2 Purpose and Need

2.1 Study Area

Interstate 81 (I-81) is relied upon for local and regional travel and interstate travel in the eastern United States. It extends 855 miles from Tennessee to New York at the Canadian border. I-81 is a major trucking corridor, connecting markets in Canada and the more densely populated northeastern United States to the mid-southern states as well as to other routes that connect to the Mexican border. Figure 2-1 (see Chapter 8, *Figures*) provides the context of I-81 in relation to the interstate system in the eastern United States.

I-81 in Virginia extends 325 miles in a southwest to northeast direction in western Virginia from the Tennessee border to the West Virginia border, passing through 21 cities and towns and 13 counties. Figure 2-2 (see Chapter 8, *Figures*) depicts I-81 in Virginia.

In Virginia, I-81 connects to three major interstate highways, specifically:

- I-77 in Wytheville;
- I-64 near Lexington and Staunton; and
- I-66 near Middletown

For a majority of its length, U.S. Route 11 runs parallel to I-81 and intersects with it at 23 of the 91 interchanges on I-81 in Virginia. These connections provide local access to rural communities, cities, and towns, such as Bristol, Radford, Wytheville, Christiansburg, Blacksburg, Roanoke, Salem, Lexington, Staunton, Harrisonburg, and Winchester. In some instances, U.S. Route 11 also provides an alternate route of travel. In two locations, between Exits 72 and 81 (the I-77 overlap), and between Exits 167 and 175, U.S. Route 11 is the same roadway as I-81.

The I-81 study area includes the entire length of I-81 in Virginia (see Figure 2-3 in Chapter 8, *Figures*). For the purpose of this study, the study area generally extends 500 feet from the outside edge of pavement of I-81. This width includes the limits of where potential highway

improvements might occur, based on the needs. Historic properties, visual resources, and economic characteristics are described beyond that distance in their respective sections in Chapter 4, *Affected Environment*. Transportation system effects were also examined at a broader scale and are discussed in Chapter 3, *Improvement Concepts*.

In addition to addressing the needs with highway improvements, the study evaluates the effectiveness of rail improvements in meeting the identified needs. Potential improvements to Norfolk Southern's Shenandoah and Piedmont rail lines, as described for Rail Concept 3, were evaluated. Rail Concept 3 was evaluated because it provides the most diversion of freight from truck to rail per dollar of investment. Since the Piedmont rail is geographically distant from I-81, a separate rail study area was also created. The rail study area consists of 13 discrete sections along existing Norfolk Southern's 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, resources were generally identified within 500 feet on either side of the rail centerline (see Figure 2-3 in Chapter 8, *Figures*). For each rail section, environmental resources were generally identified within 500 feet from the rail centerline. This width includes the limits of where potential rail improvements might occur.

2.2 I-81 History

Construction of I-81 in Virginia began in December 1957. In the succeeding years, sections of highway were opened to traffic, with the final section completed in 1971. Since that time, VDOT has been making investments on I-81, such as additional interchanges, additional travel lanes, and truck climbing lanes, to accommodate the substantial increase in traffic and to improve its operations.

Traffic demands in 1978 ranged from 14,900 to 24,700 vehicles per day (see Table 2.3-1). From 1978 through 2003, travel demands more than doubled and nearly tripled in some locations with the average annual daily traffic in 2003 ranging from 34,300 to 57,100 vehicles per day, and with a considerable portion of this traffic being heavy vehicles (21 percent to 35 percent trucks per day).

Beginning in the spring of 1996 and concluding in the fall of 1998, VDOT conducted corridor studies and divided the entire 325-mile corridor into ten concept study areas. The studies evaluated safety, traffic operations, and geometric conditions; forecasted future traffic demands; and identified potential improvements.

In January 2002, a consortium of design and construction firms submitted an unsolicited proposal to VDOT, under the Commonwealth's Public-Private Transportation Act (PPTA), to upgrade I-81. The PPTA process, which is the result of state legislation passed

in 1995, allows VDOT to partner with the private sector to improve transportation infrastructure.

VDOT subsequently solicited new PPTA proposals for I-81 improvements. Two teams submitted proposals in January 2003.

In March 2003, VDOT applied for approval to toll I-81 in Virginia under Section 1216(b) of the Transportation Equity Act for the 21st Century. In March 2003, FHWA granted conditional provisional approval of VDOT's application.

In March 2004, VDOT's Commissioner directed VDOT to enter into negotiations with one team as the potential operator under the PPTA. Even though VDOT is negotiating with this team, no decisions on the improvement concepts have been made. Furthermore, the PPTA process has not influenced the analysis of improvement concepts required by NEPA or decisions on the improvement concepts. The final decision on the improvement concept to be advanced for I-81 will not be made until the conclusion of the Tier 1 NEPA process.

In April 2004, representatives of the Departments of Transportation for West Virginia, Pennsylvania, Tennessee, and Maryland were consulted to determine the influence of highway projects in those states on I-81 to the extent available. Each state submitted available historical traffic counts and future traffic forecasts to the study team, as well as improvement concepts under study, particularly highway widening and toll options currently being considered.

In September 2004, VDOT and the FHWA Virginia Division provided the leadership to plan and host a I-81 Corridor forum, a meeting attended by a group of transportation officials representing the states that I-81 traverses (Tennessee, Virginia, West Virginia, Maryland, Pennsylvania and New York). Each state was invited to present and discuss highway and rail initiatives in their state; to share information on their respective transportation challenges and on their opportunities for meeting those challenges; and to share information on current studies along I-81 in their state. These states convened again in July 2005, at a meeting hosted by Tennessee DOT, and have a continuing commitment to work together to discuss transportation conditions on I-81.

Several meetings were also held in 2004 with DRPT and Norfolk Southern to obtain available information pertinent to the rail component of the *I-81 Corridor Improvement Study* and to discuss the rail concepts. The Federal Railroad Administration (FRA) also provided modeling assumptions for predicting truck-to-rail diversion (see also Chapter 7, *Comments and Coordination*).

2.3 Existing Transportation Conditions

Existing 2004 transportation conditions were identified by using existing material and data, as well as new data gathered as part of the *I-81 Corridor Improvement Study*. These data were collected and analyzed to define the existing conditions and to establish a benchmark for projecting 2035 No-Build conditions. New traffic information was collected during 2004. The crash data analyzed were from the three-year period of 2000 through 2002 (the most recent period available at the onset of this study). The existing geometric conditions were identified from a review of previous studies, field visits, aerial photography, and a review of the as-built construction plans for the most recently completed projects along the entire facility.

2.3.1 Traffic Volumes and Historic Growth

As described in detail in the *I-81 Corridor Improvement Study Transportation Technical Report,* several data sources were used to determine traffic growth rates, including economic data and historic count data from Virginia and surrounding states. Of the data available, VDOT historical count data were determined to be the most reliable for use in forecasting future conditions because they provide the most stable correlation over time. The historical count data show a 3.9 percent annual growth from 1978 through 2003 and a 2.7 percent growth from 1997 through 2003 at the permanent count locations. Extrapolating these trendlines into the future, a range of growth rates (from 1.7 to 2.1 percent) were used to forecast from 2003 to the 2035 horizon. These historical data were supplemented with forecasts on population and employment found in the Virginia Statewide Travel Demand Model to determine which growth rates should be applied to specific sections of the corridor.[1] Table 2.3-1 shows historical as well as current traffic volumes and traffic growth along I-81 at the eight permanent count locations. These data were used in subsequent analysis of existing conditions.

Growth rates for a 25-year period and the rates for the last seven years are shown separately to illustrate long-term and more recent trends. The rates were also shown separately because 1997 is the year that the automated count stations along I-81 became operational; therefore, data from 1997 through 2003 are based on more accurate and continuous counting methods than the rates in years before 1997.

Freight statistics, surveys, and field observations were analyzed to determine truck percentages. This information is provided in the *I-81 Corridor Improvement Study Freight Forecast and Diversion Technical Report*. For 2003, truck percentage was an average of 26 percent of the traffic at the eight permanent count stations along I-81.

[1] The Virginia Statewide Travel Demand Model is a mathematical model that assesses the transportation system performance, identifies and analyzes the deficiencies, and supports the development of local and regional plans. The statewide model includes forecasts of population and employment changes and can be used to determine the impacts of growth on Virginia's transportation system.

Table 2.3-1 Existing Traffic and Historical Traffic Volume Growth Along I-81: 1978-2003

Permanent Count Location (from South to North)	1978 AADT Volume	1997 AADT Volume[1]	2003 AADT Volume	2003 Truck Percentage	1978 – 2003 Average Annual Growth Rate	1978 – 2003 Aggregate Growth	1997 – 2003 Average Annual Growth Rate	1997 – 2003 Aggregate Growth
Route 140 to South Corporate Limit of Abingdon	18,100	37,000	41,900	23%	3.4%	131%	2.1%	13%
Route 11 to North Corporate Limit of Wytheville (I-77 overlap)	21,400	46,800	51,900	26%	3.6%	143%	1.7%	11%
Route 177 to Route 8 (near Radford)	15,400	32,000	41,000	27%	4.0%	166%	4.2%	28%
Route 581 to Route 115 (Roanoke)	24,700	52,000	57,100	21%	3.4%	131%	1.6%	10%
Route 11 to Route 11-614 (Buchanan)	14,900	30,000	34,300	35%	3.4%	130%	2.3%	14%
Route 606 to Augusta County Line (I-64 overlap)	15,300	33,000	41,700	32%	4.1%	173%	4.0%	26%
Route 11 to Route 659 (Harrisonburg)	16,700	39,000	48,000	27%	4.3%	187%	3.5%	23%
Route 50 to Route 7	18,900	48,000	56,200	21%	4.5%	197%	2.7%	17%
Average at Permanent Count Locations	18,000	39,725	46,500	26%	3.9%	155%	2.7%	17%

AADT – Average Annual Daily Traffic
1 These volumes represent actual count data. These data were grown to 2004 to form the 2004 base network to which growth rates were assigned.

2.3.2 Levels of Service

Traffic operating conditions along I-81 were evaluated to assess the overall quality of traffic flow using the procedures documented in the 2000 Highway Capacity Manual (HCM).[2] A level of service (LOS) analysis was conducted for the mainline of I-81 as well as for all ramp merge, diverge, and weave areas. LOS is a qualitative measurement of the operating conditions that takes into account a number of variables, such as speed, vehicle maneuverability, and traffic interruptions. A letter grade ranging from a high LOS A (representing the free flow of traffic) to a low LOS F (representing a forced breakdown in traffic flow) is assigned to each location. *A Policy on Geometric Design of Highways and Streets*, published by the American Association of State Highway and Transportation Officials (AASHTO), is referenced in the Code of Federal Regulations and is used to provide the LOS standard for highways on the National Highway System, which includes I-81. The level of service standard for mainline operations of I-81 is LOS B in rural areas and LOS C in urban areas. The standard for all ramps and weave areas (the crossing of two or more traffic streams traveling in the same direction along a significant length of highway) is

2 *Highway Capacity Manual*; Transportation Research Board, National Research Council; Washington D.C. 2000

LOS C. Figure 2-4 depicts existing levels of service along the corridor (see Chapter 8, *Figures*). The major findings of the existing 2004 level of service analysis are:

Mainline

- In the northbound direction, 24 miles (7 percent) of I-81 operate worse than the level of service standard.
- In the southbound direction, 32 miles (10 percent) of I-81 operate worse than the level of service standard.

Ramps and Weave Areas

- In the northbound direction, 2 of the 189 ramps (1 percent) serving I-81 in Virginia operate worse than the level of service standard.
- In the southbound direction, 2 of the 192 ramps (1 percent) operate worse than the level of service standard.
- None of the ten weave areas along I-81 (five northbound and five southbound) operate worse than the level of service standard.

Although most of I-81 operates above the LOS standard, like many other facilities the level of service has been observed to be below the standard during inclement weather and vehicular crashes or incidents. The analyses of level of service do not consider these operational constraints, only traffic volume and roadway geometry.

2.3.3 Speeds

The overall average travel speed on I-81 is currently 69 miles per hour (mph). The 85th percentile speed (the speed at or above which 85 percent of vehicles are moving) is 71 mph in the southbound direction and 72 mph in the northbound direction. These speeds all exceed the posted speed limits which vary from 60 to 65 mph throughout the length of I-81, indicating that, generally, conditions along I-81 do not currently impede traffic flow. In 2035, the projected average No-Build speeds (54 mph) are well below the current 85th percentile, which is an indication of increased congestion in the future. For more information on existing and future speed conditions, see the *I-81 Corridor Improvement Study Transportation Technical Report.*

2.3.4 Safety

Safety was analyzed along I-81 to determine if the traffic demands, combined with the geometric conditions of the highway or its ramps, have resulted in unsafe operating conditions. VDOT safety data for the three-year period from January 2000 to December 2002 were analyzed as part of this study. The following section summarizes these safety data. The

detailed analysis can be found in the *I-81 Corridor Improvement Study Transportation Technical Report*.

Statewide weighted crash scores are determined so that crash statistics can be compared among similar highways within a state. To determine the weighted crash score, crashes are scored as one point for property damage, eight points for crashes involving injuries, and 20 points for crashes involving a fatality. From these crash scores, an overall statewide average for a functional class of highway is published. The 2002 statewide weighted crash score for interstate highways in Virginia is 277 per 100 million vehicle miles of travel. The I-81 weighted crash score is less than this statewide weighted crash score and is 160 per 100 million vehicle miles of travel.

Specific segments that were identified with weighted crash scores more than double the statewide weighted crash score (see Figure 2-5 in Chapter 8, *Figures*)) include:

- Mileposts 49 to 48 southbound (north of Marion);
- Mileposts 73 to 74 northbound (Wytheville);
- Mileposts 94 to 95 northbound (Pulaski);
- Mileposts 162 to 163 northbound (south of Buchanan);
- Mileposts 168 to 169 northbound (north of Buchanan);
- Mileposts 180 to 181 northbound (north of Natural Bridge);
- Mileposts 292 to 293 northbound (south of Strasburg); and
- Mileposts 314 to 315 northbound (Winchester).

In addition to these, the following segments were identified with weighted crash scores more than 25 percent (but less than 50 percent) higher than the statewide weighted crash score:

- Northbound Direction: Mileposts 7-8; 16-17; 23-24; 45-46; 49-50; 80-81; 105-106; 109-110; 156-157; 181-182; 189-190; 195-196; 213-214; 223-224; 252-253; and 296-298.
- Southbound Direction: Mileposts 319-318; 315-314; 300-299; 285-284; 275-274; 249-246; 206-205; 203-202; 197-196; 171-169; 151-150; 122-121; 95-94; 68-67; 44-43; 35-34; and 8-7.

A total of 21 percent of all crashes (1,207 crashes) and 33 percent of all fatal crashes (23 crashes) occur within the segments identified above. These segments total 45 miles of the corridor or 7 percent of the 650 total corridor miles (325 northbound miles and 325 southbound miles). The review of I-81 crash history over the three-year period from 2000 through 2002 (the most recent period available at the onset of this study) did not show a disproportionately high involvement of trucks in crashes considering the percentage of trucks representing total traffic. Trucks constitute approximately 29 percent of all

vehicle miles traveled and were involved in approximately 29 percent of all reported crashes (1,666 crashes) and 30 percent of all fatal crashes (21 crashes).

The geometric conditions of the highway, combined with speed and weather conditions, may be contributing factors to some crashes along I-81. Some sections of I-81 are more than 40 years old and do not meet current AASHTO geometric design criteria. Geometric conditions that do not meet current AASHTO geometric design criteria involve vertical clearance, sight distance, the absence of truck climbing lanes, shoulder width, and acceleration and deceleration lanes. A detailed review of the existing geometric conditions was completed as part of VDOT's previous I-81 preliminary engineering studies. These studies, combined with a field review performed as part of this study, found that:

- More than two-thirds of I-81 in Virginia has 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; and
- Approximately 53 bridges (42 percent) have vertical clearances less than the criterion of 16.5 feet established in the VDOT Road Design Manual.

In addition to the above findings, numerous geometric conditions that do not meet current AASHTO geometric design criteria have been noted at existing interchanges. Table 2.3-2 shows interchange area features that do not meet current AASHTO geometric design criteria that were identified by the earlier preliminary engineering studies (Anderson and Associates, 1998 and 1999; HDR Engineering, 1998; HSMM, 1998; Mattern and Craig/PBSJ, 1998; Michael Baker, 1998; Whitman, Requart and Associates, 1998; Wiley and Wilson, 1998) and VDOT Staunton District staff. This list is not meant to be all-inclusive and additional interchange geometric features that do not meet current AASHTO geometric design criteria are likely.

Table 2.3-2 Existing I-81 Interchange Geometric Features That Do Not Meet Current AASHTO Geometric Design Criteria

Feature	Number of Locations	Exit Numbers[1]
Ramp geometry and/or length	10	35, 39, 47, 50, 67,70,80,126, 251, 291
Ramp termini spacing on side road	23	24, 26, 29, 32, 35, 39, 45, 47, 60, 80, 84, 86, 89, 92, 109, 205, 243, 245, 273, 302, 307, 310, 313
Weaving distance between northbound ramps	2	14, 94
Weaving distance between southbound ramps	4	220, 221, 222, 247
Stopping sight distance on ramps	3	67, 296, 302
Ramp grade greater than 8 percent	1	45
Ramp design speed less than 25 mph	3	41, 72, 81
Tapers, acceleration and/or deceleration lane lengths	12	132, 137, 140, 141, 143, 146, 156, 162, 167, 168, 180, 323
Substantial ramp delay and backup	4	150, 205, 247, 313
Left-hand exit ramp safety issues	4	143, 180, 191, 300
Ramp geometry at rest area	2	Northbound Milepost 129.3, Southbound Milepost 158

1 More detailed information on the specific locations of these features is provided in the *I-81 Corridor Improvement Study Transportation Technical Report*

These geometric conditions, 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 that were documented by numerous comments received during scoping. (The highway was designed for 15 percent truck traffic but currently experiences truck traffic that comprises 21 to 35 percent of total daily traffic).

2.4 Future Transportation Conditions

Independent of any improvements, traffic demands along I-81 are expected to continue to grow. A number of forecasts have been completed for I-81 over recent years. These sources, as well as historical traffic count data and recent land use projections, were compiled and reviewed as part of this study to determine a future year (2035) forecast for I-81. The year 2035 was selected because the potential improvements identified in this study could take 10 years to complete and they should have a useful life of at least 20 years beyond completion. Forecast methods are described in detail in the *I-81 Corridor Improvement Study Transportation Technical Report*.

2.4.1 Projected Traffic Volumes

Tables 2.4-1 and 2.4-2 on the following pages show traffic growth rates and projections for I-81. They include data used in developing projections of the 2035 No-Build condition. These tables illustrate the substantial increase in the expected number of vehicles on I-81 in 2035.

The 2035 No-Build condition assumes that only those highway projects identified for construction in the Metropolitan Planning Organizations' (MPOs') Long Range Plans throughout the corridor and the Virginia Transportation Six-Year Improvement Program for Fiscal Years 2006-2011 will be built. Additional details on anticipated growth in freight movements along the I-81 corridor and its resultant effect on future truck traffic can be found in the *I-81 Corridor Improvement Study Freight Forecast and Diversion Technical Report*.

Table 2.4-1 Projected Total Traffic Volume Growth Along I-81: 2004-2035

Location (from South to North)	Mileposts	2004 AADT Volume	2035 AADT Volume	2035 AADT Truck Percentage	Average Annual Growth Rate	Aggregate Growth
Route 140 to South Corporate Limit of Abingdon	16.4 and 17.0	42,100	74,400	30%	1.9%	77%
Route 11 to North Corporate Limit of Wytheville (I-77 overlap)	75.4	54,100	100,000	34%	2.0%	85%
Route 177 to Route 8 (near Radford)	110.8 and 113	42,900	77,800	35%	1.9%	81%
Route 581 to Route 115 (Roanoke)	145.3 and 146.1	58,800	114,100	26%	2.2%	94%
Route 11 to Route 11/614 (Buchanan)	164.5 and 167.8	35,600	63,000	45%	1.9%	80%
Route 606 to Augusta County Line (I-64 overlap)	207.5 and 207.3	42,900	77,700	42%	1.9%	81%
Route 11 to Route 659 (Harrisonburg)	245.3 and 245.4	49,400	91,000	33%	2.0%	84%
Route 50 to Route 7	315.8 and 316.0	58,500	109,000	26%	2.0%	86%
Average at Permanent Count Stations		48,000	88,400	33%	2.0%	84%

AADT – Average Annual Daily Traffic

1 2004 traffic volumes are based on 2003 AADT (see Table 2.3-1) grown by 3.3 percent to reflect annual growth and balanced in conjunction with 2004 ramp counts.

Table 2.4-2 shows growth rates in truck traffic volumes and projected truck traffic volumes on I-81.

Table 2.4-2 Projected Truck Traffic Volume Growth Along I-81

I-81 Segment	Existing AADT Trucks	2035 AADT Trucks	Average Annual Growth Rate	Aggregate Growth
Route 140 to South Corporate Limit of Abingdon	9,180	22,310	2.8%	143%
Route 11 to North Corporate Limit of Wytheville (I-77 overlap)	13,450	33,970	2.9%	153%
Route 177 to Route 8 (near Radford)	11,240	27,120	2.8%	141%
Route 581 to Route 115 (Roanoke)	11,990	30,210	2.9%	152%
Route 11 to Route 11/614 (Buchanan)	11,970	28,130	2.7%	135%
Route 606 to Augusta County Line(I-64 overlap)	13,480	32,750	2.8%	143%
Route 11 to Route 659 (Harrisonburg)	12,870	30,330	2.7%	136%
Route 50 to Route 7	11,850	28,220	2.7%	138%

AADT – Average Annual Daily Traffic

2.4.2 Levels of Service

The 2035 traffic operating conditions were analyzed and the results are depicted in Figure 2-6 in Chapter 8, *Figures*. The vast majority of I-81 (over 90 percent) is expected to operate worse than the LOS standards by 2035. Areas of significant congestion include Christiansburg, Roanoke, Staunton, Harrisonburg, and Winchester.

2.4.3 Safety

Safety is a problem in some locations today and will likely worsen by 2035 as volumes increase, the operating conditions deteriorate, and the existing geometric conditions remain.

2.5 Summary

Improvements to I-81 are needed to address existing and future capacity and safety conditions on I-81 as summarized below.

2.5.1 Existing Transportation Conditions Along I-81

- Traffic volumes have doubled and, in some cases, tripled since 1978.
- 24 northbound miles operate at worse than the LOS standard (see Figure 2-4 in Chapter 8, *Figures*).
- 32 southbound miles operate at worse than the LOS standard (see Figure 2-4 in Chapter 8, *Figures*).

- 24 northbound miles experience crash rates more than 25 percent higher than the statewide weighted crash score. Seven of these northbound miles experience more than twice the statewide weighted crash score.
- 21 southbound miles experience crash rates more than 25 percent higher than the statewide weighted crash score. One of these southbound miles experiences more than twice the statewide weighted crash score.
- 21 percent of all crashes and 33 percent of all fatal crashes occur within segments totaling 45 miles in the corridor (approximately 7 percent of the 650 total corridor miles – 325 northbound miles and 325 southbound miles).
- 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.
- More than two-thirds of I-81 in Virginia has inside shoulder widths that do not meet current AASHTO geometric design criteria based on the volume of heavy vehicles using the highway.
- More than 100 locations with sight distances that do not meet current AASHTO geometric design criteria because of the alignment of the highway have been identified.
- Ten locations have conditions that may slow truck traffic to speeds below the minimum for interstate travel.
- Approximately 53 bridges (42 percent) have vertical clearances that do not meet the design criteria established in the VDOT Design Manual.

2.5.2 Projected 2035 Conditions

- 2004 traffic volumes are expected to almost double by 2035.
- Truck traffic is projected to grow at a faster rate than general traffic.
- 295 northbound miles (91 percent) will operate at worse than the LOS standard (see Figure 2-6 in Chapter 8, *Figures*).
- 299 southbound miles (92 percent) will operate at worse than the LOS standard (see Figure 2-6 in Chapter 8, *Figures*).
- Safety is a problem at some locations today and would likely worsen by 2035, as traffic volumes increase and existing geometric conditions remain.