IMPROVEMENT
STUDY**

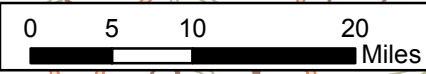


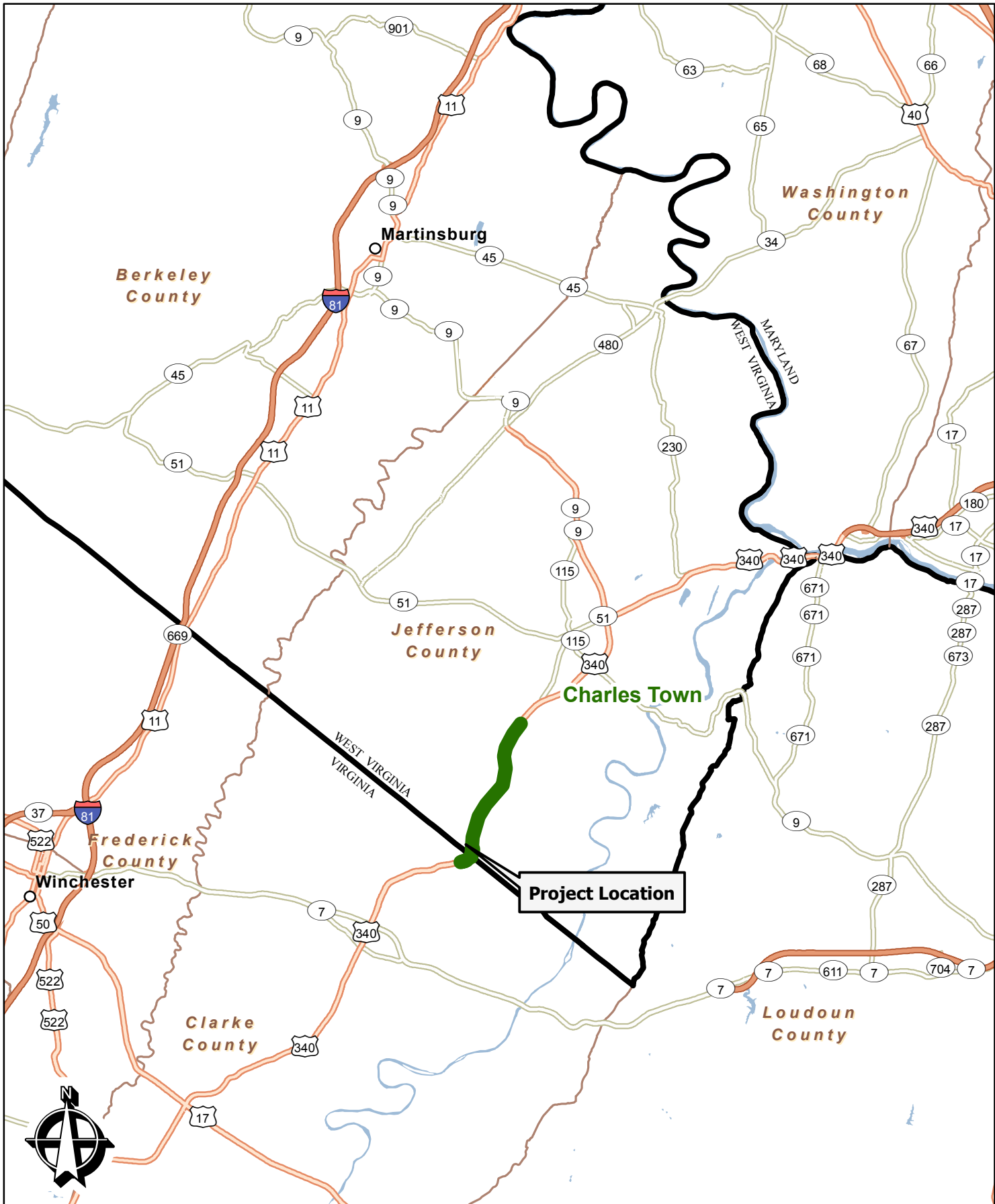
Project Study Area



**US 340
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STUDY**

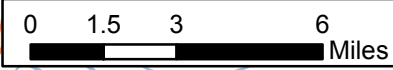
**Regional Transportation
Network**





**US 340
IMPROVEMENT
STUDY**

**Local Transportation
Network**



LOS "A" describes a condition of free flow. Drivers are able to drive at a desired speed.



LOS "B" is in the zone of stable flow. Drivers have reasonable freedom to select their speed.



LOS "C" is still in the zone of stable flow. Most of the drivers are restricted in their freedom to select their own speed.



LOS "D" approaches unstable flow. Drivers have little freedom to maneuver and comfort and convenience are low.

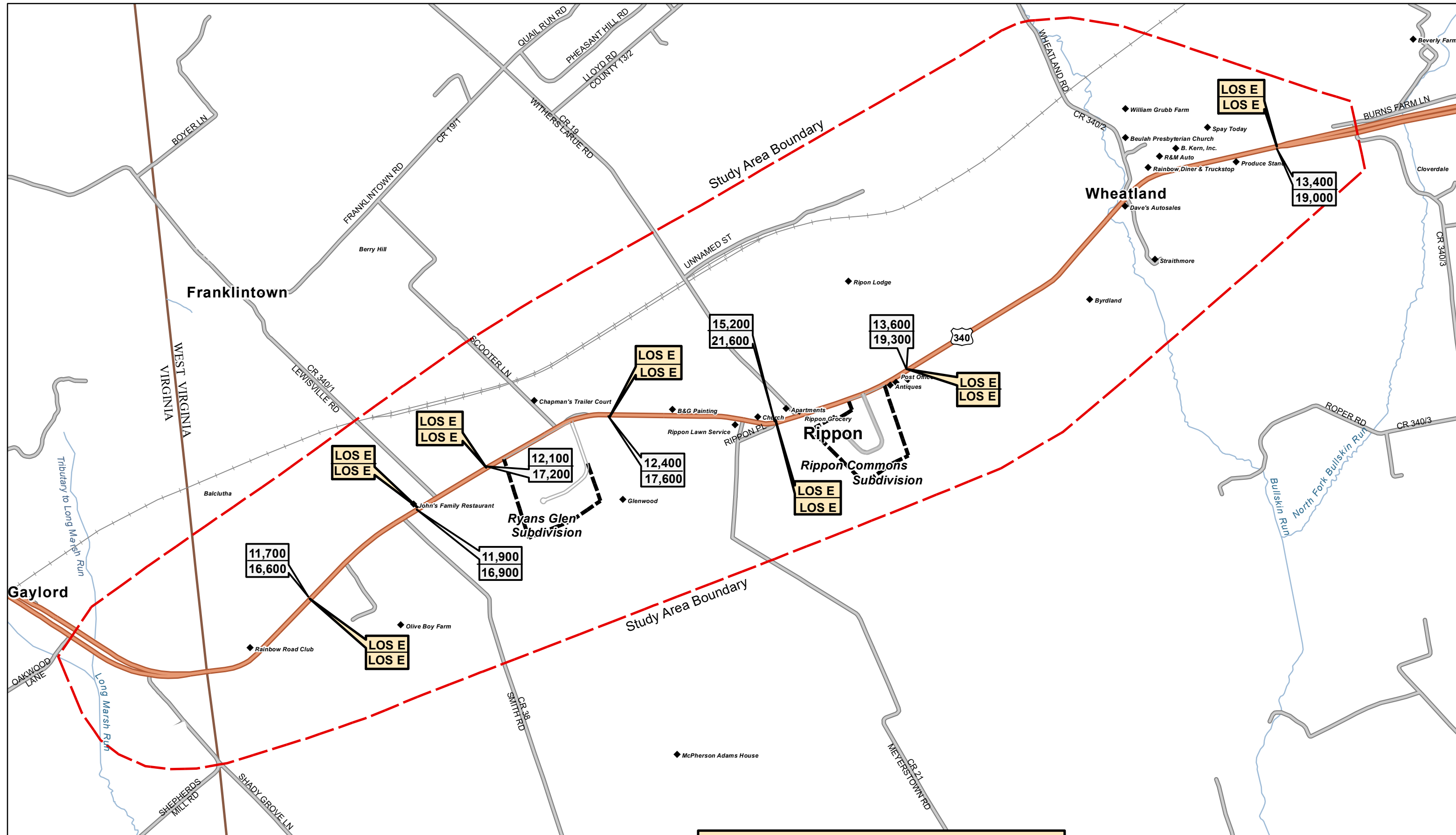


LOS "E" represents operations at or near the capacity of the highway. Traffic flow is unstable and driver frustration is high.

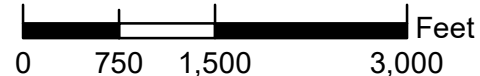


**US 340
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STUDY**

Level of Service



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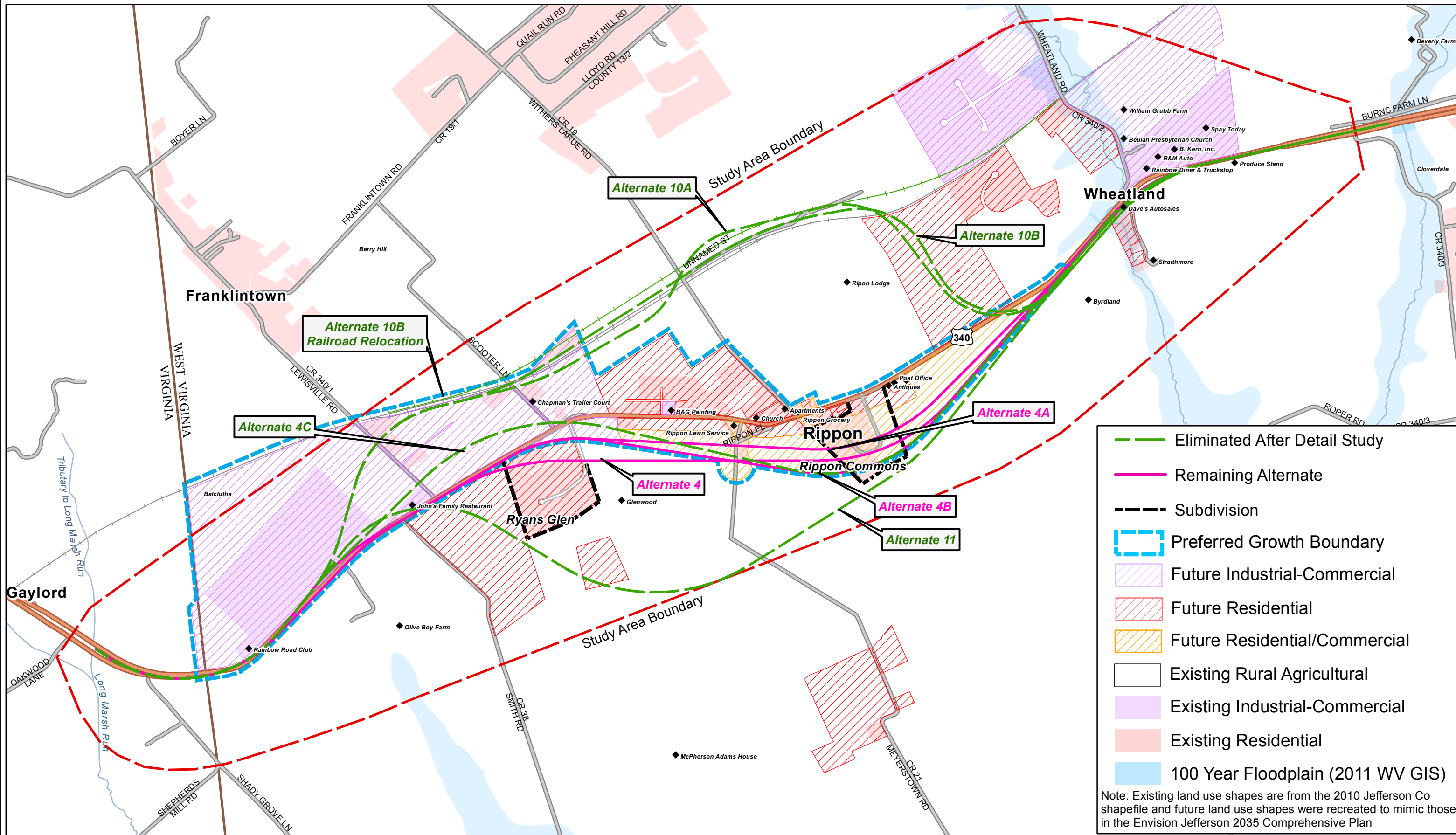


2011 & 2012 TWO LANE HIGHWAY LEVEL OF SERVICE (LOS)
2033 TWO LANE HIGHWAY LEVEL OF SERVICE (LOS)

2011 & 2012 AVERAGE DAILY TRAFFIC
2033 AVERAGE DAILY TRAFFIC

Note: Average Daily Traffic is Identified in Vehicles Per Day

**Average Daily Traffic
and
Level of Service**

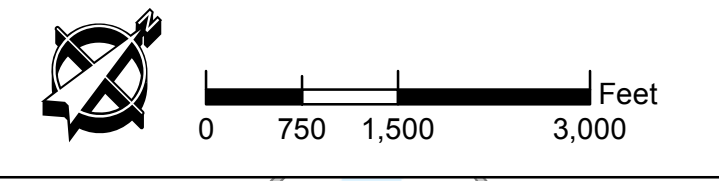


Existing and Future Land Use

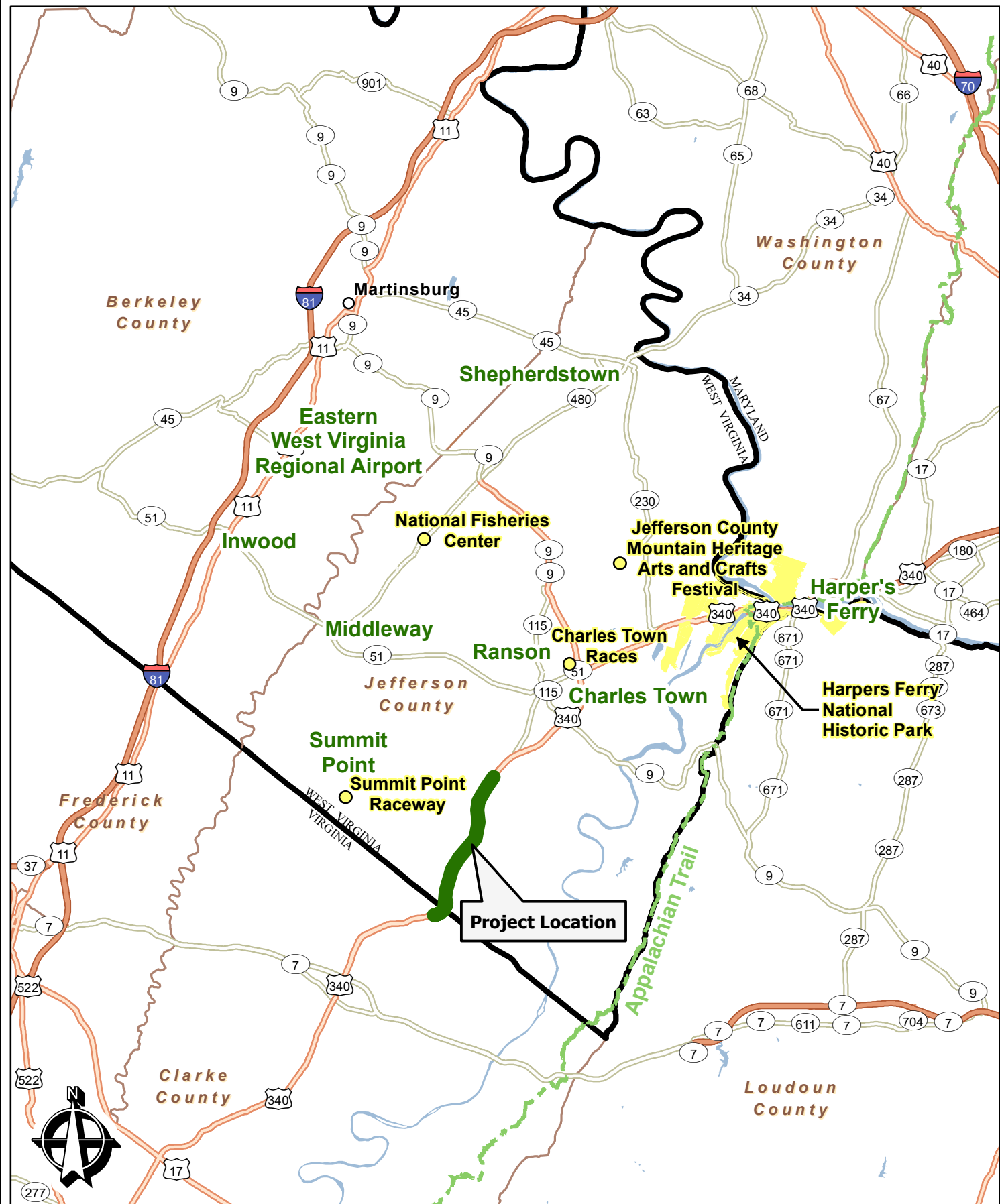
- Eliminated After Detail Study
- Remaining Alternate
- Subdivision
- Preferred Growth Boundary
- Future Industrial-Commercial
- Future Residential
- Future Residential/Commercial
- Existing Rural Agricultural
- Existing Industrial-Commercial
- Existing Residential
- 100 Year Floodplain (2011 WV GIS)

Note: Existing land use shapes are from the 2010 Jefferson Co shapefile and future land use shapes were recreated to mimic those in the Envision Jefferson 2035 Comprehensive Plan

**US 340
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STUDY**

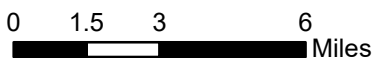


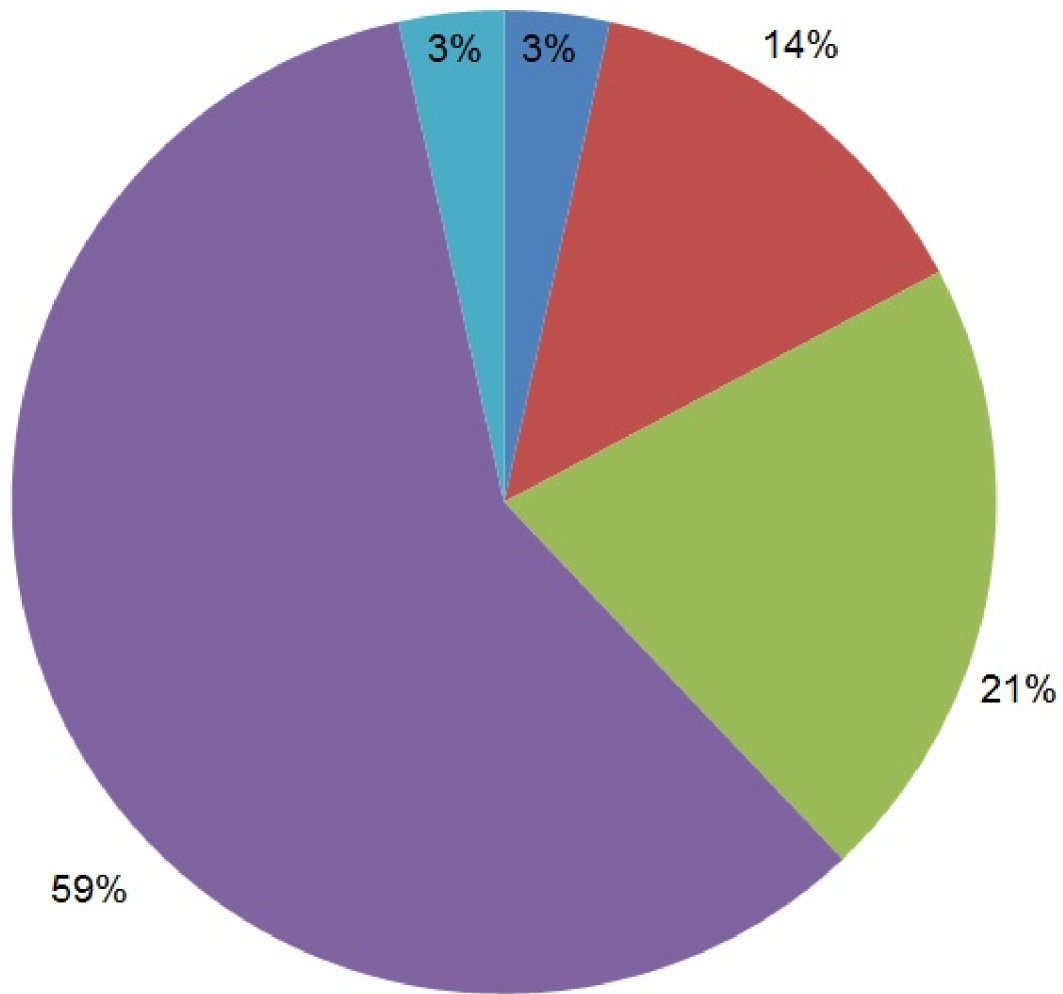
**Existing and Future
Land Use**



**US 340
IMPROVEMENT
STUDY**

Local Points of Interest



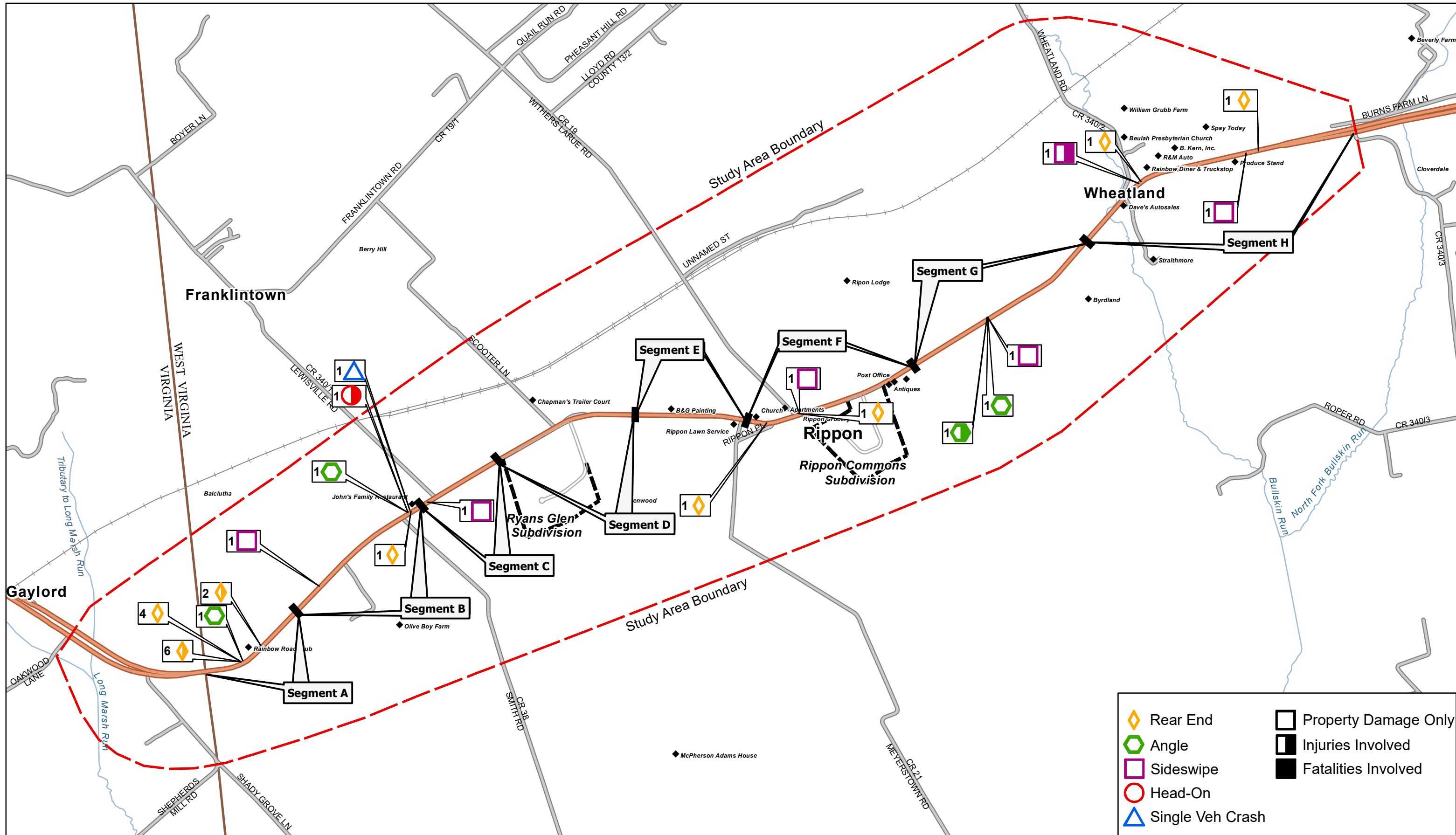


■ Single Veh Crash ■ Angle ■ Sideswipe ■ Rear End ■ Head On

***US 340
IMPROVEMENT
STUDY***

Accident Types

Exhibit II-9



Rear End	Property Damage Only
Angle	Injuries Involved
Sideswipe	Fatalities Involved
Head-On	
Single Veh Crash	

**Accident Location
and
Types by Segments**

**US 340
IMPROVEMENT
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