




PROJECT PIPELINE

**BR-23-10: LEE COUNTY
ALT US 58 (W MORGAN AVENUE / TRAIL OF THE
LONESOME PINE ROAD) FROM EAST OF SUGAR
RUN ROAD TO CECIL STREET**





Alt 58 (W Morgan Avenue / Trail of the Lonesome Pine Road) from East of Sugar Run Road to Cecil Street

Complete Project Pipeline Study Report

Draft Submittal: July 2024
Final Submittal: July 2024

Prepared for



Prepared by



115 S 15th Street, Suite 200
Richmond, Virginia 23219

Table of Contents

Appendices.....	iii
Chapter 1: Needs Evaluation and Diagnosis.....	1
Introduction.....	2
Background.....	2
Methodology.....	2
Study Area.....	3
Project Pipeline – Round 1 Summary.....	6
Project Pipeline Round 1 Recommendations.....	6
Offset Left-Turn Lanes at Trade Center Lane.....	6
Roundabout and Two-Way Left-Turn Lane between N Combs Road and Cecil Street.....	6
Traffic Operations and Accessibility:.....	6
Traffic Data.....	6
Safety and Reliability.....	6
Safety Analysis Results.....	6
FHWA Screening Tool for Equity Analysis of Projects (STEAP).....	10
Preliminary Value Engineering of Projects.....	10
Offset Left-Turn Lanes at Trade Center Lane.....	10
Roundabout and Two-Way Left-Turn Lane (TWLTL) between N Combs Road and Cecil Street.....	11
Chapter 2: Alternative Development and Refinement.....	14
Alternative Development.....	15
US Alt 58 (W Morgan Avenue) / N Combs Road Intersection.....	15
US Alt 58 (W Morgan Avenue) Between N Combs Road and Cecil Street.....	16
Pedestrian accommodations.....	17
Final Preferred Alternatives.....	17
Chapter 3: Public and Stakeholder Outreach and Feedback.....	19
Public Involvement:.....	20
Survey Design.....	20
Survey Questions and Results.....	21

freeform survey comments.....	22
Chapter 4: Preferred Alternative Design Refinement.....	24
Preferred Alternative Design Refinement.....	25
Preferred Alternative #1: ALT US 58 at N Combs Road Corridor Improvements.....	25
Design Updates and Assumptions.....	25
Project Risk and Contingency.....	25
Cost Estimate.....	25

Appendices

APPENDIX A – ROUND 5 SMART SCALE APPLICATION FOR TRADE CENTER LANE
APPENDIX B – ROUND 5 SMART SCALE APPLICATION FOR N COMBS ROAD
APPENDIX C – ROUND 1 PROJECT PIPELINE FINAL REPORT
APPENDIX D – FHWA STEAP REPORT
APPENDIX E – APPROVED TRAFFIC FORECASTING MEMORANDUM
APPENDIX F – PUBLIC COMMENTS
APPENDIX G – BASIS OF DESIGN: ALT US 58 AT N COMBS ROAD CORRIDOR IMPROVEMENTS

A large, stylized number '1' is rendered in a light green color, set against a darker green background on the left side of the slide. The '1' is composed of several overlapping, rounded shapes that create a sense of depth and movement.

Chapter 1:

Needs Evaluation and Diagnosis

Introduction

Project Pipeline is a performance-based planning program to identify cost-effective solutions to multimodal transportation needs in Virginia. Through this planning process, projects and solutions may be considered for funding through programs, including SMART SCALE, revenue sharing, interstate funding, and others. Visit the Project Pipeline webpage for additional information: vaprojectpipeline.org.

This study focuses on concepts targeting identified needs including congestion mitigation, safety improvement, pedestrian and bicycle infrastructure along the corridor, and transit access. The objectives of Project Pipeline are shown below in **Figure 1**.

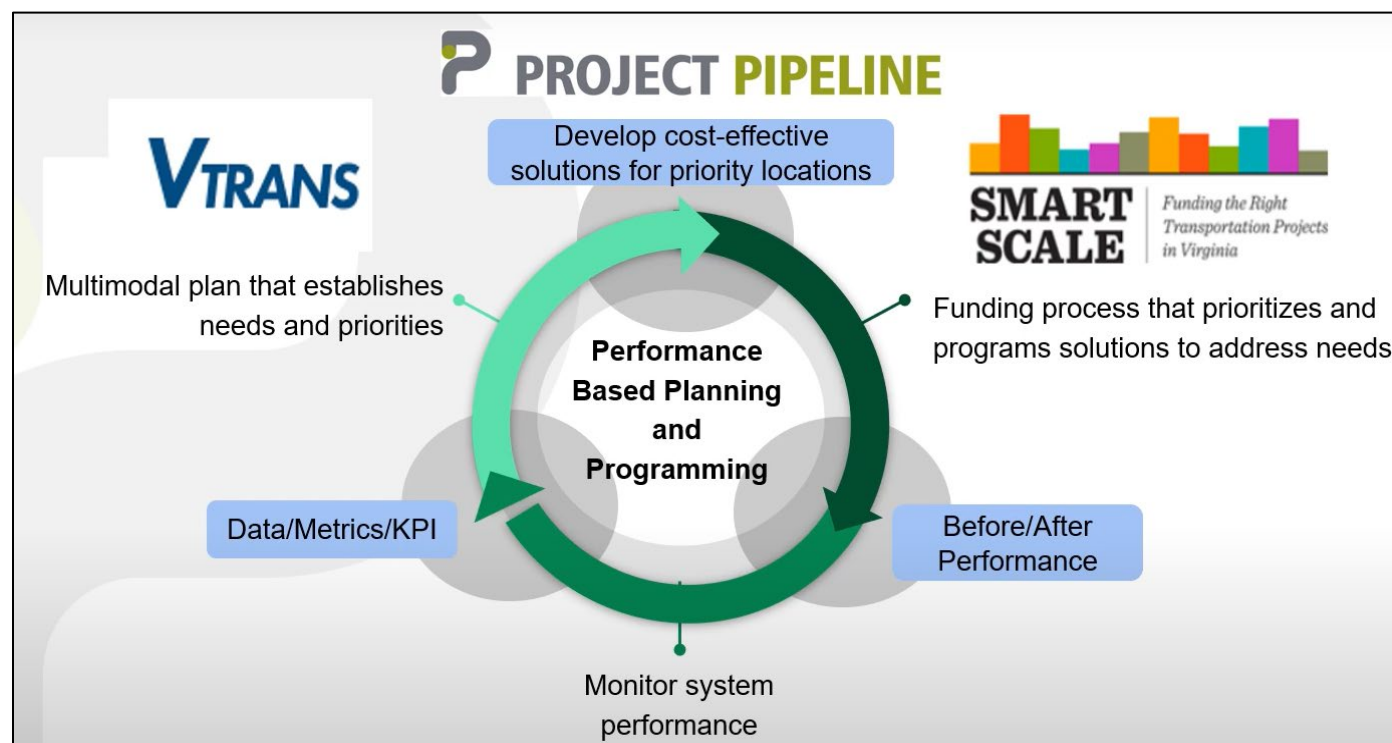









Figure 1: Project Pipeline Objectives

Background

The Office of Intermodal Planning and Investment (OIPI) prepared the VTrans Virginia's statewide transportation plan for the Commonwealth Transportation Board (CTB) in which mid-term needs (0 - 10 years) were identified for different categories listed in **Table 1**. This study focuses on addressing needs identified in VTrans, and those previously identified by the localities.

Table 1: List of VTrans Needs

VTrans Needs	
	Safety Improvement
	Transportation Demand Management
	Congestion Mitigation
	Pedestrian Safety Improvement
	Transit Access
	Capacity Preservation
	Bicycle Access

Methodology

The study is broken down into three phases. Phase 1 involves problem diagnosis and brainstorming of alternatives, Phase 2 is the detailed evaluation of alternatives and developed of initial concepts, and Phase 3 is the finalization of the preferred alternative in regard to design concept and cost estimate. Details on methods and solutions for each study phase are outlined below in **Figure 2**.

The study team is also broken down into three teams with each team simultaneously working on different areas of the study. Team 1 focuses on Traffic Operations, Capacity, and Access, Team 2 focuses on Road Reliability and Safety, while Team 3 focuses on Rail, Transit, and Transportation Demand Management (TDM), as shown in **Figure 3**. The following details the focus area of study for each team:

- Team 1 – Identify operation and access needs by conducting future traffic demand volume forecasts and performing operational analysis of future conditions using Synchro/SimTraffic. Evaluate operational mitigations such as geometric modifications, access management improvements, and installation of facilities for pedestrians and bicycles.
- Team 2 – Identify safety needs with respect to vehicles, pedestrians, and cyclists by evaluating existing roadway conditions as well as crash patterns and crash hot spot locations based on the most recent five-year crash history obtained from the Virginia Department of Transportation (VDOT) Crash Analysis Tool. Recommend safety improvement options through geometric modifications, access management improvements, and installation of facilities for pedestrians and bicycles.

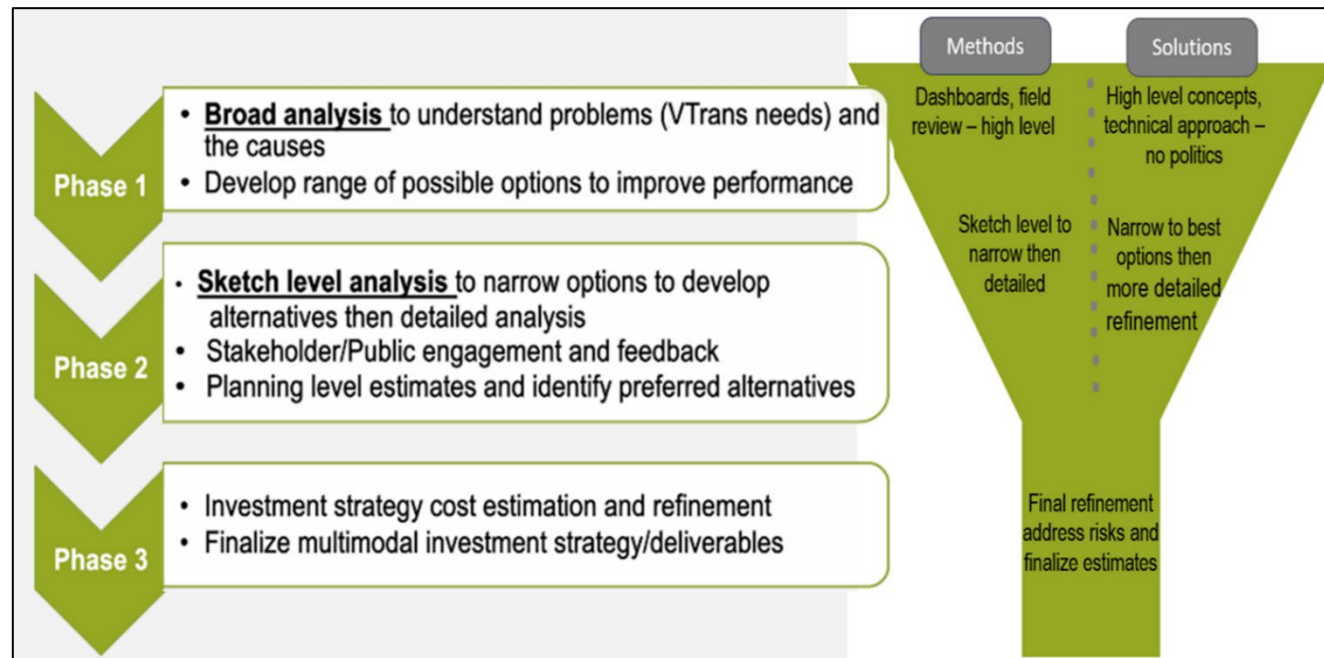


Figure 2: Study Phase Methods and Solutions

- Team 3 –Identify needs with respect to rail, transit, and TDM by reviewing existing rail and transit routes and future traffic demand volume forecasts. Consider improvements that would enhance transit ridership and shift mode choice away from single-occupancy vehicles.

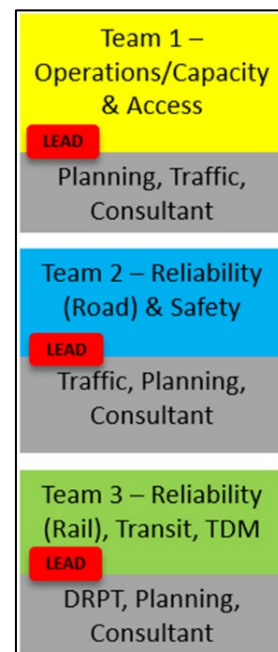


Figure 3: Study Team and Focus Area of Study

Study Area

This is a continuation of a Round 1 Project Pipeline study. The previous study looked at the entire study corridor and recommended multiple alternatives. The following two projects were moved forward to Round 5 SMART SCALE applications:

1. Offset left-turn lanes at Trade Center Lane (Provided in **Appendix A**)
2. Roundabout at N Combs Road and a two-way left-turn lane and sidewalk between N Combs Road and Cecil Street (Provided in **Appendix B**)

Neither of these SMART SCALE applications were selected for funding in Round 5 of SMART SCALE. This current process, in Round 2 of Project Pipeline, is to conduct value engineering of those two SMART SCALE applications to develop more competitive funding applications. The value engineering effort includes analyzing previous SMART SCALE scores, improving the project benefits, reducing project costs, and better defining project scope to reduce project risk.

The original study corridor was Alt US 58 (W Morgan Avenue / Trail of the Lonesome Pine Road) from east of Sugar Run Road to Cecil Street in Lee County, Virginia. The 4.5-mile Alt US 58 corridor is classified as a rural minor arterial road within the study area and is on the Corridors of Statewide Significance (CoSS). A map detailing the general location of the Alt US 58 study area is shown below in **Figure 4**. The two focus areas of this study corridor are at Trade Center Lane and between N Combs Road and Cecil Street. At Trade Center Lane, Alt US 58 has a speed limit of 55 MPH and is a four-lane divided roadway. Between N Combs Road and Cecil Street, the speed limit is 35 MPH and the corridor is a two-lane undivided roadway.

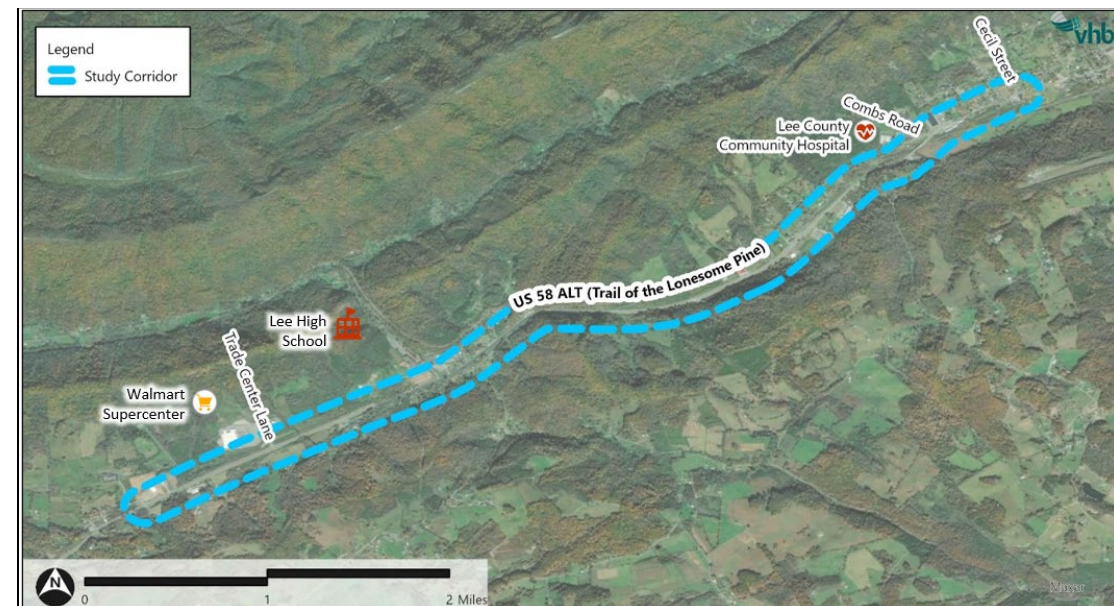


Figure 4: Study Area Map

VTrans is Virginia’s statewide transportation plan. It identifies and prioritizes locations with transportation needs using data-informed transparent processes. The policy for identifying VTrans mid-term needs establishes multimodal need categories that correspond to the Commonwealth Transportation Board-adopted VTrans visions, goals, and objectives.¹ Each need category has one or more performance measures and thresholds to identify one or more needs. Visit the VTrans policy guide for additional information: https://vtrans.org/resources/VTrans_Policy_Guide_v6.pdf.

The mid-term needs, as identified in VTrans for the Alt US 58 study corridor, were identified as ‘Very High’ for one need area, ‘High’ for one need area, ‘Low’ for one need area, and ‘None’ for eight need areas, as presented in **Table 2**.

Table 2: VTrans Needs in Study Area

VTrans 2019 Mid-Term Need	District Priority*
Congestion	None
Reliability	None
Transit Access for Equity Emphasis Areas	None
Transit Access to Activity Centers	None
Pedestrian Access to Activity Centers	None
Bicycle Access to Activity Centers	None
Access to Industrial & Economic Development Areas	None
Road Safety	High
Capacity Preservation	Very High
Transportation Demand Management (TDM)	Low
Pedestrian Safety	None

*Max priority within study area

These mid-term needs, identified in VTrans, are prioritized on a tier from 1 to 4, with 1 being the most critical and 4 being the least critical. The segments ranked as “Priority 1” represent those with multiple categories identified as high in need. **Figure 5** presents a map of the study area with 2019 VTrans mid-term needs prioritized for district attention. As can be seen in the figure, a large part of the study corridor has Priority 3 needs, with a segment to the west with Priority 2 needs. The VTrans needs for the

Trade Center Lane intersection are shown in **Table 3**, and the VTrans needs between N Combs Road and Cecil Street are shown in **Table 4**.

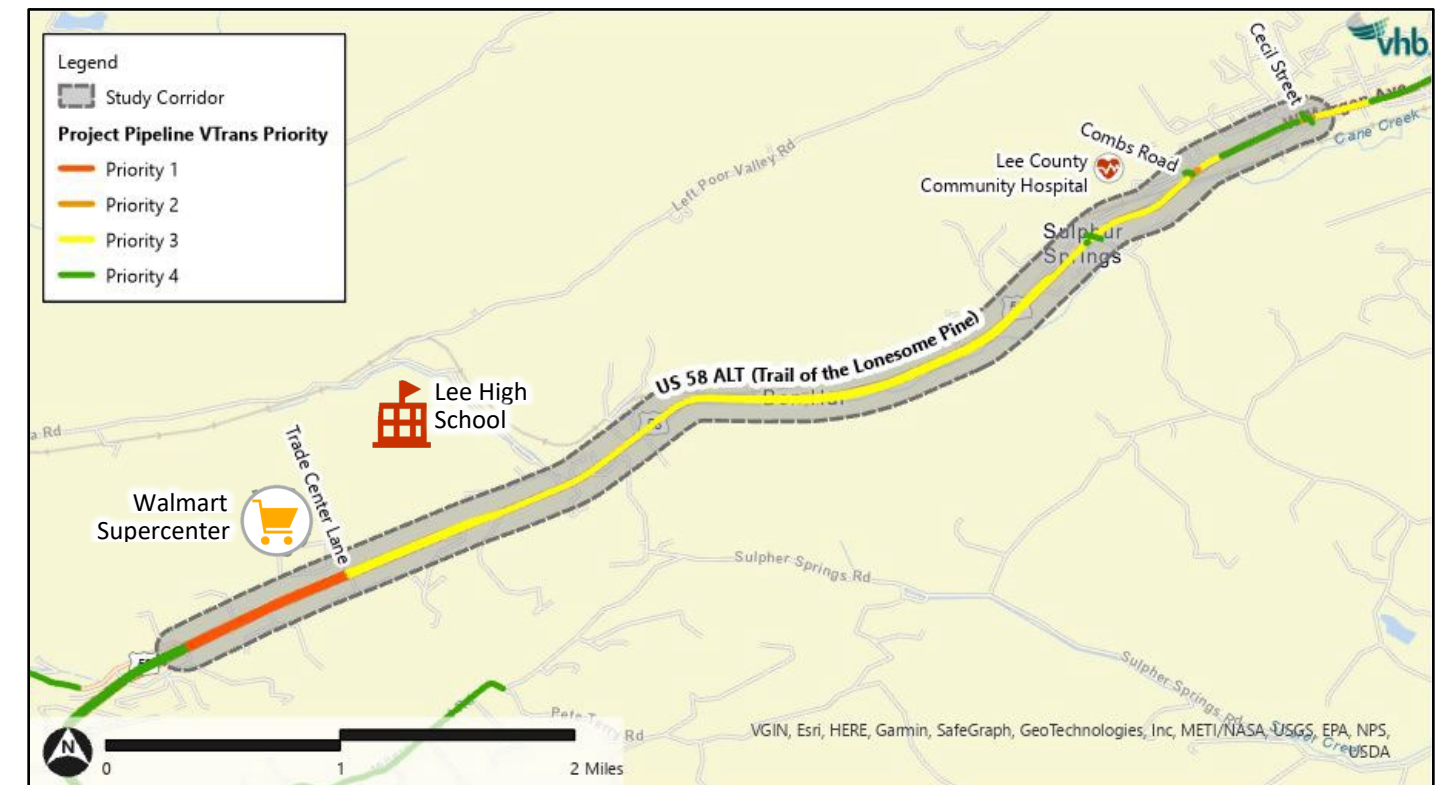


Figure 5: 2019 VTrans Prioritized Mid-term Needs in the Study Area

¹ Commonwealth Transportation Board, Actions to Approve the 2019 VTrans Vision, Goals, Objectives, Guiding Principles and the 2019 Mid-term Needs Identification Methodology and Accept the 2019 Mid-term Needs, January 15, 2020

Table 3: VTrans Needs at Trade Center Lane
Capacity Preservation

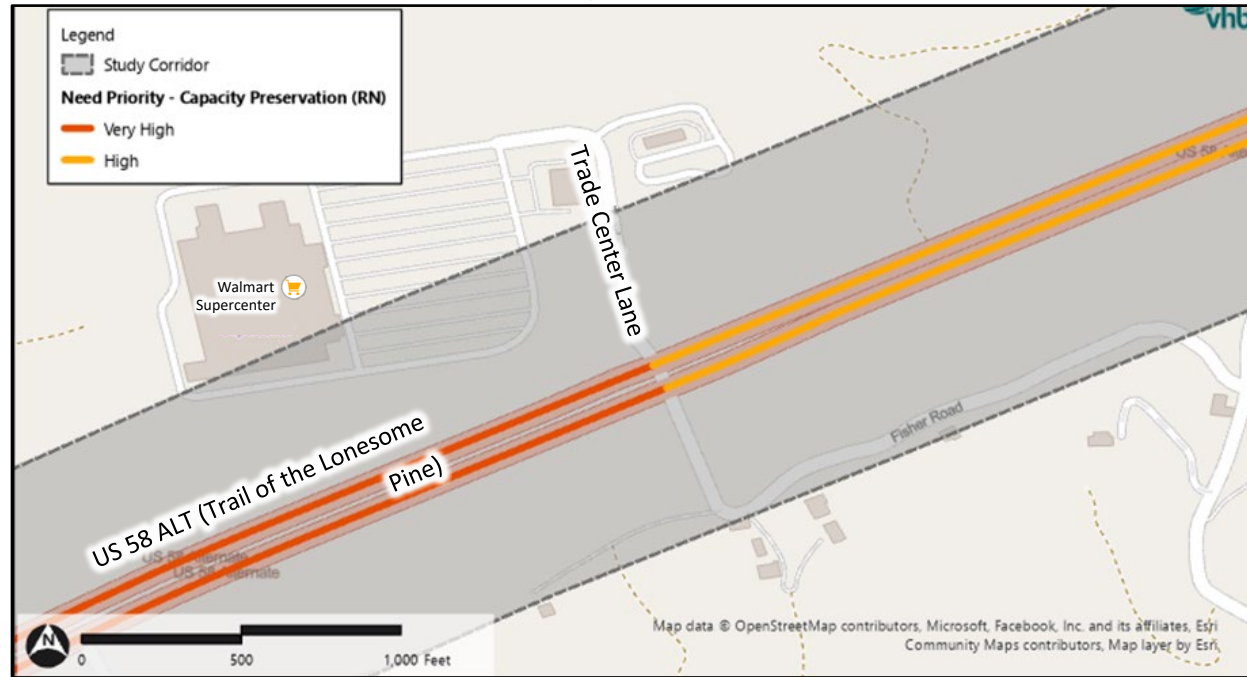
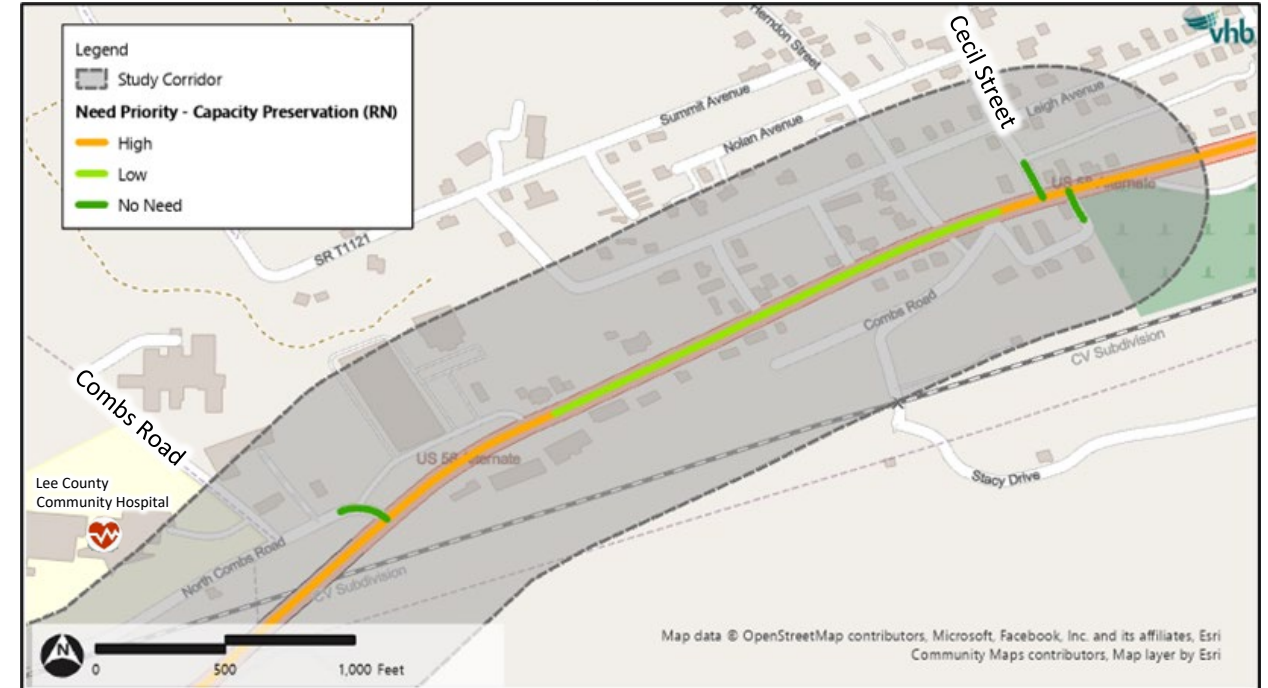
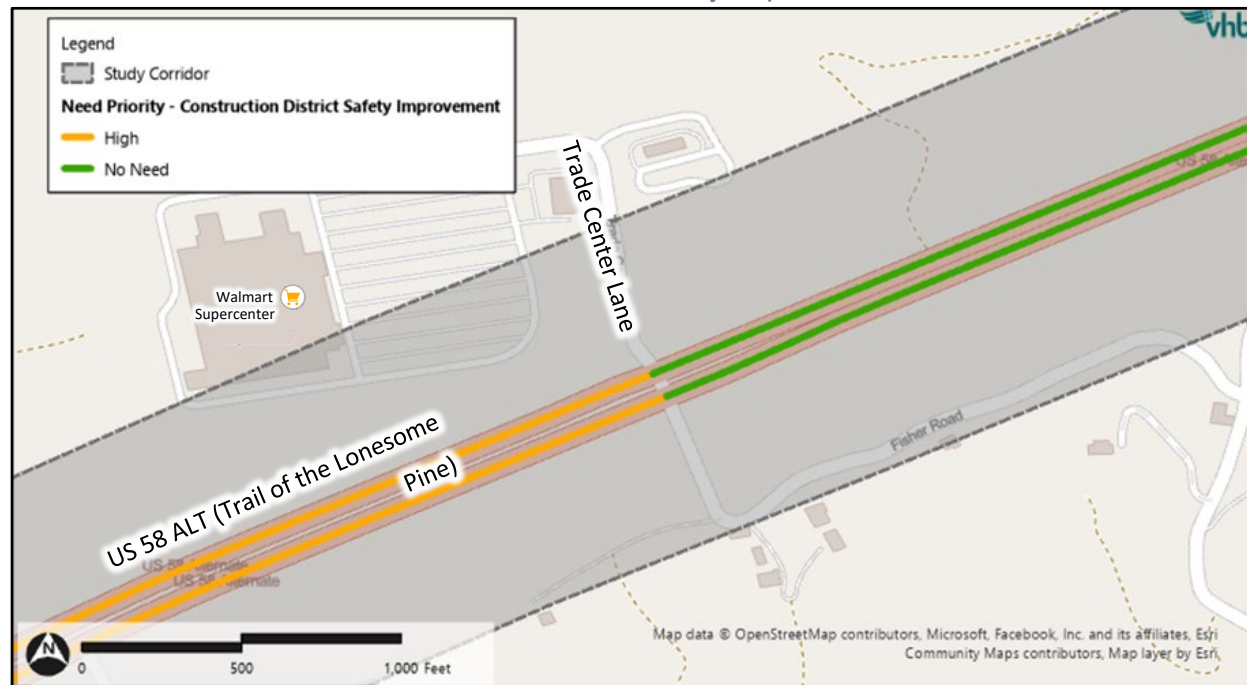


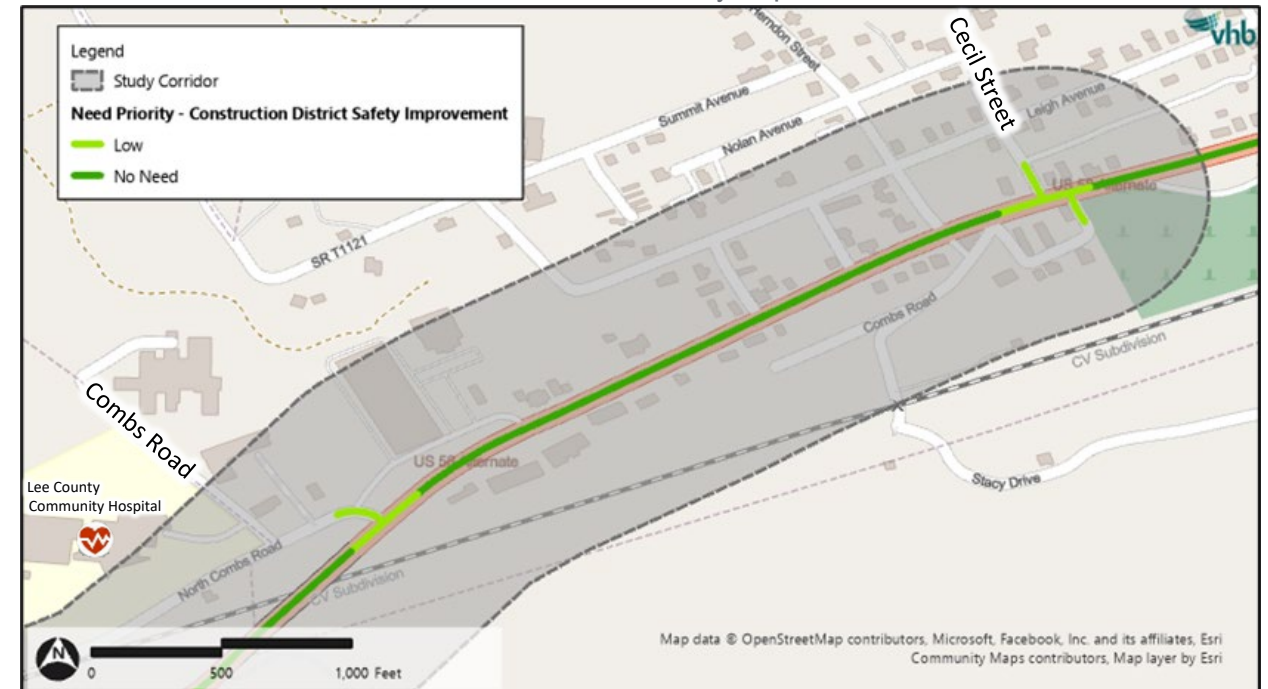
Table 4: VTrans Needs between N Combs Road and Cecil Street
Capacity Preservation



Construction District Safety Improvement



Construction District Safety Improvement



Project Pipeline – Round 1 Summary

This corridor was originally studied in Round 1 of Project Pipeline, and two main projects were proposed and advanced to funding applications based on the data collected and analyzed in that round. These recommendations are analyzed in this value engineering study to understand the origins of these two projects and the transportation needs that they were intended to address. The final report from Round 1 of Project Pipeline for this corridor is provided in **Appendix C**.

Project Pipeline Round 1 Recommendations

OFFSET LEFT-TURN LANES AT TRADE CENTER LANE

The first of the two main projects proposed in the first round of Project Pipeline was constructing offset eastbound and westbound left-turn lanes at the Alt US 58 and Trade Center Lane intersection. Project Pipeline Round 1 analyzed the crashes from 2015 to 2019, and at the Alt US 58 and Trade Center Lane intersection there were seven crashes. Out of these seven crashes, four were rear-ends, two were angle crashes, and one was a fixed object crash. The severity distribution of these seven crashes was four “B” (visible injury) crashes and three property damage only crashes. The volumes for Project Pipeline Round 1 were collected in 2021, and at this intersection, the left-turn volumes were the following:

- Eastbound: 41 in AM and 71 in PM
- Westbound: 0 in AM and 2 in PM

The mainline left-turn phasing is protected-only, negating the need for sight distance to the opposing through vehicles. Based on the Round 1 operations analysis, the intersection had an LOS of A in the AM peak hour and an LOS of C in the PM peak hour. These offset left-turn lanes were designed to improve the sight distance for left-turn drivers and the overall safety at this intersection. This project got a SMART SCALE benefit score of 0.5 and a SMART SCALE project score of 0.5. The total project cost submitted for SMART SCALE was \$9,996,225.

ROUNDABOUT AND TWO-WAY LEFT-TURN LANE BETWEEN N COMBS ROAD AND CECIL STREET

The second main project that was proposed in the first round of Project Pipeline was a roundabout at the Alt US 58 and N Combs Road intersection, a two-way left-turn lane (TWLTL) between N Combs Road and Cecil Street, and sidewalk for the extents of the project. The conversion of the existing signalized intersection to a roundabout would decrease the conflict points at this intersection, thereby lowering the potential for and severity of crashes. The roundabout was also intended to induce a traffic calming effect as there have been noted speeding issues through this intersection. The TWLTL was intended to reduce rear end crashes occurring in the vicinity of driveways by providing dedicated left turn storage. This project necessitated widening Alt US 58 between N Combs Road and Cecil Street to provide the sidewalk and TWLTL between Westgate Mall and Mark’s Alignment & Wrecker Services and

between Edwards Street and Cecil Street. This project received a SMART SCALE benefit score of 1.2 and a SMART SCALE project score of 0.7. The total project cost of the roundabout, two-way left turn lane, and sidewalk was estimated to be \$18,057,497.

Traffic Operations and Accessibility:

After reviewing the Pipeline Round 1 data, the project team evaluated whether the projects as originally developed still meet the transportation needs of the study area.

Traffic Data

New traffic data at intersections (i.e., turning movement counts) were not collected during this value engineering process. The data from Round 1 will be utilized.

VDOT’s 2021 Average Annual Daily Traffic (AADT) for the study corridor is broken into two segments:

- NCL Jonesville to Clyde Pearson Road: 6,100 Vehicles per Day (VPD)
 - Trade Center Road intersection is within this segment.
- VC Tech Drive to Pennington Gap to the west county line: 8,400 VPD
 - N Combs Road through Cecil Street is within this segment.

Safety and Reliability

The project team also reviewed newer crash data (2018-2022) to determine if the projects as originally developed still meet the transportation needs of the study area. The VDOT Crash Analysis Tool was utilized to determine the crash history at the study intersections along the study corridor on Alt US 58. Crash data was collected and analyzed for a five-year period spanning from January 2018 to December 2022. The study team reviewed the crash details provided by VDOT as well as the FR 300 crash reports for crashes that occurred at the two project locations. On the Alt US 58 study corridor, there was no “reliability” VTrans need, so this topic area was not considered. Reliability is defined as the consistency of expected travel time along a corridor.

Safety Analysis Results

Figure 6 displays a heat (density) map of all crashes on the corridor for the 2018-2022 study period. The two most common crash types were rear ends and angle crashes. The rear end crashes could be attributed to the access points on Alt US 58. Off-road crashes also made up a portion of the crash types in the study corridor. Many of the off-road crashes were fixed object crashes in which the vehicle crashed into a utility pole. While most crashes only involved property damage, four of crashes involved either a

fatality or a severe injury. These high-impact crashes are of particular importance in regard to identifying and addressing potential safety concerns. The FR 300 reports as well as the VDOT crash data were used to create a collision diagram for the two project locations shown in **Figure 7** and **Figure 8**.

The pattern of rear-end crashes is consistent with the numerous closely spaced access points through this segment. The most apparent rear-end crash pattern location is at the Sunoco gas station entrances with six rear end crashes occurring here in the study period, three of which caused visible injury. One fatality (rear end crash) occurred at the far eastern end of this segment in 2022 and involved roadway construction. At the N Combs Road intersection where the roundabout was proposed, there has only been one rear end crash in the last five years. Roundabouts typically provide the most safety benefit in reducing angle crashes.

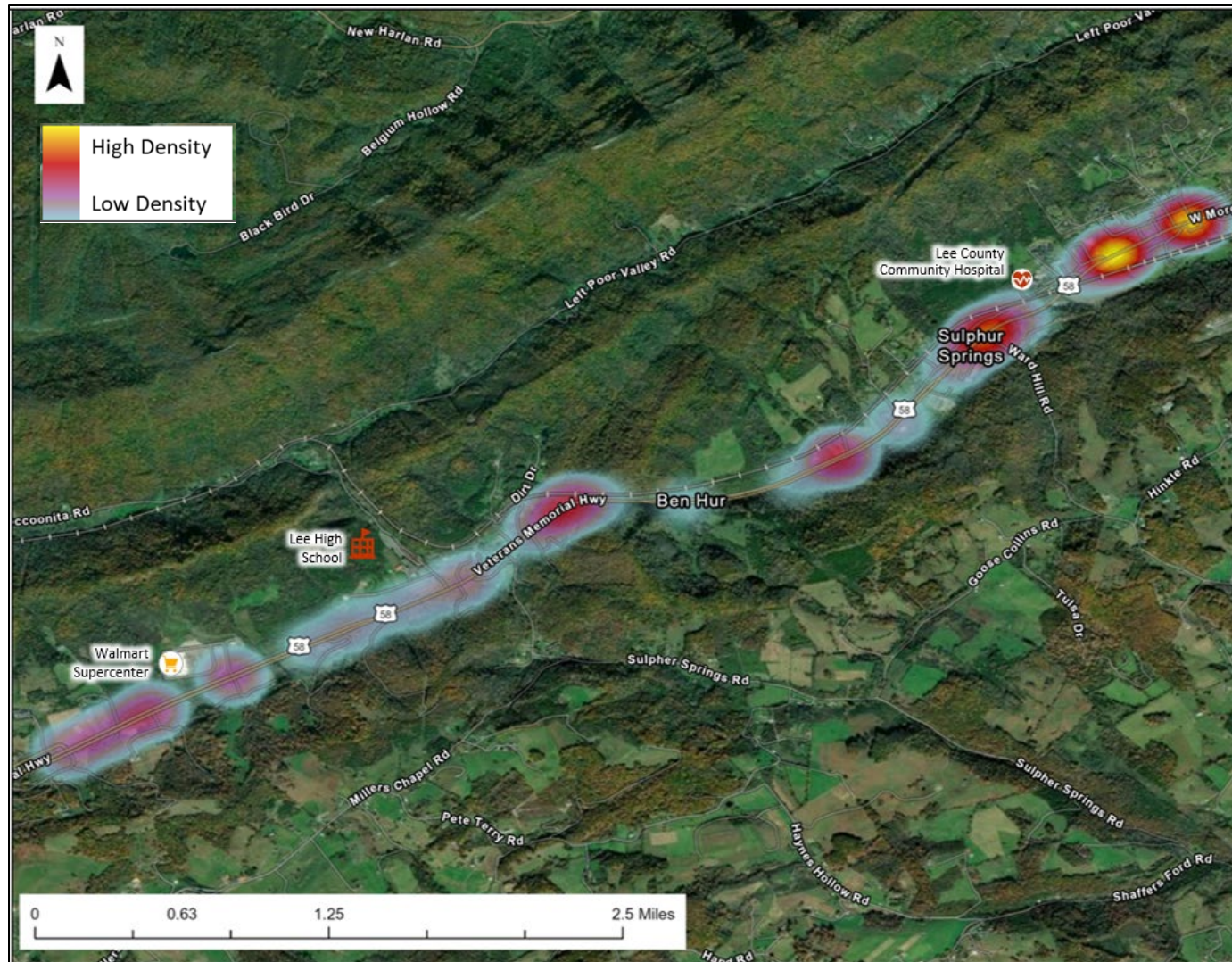
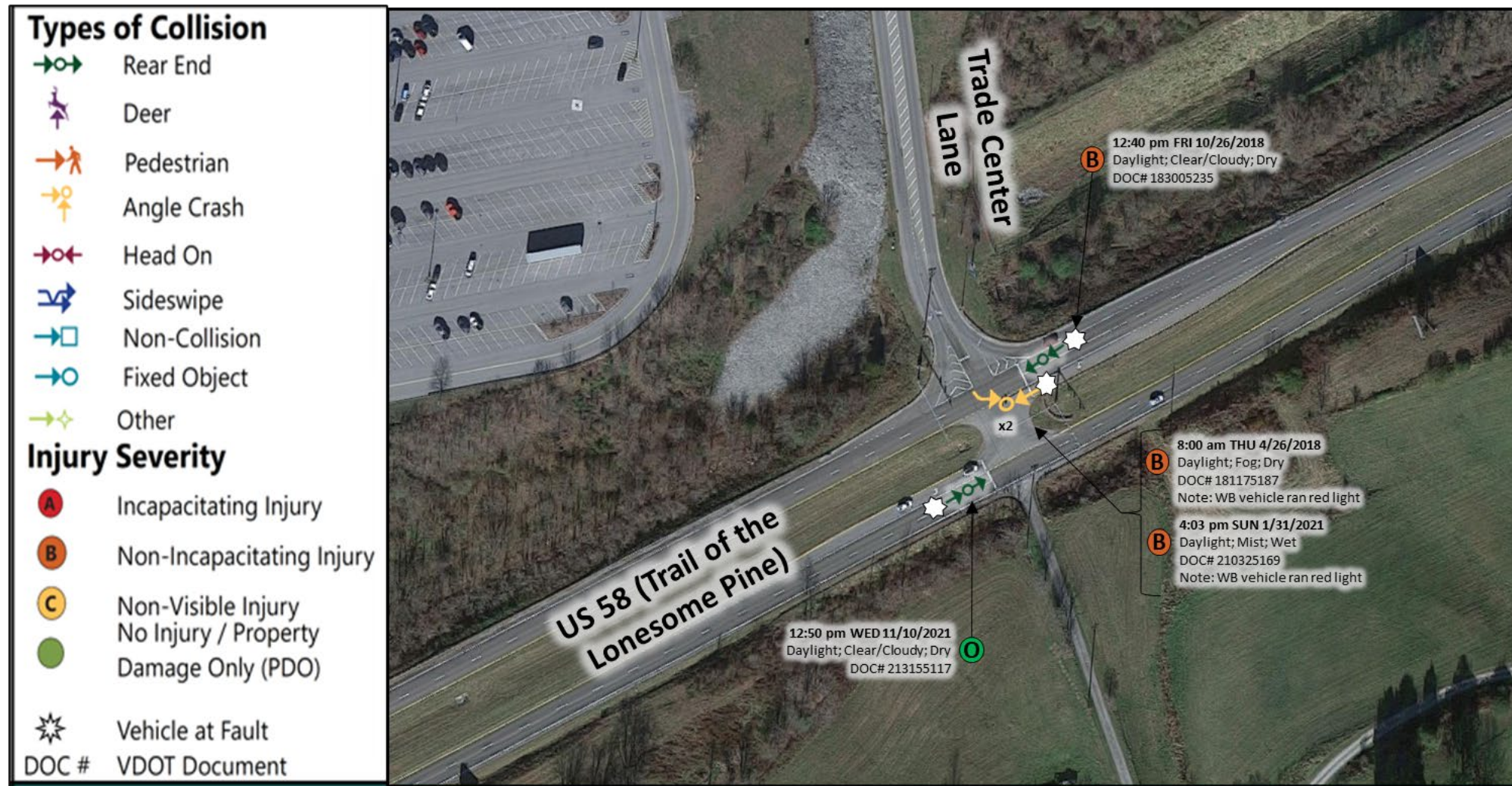


Figure 6: Alt US 58 Crash Heat Map

As shown in **Figure 7**, at the Trade Center Lane intersection, there were only four crashes from 2018-2022, including two rear ends and two angle collisions involving westbound thru vehicles that ran a red light. None of these crashes would be mitigated by an offset left turn lane project.

As shown in **Figure 8**, in the segment between N Combs Road and Cecil Road, where two-way left-turn lane was proposed, rear end crashes were the dominant crash type. There were 20 rear-end crashes on this segment, 16 of which occurred in the westbound direction, and four in the eastbound direction.



Collision Summary																							
Year	Type of Collision						Time of Day			Lighting			Weather		Pavement Condition			Severity					Total
	Angle	Rear-End	Head-On	Sideswipe	Fixed Object	Other	AM Peak (7-10AM)	PM Peak (4-7PM)	Off Peak	Daylight	Dawn/Dusk	Darkness - No Lighting	Clear	Rain/Snow	Dry	Wet	Icy	K	A	B	C	PDO	
2018	1	1					1		1	2			1	1	2					2			2
2019																							
2020																							
2021	1	1						1	1	2			1	1	1	1				1		1	2
2022																							
Total	2	2					1	1	2	4			2	2	3	1				3		1	4

Figure 7: Trade Center Lane Intersection Collision Diagram

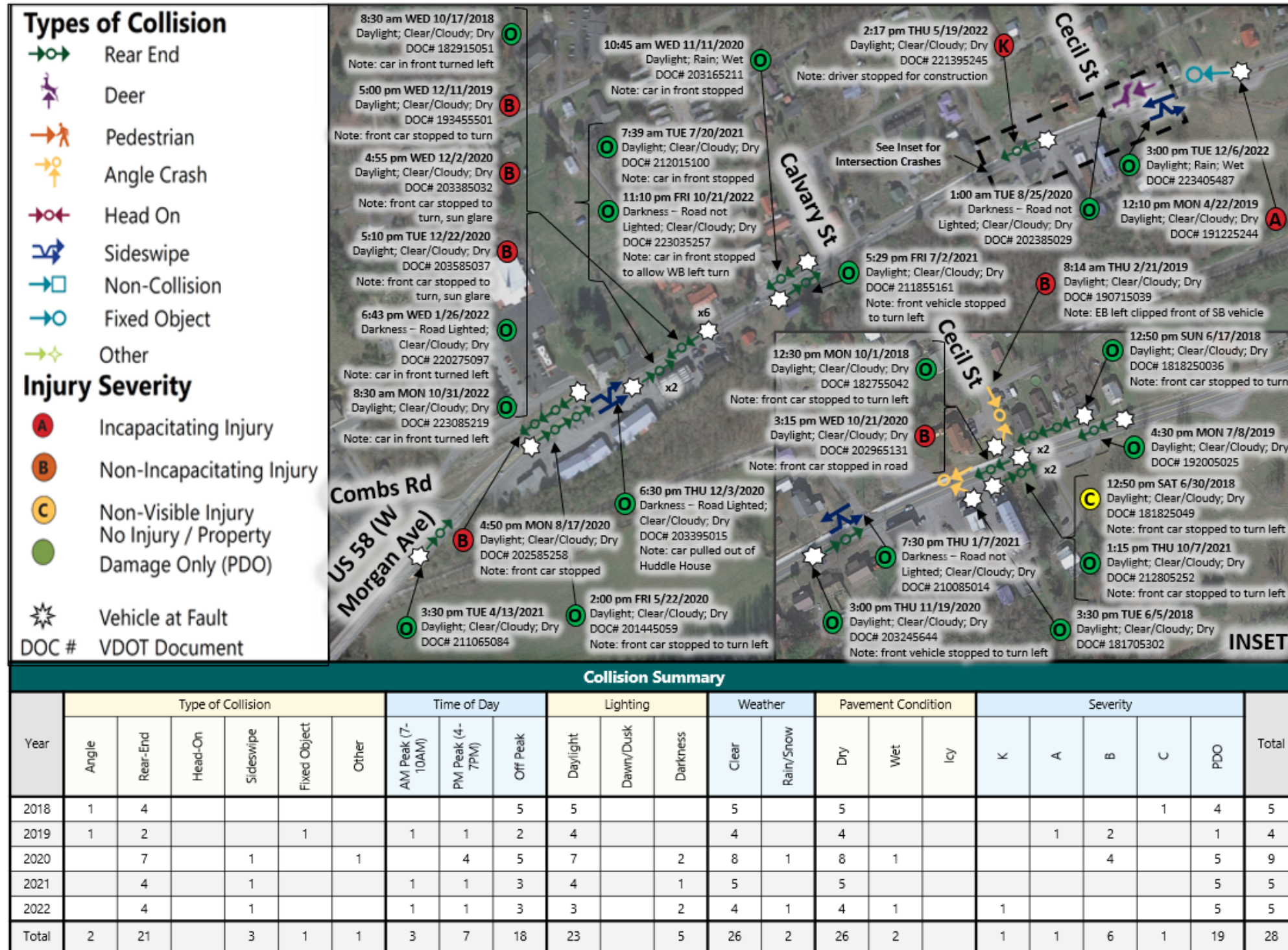


Figure 8: N Combs Road to Cecil Street Segment Collision Diagram

FHWA Screening Tool for Equity Analysis of Projects (STEAP)

This screening tool shows the demographic make-up of the population residing within the study area, the city/town, the county, and then all of Virginia. The tool allows you to compare the representation of the population with regard to a demographic characteristic, such as age or household income, within the study area compared to the city/town, county, and all of Virginia. **Figure 9** shows the household incomes present in the study area compared to all of Pennington Gap, Virginia, all of Lee County and the state of Virginia and **Figure 10** shows the age groups present in the study area compared to Pennington Gap, Virginia, all of Lee County and the state of Virginia. These figures indicate that there is a larger representation of households with a household income less than \$15,000 in the study area when compared to the households with this income in the rest of the town, county and state. Pennington Gap Virginia, the town in which the study area is in, has a higher representation of households with a household income between \$15,000 to \$35,000. The ages represented in the study area are comparable to the rest of the state, however there is a slightly larger representation of seniors in the study area compared to the rest of the town, county, and state. **Appendix D** provides the full STEAP analysis results.

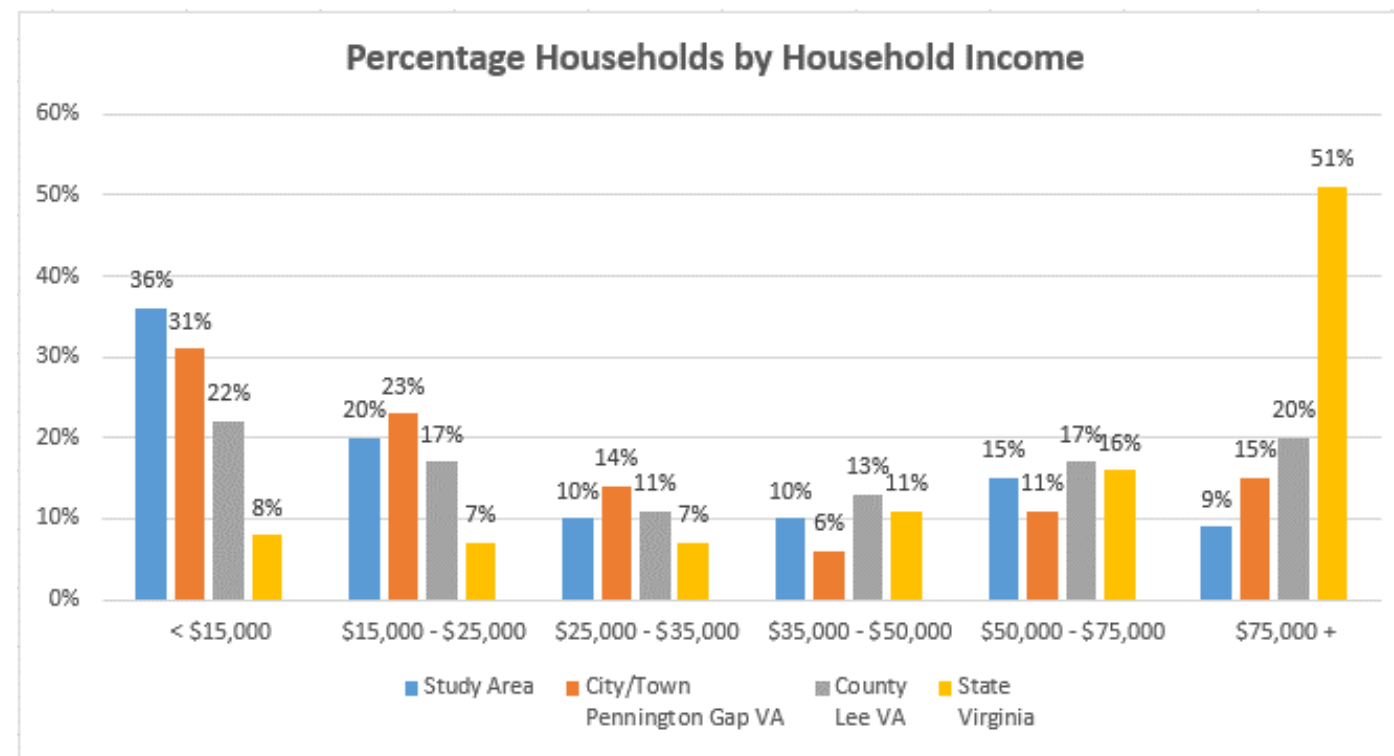


Figure 9: Percent Household by Income

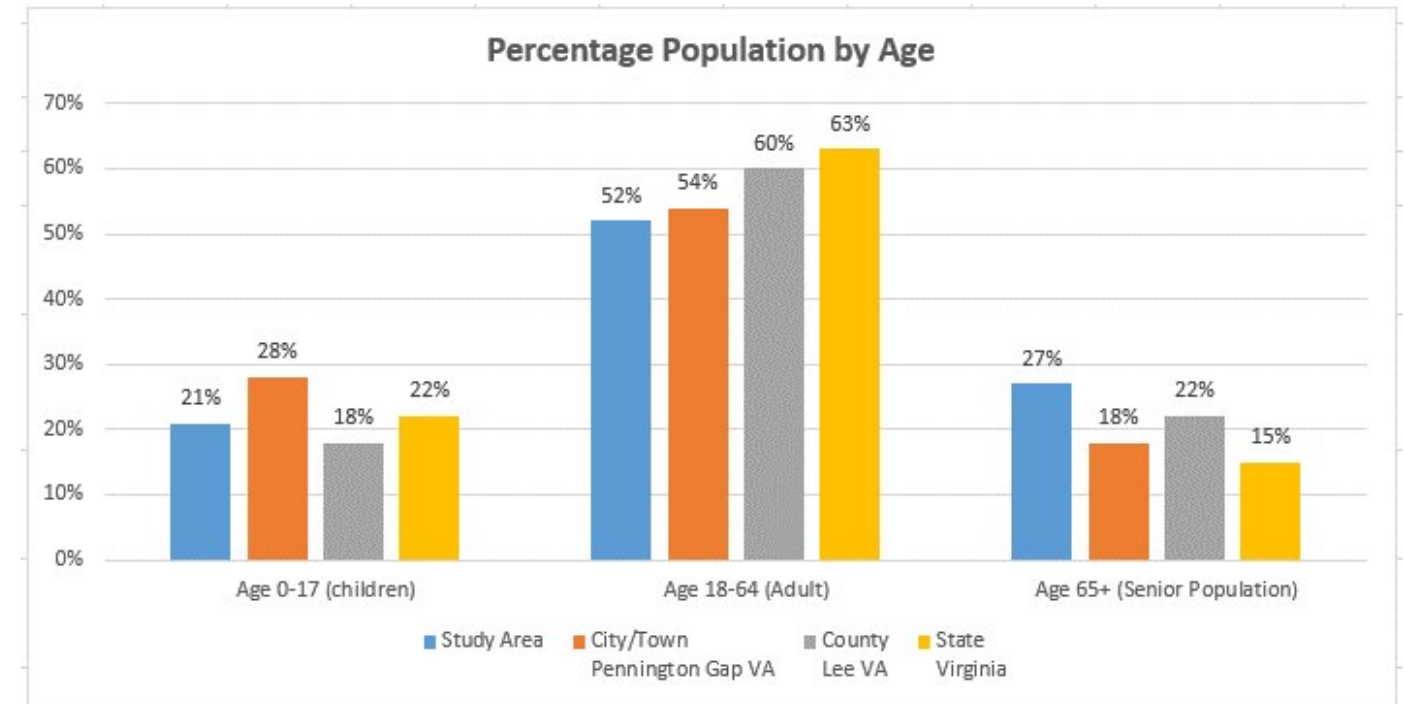


Figure 10: Percent Population by Age

Preliminary Value Engineering of Projects

Based on a comprehensive review of Pipeline Round 1 documentation as well as newer crash data, several recommendations were developed to further the value engineering process of the two projects on this corridor.

OFFSET LEFT-TURN LANES AT TRADE CENTER LANE

The offset left-turn lane project at Alt US 58 and Trade Center Lane does not appear to address an existing transportation need. The protected only left-turn lane phasing precludes the need for sight distance improvements to the opposing through vehicles and the intersection is functioning at an appropriate level of service with the current phasing and signal timings. There were four crashes in the 2018-2022 period; however, this project would not specifically mitigate any of the crashes that occurred within this timeframe. Two of the crashes that occurred at this intersection were due to drivers running red lights, and high visibility signal backplates (HVSBS) have already been installed since these crashes occurred. Furthermore, there is a very low westbound left-turn volume that would benefit from any improvement to this movement. This low volume, along with lack of data-based issues with the current operation and safety at this intersection, suggests that at this time an improvement does not need to be considered at the Alt US 58 and Trade Center Lane intersection. VDOT has concurred with the recommendation to remove this project from further value engineering or Pipeline Phase 2 consideration. **Figure 11** summarizes the Phase 1 analysis of this project.

ROUNDAABOUT AND TWO-WAY LEFT-TURN LANE (TWLTL) BETWEEN N COMBS ROAD AND CECIL STREET

The proposed roundabout and TWLTL project on Alt US 58 between N Combs Road to Cecil Street was also analyzed based on the crashes that occurred from 2018 to 2022 and the existing observations. The study team analyzed the SMART SCALE Benefit Scoring and concluded that the highest-scoring component of this project is the sidewalk. The project also received a positive score in the safety category. Based on the lack of pedestrian facilities on the west end of the corridor and the number of crashes within this segment, it would be beneficial to continue to value engineer this project to develop a more competitive funding application. One consideration to note is that in the recent study period (2018-2022), only one crash was reported at the intersection of N Combs Road, meaning that the roundabout will likely produce a lower safety score this SMART SCALE round than the previous round. As such, the study team will be considering alternative intersection control, traffic calming, and gateway treatment concepts in addition to the roundabout. Additionally, the study team documented potential constructability constraints that will need to be considered during subsequent value engineering steps.

Figure 12 summarizes the Phase 1 analysis of this project.

During Phase 1, the study team also began brainstorming potential value engineering cost savings for this project, including:

- Reducing the spatial limits of the TWLTL to reduce the amount of roadway widening and right-of-way requirements.
- Reducing the diameter of the roundabout (potentially infeasible due to need to accommodate truck movements).
- Exploring innovative stormwater management solutions.

VDOT also decided to acquire topographic, right-of-way, and subsurface utility engineering (SUE) survey along the project extents, which should assist the value engineering process by reducing risk associated with various constructability, utility, and property impacts.

Project 1 – Offset Left-Turn Lanes – Previous Design Concept

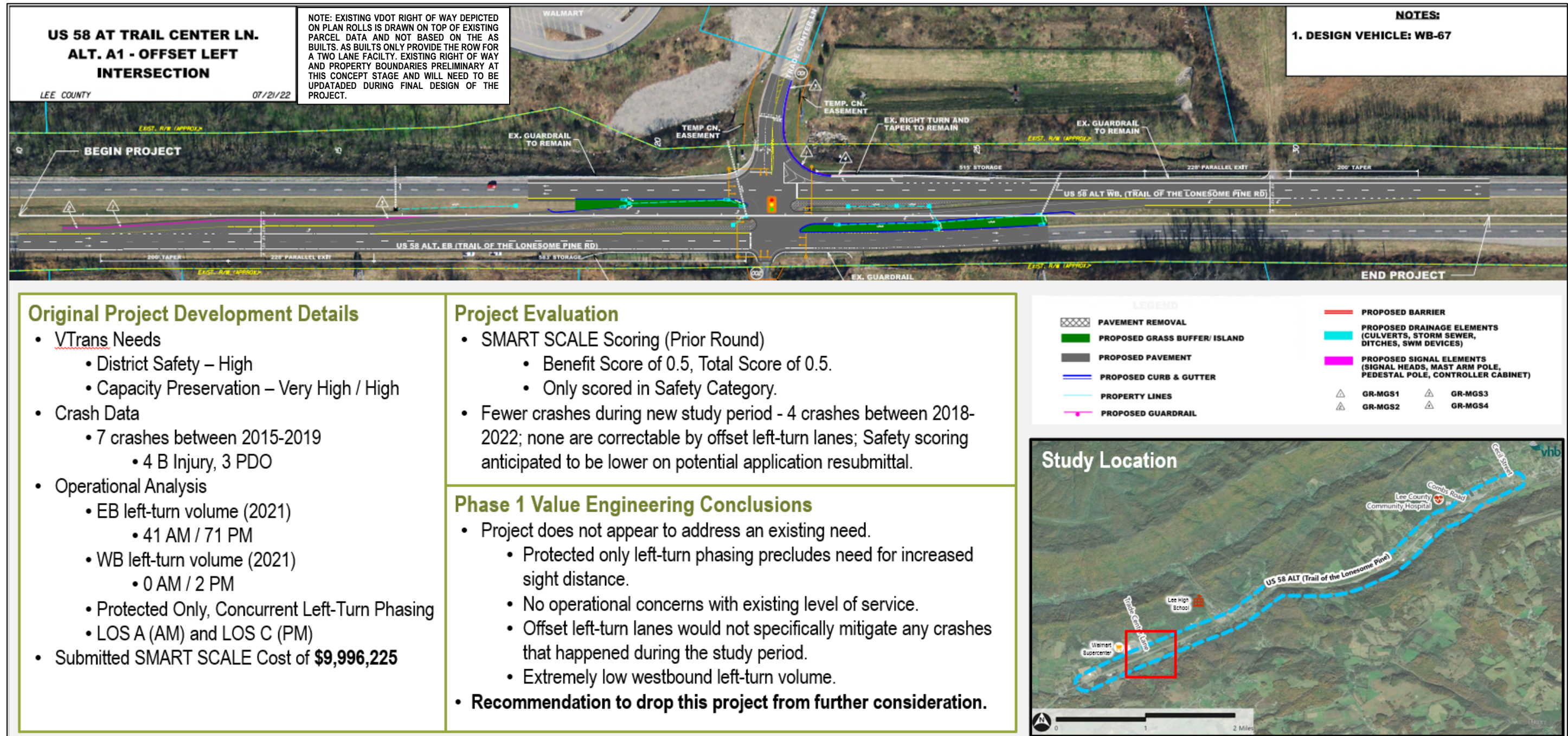
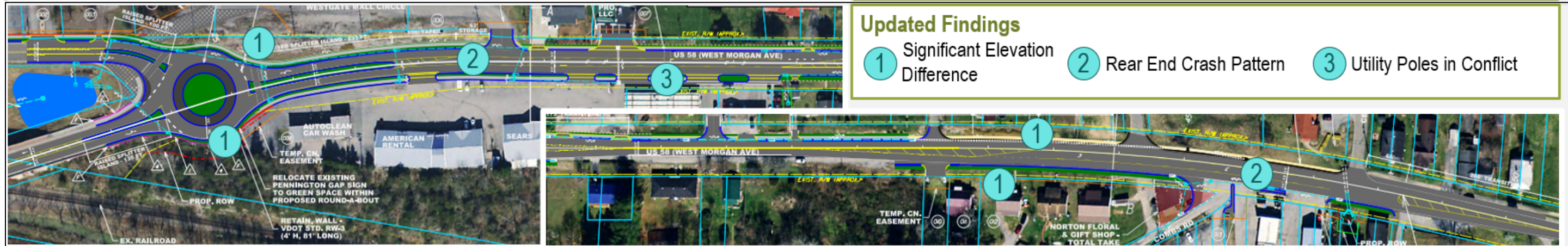


Figure 11: Analysis Summary of Offset Left-Turn Lanes SMART SCALE Project

Project 2 – Roundabout and TWLTL – Previous Design Concept



Updated Findings

- 1 Significant Elevation Difference
- 2 Rear End Crash Pattern
- 3 Utility Poles in Conflict

Original Project Details

- VTrans Needs
 - District Safety – Low
 - Capacity Preservation – High/ Low
- Crash Data
 - 7 crashes between 2015-2019 at Combs Road
- Submitted SMART SCALE Cost of **\$18,057,497**

Project Evaluation

- SMART SCALE Scoring
 - Benefit Score of 1.2, Total Score of 0.7.
 - Most benefit from Land Use Category – driven by sidewalk.
 - Second-most benefit from safety improvement. Previous study reported 7 crashes at Combs Road intersection. Current study period (2018-2022) has only 1 reported crash. Multiple crashes along proposed TWLTL segment remain.

Phase 1 Value Engineering Conclusions

- Combs Road Roundabout
 - Originally intended as a traffic calming measure.
 - Does not add much to the SMART SCALE benefit score but is a significant portion of the cost.
 - Value engineering potential includes:
 - Reducing roundabout diameter, shifting roundabout to the north to avoid steep drop, and potential stormwater efficiencies.
 - Consider alternative intersection control, speed management, and/or gateway treatments.
- Two-Way Left-Turn Lane and Sidewalk
 - Sidewalk is providing most benefit to the SMART SCALE score and should be maintained.
 - Crash data reveals significant access-related issue, particularly at gas station.
 - Consider providing dedicated left-turn lanes at targeted crash / access hot spots instead of a continuous two-way left-turn lane to minimize widening at higher cost locations.
 - Potential value engineering savings in stormwater management.

LEGEND	
	PAVEMENT REMOVAL
	EXISTING SIDEWALK
	PROPOSED TRUCK APRON
	PROPOSED GRASS BUFFER/ ISLAND
	PROPOSED SIDEWALK
	PROPOSED PAVEMENT
	PROPOSED CURB
	EXISTING CURB
	PROPERTY LINES
	PROPOSED GUARDRAIL
	PROPOSED BARRIER
	PROPOSED DRAINAGE ELEMENTS (CULVERTS, STORM SEWER, DITCHES, SWM DEVICES)

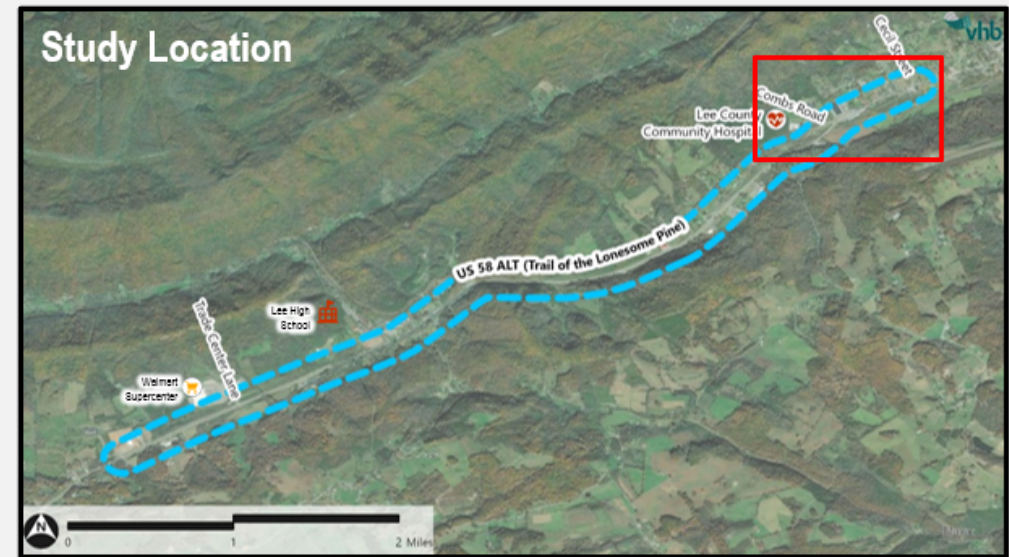


Figure 12: Analysis Summary of Roundabout and Two-Way Left-Turn Lane SMART SCALE Application

Chapter 2:

Alternative Development and Refinement

Alternative Development

In Phase 2, the study team further considered the proposed roundabout and TWLTL project on Alt US 58 between N Combs Road and Cecil Street. This consideration included different intersection control for the N Combs Road intersection, alternative traffic calming strategies and gateway treatment concepts in lieu of the proposed roundabout, and alternative project limits for the TWLTL.

US ALT 58 (W MORGAN AVENUE) / N COMBS ROAD INTERSECTION

In existing conditions this three-leg intersection is signal controlled. There is anecdotal evidence that this traffic signal may not be warranted based on existing vehicle volumes, although the traffic volumes have increased in recent years due to the reopening of the Lee County Community Hospital. While a potentially unwarranted traffic signal may impose traffic safety and operational concerns in addition to incurring ongoing maintenance costs, the existing signal may be preventing an angle crash pattern associated with unsignalized left turn movements. **Figure 8** documented zero angle crashes at this intersection within the five years of reviewed crash data. The lack of angle crashes is notable as the most significant safety benefit of a roundabout is the reduced risk of angle crashes; a roundabout replaces all crossing conflict points (associated with angle crashes) with merge/diverge conflict points. In fact, the existing signalized intersection only experienced a single crash – a property damage rear end collision – within the five years of reviewed crash data. Despite a roundabout having only six weighted conflict points (a planning-level safety metric) – compared to the twelve weighted conflict points at the signal, crash data indicates there is no safety issue that a roundabout might mitigate.

The study team also evaluated the operational performance of the intersection under three control types – the existing signal, two-way stop control, and the single-lane roundabout. As seen in **Table 5**, all three control types result in acceptable operational performance with relatively low delay and vehicle queueing. The proposed roundabout would have the greatest delay reduction benefit on the two left turn movements during the AM peak hour. While the existing signal does not have pedestrian crossing infrastructure, the Town of Pennington Gap desires a sidewalk extension to the Lee County Community Hospital. The signal and roundabout intersection control types would facilitate pedestrian crossing infrastructure; the two-way stop control intersection would not facilitate a controlled pedestrian crossing of W Morgan Avenue.

Table 5 documents the operational, safety, and pedestrian considerations for the three evaluated intersection control types at the W Morgan Avenue / N Combs Road intersection. Although the operational analysis documented was completed with existing traffic volumes, the study team did forecast 2045 design year traffic volumes as documented in **Appendix E**.

The study team considered value engineering opportunities for the proposed roundabout to reduce the construction cost; however, there are topographical and geologic constraints (examples shown in **Figure 13**) that are challenging to mitigate. Ultimately the study team, with agreement from study stakeholders,

concluded that the limited benefits associated with the roundabout did not justify the anticipated construction cost, and the roundabout was thus removed from further consideration.

Table 5: Intersection Control Comparison

Control Type	Approach	LOS (delay in sec)		Queue (ft)		Safety	Pedestrian Accommodations
		AM	PM	AM	PM		
Signal	EBL	35.8 (D)	16.9 (B)	40	36	Existing condition 12 Weighted Conflict Points	Controlled, no existing infrastructure
	EBR	2.0 (A)	16.5 (B)	4	22		
	NBL	35.9 (D)	16.2 (B)	49	15		
	NBT	2.6 (A)	4.7 (A)	48	76		
	SBT	7.3 (A)	15.7 (B)	105	179		
	SBR	5.8 (A)	10.4 (B)	13	14		
	Intersection	8.0 (A)	10.9 (B)	-	-		
Two-Way Stop Control	EBL	14.2 (B)	17.2 (C)	5	10	Potential to reduce rear end collisions on US 58, but could lead to increase in angle crashes 12 Weighted Conflict Points	Uncontrolled crossings
	EBR	9.9 (A)	11.0 (B)	3	5		
	NBL	8.1 (A)	8.3 (A)	3	0		
	NBT	-	-	-	-		
	SBT	-	-	-	-		
	SBR	-	-	-	-		
	Intersection	-	-	-	-		
Roundabout	EBL	7.2 (A)	8.1 (A)	5	10	Reduced angle crash and F&I; however, in existing signalized condition only a single rear end crash in 5 years 6 Weighted Conflict Points	Equivalent to signal
	EBR	3.4 (A)	4.2 (A)	5	10		
	NBL	8.4 (A)	8.5 (A)	45	65		
	NBT	3.7 (A)	3.8 (A)	45	65		
	SBT	3.7 (A)	3.4 (A)	48	65		
	SBR	3.8 (A)	3.6 (A)	48	65		
	Intersection	4.1 (A)	3.9 (A)	48	65		

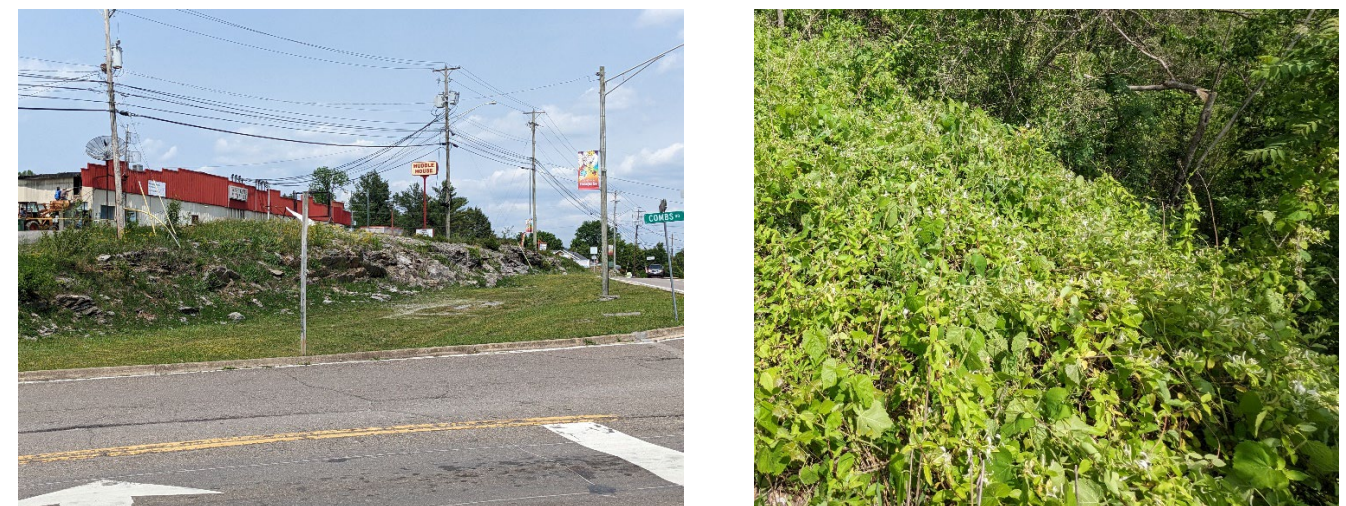


Figure 13: Site Photos showing Engineering Constraints for Proposed Roundabout (Left Image: elevation difference and rock formations northeast of intersection. Right Image: slope drop off south of intersection).

The study team and stakeholders subsequently settled on maintaining the existing signal control at this intersection (versus removing the signal and operating under two-way stop control). The signal may be preventing an unsignalized left turn crash pattern and it also facilitates the installation of pedestrian crossing infrastructure. Additionally, stakeholders noted that the Flashing Yellow Arrow (FYA) installation for the eastbound left turn at this intersection has improved operating conditions and resolved concerns about the signal.

Once the study team and stakeholders determined that the existing signal was the most appropriate signal control for the intersection, the study team considered alternative forms of traffic calming and gateway treatments in lieu of the roundabout. The study team proposed to convert the existing striped out median on the east side of the intersection to a raised landscaped median. The existing Town of Pennington Gap gateway sign – currently located on the side of the road – could be relocated into the median. Research has shown that raised medians induce traffic calming² by slowing vehicle traffic due to the travel lane feeling narrower to drivers.

The existing westbound right turn lane onto N Combs Road has 350 feet of storage plus 200 feet of taper length; however, the 2045 projected vehicle queue length (95th percentile) is only 18 feet (AM peak) and 15 feet (PM peak), so there is excess storage capacity. The study team proposed truncating this right turn lane to 100 feet of storage plus 100 feet of taper length so that new sidewalk could be constructed mostly within the existing roadway footprint. Constructing new sidewalk behind the existing roadway curb (particularly closer to Westgate Mall Circle) would have potential constraining impacts and higher construction costs due to the presence of rock outcroppings and utility poles.

US ALT 58 (W MORGAN AVENUE) BETWEEN N COMBS ROAD AND CECIL STREET

On the W Morgan Avenue segment between N Combs Road and Cecil Street, there is a significant access related crash pattern. There were 21 rear-end crashes in the 2018 to 2022 study period within this segment, with many of the crashes attributed to a car stopping to turn left. The most prevalent crash pattern is seven westbound rear ends at the Sunoco gas station, followed by four rear ends near the Cecil Street intersection – two eastbound rear ends associated with the left turn onto Cecil Street and two westbound rear ends associated with the left turn into the Family Tire store. Of note, neither the fatality nor severe injury crash near Cecil Street are one of these four crashes or associated with access – the fatality involved construction work zone and the severe injury was a run-off-road incident. The study team utilized this crash analysis to inform the prioritization of targeted left-turn lanes and two-way left-turn lane limits.

The study team first concluded that a two-way left turn lane should be prioritized at the Sunoco Gas Station to address the greatest safety need according to the crash data. The approximate limits of this section of TWLTL are Westgate Mall Circle to east of the gas station (west of Calvary Street). At the west end of this segment, the study team considered several design configurations, including whether to

include a left turn lane onto Westgate Mall Circle and whether to physically restrict left turns into the west driveway on the south side of W Morgan Avenue; **Figure 14** shows two of the considered design configurations. Based on stakeholder input, the selected design concept included a left turn lane onto Westgate Mall Circle and a median nose extension to physically restrict the westbound left turns into the driveway. On the east end of this segment, the study team concurred with the previously developed SMART SCALE concept that the TWLTL should end west of Calvary Street to avoid significant engineering and right-of-way constraints between Calvary Street and Edwards Street. The single-family residential land use in this segment and lack of rear end crash data also does suggest a need for left turn provision within this segment.

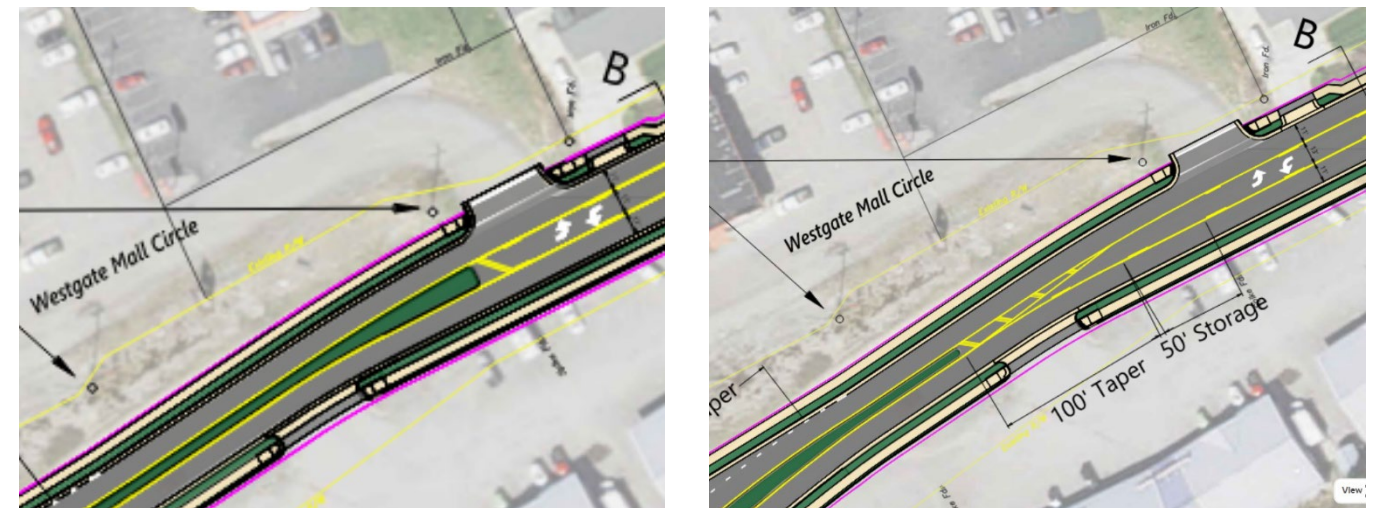


Figure 14: Conceptual Design Alternatives for Westgate Mall Circle (Left Image: No left turn lane onto Westgate Mall Circle with Median Extension). Right Image: Left turn lane onto Westgate Mall Circle with no Median Extension).

The previous SMART SCALE concept additionally proposed a TWLTL encompassing both Herndon Street and Cecil Street. Right-of-way was a significant constraint for this proposed project as the roadway widening required the take of the parking lot for Norton Floral and Gift Shop and thus resulted in the proposed total property take of this business. W Morgan Avenue could not be widened to the north without significantly impacting the single-family residential located near Herndon and Cecil Streets. The study team considered potential alternative designs to minimize right-of-way impacts, specifically to avoid a complete property take.

One option considered by the study team was to modify the existing public right-of-way behind the floral shop to shift the store's parking behind the shop, as shown in **Figure 15**. The study team also considered how to mitigate the offset-T configuration between Cecil Street and the Family Tire business as crash data included rear end collisions at both left turn movements. If two opposing vehicles arrived concurrently to complete these left turns, a TWLTL would create a head-on collision risk, which typically

² https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/eng_ctm_spd_14.pdf - See Page 3 "Center Island."

results in a higher severity collision than a rear end. After considering multiple design options, the study team and stakeholders jointly agreed that the construction cost and impacts associated with this segment of TWLTL do not provide enough crash reduction benefit to justify inclusion within a project funding application at this time. The group did consider the increased turns that would accompany the planned Family Dollar store in the northeast quadrant of W Morgan Avenue / Herndon Street; however, that is not an existing condition from which a project funding application could receive benefit scoring.

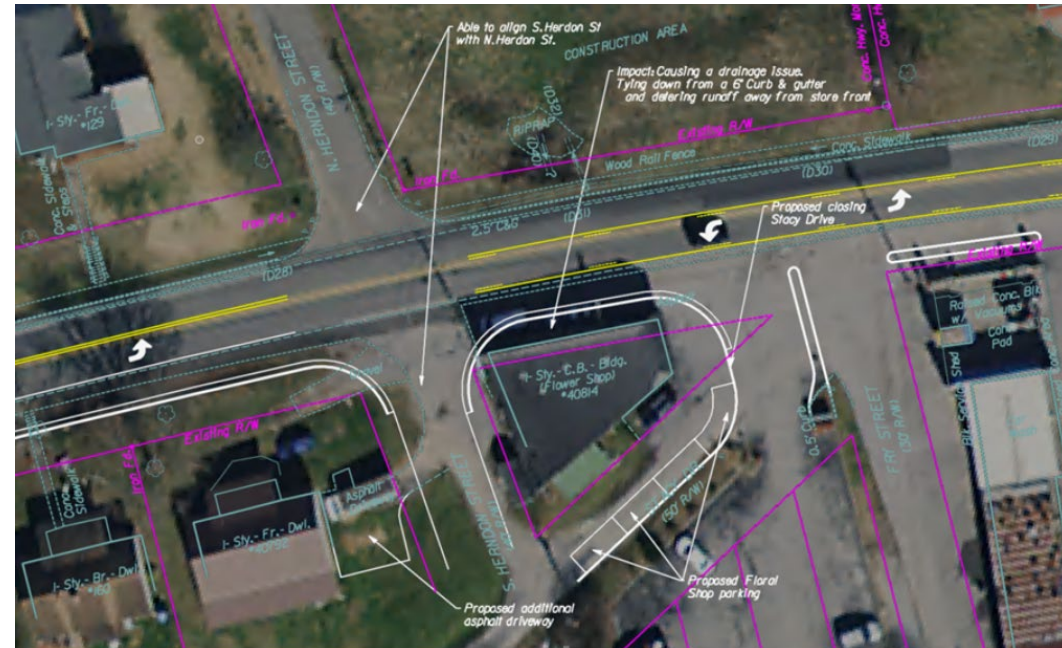


Figure 15: Proposed Concept to Shift Floral Shop Parking Behind the Store

PEDESTRIAN ACCOMODATIONS

Pedestrian facilities are an additional important aspect of this project; a stakeholder priority is the extension of sidewalk from its current terminus near Edwards Street to the Lee County Community Hospital. Pedestrian facilities were also the strongest driver of benefit score in the previous SMART SCALE Round 5 application. The study team proposed new sidewalk between the aforementioned termini along the north side of W Morgan Avenue and N Combs Road. The study team also proposed new sidewalk along the south side of W Morgan Avenue between N Combs Road and the Sunoco gas station. Pedestrian crossings of W Morgan Avenue would be provided at the N Combs Road signalized intersection and midblock in front of the Sunoco gas station.

The study team completed a VDOT midblock crosswalk study for the proposed Sunoco gas station crossing. According to the VDOT I&IM 384.1 "Pedestrian Crossing Accommodations at Unsignalized Approaches," the proposed location is eligible for a crossing as it satisfies all three safety screening requirements and three of the five installation criteria. Meeting three installation criteria means that the

crosswalk "should be installed". The Tier 1 recommended countermeasures include high visibility crosswalk markings with W11-2 signage along with a refuge island.

The crosswalk study showed that the proposed crossing meets all safety screening requirements:

- The proposed crosswalk is not within 300 feet of another marked crosswalk as there are no crosswalks across US Alt 58 (W Morgan Avenue) near this area.
- With an estimated operating speed of 42 mph, the stopping sight distance (SSD) on US Alt 58 (W Morgan Avenue) is approximately 330 feet. Although the study corridor has some horizontal curvature, the SSD is sufficiently met on both approaches to the proposed crossing location.
- This segment of US Alt 58 (W Morgan Avenue) carries 8,400 vehicles per day (VPD) and has a posted speed limit of 35 mph; this combination falls into the Tier 1 pedestrian safety countermeasure category.

The crosswalk study indicated that the proposed crossing meets the following three installation criteria:

- The proposed crosswalk location is between two pedestrian-oriented land uses – residential areas, convenience stores, and shopping centers are pedestrian-oriented land uses.
- The proposed crosswalk location connects two planned sidewalk facilities.
- This segment of US Alt 58 (W Morgan Avenue) has an AADT above 1,500 and a posted speed limit above 30 mph.

Final Preferred Alternatives

Figure 16 depicts the final preferred alternative for the study corridor. The recommended improvements include constructing a two-way left turn lane on Alt US 58 (W Morgan Avenue), encompassing both Westgate Mall Circle and the Sunoco Gas Station. A landscaped median with signalized pedestrian crossing on the east side of N Combs Road will encourage slower vehicle speeds and facilitate pedestrian access. At N Combs Road, the existing westbound right turn lane storage and taper will be reduced from 350 feet and 200 feet to 100 feet of storage and 100 feet of taper. Approximately 2,000 feet of sidewalk is proposed to be constructed between the N Combs and Health Care Drive intersection on the north side of W Morgan Avenue along with approximately 750 feet of sidewalk along the south side of Alt US 58 (W Morgan Avenue) between N Combs Road and the Sunoco Gas Station. A mid-block pedestrian crossing with a pedestrian refuge island is proposed in front of the Sunoco Gas Station. While a detailed cost estimate will be prepared in the Phase 3 of Project Pipeline for SMART SCALE application purposes, the preliminary cost estimate is as follows for this project:

- Preliminary Engineering = \$844,500
- Right of Way and Utilities = \$600,000
- Construction = \$8,726,500
- Total = \$10,171,000

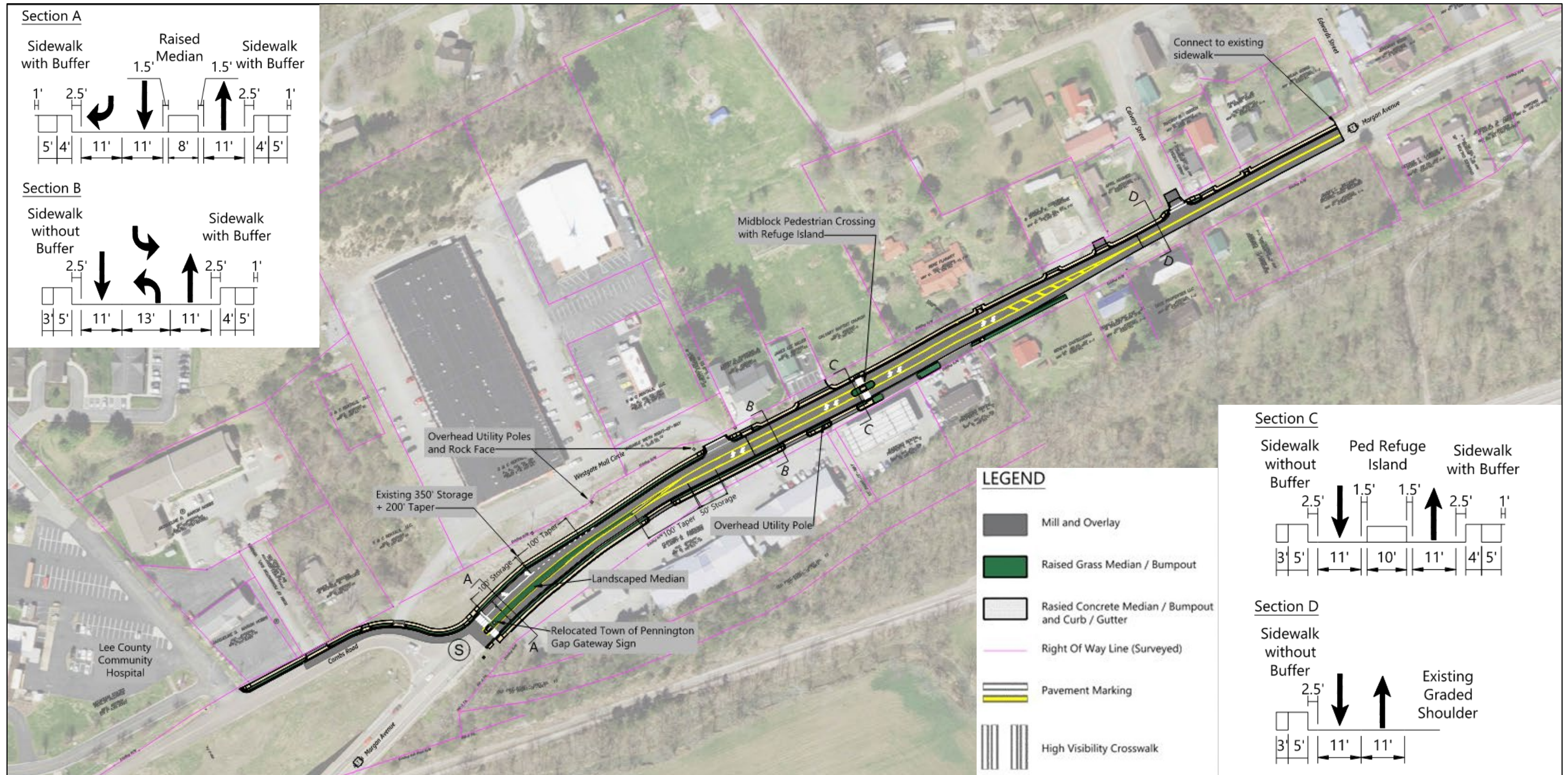


Figure 16: Final Preferred Alternative



Chapter 3:

Public and Stakeholder Outreach and Feedback

Public Involvement:

Following the development and analysis of the Preliminary Build Alternatives, a public involvement survey was developed to determine the public’s response to the recommended improvements and what they perceived as the relevant issues within the study area. This survey was available online for 14 days spanning from February 12, 2024 to February 25, 2024.

Survey Design

Public involvement for this study took place in the form of an online survey developed in VDOT’s Public Input Platform, which is an online engagement platform that is designed to educate the public while gathering informed output. The goals of this public outreach effort were to present relevant issues, educate the public on the recommended improvement concepts outlined in Chapter 2, and to receive the public’s feedback on the proposed improvements.

Overall, the survey is divided into three sections, which include the following:

1. Introduction to the study and background information
2. Proposed improvements
3. Wrap up with demographic questions

The first section provides an overview of the study partners, background, and study location, as shown in **Figure 17**. In the second section, participants were presented with recommended improvements that addressed vehicular-based operation and safety needs. Participants were asked (on a 1 to 5 scale) if they opposed or supported the project concept. A score of 1 represented “strongly oppose”, and a score of 5 represented “strongly support.” Participants were also able to provide freeform comments on each concept. At the end of the survey, the participants were asked a few demographic questions.

A total of 226 people responded to the survey with 123 unique freeform comments. A compilation of all freeform public comments can be found in **Appendix F**.

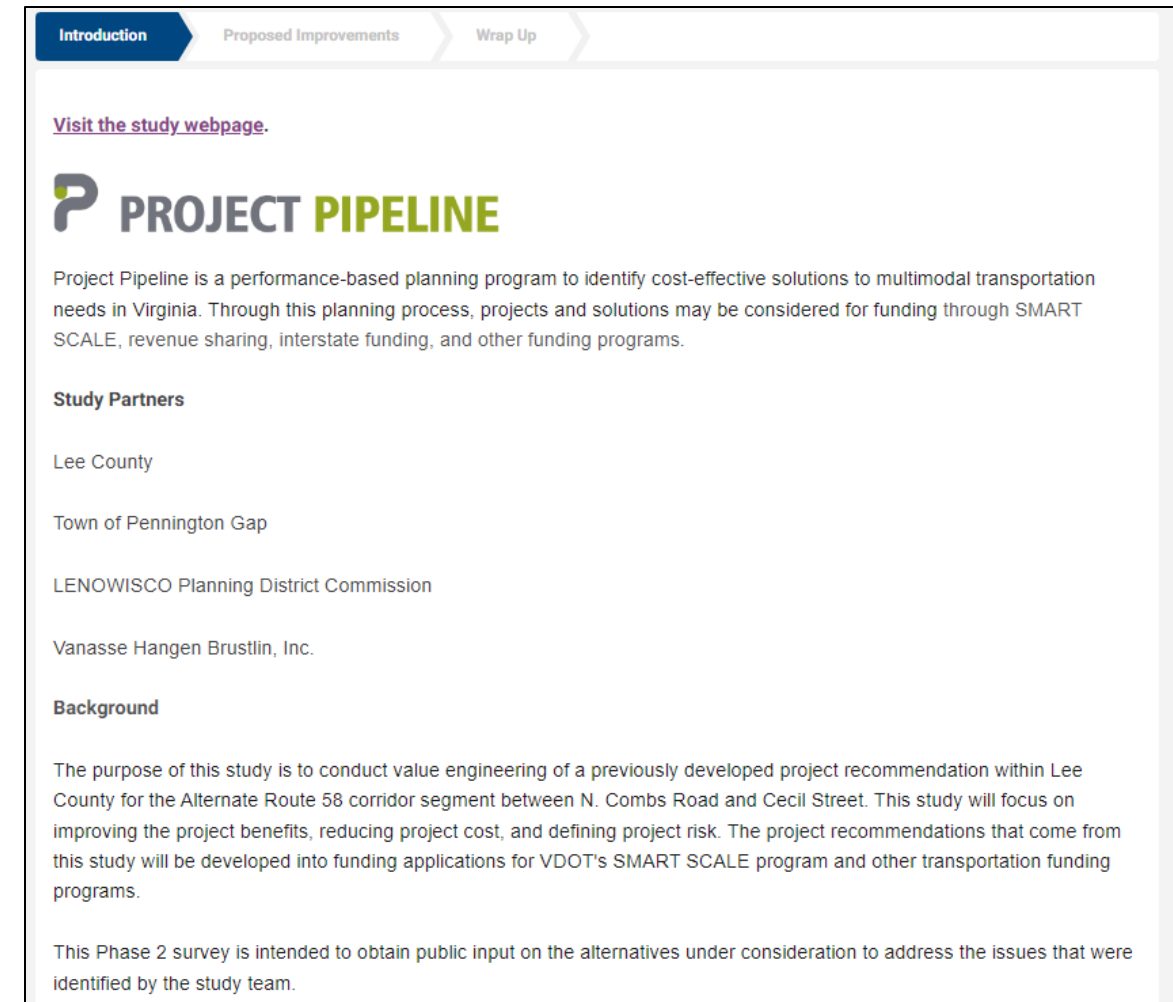


Figure 17: Public Survey Layout

Survey Questions and Results

The first concept presented to the public for feedback consisted of the following improvements between N Combs Road and Edwards Street:

- A new two-way left-turn lane from Westgate Mall Circle past the Sunoco Gas Station
- A landscaped median east of the N Combs Road intersection to encourage slower vehicle speeds
- Sidewalk extension to the hospital
- Pedestrian crossings of Morgan Avenue at both N Combs Road and the Sunoco Gas Station

Respondents were informed that “*The Morgan Avenue segment in front of Westgate Mall and the Sunoco Gas Station has experienced a number of vehicle crashes due to the absence of left turn lanes. Speeding as drivers enter the Town of Pennington Gap has also been reported as a concern. There is currently a missing sidewalk gap between the Lee County Community Hospital and Edwards Street.*” Respondents were asked to rank each concept item individually, and their feedback is recorded in **Figure 18 through Figure 21**; they had the opportunity to rate the proposed concept on a 1 (strongly oppose) to 5 (strongly support) scale. The average weighted respondent score for the concepts were as follows:

- Left-Turn Lane: 4.14 which is a positive rating above a neutral score of 3.0 indicating support for the concept
- Sidewalk Extension: 4.18 which is a positive rating above a neutral score of 3.0 indicating support for the concept
- Landscaped Median: 3.69 which is a positive rating above a neutral score of 3.0 indicating support for the concept
- Pedestrian Crossings: 3.87 which is a positive rating above a neutral score of 3.0 indicating support for the concept

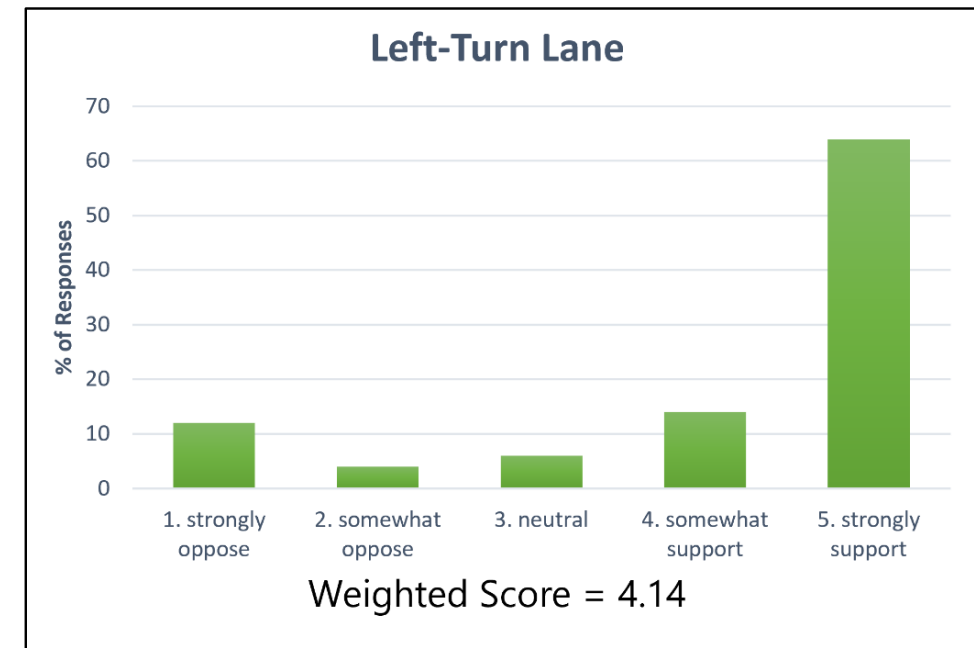


Figure 18: Respondents' Feedback on Left-Turn Lane

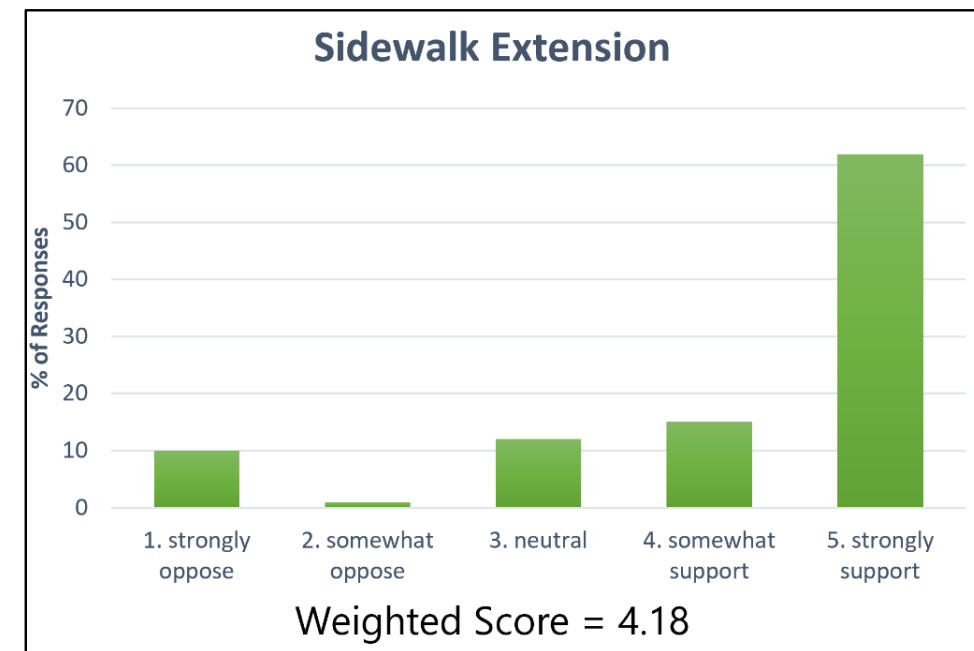


Figure 19: Respondents' Feedback on Sidewalk Extension

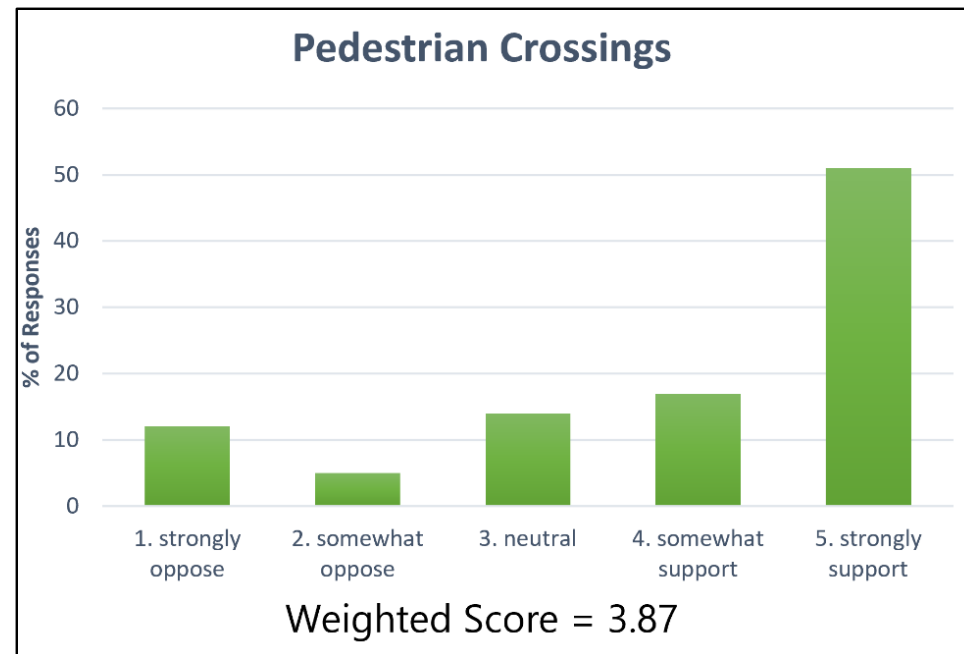


Figure 20: Respondents' Feedback on Pedestrian Crossings

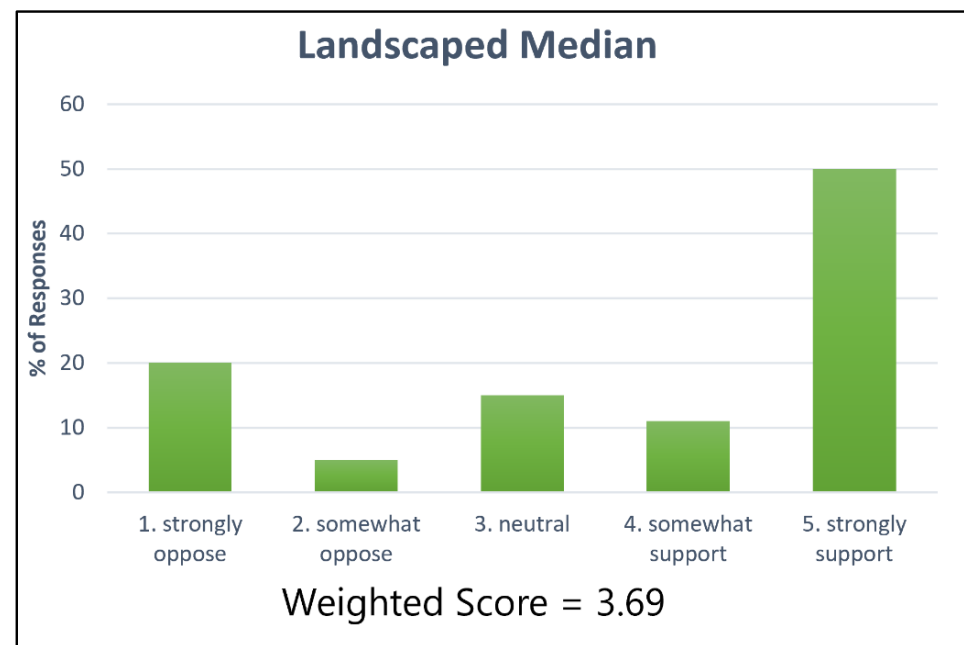


Figure 21: Respondents' Feedback on Landscaped Median

Next, the public was invited to provide feedback on a two-way left-turn lane near N. Herndon Street and Cecil Street. This concept was not moving forward to this round of SMART SCALE; however, the County wanted to obtain public feedback to guide the planning process. The respondents were informed "The Morgan Avenue segment between Herndon Street and Cecil Street has experienced several vehicle crashes related to the absence of left turn lanes. There are also several closely spaced driveway entrances. The proposed concept improvement would construct a new two-way left turn lane within this segment to mitigate this type of crash pattern. The required roadway widening would result in the complete property take of a business on Morgan Avenue." **Figure 22** provides the public response for this concept. Based on the weighted score of the 3.98, the majority of respondents strongly support this concept.

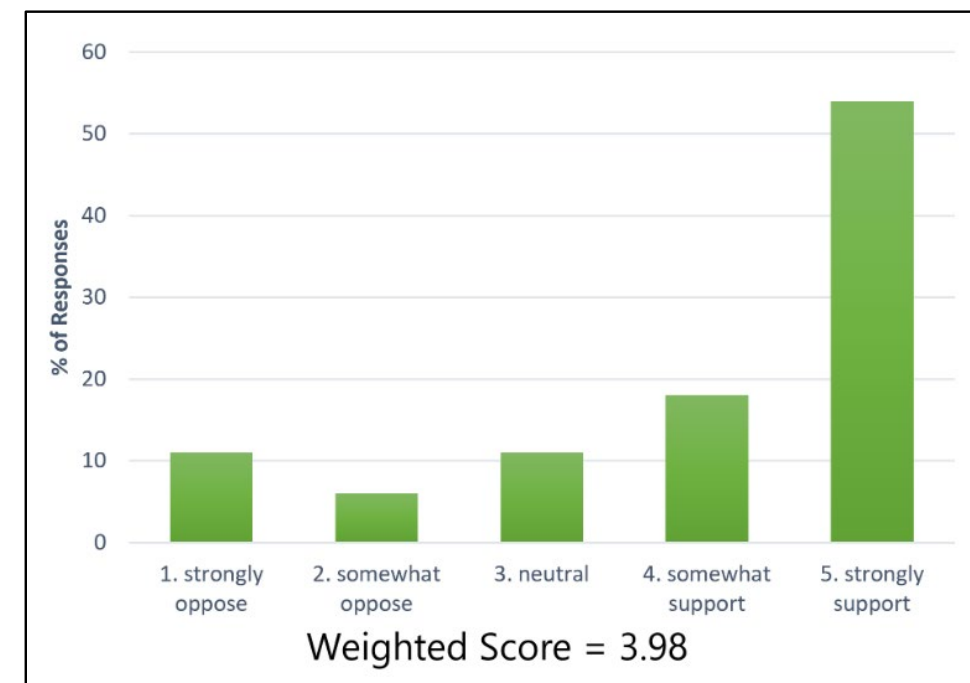


Figure 22: Respondents' Feedback on Two-Way Left-Turn Lane at N. Herndon Street and Cecil Street

FREEFORM SURVEY COMMENTS

In addition to being invited to score and rank the proposed alternatives, survey respondents had the option to provide freeform comments both generally on the study area and on individual concepts. The general themes of these comments are shown in **Table 6**. A compilation of all freeform public comments can be found in **Appendix F**.

Table 6: Summary of Public Comments and Study Team Responses

Public Comments and Study Team Responses		
	General Public Comment Themes	Study Team Response
N Combs Road to Edwards Street Concept	<ol style="list-style-type: none"> 1. Do not need or want roundabout here 2. General Support for the project aspects 3. Some commenters noted that they feel there is no issue here and money could be better spent elsewhere 4. Many references to a bypass being a better solution 5. Concerns of exacerbated issues when Family Dollar opens 	<ol style="list-style-type: none"> 1. The roundabout was proposed in a previous concept in the last round of Project Pipeline. A roundabout is not proposed for the concept in this round of Project Pipeline. 2. Acknowledged. 3. This project has been value engineered to optimize the benefit to cost. During the SMART SCALE process, the project need will be taken into consideration and a benefit cost ratio will be developed. SMART SCALE scores and funds projects based on the benefit cost ratio developed and prioritizes funding for the projects with the highest score. 4. A bypass was not considered as part of this study as a bypass would fall outside of this specific study corridor and require a regional analysis. 5. The Family Dollar store underwent a development plan review process independent of this transportation study.
Two-Way Left-Turn Lane at N. Herdon Street and Cecil Street	<ol style="list-style-type: none"> 1. General support for a two-way left-turn lane 2. Concerns of exacerbated issues when Family Dollar opens 3. Some concern over loss of business (floral shop) 4. Some commenters noted that they feel there is no issue here and money could be better spent elsewhere 	<ol style="list-style-type: none"> 1. Acknowledged. 2. Noted, the analysis took into account the impact that the Family Dollar opening may have to the roadway network. 3. This project is not currently being pursued for any funding, primarily due to the property take required. Negotiations would need to occur between the County/VDOT and the property owner if this project is considered in the future. 4. This project has been value engineered to optimize the benefit to cost. During the SMART SCALE process, the project need will be taken into consideration and a benefit cost ratio will be developed. SMART SCALE scores and funds projects based on the benefit cost ratio developed and prioritizes funding for the projects with the highest score.

Chapter 4:

Preferred Alternative Design Refinement

Preferred Alternative Design Refinement

Phase 3 of the Project Pipeline study advanced the design of the preferred alternative to prepare it for SMART SCALE application. This design refinement was focused on identifying all significant project features, defining project risk and contingency factors, and developing an appropriate cost estimate. The intent was to progress the design to a sufficient level (approximately 10% design) such that all necessary cost items were included in the project application.

Preferred Alternative #1: ALT US 58 at N Combs Road Corridor Improvements

This preferred alternative was prepared for the August 1st, 2024, Round 6 SMART SCALE Application deadline. The final application included the following deliverables: design exhibit, cost estimate, project risk register, basis of design memorandum, and supporting documentation (this Pipeline study report). The improvements included in this preferred alternative #1 package include:

- Widening of W Morgan Avenue to construct approximately 650 feet of two-way left-turn lane between Westgate Mall Circle and the Sunoco Gas Station.
- Landscaped median on W Morgan Avenue between N Combs Road and the start of the two-way left-turn lane at Westgate Mall Circle. Reduce the westbound right-turn lane from W Morgan Avenue to N Combs Road to 100 feet storage plus 100 feet taper.
- Approximately 360 feet of sidewalk on the north side of N Combs Road between Health Care Drive and W Morgan Avenue.
- Approximately 1,475 feet of sidewalk on the north side of W Morgan Avenue between N Combs Road and existing sidewalk terminus at Edwards Street.
- Approximately 575 feet of sidewalk on the south side of W Morgan Avenue between N Combs Road and the midblock pedestrian crossing at the Sunoco Gas Station.
- Signalized pedestrian crossing of the east leg at the N Combs Road and W Morgan Avenue intersection with a pedestrian refuge in the median.
- Unsignalized midblock pedestrian crossing in front of the Sunoco Gas Station with a pedestrian refuge island.

Design Updates and Assumptions

As the design of these various improvements progressed, several design refinements were completed, and design assumptions clarified. These are covered in more extensive detail in the Basis of Design

document (see **Appendix G**) that accompanied this project's Round 6 SMART SCALE Application, but a summary of these items is provided here. **Figure 23** shows the refined design alternative.

- Decreased sidewalk buffer width near Health Care Drive and Terrace Road to minimize right of way impacts.
- Updated pedestrian crosswalk markings across Calvary Street to high-visibility.
- Incorporated stormwater infrastructure to address runoff quantity and quality.
- Identified impacted overhead utility poles.
- Delineated extents of new full depth pavement versus mill and overlay.

The major design features and design assumptions for the proposed improvement are documented in the accompanying Basis of Design document.

Project Risk and Contingency

Contingencies per category are covered in more extensive detail in the Basis of Design document (see **Appendix G**) that accompanied this project's Round 6 SMART SCALE application. Specific project risks are highlighted in the Risk Analysis Matrix that also accompanied the application. This matrix documents the risk items, assesses their potential impact, and proposes mitigation strategies.

Cost Estimate

The cost estimate was developed via quantity take offs, historical VDOT bid prices, VDOT input, and percentage-based preliminary engineering costs. The estimate process is covered in more extensive detail in the Basis of Design document (see **Appendix G**) that accompanied this project's Round 6 SMART SCALE application.

The total project cost is estimated to be **\$12,800,452** and broken down by Phase/Major area as follows:

- | | |
|------------------------------------|-------------|
| • Preliminary Engineering Phase | \$2,072,377 |
| • Right of Way and Utilities Phase | \$945,442 |
| • Construction Phase (without CEI) | \$8,280,575 |
| • Construction Phase (with CEI) | \$9,782,633 |



Figure 23: Landscaped Median, Two-Way Left-Turn Lane, and Pedestrian Improvements on W Morgan Avenue