



PROJECT PIPELINE

Route 19 at Alternate Route 58

**Russell County, VA
BR-25-02**

PHASE 3 REPORT

July 2026

Prepared by

Prepared for



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Chapter 1: Needs Evaluation and Diagnosis

1.1 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: <https://vapipeline.virginia.gov/>.

This study, entitled Route 19 / Alternate Route 58, focuses on concepts targeting identified needs including district road safety, capacity preservation, and transportation demand management. The four key steps within the Project Pipeline performance-based planning and programming process are shown in **Figure 1**.

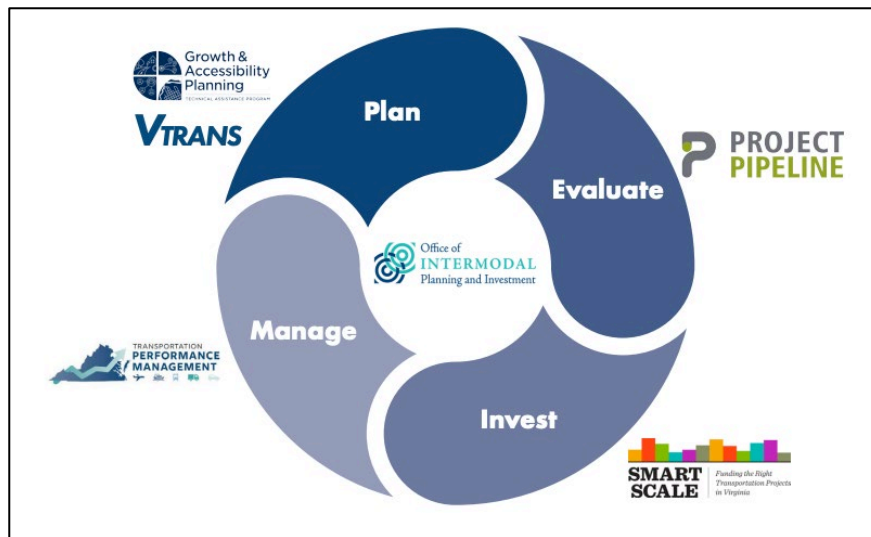


Figure 1: Project Pipeline Key Steps

1.2 Methodology

The Project Pipeline study process consists of three phases:

- **Phase 1:** Problem Diagnosis and Alternative Brainstorming
- **Phase 2:** Alternative Evaluation and Sketch-Level Analysis
- **Phase 3:** Investment Strategy and Cost Estimate

Figure 2 shows the overall Project Pipeline process, key milestones, and schedule in relation to critical SMART SCALE dates.

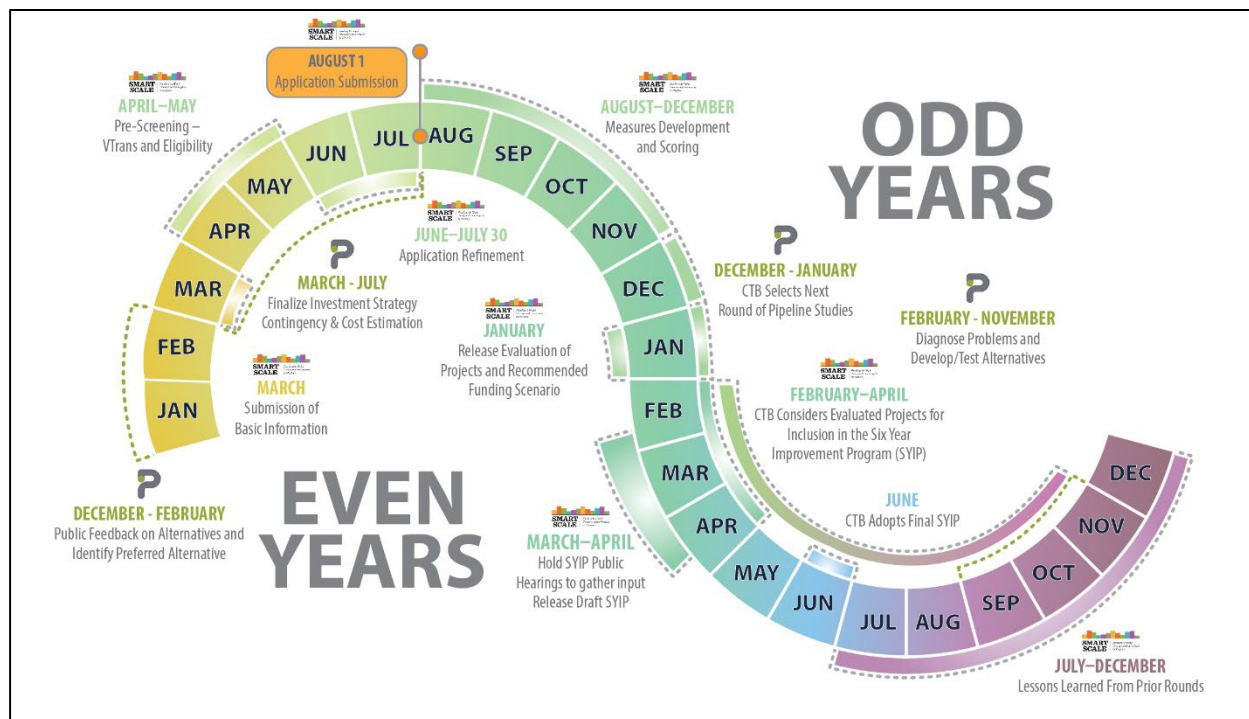


Figure 2: Study Phase Methods and Solutions

The study team is broken down into technical teams to review data, develop preliminary alternatives, refine solutions, and provide clear messages to stakeholders regarding the most viable and effective solutions related to the priorities and needs for each study. The priorities, needs, and scope of each study guides the level of Technical Team involvement. In general, the technical teams include the Office of Intermodal Planning and Investment (OIPI), the Virginia Department of Transportation (VDOT), and consultant staff from the following departments and/or disciplines:

- District Planning
- District Traffic Operations
- District Location and Design (L&D)
- District subject matter experts (e.g., Right of Way, Utilities, and Environmental, as needed)
- Consultant Teams, Central Office Divisions(s), as needed
- DRPT, as needed
- Localities, if applicable
- Metropolitan Planning Organizations (MPOs) or Planning District Commissions (PDCs), if applicable

A sample organizational chart of a technical team is shown in **Figure 3**.

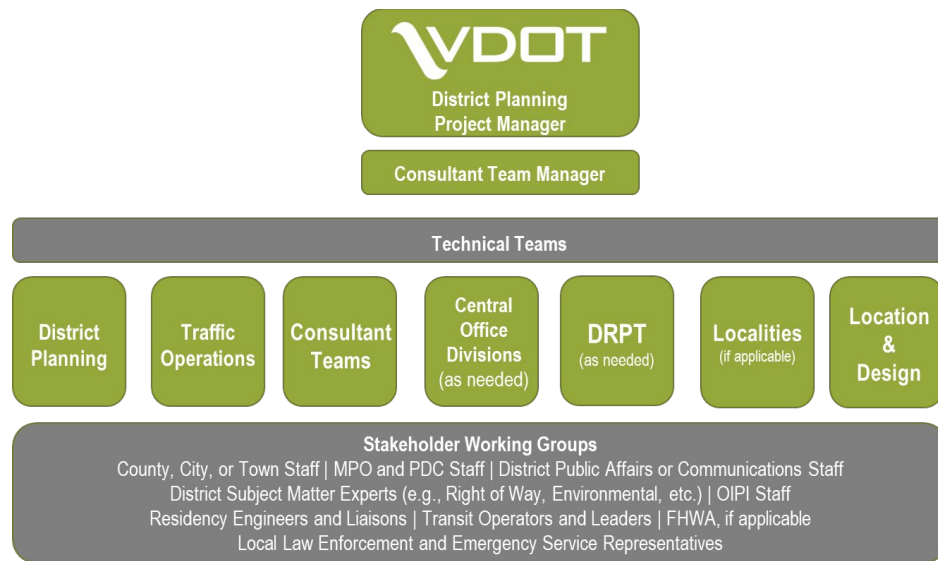


Figure 3: Structure of a Technical Team

1.3 Study Area Background

A Study Work Group (SWG) was formed for this study to capture input from local stakeholders and shape the development of potential improvements. The SWG provided local and institutional knowledge of the corridor, reviewed study methodologies, provided input on key assumptions, and reviewed and approved proposed improvements developed through the study process. The SWG included members representing the following organizations:

- Virginia Department of Transportation (VDOT)
- Office of Intermodal Planning and Investment (OIPI)
- Russell County
- Cumberland Plateau Planning District Commission (CPPDC)
- VHB

The US 19 study corridor spans from A Hanson Drive to Resilient Way and the study area along ALT US 58 spans from the US 19 at ALT US 58 intersection to Old Postal Road in Russell County, Virginia. South of the US 19 at ALT US 58 intersection, ALT US 58 and US 19 run concurrently. US 19 is a four-lane divided roadway with intersection turn lanes classified as an Other Principal Arterial. It has a 55-mph posted speed limit until it approaches the US 19 at ALT US 58 intersection where the speed limit reduces to 45-mph posted. ALT US 58 is an Other Principal Arterial with a 55-mph posted speed limit. The concurrent US 19/ALT US 58 segment south of the intersection is on the Corridors of Statewide Significance (CoSS) – Southside Corridor. The entire study area is part of VDOT’s Arterial Preservation Network (APN), a network of major arterial highways that function similarly to the interstate system in accommodating long-distance mobility of both people and freight.

The study area is bordered by rural residential and agricultural land in addition to a gas station in the unincorporated community of Hansonville, Virginia. The roadway network serves as an important connector between major activity centers and facilities regional travel.

The study area includes three at-grade intersections, including one signalized intersection and two unsignalized intersections. The three study intersections are shown in **Table 1** and **Figure 4**.

Table 1: Study Intersections

#	Intersection Name	Control Type
1	US 19 at Hanson Drive	Unsignalized
2	US 19 at ALT US 58	Signalized
3	US 19 / ALT US 58 at Resilient Way	Unsignalized

The study team collected data including traffic counts, traffic signal timings, and pedestrian and bicycle counts to assist with the transportation analysis in the study area.

A framework document was developed prior to commencing the study which outlined the study methods and assumptions. The signed framework document is in **Appendix A**. A kickoff meeting with the SWG was held on April 16, 2025, to provide an overview of the study and obtain feedback on the study's assumptions. The kickoff meeting materials are in **Appendix A**.



Figure 4: Project Study Area

1.4 VTrans Needs

Project Pipeline follows a performance-based planning approach to identify solutions that address VTrans mid-term needs. VTrans is Virginia's statewide transportation plan that is prepared by OIPI for the Commonwealth Transportation Board (CTB). VTrans mid-term needs (0-10 years) were identified from a data-informed process and were used as a primary source in the selection of Project Pipeline study corridors. Table 2 outlines the VTrans needs in the study area. Priority level is a relative ranking within VTrans need locations (i.e., a "low" priority need is still a need).

Table 2: VTrans Needs Identified in the Study Area

VTrans 2023 Mid-Term Need		Priority
	Congestion Mitigation	Low
	Capacity Preservation	Very High
	Road Safety	High
	Transportation Demand Management (TDM)	Low

The study corridor was selected as a Project Pipeline study location due to the presence of multiple VTrans needs. The project team took the following steps to confirm and evaluate the VTrans needs identified in the study area:

- Reviewed the Project Pipeline data dashboards to identify issues and transportation trends in the study area
- Conducted a field review of the study area to observe issues and document existing conditions
- Collected traffic counts at the study area intersections
- Reviewed relevant studies and plans near the study area to inform the alternative development
- Conducted detailed existing conditions traffic operational analyses using Synchro and SimTraffic
- Performed a detailed assessment of five-year crash data to identify trends and hot spots
- Assessed existing transit service, multimodal infrastructure, and the suitability for additional transit service within the study area

1.5 High-Level Needs Diagnosis

Data dashboards were developed by OIPI and VDOT to centralize data collection and leverage big data sources to streamline VTrans needs and problem diagnosis across all Project Pipeline studies as well as to expand on the core issues and patterns identified in the study's framework document.

The data dashboards contained performance measures including VDOT crash data, travel time index data, and speed data for each study area. The results of this analysis are summarized in the Needs and Existing Conditions Summary, which can be found in **Appendix B**.

The study team reviewed the dashboard performance measures in addition to other sources to validate the presence of VTrans needs and identify the most effective improvements in the study area.

1.5.1. Operations and Access Needs

The study area has a low Congestion Mitigation VTrans need, which is based on the Travel Time Index (TTI) and the proportion of travel taking place during excessively congested conditions. The TTI is a metric comparing average travel time to free flow travel time, serving as a measure of congestion. A TTI of 1.0 means average travel time equals free flow travel time. According to VDOT, a TTI over 1.3 suggests minor congestion, over 1.5 suggests moderate congestion, and over 2.0 indicates severe congestion.

The greatest impact on TTI occurs on northbound US 19 and southbound US 19 during the mid-afternoon/evening peak period with the greatest TTI of 1.10 experienced from 3:00 PM – 5:00 PM. A TTI of 1.10 is below the minor congestion threshold of 1.3 and thus, indicates minimal congestion levels along the corridor. Additionally, the greatest TTI values were also found to coincide with the lowest average speeds (bidirectional) experienced on US 19 with an average speed of 48.54 mph occurring at 3:00 PM and 5:00 PM. **Figure 5** shows the TTI values and average speeds on both directions of US 19 throughout the course of a 24-hour span.

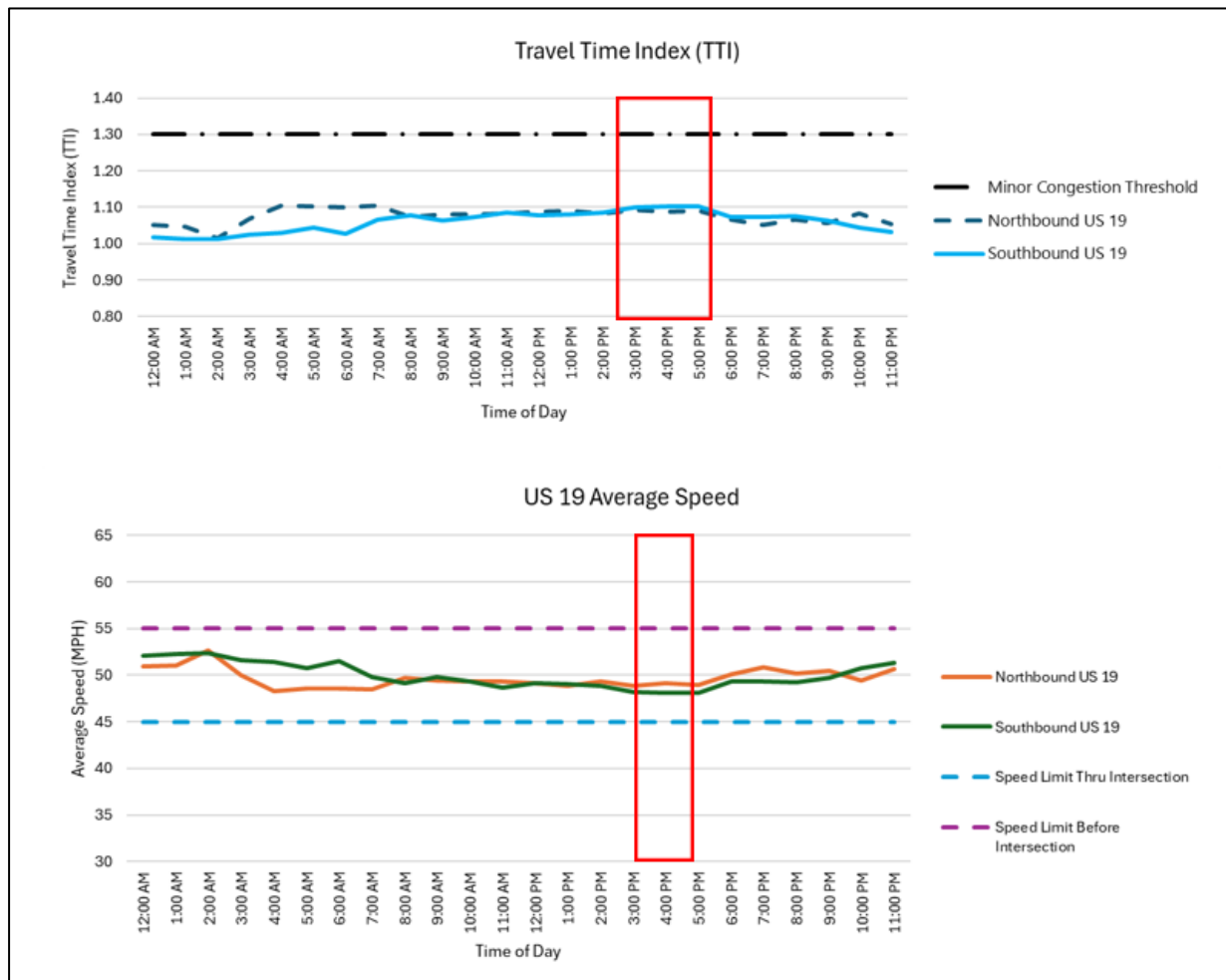


Figure 5: High-Level Operations Needs Summary

There is a low Congestion Mitigation need on the eastbound approach of the US 19 at ALT US 58 intersection and for southbound US 19 traffic exiting the intersection as shown in **Figure 6**.



Figure 6: High-Level Congestion Mitigation Needs Summary

The study area also has a very high Capacity Preservation VTrans need, which is automatically assigned to all roadways on the Arterial Preservation Network (APN). The goal of this need is to preserve and enhance the safety, reliability, and capacity of these important highways.

Specifically, there is a very high Capacity Preservation need on the northbound approach of the US 19 at ALT US 58 intersection and for southbound US 19 traffic exiting the intersection. Further downstream on US 19/ALT US 58, there is a medium Capacity Preservation need. There is a high Capacity Preservation need for the western leg of the US 19 at ALT US 58 intersection and a low Capacity Preservation need on ALT US 58 as shown in **Figure 7**.

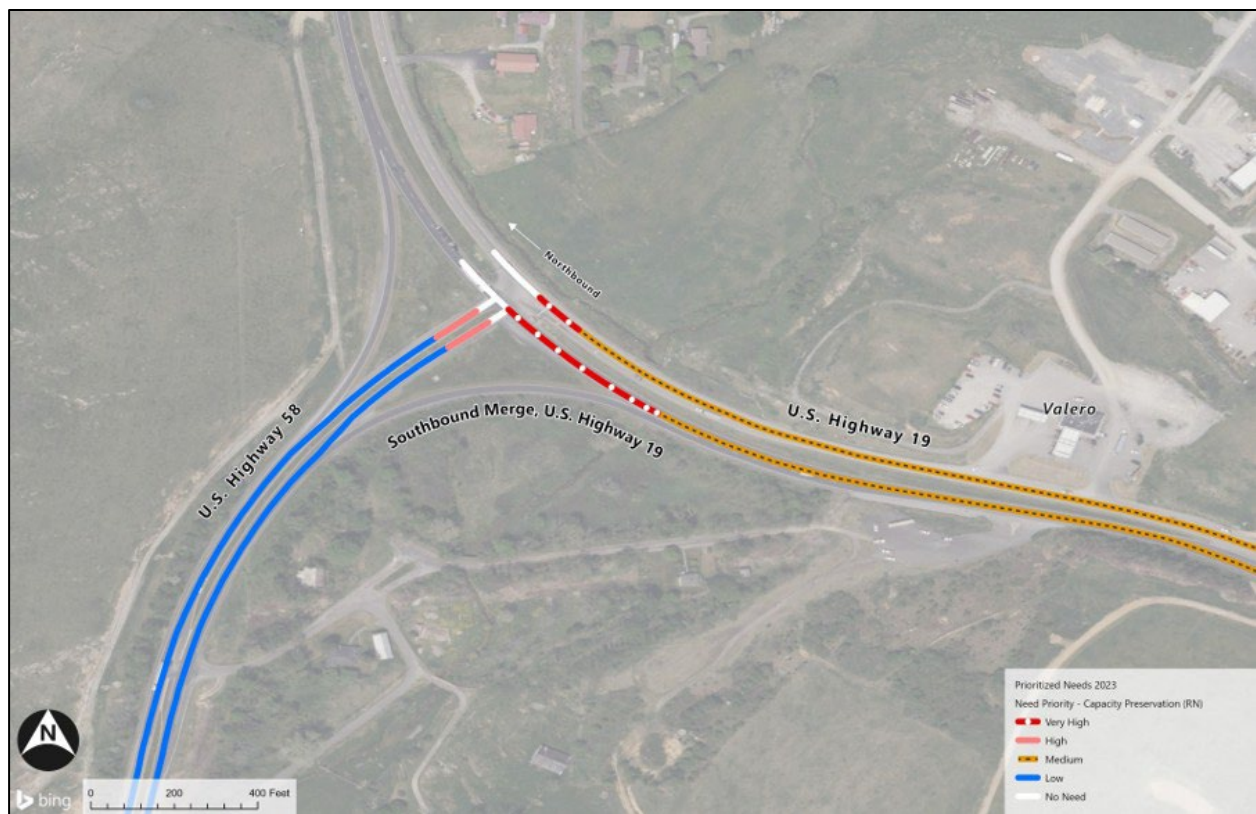


Figure 7: High-Level Capacity Preservation Needs Summary

1.5.2. Safety and Reliability Needs

The study area has a high District Road Safety VTrans need. The study team reviewed the VDOT crash data from 2020 to 2024 to identify high-level crash trends in the study corridor.

Specifically, a high need was identified across the entire US 19 at ALT US 58 intersection, while a low need was assessed for US 19/ALT US 58 south of the intersection as seen in **Figure 8**.

In total, 31 crashes were reported in the study area, 10 injury crashes, and 21 crashes involving property damage only (PDO). Most crashes in the study area were either rear-end (26%) crashes, other (23%) crashes, or sideswipe (19%) crashes. **Figure 9** displays a heat (density) map of all crashes on the corridor for the 2020-2024 study period. Northbound and southbound approaches of the US 19 at ALT US 58 intersection were identified as crash hot spots alongside US 19 in addition to the entrance and exit access points of the Valero gas station.

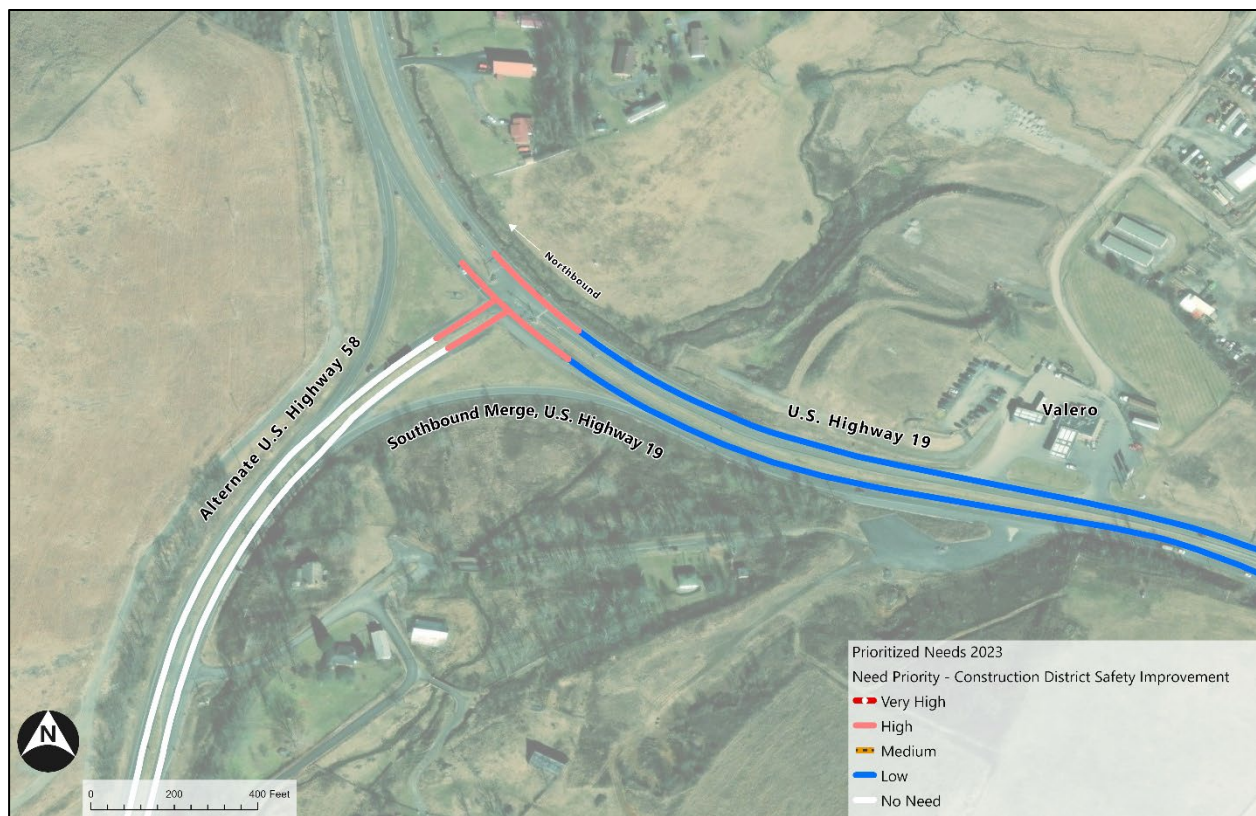


Figure 8: High-Level District Road Safety Needs Summary

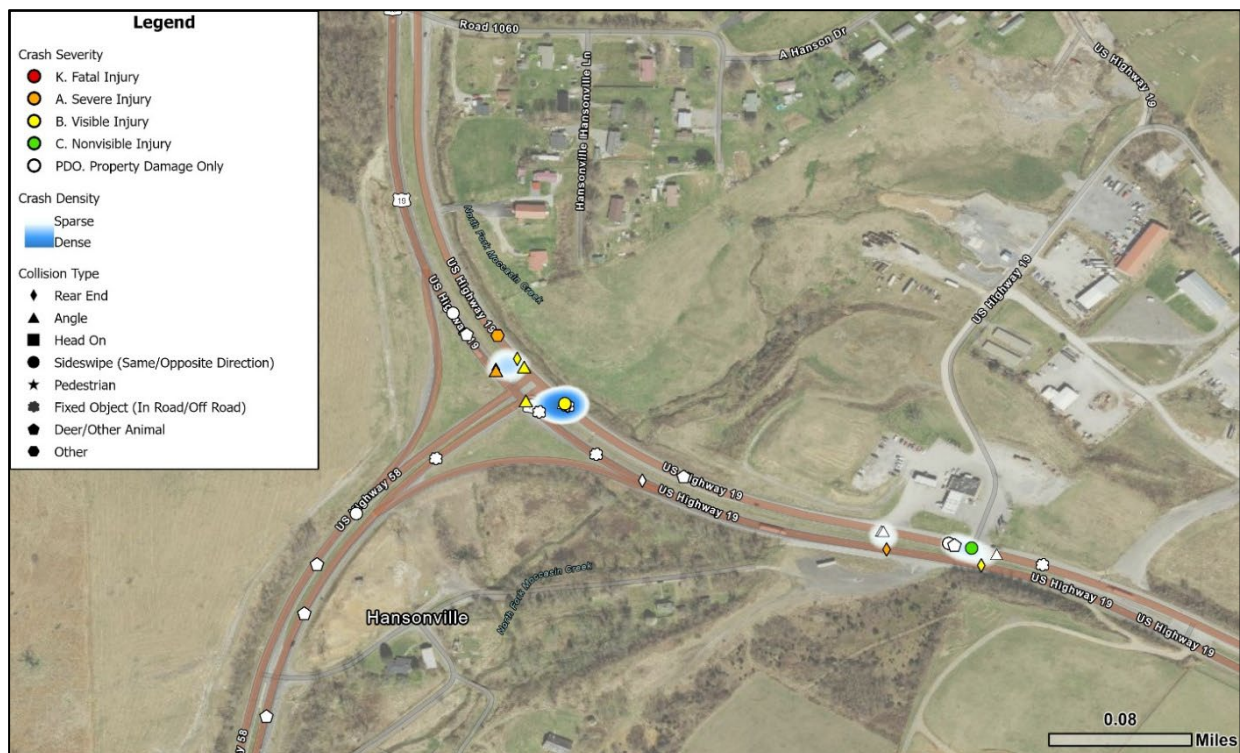


Figure 9: US 19 at ALT US 58 Crash Heat Map

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All intersection and roadway segments within the VDOT linear referencing system (LRS) are evaluated by VDOT annually for the potential for safety improvement (PSI) based on *Highway Safety Manual (HSM)* methodology. PSI is a statistical comparison between predicted crashes and crash experience, with an overrepresentation of crash experience indicating a potential for safety improvement. Crash frequency, severity of crashes, volume, and length of segment are contributing factors in the predictive analysis. The top 100 PSI intersections and 100 miles of PSI segments are published by VDOT for each district on an annual basis. VDOT also identifies Targeted Safety Need (TSN) locations, which are intersections or segments that have been identified as PSI locations for three or more of the last five years.

The intersection of US 19 at ALT US 58 was identified as a PSI intersection with a ranking of 110 in the Bristol District. The concurrent US 19/ALT US 58 segment south of the intersection was identified as a PSI segment with a ranking of 163. The segment north of Hanson Drive was identified as a PSI segment with a ranking of 179 as can be seen in **Figure 10**.

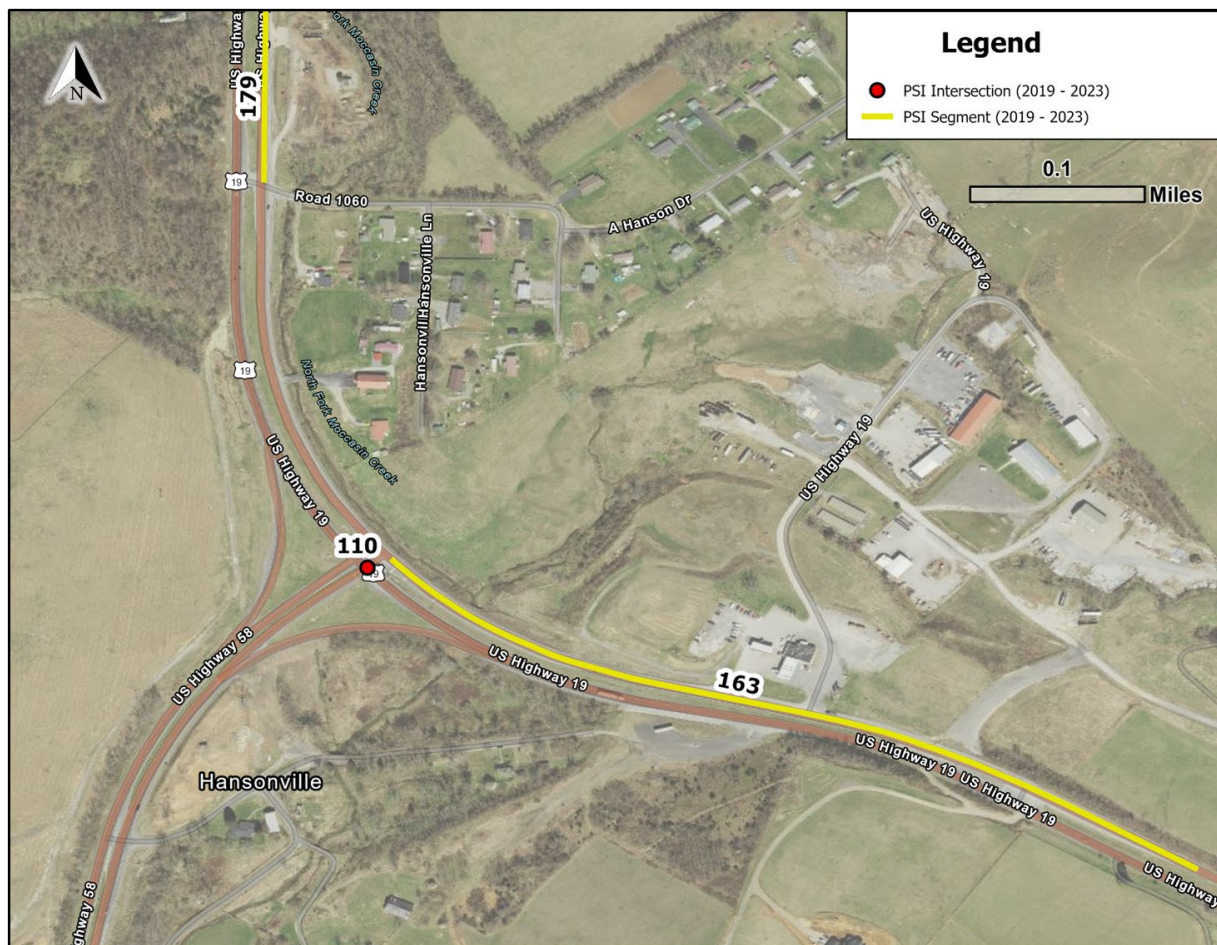


Figure 10: PSI Intersections & Segments

1.5.3. Transit and Transportation Demand Management Needs

Transportation Demand Management (TDM) was determined as a low priority need on the south and west legs of the US 19 at ALT US 58 intersection. The TDM VTrans need is automatically assigned to non-limited access facilities that are on the Corridors of Statewide Significance (CoSS), such as ALT US 58 (Cummings Street). This assignment is indicative of the importance of these statewide transportation arteries to moving people and goods. The goal of TDM in general is to convert private automobile trips to carpools or multimodal (e.g., transit, walk, bike). This need is illustrated in **Figure 11**.

The Hansonville Park and Ride facility is located alongside US 19/ALT US 58 adjacent to the Valero gas station and is in significant use but in poor surface condition. Four County Transit operates fixed route and on demand transit service within Russell County, but fixed routes do not traverse the study area.



Figure 11: High-Level Transportation Demand Management (TDM) Needs Summary

1.5.4. Environmental Considerations

The Virginia Department of Environmental Quality (DEQ) EJScreen+ tool¹ is an enhanced environmental justice screening and mapping tool. It is designed to support state-level decision-making by integrating various data sets to identify and address environmental justice issues. EJScreen+ offers detailed information on environmental and demographic indicators, helping to pinpoint areas with potential environmental risks and vulnerable communities. This tool helps to ensure that environmental actions and

¹ <https://experience.arcgis.com/experience/9d59086932ef401d9cc10b6e1415bf67>

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policies are equitable and effectively benefit all residents, particularly those disproportionately affected by environmental hazards.

An equity analysis report for the study area was generated by navigating to the study area and reviewing adjacent census block groups and tracts. VDOT Bristol District Environmental Division also offered input on the study area. The high-level desktop review of existing environmental conditions within the study area is summarized in **Table 3**.

Table 3: Existing Environmental Conditions Summary

Environmental Resource	Description	Source	Existing Resources in Study Area
Environmental Justice	Identifying minority and low-income populations adjacent to the project corridor, as defined by the VDOT Environmental Division Instructional and Informational Memorandum and determining if a disproportionately high and adverse effect is anticipated.	Environmental Justice (EJ) Screen: Low Income Communities - 30% or more of the Population Under HUD 80% AMI and Under Two Times Federal Poverty Level (2011-2018 ACS), Communities of Color – Over Statewide Average (37.8%) (2014-2018 ACS)	Within the study area, there are low-income communities ranging from 45.02% to 54.36% under HUD, 80% AMI, and 55.93% to 59.03% below two-times the federal poverty level.
Archaeological Resources	Archaeologically sensitive locations within or adjacent to the study area that may require surveys.	VDOT Bristol District Environmental Review	A Late Woodland village with burials are potentially present east of US 19. Surveys will likely be required, and transportation improvements in the area should be avoided.
Recreational Facilities	Places available for recreational or communal use, such as a YMCA or community parks.	Virginia Department of Conservation Recreation (VDCR) Natural Heritage Data Explorer (NHDE) VDCR Virginia Outdoor Plan Mapper Aerial Imagery	No recreation facilities were identified within the study area or in the surrounding vicinity.

Environmental Resource	Description	Source	Existing Resources in Study Area
Community Services	Places available to the public such as hospitals, schools, and churches.	Aerial Imagery Virginia Geographic Information Network (VGIN)	Hansonville Baptist Church is located adjacent to northbound US 19 and is north of the US 19 at ALT US 58 intersection.
Bike/Pedestrian Facilities	Existing sidewalks, bike paths, and trails.	Aerial Imagery VDCR Virginia Outdoor Plan Mapper	There were no bike or pedestrian facilities identified within the study area.
Section 6(f)	Sites funded through the Land and Water Conservation Fund (LWCF) and owned by state or local entities.	VDCR Virginia Outdoor Plan Mapper VDCR Conservation Lands	There were no sites identified within the study area or the surrounding vicinity.
Section 106* Resources	Known historic architectural or archaeological sites within or immediately adjacent to the project corridor including sites that are listed or eligible for listing on the National Register of Historic Places (NRHP) and sites that have not been evaluated are potentially eligible, or any other status as noted on the VDHR V-CRIS website.	VDOT Bristol District Environmental Review Virginia Department of Historic Resources (VDHR) Virginia Cultural Resource Information System (V-CRIS) National Register of Historic Places (NRHP)	Several locations within and surrounding the study area were listed or determined eligible including a property north of the Cross Roads at US 19 intersection and north of the study area, a 1893 property adjacent to southbound US 19 at the northern terminus of the study area, two 1950s structures adjacent to northbound US 19, and a 1940s store on Old Postal Road just south of the US 19 at ALT US 58 intersection.
Section 4(f)*	Publicly owned parks or recreation lands, wildlife and waterfowl	VDCR NHDE	No publicly owned parks or recreation lands, wildlife and waterfowl refuges, or privately and

Environmental Resource	Description	Source	Existing Resources in Study Area
	refuges, and privately and publicly owned historic sites protected by Section 4(f) of the U.S. Department of Transportation Act of 1966.	VDCCR Virginia Outdoor Plan Mapper VDHR V-CRIS	publicly owned historic sites are located within the study area or the surrounding vicinity.
Protected Species	Threatened and endangered species, as defined by the state and federal government databases, existing within or near the project corridor.	VDOT Bristol District Environmental Review United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPAC) Virginia Department of Wildlife Resource (VDWR) Virginia Fish and Wildlife Information Services (VaFWIS) VDWR Bat Consultation Tool Northern Long-Eared Bat [NLEB], Tri-Colored Bat, and Little Brown Bat Center for Conservation Biology (CCB) Eagle Nest Locator	<u>USFWS</u> USFWS IPaC – The Gray Bat, Indiana Bat, Tri-Colored Bat, Eastern Hellbender, Finerayed Pigtoe Clam, and Shiny Pigtoe Clam are endangered species within the study area. <u>VDWR Databases</u> VDWR NLEB – A NLEB consultation range exists to the south of the study area. VDWR Tri-Colored Bat – A Tri-Colored Bat consultation range exists to the north of the study area. CCB – No eagle nests were identified in the study area.
Floodplains	Areas considered at risk for flooding during 100-year and 500-year storms.	Federal Emergency Management Agency (FEMA) Flood Hazard Areas	None of the study area and surrounding areas are in Floodway or 500-Year Floodplain areas.

Environmental Resource	Description	Source	Existing Resources in Study Area
Surface Water & Wetlands	Review of NHD and NWI to determine the likelihood of streams and wetlands present within and immediately adjacent to the project corridor.	VDOT Bristol District Environmental Review United States Geological Survey (USGS) National Hydrography Dataset (NHD) USFWS National Wetland Inventory (NWI)	Multiple wetlands are scattered within and around the study area. North Fork Moccasin Creek runs through the study area and crosses US 19 at the northern terminus of the study area and US 19/ALT US 58 south of the intersection. If the scope includes instream work, water quality permits may be required.
Hazardous Materials	Any documented spills, releases, or history of contamination on surrounding sites that may be impacted by the proposed project.	VDOT Bristol District Environmental Review Virginia Department of Environmental Quality (DEQ) Environmental Data Mapper	Numerous petroleum release sites are documented within and adjacent to the corridor. Historic hazardous materials sites are also assumed to be present. Recommend ASTM Phase I Environmental Site Assessment along the entire corridor. Design should avoid construction, especially excavation, in the vicinity of documented hazardous materials sites.
Open Space, Conservations Easements, Agricultural, and Forestry Districts	Lands protected by a voluntary agreement with a non-profit land trust or government agency that allows a landowner to limit the type or amount of development on the property. Agricultural and forestry	VDCR NHDE VDCR Outdoors Plan Mapper The Virginia Outdoor Foundation The Nature Conservancy	Forest conservation areas are scattered within and around the study area and ranked in forest conservation values from 1 (average) to 4 (very high).

Environmental Resource	Description	Source	Existing Resources in Study Area
	districts are those defined as such in the zoning map.		There are no conserved lands located within or surrounding the study area.
Farmland	Lands with soils that are considered prime farmland and outside a census-designated urban area.	United States Census Bureau Urban Area Maps Natural Resources Conservation Service Web Soil Survey	Portions of prime farmland are located throughout the study area and the study area is not designated as an urban area and is thus subject to the Farmland Protection Policy Act.
Noise	Determining whether the subject project may be considered a Type I project based on VDOT and FHWA guidance.	VDOT Bristol District Environmental Review VDOT and FHWA Noise Guidance	A noise study will likely be required if capacity is added to the roadway, such as adding auxiliary lanes, the addition or extension of turn lanes, and the extension of acceleration and deceleration lanes, any minor intersection improvements or reconfigurations, and any interchange ramp extensions or modifications. Noise abatement is not anticipated.
Land Use	Land Area that has been given a specific use based on local jurisdiction land use designations.	Russell County GIS Data	The study area has commercial, agricultural, and residential land uses within and adjacent to the study area.
Air Quality	Determine whether the subject project is in an air quality attainment	Environmental Protection Agency Green Book	No air quality impacts are anticipated; therefore, a qualitative analysis is not anticipated to be required.

Environmental Resource	Description	Source	Existing Resources in Study Area
	area and whether a qualitative analysis may be required.		
Tree Clearing Time of Year Restriction	Identify if a restriction on tree clearing is restricted to certain times of the year.	VDOT Bristol District Environmental Review	A tree clearing time of year restriction (TOYR) will be required from April 1 – Nov 15 to protect bat habitat. If culverts are impacted and evidence of migratory bird nests or bats are found in the culvert, a second TOYR may be required depending on what species of bat/bird is found.

**Assessment based on the currently listed, determined eligible, or recommended eligible for the NRHP properties pending potential further investigations for recommendations not yet confirmed by VDHR or for individual sites not yet evaluated.*

1.6 Detailed Needs Validation

The study team performed additional traffic operations and safety analysis to further quantify the existing and anticipated needs within the study area. Results from these analyses were used as a baseline when comparing the conditions of the proposed improvements to the existing and anticipated no-build conditions.

1.6.1. Existing Conditions Traffic Operations and Safety Analysis

The study team conducted a multifaceted analysis of the existing conditions of the study corridor, which included reviewing previous studies, conducting a safety analysis, conducting a preliminary field review, and analyzing traffic operations using Synchro and SimTraffic. Synchro results of the existing conditions analysis and preliminary brainstorming concepts were presented to the Study Work Group on June 25, 2025. The presentation is provided for reference below.²

Relevant Studies, Plans, and Projects

A small intersection safety study of US 19 at ALT US 58 was conducted in 2023 and recommended:

- Updating traffic signal change and clearance intervals
- Adding skip line pavement markings through the intersection
- Considering a continuous Green-T intersection

It should be noted that due to the constraints of the size of the study, design elements associated with the Green-T concept were not able to be evaluated.

Safety Analysis

A safety analysis was conducted using crash data from the VDOT Crash Database over a five-year period (January 1, 2020 – December 31, 2024) and VDOT's most recent Potential for Safety Improvement (PSI) information. In total, 31 crashes were reported in the study area. Summaries of crashes in the study area by severity and collision type are shown in **Table 4** and **Table 5**, respectively.

Crash severity is coded using the KABCO scale, which is defined using the following classifications:

- K—Fatal Injury
- A—Severe Injury
- B—Visible Injury
- C—Nonvisible Injury
- PDO—Property Damage Only

The intersection of US 19 at ALT US 58 had twelve total crashes between 2020 and 2024. Five of the twelve crashes involved a rear-end collision which may be attributed to relatively high driver speeds and to unexpected stops for signal control since the corridor has infrequent signalized intersections. Eight of the twelve crashes occurred at night or in wet weather. Outside the US 19 at ALT US 58 intersection, 19 total

² <https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1749480326779/f2ff7eff3f0649d9c1536fd13db12a6e17a1cd16>

crashes occurred during the same span. Two crashes are possibly associated with trucks in the southbound shoulder approach opposite the Valero gas station and five crashes are possibly associated with merging and lane changing on southbound US 19 between the channelized right turn and the U-turn median opening. Seven of the 19 crashes either occurred at night or in wet weather.

Table 4: Study Area Crashes by Location and Crash Severity

Intersection	# of Crashes—K	# of Crashes—A	# of Crashes—B	# of Crashes—C	# of Crashes—PDO	Total
US 19 at ALT US 58	0	1	5	0	6	12
Rest of Corridor	0	2	1	1	15	19
Total	0 (0%)	3(10%)	6(19%)	1(3%)	21(68%)	31

Table 5: Study Area Crashes by Location and Collision Type

Intersection	# of Crashes – Angle	# of Crashes – Rear End	# of Crashes – Head-On	# of Crashes – Fixed Object	# of Crashes – Side-swipe	# of Crashes – Pedestrian	# of Crashes – Other	# of Crashes – Total
US 19 at ALT US 58	3	5	0	3	1	0	0	12
Rest of Corridor	2	3	0	2	5	0	7	19
Total	5 (16%)	8 (26%)	0 (0%)	5 (16%)	6 (19%)	0 (0%)	7 (23%)	31

FR300 reports and VDOT crash data were used to create collision diagrams for the corridor and identify the following crash hot spots. Southbound US 19/ALT US 58 experienced a high pattern of crashes with five crashes possibly associated with merging and lane changing and two crashes possibly associated with trucks in the shoulder. Moreover, the intersection of US 19 at ALT US 58 was identified by the team as a crash hot spot with 12 total crashes occurring within the intersection since 2020. These patterns can be seen in the collision diagrams shown in **Figure 12** and **Figure 13**.

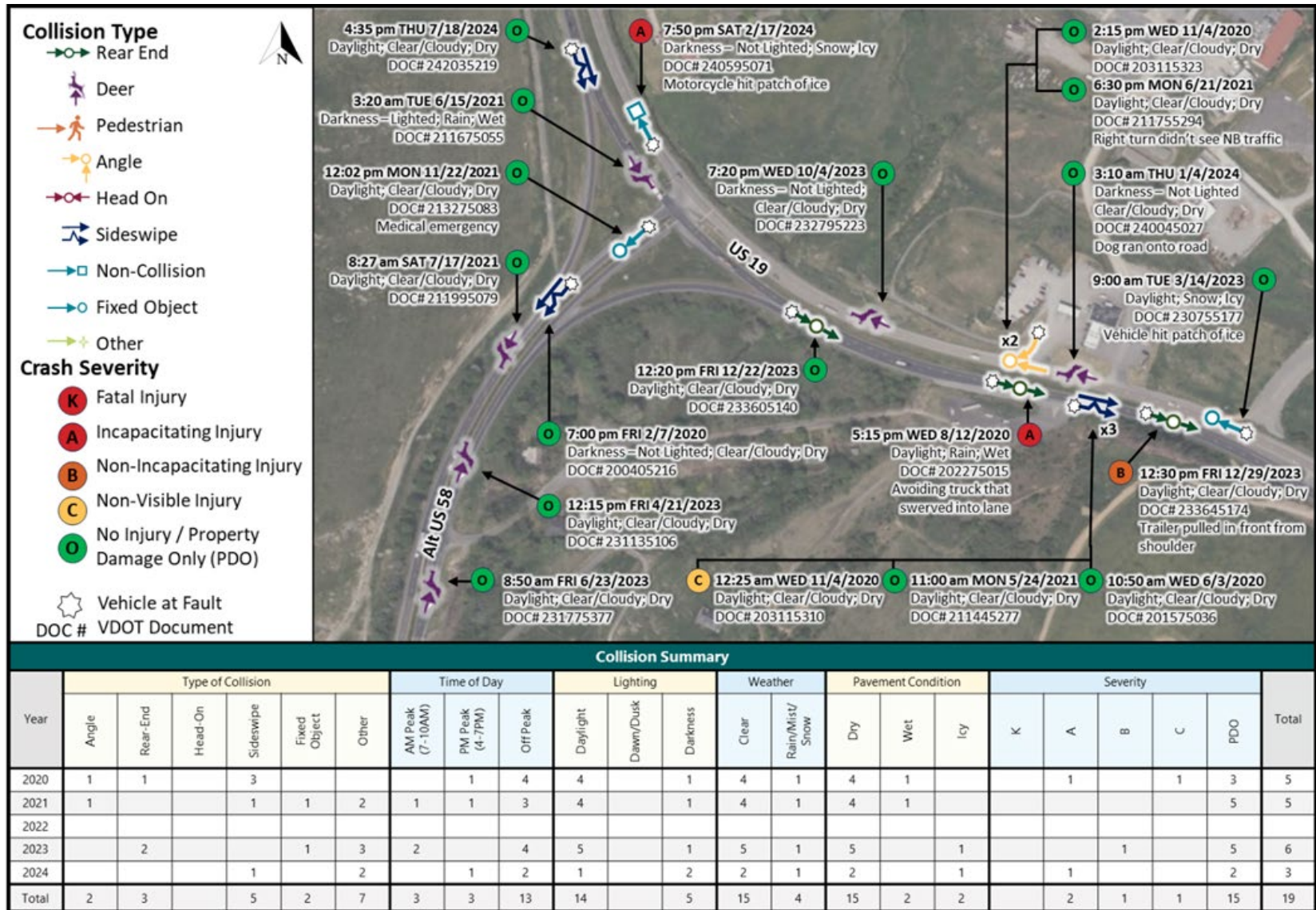


Figure 12: Outside US 19 at ALT US 58 Intersection Collision Diagram

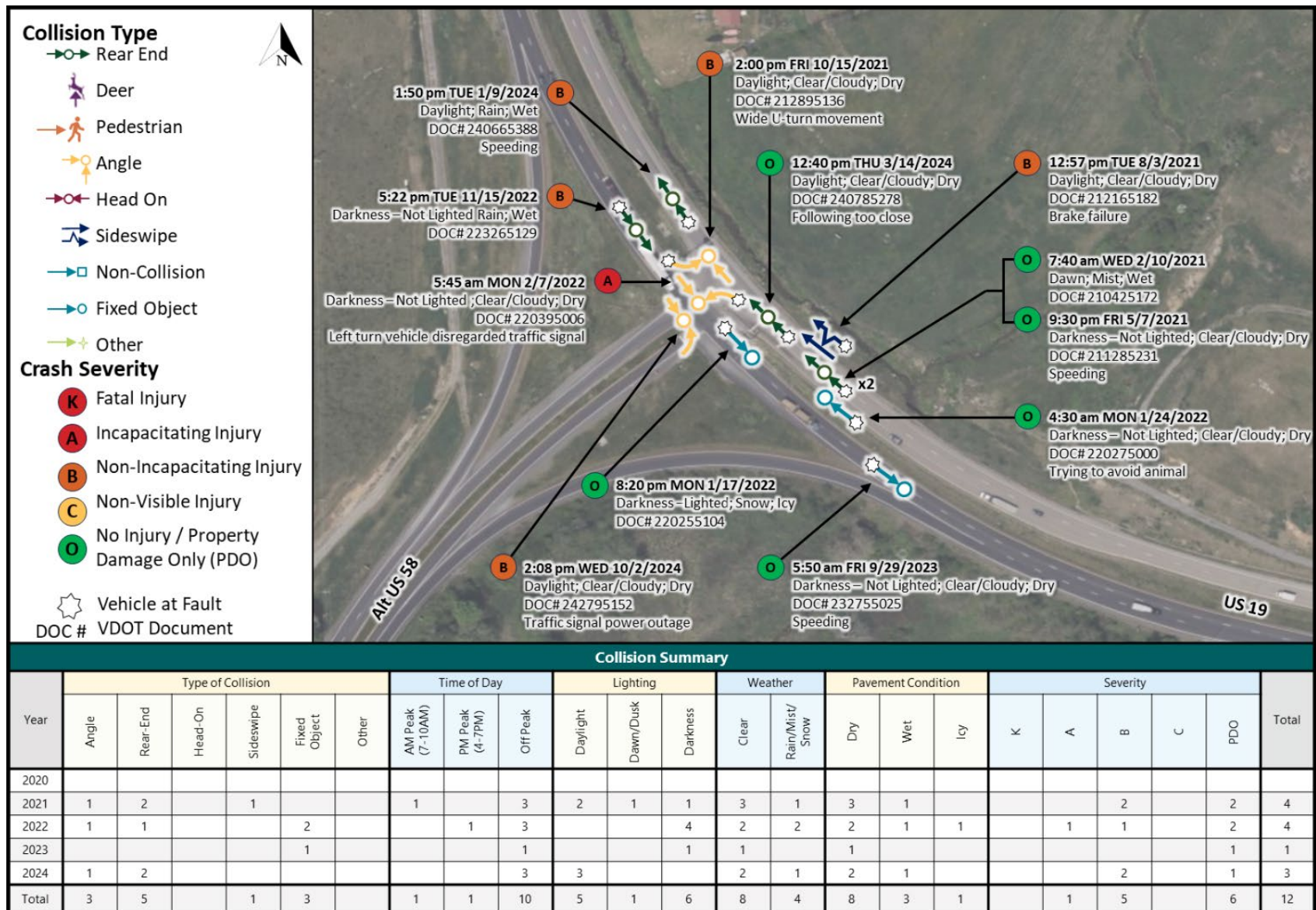


Figure 13: Inside US 19 at ALT US 58 Intersection Collision Diagram

Field Review Observations

A preliminary field review of the study area was conducted on Tuesday, April 22, 2025, to verify existing conditions, confirm traffic control devices and lane configurations, and observe peak hour traffic conditions and driver behavior. The existing lane configurations and speed limits in the study area are summarized in **Figure 14**.

The following observations were made within the study area during the field review:

- Limited sight distance exiting Valero gas station
- Aggressive driver behavior exiting Valero to enter left turn lane
- Tractor trailer parked on southbound US 19 and driver walked across all four lanes of US 19 to the Valero
- Non-VDOT maintained park and ride lot in significant use, but in rough condition

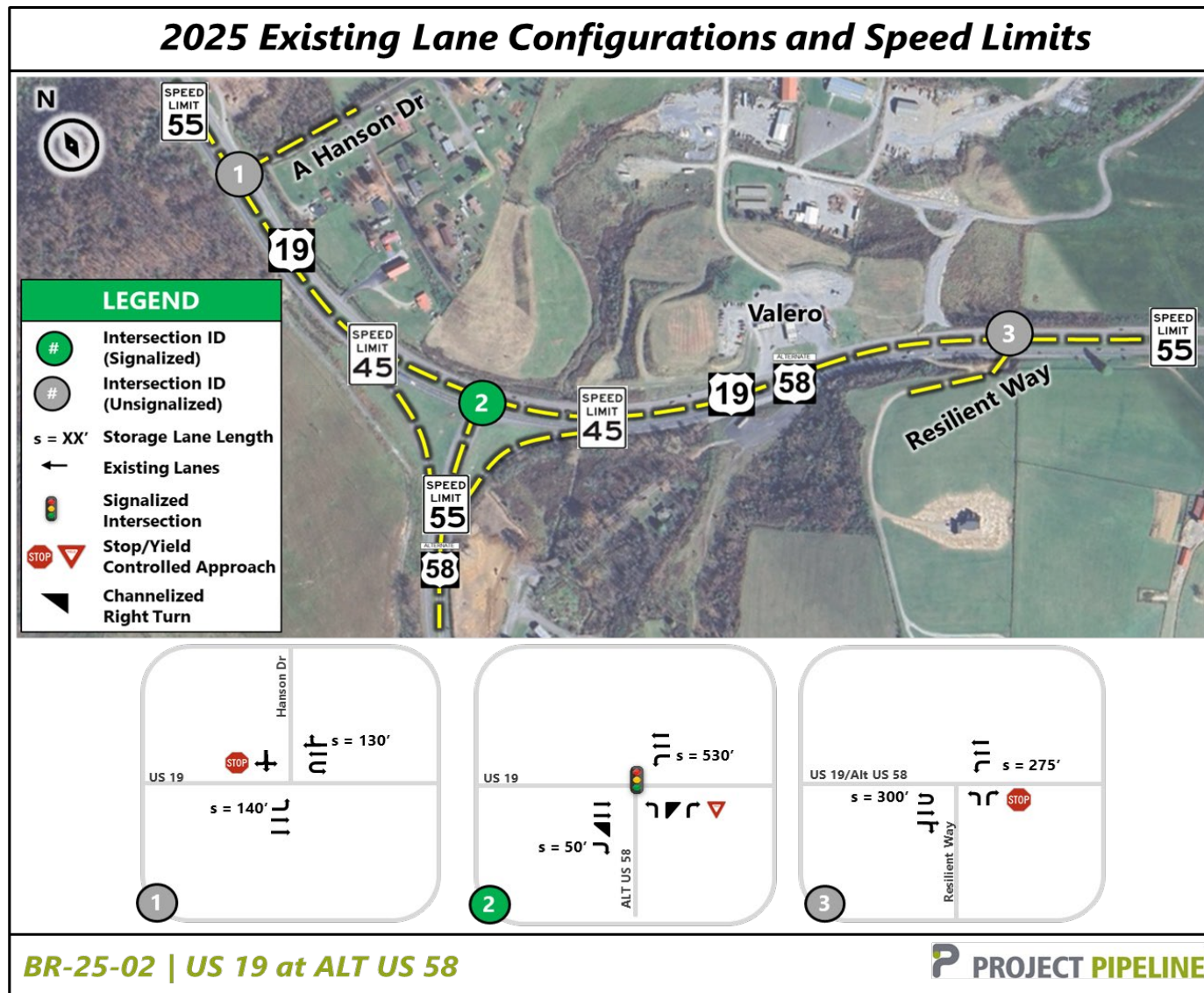


Figure 14: 2025 Existing Lane Configuration and Speed Limits

Synchro and SimTraffic Analysis

The study team conducted a traffic operations analysis to evaluate the overall performance of the study corridor under existing (2025) AM and PM peak hour conditions. Existing conditions were modeled using Synchro 11 and SimTraffic 11.

The existing AM and PM Synchro models were developed based on the existing roadway geometry, provided traffic signal phasing/timing plans, and collected traffic count data. Input and analysis methodologies were consistent with the VDOT Traffic Operations and Safety Analysis Manual (TOSAM), Version 2.0.

Traffic Data

Eight-hour vehicular turning movement count data was collected at the three study intersections on Thursday, April 10, 2025, from 6:00 AM to 10:00 AM and 2:00 PM to 6:00 PM. Additionally, 72 hours of roadway segment volume and speed data were collected from Tuesday, April 8, 2025, to Thursday, April 10, 2025. Northbound US 19 volume and speed data was recollected from Tuesday, April 29, 2025, to Thursday, May 1, 2025, due to the data collection hoses being severed during the initial data collection effort. The AM and PM peak hours were determined to be 7:30 AM to 8:30 AM and 4:45 PM to 5:45 PM. Raw traffic data can be found in **Appendix C**.

The resulting average three-day ADT values can be seen in **Figure 15** in addition to 50th and 85th percentile speeds, as well as heavy vehicle percentages for inner and outer lanes.

Figure 16 displays the distribution of volume per hour experienced on each leg of the US 19 at ALT US 58 intersection over the course of 24 hours. The study area experiences greater volumes during the established AM and PM peak hours with northbound US 19/ALT US 58 exceeding 1,000 vehicles per hour (VPH) during the PM peak hour.

Figure 17 displays the turning count movements within the study area experienced during AM and PM peak hours.

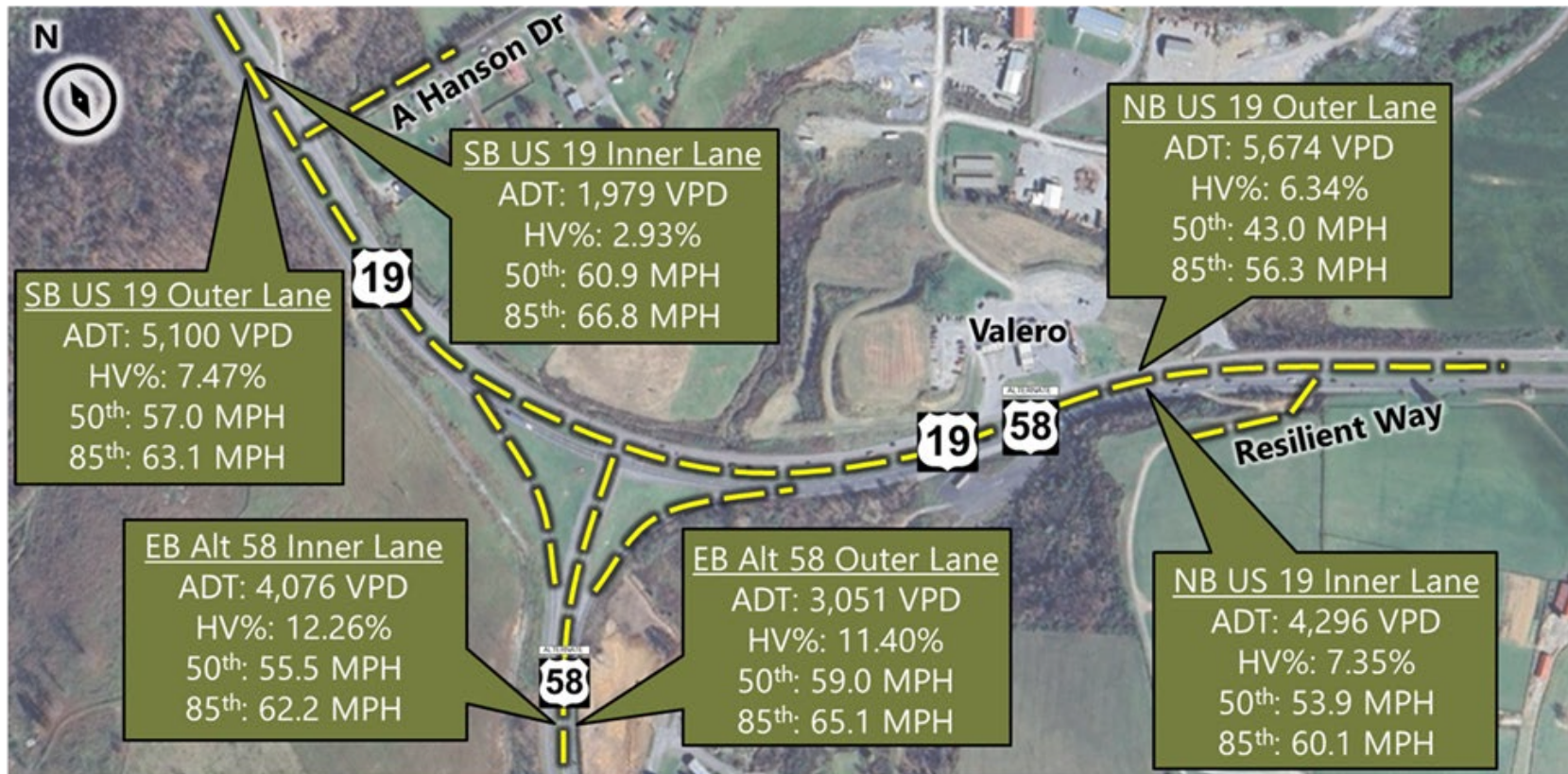


Figure 15: US 19 at US ALT 58 ADT and Speed Data

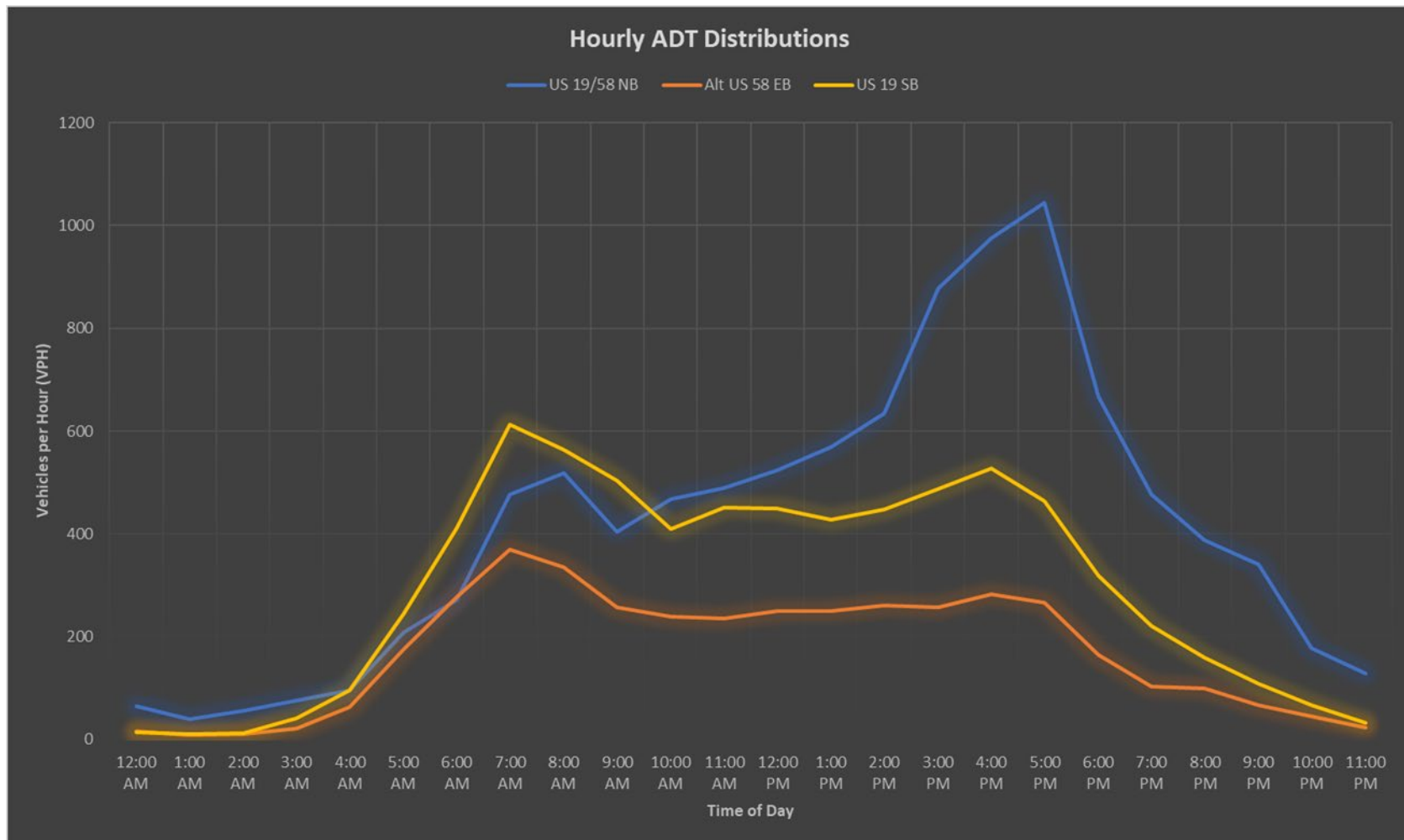


Figure 16: US 19 at US ALT 58 Hourly ADT Distributions

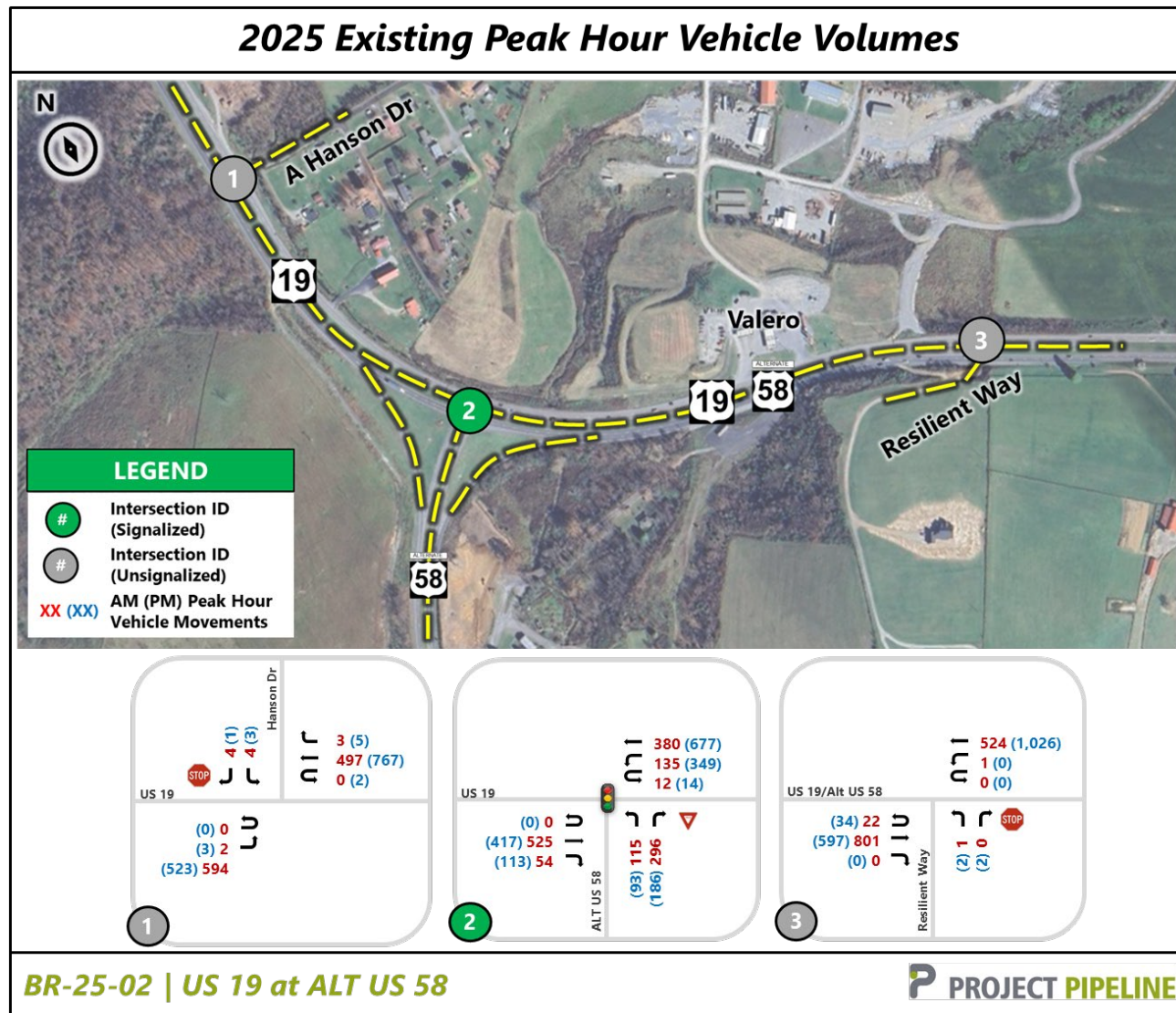


Figure 17: 2025 Existing Peak Hour Volumes

Level of Service (LOS) Criteria

The intersection Level of Service (LOS) is a qualitative measure that describes a driver's perception of the operating conditions. LOS ratings range from A to F. LOS A indicates little or no congestion and LOS F indicates severe congestion, unstable traffic flow, and/or stop-and-go conditions.

Table 6 summarizes the LOS corresponding to the delay at unsignalized and signalized intersections as specified in the HCM. The delay criteria for LOS differs slightly for unsignalized and signalized intersections due to driver expectations and behavior. For signalized intersections, LOS is calculated as the lost travel time caused by vehicles waiting at a traffic signal. For unsignalized intersections, LOS and corresponding delay is calculated by determining the number of gaps that are available in the conflicting traffic stream, since the LOS analysis assumes that traffic on the mainline is not affected by the traffic on the side street.

Table 6: Level of Service Criteria

Level of Service	Control Delay (seconds/vehicle) - Signalized Intersection	Control Delay (seconds/vehicle) - Unsignalized Intersection
A	≤ 10.0	≤ 10.0
B	> 10.0 to 20.0	> 10.0 to 15.0
C	> 20.0 to 35.0	> 15.0 to 25.0
D	> 35.0 to 55.0	> 25.0 to 35.0
E	> 55.0 to 80.0	> 35.0 to 50.0
F	≥ 80.0	≥ 50.0

Traffic Analysis Results

Control delay (seconds per vehicle), LOS, and maximum queue length (feet) were selected as measures of effectiveness to quantitatively report the performance of each study intersection. **Table 7** summarizes the Synchro analysis used to determine control delay for each intersection.

Ten SimTraffic simulations were conducted for both the AM and PM models to determine vehicle queues. The full Synchro and SimTraffic reports are included in **Appendix D**. Synchro results for the existing condition models are included in **Table 8**. SimTraffic queuing results are shown in **Table 9**.

Table 7: Synchro Report for Control Delay

Intersection Name	Synchro Report for Control Delay
US 19 at Hanson Drive	HCM 6th TWSC
US 19 at ALT US 58	HCM 6th Signalized
US 19 at Resilient Way	HCM 6th TWSC

Table 8: 2025 Existing Conditions Peak Hour Control Delay and LOS

Intersection Number and Description		Type of Control	Lane Group	Eastbound				Westbound				Northbound				Southbound				Overall LOS (delay)	
				AM		PM		AM		PM		AM		PM		AM		PM		AM	PM
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS		
1	US 19 at Hanson Drive	Unsignalized						Hanson Drive				US 19				US 19				Intersection	
			Left					14.6	B	23	C	-	-	-	-	8.5	A	9.6	A	A (0.1)	A (0.1)
			Through																		
			Right					14.6	B	23	C	-	-	-	-						
			Approach					14.6	B	23	C	0	A	0	A	0	A	0.1	A		
2	US 19 at Alt US 58	Signalized		Alt US 58								US 19				US 19				Intersection	
			Left	22.6	C	24.4	C					19.9	B	22.7	C					B (14.3)	B (14.4)
			Through				5.4					A	5.5	A	17.5	B	19.7	B			
			Right	0	A	0	A							0	A	0	A				
			Approach	22.6	C	24.4	C					9.2	A	11.3	B	17.5	B	19.7	B		
3	US 19 at Resilient Way	Unsignalized		Resilient Way								US 19/Alt US 58				US 19/Alt US 58				Intersection	
			Left	26.1	D	20.1	C					9.6	A	0	A					A (0.2)	A (0.4)
			Through				0					A	-	-	-	-	-	-			
			Right	26.1	D	20.1	C							-	-	-	-				
			Approach	26.1	D	20.1	C					0	A	0	A	0.3	A	1	A		
- No delay or level of service provided by Synchro. Movement exists.																					
Approach or movement does not exist.																					

Table 9: 2025 Existing Conditions Peak Hour Maximum Queues

Intersection Number and Description		Type of Control	Lane Group	Eastbound		Westbound		Northbound		Southbound	
				AM	PM	AM	PM	AM	PM	AM	PM
				Delay	Delay	Delay	Delay	Delay	Delay	Delay	Delay
1	US 19 at Hanson Drive	Unsignalized	Left		Hanson Drive		US 19		US 19		
			Through		34	22			3	9	
			Right				-	-	-	-	
					34	22	-	7			
2	US 19 at Alt US 58	Signalized	Left	Alt US 58			US 19		US 19		
			Through	127	104		-	-			
			Right				81	96	142	141	
				-	-				-	-	
3	US 19 at Resilient Way	Unsignalized	Left	Resilient Way			US 19/Alt US 58		US 19/Alt US 58		
			Through	11	22		8	-	31	49	
			Right				-	-	-	-	
				11	22				-	-	
- No queue length provided by SimTraffic report. Movement exists											
Approach or movement does not exist											

Under existing conditions, the intersection of US 19 at Hanson Drive operates at LOS B in the AM peak hour and LOS C in the PM peak hour. A max delay of 22.9 seconds per vehicle is estimated. The signalized intersection of US 19 and ALT US 58 operates at LOS B in the AM and PM peak hour and experiences a 14.4 second max delay per vehicle. The intersection of US 19 at Resilient Way operates at LOS D in the AM peak hour and LOS C in the PM peak hour. A max delay of 20.1 seconds per vehicle is estimated. Despite higher delay times at the two-way stop control intersections, there are very low turning volumes experiencing this delay. **Figure 18** displays the estimated queue lengths at the US 19 at ALT US 58 intersection. Minimal queue lengths are experienced during both AM and PM peak hours, corroborating the low congestion need for the intersection.

The following trends were observed under existing conditions:

AM Peak Hour

- Approaches at the intersection of US 19 at ALT US 58 range from LOS A to LOS C
- The longest queue is the southbound through movement at the intersection of US 19 at ALT US 58 at 142 feet
- No queues extend past the storage bay lengths
- The highest signalized approach delay occurs in the eastbound left turn movement at the intersection of US 19 at ALT US 58 (22.6 seconds)

PM Peak Hour

- Approaches at the intersection of US 19 at ALT US 58 range from LOS B to LOS C
- The longest queue is the northbound left turn movement at the intersection of US 19 at ALT US 58 at 141 feet
- No queues extend past the storage bay lengths
- The highest signalized approach delay occurs in the northbound left turn at the intersection of US 19 at ALT US 58 (22.7 seconds)



Figure 18: SimTraffic Existing Conditions Queues at US 19 at ALT US 58 Intersection

1.6.2. Phase 1 Public Outreach

The Phase 1 Public Input online survey was held from May 27, 2025, to June 10, 2025, to collect feedback on existing traffic, safety, transit, and bicycle and pedestrian issues within the study area. The online survey had a total of 344 participants and received 362 comments. Participants ranked corridor safety/intersection safety and reducing traffic congestion as the two most critical issues in the study area. Sudden stopping/rear-end crashes, difficulty weaving/merging, and speeding/aggressive driving were identified as the greatest safety issues. These concerns can be referenced in **Figure 19** and **Figure 20**. Detailed results from the Phase 1 public outreach efforts can be found in **Appendix E**.

Common themes among written comments included the following:

- Difficulty exiting/entering the Valero gas station and private driveways due to high mainline speeds and poor sight distances
- Short merging lane onto southbound US 19/ALT US 58 from ALT US 58
- Lack of yielding behavior on merging lane onto southbound US 19/ALT US 58 from ALT US 58
- Perceived congestion generated from short signal timing phases
- Poor visibility at night
- Suggestions to increase traffic law enforcement to combat speeding and aggressive driving

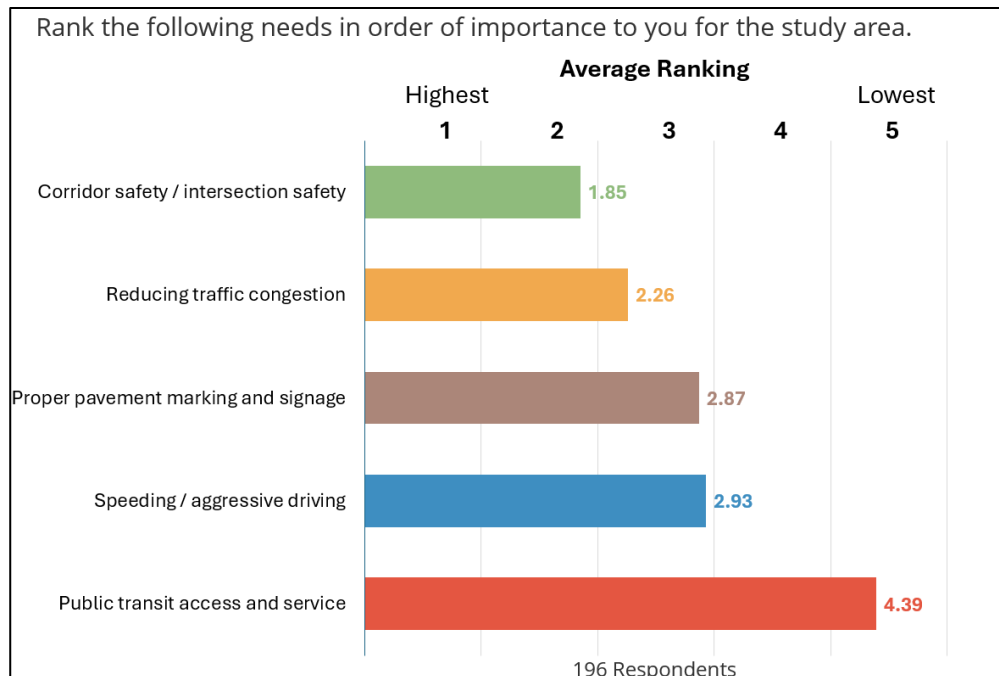


Figure 19: Ranked Corridor Needs Public Feedback

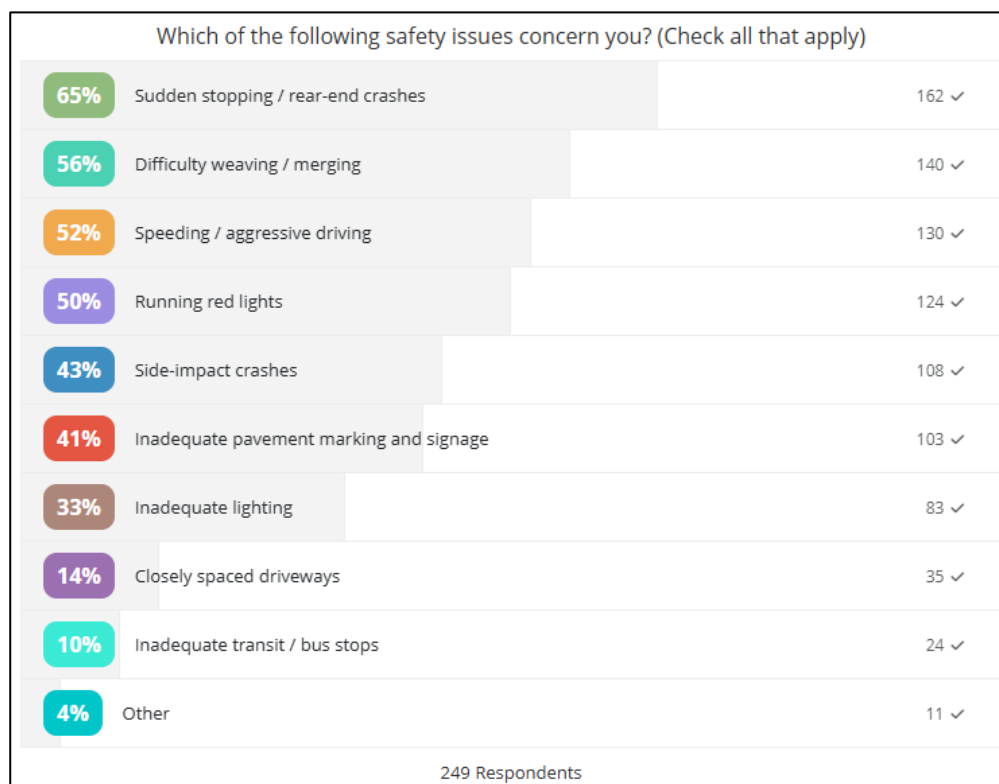


Figure 20: Public Outreach Identified Safety Concerns

1.6.3. No-Build Conditions Traffic Operations Analysis

No-Build 2050 Volume Development

Traffic operational analyses were conducted to evaluate the overall performance of the study corridor under No-Build (2050) AM and PM peak hour conditions. The intent of the No-Build conditions analysis is to provide a general understanding of the baseline future traffic conditions as a starting point for developing improvement concepts.

The following sources were reviewed to determine the growth rates to apply to existing traffic volumes to forecast future (2050) traffic volumes.

- Historical Traffic Count Data

Historical traffic count data was sourced from historical VDOT annual average daily traffic (AADT) counts over a 14-year period (2011-2024). Per VDOT policy, 2020 and 2021 were excluded from the linear regression calculation due to COVID-impacted traffic counts. Traffic count data prior to 2011 was excluded due to economic recession impacts (2008-2010) and differences in year-to-year trends. A linear regression analysis was performed to produce linear growth rates for four identified segments throughout the study area.

- Pathways for Planning Forecast

VDOT's Pathways for Planning web tool contains the official VDOT trend analysis for volume forecasts. This trend analysis is derived from the historical AADT linear regression calculations; however, if the linear regression calculations compute an annual growth rate less than 0.50%, then 0.50% is utilized as the minimum value.

Table 10 and **Figure 21** present recommended linear growth rates and the growth rates determined from historical volumes and VDOT's Pathways for Planning trend analysis data. While the historical trend analysis indicates that most of the study area is experiencing a steady decline in traffic volume, it is VDOT policy to utilize at least a 0.50% annual growth rate. VHB believes a study-wide 0.5% annual, linear growth rate will appropriately account for potential unplanned developments.

The recommended 0.5% annual growth rate applied linearly over a 25-year period (2025 counts to 2050 design year) results in a 1.125 growth factor. This was applied to the existing 2025 peak hour volumes to generate projected 2050 volumes. The No-Build (2050) AM and PM peak hour volumes are shown in **Figure 22**. The Approved Traffic Forecasting Memorandum can be found in **Appendix F**.

Table 10: Linear Growth Rate Development

ID	Segment	VDOT Historical Linear Regression Annual Growth Rate (2011-2019, 2022-2024) ¹	VDOT P4P Linear Regression Annual Growth Rate ²	Recommended Linear Annual Growth Rate	2050 “Design Year” AADT Forecast Based Upon Recommended Growth Rate
1	US 19 / ALT US 58	-0.57% ³ (-0.67%) ⁴	0.50%	0.50%	15,376
2	US 19	0.26% ³ (0.30%) ⁴	0.50%		13,787
3	ALT US 58	-0.80% ³ (-1.20%) ⁴	0.50%		7,001
4	Hanson Drive	-0.32% ⁵	--		130

¹ 2020 and 2021 excluded due to VDOT policy to consider 2020 and 2021 traffic data an outlier due to Covid-19 impacts, and thus not include within trend analysis.

² VDOT policy to have a minimum annual growth rate of 0.50%.

³ Linear regression annual growth rate derived from all years of VDOT historical AADT (2011-2019, 2022-2024), including both short-term factored counts and factored counts with growth factors.

⁴ Linear regression annual growth rate derived from just VDOT short-term factored counts. If there are less than three (3) data points, a 0.5% default growth rate is assigned.

⁵ Linear regression annual growth rate derived from unfactored 24-hour traffic counts.



Figure 21: Study Area Linear Growth Rate Segment IDs

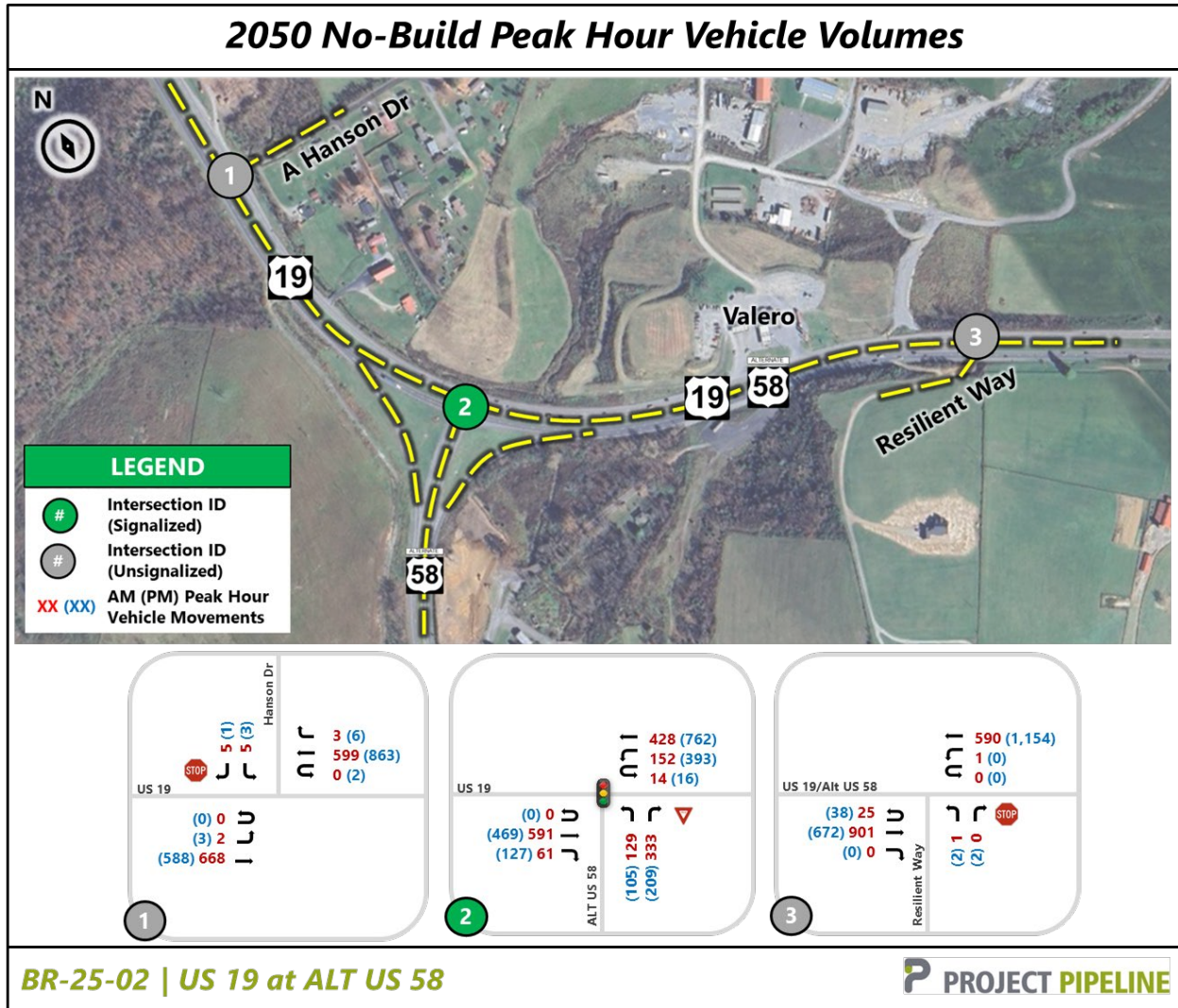


Figure 22: 2050 No-Build Peak Hour Volumes

No-Build Conditions VISSIM Analysis

Traffic operational analyses were conducted to evaluate the overall performance of the study intersections under No-Build (2050) AM and PM peak hour conditions. No-Build conditions represent future baseline traffic conditions without any proposed improvements. The intent of these analyses was to provide a general understanding of baseline future traffic conditions as a starting point for developing improvement alternatives. Due to the innovative intersection designs associated with the Phase 2 alternatives outlined in **Section 2.2**, it was determined that *PTV VISSIM 2021* would be better suited to model these alternatives than Synchro/SimTraffic, which would have had limited functionality. Therefore, VISSIM was used to conduct an operational analysis of the No-Build and Build conditions at the study area intersections.

Although existing conditions operations analyses were conducted through Synchro modeling as seen in **Section 1.6.1**, existing conditions were remodeled within VISSIM to serve as a basis for developing the No-Build models for the AM and PM peak hours. The existing AM and PM VISSIM models were developed based on the existing roadway geometry, collected traffic count data, provided signal phasing/timing plans, and observations of existing traffic behavior. Input and analysis methodologies were consistent with the *VDOT Traffic Operations and Safety Analysis Manual (TOSAM), Version 2.0* and *VDOT's VISSIM User Guide 2.0*. The VISSIM calibration memorandum, included in **Appendix G**, documents the model development, calibration methodology, calibration findings, and existing conditions traffic operations results in greater detail. Once calibrated, these existing conditions models served as the foundation for the No-Build analysis.

The No-Build models were updated with the projected 2050 No-Build traffic volumes (**Figure 22**). Traffic signal cycle lengths were assumed to be consistent with existing conditions, while splits and offsets were optimized. No-Build inputs and analysis methodologies were applied consistently with *TOSAM, Version 2.0*. Based on *VDOT's Sample Size Determination Tool, Version 2.0*, it was determined that only four simulation runs with unique random seeds were needed to produce statistically consistent results; thus, ten simulation runs were run for both the AM and PM No-Build VISSIM models as this is the VDOT minimum number of requisite model runs.

Movement delay (seconds per vehicle), approach delay (seconds per vehicle), average queue length (feet), and maximum queue length (feet) were selected as measures of effectiveness to quantitatively report the performance of each study intersection. Operations under No-Build conditions for the US 19 / ALT US 58 intersection are summarized below and documented in detail in **Table 11**.

Table 11: 2050 No-Build Conditions Traffic Operations

Scenario	Approach	Lane Group	Movement Delay (sec)		Approach Delay (sec)		Average Queue (ft)		Maximum Queue (ft)	
			AM	PM	AM	PM	AM	PM	AM	PM
Existing	ALT US 58	EBL	27.8	0.6	8.2	0.5	19	0	163	0
		EB CRT	0.7	0.5			0	0	0	0
	US 19 / ALT US 58	NBU	23.7	2.6	3.9	0.3	22	0	22	63
		NBL	23.7	2.6			22	0	22	62
		NBT	4.6	0.3			22	0	22	63
	US 19	SBT	15.2	-0.1	13.2	0.0	25	0	25	0
		SB CRT	0.5	0.4			0	0	0	0
	Intersection				8.7	0.2	-			
No Build (2050)	ALT US 58	EBL	28.7	32.6	8.5	10.7	23	22	186	165
		EB CRT	0.8	0.6			0	0	0	0
	US 19 / ALT US 58	NBU	25.3	27.5	10.9	12.9	27	59	169	289
		NBL	26.2	24.6			27	59	169	289
		NBT	5.2	6.6			27	59	169	289
	US 19	SBT	16.3	22.5	14.2	17.7	30	35	216	194
		SB CRT	0.5	0.5			0	0	0	0
	Intersection				11.6	13.9	-			

Under No-Build conditions, the US 19 / ALT US 58 intersection had an overall intersection delay of 11.6 seconds during the AM peak hour and 13.9 seconds during the PM peak hour. Compared to existing conditions, the overall intersection delay increased by 2.9 seconds in the AM peak hour and 13.7 seconds in the PM peak hour. Although the PM peak hour is projected to experience a moderate increase in delay, no significant operational constraints were identified in No-Build conditions. The greatest movement delay occurred at the eastbound left-turn movement, with 28.7 seconds during the AM peak hour and 32.6 seconds during the PM peak hour. This corroborates the Congestion Mitigation VTrans need identified for the eastbound intersection approach described in **Section 1.5.1**. The longest maximum queue in the AM peak hour occurred at the southbound through movement at 216 feet, and the longest average queue in the PM peak hour occurred at the northbound approach at 289 feet. No average queue lengths exceeded available storage lengths under No-Build conditions.

No operational constraints were identified at the US 19 / Hanson Dr and US 19 / Resilient Way intersections. Full VISSIM results, including these intersections, can be found in **Appendix H**.

1.7 Phase 1 Alternatives Summary

VHB, in partnership with the SWG, developed preliminary alternatives in parallel with the high-level needs diagnosis efforts documented in **Chapter 1**. The proposed Phase 1 alternatives were developed to improve operations at the study area intersections and address safety issues identified through crash analysis (**Section 1.5.2**). Specifically, the crash data revealed two key conflict patterns: conflicts caused by vehicles exiting the eastbound ALT US 58 channelized right turn and attempting to enter the southbound U-turn lane to access the Valero gas station, and rear-end conflicts attributed to traffic stopping for the signalized northbound US 19 approach.

1.7.1. Initial Alternatives

The needs evaluation, diagnosis, and initial alternatives were presented in SWG Meeting #3, held on August 6, 2025, on Mural, an online engagement and collaboration platform³. Eight alternatives for US 19 at ALT US 58 were presented during the meeting, which are summarized in **Table 12**.

During the SWG Meeting #3, the study team presented results gathered from the Virginia Intersection and Interchange Control Assessment Program (iCAP) Assessment Tool and Virginia Junction Screening Tool (VJuST) to screen intersection and interchange alternatives based on impacts to traffic operations, pedestrian accommodations, safety, and cost following processes outlined in *VDOT IIM-TOD-397—Virginia iCAP Policy and Guidance*. The Stage 1 iCAP results and VJuST results are summarized in **Section 1.7.2**

³ <https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1753125033232/a023a3156752f54599b25eeb1a82f0b0f73ec588>

Table 12: Phase 1 Alternatives

Intersection	Alternative	Description
US 19 at ALT US 58	One-Lane Continuous Green-T (NB-SB) ★	Removes signalization for the NB US 19 through movement and reduces the NB through movement to one lane. The existing NB US 19 inside lane converts to a drop left turn and receiving acceleration lane.
	Two-Lane Continuous Green-T (NB-SB)	Removes signalization for the NB US 19 through lane movement and retains the two NB through lanes. A receiving acceleration lane is built within the existing median.
	Unsignalized Restricted Crossing U-Turn (RCUT) (NB-SB)	Relocates EB ALT US 58 left turning movement to make U-turns at an unsignalized dedicated median opening along US 19.
	Signalized Restricted Crossing U-Turn (RCUT) (NB-SB)	Relocates EB ALT US 58 left turning movement to make U-turns at a signalized dedicated median opening along US 19.
	Signalization of All ALT US 58 Right Turns★	Removes channelization for the EB ALT US 58 right turning movement and relocates traffic to the signalized US 19 at ALT US 58 intersection. A dedicated right turn lane is built within the existing right shoulder of ALT US 58.
	Vertical Channelization of ALT US 58 Right Turns★	Separates EB ALT US 58 right turning movement into the following: - Traffic intending to stay on SB US 19 towards Abingdon uses the existing channelized right turn. - Traffic intending to U-turn onto NB US 19 (towards the Valero gas station) uses a signal-controlled right-turn lane to enter an extended U-turn storage lane with a vertical channelizing median.
	Traditional Diamond Interchange (NB-SB)	Grade-separates US 19 through movements and constructs two signalized at-grade intersections with dedicated on/off ramps for mainline traffic.
	Diverging Diamond Interchange (NB-SB)	Grade-separates US 19 through movements with ALT US 58 overpass built over US 19 and associated traffic crossing over to the other side of the roadway between the freeway ramps.

★ Advanced alternatives, or proposed aspects of future refined alternatives

1.7.2. Phase 1 Alternatives Summary

VJuST and Stage 1 iCAP and results are summarized in **Table 13**, **Table 14**, **Table 15**, and were presented at SWG Meeting #3, where it was decided which concepts would move forward to Phase 2. Input volumes were based on existing counts, as no-build volumes had not been forecasted at the time of analysis. The SWG agreed to carry three alternatives forward to Phase 2 for further refinement with some alternatives including a pairing of initial alternatives.

The three alternatives included in Phase 2:

1. One-Lane Continuous Green-T (NB-SB)
2. One-Lane Continuous Green-T (NB-SB) and Signalization of All ALT US 58 Right Turns
3. One-Lane Continuous Green-T (NB-SB) and Vertical Channelization of ALT US 58 Right Turns

The One-Lane Continuous Green-T (NB-SB) alternative was selected to be included in all three alternatives due to projected safety and operational benefits from reducing conflict points and converting the northbound approach to free-flow movement. The SWG determined that reducing the current northbound approach from two lanes to one lane was justified given the speed management benefits and the lack of operational constraints under No-Build conditions. It would also reduce construction impacts within the existing median and reduce the weaving distance between the left-turn acceleration lane and A Hanson Drive.

The One-Lane Continuous Green-T (NB-SB) and Signalization of All ALT US 58 Right Turns and One-Lane Continuous Green-T (NB-SB) and Vertical Channelization of ALT US 58 Right Turns alternatives were carried forward due to projected safety benefits from addressing the weaving crash pattern between the eastbound ALT US 58 channelized right turn and the southbound US 19 U-turn.

The Two-Lane Continuous Green-T (NB-SB) was eliminated as it was determined that a single uncontrolled through lane could handle the volume demand and the second northbound lane could be repurposed as the left-turn receiving lane to reduce project cost and facilitate acceleration lane tie-in prior to Hanson Drive, thus accommodating full access movements at that intersection. The Unsignalized and Signalized Restricted Crossing U-Turn (RCUT) (NB-SB) alternatives were eliminated due to U-turn sight distance concerns. The Traditional and Diverging Diamond Interchange (NB-SB) alternatives were eliminated due to high costs and significant impacts to right-of-way, environmental resources, and business access.

Table 16 summarizes the alternatives considered in Phase 1 and gives the justification of if a concept were to move forward to Phase 2. **Figure 23** shows the preliminary alternatives graphically categorized by the needs addressed by the alternative.

Table 13: VJuST Results

Intersection Results						
		Congestion		Pedestrian	Safety	Planning Level Costs
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Scenario
Continuous Green-T	-	0.38	-	12	\$\$	One-Lane Continuous Green-T - AM
Continuous Green-T	-	0.45	-	12	\$\$	One-Lane Continuous Green-T - PM
Continuous Green-T	-	0.38	-	12	\$\$	Two-Lane Continuous Green-T - AM
Continuous Green-T	-	0.45	-	12	\$\$	Two-Lane Continuous Green-T - PM
Restricted Crossing U-Turn	-	0.29		20	\$\$	Unsignalized Restricted Crossing U-Turn - AM
Restricted Crossing U-Turn	-	0.38		20	\$\$	Unsignalized Restricted Crossing U-Turn - PM
Restricted Crossing U-Turn	-	0.29		20	\$\$	Signalized Restricted Crossing U-Turn - AM
Restricted Crossing U-Turn	-	0.41		20	\$\$	Signalized Restricted Crossing U-Turn - PM
Conventional	-	0.43		48	\$	Signalization of All ALT US 58 Right Turns - AM
Conventional	-	0.45		48	\$	Signalization of All ALT US 58 Right Turns - PM
Traditional Diamond	-	0.19		28	\$\$\$\$\$	Traditional Diamond - AM
Traditional Diamond	-	0.31		28	\$\$\$\$\$	Traditional Diamond - PM
Diverging Diamond	-	0.18	-	20	\$\$\$\$\$	Diverging Diamond - AM
Diverging Diamond	-	0.32	-	20	\$\$\$\$\$	Diverging Diamond - PM

Table 14: iCAP Stage 1 Results – AM Peak Hour

Metric Weighting (Based on Purpose and Need)			Traffic Operations Traffic Operations Weight		Pedestrian Pedestrian Weight		Safety Safety Weight		Stage 1 Cost Stage 1 Cost Weight		Total Possible Score	
			3		1		3		3		10	
Alternatives	Source / Additional Details		VJuST Maximum V/C Ratio	Traffic Operations Metric MOE Score	VJuST Accommodation Compared to Conventional	Pedestrian Metric MOE Score	VJuST Weighted Total Conflict Points	Safety Metric MOE Score	VJuST Planning Level Cost Category	Stage 1 Cost Metric MOE Score	Total Stage 1 Score	Selected Alternative for Stage 2 Analysis? (Maximum 5)
Existing	Conventional	Conventional	0.38	--		--	48	--		--		
Alternative 1	Continuous Green-T	One Lane CGT	0.38	0.0	-	0.0	12	1.0	\$	1.0	6 out of 10	Yes
Alternative 2	Continuous Green-T	Two Lane CGT	0.38	0.0	-	0.0	12	1.0	\$	0.5	4.5 out of 10	No
Alternative 3	Restricted Crossing U-Turn NB-SB	Unsignalized RCUT	0.16	1.0	0	0.5	20	0.8	\$	1.0	8.9 out of 10	No
Alternative 4	Restricted Crossing U-Turn NB-SB	Signalized RCUT	0.29	0.4	0	0.5	20	0.8	\$	0.5	5.6 out of 10	No
Alternative 5	Traditional Diamond (Signalized)		0.19	0.9	0	0.5	28	0.6	\$	0.2	5.6 out of 10	No
Alternative 6	Diverging Diamond		0.18	0.9	-	0.0	20	0.8	\$	0.2	5.7 out of 10	No

Table 15: iCAP Stage 1 Results – PM Peak Hour

Metric Weighting (Based on Purpose and Need)			Traffic Operations Traffic Operations Weight		Pedestrian Pedestrian Weight		Safety Safety Weight		Stage 1 Cost Stage 1 Cost Weight		Total Possible Score	
			3		1		3		3		10	
Alternatives	Source / Additional Details		VJuST Maximum V/C Ratio	Traffic Operations Metric MOE Score	VJuST Accommodation Compared to Conventional	Pedestrian Metric MOE Score	VJuST Weighted Total Conflict Points	Safety Metric MOE Score	VJuST Planning Level Cost Category	Stage 1 Cost Metric MOE Score	Total Stage 1 Score	Selected Alternative for Stage 2 Analysis? (Maximum 5)
Existing	Conventional	Conventional	0.45	--		--	48	--		--		
Alternative 1	Continuous Green-T	One Lane CGT	0.45	0.0	-	0.0	12	1.0	\$	1.0	6 out of 10	Yes
Alternative 2	Continuous Green-T	Two Lane CGT	0.45	0.0	-	0.0	12	1.0	\$	0.5	4.5 out of 10	No
Alternative 3	Restricted Crossing U-Turn NB-SB	Unsignalized RCUT	0.36	0.6	-	0.0	20	0.8	\$	1.0	7.2 out of 10	No
Alternative 4	Restricted Crossing U-Turn NB-SB	Signalized RCUT	0.41	0.3	-	0.0	20	0.8	\$	0.5	4.8 out of 10	No
Alternative 5	Traditional Diamond (Signalized)		0.31	1.0	-	0.0	28	0.6	\$	0.2	5.4 out of 10	No
Alternative 6	Diverging Diamond		0.32	0.9	-	0.0	20	0.8	\$	0.2	5.7 out of 10	No

Table 16: Phase 1 Alternatives to Move Forward to Phase 2

Alternative	Move Forward to Phase 2?	Justification
One-Lane Continuous Green-T (NB-SB)	Yes	Improved operations and safety, particularly for northbound through traffic. SWG agreed that a one-lane CGT facilitates full movement access at A Hanson Drive intersection.
One-Lane Continuous Green-T (NB-SB) and Signalization of All ALT US 58 Right Turns	Yes	Mitigates the “weave” crash pattern associated with the existing channelized EB ALT US 58 right turn.
One-Lane Continuous Green-T (NB-SB) and Vertical Channelization of ALT US 58 Right Turns	Yes	Mitigates the “weave” crash pattern associated with the existing channelized EB ALT US 58 right turn, while also keeping the channelized movement for large trucks and traffic heading towards Abingdon.
Two Lane Continuous Green-T (NB-SB)	No	Two lanes likely prevents full movement access at A Hanson Drive intersection.
Unsignalized Restricted Crossing U-Turn (RCUT) (NB-SB)	No	SWG determined that it would not be ideal for additional traffic to make U-turns due to limited sight distance from vertical curvature.
Signalized Restricted Crossing U-Turn (RCUT) (NB-SB)	No	SWG determined that it would not be ideal for additional traffic to make U-turns due to limited sight distance from vertical curvature.
Traditional Diamond Interchange (NB-SB)	No	Environmental ROW constraints throughout the study area. Potential conflicts with traffic existing at the Valero gas station.
Diverging Diamond Interchange (NB-SB)	No	Environmental ROW constraints throughout the study area. Potential conflicts with traffic existing at the Valero gas station.

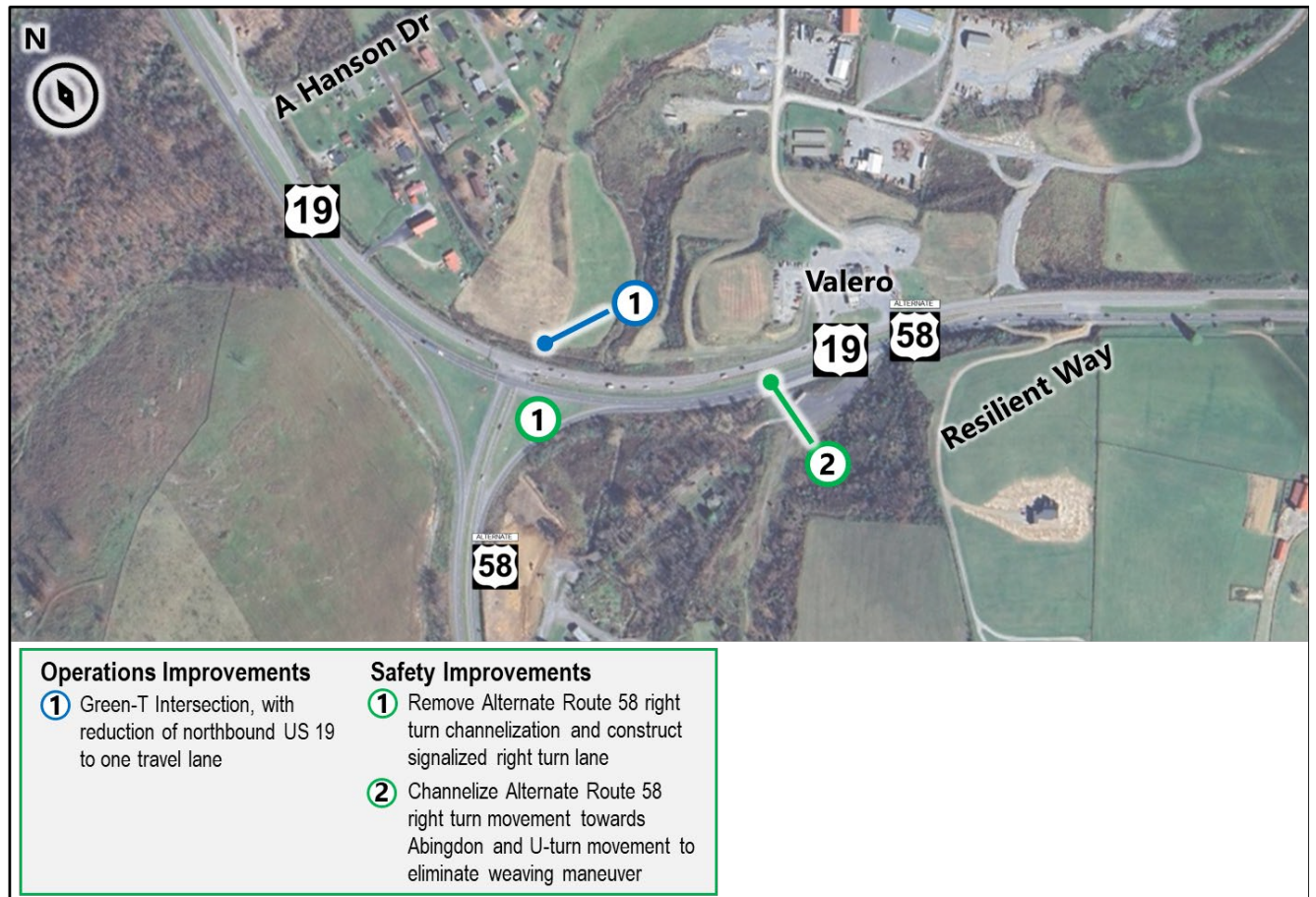


Figure 23: Phase 1 Scoping Level Improvement Alternatives

Chapter 2: Alternatives Refinement

2.1 Alternatives Refinement Overview

VHB further developed the alternatives chosen to be carried forward in Phase 2 including concept drawings, cost estimates, concept screening traffic operations, and safety analysis. SWG Meeting #4/5 was held on November 19, 2025. VHB presented revised concept sketches and concept screening results to receive feedback from the SWG in advance of public outreach. The SWG analyzed the alternatives across several metrics from the Virginia iCAP Assessment Tool, including traffic operations, safety, and cost to determine the refined list of alternatives to present to the public. The SWG Meeting #4/5 presentation was hosted on Mural, an online engagement and collaboration platform⁴.

2.2 Phase 2 Alternatives

The SWG advanced three alternatives in Phase 2: One-Lane Continuous Green-T, One-Lane Continuous Green-T and Signalization of All ALT US 58 Right Turns, and One-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements. The following section includes a description, a conceptual sketch, and screening-level traffic operations analysis and safety analysis for the three alternatives.

VHB used VISSIM to evaluate intersection operations to compare projected operations between the alternatives. VHB analyzed AM and PM future year (2050) traffic volumes to quantify the operational benefits. Movement delay (seconds per vehicle), approach delay (seconds per vehicle), average queue length (feet), and maximum queue length (feet) were used as measures of effectiveness.

VHB also reviewed Crash Modification Factors (CMFs) to determine the potential safety benefits for each alternative. CMFs estimate the expected change in the number of crashes after a specific countermeasure is implemented. They are calculated as the ratio of crashes with the countermeasure to the number of crashes without the countermeasure. A CMF of 1.00 means that there is no expected change, a CMF less than 1.00 means there is an expected reduction in crashes, and a CMF greater than 1.00 means there is an expected increase in crashes (e.g., a CMF of 0.6 means the countermeasure is projected to reduce crashes by 40%). CMFs were selected from the SMART SCALE Round 7 Planning Level CMF List. The CMF resulting in the highest projected crash reduction was applied to all study area crashes, as shown in **Table 17**.

2.2.1. One-Lane Continuous Green-T

Alternative Description

The One-Lane Continuous Green-T alternative proposes installing a Continuous Green-T at the US 19 at ALT US 58 intersection. The northbound US 19 approach would transition from two-signal controlled lanes to one free-flow through lane at the intersection. The existing inside through lane of the northbound approach would become a drop left turn lane onto ALT US 58. North of the intersection, the existing northbound US 19 inside lane would become a receiving acceleration lane for ALT US 58 left turning traffic. With only one requisite lane change, this proposed configuration would also accommodate full access

⁴ <https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1762520507579/91622daee13773e63010642af0d2e26016f1bd02>

movement at A Hanson Drive. All other approach lane configurations would remain the same. Figure 24 presents a conceptual sketch of the alternative.

Projected Traffic Operations Results for Alternative

A VISSIM model was not developed for the One-Lane Continuous Green-T alternative as the configuration is incorporated as a component of subsequent alternatives, and the corresponding VISSIM models account for this layout. All delay for the northbound US 19 through movement is removed in the subsequent alternatives and this is anticipated to be applicable to the One-Lane Continuous Green-T standalone alternative, given that all alternatives convert the northbound US 19 through movement to free-flow.

Projected Crash Reduction for Alternative

Converting a signal to a Continuous Green-T intersection is listed in the SMART SCALE Round 7 Planning Level CMF List as 0.85. This value indicates that there is an expected 15% reduction in crashes with this alternative, primarily due to conversion of the northbound through movement to free-flow conditions. The Annual Crash Reduction with the applied associated CMF is 0.95. **Table 17** displays the CMF and the crash reduction for the alternative.

Table 17: CMF and Crash Reduction Summary — One-Lane Continuous Green-T

Improvement Type/Feature	CMF	5-Year Crash Total	Annual Crash Reduction
Convert Signal to Continuous Green-T Intersection	0.85	31	0.95

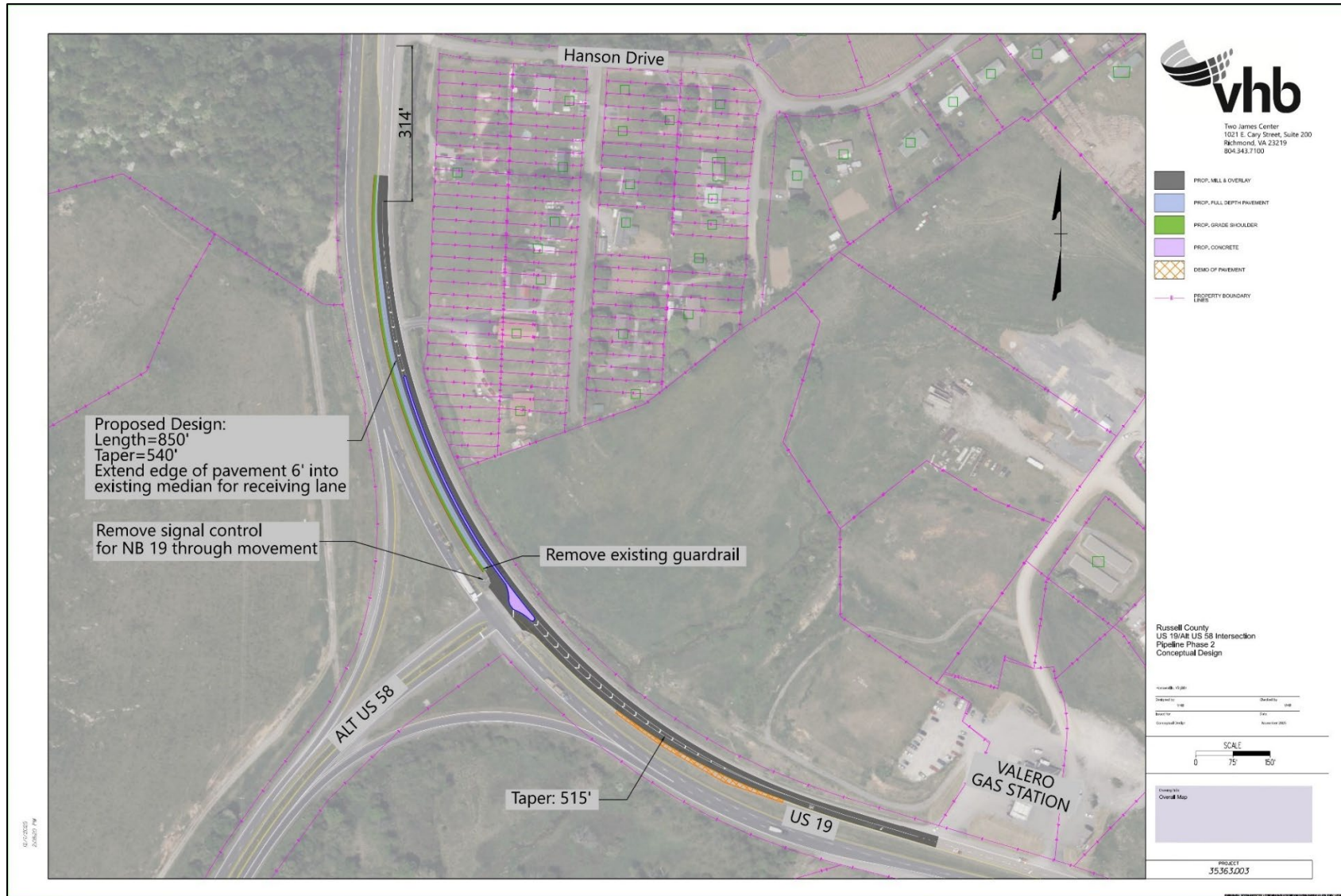


Figure 24: Phase 2 Alternative — One-Lane Continuous Green-T

2.2.2. One-Lane Continuous Green-T and Signalization of All ALT US 58 Right Turns

Alternative Description

This alternative is built upon the One-Lane Continuous Green-T alternative. In addition to the Continuous Green-T configuration, this alternative proposes the removal of the eastbound channelized right turn lane and the relocation of all eastbound ALT US 58 right-turning movements to the signalized US 19 at ALT US 58 intersection. This would be achieved by constructing a dedicated right turn lane on the eastbound ALT US 58 approach at the signal.

The relocation of the eastbound right turn movement to the signalized intersection would address the existing crash pattern attributed to weaving conflicts. By controlling both the eastbound right turn and southbound US 19 through movements with the traffic signal, vehicle conflicts between these movements would be eliminated. This configuration would also provide increased lane-changing distance along southbound US 19 for eastbound right traffic heading towards the U-turn movement back to the Valero gas station.

In addition to the safety benefits from removing signalization for the northbound approach as outlined in the One-Lane Continuous Green-T alternative, relocating the eastbound right turn movement to the signalized intersection would address the existing crash pattern caused by weaving conflicts. Between 2020 and 2024, six crashes occurred between the merge point of the eastbound channelized right turn and the median opening, including three rear-end crashes (one resulting in a Severe Injury (A)) and three sideswipe crashes. By controlling both the eastbound right turn and southbound US 19 through movements with the traffic signal, these vehicle conflicts would be mitigated. This configuration would provide increased lane-changing distance along southbound US 19 for eastbound right-turning traffic.

The proposed modifications would maintain existing upstream lane utilization on ALT US 58, with a drop left turn lane and drop right turn lane consistent with current conditions. **Figure 25** presents a conceptual layout of this alternative.

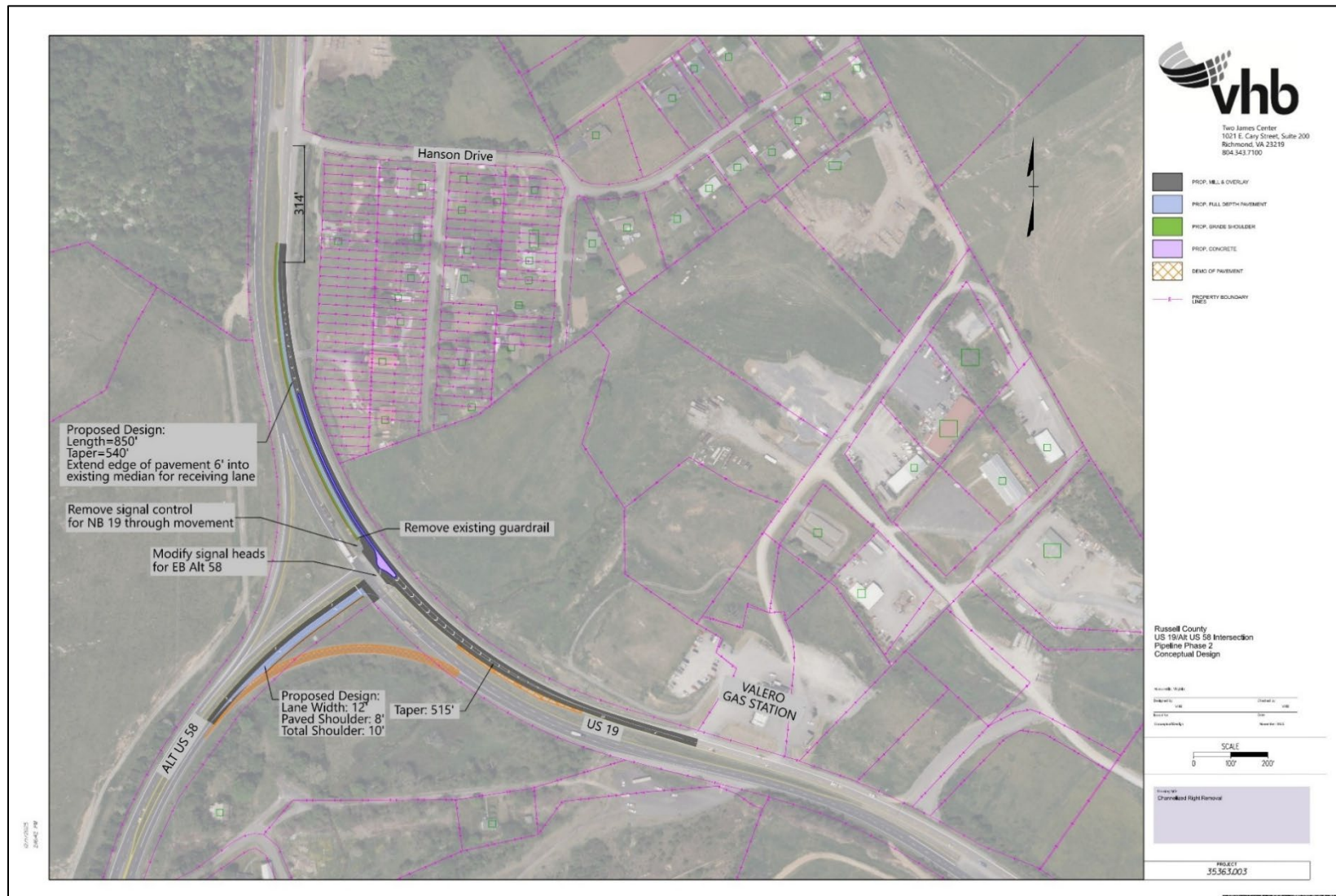


Figure 25: Phase 2 Alternative—Continuous Green-T and Signalization of All ALT US 58 Right Turns

Projected Traffic Operations Results for Alternative

The build alternative minimally affects the intersection delay during the AM and PM peak hour when compared to the no-build scenario. There is an increase of 1.4 seconds per vehicle during the AM peak hour and a reduction of 0.7 seconds per vehicle during the PM peak hour. Average and maximum queues are accommodated at all approaches. The removal of the eastbound ALT US 58 channelized right turn and signalization of eastbound right turns imparts minor delay and queuing on a movement that is free-flow in existing conditions. The northbound through movement is improved due to free-flow conditions with the Continuous Green-T and there are no anticipated operational impacts from reducing the northbound through lanes from two lanes to one lane.

Table 18 presents the movement delay, approach delay, average queue, and maximum queue results for the US 19 at ALT US 58 intersection. **Table 19** shows the change in movement delay and maximum queue length between the build and no-build alternatives.

The following trends were observed under build conditions:

AM Peak Hour

- Approaches at the intersection of US 19 at ALT US 58 have minimal approach delays
- The northbound through movement experienced the largest reduction in movement delay and maximum queue length (-4.7 seconds per vehicle and -169 feet)
- The longest queue is the eastbound right movement at the intersection of US 19 at ALT US 58 at 242 feet
- No queues extend past the storage bay lengths
- The highest signalized movement delay occurs in the northbound left turn movement at the intersection of US 19 at ALT US 58 (26.6 seconds)

PM Peak Hour

- Approaches at the intersection of US 19 at ALT US 58 have minimal approach delays
- The eastbound right movement experienced the largest increase in movement delay and maximum queue length (+9.7 seconds per vehicle and +200 feet)
- The northbound through movement experienced the largest reduction in movement delay and maximum queue length (-5.6 seconds per vehicle and -289 feet)
- The longest queue is the northbound left movement at the intersection of US 19 at ALT US 58 at 407 feet
- No queues extend past the storage bay lengths
- The highest signalized approach delay occurs in the northbound left turn movement at the intersection of US 19 at ALT US 58 (25.9 seconds)

Table 18: Traffic Operations Analysis for US 19 / ALT US 58—Continuous Green-T and Signalization of All ALT US 58 Right Turns

Scenario	Approach	Lane Group	Movement Delay (sec)		Approach Delay (sec)		Average Queue (ft)		Maximum Queue (ft)	
			AM	PM	AM	PM	AM	PM	AM	PM
Existing	EB ALT US 58	Left	27.8	0.6	8.2	0.5	19	0	163	0
		CRT	0.7	0.5			0	0	0	0
	NB US 19 / ALT US 58	U-Turn	23.7	2.6	9.8	0.7	22	0	162	63
		Left	23.9	1.4			22	0	162	62
		Thru	4.6	0.3			25	0	162	63
	SB US 19	Thru	15.2	-0.1	13.2	0.0	25	0	184	0
		CRT	0.5	0.4			0	0	0	0
	Intersection		-		10.7	0.5	-		-	
No-Build (2050)	EB ALT US 58	Left	28.7	32.6	8.5	10.7	23	22	186	165
		CRT	0.8	0.6			0	0	0	0
	NB US 19 / ALT US 58	U-Turn	25.3	27.5	10.9	12.9	27	59	169	289
		Left	26.2	24.6			27	59	169	289
		Thru	5.2	6.6			27	59	169	289
	SB US 19	Thru	16.3	22.5	14.2	17.7	30	35	216	194
		CRT	0.5	0.5			0	0	0	0
	Intersection		-		11.6	13.9	-		-	
Continuous Green-T and Signalization of All ALT US 58 Right Turns	EB ALT US 58	Left	23.0	28.3	13.6	16.0	25	22	209	167
		Right	10.0	10.3			37	31	242	200
	NB US 19 / ALT US 58	U-Turn	11.1	24.6	7.3	9.6	6	33	126	354
		Left	26.6	25.9			25	63	179	407
		Thru	0.5	1.0			0	0	0	0
	SB US 19	Thru	20.2	23.9	17.6	18.8	38	37	237	198
		CRT	0.5	0.5			0	0	0	0
	Intersection		-		13.0	13.2	-		-	

Table 19: Change in Delay and Queue Length—Continuous Green-T and Signalization of All ALT US 58 Right Turns

		AM Peak Hour		PM Peak Hour	
Approach	Lane Group	Δ from No Build		Δ from No Build	
		Movement Delay (sec/veh)	Max Queue Length (ft)	Movement Delay (sec/veh)	Max Queue Length (ft)
EB ALT US 58	Left	-5.7	23	-4.3	2
	Right	9.2	242	9.7	200
NB US 19 / ALT US 58	Left	0.4	10	0.3	118
	Thru	-4.7	-169	-5.6	-289
SB US 19	Thru	3.9	21	1.4	4
	CRT	0	0	0	0
Intersection		+1.4	-	-0.7	-

Projected Crash Reduction for Alternative

This alternative retains the Continuous Green-T configuration and its associated CMF of 0.85 (15% crash reduction). The calculated Annual Crash Reduction for the Continuous Green-T component is 0.95 crashes per year.

The removal of a channelized right turn and relocating movements to a signalized control does not have an associated CMF in the SMART SCALE Round 7 Planning Level CMF List. However, VHB believes these measures address the “weave” crash pattern attributed to merging movements from the existing channelized right turn and reduce conflict points. The calculated Annual Crash Reduction is up to 0.60 crashes per year, based on three crashes involving the “weave” pattern over the five-year analysis period.

Table 20 displays the CMF and Crash Reduction Summary for the alternative.

Table 20: CMF and Crash Reduction Summary — Continuous Green-T and Signalization of All ALT US 58 Right Turns

Alternative	CMF	5-Year Crash Total	Annual Crash Reduction
Convert Signal to Continuous Green-T Intersection	0.85	31	0.95
Removal of Channelized Right Turn / Relocating Right Turning Movements to Signalized Control Type	*	Up to 3	Up to 0.60

* No applicable CMF in Virginia Smart Scale CMF List.

2.2.3. One-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements

Alternative Description

This concept builds upon the One-Lane Continuous Green-T alternative. In addition to the Continuous Green-T configuration, this alternative proposes to physically separate right turn movements intending to stay south on US 19 towards Abingdon versus right turn movements intending to U-turn onto northbound US 19 towards the Valero Gas Station. This separation is achieved by maintaining use of the existing channelized right-turn lane for drivers intending to stay on southbound US 19 and relocating traffic intending on using the U-turn onto northbound US 19 to a new right turn lane at the signalized US 19 at ALT US 58 intersection. Between the intersection and the U-turn median opening, the U-turn storage lane would be extended with a vertical channelizing median to prevent traffic from weaving across from the channelized right-turn lane to the U-turn lane. **Figure 26** presents a conceptual layout of this alternative.

In addition to the safety benefits from removing signalization for the northbound approach as outlined in the One-Lane Continuous Green-T alternative, separating the eastbound right turn movements would reduce the frequency of conflicts associated with eastbound ALT US 58 right-turning traffic attempting to merge from the acceleration lane into the U-turn lane to access northbound US 19.

Projected Traffic Operations Results for Alternative

The build alternative minimally affects the intersection delay during the AM and PM peak hour when compared to the no-build scenario. There is a reduction of 1.9 seconds per vehicle during the AM peak hour and a reduction of 2.5 seconds per vehicle during the PM peak hour. Average and maximum queues are accommodated at all approaches. The relocation of eastbound right turning traffic intending on U-turning onto northbound US 19 to a signalized dedicated right turn at the intersection minimally impacts traffic operations as the eastbound approach delay is reduced by 0.8 seconds per vehicle during the AM peak hour and by 0.3 seconds per vehicle during the PM peak hour. **Table 22** presents the movement delay, approach delay, average queue, and maximum queue results for the US 19 at ALT US 58 intersection. **Table 23** shows the change in movement delay and maximum queue length between the build alternative and no-build alternative. The following trends were observed under build conditions:

AM Peak Hour

- Approaches at the intersection of US 19 at ALT US 58 have minimal approach delays
- The eastbound right movement experienced the largest increase in movement delay and maximum queue length (+6.6 seconds per vehicle and +193 feet)
- The northbound through movement experienced the largest reduction in movement delay and maximum queue length (-4.7 seconds per vehicle and -169 feet)
- The longest queue is the southbound through movement at the intersection of US 19 at ALT US 58 at 195 feet
- No queues extend past the storage bay lengths
- The highest signalized movement delay occurs in the eastbound left turn movement at the intersection of US 19 at ALT US 58 (24.6 seconds)

PM Peak Hour

- Approaches at the intersection of US 19 at ALT US 58 have minimal approach delays
- The eastbound right movement experienced the largest increase in movement delay and maximum queue length (+8.4 seconds per vehicle and +186 feet)
- The northbound through movement experienced the largest reduction in movement delay and maximum queue length (-5.6 seconds per vehicle and -289 feet)
- The longest queue is the northbound left movement at the intersection of US 19 at ALT US 58 at 373 feet
- No queues extend past the storage bay lengths
- The highest signalized approach delay occurs in the eastbound left turn movement at the intersection of US 19 at ALT US 58 (30.1 seconds)

Projected Crash Reduction for Alternative

This alternative retains the Continuous Green-T configuration and its associated CMF of 0.85 (15% crash reduction). The calculated Annual Crash Reduction for the Continuous Green-T component is 0.95 crashes per year. The separation of right turning movements and the use of vertical channelization does not have an associated CMF in the SMART SCALE Round 7 Planning Level CMF List. However, VHB believes these measures address the “weave” crash pattern attributed to merging movements from the existing channelized right turn and reduce conflict points. The calculated Annual Crash Reduction is up to 0.6 crashes per year, based on three crashes involving the “weave” pattern over the five-year analysis period.

Table 21 displays the CMF and Crash Reduction Summary.

Table 21: CMF and Crash Reduction Summary — Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements

Alternative	CMF	5-Year Crash Total	Annual Crash Reduction
Convert Signal to Continuous Green-T Intersection	0.85	31	0.95
Separation / Vertical Channelization of Right Turns	*	Up to 3	Up to 0.6

* No applicable CMF in Virginia Smart Scale CMF List.

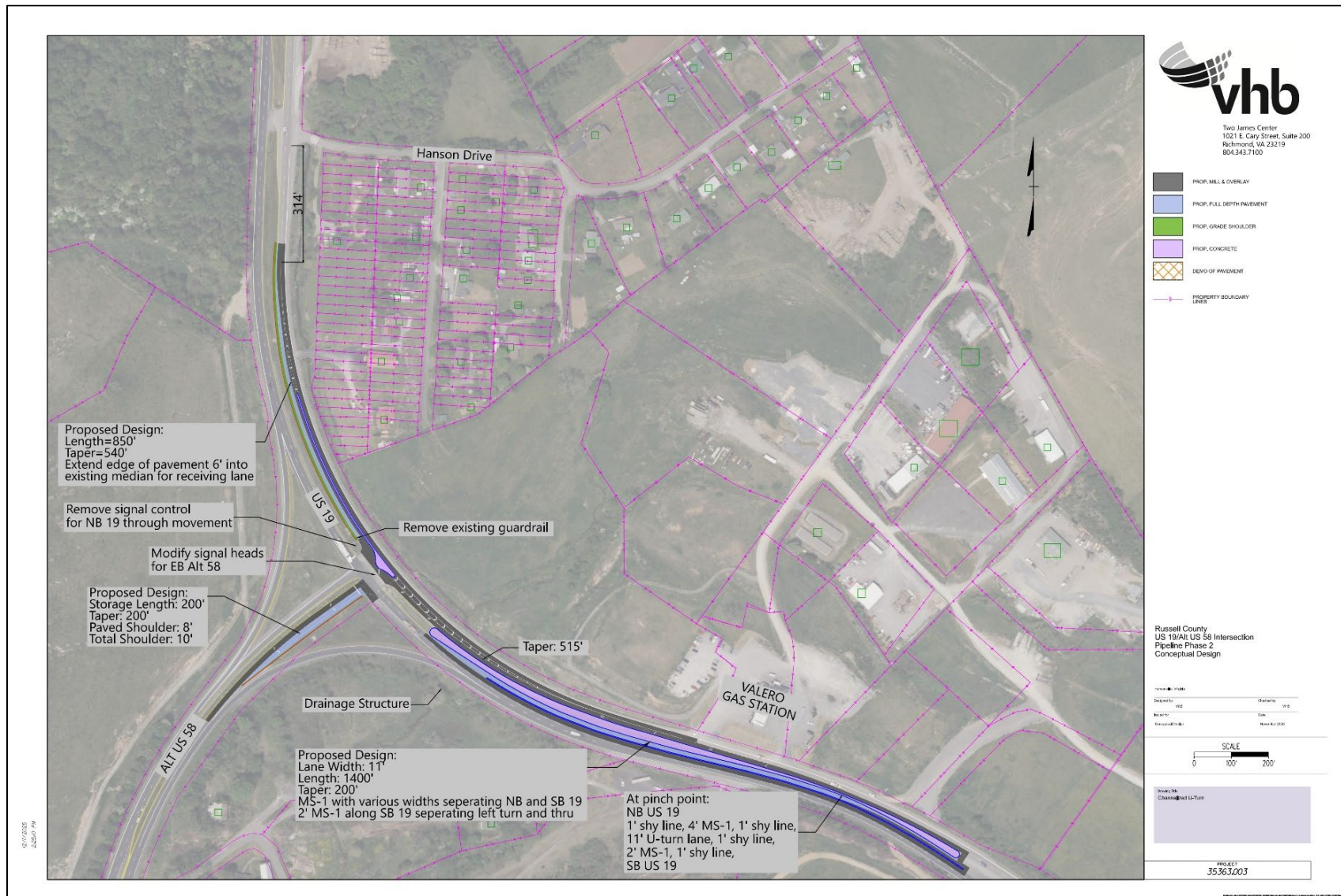


Figure 26: Phase 2 Alternative—Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements

Table 22: Traffic Operations Analysis for US 19 / ALT US 58—Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements

Scenario	Approach	Lane Group	Movement Delay (sec)		Approach Delay (sec)		Average Queue (ft)		Maximum Queue (ft)	
			AM	PM	AM	PM	AM	PM	AM	PM
Existing	EB ALT US 58	Left	27.8	0.6	8.2	0.5	19	0	163	0
		CRT	0.7	0.5			0	0	0	0
	NB US 19 / ALT US 58	U-Turn	23.7	2.6	9.8	0.7	22	0	162	63
		Left	23.9	1.4			22	0	162	62
		Thru	4.6	0.3			25	0	162	63
	SB US 19	Thru	15.2	-0.1	13.2	0.0	25	0	184	0
		CRT	0.5	0.4			0	0	0	0
	Intersection		-		10.7	0.5	-		-	
No-Build (2050)	EB ALT US 58	Left	28.7	32.6	8.5	10.7	23	22	186	165
		CRT	0.8	0.6			0	0	0	0
	NB US 19 / ALT US 58	U-Turn	25.3	27.5	10.9	12.9	27	59	169	289
		Left	26.2	24.6			27	59	169	289
		Thru	5.2	6.6			27	59	169	289
	SB US 19	Thru	16.3	22.5	14.2	17.7	30	35	216	194
		CRT	0.5	0.5			0	0	0	0
	Intersection		-		11.6	13.9	-		-	
Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements	EB ALT US 58	Left	24.6	30.1	7.7	10.4	20	20	162	158
		Right	7.4	9.0			19	21	193	186
		CRT	0.7	0.6			0	0	0	0
	NB US 19 / ALT US 58	U-Turn	9.2	20.1	6.3	8.8	4	28	132	319
		Left	23.1	23.5			21	56	185	373
		Thru	0.5	1.0			0	0	0	0
	SB US 19	Thru	16.0	21.7	14.0	17.2	29	33	195	197
		CRT	0.5	0.5			0	0	0	0
	Intersection		-		9.7	11.4	-		-	

Table 23: Change in Delay and Queue— Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn

Approach	Lane Group	AM Peak Hour		PM Peak Hour	
		Δ from No Build		Δ from No Build	
		Movement Delay (sec/veh)	Max Queue Length (ft)	Movement Delay (sec/veh)	Max Queue Length (ft)
EB ALT US 58	Left	-4.1	-24	-2.5	-7
	Right	6.6	193	8.4	186
	CRT	0.0	0	0.0	0
NB US 19 / ALT US 58	Left	-3.1	16	-1.1	84
	Thru	-4.7	-169	-5.6	-289
SB US 19	Thru	-0.3	-21	-0.8	3
	CRT	0	0	0	0
Intersection		-1.9	-	-2.5	-

2.2.4. Traffic Operations Summary

Intersection operations were evaluated to compare projected operations between the different alternatives using *VISSIM*. The study team analyzed AM and PM future year (2050) traffic volumes to evaluate the operational benefits of the five alternatives. Control delay (seconds per vehicle), LOS, and maximum queue length (feet) were used as measures of effectiveness. **Table 24** compares the change in intersection delay of the build scenarios to the no-build scenario in the AM and PM peak hours. There are minimal effects to intersection delay for all alternatives.

Table 24: Traffic Operations Summary

Alternative	AM Peak Hour Change in Delay (s/veh)	PM Peak Hour Change in Delay (s/veh)
One-Lane Continuous Green-T	-1.6	-1.8
One-Lane Continuous Green-T and Signalization of All ALT US 58 Right Turns	+1.4	-0.7
One-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements	-1.9	-2.5

2.3 Phase 2 Public Involvement

The Phase 2 Public Input online survey was held from December 8, 2025, to December 29, 2025, to collect feedback on the potential improvements within the study area. The Public Input survey provided the study team with an understanding of how the public viewed each alternative, which subsequently informed the preferred alternative selection. 39 respondents participated in the survey and submitted 13 written comments.

The SWG held an in-person public information meeting on December 17, 2025, from 4:00-6:00 PM at Southwest Community College in Cedar Bluff, Virginia, to collect feedback and input on the potential improvements. Five participants signed the attendance sheet for the event, including four government staff/officials. Feedback gathered during the in-person meeting was consistent with feedback received from the Public Input survey.

Survey respondents were asked to rate the alternatives from strongly opposed to strongly support. **Figure 27** summarizes the average score for each alternative presented in the survey at the intersection of US 19 at ALT US 58. An average score of five corresponds with strong support while an average score of one corresponds with strong opposition. All alternatives had an average ranking of over three, indicating positive support. The highest ranked alternative was One-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turns with a 3.51 score.

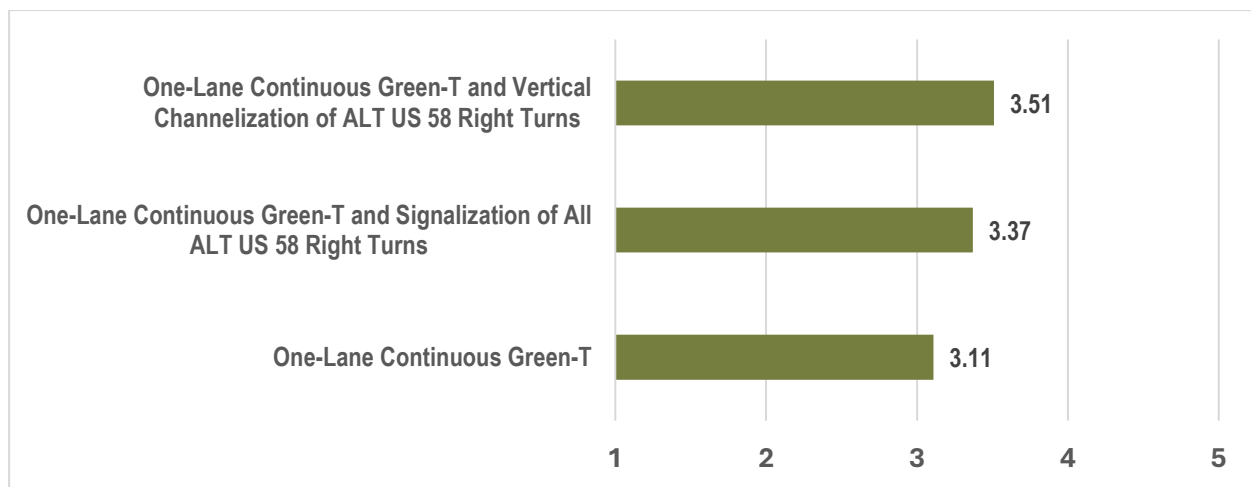


Figure 27: Public Engagement - Average Rating of Alternatives

Figure 28 shows how each alternative was ranked by survey participants. Most respondents ranked the alternatives as neutral, somewhat support, or strongly support. The most favorable alternative was One-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turns with 61% support (somewhat support and strongly support) which aligns with the results of the average rating.

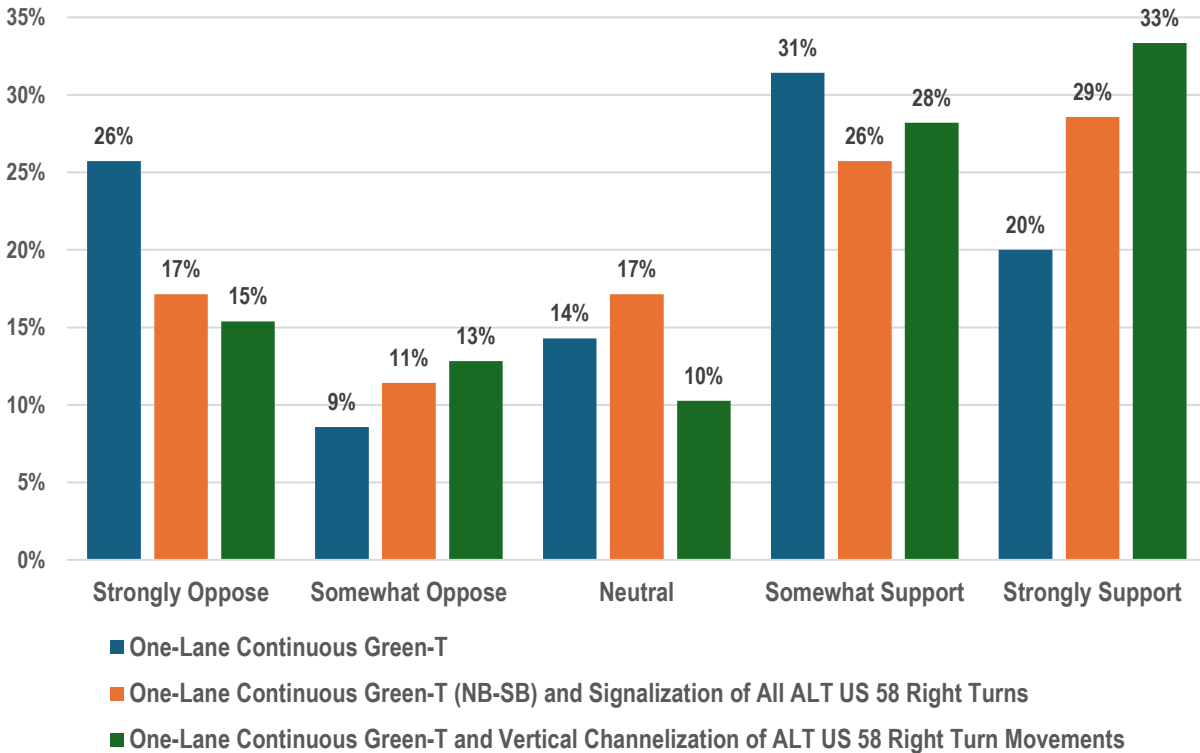


Figure 28: Alternative Survey Responses

Comments indicated support for maintaining the eastbound ALT US 58 channelized right turn, ensuring free-flow conditions for northbound US 19 traffic, maintaining two northbound through lanes, and addressing the “weave” crash pattern. Respondents suggested consideration for incorporating clear signage to prevent confusion caused by the implementation of alternatives. **Table 25** presents public involvement feedback themes associated with the proposed alternatives. Rankings from the public survey were in line with the preferences of the SWG. Detailed survey results are shown in **Appendix I**.

Table 25: Public Involvement Feedback Themes for Proposed Alternatives

Alternative	Public Involvement Feedback Themes
One-Lane Continuous Green-T	Support for simplicity and free-flow northbound US 19 through traffic. Concerns with reducing the two northbound 19 US through lanes to one and potential impacts to congestion.
One-Lane Continuous Green-T and Signalization of All ALT US 58 Right Turns	Concerns with removing the ALT US 58 channelized right turn, especially for heavy vehicles turning right onto US 19 at the signalized intersection.
One-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements	Support expressed for perceived safety benefits. Concerns involved with complexity and potential confusion caused to road users.

2.4 Preferred Alternative Selection

The Phase 2 Public Engagement Results, Preferred Alternative Selection, and Phase 3 Scoping Meeting (SWG Meeting #6) was held on February 11, 2026, on Mural⁵. The purpose of the meeting was to review the Phase 2 public engagement results and select the preferred alternative. During this meeting, VHB suggested a set of alternatives to advance towards the development of a preferred alternative. The Project Pipeline Program requires that all recommended improvements be categorized into three distinct groups:

- **Short Term Recommendations (State/Local Forces):** This category consists of immediate maintenance and operational improvements that could be implemented through state/local forces. Examples include vegetation management, HSIP systemic-level safety improvements, adjusting signal timings. Some improvements in this category may also be included in the final-mid-term investment strategy.
- **Mid-Term Investment Strategy (Preferred Alternative):** This category consists of improvements that are targeted for a funding request/application within the next 12 months. Items in this group will advance to Phase 3 of the Project Pipeline study process for further design and cost refinement. All recommendations in the mid-term investment strategy category will be considered the preferred alternative per SMART SCALE policy.
- **Long-Term Investment Vision:** This category includes recommendations that represent a long-term investment vision (beyond 20 years). These improvements are not targeted for funding in near or mid-term but are intended to guide localities in their comprehensive planning efforts, inform land development decisions, and reserve and protect future right-of-way. Recommendations in this category will not advance to Phase 3 of Project Pipeline.

In public outreach, respondents worried that reducing northbound US 19 to a single through lane would increase congestion. In response to this feedback, the SWG decided to advance a Two-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements alternative that includes two northbound US 19 through lanes and a receiving lane built within the existing median. Due to acceleration lane length and lane-changing distance, the alternative would channelize southbound left turns onto A Hanson Drive and restrict left turns from A Hanson Drive onto southbound US 19. Drivers intending to complete this movement would instead turn at US 19 / Cross Roads approximately 1,300 feet north of the intersection, and then travel southbound on US 19. The revised alternative is shown in **Figure 29**.

⁵ <https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1766511396211/c622d44e6d2d943f6cd97e3e90b82364e443f363>

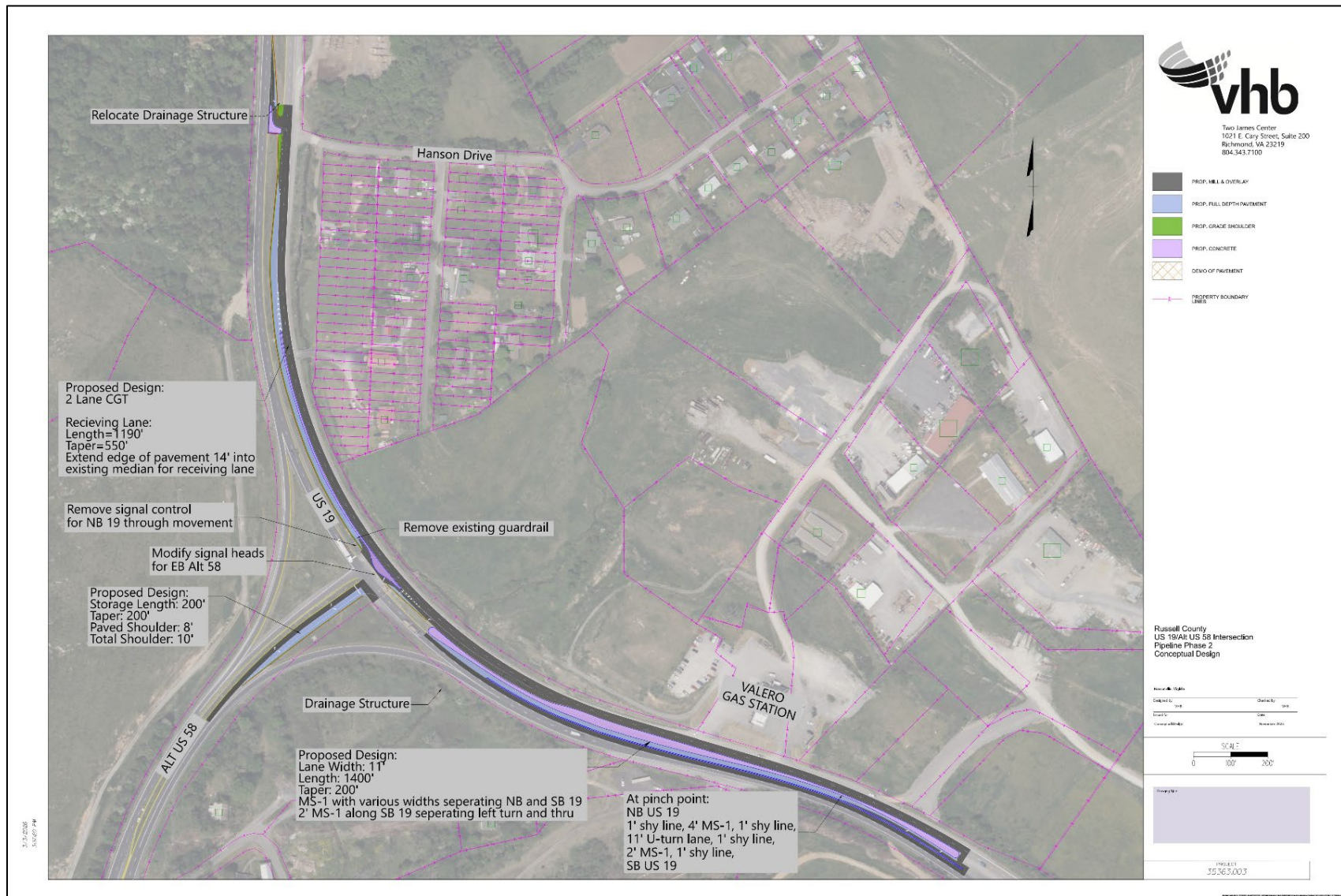


Figure 29: Phase 2 Alternative—Two-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements

Table 26 and **Table 27** include the iCAP Stage 2 summary of all the alternatives considered for the intersection during AM and PM peak hours. Additionally, iCAP Stage 1 VJuST Maximum V/C ratios were updated to reflect no-build volumes. Updated Stage 1 and Stage 2 iCAP results of initial alternatives can be found in **Appendix J**.

The alternatives are as follows (top to bottom):

- One-Lane Continuous Green-T
- One-Lane Continuous Green-T and Signalization of All ALT US 58 Right Turns
- One-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements
- Two-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements

Table 26: Virginia iCAP Stage 2 Results—AM Peak Hour

Alternative	Traffic Operations Metric			Pedestrian Metric Score	Safety Metric		Stage 2 Cost Metric		Total Stage 2 Score
	MOE 1 Score	MOE 2 Score	Total Score		Annual F+I Crash Reduction	Score	VJuST-C Cost Estimate	Score	
Continuous Green-T	1.0		1.0	0.0	0.30	0.5	\$ 8,000,000	1.0	7.5 out of 10
Continuous Green-T	0.7		0.7	0.0	0.60	1.0	\$ 8,500,000	0.9	7.8 out of 10
Continuous Green-T	1.0		1.0	0.0	0.60	1.0	\$ 10,000,000	0.8	8.4 out of 10
Continuous Green-T	1.0		1.0	0.0	0.60	1.0	\$ 10,000,000	0.8	8.4 out of 10
					0.00	0.0			
Metric Weighting	3			1	3		3		

Table 27: Virginia iCAP Stage 2 Results—PM Peak Hour

Alternative	Traffic Operations Metric			Pedestrian Metric Score	Safety Metric		Stage 2 Cost Metric		Total Stage 2 Score
	MOE 1 Score	MOE 2 Score	Total Score		Annual F+I Crash Reduction	Score	VJuST-C Cost Estimate	Score	
Continuous Green-T	0.9		0.9	0.0	0.30	0.5	\$ 8,000,000	1.0	7.2 out of 10
Continuous Green-T	0.8		0.8	0.0	0.60	1.0	\$ 8,500,000	0.9	8.1 out of 10
Continuous Green-T	1.0		1.0	0.0	0.60	1.0	\$ 10,000,000	0.8	8.4 out of 10
Continuous Green-T	1.0		1.0	0.0	0.60	1.0	\$ 10,000,000	0.8	8.4 out of 10
					0.00	0.0			
Metric Weighting	3			1	3		3		

Although the SWG had initially intended on advancing the Two-Lane Continuous Green-T and Vertical Channelization of ALT US 58 Right Turn Movements alternative, in mid-March 2026, several VDOT members of the SWG expressed concern for the potential of vehicle overturns, particularly to the immediate north of US 19/Resilient Way. This concern stems from the elevation differences between the northbound and southbound US 19 approaches and the narrow median width that would exist following the extension of the southbound U-turn lane with channelizing median.

As a result, the SWG pivoted before the April 1st, 2026, Smart Scale pre-application deadline to advance a Two-Lane Continuous Green-T alternative without the vertical channelization component. Like the previous alternative, this design maintains two northbound US 19 through lanes to address the public's congestion concerns. In addition, the alternative would install a northbound channelized left turn at US 19/Resilient Way to accommodate northbound traffic turning into Resilient Way. This modification would eliminate at this location the existing southbound U-turn movement for traffic heading to the Valero gas station. Instead, this traffic would be rerouted to a Restricted Crossing U-Turn (RCUT) at a median opening on US 19 approximately 1,400 feet south of Resilient Way. Back-to-back RCUTs would be installed to accommodate both northbound and southbound US 19 movements at this location.

With these modifications, the SWG advanced the modified alternative to Smart Scale pre-application and Phase 3 project development as it reflects public feedback by maintaining two northbound through lanes and reducing driver confusion, reduces delays and queueing at the US 19/ALT US 58 intersection, and provides significant safety improvements by addressing two key crash patterns. The northbound US 19 rear-end crash pattern is mitigated by removing signalization for the movement, while the crash pattern involving traffic exiting the eastbound ALT US 58 channelized right turn and attempting to enter the southbound U-turn lane to access the Valero gas station is addressed by relocating U-turning traffic further downstream, which discourages aggressive merging movements. The proposed U-turn location also has better sight distance than at the existing median opening at Resilient Way.

The revised Preferred Alternative is shown in **Figure 30** and **Figure 31** and will advance to Phase 3 of Project Pipeline. There are no alternatives from this study that will be considered as a short-term recommendation or long-term investment vision. **Appendix K** includes the Phase 2 Preferred Alternative Summary.

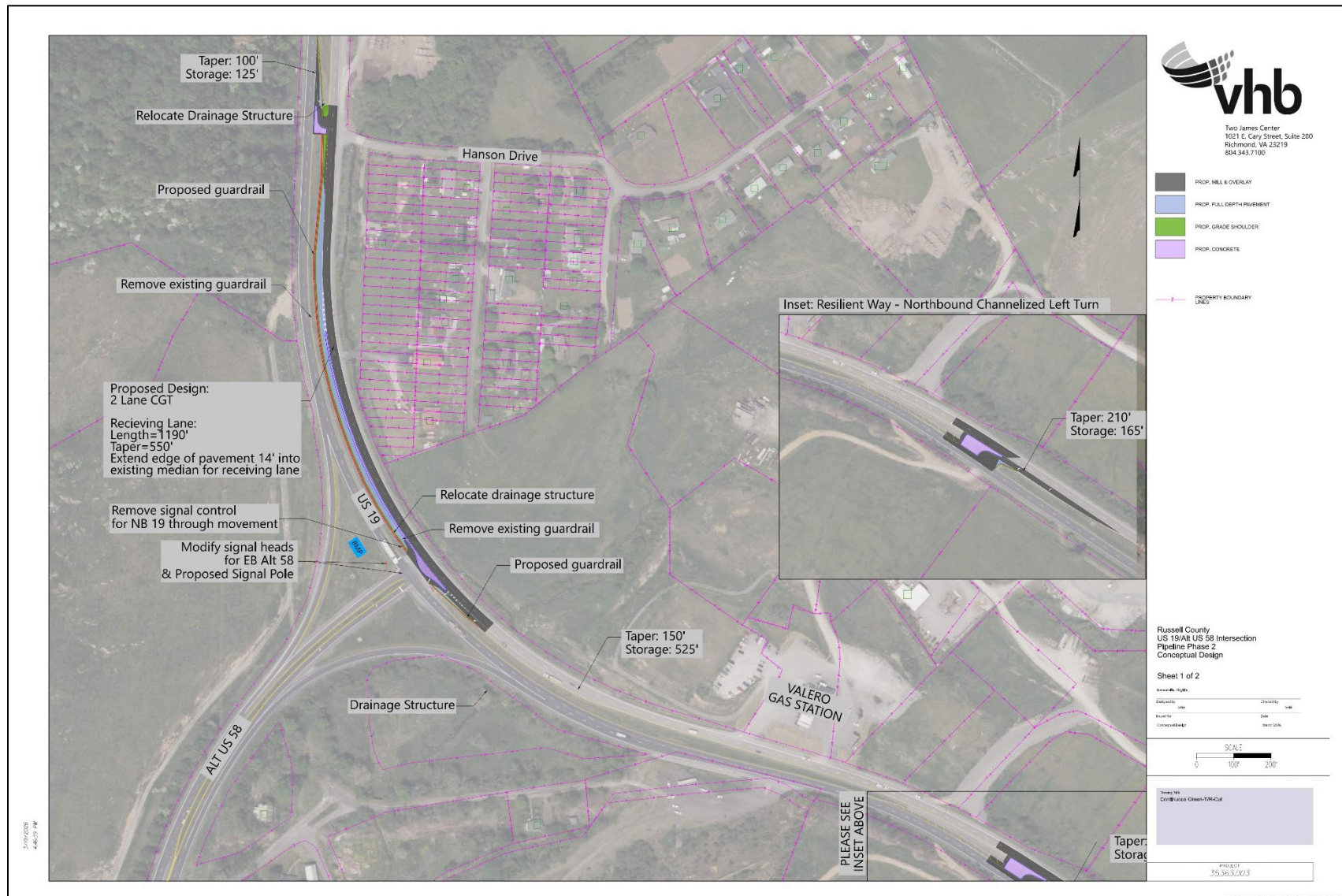


Figure 30: Preferred Alternative—Two-Lane Continuous Green-T (Sheet 1)

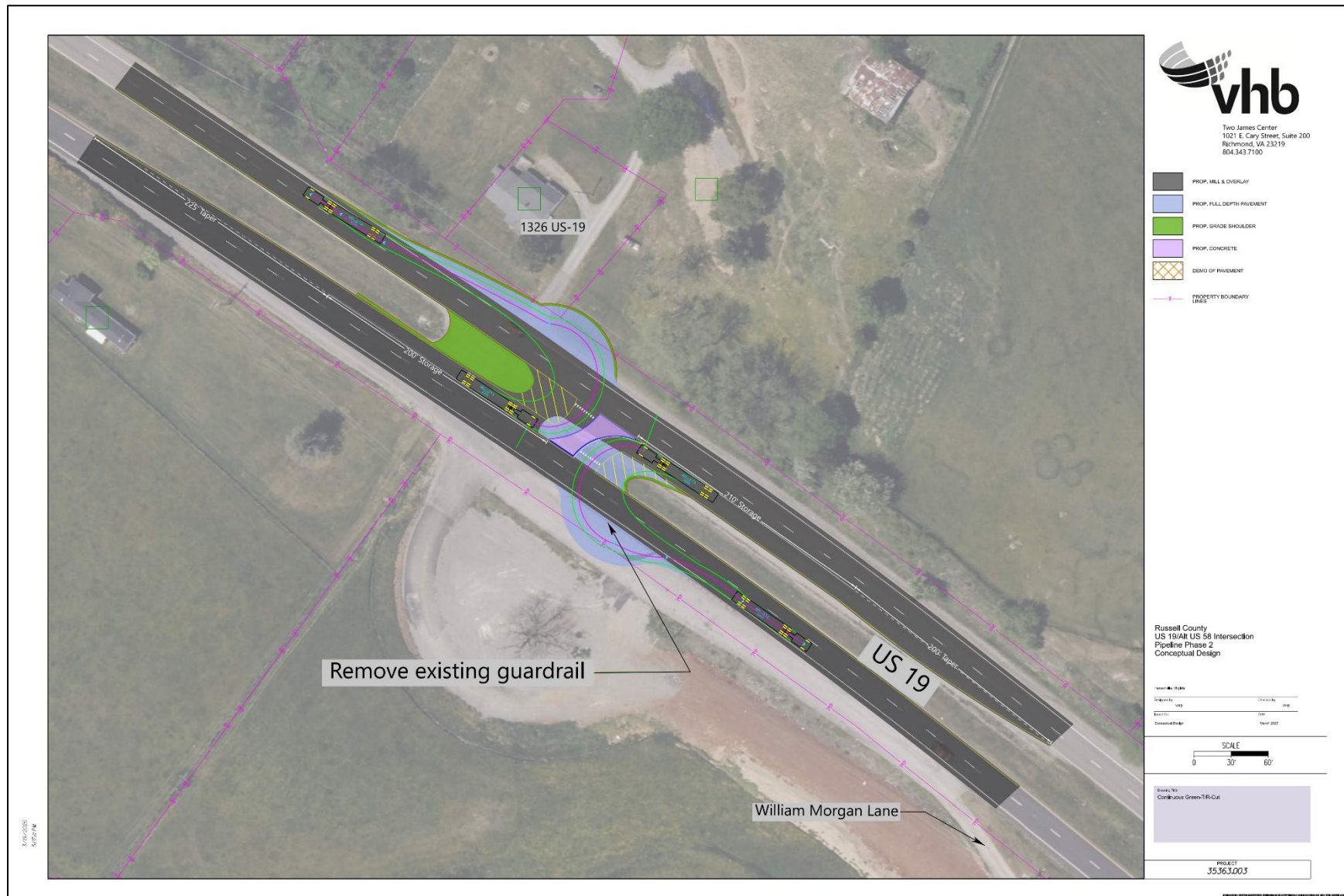


Figure 31: Preferred Alternative—Two-Lane Continuous Green-T (Sheet 2)

Chapter 3: Preferred Alternative Analysis and Investment Strategy

Phase 3 of the study included a detailed design, cost estimate, risk assessment, and further operations assessment of the selected preferred alternative. As discussed in **Section 2.4 Preferred Alternative Selection**, the SWG chose the continuous Green-T with relocated southbound U-turn concept as the preferred alternative. The preferred alternative concept has the following components:

- Convert US 19 / ALT US 58 intersection to a Continuous Green-T signalized intersection, including conversion of northbound-through movements to be free flow
- Widen US 19 northbound into the median to add an acceleration lane for eastbound left-turn movements
- Construct a channelized left turn for southbound movements into A Hanson Dr
- Construct a channelized left turn for northbound movements into Resilient Way
- Construct a new median opening for southbound U-turn movements towards the Valero Gas Station

3.1 Preferred Alternative Concept Revision

A significant design focus of Phase 3 was evaluating the preferred location for southbound US 19 U-turn movements. At the conclusion of Phase 2, back-to-back RCUTs were proposed at the approximate location of the existing median opening northwest of William Morgan Lane. During an April 2026 field meeting, VDOT and VHB staff concluded that the vertical profile of US 19 limits the southbound U-turn sight distance of approaching northbound traffic. An additional challenge at this location is access to William Morgan Lane, on which there is a wedding venue, as well as continued use of the old weigh station by Virginia State Police to conduct inspections. The stakeholder group evaluated multiple alternative design concepts, which are documented in SWG Meetings #7 (April 16th, 2026)⁶, #8 (May 21st, 2026)⁷, and #9 (June 18th, 2026)⁸ – all of which were hosted on Mural, an online engagement and collaboration platform.

During SWG #8, VHB presented a revised concept that reversed the back-to-back RCUTs, placing the southbound U-turn south of the northbound U-turn. This placement mitigated the vertical profile induced limited sight distance for the southbound U-turn; however, it introduced rock cut to construct the southbound U-turn and it introduced risk of impacting a residential septic system and undercutting house foundation to construct the northbound U-turn. This sketch is shown in **Figure 32**. Other preferred alternative concept revisions captured in SWG #8 included modified traffic signal equipment design at the US 19 / ALT US 58 intersection, proposed BMP stormwater facilities, and conversion of the grass median north of ALT US 58 to a single slope median with closed drainage system.

⁶ <https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1778010303337/7a4e161ecb3f3c763a00404d8192072c8048bc86?sender=ua9245a962773594bd35a3085>

⁷ <https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1778010303337/7a4e161ecb3f3c763a00404d8192072c8048bc86>

⁸ <https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1781700989672/af33a78eac80db32cbcea8c1245c5d2d5c37bb60?sender=ua9245a962773594bd35a3085>



- Less travel distance for southbound U-turn movement
- Avoids rock cut and site access / inspection area issues near William Morgan Lane
- Removes northbound U-turn improvement, which is unrelated to US 19 / Alt US 58 intersection improvements
- VDOT met with property owner impacted by proposed U-turn loop, who is amenable to project



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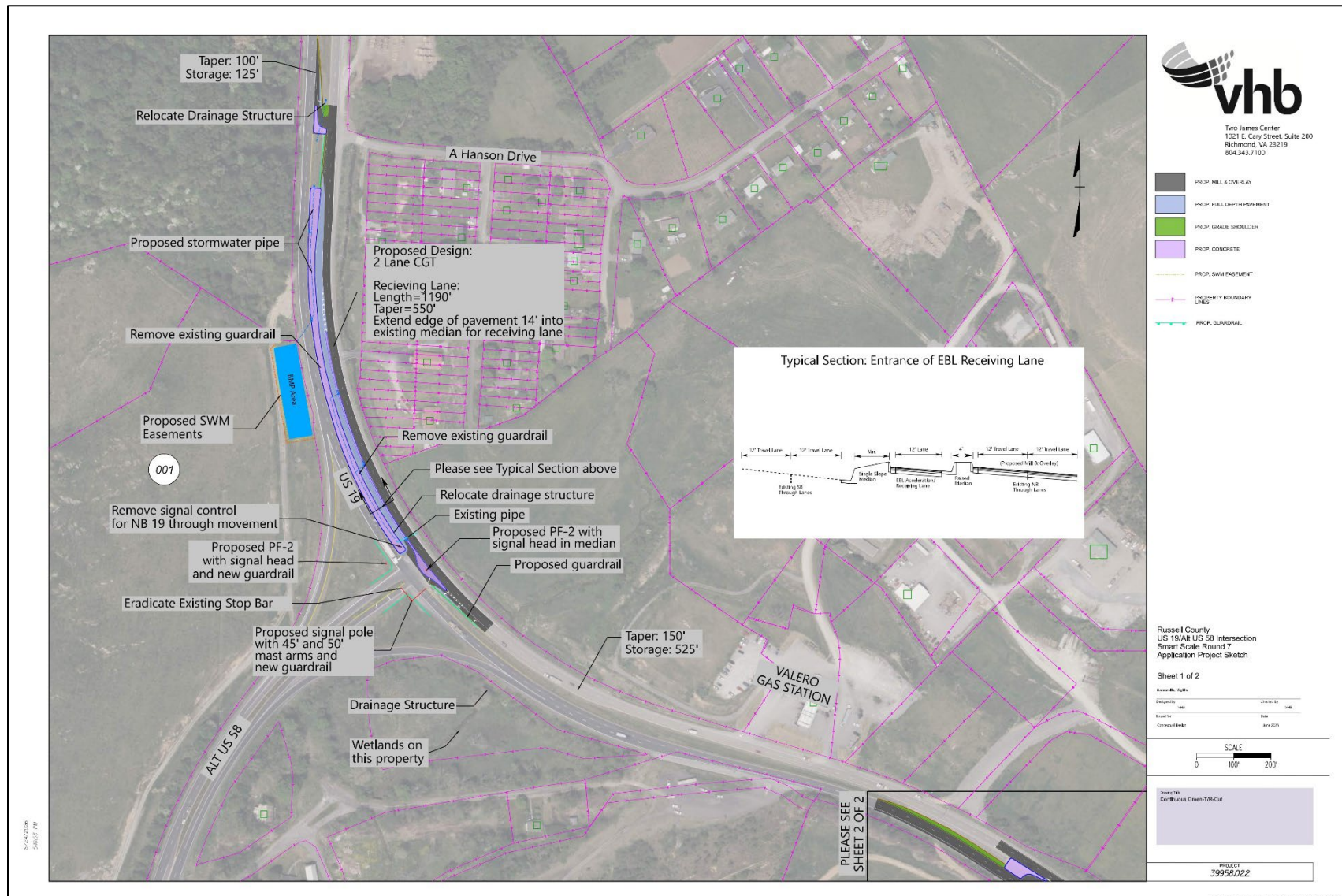


Figure 33: Smart Scale Sketch —Two-Lane Continuous Green-T (Sheet 1)

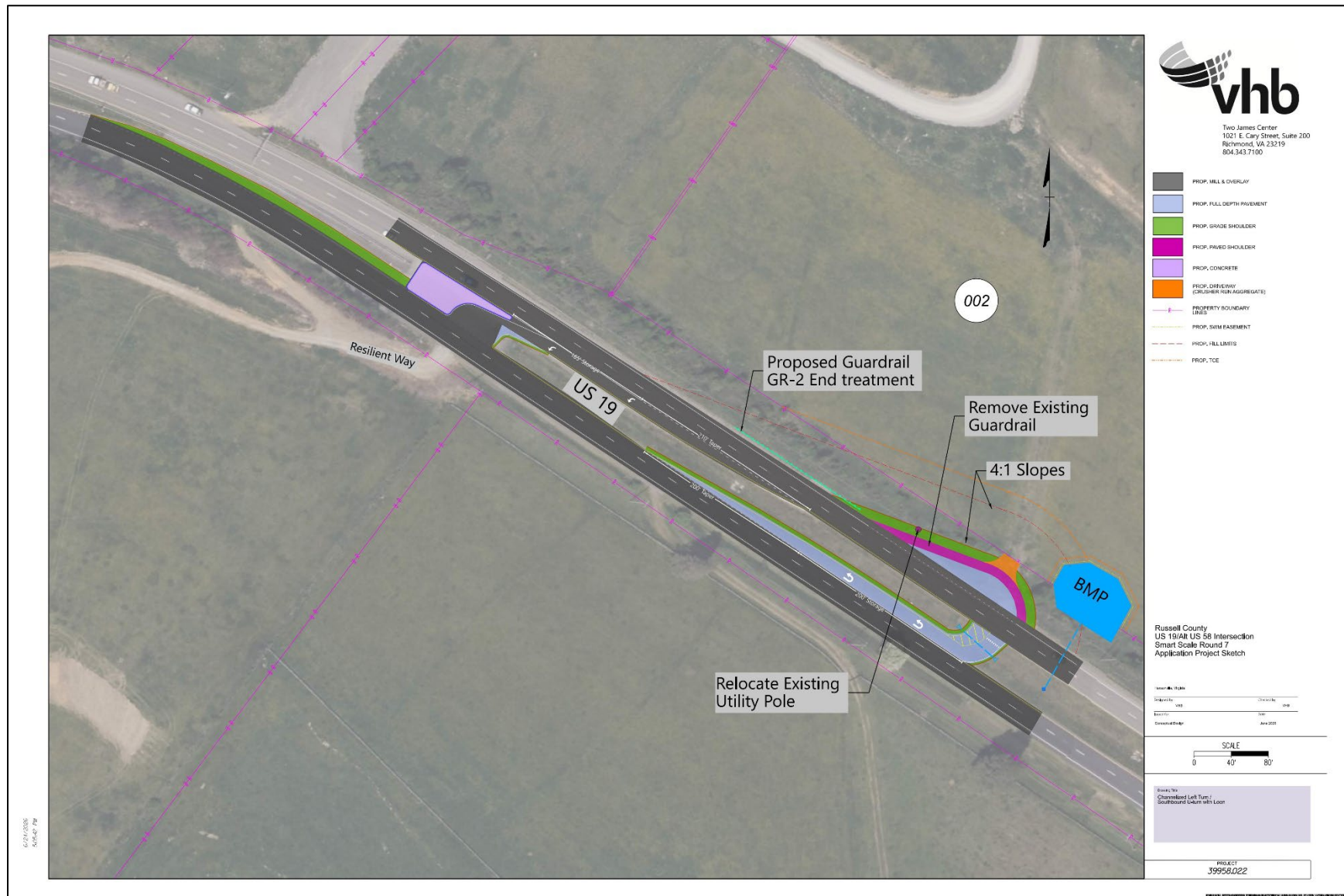


Figure 34: Smart Scale Sketch —Two-Lane Continuous Green-T (Sheet 2)

3.2 Preferred Alternative Safety and Operational Analysis

Converting a signal to a Continuous Green-T intersection is listed in the SMART SCALE Round 7 Planning Level CMF List as 0.85. This value indicates that there is an expected 15% reduction in crashes with this alternative, primarily due to conversion of the northbound through movement to free-flow conditions – thus eliminating rear end crash risk. The Annual Crash Reduction with the applied associated CMF is 0.95 crashes per year. **Table 17** displays the CMF and the crash reduction for the alternative. The crash analysis (**Section 1.5.2**) revealed two key conflict patterns: conflicts caused by vehicles exiting the eastbound ALT US 58 channelized right turn and attempting to enter the southbound U-turn lane to access the Valero gas station, and rear-end conflicts attributed to traffic stopping for the signalized northbound US 19 approach.

Once the preferred alternative was selected, the study team conducted VISSIM analysis to include the refined geometry of the preferred alternative and quantify the anticipated future traffic operations. Traffic signal cycle lengths were assumed to be consistent with No-Build conditions, while splits and offsets were optimized. Build conditions analyses were conducted for the AM and PM peak periods. **Table 28** summarizes the delay and VISSIM maximum queue lengths measures of effectiveness and compares the Build conditions results against the No-Build conditions results.

In the AM and PM peak hours, the overall delay at the intersection of US 19 and Alt US 58 was slightly improved to No-Build conditions with removal of delay for the northbound through movement and reallocation of signal capacity. Queue results showed significant improvements in Build conditions compared to No-Build conditions. The majority decrease in queue resulted from the conversion of the northbound through movement to be independent of the signal. The preferred alternative safety and traffic operational results were presented at SWG Meeting #8, held on May 21st, 2026. **Appendix D** includes the full VISSIM results from the analysis and meeting materials.

Sensitivity Analysis

There are currently no future nearby projects that impact the traffic analysis of the Build conditions of converting the US 19 / Alt US 58 intersection to a Continuous Green-T.

Table 28: Traffic Operations Analysis for US 19 / ALT US 58—Continuous Green-T

Scenario	Approach	Lane Group	Movement Delay (sec)		Approach Delay (sec)		Average Queue (ft)		Maximum Queue (ft)	
			AM	PM	AM	PM	AM	PM	AM	PM
No-Build (2050)	EB ALT US 58	Left	28.7	32.6	8.5	10.7	23	22	186	165
		CRT	0.8	0.6			0	0	0	0
	NB US 19 / ALT US 58	U-Turn	25.3	27.5	10.9	12.9	27	59	169	289
		Left	26.2	24.6			27	59	169	289
		Thru	5.2	6.6			27	59	169	289
	SB US 19	Thru	16.3	22.5	14.2	17.7	30	35	216	194
		CRT	0.5	0.5			0	0	0	0
	Intersection		-		11.6	13.9	-		-	
Continuous Green-T (2050)	EB ALT US 58	Left	24.6	30.1	7.7	10.4	20	20	162	158
		CRT	0.7	0.6			0	0	0	0
	NB US 19 / ALT US 58	U-Turn	9.2	20.1	6.3	8.8	4	28	132	319
		Left	23.1	23.5			21	56	185	373
		Thru	0.5	1.0			0	0	0	0
	SB US 19	Thru	16.0	21.7	14.0	17.2	29	33	195	197
		CRT	0.5	0.5			0	0	0	0
	Intersection		-		9.7	11.4	-		-	

3.3 Conceptual Sketch and Cost Estimates

Appendix L includes the Basis of Design Memo detailing the established project design criteria, field review notes, risk assessment, and assumptions made during the design effort. **Figure 33** and **Figure 34** present the preferred alternative planning level sketch.

An engineer's preliminary opinion of probable cost was created for construction costs, right of way acquisition costs, and utility relocation costs for the preferred alternative. These cost opinions established the project budget, in FY2026 dollars, as shown in **Table 29**. Detailed cost estimates are included in **Appendix L**.

Table 29: BR-25-02 Preferred Alternative Improvements

Phase Description	Budget (FY 2026)
Preliminary Engineering	\$ 2,434,288
Right of Way and Utility Relocation	\$ 460,567
Construction	\$11,087,099
Total Project Budget	\$13,981,954

3.4 Schedule Estimates

VDOT staff developed a schedule estimate for the preferred alternative. **Table 30** summarizes the projected timeframes for the preliminary engineering (PE), right of way (RW), and construction (CN) phases.

Table 30: Schedule Estimate

Estimated Schedule by Phase	PE	RW	CN	Total
Preferred Concept (all inclusive, months)	19	10	16	45

3.5 Project Risks

All projects have risks; however, some projects may have more significant risks than others due to technical complexity, funding, financing, and stakeholder acceptance. Risk management generally involves the process of anticipating what risks a project may face, mitigating them to the extent reasonably possible, and having a plan to react to them if and when they occur. This is recognized in VDOT guidance regarding the analysis of and mitigation of risks.

A project risk meeting (SWG Meeting #7) was held on April 16th, 2026. The SWG agreed to change the location of the southbound U-turn lane. The SWG also agreed to removing the proposed northbound U-turn lane and add geometry in the median in front of Resilient Way to only allow northbound left-turns. A final concept, cost, and risk meeting (SWG Meeting #9) was held on June 18th, 2026, to review the final preferred alternative.

The following lists the most notable potential issues that may affect project development, risks faced by the project, and risk mitigation strategies to be applied to manage and minimize risks throughout project

development. **Appendix L** includes the materials from both meetings, risk analysis matrix with details on the risk assessment, and mitigation strategy.

Risk/Issue: Roadway Design

Potential need for median barrier was addressed by incorporating a single slope median barrier into the base design and estimate. The southbound U-turn was located to avoid significant right of way impacts.

Risk/Issue: Right of Way

Two parcels will be impacted along US 19 for stormwater management easements. The refined alternative show two areas where a BMP is implemented adjacent to the corridor. The total area may be larger than anticipated, which increases the ROW impact.

Risk/Issue: Environmental

Based on the desktop environmental review, the following areas may require additional studies or data analysis: (1) The study area is located within North Fork Moccasin Creek and will require a mussel survey for the state-endangered slippershell mussel and federally-endangered pearly mussel if there is instream work; however, there is no construction anticipated based on the proposed improvements; (2) archaeological resources are potentially present within the project area which may warrant surveys; and (3) a noise analysis may be required due to the addition of a receiving lane.

Risk/Issue: Utilities

There is a lack of underground utility investigation for the study area which could affect the proposed design, especially the placement of junction boxes for the new traffic signal poles.

Risk/Issue: Geotechnical

Areas of unsuitable material have been assumed and are undefined without a geotechnical report.

Risk/Issue: Drainage

Closed drainage system is incorporated into the base design and estimate. The Holston watershed currently has a low available amount of nutrient credits, which will likely require onsite mitigation for quality mitigation.

Risk/Issue: Construction

A tree clearing Time-of-Year Restriction (TOYR) will be required from April 1 – Nov 15 to protect bat habitat. If culverts are impacted, a bat inventory may be required depending on the size of the culvert. If evidence of migratory bird nests or bats are found in the culvert a second TOYR may be required depending on what species of bat/bird is found. Any impacts to jurisdictional waters will require instream TOYR of April 15 – July 31 and August 15 – September 30 of any year for North Fork Moccasin Creek.

Risk/Issue: Additional Issues

As the build year and/or time of construction can be delayed, inflation will cause cost of materials and labor to increase.

3.6 Possible Funding Sources

Russell County elected to submit the preferred alternative for SMART SCALE funding, which includes converting the intersection of US 19 and Alt US 58 to a Continuous Green-T, modifying median openings in front of Resilient Way and A Hanson Drive to only allow a northbound and southbound left-turn movement, respectively, and constructing a new median opening south of Resilient Way to accommodate southbound U-turn movements.