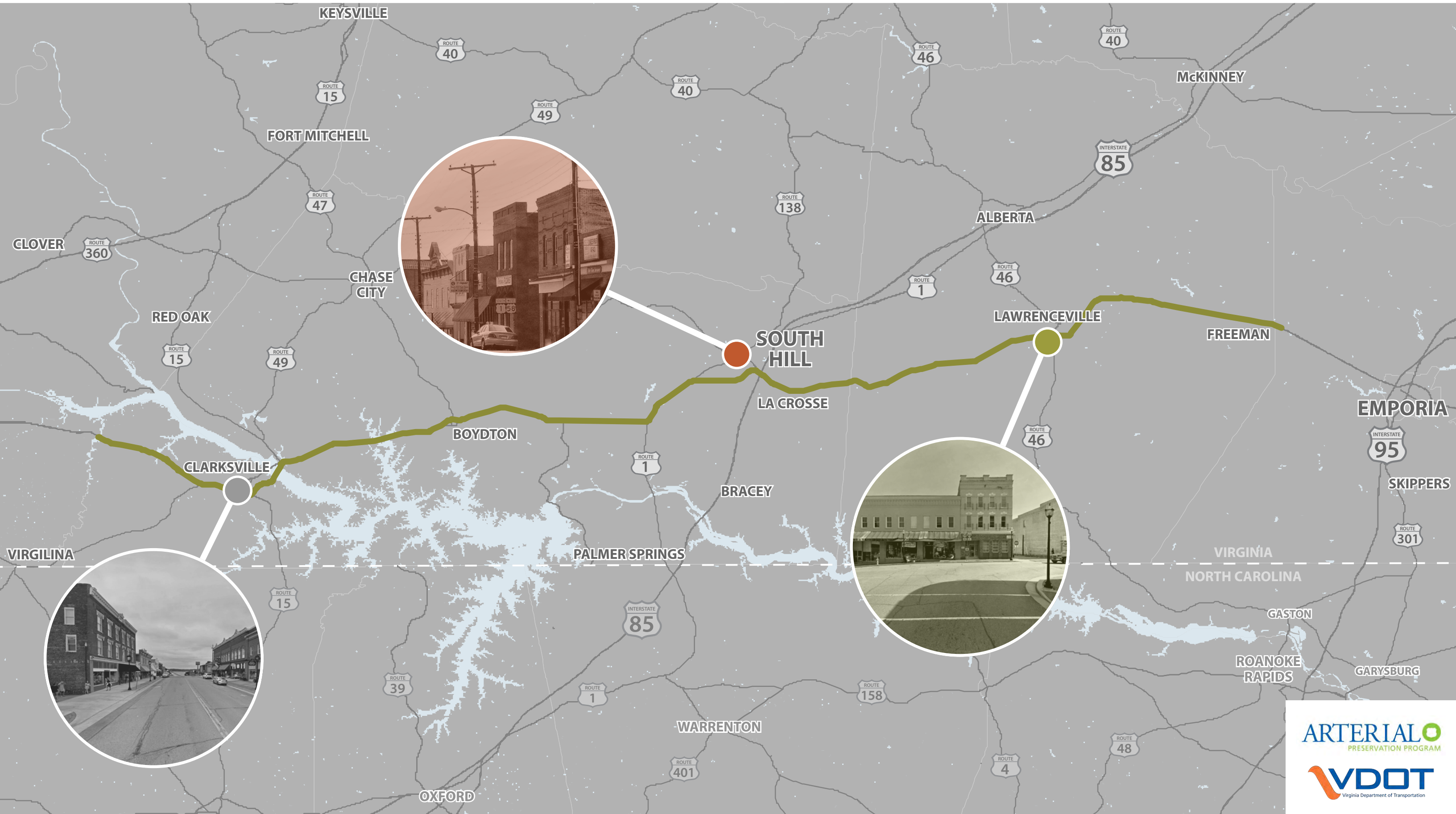


US 58 ARTERIAL PRESERVATION



ARTERIALO
PRESERVATION PROGRAM

VDOT
Virginia Department of Transportation

US 58 Arterial Preservation Plan

Brunswick and Mecklenburg Counties

November 1st, 2019

Prepared for:



Virginia Department of Transportation

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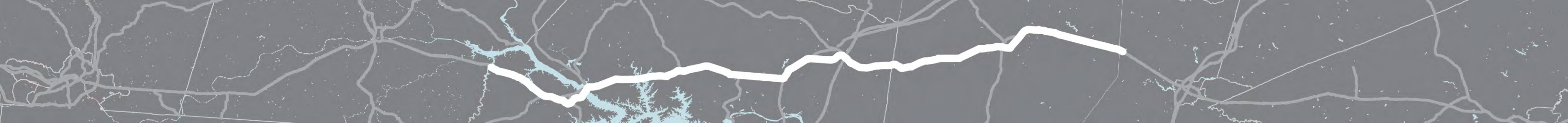
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LIST OF ACRONYMS

- ADT Average Daily Traffic
- HCM Highway Capacity Manual
- LOS Level of Service
- PDC Planning District Commission
- PSI Potential for Safety Improvement
- TAZ Traffic Analysis Zone
- TMPD..... Transportation and Mobility Planning Division
- TOSAM..... Traffic Operations and Safety Analysis Manual
- TTR Travel Time Ratio
- VDOT Virginia Department of Transportation

CHAPTER 1: INTRODUCTION

1.1 Study Purpose

The purpose of the US 58 Arterial Preservation Plan is to develop a holistic approach that identifies ways to ensure the safety and preserve the capacity of the US 58 study corridor without wide-scale roadway widenings or increased signal proliferation. This Arterial Preservation Plan has been requested to identify investment recommendations that will help preserve and enhance this key transportation corridor due to the important role it plays in the region as a key freight corridor serving the Port of Virginia, a vital link within the Commonwealth, and a key facility for connections to North Carolina and points south.

1.2 What is the Arterial Preservation Program?

The Virginia Department of Transportation's (VDOT) Arterial Preservation Program is designed to preserve and enhance the capacity and safety of the critical transportation highways in Virginia. These major highways accommodate the long-distance mobility of people and goods throughout the Commonwealth. Preserving mobility on these corridors is critical to the current and future economy.

Within the framework of the Arterial Preservation Program, VDOT is developing methodologies to consistently and programmatically evaluate the corridors, creating a toolbox of preservation and

enhancement strategies and identifying opportunities to implement these strategies. As an alternative to widening major highways to add capacity, preservation and enhancement strategies promote the use of innovative transportation solutions, minimizing delays for through traffic and improving safety, while incorporating local economic development goals. Developed in partnership with localities, the strategies are used as tools to plan for infrastructure that supports future land use and development.

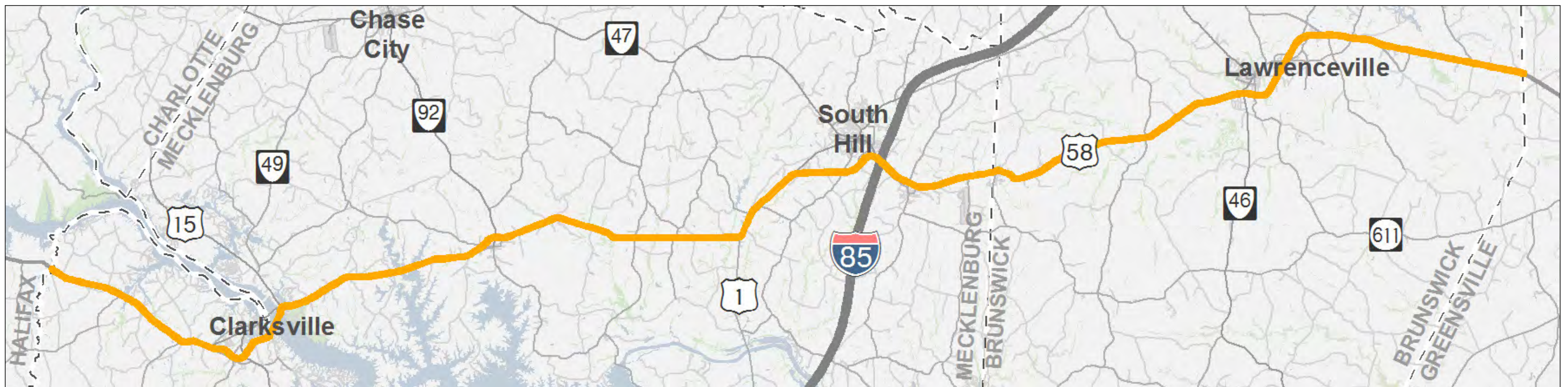
1.3 Study Area

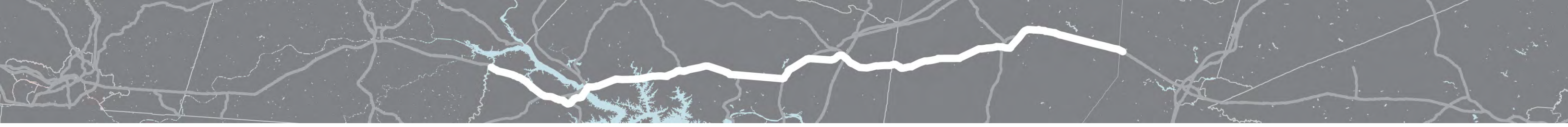
The study area, located in VDOT's Richmond construction district, traverses Brunswick and Mecklenburg Counties and extends from the Hampton Roads construction district boundary at the Greenville / Brunswick corporate limits to the western termini at the Lynchburg construction district boundary at the Mecklenburg / Halifax corporate limits. The study area is 65.7 miles in length. Figure 1 depicts the study area for the US 58 Arterial Preservation Plan.

1.4 Review of Existing Studies and Documents

A literature review gathered data and documented any proposed developments or projects for the US 58 corridor within the study area. These documents assisted in the development of land use assumptions

Figure 1. Study Area





and growth patterns and helped identify potential problem areas along the US 58 corridor. The literature review included the comprehensive plans for each locality in the study area, the Six-Year Improvement Plan, long range transportation plans, and corridor studies as noted below:

- VTrans2040
- Southside Planning District Commission (PDC) 2035 Regional Long Range Transportation Plan
- Brunswick County Comprehensive Plan
- Mecklenburg County Long Range Plan
- Town of Boydton Comprehensive Plan
- Town of Clarksville Comprehensive Plan
- Town of South Hill Comprehensive Plan
- US 58 Corridor Study South Hill, VA – La Crosse, VA (VDOT)

1.5 Public Involvement Process

The public involvement process began with the April 17th, 2018 project kick-off/scoping meeting and subsequent discussion with the core study team. Project stakeholders involved in the development of the study included:

- Brunswick County
- Mecklenburg County
- Town of Boydton
- Town of Brodnax
- Town of Clarksville
- Town of LaCrosse
- Town of Lawrenceville
- Town of South Hill
- Southside PDC
- VDOT at the Residency, District, and Central Office level

This stakeholder group consisted of staff-level representatives from each of the identified organizations. This group met at key milestones throughout the study to review progress and results. These meetings were held at the Southside PDC offices located at 200 S. Mecklenburg Avenue in the Town of South Hill. Table 1 lists the dates and topics of these meetings.

Table 1. Core Study Team Meetings

Meeting Date	Meeting Topic
April 17, 2018	Study Kick-Off/Orientation
September 18, 2018	Existing Conditions/Opportunities for Improvement
May 20, 2019	Preliminary Study Recommendations
August 7, 2019	Final Study Recommendations

1.5.1 Stakeholder Surveys

As part of the outreach process, a web-based survey was conducted with study stakeholders in the summer of 2018 to understand current issues along the corridor and possible changes to the land use and local plans in the study area. Respondents also ranked highly-needed improvements in the corridor. Table 2 presents a summary of responses received.

Table 2. Stakeholder Survey Responses

Current Issues Along the Study Corridor (Not Ranked)
Safety
Allow easier access to businesses
Corridor needs updating to current standards
Need improved / additional turning lanes
Highly Needed Improvements (Ranked)
1. Access improvements
2. Safety improvements
3. Operational improvements
4. Geometric improvements

1.5.2 Public Outreach

A public meeting was held on January 29, 2019 at Southside PDC to review the existing conditions assessment and opportunities for improvements along the US 58 corridor. Eighteen citizens and stakeholders attended this meeting.

Members of the public were invited to provide comments on the preliminary findings and to suggest additional locations where improvements should be considered. Feedback received from the public was further reviewed during the recommendations’ development process.

General comments received at the public meetings included:

- Concerns with truck traffic
- Concerns with vehicle speeds
- Need to improve median crossovers and add turn lanes
- Need to update corridor to current design standards
- Poor visibility at crossovers

Specific areas of concern from the public meeting included:

- Cattail Drive and Twin Ponds – No turn lanes and dangerous crossing maneuver
- Crashes from Totaro Creek to US 46
- Dangerous turning movements around Brunswick Square
- Speed limit not observed in Brodnax
- I-85 in South Hill to La Crosse needs attention
- Turn lane improvements and acceleration lanes on US 58 in Boydton

A second and final public meeting was held on September 4, 2019 at Southside PDC to present the final corridor recommendations. The meeting included a formal presentation from the study team, various displays describing the study results, recommendations, and a citizen comment area. Twenty citizens and stakeholders attended the second public meeting. No written comments were submitted by the public in response to the final study recommendations.

CHAPTER 2: EXISTING CONDITIONS

2.1 Existing Land Use

The study area traverses miles of rural land, occasionally passing by the edge of a small town or serving as a major corridor for larger population centers' suburbs. The landscape is primarily agricultural or wooded in land use. The rural portions of the corridor feature large lot residential uses, large-scale industrial uses, and institutional uses. At major crossroads, low-density small-town development is likely and includes smaller lot residential uses as well as small-scale commercial and industrial. Further East, approaching Lawrenceville and South Hill, the study area becomes suburban in character, becoming the primary access route for regionally-significant commercial centers.

Existing Land Use Key Findings:

- Clusters of single-family homes with direct access to US 58:
 - In the Town of Brodnax;
 - In the Town of La Crosse;
 - Between Park View Circle and US 1 in Mecklenburg County; and
 - Between Carters Point Road and Buffalo Springs Road in Mecklenburg County.
- Retail development with direct access to US 58:
 - Brunswick Square in Lawrenceville;
 - In the Town of La Crosse; and
 - In the Town of South Hill.
- Industrial development with direct access to US 58:
 - Dominion Power, Brunswick County;
 - Redland Brick, Brunswick County;
 - Scotts, Brunswick County;
 - Brodnax Lumber, Brunswick County; and
 - Microsoft Data Center, Town of Boynton.
- Institutional uses with direct access to US 58:
 - Park View High School, Mecklenburg County; and
 - Park View Middle School, Mecklenburg County.
- Other relevant development with direct access to US 58:
 - Lawrenceville-Brunswick Municipal Airport.

2.2 Existing Infrastructure

A field review was conducted on June 12, 2018 at the outset of the study to review roadway and intersection configurations, identify deficiencies and areas of concern including sight distances or grade issues, identify unique roadway features, and observe traffic operations. US 58 is primarily a four-lane roadway running east-west and includes an interchange with Interstate 85 (I-85). The US 58 study corridor intersects with US 1 and US 15 in Mecklenburg County. Access along US 58 is primarily uncontrolled within the study area. The only sections along the corridor where access is fully or partially controlled are between US 58 Bus and US 15 in Mecklenburg, around Clarksville, and between Route 46 (Christanna Highway) and Route 641 (Bright Leaf Road). A full description of the field review for the corridor is available in Appendix B.

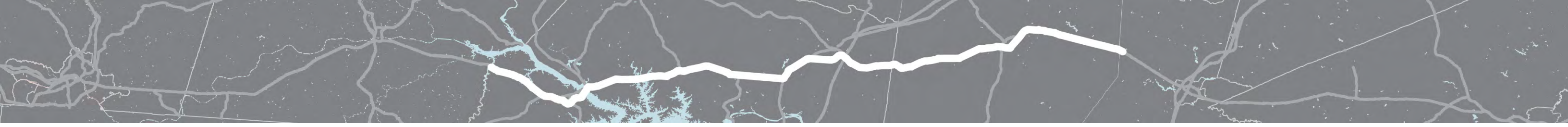
The corridor has several roadway segments with design features that may reduce capacity, level of service or safety. The western end of the corridor is characterized by numerous intersections and crossovers with sub-standard turn lanes. Often, significant grade differentials exist between the eastbound and westbound lanes of US 58 at intersections and crossovers. At Route 92 (Washington Street) and Route 4 (Buggs Island Road), limited sight distance impairs turning movements. Between the western US 1 intersection and Route 780 (Theater Road), US 58 has a two-way left turn lane accompanied by a noted increase in direct access points to US 58.

The highest intensity of development along the corridor is located in South Hill due to the presence of the I-85 interchange. The interchange suffers from adjacent roadways in close proximity, improper pavement markings for the southbound I-85 to the westbound US 58 through movement, and no turn lane or taper for westbound US 58 to northbound I-85. On the eastern side of the interchange, motorists were observed cutting across eastbound US 58 from the northbound I-85 off-ramp to turn left in a distance of less than 600 feet. Numerous access points and median crossovers accompanied by significant grade differences between lanes complicate maneuvers in this area.

East along the corridor, heading toward Brodnax, shoulder widths and shoulder types become inconsistent and crossovers lack turning lanes. US 58 in Brodnax is characterized by a continuous two-way left turn lane with frequent access points and narrow shoulders. The raised median resumes east of Brodnax, but several crossovers lack turn lanes and have poor sight distance. From Route 46 (Christanna Highway) to Route 641 (Bright Leaf Road), US 58 is primarily limited access. Route 641 is a skewed intersection that may be difficult for trucks to navigate. The pattern of frequent crossovers with insufficient turn lanes continues across the rolling terrain to the eastern termini of the study corridor. The results of the full inventory field review are available in Appendix C.

Figure 2. The Intersection of Route 58 and I-85 in South Hill





2.3 Existing Access

The number of crossovers such as intersections and median crossovers, points along the US 58 corridor were inventoried and the distance between each point measured and reviewed for compliance with VDOT’s Access Management Spacing Standards which takes into account functional classification, roadway speed, and access type.

As identified in Table 3 and Figure 3, the evaluation of crossovers shows that only 54% percent (2.8 mi) of westbound segments and 32% percent (2.4 mi) of eastbound segments in the study corridor are non-compliant. The most significant areas of non compliance are in the Town of South Hill, and near the Town of Lawrenceville.

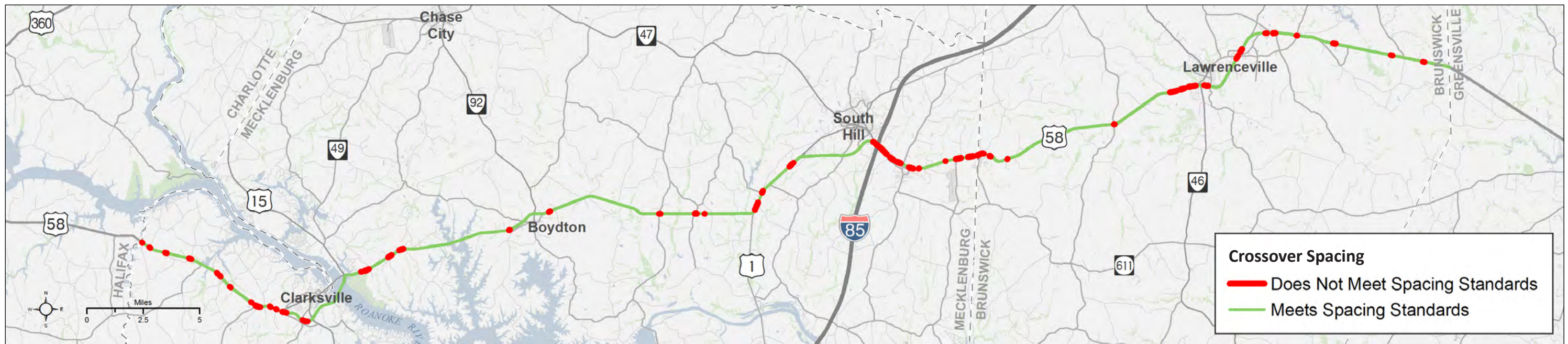
Figures 4 through 7 present a comprehensive inventory of access points and crossovers along the study corridor.

Table 3. Crossover Points Findings*

	Crossover Points		
	Compliant	Non-Compliant	Total
Eastbound	39	18	57
Westbound	25	29	54
Total	64	47	111

*Compliance was calculated based on VDOT design standards, Table 2-2 of the Virginia Road Design Manual Appendix E, for access management of entrances and intersections.

Figure 3. Crossover Locations: Of 111 total crossover locations, 64 meet VDOT spacing requirements



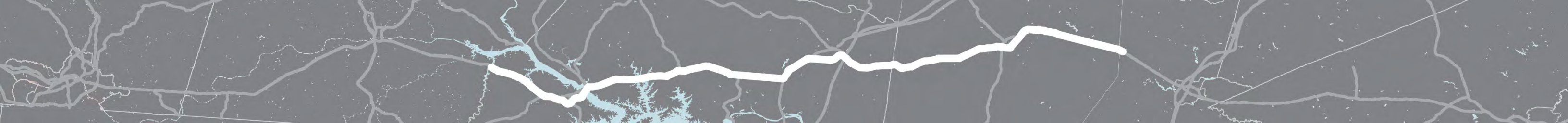


Figure 4. Eastbound Access Points, Western Half of Study Area

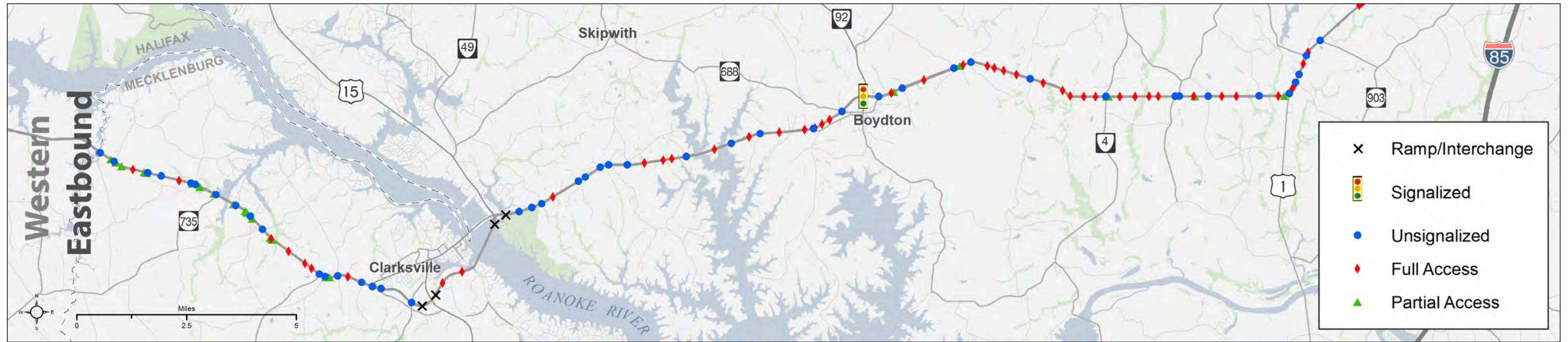
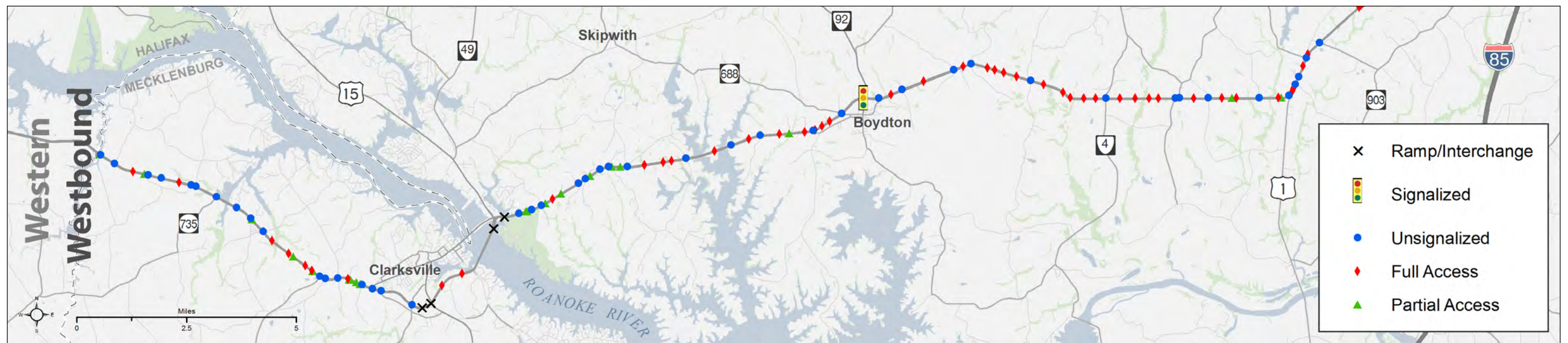


Figure 5. Westbound Access Points, Western Half of Study Area



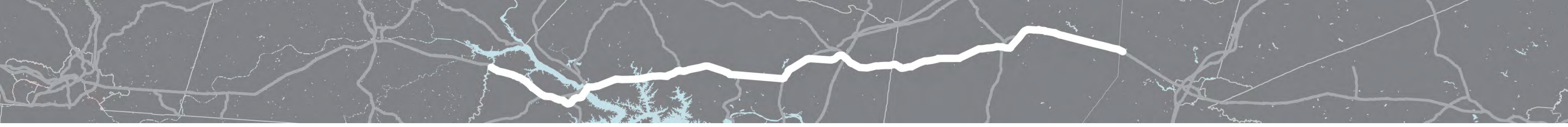


Figure 6. Eastbound Access Points, Eastern Half of Study Area



Figure 7. Westbound Access Points, Eastern Half of Study Area



2.4 Crash Analysis

An evaluation of corridor safety was conducted based on an analysis of crash information. The latest five years of available crash data (2013 to 2018) was obtained from VDOT's Roadway Network System to identify potential locations for safety improvements.

Analysis of existing conditions found that the crash rate for over 80% of the corridor is at or below the statewide average for a rural arterial. Portions of the corridor with crash rates that are greater than 100% above the statewide average are near or within the Towns of Lawrenceville and South Hill as well as near the western Mecklenburg County Line. Figure 10 illustrates the crash rate within the study area, Figure 11 illustrates the crash density within the study area, and Figure 12 illustrates the crash severity within the study area.

Crash Analysis Key Findings:

- 845 total crashes were reported between 2013 and 2018 along the study corridor. In 69% of crashes only property damage occurred with no injuries or fatalities. 2% of crashes resulted in fatal injury.
- The greatest number of crashes were fixed-object, off-road collisions, which accounted for 32.0% of crashes. This is followed closely by angle collisions, which accounted for 21.5% of crashes.
- The crash rate is highest in the Town of South Hill near the I-85 interchange.

In accordance with VDOT's Arterial Preservation Program, innovative intersections and access management techniques were evaluated where applicable during the recommendations development of this study. Innovative intersections and access management inherently provide safety benefits by removing and separating conflict points that may exist in traditional intersection designs.

The most common method for determining the potential safety benefits of a roadway improvement is the calculation of expected crash reduction. This is done using crash reduction percentages from the Federal Highway Administration's (FHWA) Crash Modification Factors (CMF) Clearinghouse website, related safety research, and Virginia crash rate summaries and models. A CMF is an indicator of how crash occurrence will change as a result of a project based on evidence from similar improvements. A CMF less than 1.0 indicates a treatment that has a potential to reduce crashes. For example, a treatment with a CMF of 0.86 indicates that there is an expected 14 percent reduction in total estimated crash frequency. Table 4 displays fatal and injury crash CMFs used by VDOT for typical innovative intersections and access management treatments. Those in bold have been recommended at one or more areas along the corridor as part of this study.

Table 4. Crash Modification Factors

Improvement Type / Features	Fatal + Injury CMF
Intersections	
Roundabout: Convert signal to roundabout	0.40
Roundabout: Convert stop/yield control to roundabout	0.20
Access Management: Close median opening (allow right-in right-out only)	0.40
Two-way Stop Control to Restricted Crossing U-Turn	0.65
Signal Control to Signalized Restricted Crossing U-Turn	0.80
Signal Control to Continuous Green T Signal	0.85
Stop Control to Continuous Green T	0.85
Displaced Left Turn	0.80
Median U-Turn	0.70
Interchanges	
Non-Freeway Segment: Convert Diamond to Diverging Diamond Interchange	0.30
Non-Freeway Segment: Convert Diamond to Single Point Urban Interchange	0.60
Segments	
Access Management: Reduce Driveway Density (eliminate/close)	0.70
Access Management: Provide Median (allow right-in right-out only)	0.40

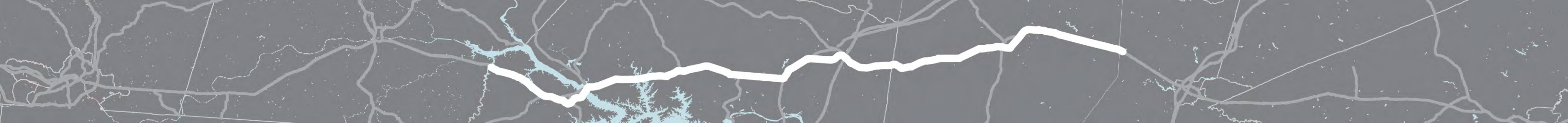


Figure 8. Crashes by Type

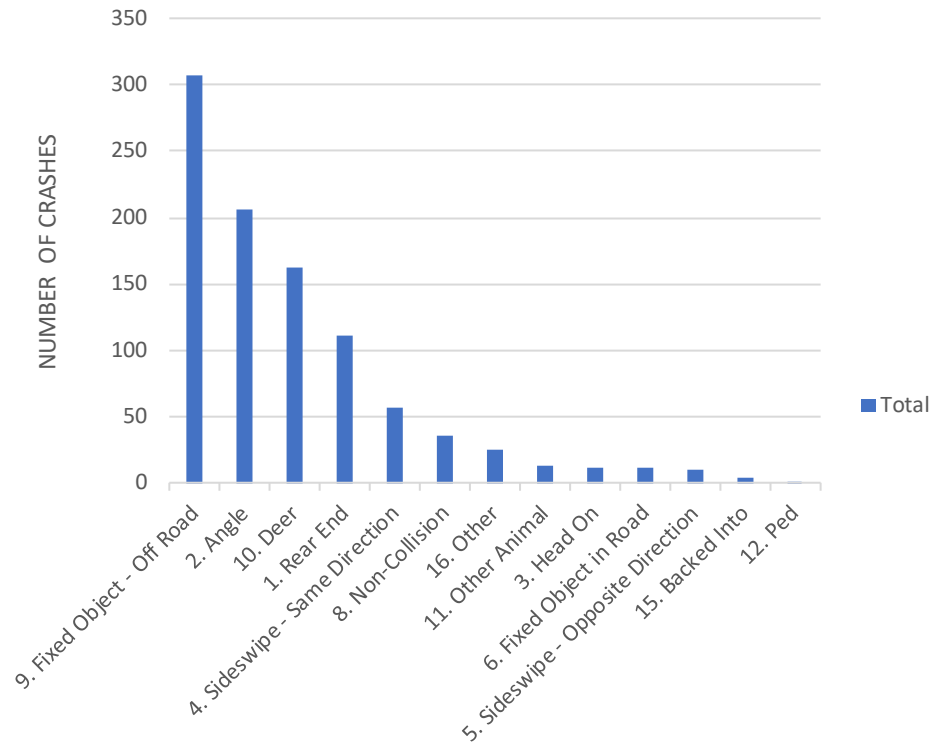


Figure 9. Crashes by Severity

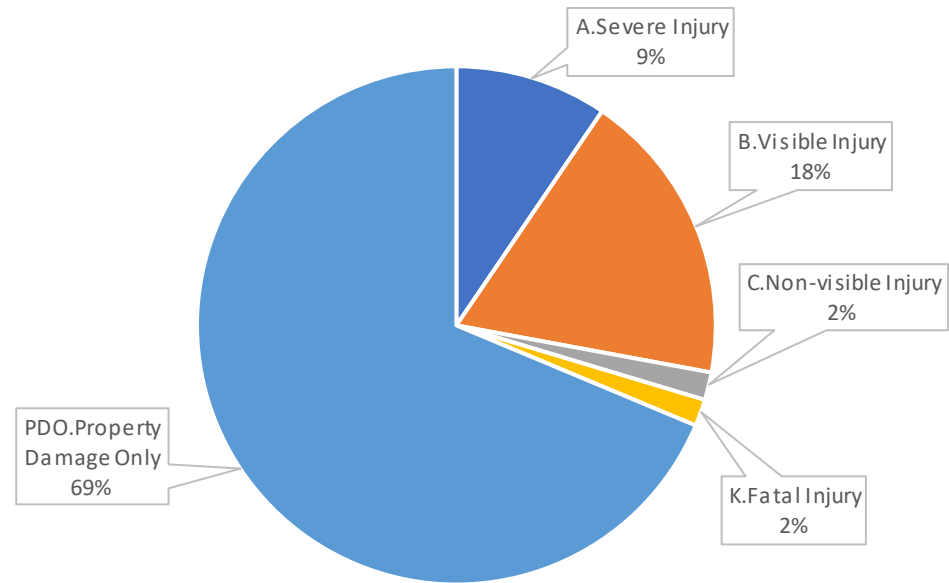


Figure 10. Corridor Crash Rates



Figure 11. Corridor Crash Density

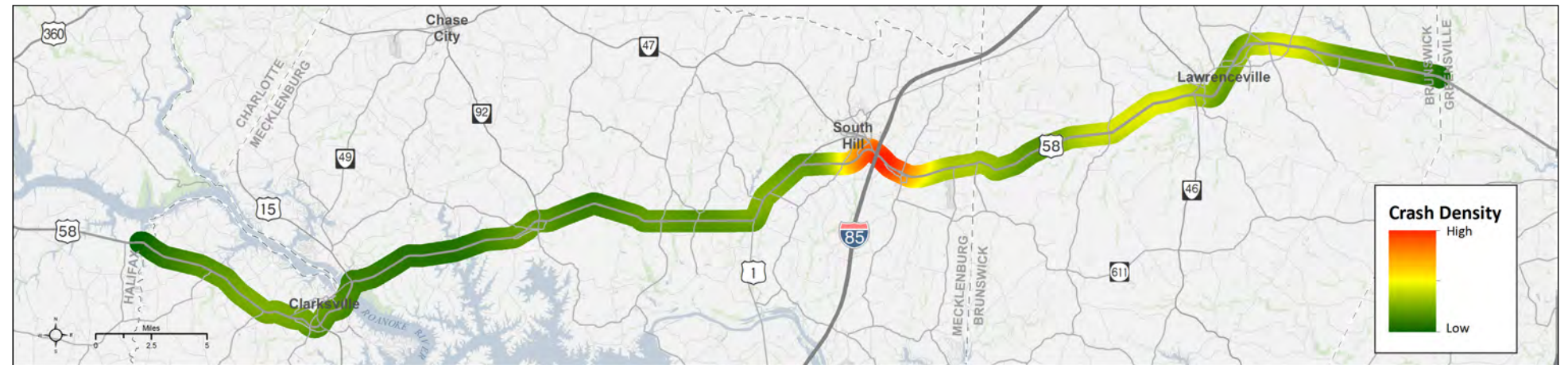
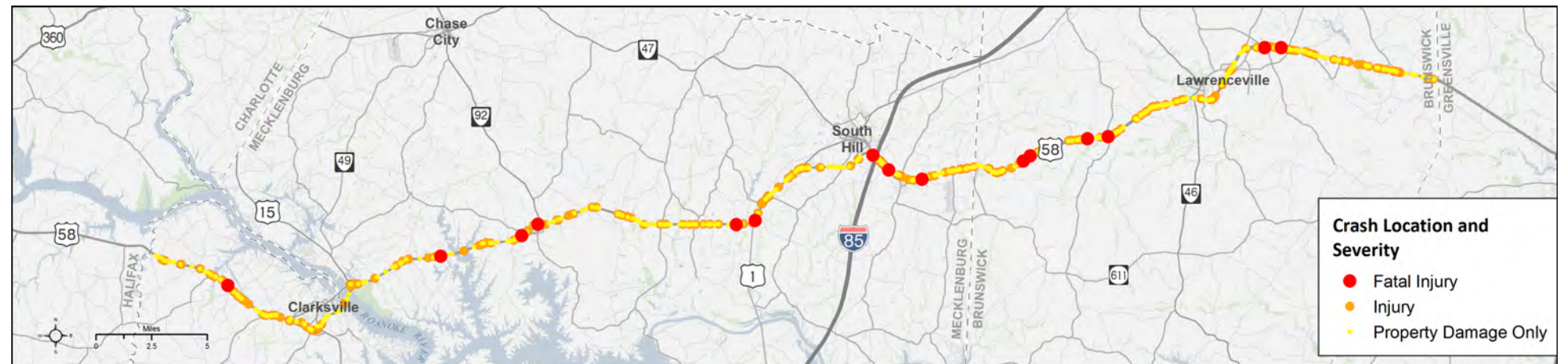


Figure 12. Corridor Cash Severity



2.5 Existing Traffic Volumes

Existing peak hour traffic volumes were developed using turn movement counts collected on May 16th, 2018 at the intersections listed below.

- US 58 / Business US 58 (Virginia Avenue) – Town of Clarksville
- US 58 / US 15 North – Town of Clarksville
- US 58 / VA 92 (Washington Street) – Mecklenburg County
- US 58 / VA 4 (Buggs Island Road) – Mecklenburg County
- US 58 / US 1 (Big Fork) – Mecklenburg County
- US 58 / VA 780 (Theater Road) – Town of South Hill
- US 58 / VA 641 (Bright Leaf Road) – Brunswick County

A full list of 2018 intersection volumes by AM and PM peak hour is found in Appendix D. The AM and PM peak hours are the times with the highest traffic volumes in the study area. The AM peak hour for analysis is 7:15 to 8:15. The PM peak hour for analysis is 4:45 to 5:45.

2.6 Existing Traffic Operations

The peak hour intersection turning movement counts developed in the previous section were analyzed in Synchro using the Highway Capacity Manual (HCM) module for both the AM and PM peak hours. Level of Service (LOS) is a qualitative measure used to relate the quality of traffic operations using letters A through F, where A represents free flow conditions and F represents extreme congestion. The operational analysis results for the study intersections are presented in Table 5. As shown in the table, all study intersections operate at LOS A for both peak hours, however congestion and delay increase as vehicles approach the Town of South Hill. Appendix

E contains more detailed results of intersection operations for each intersection analyzed along the corridor.

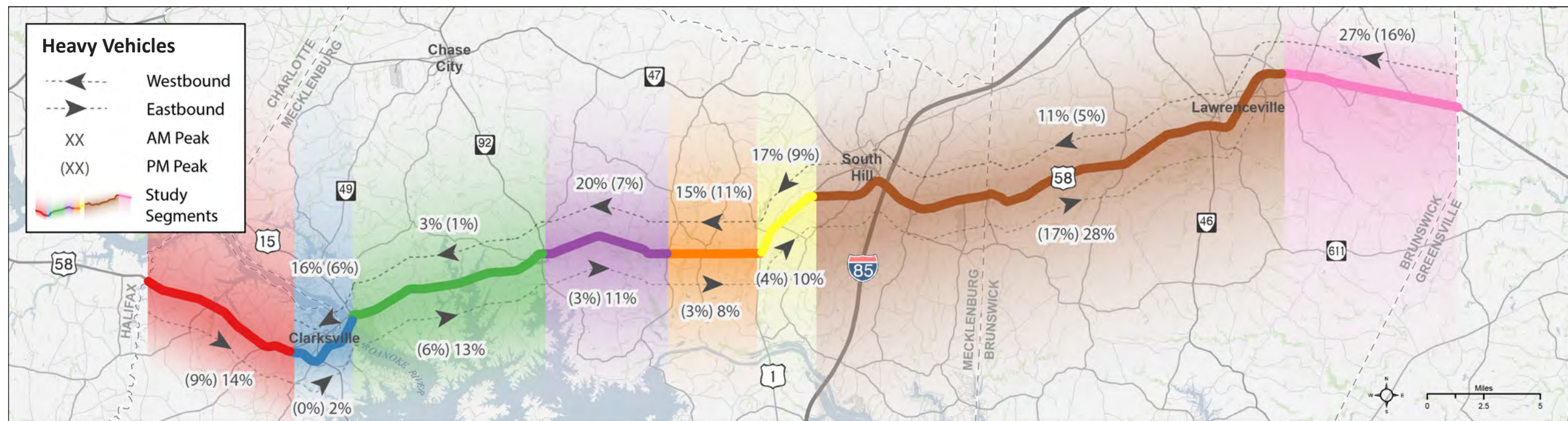
Existing heavy vehicle percentages vary throughout the corridor. Heavy vehicle percentages are highest east of VA 92 (Washington Street). Further information about heavy vehicle percentages and volumes along specific segments of the study corridor is presented in Figure 13.

Figure 14 and Figure 15 represent the Travel Time Ratio (TTR) across the corridor, where TTR is defined as the ratio of commuting travel time to free-flow travel time. For example, a TTR of 1.10 indicates that the peak-period travel time is 10% greater than free-flow travel time.

Table 5. Existing Level of Service

2018 Existing Conditions		
Intersection	AM LOS	PM LOS
Virginia Avenue & Route 58	A	A
VA 92 & Route 58	A	A
Kingdom Hall/US 1 & Route 58	A	A
Theater Road & Route 58	A	A
Main St(LaCrosse) & Route 58	A	B
VA 641 (BrightLeaf Rd) & Route 58	A	A

Figure 13. Heavy Vehicle Percentages



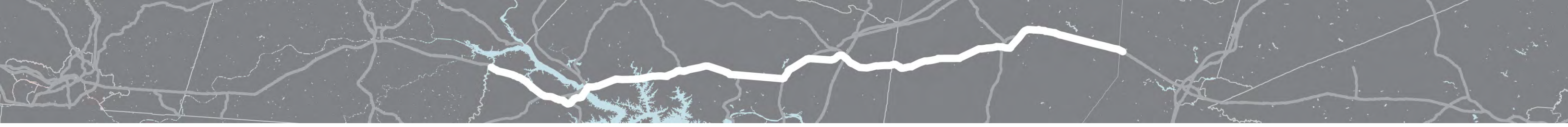


Figure 14. AM Travel Time Ratio

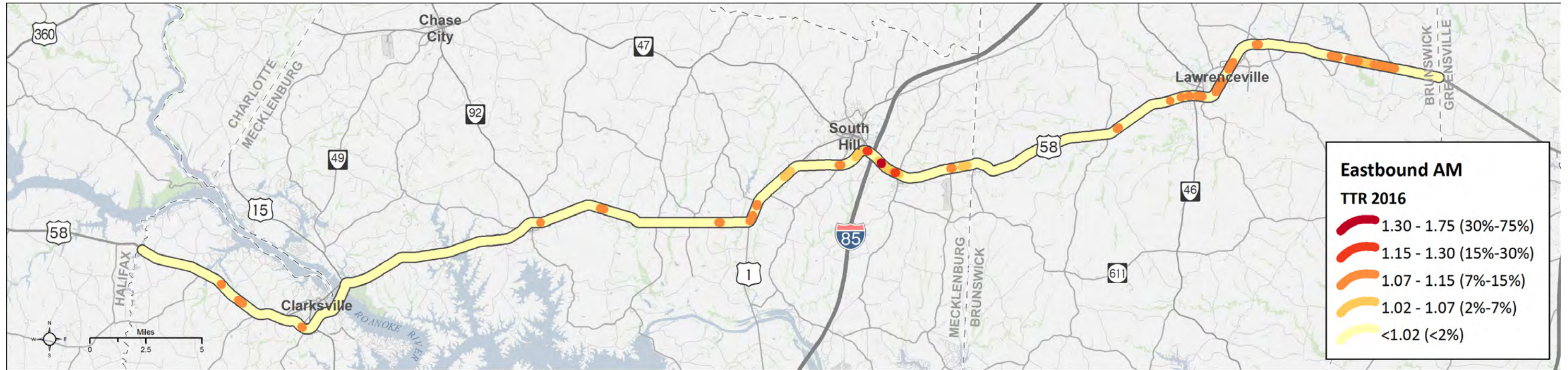
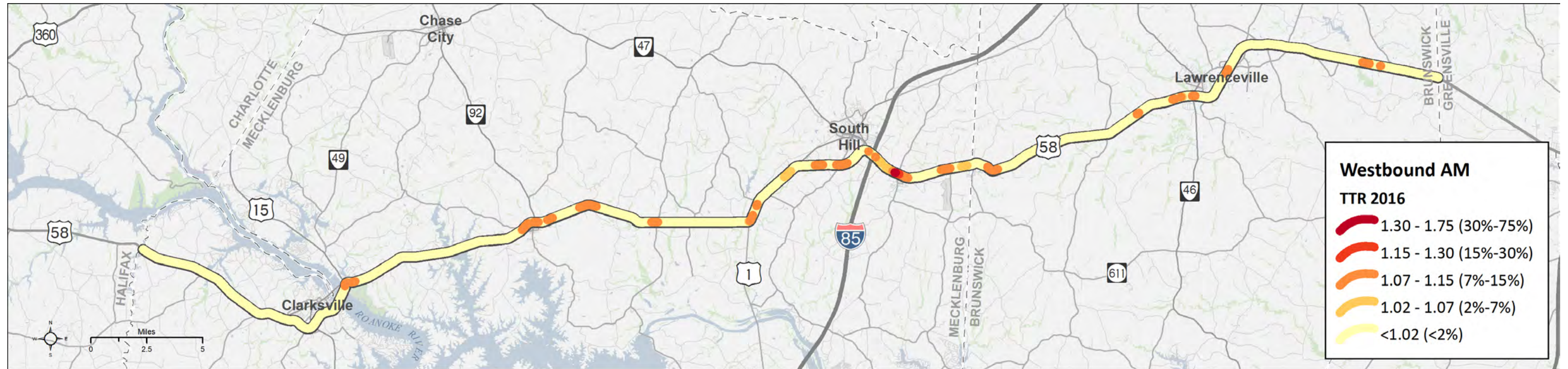




Figure 15. PM Travel Time Ratio



CHAPTER 3: FUTURE CONDITIONS

3.1 Development of Growth Rates

Traffic volumes along the US 58 Corridor are anticipated to continue growing. Both Brunswick and Mecklenburg Counties note the US 58 corridor as appropriate for industrial development and commercial development along the roadway in their comprehensive plans. Future development, including proposed industrial parks near the Town of La Crosse, increased commercial development near the I-85 interchange, and the continued development of facilities such as the Microsoft Data Center, will contribute to traffic growth.

In addition to local growth, US 58 is the second busiest east-west corridor that connects the Port of Virginia to critical markets and that commercial growth is anticipated to continue. Updated traffic growth rates for the US 58 corridor were developed collaboratively using previous studies, historic traffic counts, the statewide travel demand model, and stakeholder input. The following sections outline the steps taken to develop the future 2040 traffic volumes.

3.1.1 Historical Average Annual Traffic Volumes and Travel Patterns

Historical average annual traffic volumes help establish a trend along the corridor and highlight segments where traffic volume may increase. The study team used VDOT historic traffic counts for fifteen segments in the corridor. For the historic data, VDOT collects traffic counts from sensors in average daily traffic (ADT) volume. Table 5 outlines these historic traffic volumes from 2010 to 2018.

3.1.2 Socio-Economic Data

This corridor plan derived estimated changes in population, households, and employment for the study area from the Statewide Travel Demand Model. Employment and population estimates are for the traffic analysis zones (TAZs) along the study corridor as shown in Figure 16. Table 6 summarizes the 2015 and 2040 estimates for population, household, and employment data from the Statewide Travel Demand Model for Brunswick and Mecklenburg Counties.

The socio-economic data from the Statewide Travel Demand Model shows an anticipated overall percent change for population, households, and employment in the study corridor TAZs. The corridor is anticipated to see modest growth with a 6% increase in population in Brunswick County and a 4% increase in population in Mecklenburg County. Employment along the corridor is anticipated to grow at a quicker pace with a 20% increase in employment for Brunswick County and a 9% increase in employment for Mecklenburg County.

3.1.3 Annualized Background Growth Rate

A one percent non-compounded annual background growth rate was developed using the historic traffic counts, statewide traffic model, existing documentation, and coordination with VDOT and the local communities. This background growth rate represents the expected increase in traffic volumes that travel through the entire US 58 study area and do not have an origin or destination along the route

Table 6. Historical Average Daily Traffic

		Historical ADT									
From	To	2010	2011	2012	2013	2014	2015	2016	2017	2018	
East Brunswick County Line	Old Stage Rd	6,900	9,200	9,100	8,900	9,100	9,700	9,300	9,400	9,200	
Old Stage Rd	US 58 BUS/Lawrenceville Plank Rd	12,000	11,000	11,000	10,000	10,000	11,000	9,400	9,500	9,300	
US 58 BUS/Lawrenceville Plank Rd	Cattail Rd	9,700	9,300	9,200	8,700	8,800	9,500	8,500	8,600	8,400	
Cattail Rd	Grandy Rd	8,600	8,200	8,100	8,200	8,400	9,000	8,900	9,000	8,800	
Grandy Rd	Mecklenburg County Line	9,800	9,400	9,300	9,100	9,300	10,000	10,000	10,000	10,000	
Mecklenburg County Line	Country Club Rd	11,000	10,000	10,000	11,000	11,000	12,000	11,000	11,000	11,000	
Country Club Rd	Country Lane	14,000	16,500	17,000	17,500	17,500	16,000	21,000	23,500	25,000	
Country Lane	Theater Rd	6,400	6,100	6,000	6,100	6,200	6,700	7,000	7,200	7,100	
Theater Rd	US 1	9,000	8,800	8,600	8,900	9,000	9,500	10,000	11,000	11,000	
US 1	Buggs Island Rd	6,200	6,100	5,900	5,900	6,100	6,900	7,400	7,700	7,700	
Buggs Island Rd	VA 92	5,800	6,000	5,600	5,500	5,500	5,900	6,500	6,800	6,700	
VA 92	US 15	4,600	4,600	4,400	4,600	4,600	5,200	5,600	5,600	5,500	
US 15	Virginia Ave	5,100	5,000	4,900	4,800	4,800	4,900	5,200	5,300	5,100	
Virginia Ave	West Mecklenburg County Line	6,500	6,000	6,500	6,500	6,500	6,000	6,500	6,900	6,900	

within the study area. The trip generation for the study area (discussed in the following section) and this background growth rate will be added to the existing traffic volumes to develop the future 2040 traffic volumes.

3.2 Projected Future Growth (2040) and Traffic Volumes

3.2.1 Future Land Use and Approved Development

Future land use was based on the socio-economic data in the travel demand model and stakeholder input. The study team looked at the projected population, household, and employment growth in the statewide travel demand model between 2015 and 2040 in TAZs within the study corridor. Figure 16 shows the TAZ growth along the corridor. Stakeholders reviewed these findings to assess the accuracy and provided feedback to the study team if adjustments to the assumed growth in certain TAZs were needed. These adjusted socio-economic datasets were used to estimate future traffic volumes in the study corridor and develop future traffic volumes at key intersections along the corridor.

Table 7. Employment and Population Growth Estimates

Jurisdiction (TAZs)	2015			2040			% Change (2015 - 2040)		
	Population	Households	Employment	Population	Households	Employment	Population	Households	Employment
Brunswick County	10,621	3,641	4,669	11,278	3,848	5,584	6.2%	5.7%	19.6%
Mecklenburg County	19,679	8,396	12,612	20,431	8,567	13,756	3.8%	2.0%	9.1%
Total	30,300	12,037	17,281	31,709	12,415	19,340	4.7%	3.1%	11.9%

3.2.2 Trip Generation and Distribution

The study team evaluated the TAZs along the study corridor that have a direct effect on the turning movement counts used for the existing and future analyses. Traffic was then distributed at the study intersections based on the existing turning movement counts. With consideration for location, potential growth areas, and infrastructure off US 58, engineering judgement was used to make reasonable adjustments to the trip distribution. The future trip generation traffic volumes were added to the calculated background growth for the corridor and then used in the year 2040 analyses. The future turning movement volumes, trip generation, and background growth are outlined in Appendix D.

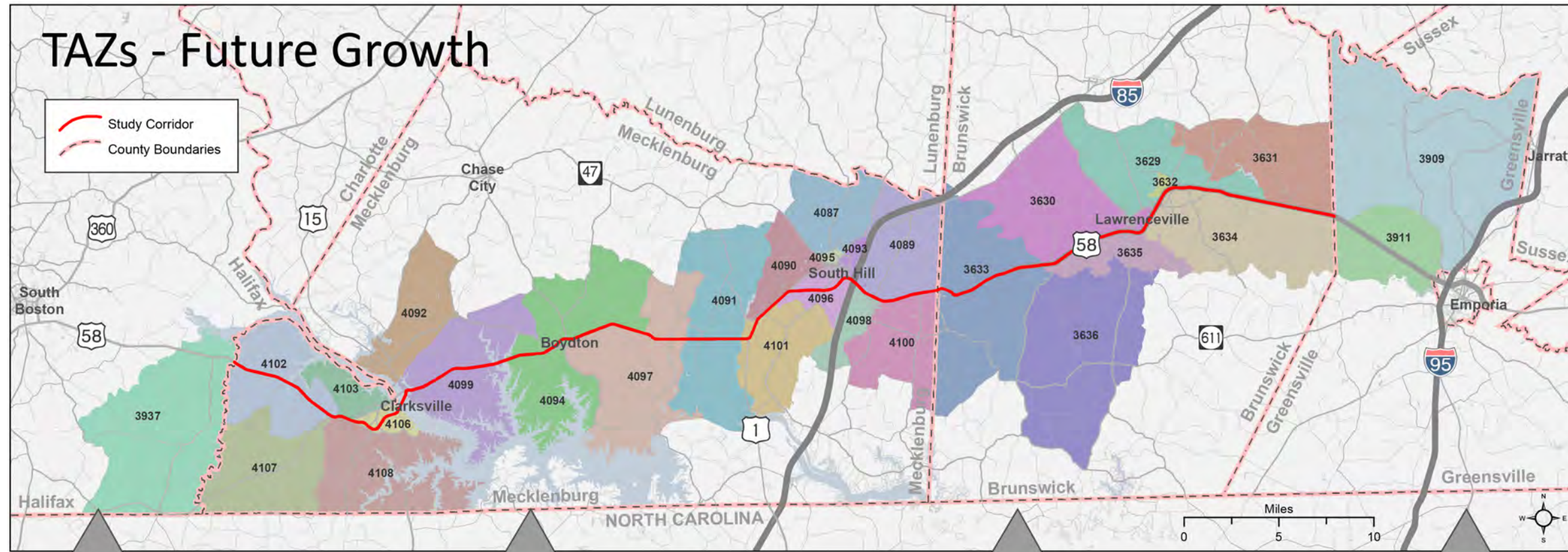
3.2.3 Future (2040) Traffic Volumes

Traffic volumes for the year 2040 were developed based on the trip generation discussed in the previous section and the background growth of one percent for the through traffic along the US 58 corridor. The projected 2040 volumes at various points within the study area are listed in Figure 16.

Table 8. Future Traffic Volumes

Future Traffic Volumes			
From	To	2018	2040
East Brunswick County Line	Old Stage Rd	9,400	11,500
Old Stage Rd	US 58 BUS/Lawrenceville Plank Rd	9,500	11,600
US 58 BUS/Lawrenceville Plank Rd	Cattail Rd	8,600	10,500
Cattail Rd	Grandy Rd	9,000	11,000
Grandy Rd	Mecklenburg County Line	10,000	12,200
Mecklenburg County Line	Country Club Rd	11,000	13,400
Country Club Rd	Country Lane	23,500	28,700
Country Lane	Theater Rd	7,200	8,800
Theater Rd	US 1	11,000	13,400
US 1	Buggs Island Rd	7,700	9,400
Buggs Island Rd	VA 92	6,800	8,300
VA 92	US 15	5,600	6,800
US 15	Virginia Ave	5,300	6,500
Virginia Ave	West Mecklenburg County Line	6,900	8,400

Figure 16. Traffic Analysis Zone Growth



Halifax County			
TAZ ID	Population Increase (2015 to 2040)	Household Increase (2015 to 2040)	Employment Increase (2015 to 2040)
3937	-36	-18	70

Mecklenburg County			
TAZ ID	Population Increase (2015 to 2040)	Household Increase (2015 to 2040)	Employment Increase (2015 to 2040)
4087	51	12	13
4089	45	10	70
4090	38	9	138
4091	34	8	9
4092	28	8	6
4093	49	12	108
4094	43	10	6
4095	38	9	145
4096	43	10	150
4097	66	9	192
4098	37	8	11
4099	24	6	11
4100	34	7	79
4101	34	7	10
4102	45	11	12
4103	36	9	51
4106	36	9	99
4107	26	6	4
4108	45	11	30

Brunswick County			
TAZ ID	Population Increase (2015 to 2040)	Household Increase (2015 to 2040)	Employment Increase (2015 to 2040)
3629	88	28	49
3630	147	56	191
3631	51	20	47
3632	103	0	268
3633	88	35	70
3634	81	29	99
3635	36	14	163
3636	63	25	28

Greenville County			
TAZ ID	Population Increase (2015 to 2040)	Household Increase (2015 to 2040)	Employment Increase (2015 to 2040)
3909	395	12	112
3911	95	8	3



CHAPTER 4: FUTURE (2040) TRAFFIC CONDITIONS

4.1 Future Traffic Operations

The 2040 future year operational analyses for the US 58 study intersections were performed using Synchro in accordance with VDOT's Traffic Operations and Safety Manual (TOSAM). Additional analysis was conducted in the Town of South Hill which included recommendations for the I-85 interchange. A summary of the additional analysis in the Town of South Hill is included in Appendix F. Although it is not known when the full build-out of the future land use will occur, the operational analysis for the 2040 scenarios includes the future traffic volumes for the full build-out of development to maximize the project life span for the recommended improvements. Two future traffic condition scenarios were analyzed. First, the no-build scenario assumes that US 58 will remain as is. Second, the build scenario assumes improvements will be made along US 58 as described further in Chapter 5. Tables 8 through 13 compare the analysis results of the existing, future no-build, and build conditions.

4.2 Future No-Build Traffic Operations and Deficiencies

Future traffic volumes, along with the background growth for through-vehicles, would have minimal impacts on most of the corridor based on the 2040 No-Build scenario. However, the Town of South Hill and La Crosse will experience delays up to LOS C in the AM and PM peak hours. Conventional signalized intersections do not have enough capacity to operate efficiently with extremely large traffic volumes and at unsignalized intersections, the through-movements along US 58 would not allow large enough gaps in traffic for turning movements to occur. Crashes would increase due to queue lengths extending into mainline traffic and the increases in stop-and-go traffic due to more congestion.

4.3 Results of Operational Analyses for Recommended Improvements

Chapter 5 details the recommended improvements, operations, and safety benefits of the recommendations. Although all the study intersections operated well in the future, recommendations were developed that focused on improving the safety of these intersections. The analysis was conducted to ensure that both safety and capacity would be satisfactory.

Recommendations consist mainly of innovative intersections concepts. Some of the recommendations include two or three intersections that function together as one system. Synchro does not currently have a method to analyze innovative intersections; however, Chapter 23 of the Highway Capacity Manual outlines a methodology for calculating delays and LOS by using travel time and the appropriate delay(s) through the innovative intersections. The HCM method provides a better way of comparing innovative intersections with the traditional intersection configurations that occupy the corridor today. All recommended improvements maintain an acceptable level of service of LOS C or better.

Table 9. Future Traffic Operations: Virginia Avenue and Route 58

Intersection	Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach (sec/veh) (Level of Service)											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Virginia Avenue & Route 58	AM Peak Hour													
	2018 Existing	2.7	8.1	0.0	N/A	0.0	0.0	0.0	N/A	13.3	N/A	9.4		
		A	A	A	A	A	A	A		B	N/A	A		
	2040 No Build	2.5	2.4 (A)			0.0 (A)			N/A	10.3(B)				
		A	8.4	0.0	N/A	0.0	0.0	0.0		14.6	N/A	9.7		
	2040 Build	4.2	8.4	0.0	N/A	0.0	0.0	0.0	N/A	12.8	N/A	9.7		
		A	A	A	A	A	A	A		B	N/A	A		
	PM Peak Hour													
	2018 Existing	4.3	8.3	0.0	N/A	0.0	0.0	0.0	N/A	14.3	N/A	9.9		
		A	A	A	A	A	A	A		B	N/A	B		
	2040 No Build	3.9	3.9 (A)			0.0 (A)			N/A	10.8 (B)				
		A	8.6	0.0	0.0	0.0	0.0	0.0		15.5	N/A	10.4		
2040 Build	5.2	8.8	0.0	N/A	0.0	0.0	0.0	N/A	14.5	N/A	10.6			
	A	A	A	A	A	A	A		B	N/A	B			
11.4 (B)														

Table 10. Future Traffic Operations: VA 92 and Route 58

Intersection	Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach (sec/veh) (Level of Service)											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
VA 92 & Route 58	AM Peak Hour													
	2018 Existing	3.3	7.9	0.0	0.0	7.7	0.0	0.0	11.1	11.1	11.1	11.8	11.8	11.8
		A	A	A	A	A	A	A	B	B	B	B	B	B
	2040 No Build	3.0	8.1	0.0	0.0	7.9	0.0	0.0	11.8	11.8	11.8	12.8	12.8	12.8
		A	A	A	A	A	A	A	B	B	B	B	B	B
	2040 Build	3.2	8.0	0.0	0.0	12.0	0.0	0.0	N/A	N/A	9.2	13.6	21.3	9.3
		A	A	A	A	A	A	A	A	B	C	A	A	A
	PM Peak Hour													
	2018 Existing	4.3	8.0	0.0	0.0	7.5	0.0	0.0	11.0	11.0	11.0	11.4	11.4	11.4
		A	A	A	A	A	A	A	B	B	B	B	B	B
	2040 No Build	3.9	8.3	0.0	0.0	7.7	0.0	0.0	11.7	11.7	11.7	12.4	12.4	12.4
		A	A	A	A	A	A	A	B	B	B	B	B	B
2040 Build	3.6	8.8	0.0	0.0	12.0	0.0	0.0	N/A	N/A	9.0	13.0	22.3	10.3	
	A	A	A	A	A	A	A	A	B	C	B	B	B	

Table 11. Future Traffic Operations: Kingdom Hall/US 1 and Route 58

Intersection	Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach (sec/veh) (Level of Service)											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Kingdom Hall/US 1 & Route 58	AM Peak Hour													
	2018 Existing	2.7	0.0	0.0	0.0	8.3	0.0	0.0	11.1	11.1	11.1	0.0	0.0	0.0
		A	A	A	A	A	A	A	B	B	B	A	A	A
	2040 No Build	3.1	0.0	0.0	0.0	8.6	0.0	0.0	11.8	11.8	11.8	0.0	0.0	0.0
		A	A	A	A	A	A	A	B	B	B	A	A	A
	2040 Build	3.0	N/A	0.0	0.0	8.3	0.0	0.0	13.4	N/A	10.8	N/A	N/A	0.0
		A	A	A	A	A	A	A	B	B	B	A	A	A
	PM Peak Hour													
	2018 Existing	2.2	0.0	0.0	0.0	8.6	0.0	0.0	11.2	11.2	11.2	0.0	0.0	0.0
		A	A	A	A	A	A	A	B	B	B	A	A	A
	2040 No Build	2.6	0.0	0.0	0.0	8.9	0.0	0.0	11.7	11.7	11.7	0.0	0.0	0.0
		A	A	A	A	A	A	A	B	B	B	A	A	A
2040 Build	2.6	N/A	0.0	0.0	8.8	0.0	0.0	16.5	N/A	10.6	N/A	N/A	0.0	
	A	A	A	A	A	A	A	C	B	B	A	A	A	

Table 12. Future Traffic Operations: Theater Road and Route 58

Intersection	Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach (sec/veh) (Level of Service)											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Theater Road & Route 58	AM Peak Hour													
	2018 Existing	3.4	9.8	0.0	0.0	7.8	0.0	0.0	19.2	19.2	19.2	24.1	24.1	24.1
		A	A	A	A	A	A	A	C	C	C	C	C	C
	2040 No Build	3.0	10.3	0.0	0.0	8.2	0.0	0.0	22.9	22.9	22.9	28.4	28.4	28.4
		A	B	B	B	A	A	A	C	C	C	D	D	D
	2040 Build	3.0	10.3	0.0	0.0	8.2	0.0	0.0	22.9	22.9	22.9	28.4	28.4	28.4
		A	B	B	B	A	A	A	C	C	C	D	D	D
	PM Peak Hour													
	2018 Existing	3.0	8.4	0.0	0.0	8.3	0.0	0.0	15.9	15.9	15.9	18.2	18.2	18.2
		A	A	A	A	A	A	A	C	C	C	C	C	C
	2040 No Build	2.6	8.9	0.0	0.0	8.7	0.0	0.0	18.5	18.5	18.5	21.2	21.2	21.2
		A	A	A	A	A	A	A	C	C	C	C	C	C
2040 Build	2.6	8.9	0.0	0.0	8.7	0.0	0.0	18.5	18.5	18.5	21.2	21.2	21.2	
	A	A	A	A	A	A	A	C	C	C	C	C	C	

Table 13. Future Traffic Operations: Main Street (LaCrosse) and Route 58

Intersection	Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach (sec/veh) (Level of Service)											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Main St(LaCrosse) & Route 58	AM Peak Hour													
	2018 Existing	8.7	36.0	5.2	4.7	26.5	5.6	4.5	25.3	25.3	25.3	21.0	21.0	21.0
		A	D	A	A	C	A	A	C	C	C	C	C	C
	2040 No Build	14.1	157.7	8.5	7.5	44.1	10.2	6.9	27.6	27.6	27.6	18.3	18.3	18.3
		B	F	A	A	D	B	A	C	C	C	B	B	B
	2040 Build	6.6	59.8	4.8	0.3	26.1	5.8	0.0	16.1	16.1	16.1	30.5	25.0	13.7
		A	A	A	A	B	A	A	B	B	B	C	C	B
	PM Peak Hour													
	2018 Existing	12.5	64.0	7.3	6.5	28.8	7.9	6.6	26.0	26.0	26.0	18.9	18.9	18.9
		B	E	A	A	C	A	A	C	C	C	B	B	B
	2040 No Build	22.2	81.9	10.2	9.2	42.3	12.1	8.7	66.3	66.3	66.3	18.0	18.0	18.0
		C	F	B	A	D	B	A	E	E	E	B	B	B
2040 Build	10.9	62.1	7.1	0.3	27.4	7.1	0.0	25.1	25.1	25.1	27.0	20.2	8.9	
	B	F	A	A	B	A	A	C	C	C	C	C	B	

Table 14. Future Traffic Operations: VA 641 (Bright Leaf Road) and Route 58

Intersection	Scenario	Overall Delay (LOS)	Delay per Lane Group by Approach (sec/veh) (Level of Service)																																																																		
			Eastbound			Westbound			Northbound			Southbound																																																									
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT																																																							
VA 641 (BrightLeaf Rd) & Route 58	AM Peak Hour																																																																				
	2018 Existing	1.7	8.6	0.0	N/A	N/A	0.0	0.0	N/A	10.8	N/A	10.8																																																									
		A	A	A	A	A	A	B		B	B																																																										
	2040 No Build	1.8	9.1	0.0	N/A	N/A	0.0	0.0	N/A	11.7	N/A	11.7																																																									
		A	A	A	A	A	A	B		B	B																																																										
	2040 Build	0.9	9.1	0.0	N/A	N/A	0.0	0.0	N/A	11.7	N/A	10.0																																																									
		A	A	A	A	A	A	B		B	B																																																										
	PM Peak Hour																																																																				
	2018 Existing	1.4	8.8	0.0	N/A	N/A	0.0	0.0	N/A	11.2	N/A	11.2																																																									
		A	A	A	A	A	A	B		B	B																																																										
	2040 No Build	1.6	9.4	0.0	N/A	N/A	0.0	0.0	N/A	12.5	N/A	12.5																																																									
		A	A	A	A	A	A	B		B	B																																																										
2040 Build	1.6	9.2	0.0	N/A	N/A	0.0	0.0	N/A	12.6	N/A	10.7																																																										
	A	A	A	A	A	A	B		B	B																																																											
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CHAPTER 5: ALTERNATIVES AND RECOMMENDATIONS

5.1 US 58 Corridor Recommendations

Future traffic volumes show that the US 58 corridor needs improvements to maintain capacity and improve safety. The majority of these improvements are needed to maintain regional growth and improve roadway safety. Additional improvements such as crossover closings may be implemented immediately to increase safety through access management. Based on capacity analyses of current and future conditions and a review of current corridor infrastructure, a “toolbox” of improvements was developed for the US 58 study area. These include:

- Remove existing crossover (based on inadequate spacing/grade/etc.);
- Upgrade existing crossover to meet VDOT standards;
- Convert existing crossover to directional median to allow only certain movements;
- Install alternative intersection concepts; and
- Improve shoulder widths to meet VDOT requirements

Alternative intersections and access management techniques were evaluated during the development of recommendations. Below is a list of alternative intersection designs that are included in the VDOT Arterial Preservation Plan toolbox that were evaluated as potential recommendations. Some of the alternative designs were not suitable for certain locations due to the geometric constraints, concept’s principles, associated costs, and/or Right-of-Way limitations. The concepts listed below were evaluated to screen individual concepts at every location to determine the most effective options for analysis and recommendation.

- Median U-turn Intersection (MUT)
- Restricted Crossing U-turn Intersection (RCUT)
- Continuous Green-T (CGT)
- Quadrant Roadway (QR)

Detailed information on each of these concepts is available on VDOT’s Innovative Intersections website located at <http://www.virginiadot.org/innovativeintersections/>.

It is well documented that as the number of access points increase along a corridor, the running speed decreases and the number of crashes increase. Given that the study segments of US 58 are of vital importance to the state and region, it is important to ensure the safety and throughput capacity of the corridor.

Recommendations were developed using the crash evaluation and analysis of the future volumes from both planned and potential developments along the study corridor. Project stakeholders and the public were engaged throughout the project process to identify the most preferred recommendations. These recommendations are presented in Appendix A. Table 15 contains a suggested ranking of the recommendations based on crash history and the VDOT Potential for Safety Improvements (PSI) database. Recommendation locations are highlighted on corridor aerial photos, with the identification circle indicating the type of recommendation. A green circle indicates no recommendation, a red circle indicates a recommended crossover removal, a yellow circle indicates a minor improvement, and a blue circle indicates a major improvement. Recommendations are denoted with C# for crossovers and I# for intersections. The written recommendation description is available by finding the corresponding C# or I# in the right-hand information box. For complex recommendations, the description will refer to a

figure with a detailed project sketch. Cost estimates were developed using the VDOT Transportation and Mobility Planning Division (TMPD) Cost Estimate Spreadsheet tool and the figures include the range of costs in 2019 dollars for each recommendation.

It is intended that the recommendations presented in Appendix A will accommodate the full build-out of development identified in the future land use as well as the increased vehicular through-put on US 58. As part of this US 58 Arterial Preservation Plan, it is recommended that no additional traffic signals be installed other than those listed in the recommendations. As well, it is recommended that no additional crossovers be constructed within the US 58 median beyond the Preservation Plan recommendations.

Additional shoulder widths with safety edges, when applicable, are recommended to be constructed in areas that do not meet minimum design standards. All shoulders should be paved to the VDOT design standard of eight feet or better to accommodate disabled vehicles, vehicles entering and exiting residential and commercial driveways, and bicyclists. In areas where the existing grade does not support the minimum shoulder requirements, guardrail should be installed.

5.2 Possible Funding Sources

Implementation of the recommended improvements will require funding sources. The VDOT SMART SCALE Program is a process that invests in projects that meet the most critical transportation needs in the state. Projects are evaluated based on improvements in certain categories such as congestion and safety. At the corridor level, more specific strategies and operational improvements can be assessed in studies and implemented using a variety of funding sources, including Federal funding streams such as the Surface Transportation Program (STP), National Highway System (NHS) funds, the Congestion Mitigation and Air Quality Improvement (CMAQ) Program, Revenue Sharing, Highway Safety Improvement Program (HSIP), as well as through state or local funding or other discretionary funding sources. For larger projects, particularly capacity-adding projects, demand management, and operational strategies should also be analyzed for incorporation into the project as part of the project development process. The complex recommendations presented in Appendix A, Figures 5, 12, 13, 19, 23, 24, 25, 26, 28, 35, and 38 include improvement types that correspond with the categories required for specific funding sources.

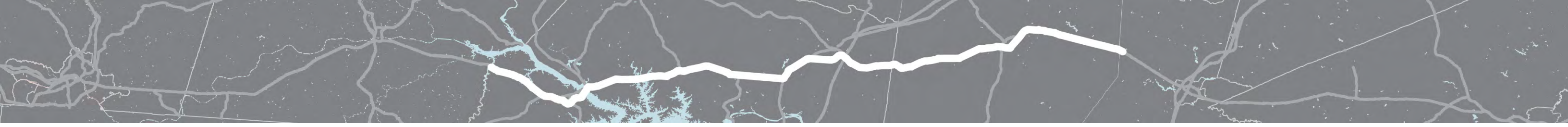


Table 15. Suggested Priority for US 58 Recommendations

Recommendation Figure	Intersecting US 58 Roadway	Jurisdiction	High Cost (\$ Millions)	Total Crashes (2013 - 2018)	VTrans Needs Met	Economic Development Support	Congestion (Existing LOS)	Crash Rank	Congestion Rank	ED Rank	Total Score	Cost/Score	Rank
24	Country Ln	Town of South Hill	3.1	19	2	Y	C	27	35	31	30.45	9.82	1
26	Roundabout - Eastern Corporate Limits	Town of South Hill	6	20	2	Y	A	28	1	31	27.35	4.56	2
26	Cycle/Peebles - Eastern Corp	Town of South Hill	2.3	43	2	Y	B	33	34	31	32.15	13.98	3
28	N Main St	Town of La Crosse	1.1	16	1	N	A	26	1	1	8.5	7.73	4
32	Robinson Ferry Rd	Brunswick County	1	10	1	N	A	21	1	1	7	7.00	5
29	Regional Airport Rd	Mecklenburg County	1	7	1	N	A	18	1	1	6.1	6.10	6
35	Cattail Dr	Town of Lawrenceville	3.4	13	1	Y	A	25	1	31	18.7	5.50	7
41	Freemans Crossing Rd	Brunswick County	1.3	10	1	N	A	21	1	1	7	5.38	8
5	Virginia Ave	Town of Clarksville	1.4	6	1	N	A	16	1	1	5.5	3.93	9
17	Baskerville Rd	Mecklenburg County	1.1	4	1	N	A	12	1	1	4.3	3.91	10
32	Evans Creek Rd	Brunswick County	2.2	12	1	N	A	23	1	1	7.6	3.45	11
10	Skipwith Rd	Town of Boydton	1.6	6	1	N	A	16	1	1	5.5	3.44	12
38	Bright Leaf Rd/Airport Dr	Brunswick County	2.3	12	1	N	A	23	1	1	7.6	3.30	13
33	Pleasant Grove Rd	Brunswick County	2.1	7	1	N	A	18	1	1	6.1	2.90	14
21	Goods Ferry Rd	Mecklenburg County	1.5	4	1	N	A	12	1	1	4.3	2.87	15
2	Cherry Hill Church Rd	Mecklenburg County	1	3	1	N	A	7	1	1	2.8	2.80	16
3	Clarksville Rd	Mecklenburg County	1	3	1	N	A	7	1	1	2.8	2.80	17
12	Washington St	Town of Boydton	1.9	5	1	N	A	15	1	1	5.2	2.74	18
2	Buffalo Springs Rd	Mecklenburg County	1	2	1	N	A	5	1	1	2.2	2.20	19
Segment	Landfill Rd to Buggs Island Rd	Mecklenburg County	5	24	1	N	A	30	1	1	9.7	1.94	20
Segment	Union Woods Rd to Pleasant Grove Rd	Brunswick County	5.7	50	1	N	A	34	1	1	10.9	1.91	21
Segment	Evans Creek Rd to Grandy Rd	Brunswick County	7.5	64	1	N	A	35	1	1	11.2	1.49	22
Segment	Branch Rd to Gholson Rd	Brunswick County	6.1	20	1	N	A	28	1	1	9.1	1.49	23
Segment	Airport Dr to Old Stage Rd	Brunswick County	7.2	35	1	N	A	32	1	1	10.3	1.43	24
14	Hayes Mill Rd	Mecklenburg County	1.7	2	1	N	A	5	1	1	2.2	1.29	25
30	Dornia Ave	Brunswick County	3.8	4	1	N	A	12	1	1	4.3	1.13	26
25	I-85	Town of South Hill	28	30	2	Y	A	31	1	31	28.25	1.01	27
2	Tabernacle Rd	Mecklenburg County	1	1	1	N	A	1	1	1	1	1.00	28
6	Shiney Rock Rd	Town of Clarksville	1	1	1	N	A	1	1	1	1	1.00	29
10	Jefferson St	Town of Boydton	3.1	3	1	N	A	7	1	1	2.8	0.90	30
8	Tower Rd	Mecklenburg County	1.3	1	1	N	A	1	1	1	1	0.77	31
30	Main St	Brunswick County	3.8	3	1	N	A	7	1	1	2.8	0.74	32
13	US 58 BUS	Town of Boydton	1.4	1	1	N	A	1	1	1	1	0.71	33
19	US 1	Mecklenburg County	9.7	9	1	N	A	20	1	1	6.7	0.69	34
10	Mayfield Dr	Town of Boydton	4.6	3	1	N	A	7	1	1	2.8	0.61	35

Scores reflect weighting by SMART SCALE area type categories.

Although the score of Cycle/Peebles - Eastern Corp Limits South Hill is higher, the roundabout must occur first before pursuing this option. This has been reflected in the recommended priority.

APPENDICES

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