



PROJECT PIPELINE

Route 67 at Route 460 Exit 2 Ramps, Front Street & 2nd Street

Town of Richlands, VA
BR-25-03

PHASE 3 REPORT
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Prepared for



Prepared by



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Chapter 1: Needs Evaluation and Alternatives Development

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 BR-25-03 Route 67 at Route 460 Exit 2 Ramps, Front Street and 2nd Street, focuses on concepts targeting identified needs including congestion mitigation, safety improvements, and transportation demand management (TDM) access. The four key steps within the Project Pipeline performance-based planning and programming process are shown in Figure 1.

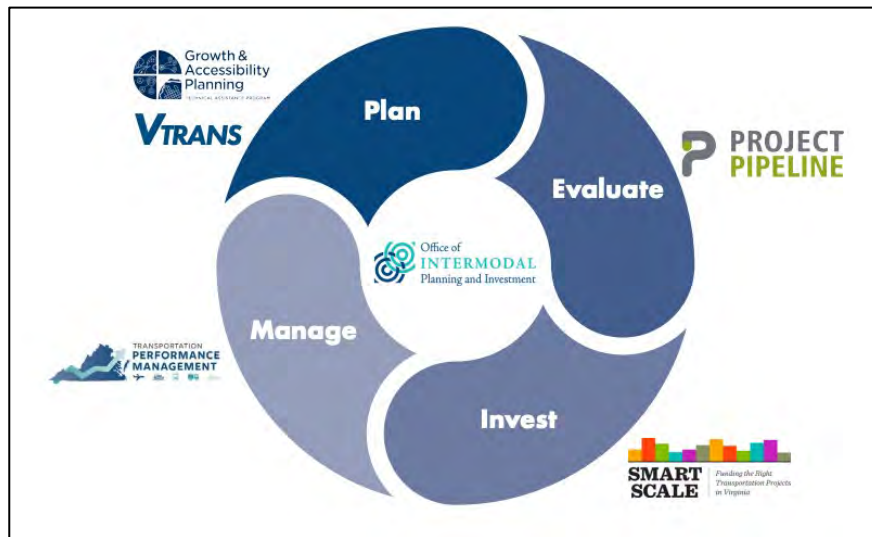


Figure 1: Project Pipeline Key Steps

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.

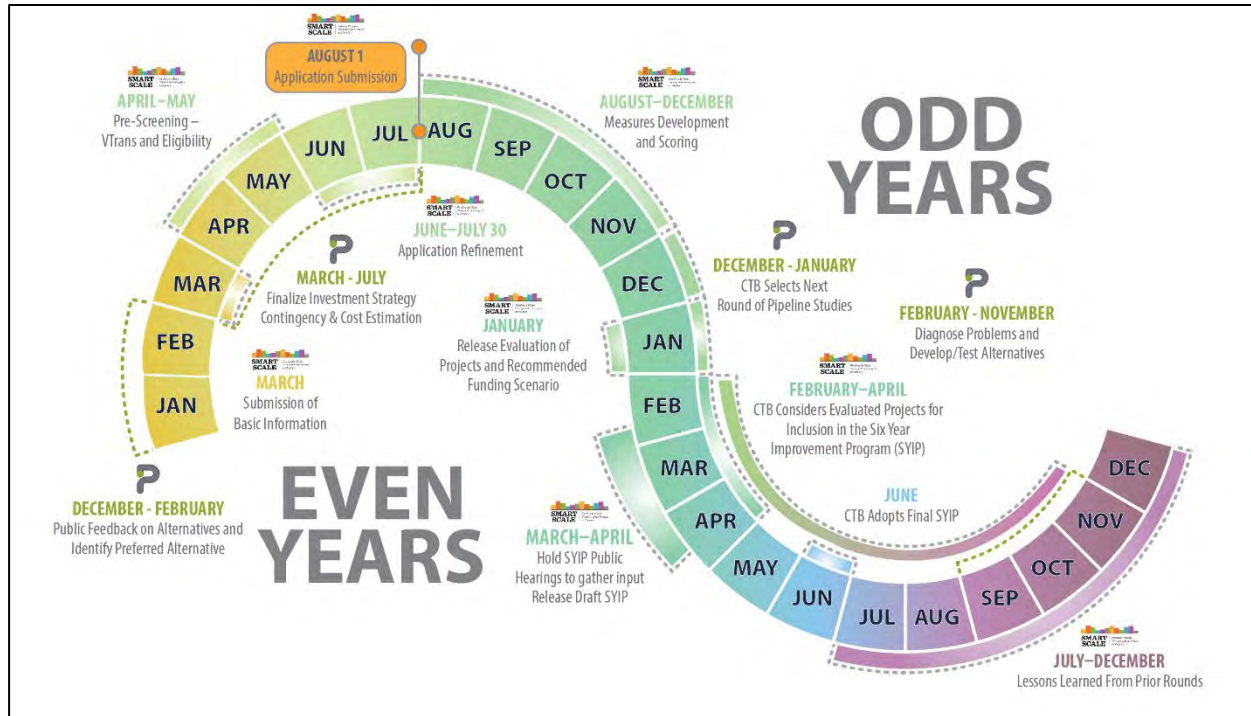


Figure 2: Study Phase Methods and Solutions

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.

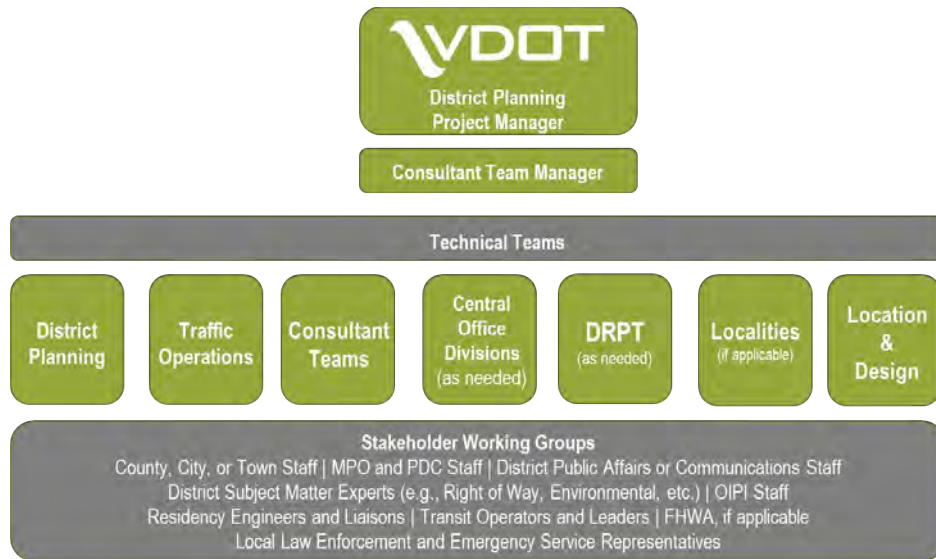


Figure 3: Structure of a Technical Team

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:

- Town of Richlands
- Cumberland Plateau Planning District Commission (CPPDC)
- Virginia Department of Transportation (VDOT)
- Office of Intermodal Planning and Investment (OIPI)
- Department of Rail and Public Transportation (DRPT)
- VHB

US 460 (The Governor George C Peery Highway) is classified as a Principal Arterial with a 55-mph posted speed limit. US 460 is a major east-west route in Virginia, extending from Kentucky to the Atlantic Ocean. The study area includes the US 460 Exit 2 Interchange with SR 67 – Railroad Avenue south of US 460 and Big Creek Road north of US 460. Railroad Avenue is a two-lane, undivided roadway; however, at the interchange, it expands to a four-lane, partially divided roadway. It is classified as an Urban Minor Arterial with a 25-mph posted speed limit. Big Creek Road is a two-lane, undivided roadway classified as a Major Collector with a 25-mph posted speed limit. US 460 is part of the Heartland Corridor on the Corridors of Statewide Significance (CoSS).

The second portion of the study area in the Town of Richlands includes Front Street from Kents Ridge Road / Veterans Drive to 2nd Street, 2nd Street from Kents Ridge Road / Veterans Drive to Front Street, and the interconnecting side streets such as Allegheny Street, Railroad Avenue, Norfolk Street, Suffolk Avenue, and Scott Street. Front Street and 2nd Street form a pair of one-way streets through downtown Richlands and together comprise US BUS 460. Front Street has two eastbound lanes with on-street parking and is classified as an Urban Minor Arterial with a 25-mph posted speed limit. 2nd Street has two

westbound lanes with on-street parking and is classified as an Urban Minor Arterial with a 25-mph posted speed limit. The study area includes fifteen at-grade intersections, comprising three signalized intersections and twelve unsignalized intersections. The fifteen study intersections are shown in Table 1, Table 2, Figure 4, and Figure 5.

Table 1: Study Intersections for US 460 Interchange

#	Intersection Name	Control Type
1	Big Creek Road at Kentucky Avenue	Unsignalized
2	Big Creek Road at WB US 460 Ramp	Unsignalized
3	Railroad Avenue at EB US 460 Ramp	Unsignalized

Table 2: Study Intersections for Front Street and 2nd Street

#	Intersection Name	Control Type
1	2nd Street at Veterans Drive	Signalized
2	2nd Street at Allegheny Street	Unsignalized
3	2nd Street at Railroad Avenue	Signalized
4	2nd Street at Norfolk Street	Unsignalized
5	2nd Street at Suffolk Avenue	Signalized
6	2nd Street at Scott Street	Unsignalized
7	Front Street at Allegheny Street	Unsignalized
8	Front Street at Iron Street/Railroad Avenue	Unsignalized
9	Front Street at Norfolk Street	Unsignalized
10	Front Street at Suffolk Avenue	Unsignalized
11	Front Street at Scott Street	Unsignalized
12	Front Street at 2nd Street	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. A kickoff meeting with the SWG was held on April 14, 2025, to provide an overview of the study and obtain feedback on the study's assumptions. The signed framework document and kickoff meeting materials are in Appendix A.



Figure 4: US 460 Interchange Study Area



Figure 5: Front Street/2nd Street 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 3 and Table 4 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 3: VTrans Needs Identified in the US 460 Interchange Study Area

VTrans 2023 Mid-Term Need	Priority
 Congestion Mitigation	Low
 Road Safety Improvement	Medium

Table 4: VTrans Needs Identified in the Front Street/2nd Street Study Area

VTrans 2023 Mid-Term Need	Priority
 Road Safety Improvement	Low
 Transportation Demand Management (TDM)	Low
 Congestion Mitigation	Low

Route 67 at Route 460 Exit 2 Ramps and Front Street/2nd Street areas were 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 an assessment of five-year crash data to identify trends and hot spots
- Assessed existing transit service and multimodal infrastructure

1.5 High-Level Needs Evaluation

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, speed data, and census-based demographics 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 along 2nd Street has a low Congestion Mitigation VTrans need as displayed in Figure 6. This determination was 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. TTI and average speed data were obtained from a VDOT dashboard.



Figure 6: High-Level Congestion Mitigation Needs Summary

The greatest impact to TTI occurs along Front Street and 2nd Street during the PM peak hour of 3:00 PM to 4:00 PM, as shown in Figure 7, when the TTI is equal to 1.21 on eastbound Front Street. The average recorded speeds are also lower during the PM peak hour, which indicates possible congestion.

Railroad Avenue experiences a TTI peak of 1.19 around 5:00 AM, as shown in Figure 8. The TTI does not exceed the minor congestion threshold. A noticeable dip in average speeds to approximately 20 MPH is also recorded during this same time frame.

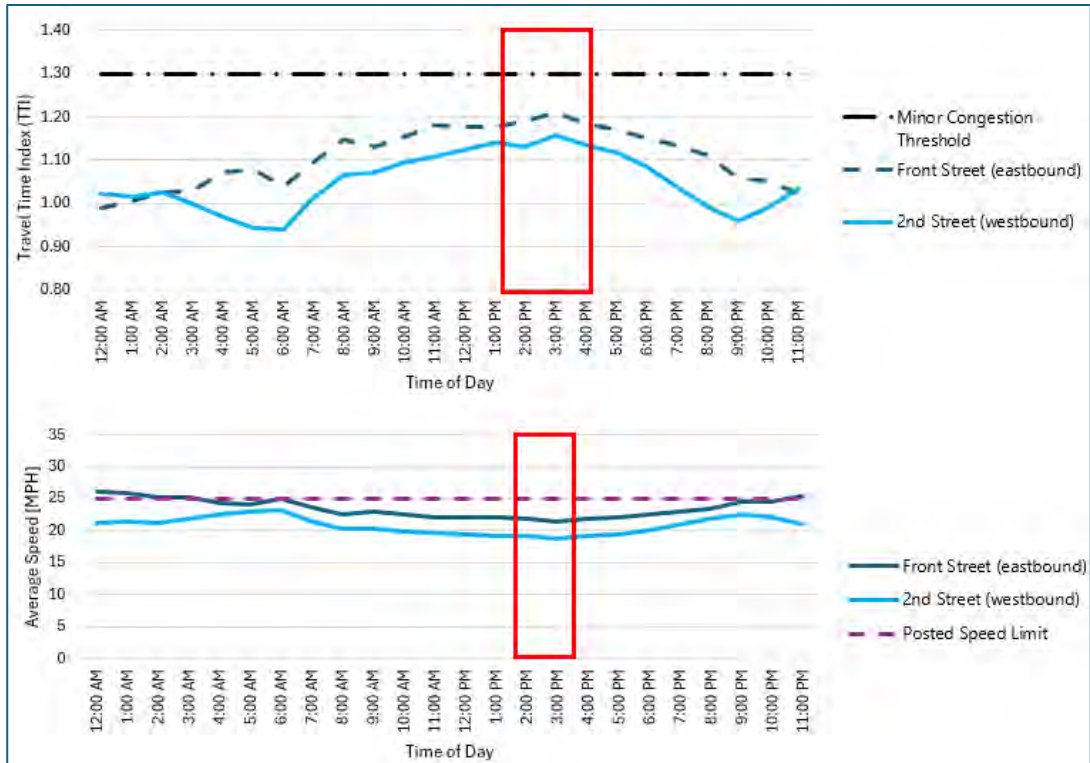


Figure 7: High-Level Operations Needs Summary Front Street/2nd Street Study Area



Figure 8: High-Level Operations Needs Summary US 460 Interchange Study Area

1.5.2. Safety and Reliability Needs

The Front Street / 2nd Street study area has a low Construction District Safety Improvement VTrans need on 2nd Street from Veterans Drive to Railroad Avenue and at the Front Street at Norfolk Street intersection. The US 460 Interchange study area has a medium Construction District Safety Improvement VTrans need at the intersection of Big Creek Road at westbound US 460 Ramp. These needs are shown in Figure 9.



Figure 9: High-Level District Safety Improvement Needs Summary

The study team reviewed the VDOT crash data from 2020 to 2024 to identify high-level crash trends in the study corridor. In total, the US 460 Interchange study area had 12 crashes reported, including four injury crashes and eight crashes involving property damage only (PDO). Most crashes in the study area were angle collisions, with six of them involving a left turn from an off-ramp to head south on Railroad Avenue, two of which resulted in visible injuries. The Front Street / 2nd Street study area had 44 crashes reported during the same period. Most crashes in the study area were fixed object and angle collisions. Most crashes were only PDO; however, one severe injury and ten visible injuries were reported.

Figure 10 and Figure 11 display heat (density) maps of all crashes for each study area during the 2020 to 2024 study period and distinguishes the collision types and severity. Big Creek Road at westbound US 460 Ramp was identified as a crash hot spot in the US 460 Interchange study area and the intersections of Front Street at Allegheny Street, 2nd Street at Suffolk Avenue, and Front Street at Norfolk Street were identified as crash hot spots for the Front Street / 2nd Street study area.



Figure 10: US 460 Interchange Crash Heat Map



Figure 11: Front Street / 2nd Street Crash Heat Map

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 intersections of US 460 at Big Creek Road / Railroad Avenue and Front Street at Norfolk Street were identified as PSI intersections within the Bristol District with rankings of 99 and 134, respectively. Front Street accounted for three PSI segments with rankings of 100, 168, and 176, while 2nd Street contained a PSI segment ranked 53 within the Bristol District. These PSI intersections and segments can be seen in Figure 12.

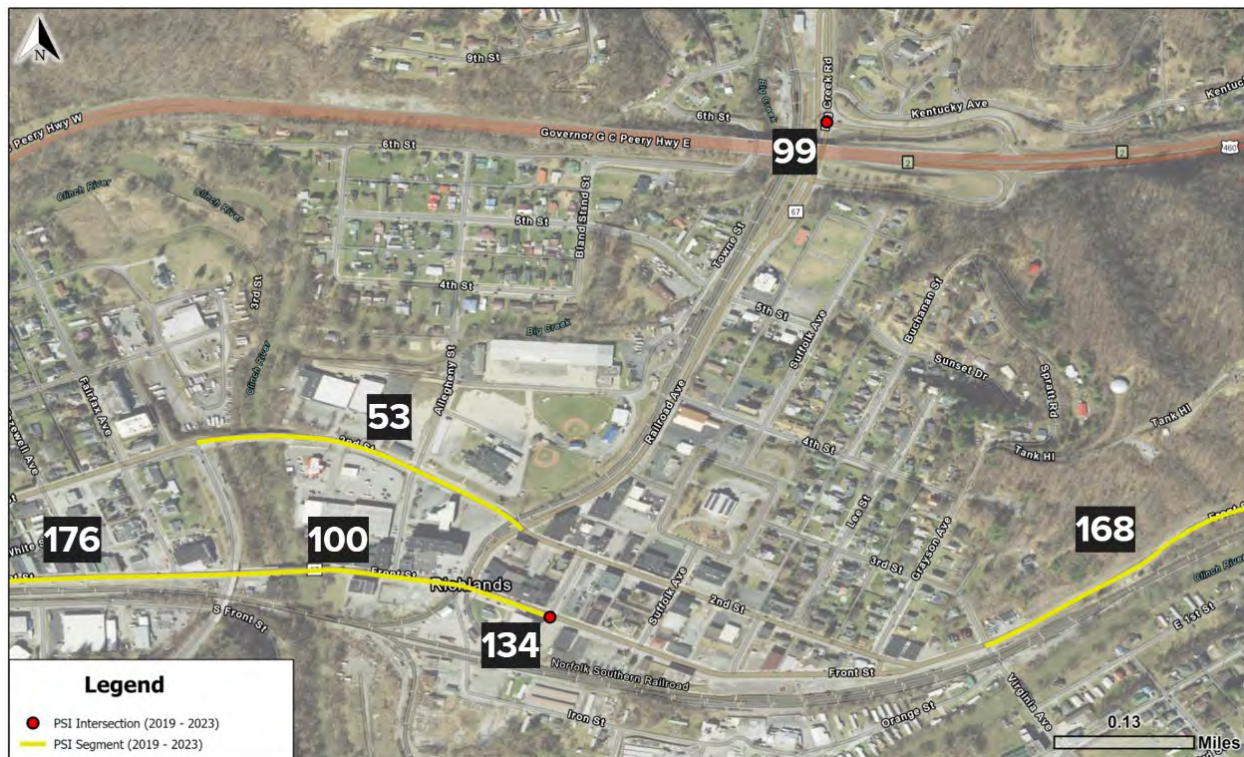


Figure 12: PSI Intersections & Segments

1.5.3. Transit and Transportation Demand Management Needs

Front Street and 2nd Street have a low Transportation Demand Management (TDM) VTrans need. The TDM VTrans need is automatically assigned to non-limited access facilities that are on the Corridors of Statewide Significance (CoSS), such as Front Street and 2nd 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 13.



Figure 13: High-Level Transportation Demand Management (TDM) Needs Summary

1.5.4. Environmental Considerations

The Virginia Department of Environmental Quality (DEQ) EJScreen+ tool 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 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 5.

Table 5: 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 and adjacent to the study area, there are low-income communities ranging from 52.03% to 61.76% under HUD, 80% AMI, and 30.34% to 89.72% 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	Archaeological surveys and coordination with Virginia Department of Historic Resources may be required in these areas: <u>US 460 Interchange</u> The study area encompassing the Route 460 interchange may include limited potential for archaeological deposits in the flood plain areas along Big Creek on the west side of the N&S railroad line. <u>Front Street/2nd Street</u> Vacant lots along Front Street and 2nd Street as well as the wooded area along the west bank of the Clinch River may have intact archaeological deposits.
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)	<u>US 460 Interchange</u> No recreation facilities were identified within the study area or in the surrounding vicinity.

Environmental Resource	Description	Source	Existing Resources in Study Area
		VDCR Virginia Outdoor Plan Mapper Aerial Imagery	<u>Front Street / 2nd Street</u> Greenway Park is in the southwest quadrant of the Front Street at Suffolk Avenue intersection. Williams Field Recreation Park is located south of the Front Street/2nd Street study area.
Community Services	Places available to the public such as hospitals, schools, and churches.	Aerial Imagery Virginia Geographic Information Network (VGIN)	<u>US 460 Interchange</u> Life Sanctuary is a church that uses Kentucky Avenue as an access point. <u>Front Street / 2nd Street</u> Tazewell County Public Library (Richlands Branch) and a United States Postal Service (USPS) office are located on Front Street. Additionally, the Richlands Railroad Section Forman's House is a public landmark located on Front Street. The First Christian Church and Richlands Presbyterian Church are located along 2nd Street and the Richlands Farmers Market is in the northeast quadrant of the 2nd Street at Allegheny Street intersection.
Bike/Pedestrian Facilities	Existing sidewalks, bike paths, and trails.	Aerial Imagery VDCR Virginia Outdoor Plan Mapper	There are no bicycle facilities identified within either study area. <u>US 460 Interchange</u> Sidewalk runs alongside northbound Railroad Avenue throughout the study area. <u>Front Street / 2nd Street</u>

Environmental Resource	Description	Source	Existing Resources in Study Area
			Sidewalks run adjacent on both sides of Front Street and 2nd Street between Allegheny Street and Scott Street. Sidewalk runs south of 2nd Street past Allegheny Street and sidewalk runs north of Front Street past Scott Street.
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	Williams Field Recreation Park is located south of the Front Street/2nd Street study area and was identified as a LWCF 6(f) Local and State Assistance site.
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	VDOT Bristol District Environmental Review Virginia Department of Historic Resources (VDHR) Virginia Cultural Resource Information System (V-CRIS) National Register of Historic Places (NRHP)	<u>US 460 Interchange</u> There were no sites identified within the study area or the surrounding vicinity. <u>Front Street / 2nd Street</u> Most of the structures on the eastern end of the study area lie within the Richlands Historic District. The Historic District is listed on both the National Register of Historic Places and the Virginia Landmarks Register. Most of the structures on the western end of the study area lie within the Tazewell Avenue Historic District. The Historic Districts are listed on both the National Register of Historic Places and the Virginia Landmarks Register. VDOT Bristol District Environmental Division recommends conducting architectural surveys and coordination with Virginia Department of Historic Resources to determine eligibility for the NHRP. This may be required for properties that have not been

Environmental Resource	Description	Source	Existing Resources in Study Area
			individually surveyed. Previously recorded properties within the Historic Districts would require updated survey forms and coordination.
Section 4(f)*	Publicly owned parks or recreation lands, wildlife, and waterfowl refuges, and privately and publicly owned historic sites protected by Section 4(f) of the U.S. Department of Transportation Act of 1966.	VDCR NHDE VDCR Virginia Outdoor Plan Mapper VDHR V-CRIS	No publicly owned parks or recreation lands, wildlife and waterfowl refuges, or privately and 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.	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> - The Indiana Bat, Northern Long Eared Bat (NLEB), Tri-Colored Bat, Virginia Big-eared Bat, Finerayed Pigtoe Clam, Oyster Mussel, and Shiny Pigtoe Clam are endangered species within both study areas. <u>VDWR Databases</u> <u>VDWR NLEB</u> - A NLEB consultation range exists within both study areas. <u>VDWR Tri-Colored Bat</u> - A Tri-Colored Bat consultation range exists within both study areas. <u>CCB</u> - No eagle nests were identified in either study area.
Floodplains	Areas considered at risk for flooding during 100-year and 500-year storms.	Federal Emergency Management Agency (FEMA) Flood Hazard Areas	Portions of both study areas and surrounding areas are in Floodway, 100-Year Floodplain, or 500-Year Floodplain areas.

Environmental Resource	Description	Source	Existing Resources in Study Area
			The intersection of 2nd Street at Allegheny Street is located within a 100-Year Floodplain.
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.	United States Geological Survey (USGS) National Hydrography Dataset (NHD) USFWS National Wetland Inventory (NWI) Virginia Department of Conservation and Recreation (VDCR)	Multiple wetlands are scattered within and around the study areas. <u>US 460 Interchange</u> Big Creek runs through and alongside the study area. <u>Front Street/2nd Street</u> Clinch River, a Section 10 Water, flows north to south through the study area east of Veterans Drive. Clean Water Act Section 404 and potentially Rivers and Harbors Act Section 10 permits would be required for any instream impacts. VDOT Bristol District Environmental Division recommends avoiding any instream impacts.
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. VDOT Bristol District Environmental Division recommends ASTM Phase I Environmental Site Assessment along the entire corridor, and that design should avoid construction, especially excavation, in the vicinity of documented hazardous materials sites.

Environmental Resource	Description	Source	Existing Resources in Study Area
Open Space, Conservations Easements, Agricultural, and Forestal 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 forestal districts are those defined as such in the zoning map.	VDCR NHDE VDCR Outdoors Plan Mapper The Virginia Outdoor Foundation The Nature Conservancy	No protected lands were identified within either study area.
Farmland	Lands with soil 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 Virginia Department of Conservation and Recreation (DCR)	Both study areas are within a census-designated urban area.
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 specific use based on local jurisdiction land use designations.	Tazewell County GIS Data	<u>US 460 Interchange</u> The study area primarily consists of residential uses with commercial use at the northern terminus of the project. <u>Front Street / 2nd Street</u>

Environmental Resource	Description	Source	Existing Resources in Study Area
			The study area primarily consists of commercial/industrial and single-family urban residential land uses.
Air Quality	Determine whether the subject project is in an air quality attainment area and whether a qualitative analysis may be required.	Environmental Protection Agency Green Book	No air quality impacts are anticipated; therefore, a qualitative analysis is not anticipated to be required.
Time of Year Restrictions	Identify if a restriction on tree clearing or instream work is restricted to certain times of the year.	VDOT Bristol District Environmental Review	A tree clearing time of year restriction 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. A Clinch Dace (state endangered) instream TOYR will likely be required from April 1 – July 31 if instream work is proposed. If instream work is required, a mussel survey must be conducted, and formal Section 7 consultation is assumed. An instream TOYR for mussels will be required from April 15 - July 31 & August 15 - Sept 30. VDOT Bristol District Environmental Division recommends avoiding any instream impacts.

**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 will be 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, analyzing traffic operations using Synchro and SimTraffic, and reviewing of pedestrian, bicycle, and transit activity. Synchro results of the existing conditions analysis and preliminary brainstorming concepts were presented to the Study Work Group on June 23, 2025. The presentation is provided for reference below.¹

Relevant Studies, Plans, and Projects

Information for the following studies, plans, and projects was collected and reviewed to identify previous or ongoing recommendations in and adjacent to the study area:

- Realignment of 2nd Street Approach at Front Street / Kent Ridge Intersection
 - Project located west of study area
 - Realign inside southbound 2nd Street lane to be perpendicular to Front Street
 - Convert southbound 2nd Street lane to a free-flow movement
 - Provide a receiving lane for free-flow southbound left turn
- Front Street bridge replacement over Clinch River
 - Project spans from Front Street at Fairfax Avenue intersection to Front Street at Allegheny Street intersection
 - Construction expected to take place from April 2025 to April 2026
 - Traffic detours utilize westbound Front Street onto US 460 to use eastbound off ramp going to Railroad Avenue

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). In total, 12 crashes were reported at the interchange study area and 44 crashes were reported in the Front Street / 2nd Street study area, including one severe injury. Summaries of crashes in both study areas by intersection and severity are shown in Table 6 and Table 8, respectively. Table 7 and Table 9 identify the collision types for the crashes experienced for each respective study area.

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

¹<https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1743798184136/7257d17a9d90327f7a99d1685b11715b65cac13f>

Table 6: Study Area US 460 Interchange Crashes by Crash Severity

Intersection	# of Crashes—K	# of Crashes—A	# of Crashes—B	# of Crashes—C	# of Crashes—PDO	Total
Big Creek Road and Kentucky Avenue	0	0	0	0	0	0
Big Creek Road and WB US 460 Ramps	0	0	2	1	5	8
Railroad Avenue and EB US 460 Ramps	0	0	0	1	2	3
Rest of Corridor	0	0	0	0	1	1
Total	0 (0%)	0 (0%)	2 (17%)	2 (17%)	8 (67%)	12

Table 7: Study Area US 460 Interchange Crashes by Crash Type

Intersection	# of Crashes – Angle	# of Crashes – Rear End	# of Crashes – Head-On	# of Crashes – Fixed Object	# of Crashes – Sideswipe	# of Crashes – Pedestrian	# of Crashes – Other	# of Crashes – Total
Big Creek Road and Kentucky Avenue	0	0	0	0	0	0	0	0
Big Creek Road and WB US 460 Ramps	6	1	0	0	1	0	0	8
Railroad Avenue and EB US 460 Ramps	3	0	0	0	0	0	0	3
Rest of Corridor	0	0	0	0	0	0	1	1
Total	9 (75%)	1 (8%)	0 (0%)	0 (0%)	1 (8%)	0 (0%)	1 (8%)	12

Table 8: Study Area Front Street and 2nd Street Crashes by Crash Severity

Intersection	# of Crashes—K	# of Crashes—A	# of Crashes—B	# of Crashes—C	# of Crashes—PDO	Total
2nd Street at Veterans Drive	0	0	0	1	2	3
2nd Street at Allegheny Street	0	0	2	0	4	6
2nd Street at Railroad Avenue	0	0	1	1	2	4
2nd Street at Norfolk Street	0	0	0	0	2	2
2nd Street at Suffolk Avenue	0	0	0	1	4	5
2nd Street at Scott Street	0	0	0	0	1	1
Front Street at Allegheny Street	0	0	3	0	5	8
Front Street at Iron Street/Railroad Avenue	0	0	0	0	0	0
Front Street at Norfolk Street	0	1	2	2	2	7
Front Street at Suffolk Avenue	0	0	0	0	1	1
Front Street at Scott Street	0	0	0	0	0	0
Front Street at 2nd Street	0	0	0	0	0	0
Rest of Corridor	0	0	2	0	5	7
Total	0(0%)	1 (2%)	10 (23%)	5 (11%)	28 (64%)	44

Table 9: Study Area Front Street and 2nd Street Crashes by Crash Type

Intersection	# of Crashes – Angle	# of Crashes – Rear End	# of Crashes – Head-On	# of Crashes – Fixed Object	# of Crashes – Sideswipe	# of Crashes – Pedestrian	# of Crashes – Other	# of Crashes – Total
2nd Street at Veterans Drive	1	1	0	0	0	0	1	3
2nd Street at Allegheny Street	3	0	0	2	0	0	1	6
2nd Street at Railroad Avenue	0	0	0	2	2	0	0	4
2nd Street at Norfolk Street	1	0	0	0	1	0	0	2
2nd Street at Suffolk Avenue	0	1	0	1	1	0	2	5
2nd Street at Scott Street	1	0	0	0	0	0	0	1
Front Street at Allegheny Street	2	0	0	5	0	0	1	8
Front Street at Iron Street/Railroad Avenue	0	0	0	0	0	0	0	0
Front Street at Norfolk Street	1	1	0	2	1	1	1	7
Front Street at Suffolk Avenue	1	0	0	0	0	0	0	1
Front Street at Scott Street	0	0	0	0	0	0	0	0
Front Street at 2nd Street	0	0	0	0	0	0	0	0
Rest of Corridor	2	1	0	2	1	0	1	7
Total	12 (27%)	4 (9%)	0 (0%)	14 (32%)	6 (14%)	1 (2%)	7 (16%)	44

The study team reviewed FR300 crash reports to create collision diagrams for all the crashes at the study intersections and adjacent roadway segments. Figures 14-20 display these collision diagrams.

Big Creek Road at westbound US 460 Ramps was identified as an intersection of concern with eight crashes occurring during the 2020 to 2024 study period. Six angle crashes (75%) were related to vehicles turning onto Big Creek Road from the westbound US 460 off-ramp. The collision diagram for Big Creek Road at westbound US 460 Ramps can be found in Figure 14.

2nd Street at Suffolk Avenue was also identified as a crash hot spot with five crashes occurring during the 2020 to 2024 study period. Four of the five recorded crashes potentially occurred due to conflicts related to reversing into and out of parking spots. The collision diagram for 2nd Street at Suffolk Avenue, and the surrounding area (with three additional crashes), can be referenced in Figure 18.

The study team identified the intersection of Front Street at Allegheny Street as a crash hot spot with eight crashes, three of which resulted in a visible injury. The collision diagram for this intersection can be referenced in Figure 19.

The Front Street at Norfolk Street intersection experienced seven crashes during the study period. One pedestrian crash occurred when a pedestrian attempted to cross Front Street. This crash resulted in a severe injury. The collision diagram for Front Street at Norfolk Street, and the surrounding area (with one additional crash), can be found in Figure 20.

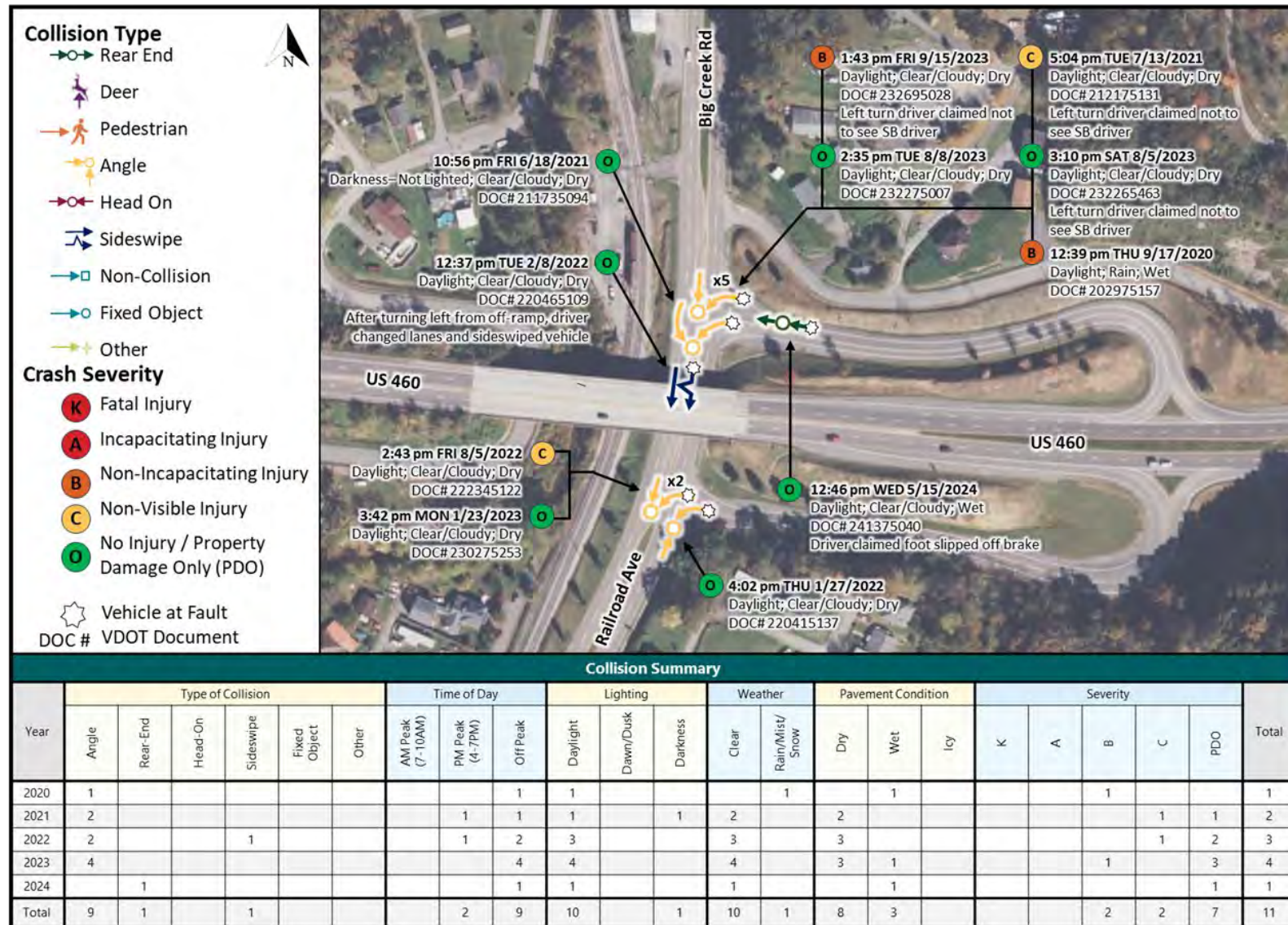


Figure 14: US 460 at Big Creek Road/Railroad Avenue Interchange Collision Diagram

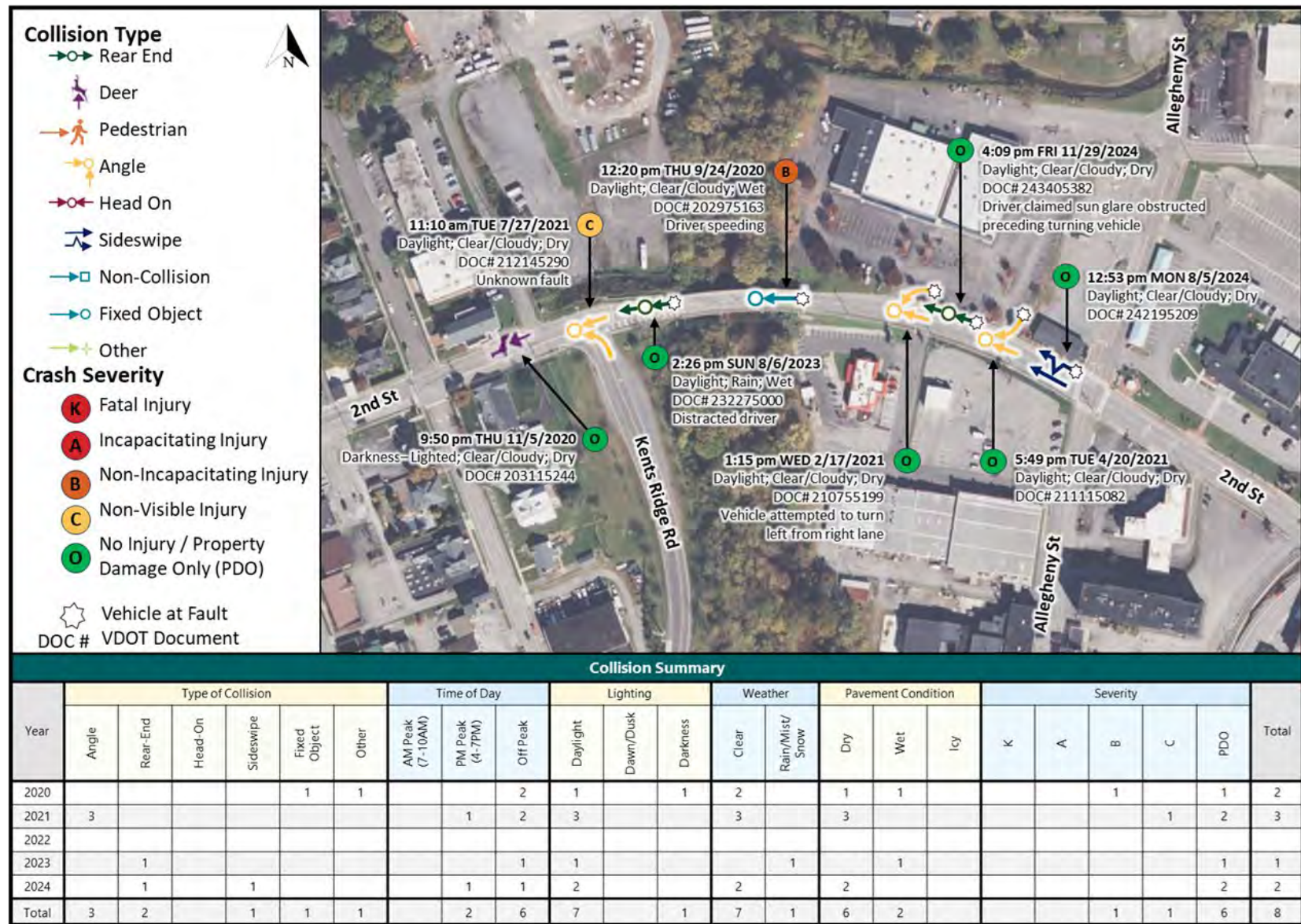


Figure 15: 2nd St between Kent Ridge Road and Allegheny Street Collision Diagram

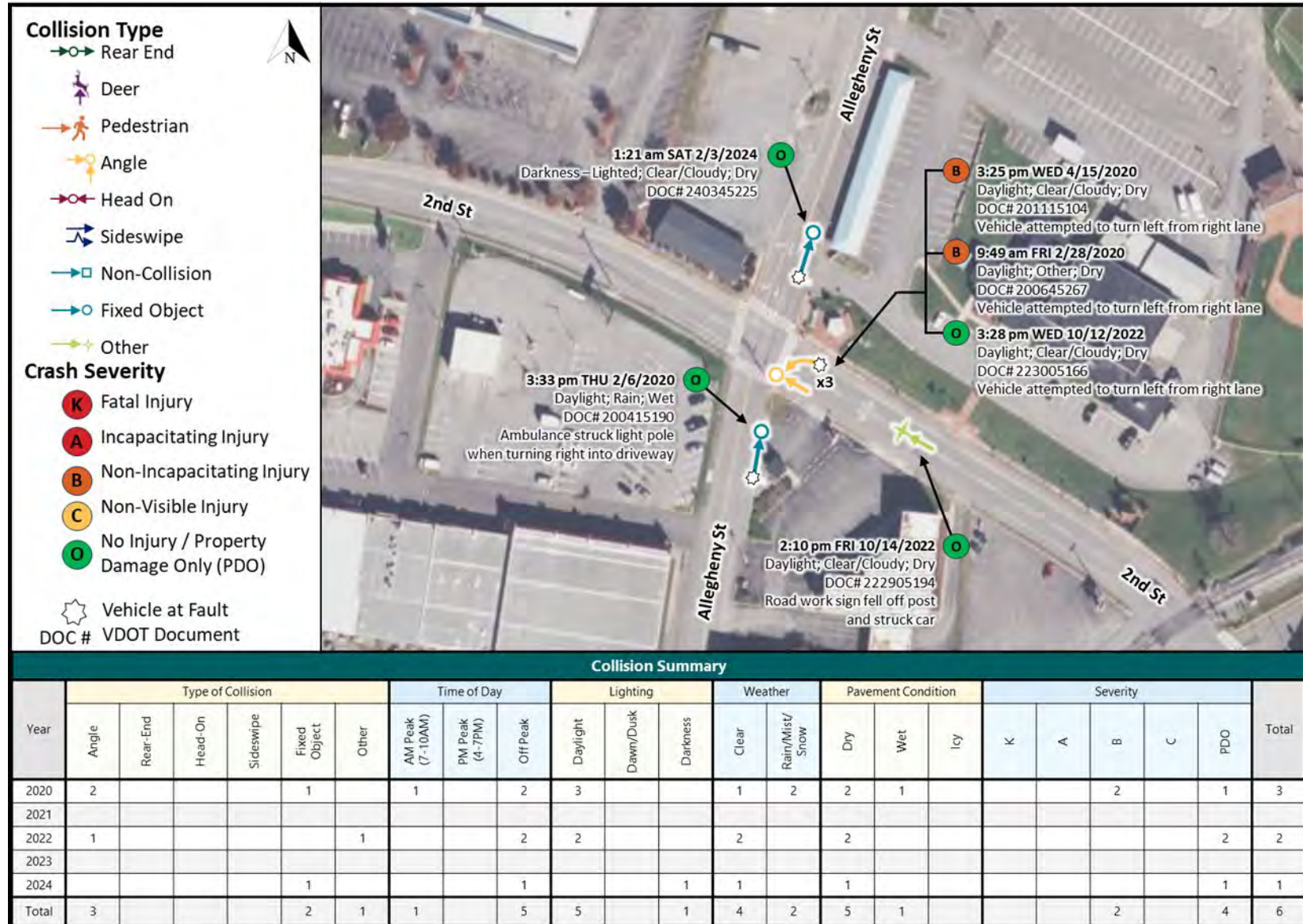


Figure 16: 2nd Street at Allegheny Street Intersection Collision Diagram

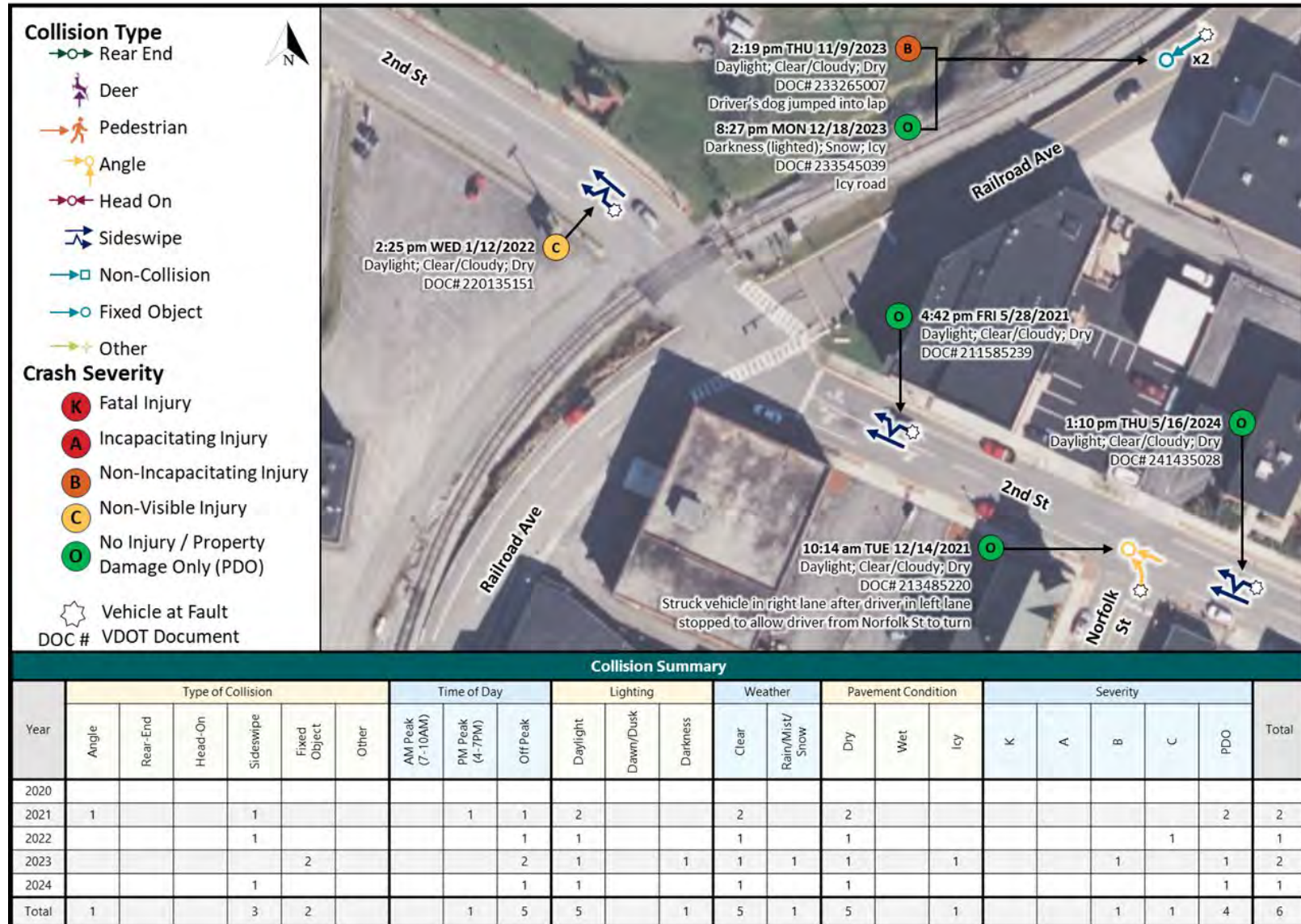


Figure 17: 2nd Street at Railroad Avenue Intersection Collision Diagram

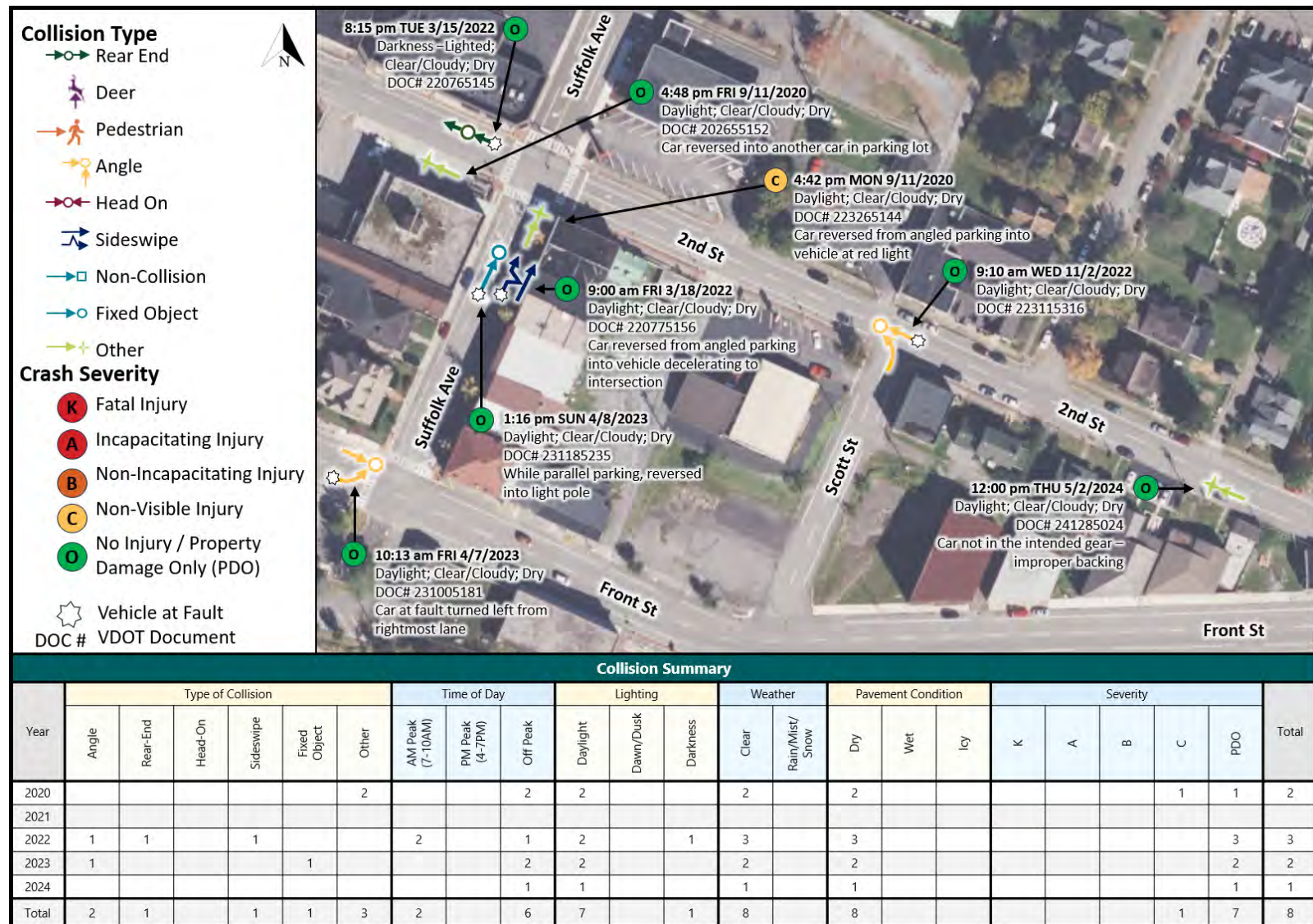


Figure 18: 2nd Street at Suffolk Avenue Intersection Collision Diagram

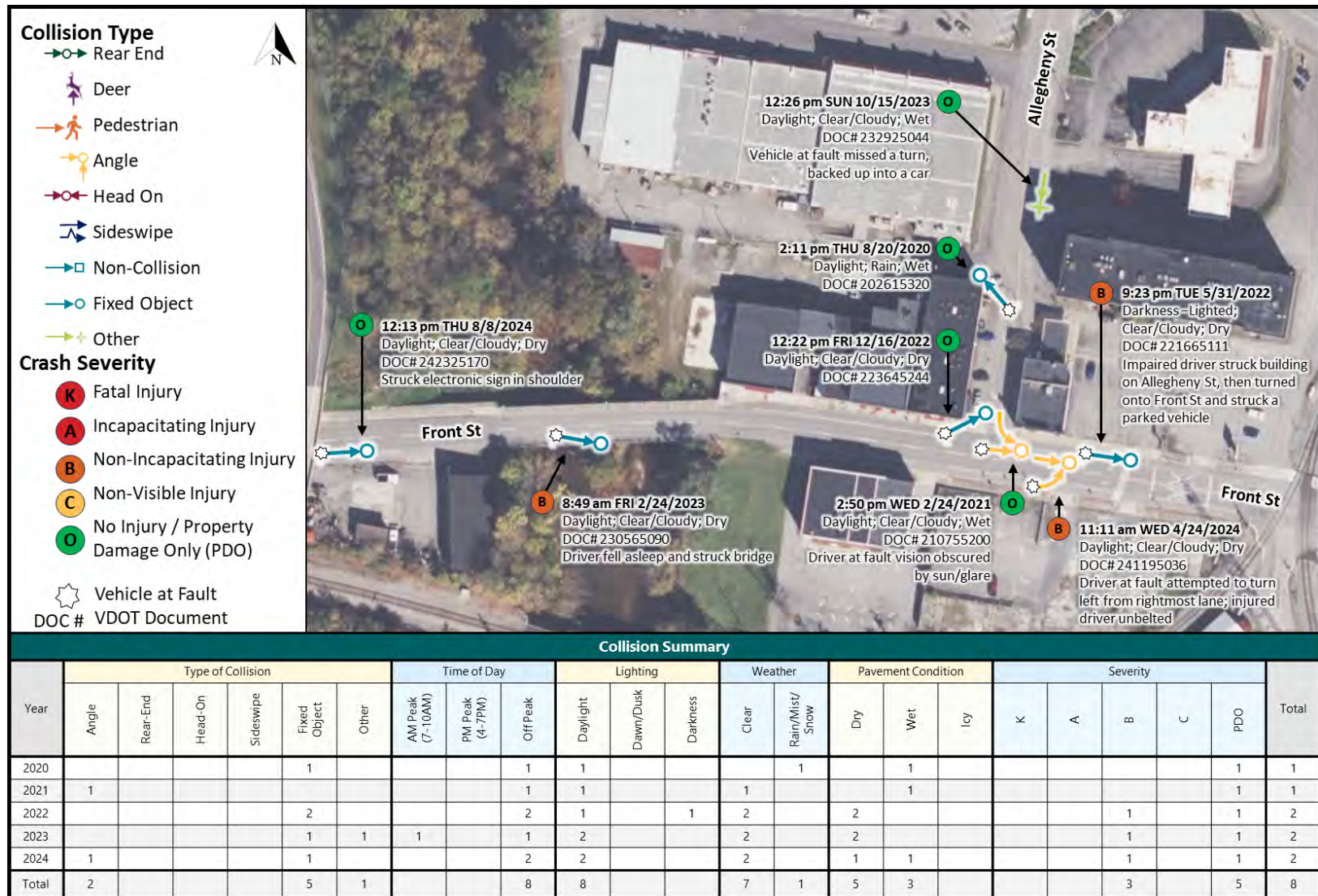


Figure 19: Front Street at Allegheny Street Intersection Collision Diagram

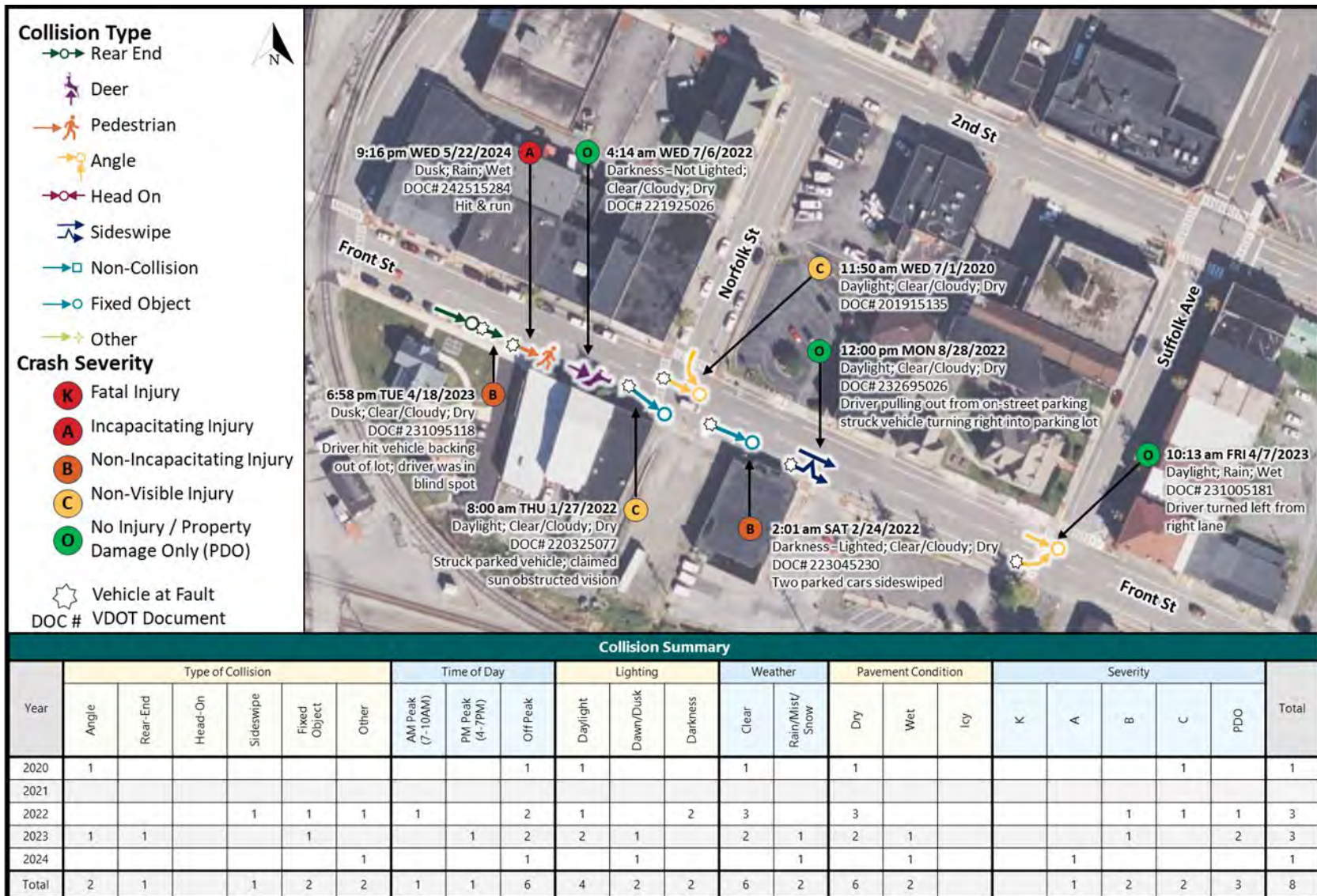


Figure 20: Front Street at Norfolk Street Intersection Collision Diagram

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 21 and Figure 22.

The following observations were made during the field review:

US 460 Interchange Study Area

- Truck tire tracks seen on the median and sidewalk within the interchange between ramp intersections
- Heavy vehicles making wide turns
- Significant sediment build-up obstructing stormwater drainage
- Degraded stormwater infrastructure and slope erosion between railroad tracks and roadway

Front Street / 2nd Street Study Area

- Faded crosswalks and pavement markings
- Missing safety railing along sidewalk on 2nd Street near Railroad Avenue
- Wide travel lanes appear to encourage speeding
- Non-MUTCD compliant signal head placement/spacing at 2nd Street / Suffolk Avenue

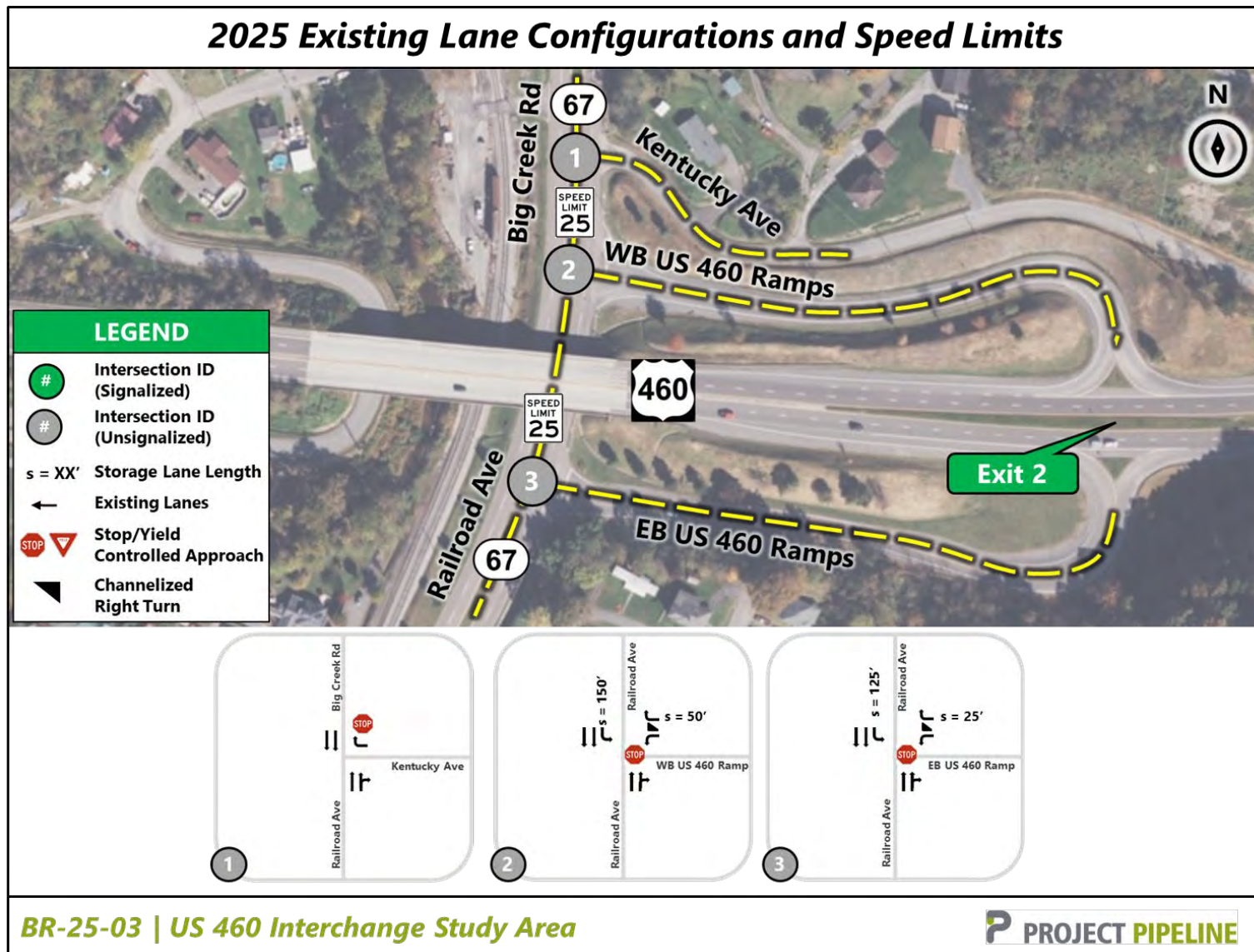


Figure 21: 2025 Existing Lane Configurations and Speed Limits US 460 Interchange

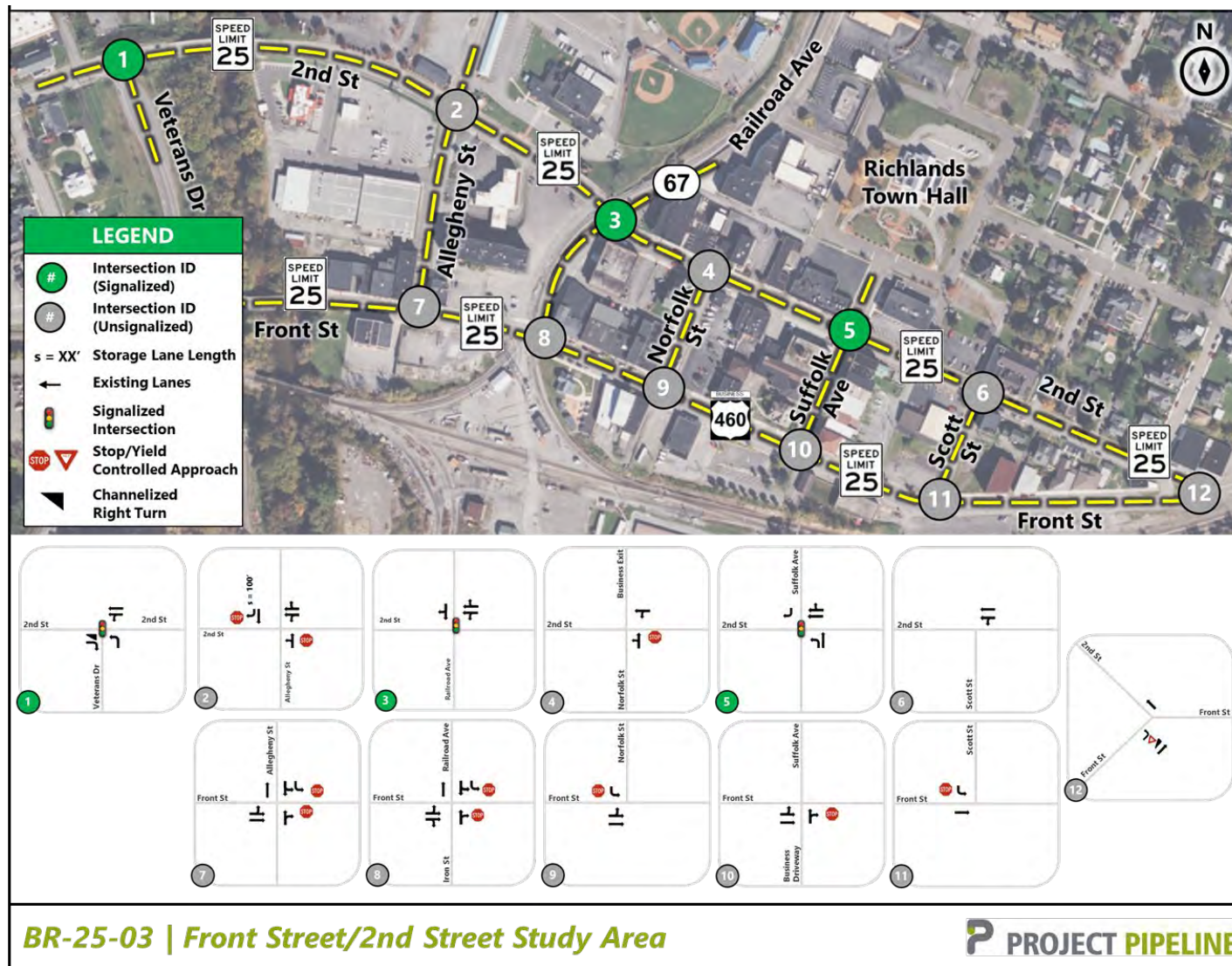


Figure 22: 2025 Existing Lane Configuration and Speed Limits Front Street / 2nd Street

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, pedestrian, and bicycle count data was collected at the 15 study intersections on Tuesday, April 8, 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. The AM peak hour was determined to be 7:30 AM to 8:30 AM for both study areas while the PM peak hour was determined to be 3:00 PM to 4:00 PM in the Front Street / 2nd Street study area and 4:15 PM to 5:15 PM in the US 460 Interchange study area. Raw traffic data can be found in Appendix C.

As traffic data was collected over the course of three days, the ADT was determined based on averaging the counts. The resulting average ADT values can be seen in Figure 23 and Figure 24, which also depict 50th and 85th percentile speeds.

Figure 25 and Figure 26 display the temporal distributions of volume per hour on roadway segments in both study areas over the course of 24 hours. All segments in both study areas experience greater volumes during the established AM and PM peak hours.

Figure 27 and Figure 28 display the turning count movements for each respective study area experienced during AM and PM peak hours.

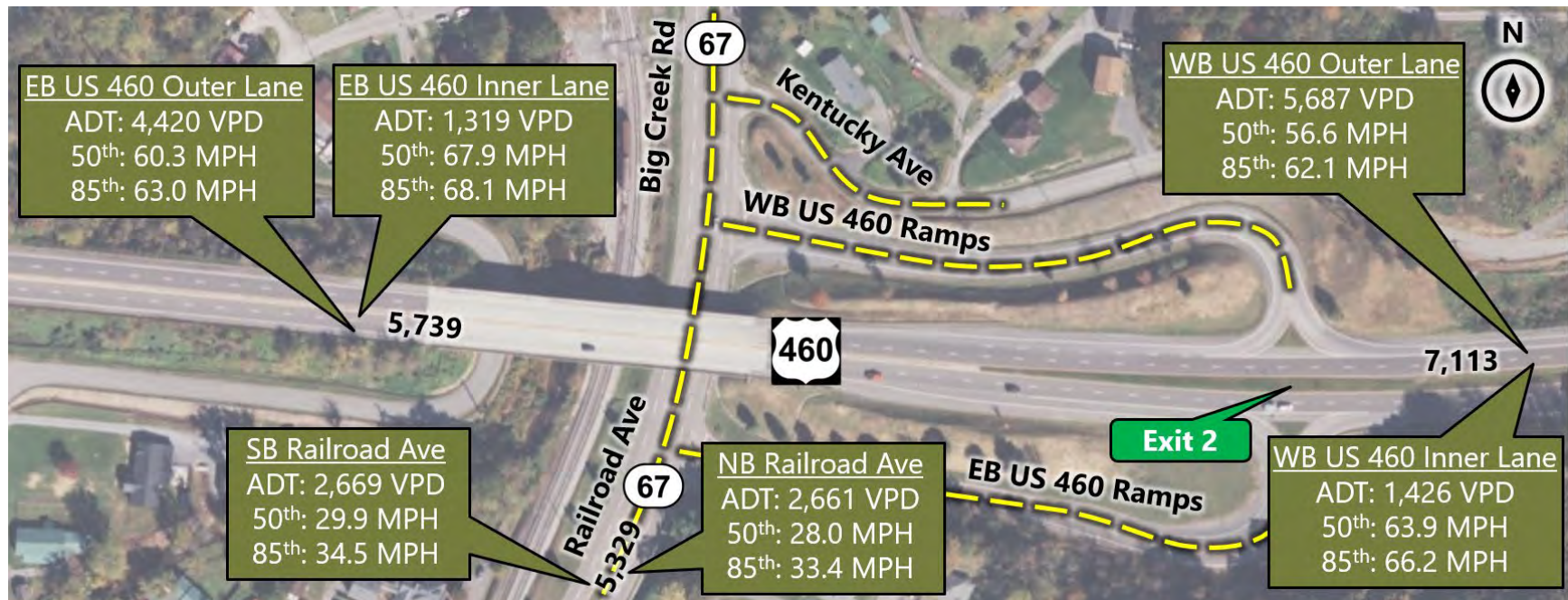


Figure 23: 2025 US 460 Interchange Existing ADT and Speed Data

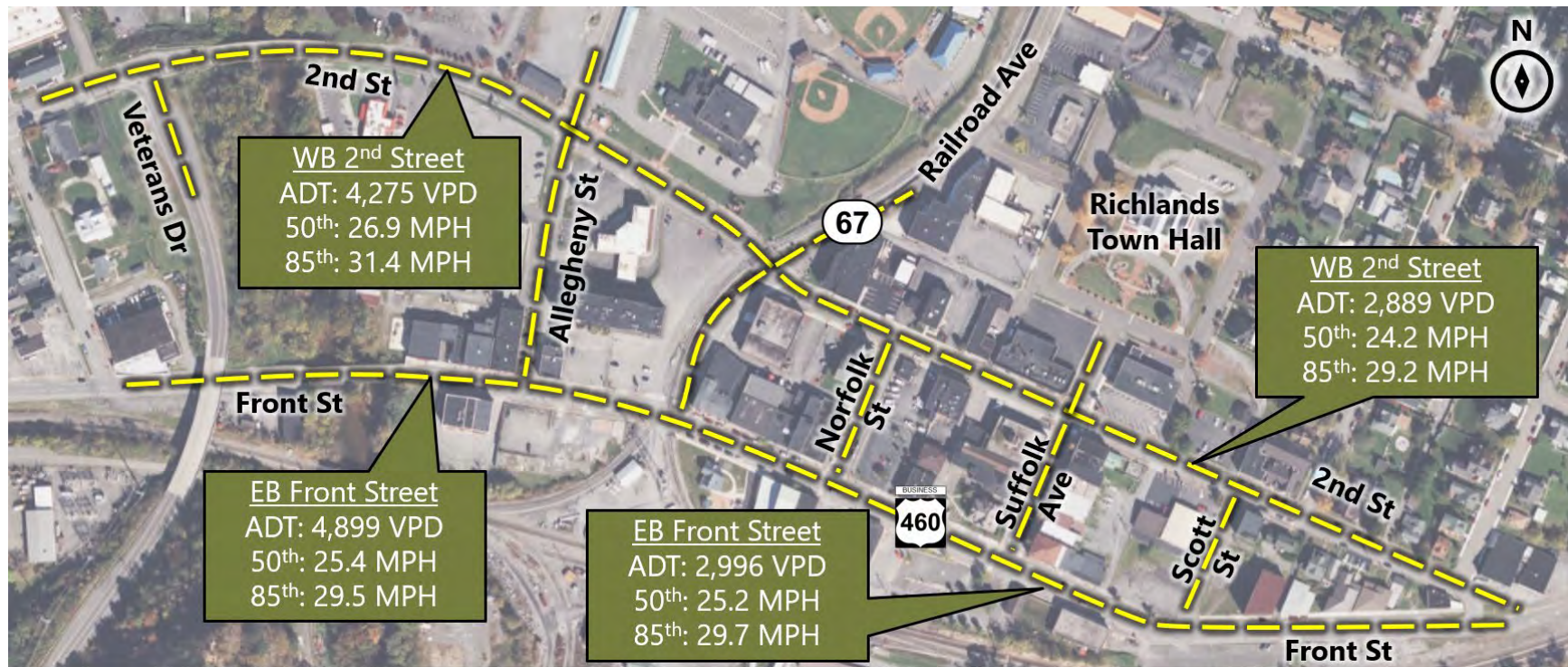


Figure 24: 2025 Front Street and 2nd Street Existing ADT and Speed Data

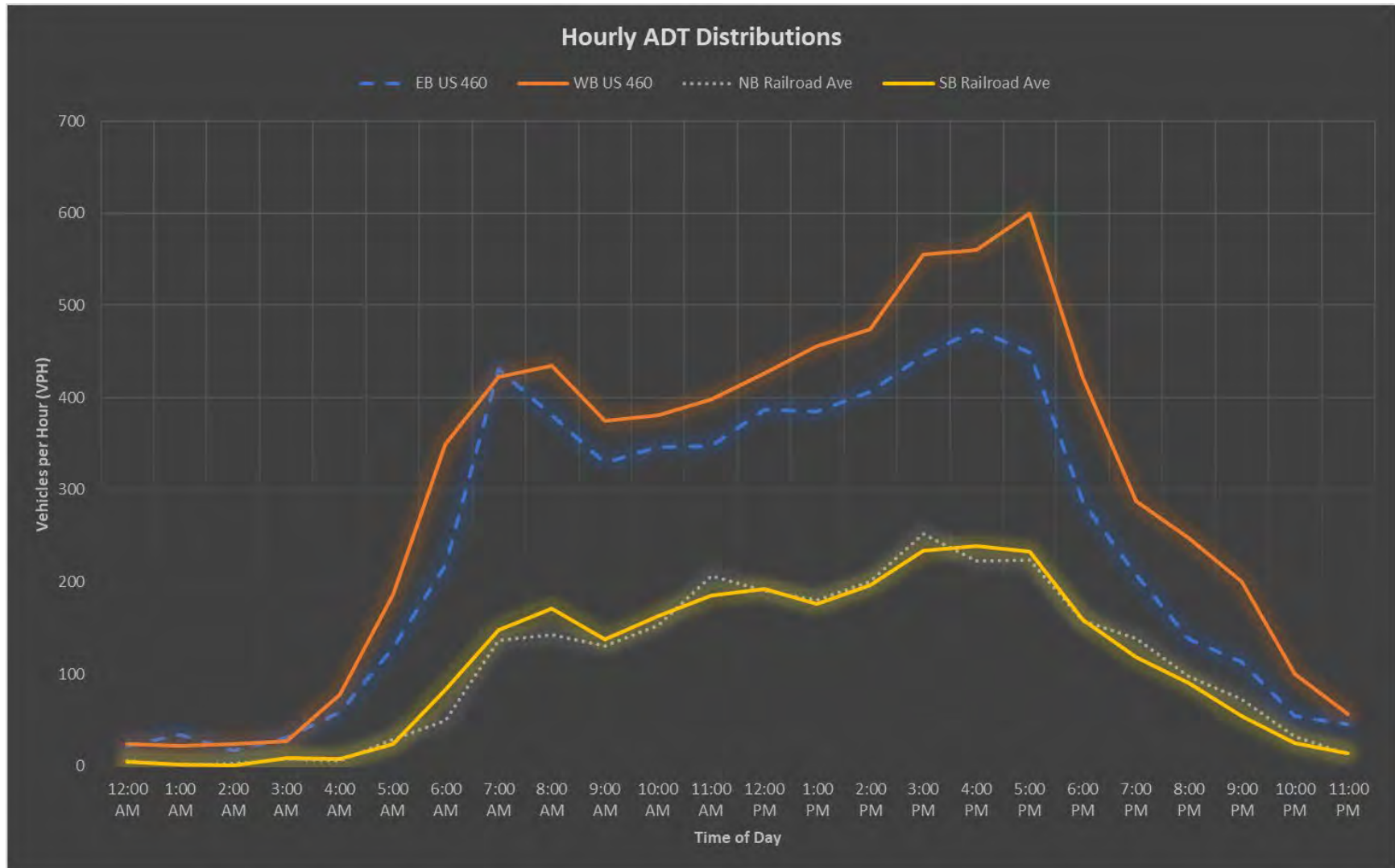


Figure 25: 2025 US 460 Interchange ADT Distribution

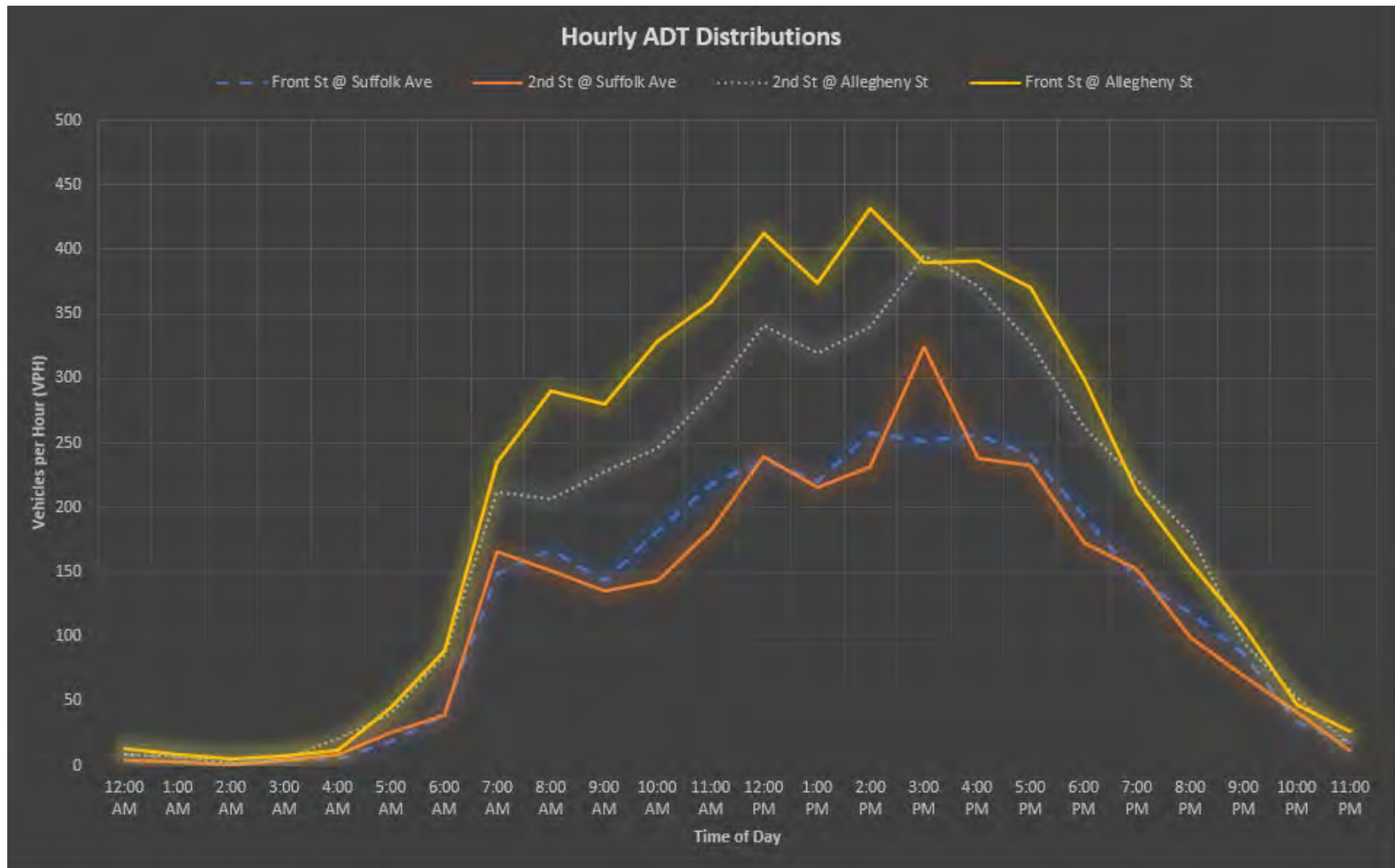


Figure 26: 2025 Front Street / 2nd Street ADT Distribution

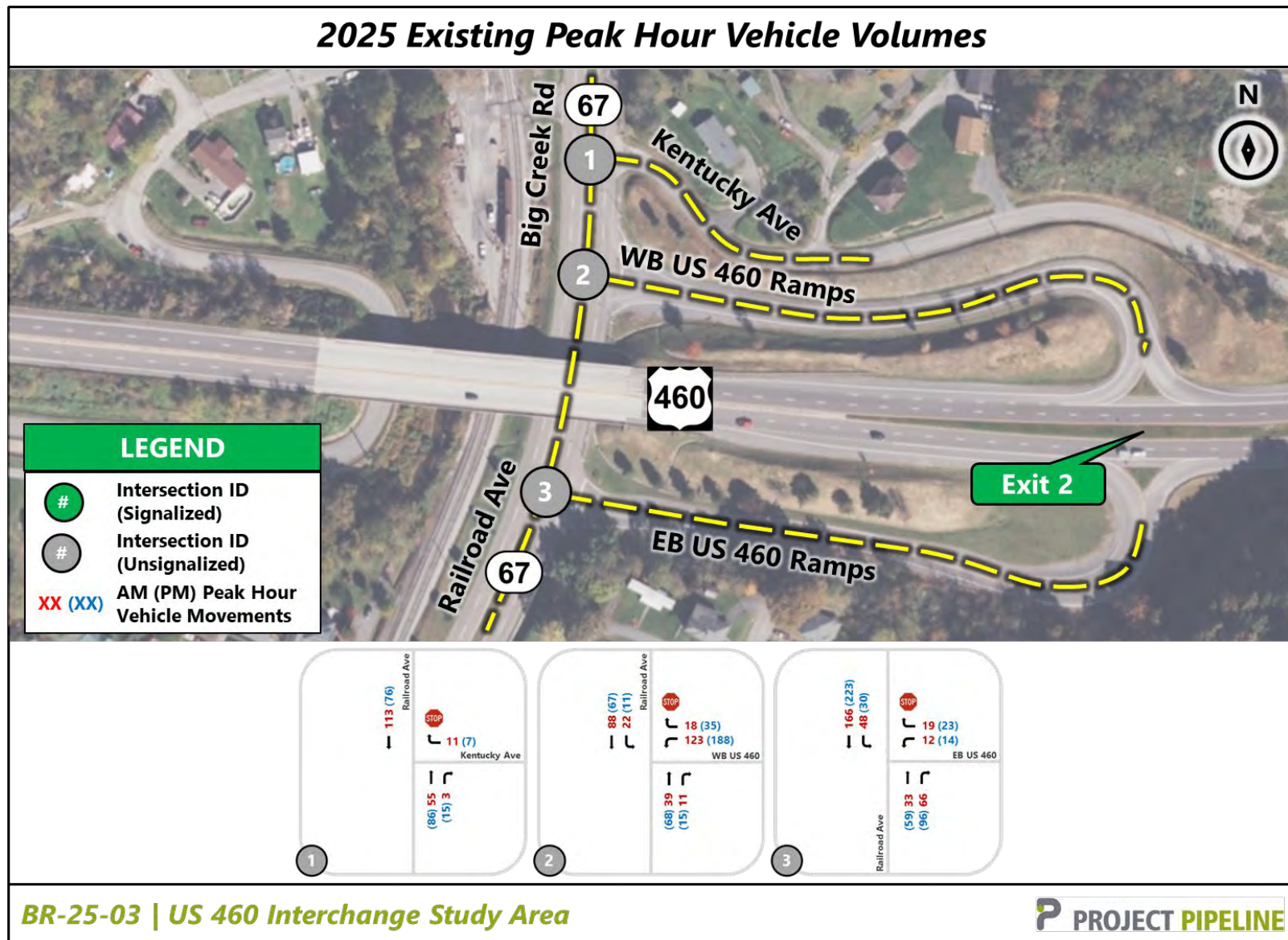


Figure 27: 2025 Existing Peak Hour Volumes US 460 Interchange

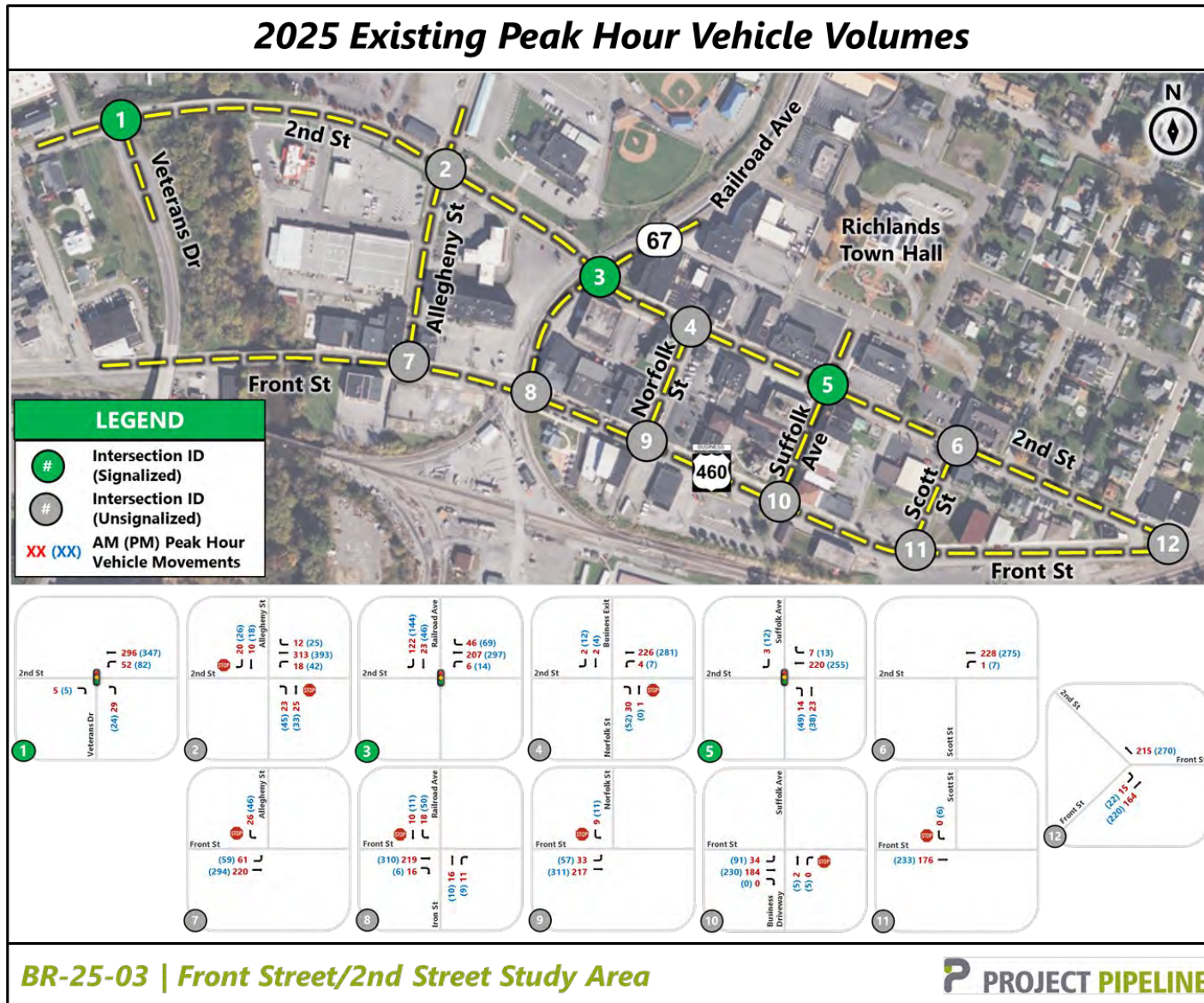


Figure 28: 2025 Existing Peak Hour Volumes Front Street / 2nd Street

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 10 summarizes the LOS corresponding to the delay at unsignalized and signalized intersections as specified in the HCM. The delay criteria for LOS differ 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 10: 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 95th percentile queue (feet) were selected as measures of effectiveness to quantitatively report the performance of each study intersection. Table 11 summarizes the Synchro analysis used to determine control delay for each intersection.

Ten SimTraffic simulations were conducted for both the AM and PM models. Full Synchro and SimTraffic reports are included in Appendix D. Synchro results for the existing condition models are included in Table 12 and Table 14. SimTraffic queuing results are shown in Table 13 and Table 15.

Table 11: Synchro Report for Control Delay

Intersection Name	Synchro Report for Control Delay
Big Creek Road at Kentucky Avenue	HCM 6th TWSC
Railroad Avenue/Big Creek Road at Westbound US 460	HCM 6th TWSC
Railroad Avenue at Eastbound US 460	HCM 6th TWSC
Railroad Avenue at 2nd Street	HCM 2000 Signalized
Veterans Drive at 2nd Street	HCM 2000 Signalized
Allegheny Street at 2nd Street	HCM 6th TWSC
Front Street at Allegheny Street	HCM 6th TWSC

Iron Street/Railroad Avenue at Front Street	HCM 6th TWSC
Norfolk Street/Driveway at 2nd Street	HCM 6th TWSC
Suffolk Avenue at 2nd Street	HCM 2000 Signalized
Front Street at Norfolk Street	HCM 6th TWSC
Suffolk Avenue at Front Street	HCM 6th TWSC

Under existing conditions, no significant intersection operation issues are experienced. The lowest LOS and greatest delays are at 2nd Street at Veterans Drive, which operates at LOS C in the AM and PM peak hours at a max delay of 21.4 seconds in the AM peak hour and 22.8 seconds in the PM peak hour. All other intersections within both study areas experience minimal max delays and operate at LOS A or LOS B in AM and PM peak hours. Figure 29 and Figure 30 display the 95th percentile queue lengths experienced at intersections within the US 460 Interchange study area with AM and PM peak volumes. Figure 31 and Figure 32 display the 95th percentile queue lengths experienced at intersections within the Front Street / 2nd Street study area with AM and PM peak volumes. Minimal queue lengths are experienced during both AM and PM peak hours, corroborating the low congestion need for the study areas. Signalized intersections within the Front Street / 2nd Street study area have surplus capacity.

The following trends were observed under existing conditions:

AM Peak Hour

- The highest approach delay occurs on the eastbound approach at the intersection of 2nd Street at Veterans Drive (33 seconds)
- The eastbound approach at the intersection of 2nd Street at Veterans Drive operates at LOS C
- The longest queue is the westbound through movement at the intersection of Veterans Drive and 2nd Street (118 ft)
- The southbound approach at the intersection of 2nd Street at Suffolk Avenue operates at LOS C with a max delay of 30.2 seconds
- No queues extend beyond storage bay lengths

PM Peak Hour

- The highest approach delay occurs on the eastbound approach at the intersection of 2nd Street at Veterans Drive (33.5 seconds)
- The eastbound approach at the intersection of 2nd Street at Veterans Drive operates at LOS C
- The longest queue is the westbound through movement at the intersection of 2nd Street at Veterans Drive (136 ft)
- The southbound approach at the intersection of 2nd Street at Suffolk Avenue operates at LOS C with a max delay of 30 seconds
- No queues extend beyond storage bay lengths

Table 12: 2025 Existing Conditions Peak Hour Control Delay and LOS US 460 Interchange

Intersection Number and Description		Type of Control	Lane Group	Eastbound						Westbound						Northbound						Southbound						Overall LOS									
				AM			PM			AM			PM			AM			PM			AM			PM			(delay)									
				Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		Delay	LOS		AM	PM								
1	Big Creek Road at Kentucky Avenue	Unsignalized								Kentucky Avenue						Big Creek Road						Big Creek Road						Intersection									
			Left							8.5						A						8.6						A						A (0.5)		A (0.4)	
			Through																																		
			Right																																		
	Approach																																				
2	Railroad Avenue/Big Creek Road at WB US 460	Unsignalized								WB US 460 Ramp						Railroad Avenue						Big Creek Road						Intersection									
			Left							9.3						A						9.4						A						A (5.1)		A (5.9)	
			Through																																		
			Right																																		
	Approach																																				
3	Railroad Avenue at EB US 460	Unsignalized								EB US 460 Ramp						Railroad Avenue						Railroad Avenue						Intersection									
			Left							9.7						A						9.6						A						A (1.9)		A (1.3)	
			Through																																		
			Right																																		
	Approach																																				
-	No delay or level of service provided by Synchro. Movement exists.																																				
-	Approach or movement does not exist.																																				

Table 13: 2025 Existing Conditions Peak Hour 95th Percentile Queues US 460 Interchange

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	Big Creed Road at Kentucky Avenue	Unsignalized	Left Through Right		Kentucky Avenue		Big Creek Road		Big Creek Road		
					19		15		-		
2	Railroad Avenue/Big Creek Road at WB US 460	Unsignalized	Left Through Right		WB US 460 Ramp		Railroad Avenue		Big Creek Road		
					59		71		10		
					59		71		-		
3	Railroad Avenue at EB US 460	Unsignalized	Left Through Right		EB US 460 Ramp		Railroad Avenue		Railroad Avenue		
					42		35		21		
									-		
					42		35		0		
- No queue length provided by SimTraffic report. Movement exists											
Approach or movement does not exist											

Table 14: 2025 Existing Conditions Peak Hour Control Delay and LOS Front Street / 2nd Street

Intersection Number and Description		Type of Control	Lane Group	Eastbound				Westbound				Northbound				Southbound				Overall LOS	
				AM		PM		AM		PM		AM		PM		AM		PM		(delay)	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	AM	PM
1	2nd Street at Veterans Drive	Signalized	Left	2nd Street				2nd Street				Veterans Drive								Intersection	
			Through																		
			Right																		
			Approach																		
2	2nd Street at Allegheny Street	Unsignalized	Left					2nd Street				Allegheny Street				Allegheny Street				Intersection	
			Through																		
			Right																		
			Approach																		
3	2nd Street at Railroad Avenue	Signalized	Left					2nd Street								Railroad Avenue				Intersection	
			Through																		
			Right																		
			Approach																		
4	2nd Street at Norfolk Street	Unsignalized	Left					2nd Street				Norfolk Street				Driveway				Intersection	
			Through																		
			Right																		
			Approach																		
5	2nd Street at Suffolk Avenue	Signalized	Left					2nd Street				Suffolk Avenue				Suffolk Avenue				Intersection	
			Through																		
			Right																		
			Approach																		
6	2nd Street at Scott Street	Unsignalized	Left					2nd Street													
			Through																		
			Right																		
			Approach																		
7	Front Street at Allegheny Street	Unsignalized	Left	Front Street												Allegheny Street				Intersection	
			Through																		
			Right																		
			Approach																		
8	Front Street at Iron Street/Railroad Avenue	Unsignalized	Left	Front Street								Iron Street				Railroad Avenue				Intersection	
			Through																		
			Right																		
			Approach																		
9	Front Street at Norfolk Street	Unsignalized	Left	Front Street												Norfolk Street				Intersection	
			Through																		
			Right																		
			Approach																		
10	Front Street at Suffolk Avenue	Unsignalized	Left	Front Street								Driveway								Intersection	
			Through																		
			Right																		
			Approach																		
11	Front Street at Scott Street	Unsignalized	Left	Front Street												Scott Street					
			Through																		
			Right																		
			Approach																		
12	Front Street at 2nd Street	Unsignalized	Left	Front Street				Front Street													
			Through																		
			Right																		
			Approach																		

- No delay or level of service provided by Synchro. Movement exists.

Approach or movement does not exist.

Table 15: 2025 Existing Conditions Peak Hour 95th Percentile Queues Front Street / 2nd Street

Intersection Number and Description		Type of Control	Lane Group	Eastbound		Westbound		Northbound		Southbound	
				AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay
1	2nd Street at Veterans Drive	Signalized	Left	2nd Street		2nd Street		Veterans Drive			
			Through			110	135	39	30		
			Right			118	136				
			-	-							
2	2nd Street at Allegheny Street	Unsignalized	Left			2nd Street		Allegheny Street		Allegheny Street	
			Through			-	7	45	53	30	19
			Right			-	-			45	50
			-			1					
3	2nd Street at Railroad Avenue	Signalized	Left			2nd Street				Railroad Avenue	
			Through			55	85				
			Right			-	-			53	78
			82			104					
4	2nd Street at Norfolk Street	Unsignalized	Left			2nd Street		Norfolk Street		Driveway	
			Through			-	-	45	49		
			Right			-	-			19	39
5	2nd Street at Suffolk Avenue	Signalized	Left			2nd Street		Suffolk Avenue		Suffolk Avenue	
			Through					33	46		
			Right			52	65	43	49		
			82			89			23	38	
6	2nd Street at Scott Street	Unsignalized	Left			2nd Street					
			Through			-	-				
			Right			-	-				
7	Front Street at Allegheny Street	Unsignalized	Left	Front Street						Allegheny Street	
			Through	-	-					49	49
			Right	-	-						
8	Front Street at Iron Street/Railroad Avenue	Unsignalized	Left	Front Street				Iron Street		Railroad Avenue	
			Through	-	-					40	45
			Right	-	-			-	-	19	11
				-	-			41	39		
9	Front Street at Norfolk Street	Unsignalized	Left	Front Street						Norfolk Street	
			Through	-	-					33	33
			Right	-	-						
10	Front Street at Suffolk Avenue	Unsignalized	Left	Front Street				Driveway			
			Through	-	4						
			Right	-	-			17	58		
				-	2						
11	Front Street at Scott Street	Unsignalized	Left	Front Street						Scott Street	
			Through	-	-					-	-
			Right								
12	Front Street at 2nd Street	Unsignalized	Left	Front Street		Front Street					
			Through	-	-						
			Right	-	-	-	-				

- No queue length provided by SimTraffic report. Movement exists
 Approach or movement does not exist



Figure 29: 95th Percentile Queues US 460 Interchange AM Peak



Figure 30: 95th Percentile Queues US 460 Interchange PM Peak



Figure 31: 95th Percentile Queues Front Street / 2nd Street AM Peak



Figure 32: 95th Percentile Queues Front Street / 2nd Street PM Peak

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 250 participants and received 363 comments.

Participants ranked corridor safety/intersection safety, pavement marking and signage, and reducing traffic congestion as the most critical issues in the US 460 Interchange study area. Inadequate pavement marking and signage, speeding/aggressive driving, and sudden stopping/rear-end crashes were identified by participants as prominent safety issues that concern them. These concerns can be referenced in Figure 33 and Figure 34.

Common themes among written comments included the following:

- Poor roadway conditions and drainage lead to hydroplaning
- Perceived reckless driving is observed frequently
- Suggestions to increase traffic law enforcement to combat speeding and aggressive driving
- Sight distances for traffic exiting Kentucky Avenue impeded by a dirt mound
- Turning radii for the US 460 on and off-ramps are too tight
- Difficulty making left turns

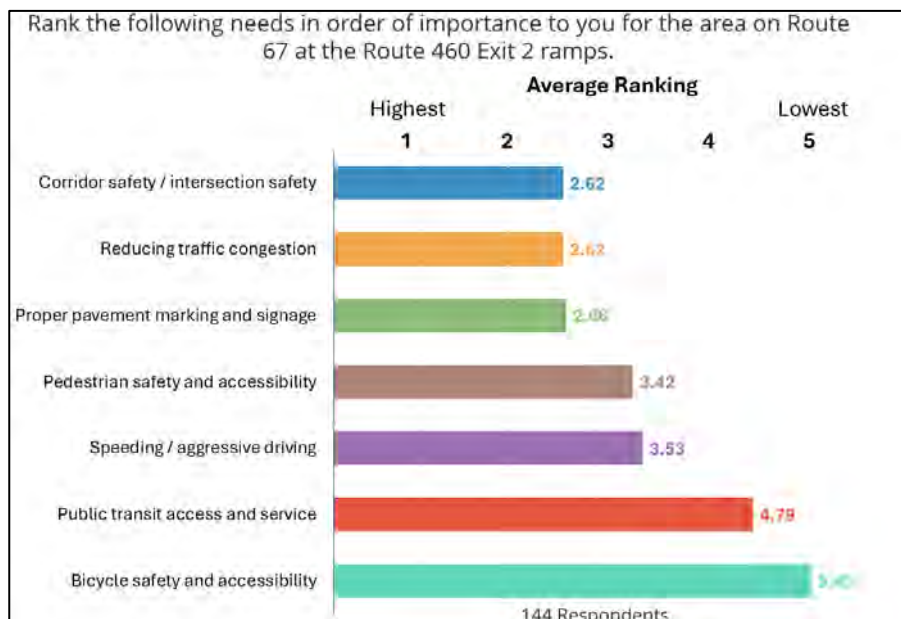


Figure 33: Ranked Corridor Needs Public Feedback US 460 Interchange

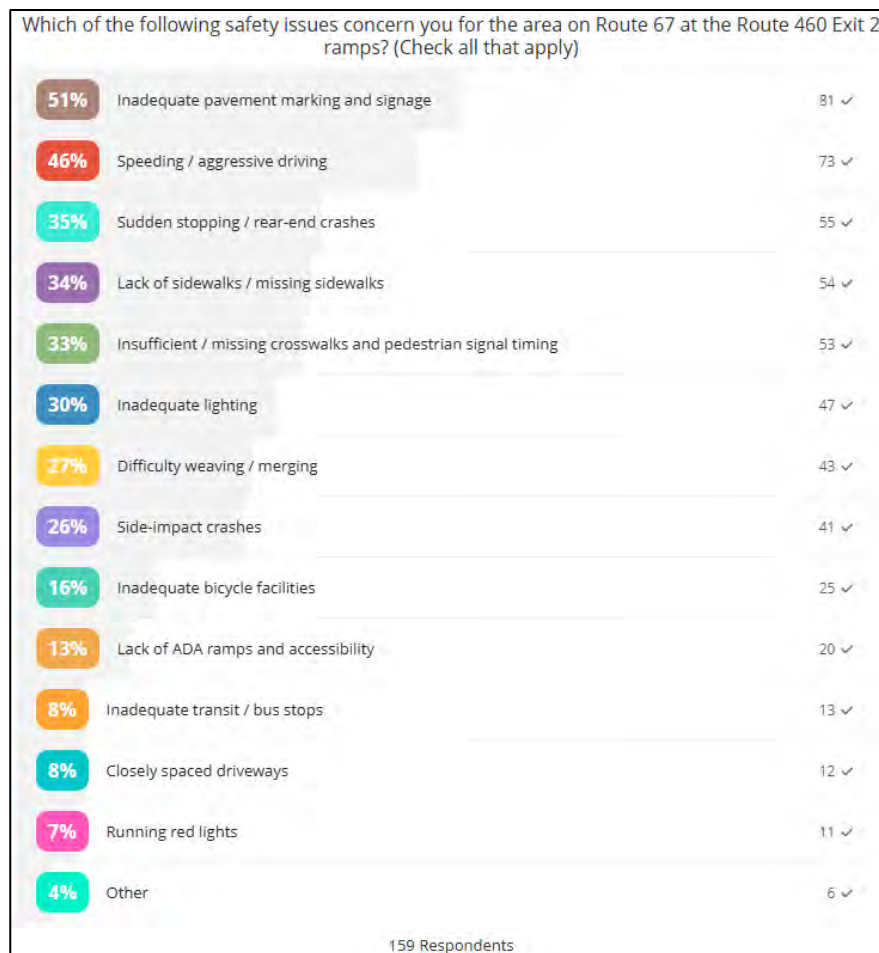


Figure 34: Public Outreach Identified Safety Concerns US 460 Interchange

In the Front Street / 2nd Street study area, participants ranked pedestrian safety and accessibility, pavement marking and signage, and corridor safety/intersection safety as the most critical issues. Inadequate pavement markings and signage, insufficient/missing crosswalks and pedestrian signal timing, and speeding/aggressive driving were identified by participants as prominent safety issues that concern them. These concerns can be referenced in Figure 35 and Figure 36. Detailed results from the Phase 1 public outreach efforts can be found in Appendix E.

Common themes among written comments included the following:

- Sight distance issues due to parallel parked vehicles
- Inadequate signage and pavement markings
- Lack of ADA compliant ramps and sidewalks
- Poor pavement quality

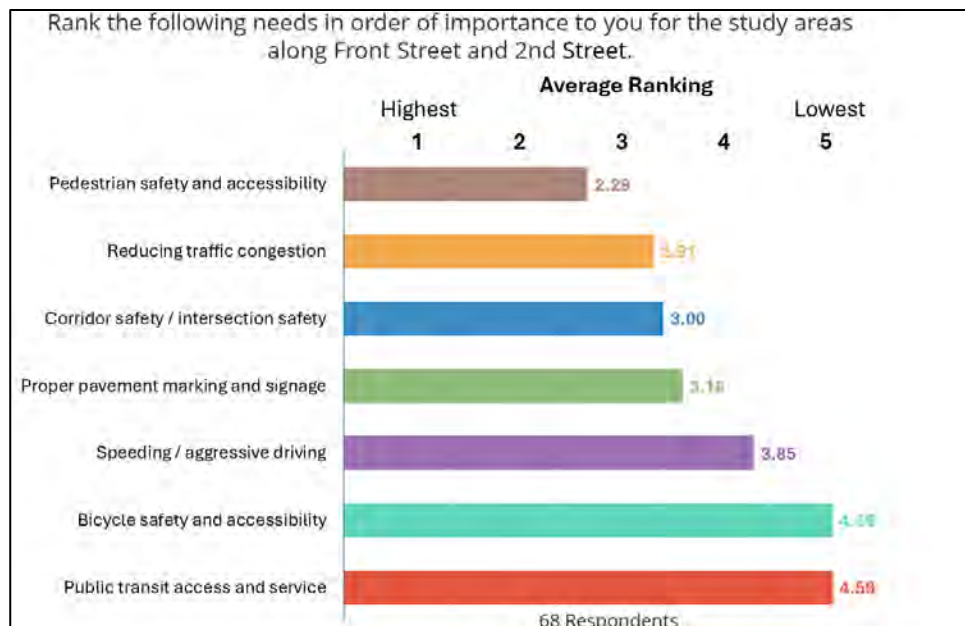


Figure 35: Ranked Corridor Needs Public Feedback Front / 2nd Street

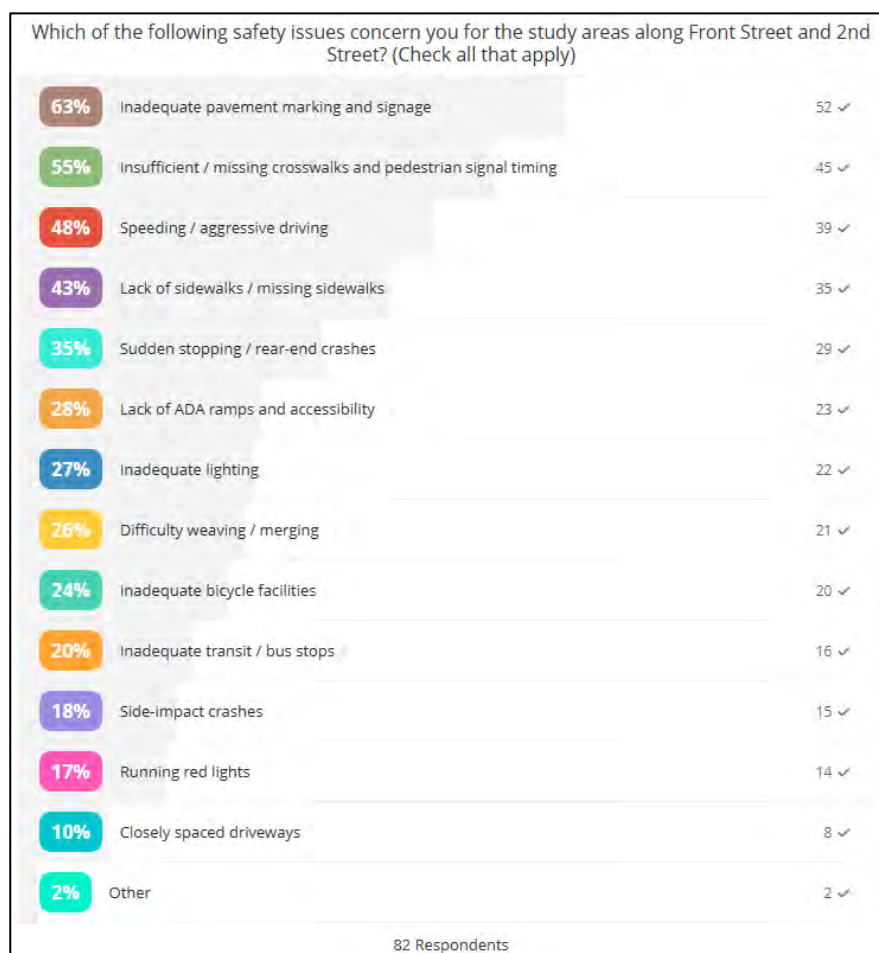


Figure 36: Public Outreach Identified Safety Concerns Front / 2nd Street

1.6.3. No-Build Conditions Traffic Operations Analysis

Traffic operational analyses were conducted to evaluate the overall performance of the study corridor under No-Build (2041) 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.

No-Build 2041 Traffic Forecasting and Volume Development

The following sources were reviewed to determine the growth rates to apply to existing traffic volumes to forecast future (2041) traffic volumes.

- **Historical traffic count data**

Historical traffic count data were sourced primarily from official VDOT historical annual average daily traffic (AADT) counts. Per VDOT policy, 2020 and 2021 were excluded from the linear regression calculation due to COVID-impacted traffic counts. Significant development and regression trends between years were identified, outliers were removed, and a linear regression was performed to produce linear growth rates for 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 16, Figure 37, and Figure 38 present recommended linear growth rates and the growth rates determined from historical volume and VDOT's Pathways for Planning trend analysis data. While the historical trend analysis indicates that 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 16-year period (2025 to 2041 design year) results in a 1.08 growth factor. This was applied to the existing 2025 peak hour volumes to generate projected 2041 volumes. The No-Build (2041) AM and PM peak hour volumes are shown in Figure 39, Figure 40, and Figure 41. The Traffic Forecasting Memorandum can be found in Appendix F.

Table 16: Linear Growth Rate Development Summary

ID	Location	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	2041 "Design Year" AADT Forecast Based Upon Recommended Growth Rate
1	2nd St: Front St to Railroad Ave	-2.02% ³ (-2.39%) ⁴	0.50%	0.50%	5,408
2	2nd St: Railroad Ave to Norfolk St	-3.14% ³ (-3.33%) ⁴	0.50%		2,672
3	2nd St: Norfolk St to Grayson Ave	-1.70% ³ (-2.21%) ⁴	0.50%		2,562
4	Front St: Fairfax Ave to Railroad Ave	-2.65% ³ (-2.77%) ⁴	0.50%		4,914
5	Front St: Railroad Ave to Norfolk St	-2.48% ³ (-2.30%) ⁴	0.50%		4,470
6	Front St: Norfolk St to Grayson Ave	-2.29% ³ (-2.13%) ⁴	0.50%		3,073
7	Front St: Grayson Ave to Dickenson Pl	-2.07% ³ (-2.38%) ⁴	0.50%		5,492
8	Rt. 67 Big Creek Rd: WB US 460 Ramp to Brown St	-2.67% ³ (-2.46%) ⁴	0.50%		1,880
9	Rt. 67 Big Creek Rd: 5th St to WB US 460 Ramp	-3.14% ³ (-3.33%) ⁴	0.50%		2,672
10	US 460: Front St to WB/EB On/Off Ramps	-1.49% ³ (-1.38%) ⁴	0.50%		10,424
11	US 460: On/Off Ramp to Jones Chapel Rd	-1.57% ³ (-1.59%) ⁴	0.50%		12,591

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 included 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.

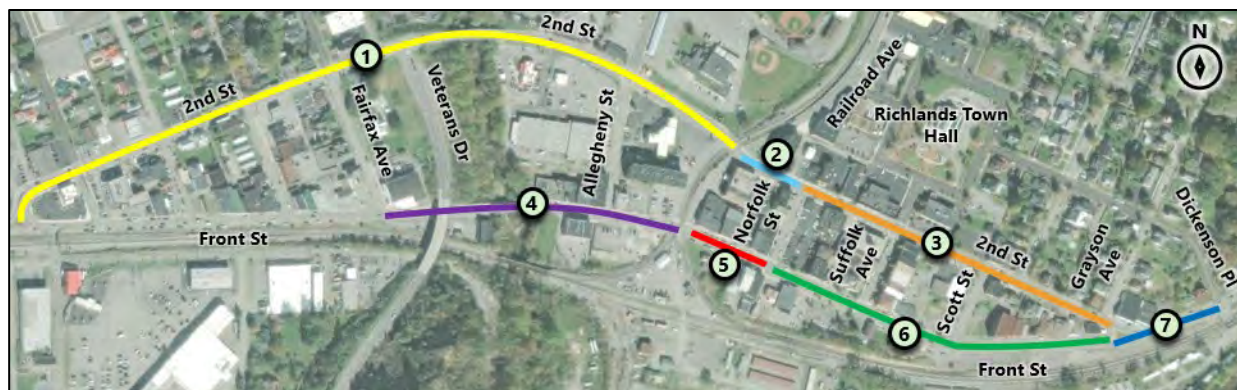


Figure 37: Front Street / 2nd Street Study Area Linear Growth Segment IDs

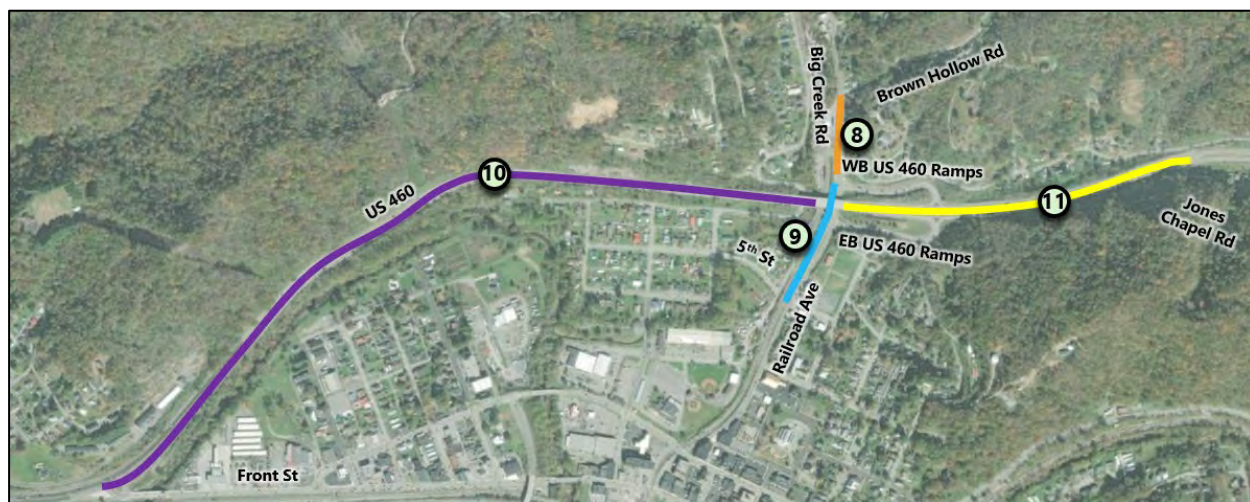


Figure 38: US 460 Interchange Study Area Linear Growth Segment IDs

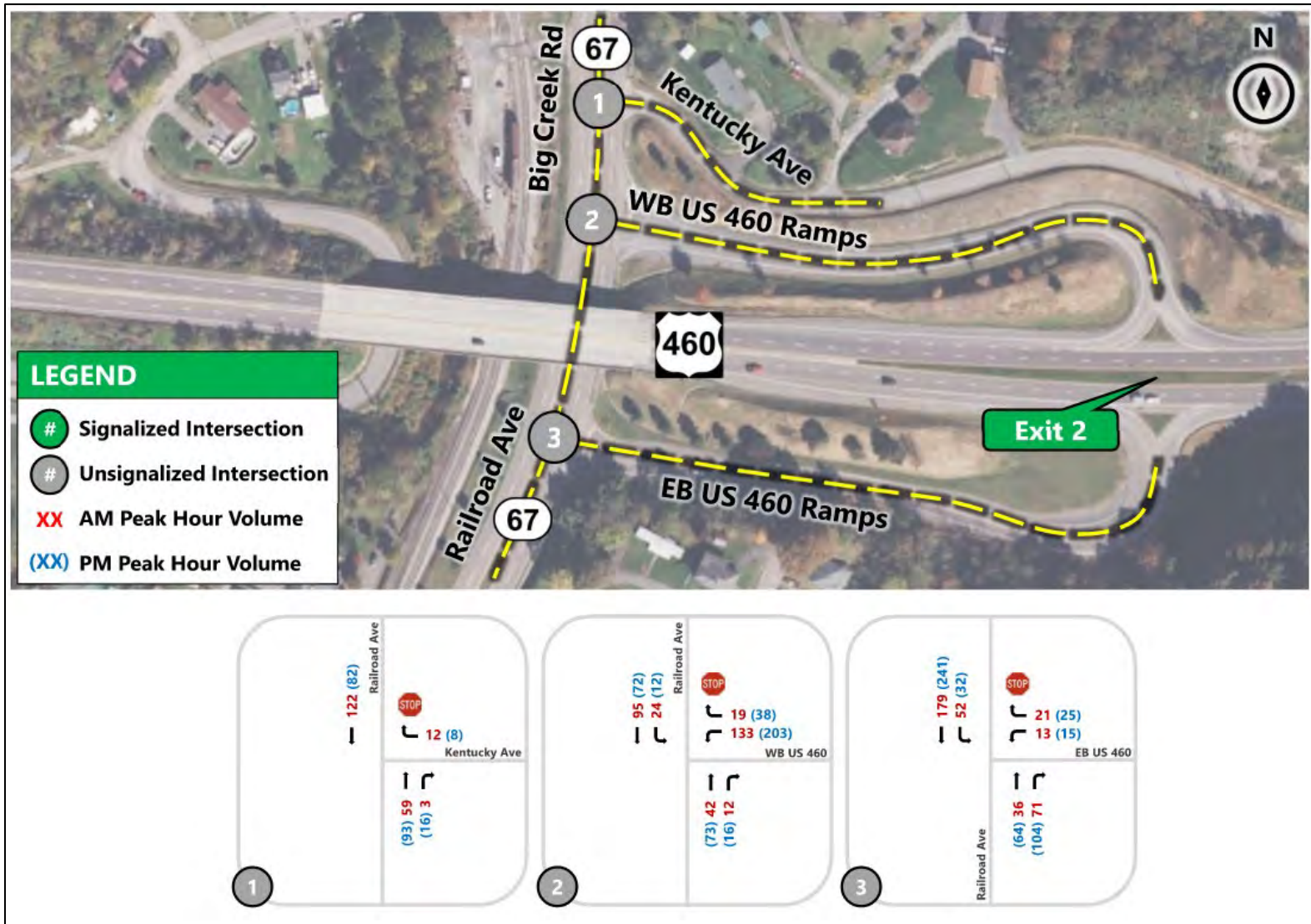


Figure 39: 2041 No-Build Volume–US 460 Interchange Study Area

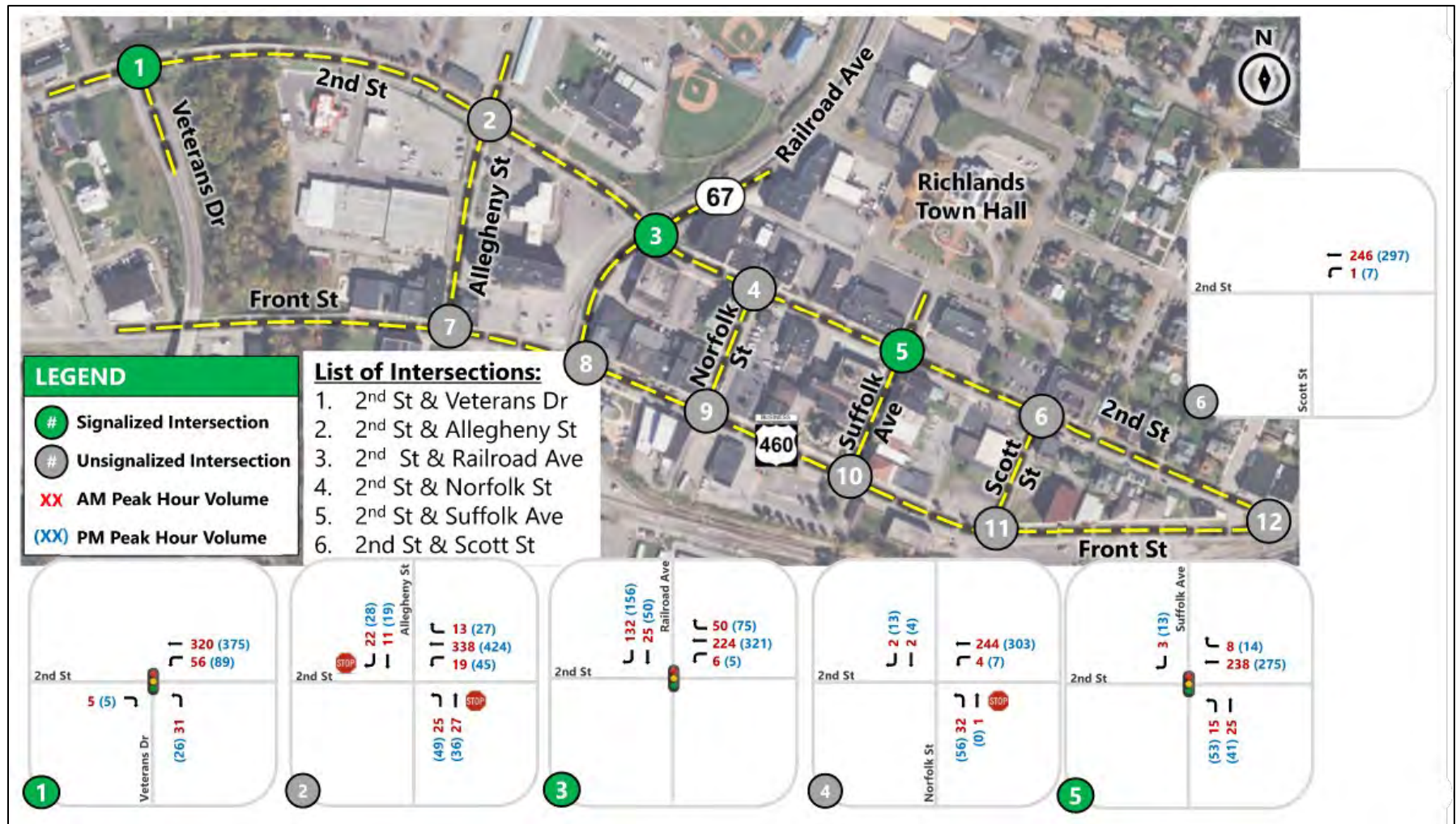


Figure 40: 2041 No-Build Peak Hour Volumes–2nd Street

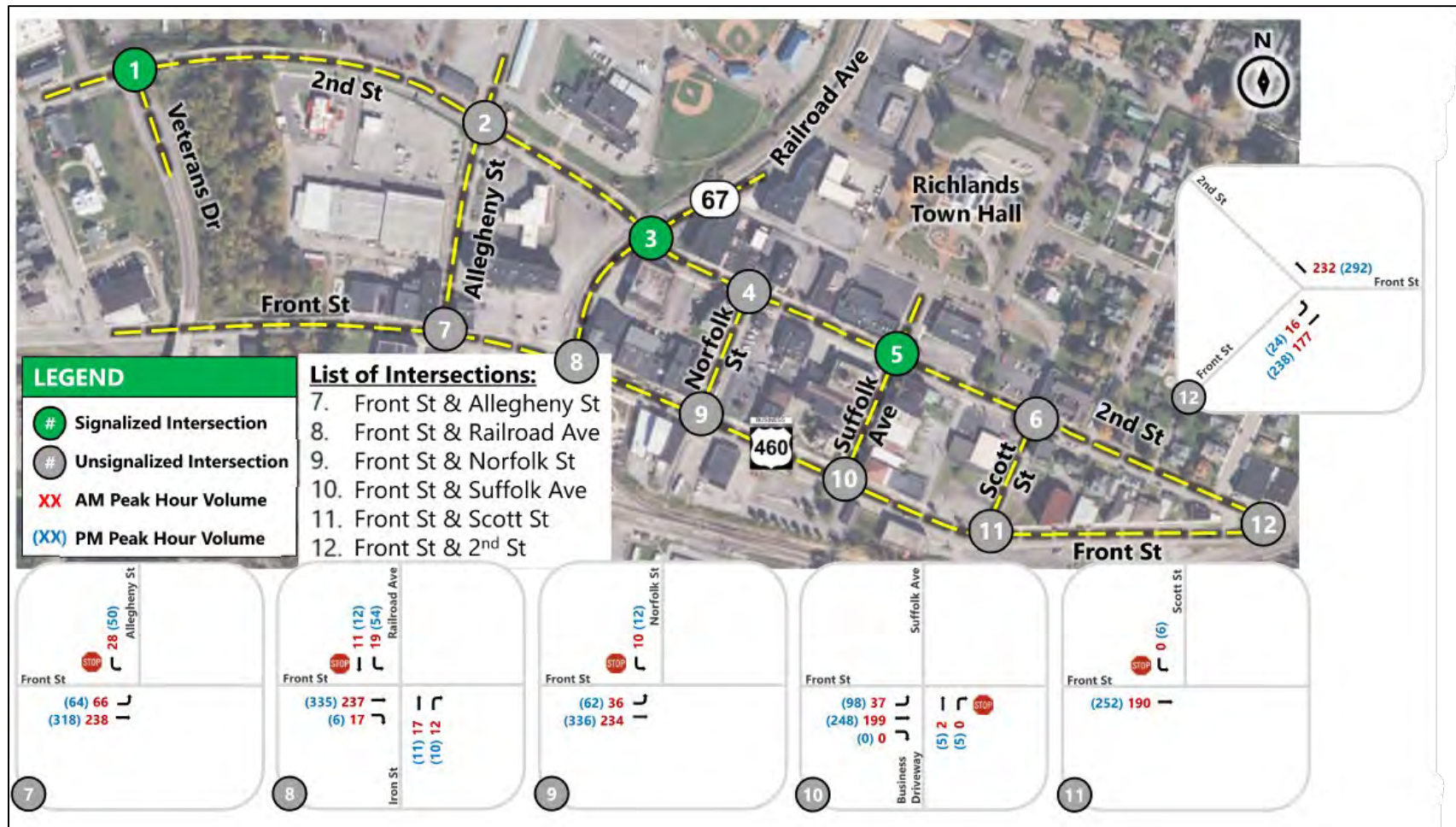


Figure 41: 2041 No-Build Peak Hour Volumes–Front Street

No-Build Conditions Synchro and SimTraffic Analysis

Traffic operational analyses were conducted to evaluate the overall performance of the study intersections under No-Build (2041) AM and PM peak hour conditions. The intent of these analyses was to provide a general understanding of the baseline future traffic conditions as a starting point for developing improvement alternatives. No-Build conditions were modeled using *Synchro 11* and *SimTraffic 11* for both study areas.

The existing conditions Synchro models were used as a basis to develop the No-Build models for the AM and PM peak hour conditions. The models were updated with the projected 2041 No-Build traffic volumes. 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*. Ten simulations were conducted for both the AM and PM No-Build SimTraffic models. Movement delay (seconds per vehicle), approach delay (seconds per vehicle), and 95th percentile queues (feet) were used as measures of effectiveness. Synchro and SimTraffic reports used for control delay were consistent with existing conditions and summarized in Table 17 to Table 20.

Similar trends in delay and queuing were observed under No-Build conditions as observed in existing conditions. Under No-Build conditions, all intersections operated at LOS B or better in both AM and PM peak hours and all approaches operated at LOS C or better in both AM and PM peak hours. The greatest movement delay across both study areas occurred at the eastbound right turning movement at the 2nd Street at Veterans Drive intersection, with 30.4 seconds per vehicle during the AM peak hour and 30.2 seconds per vehicle during the PM peak hour.

Queue results for the alternatives are presented in Table 18 and Table 20. The greatest 95th percentile queue length across both study areas occurred at the westbound left/through movement at the 2nd Street at Veterans Drive intersection, with 118 feet during the AM peak hour and 134 feet during the PM peak hour. Projected 95th percentile queues do not extend to upstream intersections. Full No-Build Conditions Synchro and SimTraffic results can be found in Appendix D.

Table 17: 2041 No-Build Conditions Peak Hour Control Delay and LOS—US 460 Interchange Study Area

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	Big Creek Road at Kentucky Avenue	Unsignalized	Left					Kentucky Avenue					Big Creek Road				Big Creek Road				Intersection				
			Through																	A (0.5)		A (0.4)			
			Right																						
			Approach																						
2	Railroad Avenue/Big Creek Road at WB US 460	Unsignalized	Left					WB US 460 Ramp					Railroad Avenue				Big Creek Road				Intersection				
			Through																	A (5.1)		A (6.0)			
			Right																						
			Approach																						
3	Railroad Avenue at EB US 460	Unsignalized	Left					EB US 460 Ramp					Railroad Avenue				Railroad Avenue				Intersection				
			Through																	A (2)		A (1.3)			
			Right																						
			Approach																						
-	No delay or level of service provided by Synchro. Movement exists. Approach or movement does not exist.																								

Table 18: 2041 No-Build Conditions Peak Hour 95th Percentile Queues—US 460 Interchange Study Area

Intersection Number and Description		Type of Control	Lane Group	Eastbound		Westbound		Northbound		Southbound	
				AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay
1	Big Creed Road at Kentucky Avenue	Unsignalized	Left		Kentucky Avenue		Big Creek Road		Big Creek Road		
			Through				-	-	-	-	
			Right		20	17	-	-			
2	Railroad Avenue/Big Creek Road at WB US 460	Unsignalized	Left		WB US 460 Ramp		Railroad Avenue		Big Creek Road		
			Through		61	79			8	12	
			Right				-	-	-	-	
3	Railroad Avenue at EB US 460	Unsignalized	Left		EB US 460 Ramp		Railroad Avenue		Railroad Avenue		
			Through		42	32			26	25	
			Right						-	-	
					42	32	5	3			
-	No queue length provided by SimTraffic report. Movement exists										
	Approach or movement does not exist										

Table 19: 2041 No-Build Conditions Peak Hour Control Delay and LOS—Front Street / 2nd Street Study Area

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	2nd Street at Veterans Drive	Signalized		2nd Street				2nd Street				Veterans Drive								Intersection	
			Left					19.8 B 19.9 B				8.1 A 8.4 A								B (19.0)	B (19.4)
			Through	30.4 C 30.2 C																	
			Right					19.8 B 19.9 B													
				Approach	30.4 C 30.2 C			19.8 B 19.9 B			8.1 A 8.4 A										
2	2nd Street at Allegheny Street	Unsignalized		2nd Street				Allegheny Street				Allegheny Street				Intersection					
			Left					11.3 B 13.2 B				12.8 B 14.9 B				A (2.1)	A (2.7)				
			Through					11.3 B 13.2 B				9.8 B 10.3 B									
			Right									10.8 B 12.2 B									
				Approach				11.3 B 13.2 B													
3	2nd Street at Railroad Avenue	Signalized		2nd Street								Railroad Avenue				Intersection					
			Left									12.5 A 11.2 A				A (9.9)	B (11.6)				
			Through	8.5 A 11.8 B																	
			Right																		
				Approach	8.5 A 11.8 B						12.5 A 11.2 A										
4	2nd Street at Norfolk Street/Driveway	Unsignalized		2nd Street				Norfolk Street				Driveway				Intersection					
			Left					9.7 A 10.3 B								A (1.3)	A (1.9)				
			Through					9.7 A 10.3 B				10 B 9.9 A									
			Right									10 B 9.9 A									
				Approach				9.7 A 10.3 B			10 B 9.9 A										
5	2nd Street at Suffolk Avenue	Signalized		2nd Street				Suffolk Avenue				Suffolk Avenue				Intersection					
			Left					24 C 19.6 B								A (9.8)	B (14.8)				
			Through	7.2 A 12.6 B				25 C 20.1 C													
			Right	7.2 A 12.6 B																	
				Approach	7.2 A 12.6 B			24.6 C 19.8 B			28.6 C 29.9 C										
6	2nd Street at Scott Street	Unsignalized		2nd Street																	
			Left																		
			Through																		
			Right																		
				Approach																	
7	Front Street at Allegheny Street	Unsignalized		Front Street								Allegheny Street				Intersection					
			Left									10.4 B 10.7 B				A (0.9)	A (1.2)				
			Through																		
			Right									10.4 B 10.7 B									
				Approach																	
8	Front Street at Iron Street/Railroad Avenue	Unsignalized		Front Street								Iron Street				Railroad Avenue				Intersection	
			Left													9.7 A 9.9 A				A (1.8)	A (2)
			Through													10.5 B 10.6 B					
			Right									9.2 A 9.6 A									
				Approach				9.2 A 9.6 A			10 B 10 B										
9	Front Street at Norfolk Street	Unsignalized		Front Street												Norfolk Street				Intersection	
			Left													10 B 10.7 B				A (0.4)	A (0.3)
			Through																		
			Right																		
				Approach							10 B 10.7 B										
10	Front Street at Suffolk Avenue	Unsignalized		Front Street								Suffolk Avenue								Intersection	
			Left																	A (0)	A (0.3)
			Through									10.5 B									
			Right									10.5 B									
				Approach							10.5 B										
11	Front Street at Scott Street	Unsignalized		Front Street												Scott Street					
			Left																		
			Through																		
			Right																		
				Approach																	
12	Front Street at 2nd Street	Unsignalized		Front Street				Front Street													
			Left																		
			Through																		
			Right																		
				Approach																	
- No delay or level of service provided by Synchro. Movement exists.																					
Approach or movement does not exist.																					

Table 20: 2041 No-Build Conditions Peak Hour 95th Percentile Queues—Front Street / 2nd Street Study Area

Intersection Number and Description		Type of Control	Lane Group	Eastbound		Westbound		Northbound		Southbound		
				AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay	
1	2nd Street at Veterans Drive	Signalized	Left	2nd Street		2nd Street		Veterans Drive				
			Through		109	131	39	35				
			Right		118	134						
2	2nd Street at Allegheny Street	Unsignalized		-	-	2nd Street		Allegheny Street		Allegheny Street		
			Left		-	4	48	54	33	41		
			Through		-	4			50	51		
3	2nd Street at Railroad Avenue	Signalized	Right			2nd Street				Railroad Avenue		
			Left		57	79						
			Through		87	99			61		81	
4	2nd Street at Norfolk Street	Unsignalized	Right			2nd Street		Norfolk Street		Driveway		
			Left		-	-	45	47				
			Through		-	-			21	38		
5	2nd Street at Suffolk Avenue	Signalized				2nd Street		Suffolk Avenue		Suffolk Avenue		
			Left				36	46				
			Through		55	70	44	53				
6	2nd Street at Scott Street	Unsignalized	Right			2nd Street				16		34
			Left		86	97						
			Through		-	-						
7	Front Street at Allegheny Street	Unsignalized	Right	Front Street						Allegheny Street		
			Left	-	-			51		49		
			Through	-	-							
8	Front Street at Iron Street/Railroad Avenue	Unsignalized		Front Street				Iron Street		Railroad Avenue		
			Left				37	47				
			Through	-	-	-	-	21	12			
9	Front Street at Norfolk Street	Unsignalized	Right	-	-			43		41	Norfolk Street	
			Left	-	-					35	33	
			Through	-	-							
10	Front Street at Suffolk Avenue	Unsignalized		Front Street				Driveway				
			Left	-	0							
			Through	-	7			18	49			
11	Front Street at Scott Street	Unsignalized	Right	-	7							
			Left	Front Street						Scott Street		
			Through	-	-			-		21		
12	Front Street at 2nd Street	Unsignalized		Front Street		Front Street						
			Left	-								
			Through	-		-	-					

- No queue length provided by SimTraffic report. Movement exists

Approach or movement does not exist

1.7 Phase 1 Alternatives Development

VHB, in partnership with the SWG, developed preliminary alternatives in parallel with the high-level needs diagnosis efforts documented in Section 1.5. The proposed Phase 1 alternatives were developed to meet the criteria specific to each study area, which are as follows:

US 460 Interchange Study Area

- Reduce angle crashes
- Mitigate limited sight distance influenced by roadway curvature, grade, and topography

Front Street / 2nd Street Study Area

- Improve pedestrian facilities
- Address risky driver behavior
- Narrow lane widths to introduce traffic calming measures and improve the Downtown streetscape
- Improve ADA and MUTCD compliance
- Upgrade pavement markings

1.7.1. Initial Alternatives

The needs evaluation, diagnosis, and initial alternatives were presented at SWG Meeting #3, held on August 5, 2025. The SWG Meeting #3 was hosted on Mural, an online platform.² 16 alternatives were presented during the meeting: three (3) alternatives for the US 460 Interchange Study Area and 13 alternatives for the Front Street / 2nd Street Study Area. Initial alternatives were presented with flexibility in mind, allowing various elements to be mixed in future alternatives. All 16 alternatives are summarized in Table 21 and Table 22.

During the meeting, the study team used the Virginia Junction Screening Tool (VJuST) to screen intersection and interchange alternatives for the US 460 Interchange Study Area based on impacts to traffic operations, pedestrian accommodations, safety, and cost. VJuST was not used to screen alternatives for the Front Street / 2nd Street Study Area. The VJuST results for the US 460 Interchange Study Area are summarized in Table 23.

Pedestrian Alternatives

The SWG considered alternatives addressing pedestrian access in addition to vehicular operations and safety for the Front Street / 2nd Street study area. Multiple pedestrian-focused alternatives were analyzed, including curb bulb-outs and enhanced crosswalks to reduce crossing distances and improve pedestrian visibility. Chicanes were also proposed on Front Street and 2nd Street to calm traffic and allow for wider sidewalks, enhancing the pedestrian experience. Both treatments were identified as components for future refined alternatives.

²<https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1753125041867/e9c38d00b384d32f81b96372f7c6082b27c72b48>

Table 21: US 460 Interchange Study Area Phase 1 Alternatives

Study Area	Alternative	Description
US 460 Interchange Study Area	Peanut Roundabout	Converts the westbound Kentucky Avenue approach to right-in/right-out access. Westbound left-out traffic is re-routed to a northbound U-turn and southbound left-in traffic is re-routed to U-turn at the peanut roundabout.
	Chicane ★	Converts the westbound Kentucky Avenue approach to right-in/right-out access. Westbound left-out traffic is re-routed to a northbound U-turn and southbound left-in traffic is re-routed to U-turn at the Big Creek Road at WB US 460 Ramp intersection.
	Restricted Crossing U-Turn (RCUT)	Converts the westbound Kentucky Avenue approach to right-in/right-out access. Westbound left-out traffic is re-routed to a northbound U-turn at a dedicated median opening/looon. Southbound left-in traffic is re-routed to U-turn at the Big Creek Road at WB US 460 Ramp intersection.

★ Advanced alternative

Table 22: Front Street / 2nd Street Study Area Phase 1 Alternatives

Study Area / Corridor / Segment	Alternative	Description
Front Street / 2nd Street Study Area	Curb Bulb-Outs and Enhanced Crosswalks ★	Installs curb bulb-outs and enhanced crosswalks along Front Street and 2nd Street. Bulb-outs extend curbs into parking lanes.
	Traffic Signal Improvements ★	Updates non-compliant signal heads throughout the study area to meet MUTCD standards.
Front Street Corridor	Single Travel Lane and Chicane ★	Reduces Front Street to one travel lane with expanded parallel parking and wider sidewalks. Adds angled parking in the southern section of the corridor, along with a chicane for traffic calming.
	Single Travel Lane and Reclaimed Greenspace	Reduces Front Street to one travel lane with angled parking added in the southern section of the corridor. The existing parallel parking lane in the northern section of the corridor converts to reclaimed greenspace.

Study Area / Corridor / Segment	Alternative	Description
	Two Travel Lanes and Reclaimed Greenspace	Maintains two travel lanes on Front Street. Existing on-street parking is removed to accommodate reclaimed green space in the southern section of the corridor.
2nd Street Corridor	Single Travel Lane and Chicane ★	Reduces 2nd Street to one travel lane with expanded parallel parking and wider sidewalks. Adds angled parking in the northern section of the corridor, along with a chicane for traffic calming.
	Single Travel Lane	Reduces 2nd Street to a single travel lane with angled parking in the northern section of the corridor.
	Two Travel Lanes and Raised Crosswalks	Maintains two travel lanes on 2nd Street and implements curb extensions and raised crosswalks.
Suffolk Avenue	Single Travel Lane ★	Reduces Suffolk Avenue to a single travel lane with widened sidewalks, parallel parking on the west side, and angled parking on the east side.
Railroad Avenue	Convert to Two-Way Traffic ★	Converts Railroad Avenue between Front Street and 2nd Street to two-way traffic and closes access to the northbound driveway adjacent to the Richlands Professional Building and Railroad Avenue.
Scott Street	Convert to Two-Way Traffic ★	Converts Scott Street to two-way traffic with one travel lane in each direction.
	Single Travel Lane with Sidewalk	Reduces Scott Street to a single lane of one-way southbound traffic and implements parallel parking on the west side and sidewalks on both sides of the street.
	Single Travel Lane with Angled Parking	Reduces Scott Street to a single lane of one-way southbound traffic and installs an angled parking lane and sidewalk on the east side of the street.

★ Advanced alternatives, or proposed aspects of future refined alternatives

1.7.2. Phase 1 Alternatives Summary

VJuST results for the US 460 Interchange study area are summarized in Table 23 and were presented at SWG Meeting #3, where the SWG decided which alternative concepts would move forward to Phase 2. The SWG agreed to carry nine alternatives across the two study areas forward to Phase 2 for further refinement. The nine alternatives include:

- Chicane at US 460 Interchange
- Curb Bulb-Outs and Enhanced Crosswalks
- Pavement Markings, Signage, and Traffic Signals
- 2nd Street Reconfiguration (Front Street to Railroad Avenue): One Travel Lane and One Angled Parking Lane
- Front Street Reconfiguration (Veterans Drive to 2nd Street): Two Travel Lanes and Two On-Street Parking Lanes
- Front Street Reconfiguration (Veterans Drive to 2nd Street): Two Travel Lanes, One Angled Parking Lane, and One Parallel Parking Lane
- Railroad Avenue Reconfiguration (2nd Street to Front Street): Convert to Two-Way Traffic
- Suffolk Avenue (Front Street to 2nd Street): One Travel Lane and Wider Parking Lanes
- Scott Street: Convert to Two-Way Traffic

The SWG eliminated alternatives from Phase 2 due to various constraints, including viability, impacts to right-of-way, and environmental constraints.

- The Peanut Roundabout alternative was eliminated due to high construction cost, concern with heavy vehicle traffic damaging mountable truck aprons, and topographical constraints.
- The RCUT alternative was eliminated due to right-of-way constraints and the difficulty of designing a loop to accommodate vehicles traveling toward the downtown area.
- The Chicane alternative was advanced for the US 460 Interchange Study Area due to the safety benefits it provides as a speed mitigation measure which mitigates the frequency and severity of angle collisions related to left turns from the westbound US 460 Ramp. Additionally, the Chicane alternative improves the limited sight distance of the study area attributed to road alignment and topography.
- For the Front Street corridor, the SWG favored advancing an alternative that reduces Front Street to a single travel lane with parallel parking on the north side and angled parking on the south side, as it maintains parking options within the Downtown. Alternatives that involved removing parking did not advance due to concerns about parking limitations.
- Similarly, the SWG favored reducing 2nd Street to a single travel lane with angled parking on the north side and parallel parking on the south side.
- The Chicane component of both Front Street and 2nd Street alternatives was advanced as a separate element to be included in Combination alternatives, as further detailed in Section 2.2.2. This was advanced due to the speed mitigation the Chicane provided.
- The Single Travel Lane alternative was advanced for Suffolk Avenue due to the additional width provided to the parallel and angled parking lanes.

- The conversion of Railroad Avenue to two-way traffic was advanced due to improved access and safety benefits related to preventing vehicles from making the northbound through maneuver using the private driveway at the Front Street at Iron Street/Railroad Avenue intersection.
- The conversion of Scott Street to two-way traffic was advanced due to improved access. However, the Single Travel Lane with Sidewalk and Single Travel Lane with Angled Parking alternatives were eliminated due to the SWG's preference for two-way traffic on Scott Street.

Table 24 and Table 25 summarize the alternatives considered in Phase 1 and gives the justification of if a concept were to move forward to Phase 2. Figure 42 and Figure 43 show the preliminary alternatives graphically categorized by the needs addressed by the alternative. Appendix B includes the Phase 1 Preferred Alternative Summary.

Table 23: VJuST Results–US 460 Interchange Study Area

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
TWSC	-	0.16		12	\$	TWSC - AM
TWSC	-	0.26		12	\$	TWSC - PM
Roundabout	-	0.11		6	\$\$	Roundabout - AM
Roundabout	-	0.18		6	\$\$	Roundabout - PM
Restricted Crossing U-Turn	-	0.13		8	\$\$	RCUT - AM
Restricted Crossing U-Turn	-	0.22		8	\$\$	RCUT - PM

Table 24: Phase 1 Alternatives to Move Forward to Phase 2 - US 460 Interchange Study Area

Study Area	Alternative	Move Forward to Phase 2?	Justification
US 460 Interchange Study Area	Peanut Roundabout	No	SWG expressed concerns with maintenance costs given the high heavy vehicle volume throughout the study area. Topography constraints also pose issues with construction.
	Chicane	Yes	Safety improvement
	Restricted Crossing U-Turn (RCUT)	No	SWG expressed concerns with the associated U-turn loon, which would not be large enough to accommodate heavy vehicles. There is a right-of-way constraint with private property.

Table 25: Phase 1 Alternatives to Move Forward to Phase 2 - Front Street / 2nd Street Study Area

Study Area / Corridor / Segment	Alternative	Move Forward to Phase 2?	Justification
Front Street / 2nd Street Study Area	Pavement Markings, Signage, and Traffic Signals	Yes	Safety improvement
Front Street Corridor	Curb Bulb-Outs and Enhanced Crosswalks	Yes	Safety improvement
	Roadway Reconfiguration: Two Travel Lanes	Yes	Safety improvement
	Roadway Reconfiguration: Single Travel Lane	Yes	Safety improvement
	Chicane	Yes	Safety improvement
2nd Street Corridor	Curb Bulb-Outs and Enhanced Crosswalks	Yes	Safety improvement
	Roadway Reconfiguration (Front Street to Railroad Avenue): One Travel Lane and One Angled Parking Lane	Yes	Safety improvement
	Chicane	Yes	Safety improvement
Railroad Avenue (2nd Street to Front Street)	Roadway Reconfiguration: Two-Way Traffic	Yes	Access and safety improvement
Suffolk Avenue (Front Street to 2nd Street)	Roadway Reconfiguration: One-Way Traffic with Widened Parking	Yes	Safety improvement
Scott Street	Roadway Reconfiguration: Two-Way Traffic	Yes	Access improvement
	Roadway Reconfiguration: Single Travel Lane with Sidewalk	No	SWG felt the inclusion of a sidewalk was unnecessary for the context of the area and preferred a two-way traffic alternative for Scott Street.
	Roadway Reconfiguration: Single Travel Lane with Angled Parking	No	SWG preferred a two-way traffic alternative for Scott Street.



Figure 42: Phase 1 Scoping Level Improvements Alternatives - US 460 Interchange Study Area

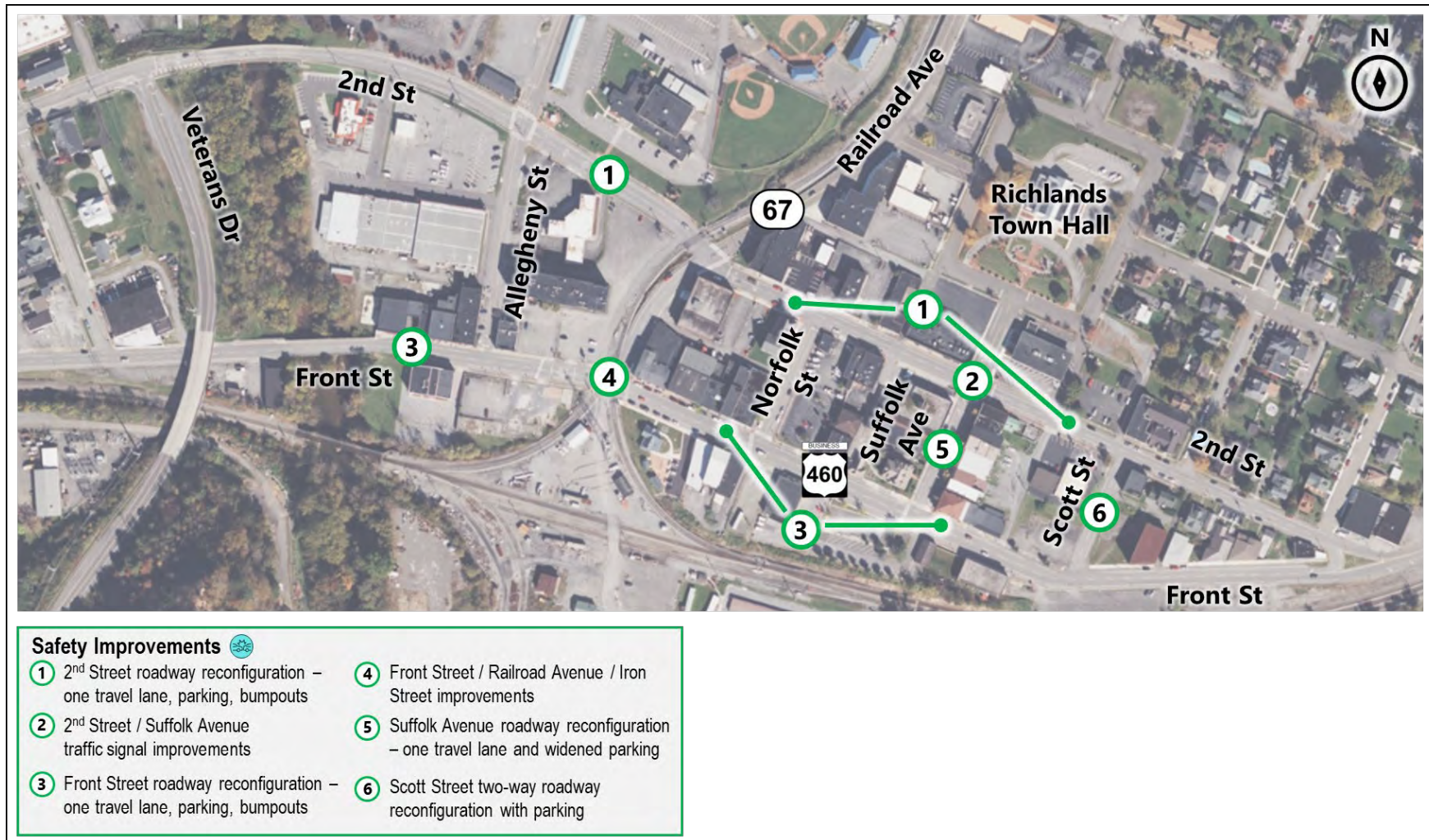


Figure 43: Phase 1 Scoping Level Improvements Alternatives – Front Street / 2nd Street Study Area

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, and concept screening traffic operations and safety analysis. The primary goal of the Phase 2 alternatives refinement effort was to present feasible alternatives to the public to obtain feedback and ultimately select a preferred alternative. VHB evaluated alternatives across several metrics, including traffic operations, safety, pedestrian and bicycle access, and cost.

SWG Meeting #4/5 was held on November 20, 2025, on Mural, an online platform.³ VHB presented revised concept sketches, cost estimates, and concept screening results to receive feedback from the SWG. The SWG analyzed the alternatives based on impacts to safety, traffic operations, cost, and right-of-way. The meeting concluded with the SWG selecting the concepts to be shared during public outreach.

2.2 Phase 2 Alternatives

The SWG advanced one alternative for the US 460 Interchange study area and 11 alternatives for the Front Street / 2nd Street study area to Phase 2. The following section gives a description of each of the alternatives, provides a conceptual sketch of the alternative, and a summary of results from a screening-level traffic operations analysis and safety analysis, if applicable.

2.2.1. US 460 Interchange Study Area

Chicane

This alternative proposes installing curb extensions and pavement markings to develop a chicane on both northbound and southbound Railroad Avenue / Big Creek Road approaches to the US 460 / Railroad Avenue / Big Creek Road interchange. This configuration would reduce Route 67 from two existing through lanes to one through lane in each direction. The proposed improvements will accommodate all interchange traffic, including large trucks. Figure 44 presents a conceptual sketch of the alternative.

12 crashes, nine of which were angle collisions, occurred from 2020 to 2024. The chicane would narrow the road and introduce slight curves to reduce traffic speeds for Route 67 by facilitating drivers to travel the posted 25 MPH speed limit through the Exit 2 interchange. By encouraging lower speeds and increased driver awareness, the alternative would mitigate the frequency and severity of angle collisions related to left turns.

³<https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1762520550635/f36299e7a70b8a72329f0554f8a2c77b1b585fb1>



Figure 44: Phase 2 Alternative—US 460 Interchange Chicane

2.2.2. Front Street / 2nd Street Study Area

Intersection Improvements

Curb Bulb-Outs and Enhanced Crosswalks

This alternative would install curb bulb-outs and enhanced crosswalks at select intersections and mid-block locations along Front Street and 2nd Street. Curb bulb-outs extend the curb line into the on-street parking lane, reducing pedestrian crossing distances and improving sight lines between drivers and pedestrians. In combination with new or upgraded crosswalks, these treatments would improve pedestrian visibility, highlight key crossing locations, and provide traffic-calming benefits by visually narrowing the roadway and encouraging lower vehicle speeds. This alternative is included as part of Combination 1 and Combination 2 for town-wide implementation combinations. Figure 51 and Figure 52 presents a conceptual sketch of the combination and potential locations where curb bulb-outs and enhanced crosswalks can be implemented.

Pavement Markings, Signage, and Traffic Signals

This alternative proposes targeted upgrades to pavement markings, signage, and traffic signals along Front Street and 2nd Street. These improvements are intended to improve the quality and clarity of information conveyed to road users.

Front Street and 2nd Street Reconfigurations

The study developed three roadway reconfiguration concepts for sections of 2nd Street and Front Street to calm traffic, improve safety, and enhance pedestrian and parking access to local businesses.

Front Street varies in width throughout the Town of Richlands, ranging from 42 feet between Veterans Drive and Railroad Avenue to 50 feet between Railroad Avenue and Scott Street. Despite this variance in width, Front Street maintains two wide travel lanes and two parallel, on-street parking lanes in the existing condition from Veterans Drive to 2nd Street.

2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane

This concept would convert the two existing parallel parking lanes to one 21-foot angled parking lane on the north side of the corridor and reduce the existing two travel lanes to a proposed one 11-foot travel lane.

By converting 2nd Street to a single, narrower travel lane, the alternative would act as a speed management countermeasure. A comparison of the typical sections of the existing and proposed conditions can be found in Figure 45.

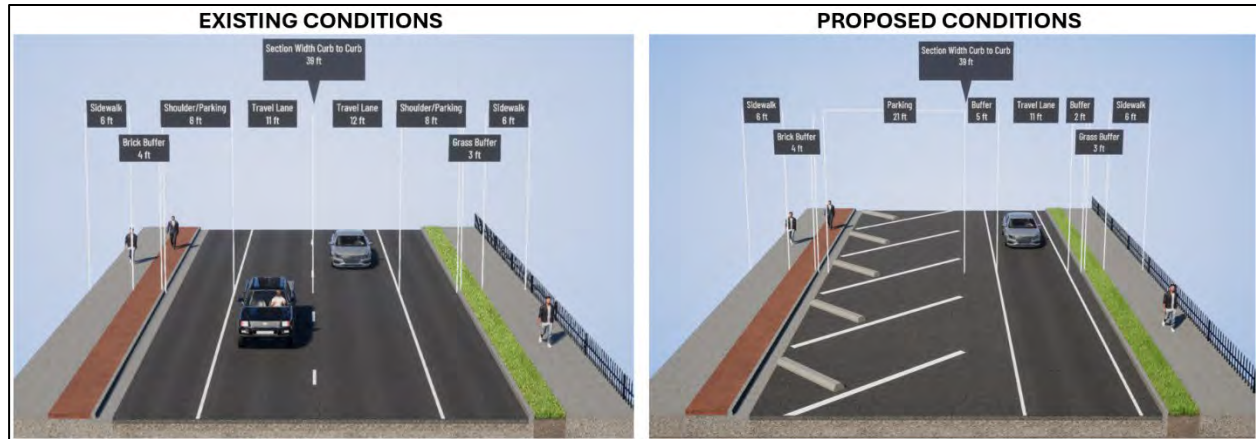


Figure 45: 2nd Street Typical Section Comparison

Front Street Reconfiguration (Veterans Drive to 2nd Street): Two Travel Lanes and On-Street Parking Options

This concept would restripe lane markings to narrow the existing two Front Street travel lanes from 13 feet to 12 feet. Parking options vary by width of the roadway. From Veterans Drive to Railroad Avenue, the concept proposes adding additional width to the on-street parking lanes of both sides of the corridor. From Railroad Avenue to Scott Street, the concept proposes converting the on-street parking lanes to one angled parking lane on the north side of the corridor. By narrowing the travel lanes on Front Street, the alternative would act as a speed management countermeasure. A comparison of the typical sections of the existing and proposed conditions for the Veterans Drive to Railroad Avenue segment and Railroad Avenue to Scott Street segment can be found in Figure 46.

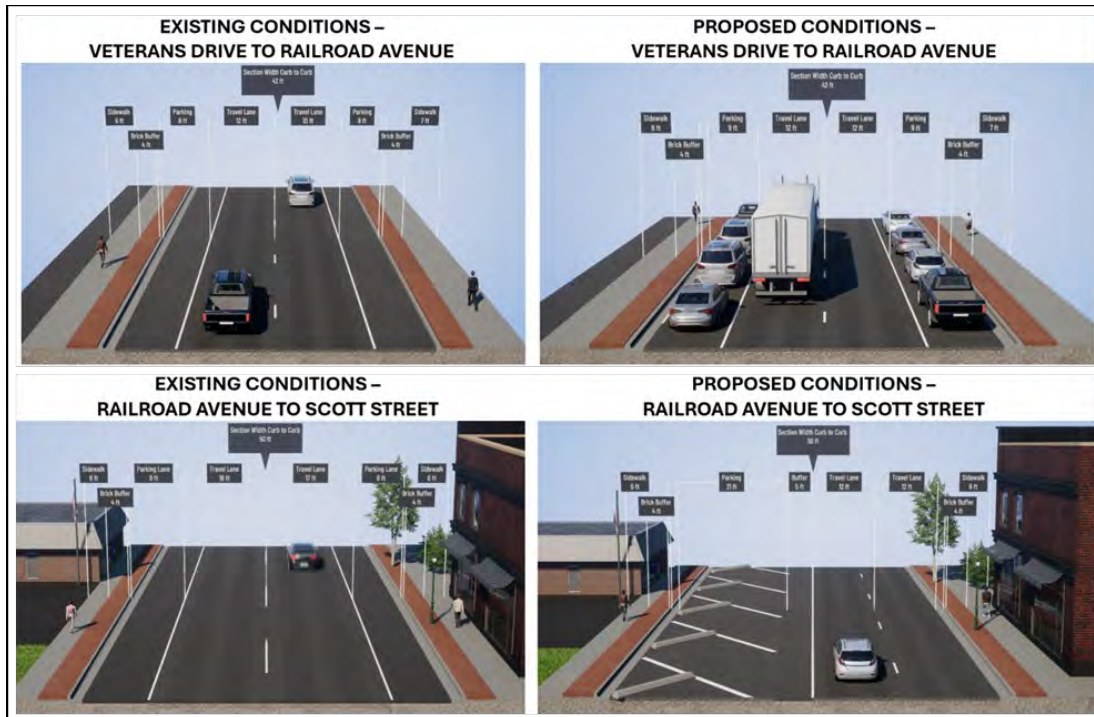


Figure 46: Front Street Typical Section Comparison—2 Travel Lanes & 2 On-Street Parking Lanes

Front Street Reconfiguration (Veterans Drive to 2nd Street): One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane

This concept would reduce the existing two travel lanes to the proposed one travel lane to accommodate for an angled parking lane on the north side of the corridor. An existing on-street parking lane on the south side of the corridor is maintained in this alternative. The Railroad Avenue to Scott Street segment would add a three-foot buffer between the on-street parking lane and travel lane. By reducing the number of travel lanes on Front Street, the alternative would act as a speed management countermeasure. A comparison of the typical sections of the existing and proposed conditions for the Veterans Drive to Railroad Avenue segment and Railroad Avenue to Scott Street segment can be found in Figure 47.

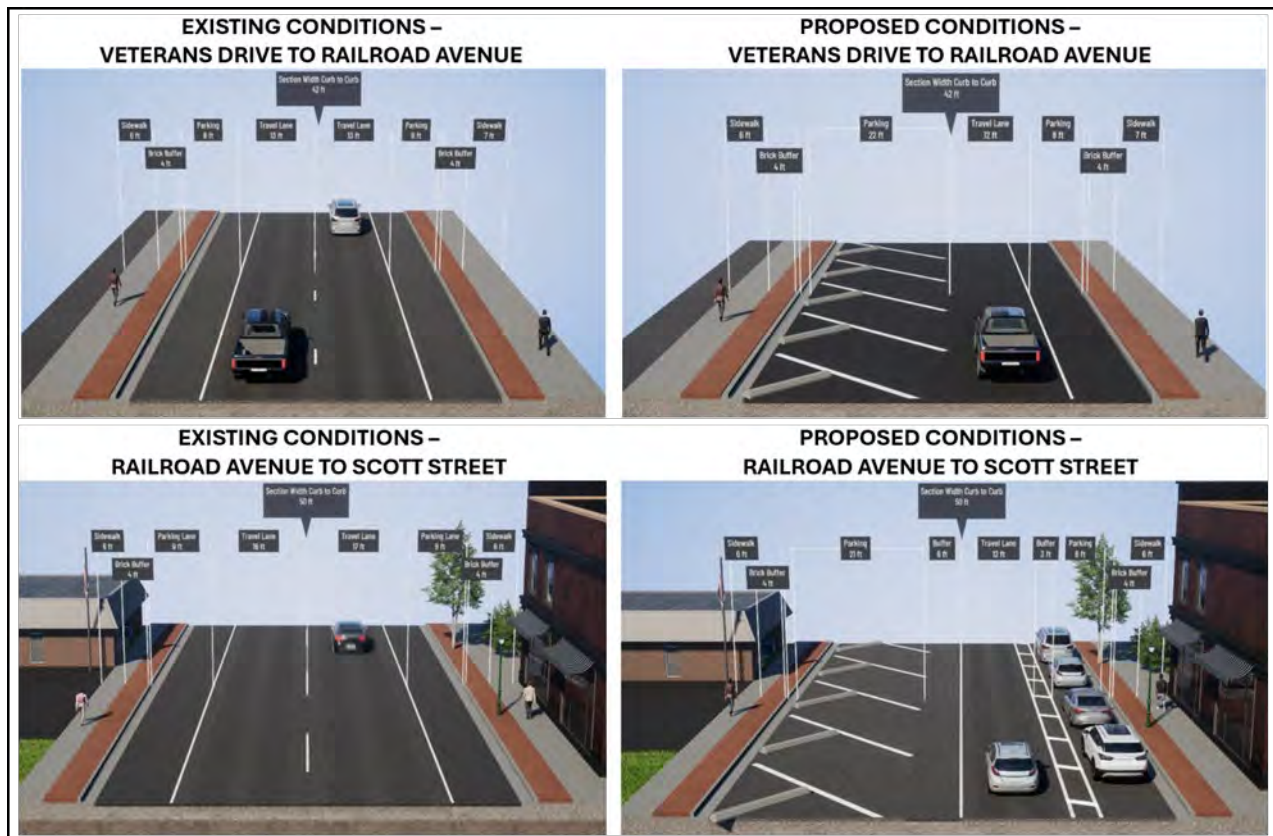


Figure 47: Front Street Typical Section Comparison—One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane

Railroad Avenue, Suffolk Avenue, and Scott Street Reconfigurations

Railroad Avenue Reconfiguration (2nd Street to Front Street): Convert to Two-Way Traffic

This concept would convert Railroad Avenue between 2nd Street and Front Street from two existing one-way southbound lanes to a two-way street with one travel lane in each direction. In existing conditions, Railroad Avenue is a two-way street north of 2nd Street and south of Front Street. Thus, this alternative would match the cross-section of the rest of Railroad Avenue. The existing through movement at the Front Street / Iron Street / Railroad Avenue intersection is accommodated. A comparison of the typical sections of the existing and proposed conditions can be found in Figure 48.

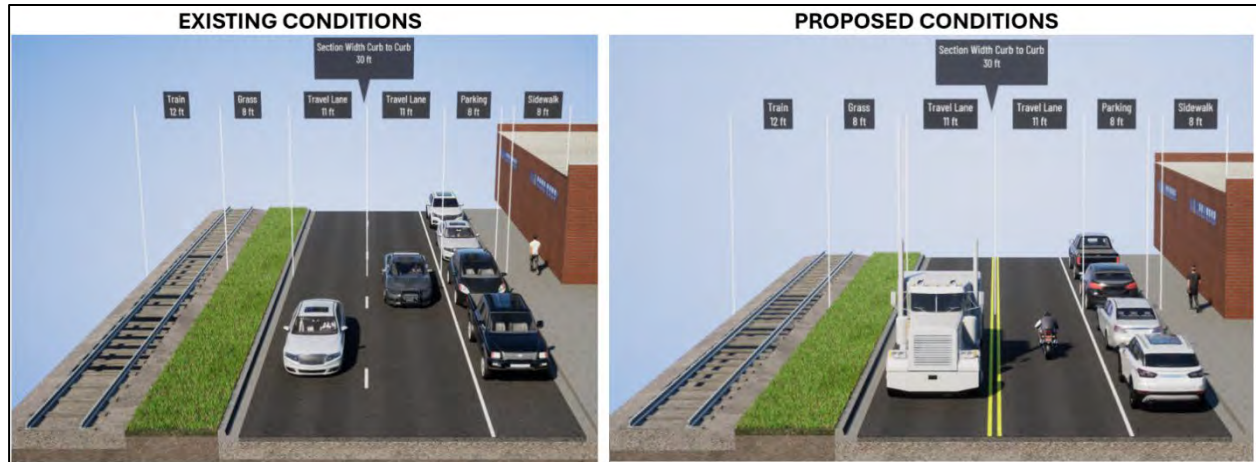


Figure 48: Railroad Avenue Typical Section Comparison

Suffolk Avenue (Front Street to 2nd Street): One Travel Lane and Wider Parking Lanes

This concept would reconfigure Suffolk Avenue between Front Street and 2nd Street from two existing narrow travel lanes, a parallel parking lane, and a narrow angled parking lane to one wider travel lane, a parallel parking lane, and a standard width angled parking lane. The angled parking lane would flip from the west side of the roadway to the east side of the roadway to better align the 2nd Street traffic signal with the northbound travel lane. By reducing the number of travel lanes on Suffolk Avenue, the alternative would act as a speed management countermeasure. A comparison of the typical sections of the existing and proposed conditions can be found in Figure 49.

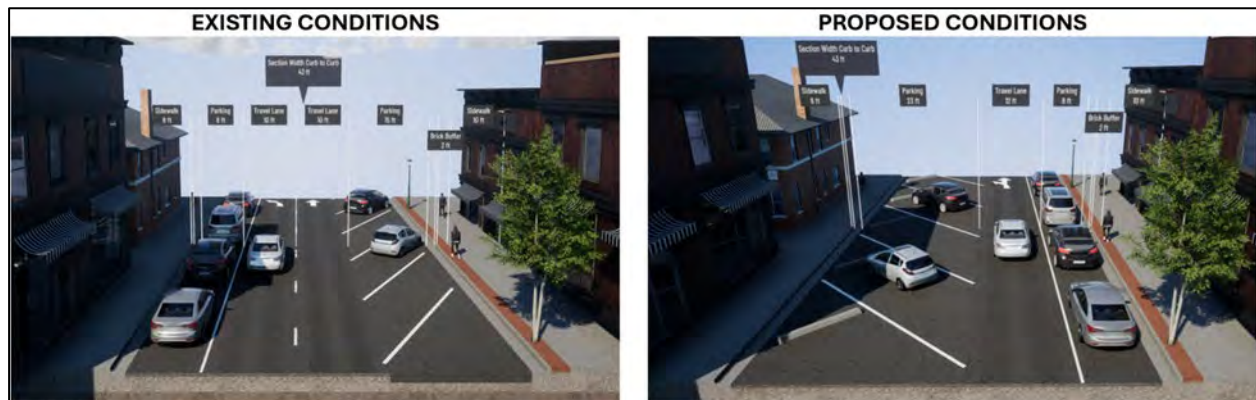


Figure 49: Suffolk Avenue Typical Section Comparison

Scott Street: Convert to Two-Way Traffic

This concept would convert Scott Street from two existing one-way southbound lanes to a two-way street with one travel lane in each direction. Converting Scott Street to two-way traffic would help improve connectivity. A comparison of the typical sections of the existing and proposed conditions can be found in Figure 50.

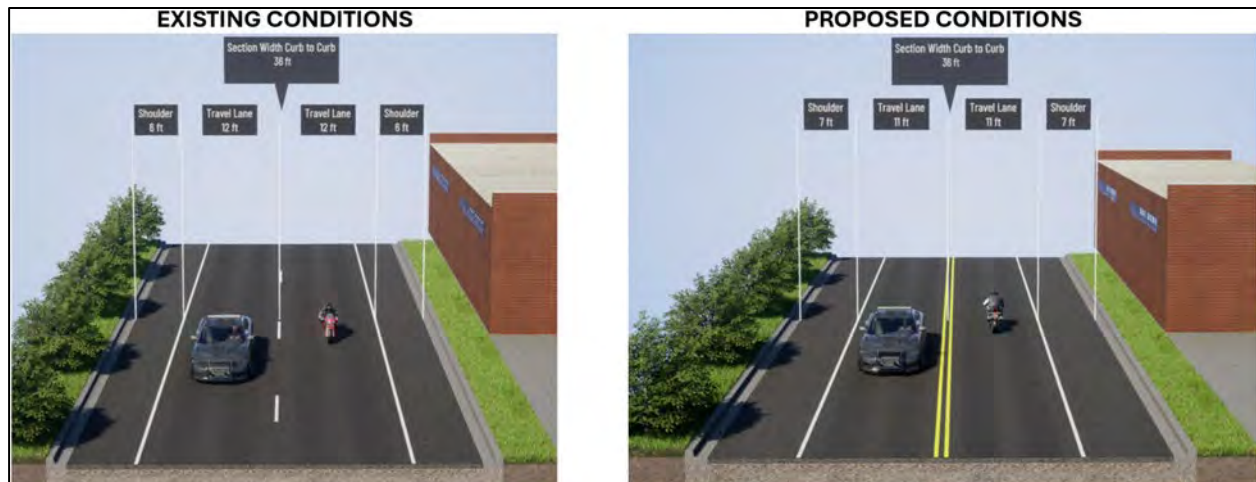


Figure 50: Scott Street Typical Section Comparison

Townwide Implementation Combinations

The intersection or street improvement concepts could be combined to create a project that enhances all downtown Richlands. The study team prepared two possible combinations to visualize what such a project could look like; however, these two graphics do not represent the only possible project combinations.

Combination 1

The first combination visualizes the following improvement features:

- Reconfigure 2nd Street with one travel lane and an angled parking lane
- Reconfigure Front Street with one travel lane, an angled parking lane, and a parallel parking lane
- Reconfigure Railroad Avenue to allow two-way traffic between 2nd Street and Front Street
- Reconfigure Suffolk Avenue with one travel lane, a wider angled parking lane, and a parallel parking lane
- Reconfigure Scott Street to allow two-way traffic between 2nd Street and Front Street
- Intersection improvements including curb bulb-outs, enhanced crosswalks, improved pavement markings, and traffic signal upgrades.
- Extend sidewalk adjacent to Railroad Avenue at 2nd Street and Front Street

This proposed combination would provide a similar number of parking spaces currently within downtown Richlands. Figure 51 presents a conceptual sketch of the combination.

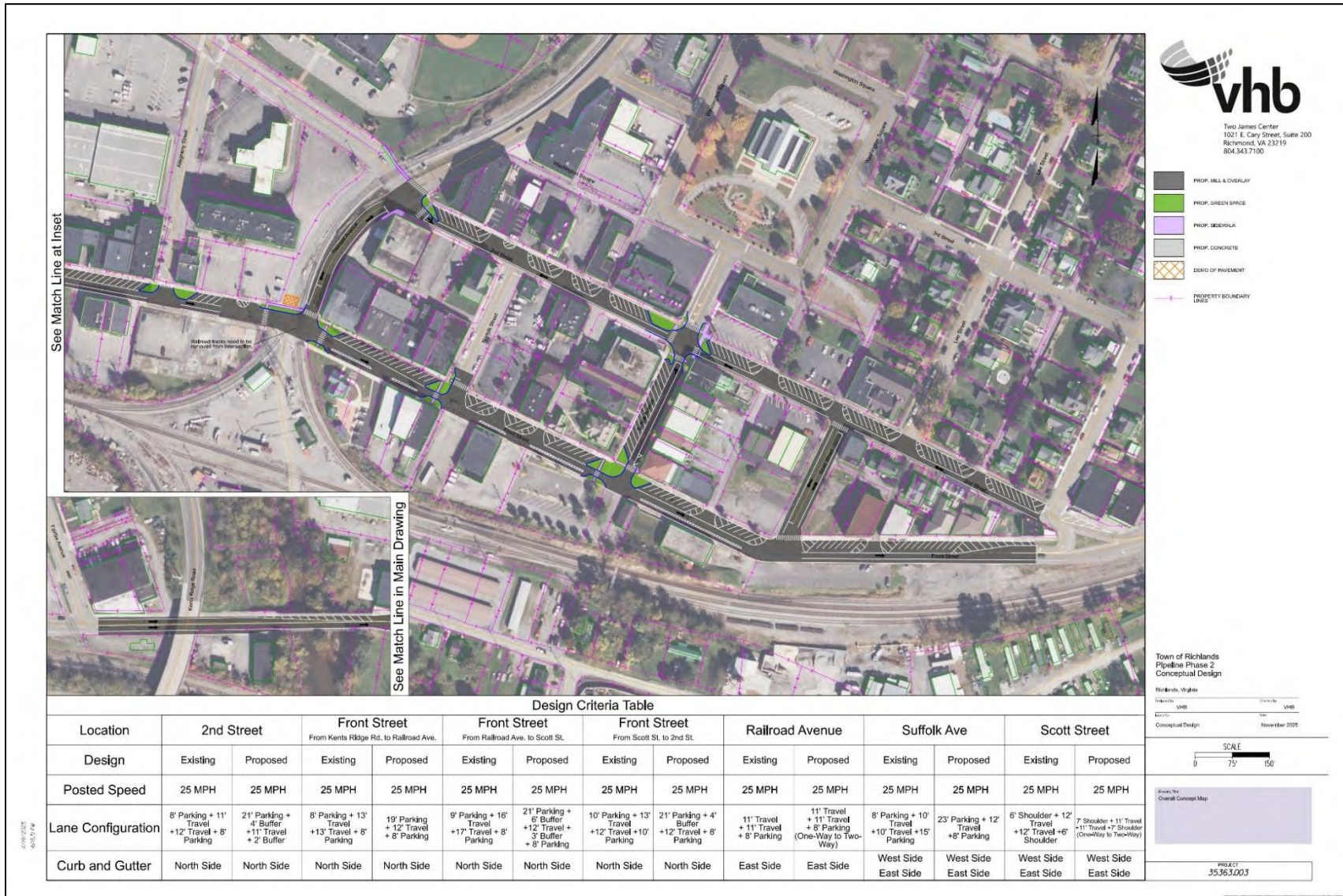


Figure 51: Townwide Implementation—Combination 1

Combination 2

The second combination specifically focuses on reducing vehicle speeds and improving pedestrian safety and visibility. The second combination visualizes the following improvement features:

- Install a chicane throughout the 2nd Street and Front Street corridors.
 - Maintain angled and parallel parking where feasible.
 - Include curb extensions to provide wider sidewalks and green space.
- Reconfigure 2nd Street and Front Street to only include one travel lane.

The chicane treatment would include curbside constrictions on alternating sides of the street to introduce an S-shape travel path on an otherwise straight section of street. Wider sidewalks are also proposed to support pedestrian activity and overall streetscape function and placemaking for the downtown area. The chicane reconfiguration of 2nd Street and Front Street would result in the loss of approximately one-third of the existing parking spaces along those streets. Figure 52 presents a conceptual sketch of the combination.

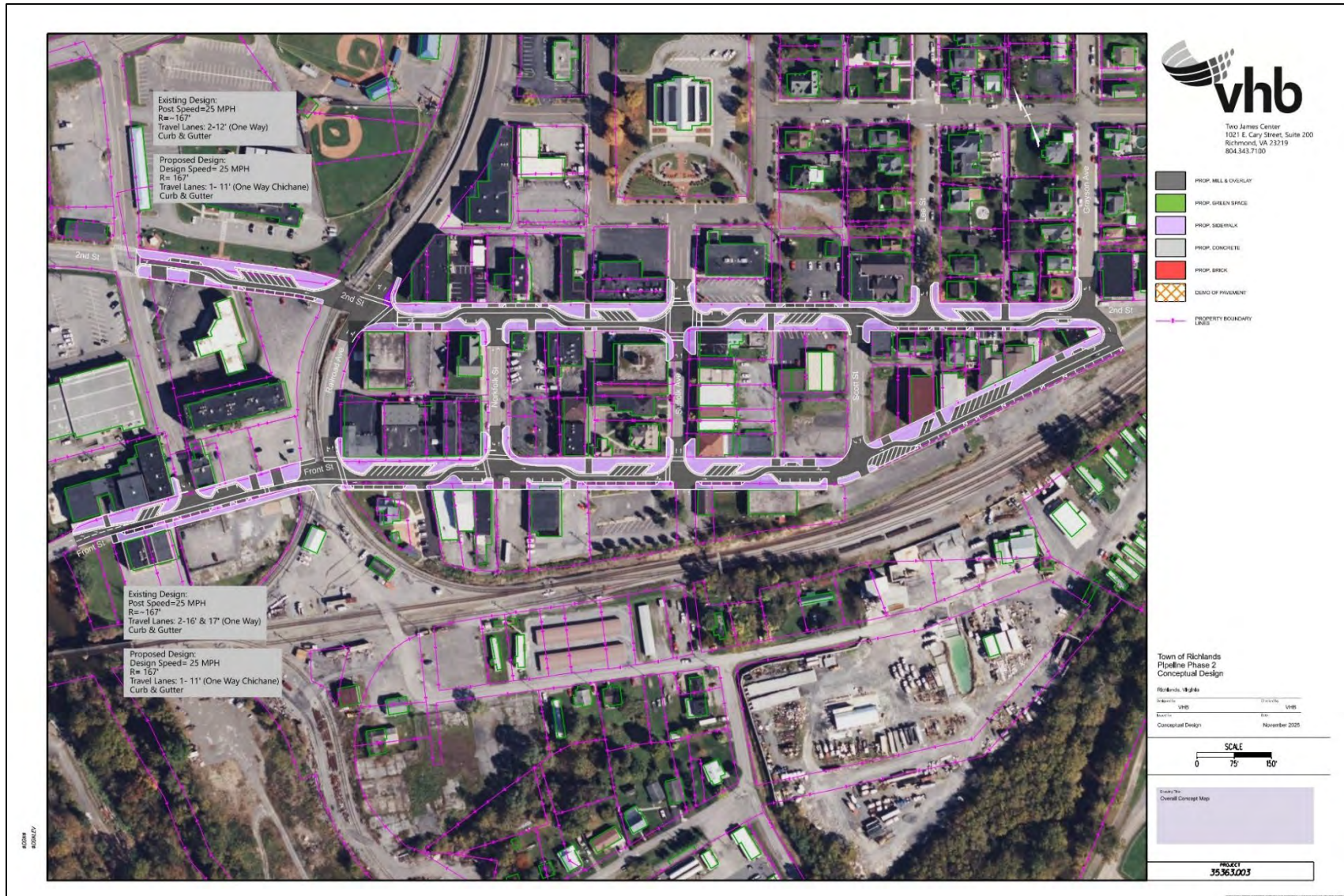


Figure 52: Townwide Implementation—Combination 2

2.3 Traffic Operations and Safety Results

The study team conducted a screening-level traffic operations analysis and safety analysis to further refine the alternatives considered.

Anticipated Traffic Operations Results for Alternatives

Intersection operations were evaluated to compare projected operations between the different alternatives using *Synchro 11*. The study team analyzed AM and PM future year (2041) traffic volumes to evaluate the operational benefits of the alternatives. Movement delay (seconds per vehicle), approach delay (seconds per vehicle), and 95th percentile queues (feet) were used as measures of effectiveness. *SimTraffic* was used to evaluate queue lengths to accurately capture queue lengths given the downtown context and proximity of intersections in the Front Street / 2nd Street study area.

Table 26 and Table 29 summarize the traffic operations results for the proposed alternatives in both study areas compared to No-Build conditions. Similar trends in delay and queuing were observed under Build conditions as under No-Build conditions. Under Build conditions, all intersections operated at LOS C or better during both AM and PM peak hours, with the 2nd Street at Veterans Drive intersection being the only location operating at LOS C during both peak periods. All intersection approaches operated at LOS C or better during both AM and PM peak hours. The greatest movement delay across both study areas occurred at the eastbound right turning movement at the 2nd Street at Veterans Drive intersection, with 30.8 seconds per vehicle during the AM peak hour and 31.9 seconds per vehicle during the PM peak hour.

Queue results for the alternatives are presented in Table 27 and Table 30. The greatest 95th percentile queue length across both study areas occurred at the westbound left/through movement at the 2nd Street at Veterans Drive intersection, with 208 feet during the AM peak hour and 249 feet during the PM peak hour. The proposed alternatives are expected to accommodate projected 95th percentile queues without extending to upstream intersections.

Table 28 and Table 31 show the change in intersection delay under Build conditions compared to No-Build conditions for both AM and PM peak hours. Although some intersections experienced minimal increases in delay, no significant operational constraints were identified under Build conditions. The largest increase in intersection delay occurred at the 2nd Street at Veterans Drive intersection, with 2.6 seconds per vehicle in the AM peak hour and 4.1 seconds per vehicle in the PM peak hour. Full Build Conditions *Synchro* and *SimTraffic* results can be found in Appendix D.

Table 26: 2041 Build Conditions Peak Hour Control Delay and LOS—US 460 Interchange Study Area

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	Big Creek Road at Kentucky Avenue	Unsignalized	Left					Kentucky Avenue					Big Creek Road				Big Creek Road				Intersection				
			Through																	A (0.5)	A (0.4)				
			Right					8.5				A	8.6	A	-				-			-	-	-	
			Approach					8.5				A	8.6	A	-				-			-	-	-	
2	Railroad Avenue/Big Creek Road at WB US 460	Unsignalized	Left					WB US 460 Ramp					Railroad Avenue				Big Creek Road					Intersection			
			Through					9.6				A	9.8	A	-				-	-	-	-	A (5.2)	A (6.2)	
			Right					9.6				A	9.8	A	-				-	-	-	-			
			Approach					9.6				A	9.8	A	-				-	-	-	-			
3	Railroad Avenue at EB US 460	Unsignalized	Left					EB US 460 Ramp					Railroad Avenue				Railroad Avenue				Intersection				
			Through					9.8				A	9.7	A	-				-	-	-	-	A (2)	A (1.3)	
			Right					9.8				A	9.7	A	-				-	-	-	-			
			Approach					9.8				A	9.7	A	-				-	-	-	-			
-	No delay or level of service provided by Synchro. Movement exists.																								
-	Approach or movement does not exist.																								

Table 27: 2041 Build Conditions Peak Hour 95th Percentile Queues—US 460 Interchange Study Area

Intersection Number and Description		Type of Control	Lane Group	Eastbound		Westbound		Northbound		Southbound	
				AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay
1	Big Creed Road at Kentucky Avenue	Unsignalized	Left			Kentucky Avenue		Big Creek Road		Big Creek Road	
			Through					-	-	-	-
			Right					20	16	-	-
2	Railroad Avenue/Big Creek Road at WB US 460	Unsignalized	Left			WB US 460 Ramp		Railroad Avenue		Big Creek Road	
			Through			64	86	-	4	12	11
			Right			64	86			-	-
3	Railroad Avenue at EB US 460	Unsignalized	Left			EB US 460 Ramp		Railroad Avenue		Railroad Avenue	
			Through			42	39	-	7	27	28
			Right			42	39			-	-
No queue length provided by SimTraffic report. Movement exists											
Approach or movement does not exist											

Table 28: Change in Intersection Delay—US 460 Interchange Study Area

Intersection	Alternative	AM Peak Hour Change in Delay (s/veh)	PM Peak Hour Change in Delay (s/veh)
Big Creek Rd / Kentucky Ave	Chicane	0.0	0.0
Railroad Ave / Big Creek Rd / WB US 460		+0.1	+0.2
Railroad Ave / EB US 460		0.0	0.0

Table 29: 2041 Build Conditions Peak Hour Control Delay and LOS—Front Street/2nd Street Study Area

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	2nd Street at Veterans Drive	Signalized		2nd Street				2nd Street				Veterans Drive								Intersection	
			Left					22.4	C	24.1	C	10.5	B	12	B					C (21.6)	C (23.5)
			Through					22.4	C	24.1	C										
			Right																		
Approach	30.8	C	31.9	C	22.4	C	24.1	C	10.5	B	12	B									
2	2nd Street at Allegheny Street	Unsignalized		2nd Street				Allegheny Street				Allegheny Street				Intersection					
			Left					-	-	-	-	12.1	B	15.3	C	12.6	B	14.7	B	A (2.2)	A (3)
			Through					-	-	-	-	12.1	B	15.3	C						
			Right					-	-	-	-					11	B	11.9	B		
Approach	-	-	-	-	12.1	B	15.3	C	11.5	B	13	B									
3	2nd Street at Railroad Avenue	Signalized		2nd Street				Railroad Avenue				Railroad Avenue				Intersection					
			Left					9.6	A	14.1	B	12.4	B	11.7	B	12.4	B	11.9	B	B (10.9)	B (13.1)
			Through									12.4	B	11.7	B						
			Right													12.4	B	11.9	B		
Approach	9.6	A	14.1	B	12.4	B	11.7	B	12.4	B	11.9	B									
4	2nd Street at Norfolk Street	Unsignalized		2nd Street				Norfolk Street				Driveway				Intersection					
			Left					-	-	-	-	10.5	B	11.2	B	10.3	B	10.6	B	A (0.3)	A (0.6)
			Through					-	-	-	-	10.5	B	11.2	B	10.3	B	10.6	B		
			Right					-	-	-	-					10.3	B	10.6	B		
Approach	-	-	-	-	10.5	B	11.2	B	10.3	B	10.6	B									
5	2nd Street at Suffolk Avenue	Signalized		2nd Street				Suffolk Avenue				Suffolk Avenue				Intersection					
			Left									26.6	C	21.1	C	B (10.5)		B (16.4)			
			Through					7.7	A	14.3	B	26.6	C	21.1	C						
			Right					7.7	A	14.3	B			29.2	C				30.1	C	
Approach	7.7	A	14.3	B	26.6	C	21.1	C	29.2	C	30.1	C									
6	2nd Street at Scott Street	Unsignalized		2nd Street				Scott Street								Intersection					
			Left					-	-	-	-					10.5	B	11.2	B	A (0.3)	A (0.4)
			Through																		
			Right																		
Approach					10.5	B	11.2	B													
7	Front Street at Allegheny Street	Unsignalized		Front Street								Allegheny Street				Intersection					
			Left	-	-	-	-					11	B	11.8	B	A (0.9)	A (1.4)				
			Through	-	-	-	-														
			Right	-	-	-	-														
Approach	-	-	-	-	11	B	11.8	B													
8	Front Street at Iron Street/Railroad Avenue	Unsignalized		Front Street				Iron Street				Railroad Avenue				Intersection					
			Left	-	-	-	-	11.5	B	12.7	B	11	B	12.1	B	A (1.9)	A (2.2)				
			Through	-	-	-	-	11.5	B	12.7	B	11	B	12.1	B						
			Right	-	-	-	-	11.5	B	12.7	B										
Approach	-	-	-	-	11.5	B	12.7	B	11	B	12.1	B									
9	Front Street at Norfolk Street	Unsignalized		Front Street								Norfolk Street				Intersection					
			Left	-	-	-	-					10.2	B	10.9	B	A (0.4)	A (0.4)				
			Through	-	-	-	-														
			Right	-	-	-	-														
Approach	-	-	-	-	10.2	B	10.9	B													
10	Front Street at Suffolk Avenue	Unsignalized		Front Street				Driveway								Intersection					
			Left	-	-	-	-	-	-	11.3	B					A (0)	A (0.3)				
			Through	-	-	-	-														
			Right	-	-	-	-	-	-	11.3	B										
Approach	-	-	-	-	-	-	11.3	B													
11	Front Street at Scott Street	Unsignalized		Front Street								Scott Street				Intersection					
			Left	-	-	-	-					-	-	9.6	A	A (0)	A (0.2)				
			Through	-	-	-	-														
			Right	-	-	-	-														
Approach	-	-	-	-	-	-	9.6	A													
12	Front Street at 2nd Street	Unsignalized		Front Street				Front Street													
			Left	-	-	-	-	-	-	-	-										
			Through	-	-	-	-														
			Right	-	-	-	-														
Approach	-	-	-	-	-	-	-	-	-												
- No delay or level of service provided by Synchro. Movement exists.																					
Approach or movement does not exist.																					

Table 30: 2041 Build Conditions Peak Hour 95th Percentile Queues—Front Street / 2nd Street Study Area

Intersection Number and Description		Type of Control	Lane Group	Eastbound		Westbound		Northbound		Southbound	
				AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay	AM Delay	PM Delay
1	2nd Street at Veterans Drive	Signalized	Left	2nd Street		2nd Street		Veterans Drive			
			Through			208	249	40	39		
			Right	-	-						
2	2nd Street at Allegheny Street	Unsignalized	Left			2nd Street		Allegheny Street		Allegheny Street	
			Through			2	6	50	60	31	42
			Right							50	51
3	2nd Street at Railroad Avenue	Signalized	Left			2nd Street		Railroad Avenue		Railroad Avenue	
			Through			142	171	39	52		
			Right							63	94
4	2nd Street at Norfolk Street	Unsignalized	Left			2nd Street		Norfolk Street		Driveway	
			Through			13	24	15	16		
			Right							22	35
5	2nd Street at Suffolk Avenue	Signalized	Left			2nd Street		Suffolk Avenue		Suffolk Avenue	
			Through			120	153	49	69		
			Right							23	39
6	2nd Street at Scott Street	Unsignalized	Left			2nd Street		2nd Street			
			Through			-	-	30	31		
			Right			-	-				
7	Front Street at Allegheny Street	Unsignalized		Front Street						Allegheny Street	
			Left	-	-					49	49
			Through	-	-						
8	Front Street at Iron Street/Railroad Avenue	Unsignalized	Left	Front Street				Iron Street		Railroad Avenue	
			Through	2	6					55	61
			Right					39	41		
9	Front Street at Norfolk Street	Unsignalized	Left	Front Street						Norfolk Street	
			Through	-	-					36	30
			Right	-	-						
10	Front Street at Suffolk Avenue	Unsignalized	Left	Front Street				Driveway			
			Through	-	6						
			Right					18	59		
11	Front Street at Scott Street	Unsignalized	Left	Front Street						Scott Street	
			Through	-	-					-	19
			Right	-	-						
12	Front Street at 2nd Street	Unsignalized	Left	Front Street		Front Street					
			Through	17	32						
			Right			-	4				
-	No queue length provided by SimTraffic report. Movement exists										
	Approach or movement does not exist										

Table 31: Change in Intersection Delay—Front Street / 2nd Street Study Area

Intersection	Alternative	AM Peak Hour Change in Delay (s/veh)	PM Peak Hour Change in Delay (s/veh)
2nd Street at Veterans Drive	2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane	+2.6	+4.1
2nd Street at Allegheny Street	2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane	+0.1	+0.3
2nd Street at Railroad Avenue	2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane / Railroad Avenue Reconfiguration (2nd Street to Front Street): Convert to Two-Way Traffic	+1.0	+1.5
2nd Street at Norfolk Street	2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane	-1.0	-1.3
2nd Street at Suffolk Avenue	2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane / Suffolk Avenue: One Travel Lane and Wider Parking Lanes	+0.7	+1.6
2nd Street at Scott Street	2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane Scott Street: Convert to Two-Way Traffic	N/A	N/A
Front Street at Allegheny Street	Front Street Reconfiguration: One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane	0.0	+0.2
Front Street at Iron Street/Railroad Avenue	Front Street Reconfiguration: One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane Railroad Avenue Reconfiguration (2nd Street to Front Street): Convert to Two-Way Traffic	+0.1	+0.2
Front Street at Norfolk Street	Front Street Reconfiguration: One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane	0.0	+0.1

Front Street at Suffolk Avenue	Front Street Reconfiguration: One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane Suffolk Avenue: One Travel Lane and Wider Parking Lanes	0.0	0.0
Front Street at Scott Street	Front Street Reconfiguration: One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane Scott Street: Convert to Two-Way Traffic	N/A	N/A
Front Street at 2nd Street	Front Street Reconfiguration: One Travel Lane, One Angled Parking Lane, and One Parallel Parking Lane 2nd Street Reconfiguration: One Travel Lane and One Angled Parking Lane	N/A	N/A

Anticipated Crash Reduction for Alternatives

The study team reviewed Crash Modification Factors (CMFs) to determine the potential safety benefits for each alternative. CMFs are used to 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.

US 460 Interchange Study Area

While chicane installation is not explicitly listed in the SMART SCALE Round 7 Planning Level CMF List, the most applicable CMF is Install Traffic Calming Measures, which has an associated value of 0.89. Based on 12 crashes within the study area over the five-year analysis period, the calculated annual crash reduction is 0.26 crashes per year. The project would also enhance driver sight distance within the study area and provide pedestrian accommodations; however, no pedestrian-related crashes occurred during the study period.

Front Street / 2nd Street Study Area

Similarly, many of the proposed roadway reconfiguration alternatives for the Front Street / 2nd Street Study Area are not explicitly listed in the SMART SCALE Round 7 Planning Level CMF List. The study team believes the proposed alternatives align with two applicable CMFs: Install Traffic Calming Measures (CMF of 0.89) and Install Pedestrian or Bicyclist Accommodations (Targeted CMF). Applying the traffic calming CMF to the 44 crashes within the study area over the five-year analysis period yields a calculated annual

crash reduction of 0.97 crashes per year. One pedestrian-related crash occurred in the study area during the study period.

2.4 Phase 2 Public Involvement

The Phase 2 PublicInput survey was held from December 8, 2025, to December 29, 2025, to collect feedback on the potential improvements within the study areas. The PublicInput survey provided the study team with an understanding of how the public viewed each alternative before selecting the preferred option. In total, 88 respondents participated in the survey and submitted a total of 87 written comments.

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

Survey Results by Alternative

Survey respondents were asked to rate the alternatives from strongly opposed to strongly support. Figure 53 summarizes the average score for each alternative presented in the survey. An average score of five corresponds with strong support while an average score of one corresponds with strong opposition. Table 32 presents public involvement feedback themes associated with the proposed alternatives. Table 33 shows how each alternative was ranked by survey participants. Detailed survey results are shown in Appendix E.

2.4.1. US 460 Interchange Study Area

Chicane

The Chicane concept received an average rating of 2.65, with support from 32% of respondents (28 respondents). Multiple respondents indicated that the alternative did not adequately address safety concerns within the study area, specifically citing aggressive driving behaviors. Some noted that narrowing the roadway could exacerbate aggressive driving conditions. Supporters of the concept emphasized that the existing roadway has too many lanes for the context of the area.

2.4.2. Front Street / 2nd Street Study Area

The following section provides a summary of public feedback received for alternatives within the Front Street / 2nd Street Study Area in downtown Richlands. Multiple comments expressed hesitancy to proposed changes, explaining that the Front Street bridge project should be completed before additional projects are proposed. Additional details on the Front Street Bridge project can be found in Section 1.1.

Intersection Improvements

Survey respondents ranked both the Curb Bulb-Outs and Enhanced Crosswalks concept and the Pavement Markings, Signage, and Traffic Signals concept favorably, with each receiving an average score above three. The Pavement Markings, Signage, and Traffic Signals concept received stronger support, with an average rank of 4.14 and support from 73% of respondents (48 respondents). In comparison, the Curb

Bulb-Outs and Enhanced Crosswalks concept received an average rank of 3.28, with support from 53% of respondents (36 respondents).

Respondents expressed support for making roads safer for all users, not just drivers. However, some questioned whether current pedestrian activity levels and crash patterns justify implementation of the Curb Bulb-Outs and Enhanced Crosswalks concept. Several respondents recommended piloting proposed changes with temporary measures and conducting comprehensive public outreach before permanent implementation. Regarding the Pavement Markings, Signage, and Traffic Signals concept, respondents emphasized the importance of addressing fundamental infrastructure needs, including functioning pedestrian signals, clearer pavement markings, and improved signage, particularly for one-way streets.

Front Street and 2nd Street Reconfigurations

Among the three reconfiguration concepts, the Front Street Reconfiguration (Veterans Drive to 2nd Street): Two Travel Lanes and Two On-Street Parking Lanes received the highest level of support, with an average rating of 3.16 and support from 47% of respondents. In contrast, the remaining two concepts received lower average ratings. The 2nd Street Reconfiguration (Front Street to Railroad Avenue): One Travel Lane and One Angled Parking Lane received an average rating of 2.08, with 70% of respondents expressing opposition. The Front Street Reconfiguration (Veterans Drive to 2nd Street): Two Travel Lanes, One Angled Parking Lane, and One Parallel Parking Lane received the lowest rating of 1.85, with 78% of respondents in opposition.

Respondents expressed concerns regarding alternatives that included angled parking, citing safety and operational issues related to drivers backing out of spaces and the potential for traffic delays.

Railroad Avenue, Suffolk Avenue, and Scott Street Reconfigurations

Among the concepts, the Scott Street: Convert to Two-Way Traffic concept received the highest level of public support, with an average rating of 3.22 and support from 48% of respondents. The Railroad Avenue Reconfiguration (2nd Street to Front Street): Convert to Two-Way Traffic concept also received favorable support, with an average rating of 3.10 and support from 48% of respondents. The Suffolk Avenue (Front Street to 2nd Street): One Travel Lane and Wider Parking Lanes concept received comparatively lower support, with an average rating of 2.78 and support from 39% of respondents.

Respondents expressed general support for two-way traffic conversions. One respondent suggested converting the on-street parking lane on Railroad Avenue to a bicycle lane. Concerns were raised regarding the reduction of travel lanes from two to one for the Suffolk Avenue reconfiguration concept.

Townwide Implementation Combinations

Across both combinations, respondents expressed support for efforts to improve safety for all road users, while raising concerns regarding safety and operational impacts from angled parking and the potential complexity and confusion for road users. For Combination 1, supporters highlighted potential business benefits and improved street aesthetics, while others questioned whether the project represented the most effective use of available funding. For Combination 2, supporters indicated that current parking supply is more than sufficient, whereas opponents expressed concern that the chicane would make downtown Richlands more difficult to navigate and negatively impact local businesses. Opponents also questioned whether existing pedestrian activity levels and crash patterns justify the proposed improvements.

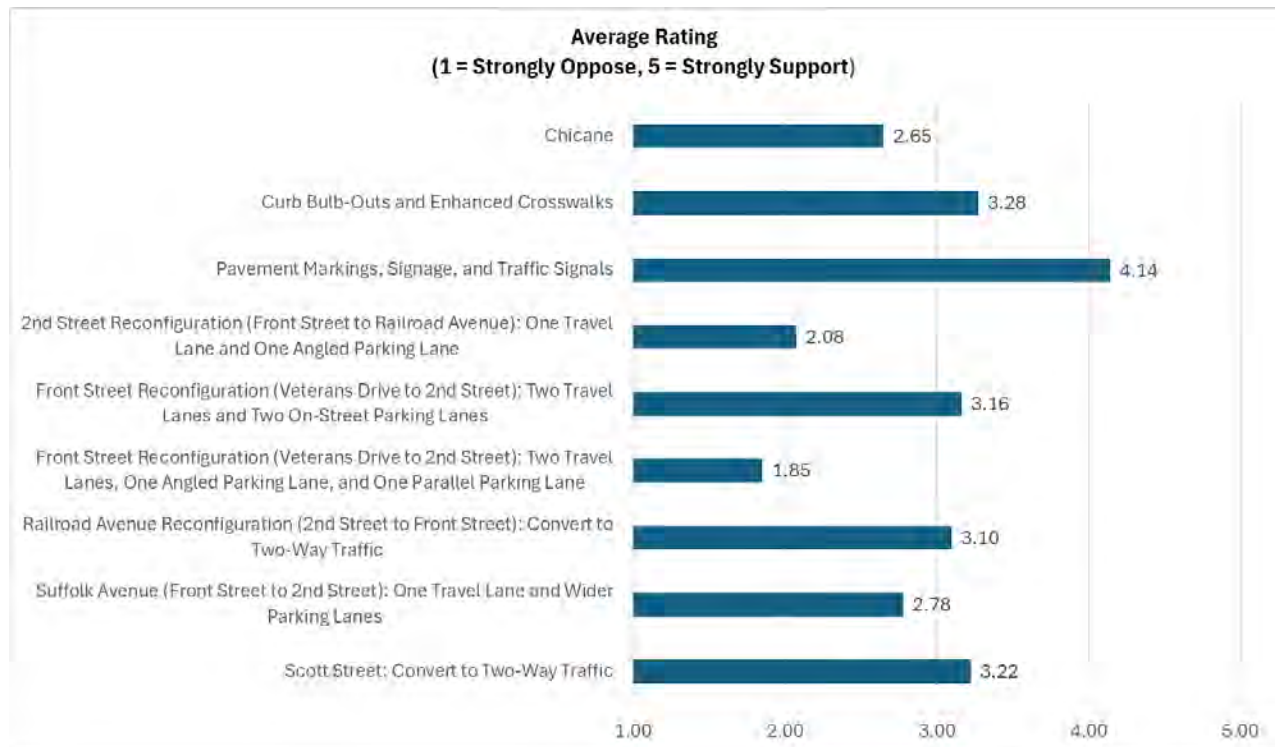
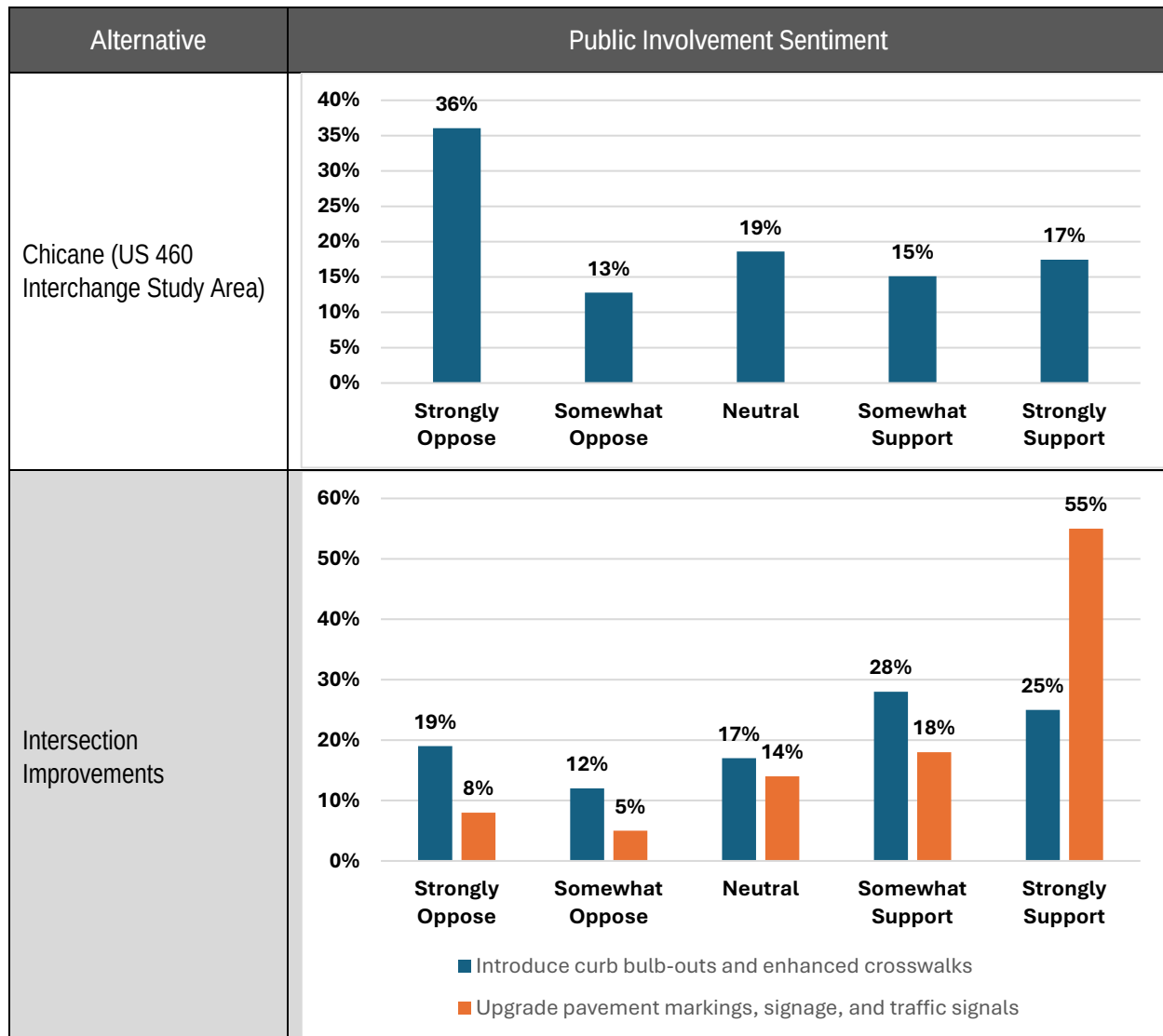


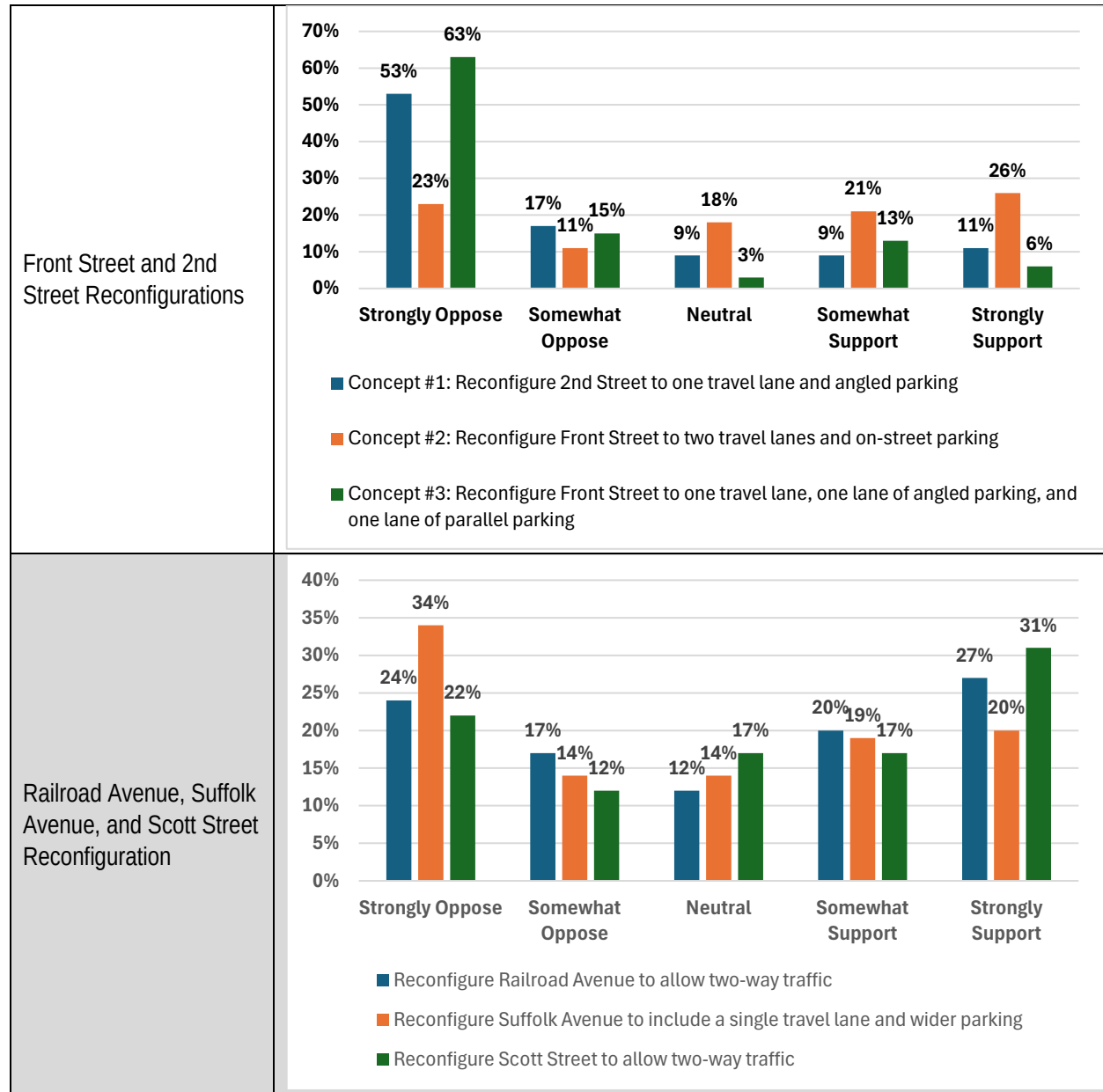
Figure 53: Public Involvement—Average Rating of Alternatives

Table 32: Public Involvement Feedback Themes

Alternative	Public Involvement Feedback Themes
Chicane	Concerns that the alternative did not adequately address aggressive driving behaviors and that narrowing the roadway could exacerbate aggressive driving conditions. Supporters of the concept emphasized that the existing roadway has too many lanes for the context of the area.
Intersection Improvements	Support for making roads safer for all users, not just drivers. Concern whether the current pedestrian activity levels and crash patterns justify implementation of the Curb Bulb-Outs and Enhanced Crosswalks concept. Suggestions to pilot the concept through temporary measures and conduct comprehensive public outreach before permanent implementation. Suggestion for Pavement Markings, Signage, and Traffic Signals concept to address fundamental infrastructure needs, including functioning pedestrian signals, clearer pavement markings, and improved signage, particularly for one-way streets.
Front Street and 2nd Street Reconfigurations	Concern about angled parking contributing to safety and operational issues related to drivers backing out of spaces and the potential for traffic delays.
Railroad Avenue, Suffolk Avenue, and Scott Street Reconfigurations	General support for two-way traffic conversions. Concerns regarding the reduction of travel lanes on Suffolk Avenue, with skepticism that the concept would improve conditions. Additional concerns with the Suffolk Avenue reconfiguration included reduced safety for pedestrians, poor visibility for businesses, and ineffective traffic calming measures.
Townwide Implementation Combinations	Mixed opinions regarding travel lane reductions and angled parking implementation. Concerns were raised about safety impacts from drivers backing out of angled parking spots into a single travel lane, as well as potential confusion and navigation difficulties resulting from the changes. Support was expressed for anticipated safety and business benefits, along with opportunities to improve non-car travel options and enhance street aesthetics.

Table 33: Public Involvement Sentiment





2.5 Preferred Alternative Selection

The Review of Public Feedback and Preferred Alternative Selection (SWG Meeting #6) was held on February 6, 2026, on Mural.⁴ 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.

After reviewing the survey results, the SWG decided to move forward with the Chicane alternative for the US 460 Interchange study area as it mitigates the frequency and severity of angle collisions related to left turning movements by improving sight distance, encouraging reduced speeds, and increasing driver awareness. The chicane alternative is categorized into a mid-term investment strategy that will be advanced 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. The preferred alternative is shown in Figure 54.

All alternatives for the Front Street / 2nd Street study area were not advanced to Phase 3 as members of the SWG believed further community engagement is needed to refine the proposed alternatives and determine a preferred investment vision. Future roadway reconfiguration alternatives could include changes to one-way street orientation, number of travel lanes, type and configuration of on street parking, and intersection improvements. It was agreed that proposed alternatives for the Front Street / 2nd Street study area would be delayed until the next SMART SCALE cycle. Appendix B includes the Phase 2 Preferred Alternative Summary.

⁴<https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1766511494356/427246eb39a6cee4adf2f01c11b5ad098af2f3d3>

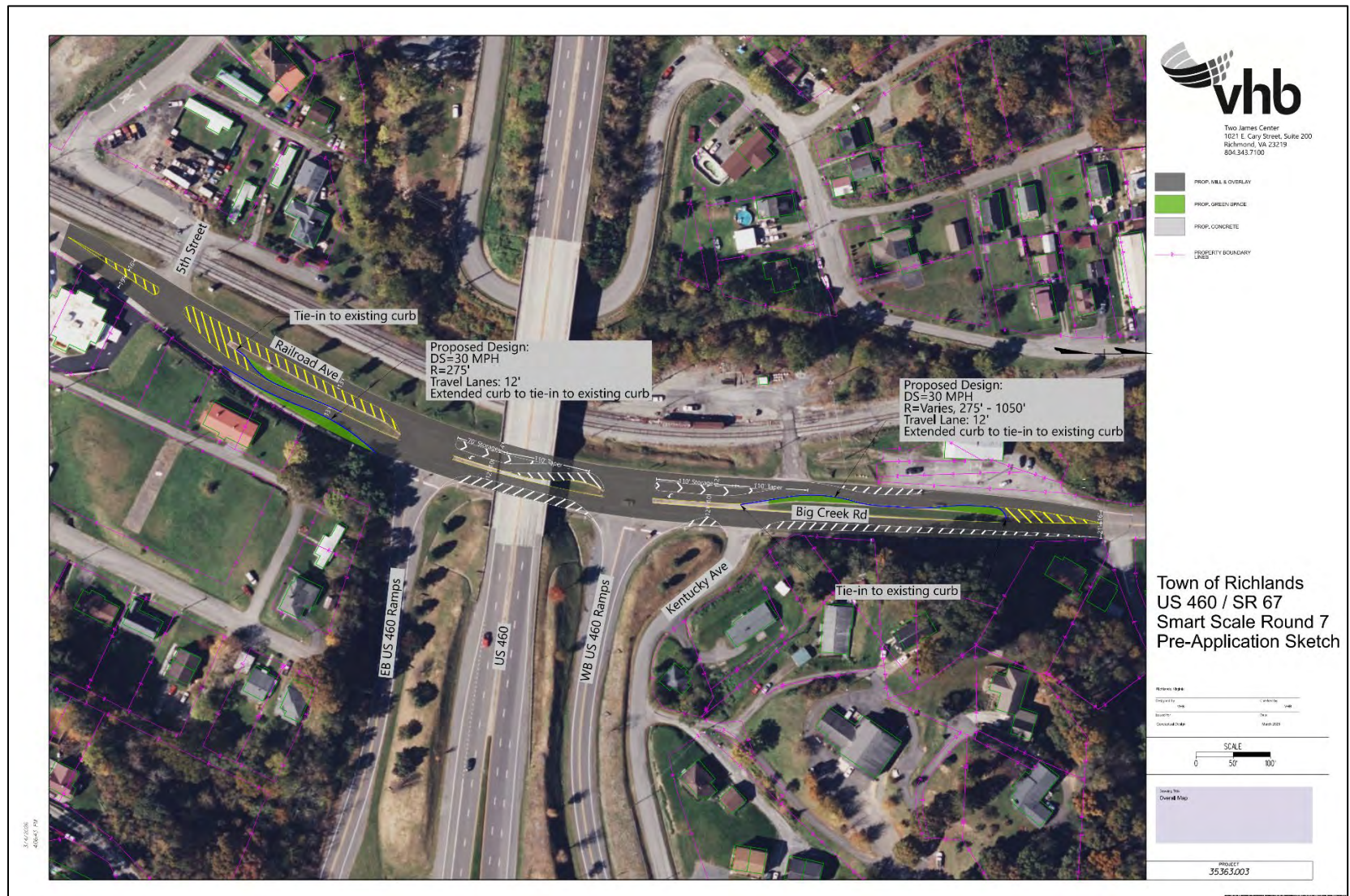


Figure 54: Preferred Alternative—US 460 Interchange Chicane

Chapter 3: Preferred Alternative Analysis and Investment Strategy

Phase 3 of the study included detailed design, cost estimate, risk assessment, and further operations assessment of the selected alternative. As discussed in Section 2.5, the SWG chose to pursue the Railroad Avenue reconfiguration within the interchange and exclude the downtown alternative. The preferred alternative has the following components:

- Construct chicanes for both directions of SR 67 at the US 460 interchange
- Narrow both directions of SR 67 to one travel lane
- Install curb ramps and rebuild sidewalk to meet ADA standards
- Replace 5 stormwater pipes within the project limits, including 1 that crosses the railroad

3.1 Preferred Alternative Safety and Operational Analysis

Once the preferred alternative was selected, the study team conducted analyses to refine geometry of the preferred alternative. The left-turn lane from SR 67 to westbound US 460 was shifted west to provide greater sight distance.

3.2 Conceptual Sketch and Cost Estimates

Appendix G 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 55 presents 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 34. Detailed cost estimates are included in Appendix G.

Table 34: BR-25-03 Preferred Alternative Improvements

Phase Description	Budget (FY 2026)
Preliminary Engineering	\$ 1,538,378
Right of Way and Utility Relocation	\$ 561,000
Construction	\$ 5,557,970
Total Project Budget	\$ 7,657,348

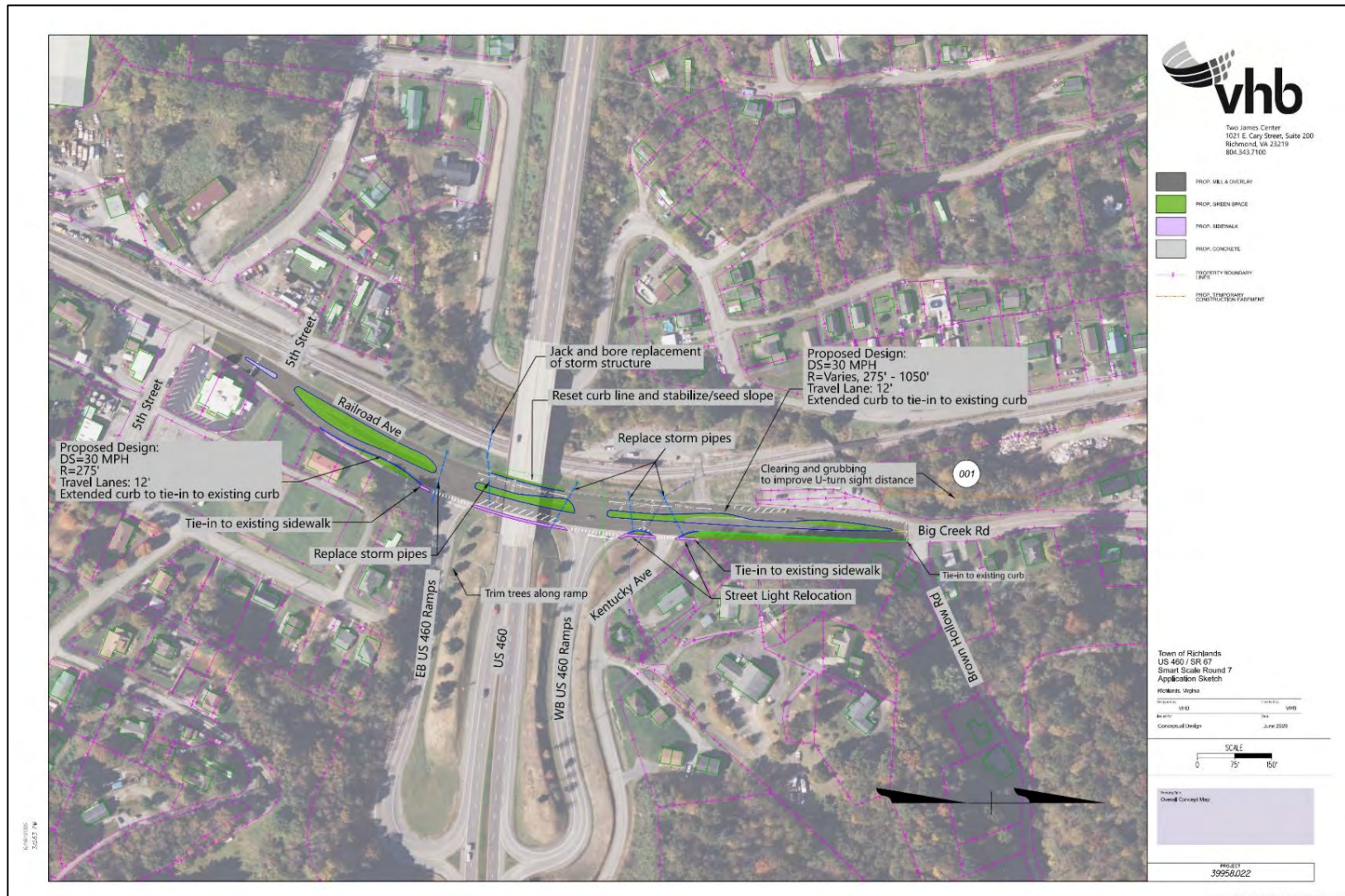


Figure 55: Preferred Alternative—US 460 Interchange Chicane

3.3 Schedule Estimates

A schedule estimate was developed for the preferred alternative. Table 35 summarizes the projected timeframes for the preliminary engineering (PE), right of way (RW), and construction (CN) phases.

Table 35: Schedule Estimate

Estimated Schedule by Phase	PE	RW	CN	Total
Preferred Concept (all inclusive, months)	18	3	24	45

3.4 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 13th, 2026, on Mural, an online platform⁵. The SWG preferred to have raised island instead of pavement markings for easier long-term maintenance. A preferred alternative finalization meeting (SWG Meeting #8) was held on May 18th, 2026⁶. A final concept, cost, and risk meeting (SWG Meeting #9) was held on June 22nd, 2026, to review the final preferred alternative⁷.

The following is a list of 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 G includes the materials from both meetings, risk analysis matrix with details on the risk assessment, and mitigation strategy.

Risk/Issue: Roadway Design

The inclusion of sidewalks and curb ramps require them to be ADA compliant. Due to long-term maintenance needs, gore markings will be replaced with vertical construction.

Risk/Issue: Right of Way

Negotiations or coordination may be required due to potential stabilization of slope between Big Creek Road and the railroad where mitigation may chase into railroad ROW. While the project is within VDOT right-of-way, the existing undefined access to 610-730 may require negotiations and coordination due to partial loss of access.

⁵<https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1775500541555/5f99331c313acb134569245beec9d85229ac24c8>

⁶<https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1778009043094/f6d63287edcdeb1ac0eb1885862994b118cb1b05?sender=u4b5b33e1aad37f262cb90568>

⁷<https://app.mural.co/t/vhbipd8103/m/vhbipd8103/1781873763709/ba736060d96a694c8a68106bbf9d1d9ac099d93b>

Risk/Issue: Environmental

Several petroleum release sites are documented within and adjacent to the project. Historic hazardous materials sites are also assumed to be present. Limited potential for archaeological deposits in the flood plain areas along Big Creek on the west side of the N&S railroad line. 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 time-of-year restriction may be required depending on what species of bat/bird is found.

Risk/Issue: Utilities

Existing water and sewer lines between railroad tracks and creek lay in vicinity of proposed construction.

Risk/Issue: Geotechnical

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

Risk/Issue: Drainage

Existing stormwater system appears degraded from field observations, including clogged culverts and broken drainage ditches; slope between roadway and railroad tracks appears to be eroding; improvement to road might risk to also bringing existing drainage system up to standard.

Risk/Issue: Public Involvement

In-person and online public engagement occurred during the project's conceptual development. While the public agreed there was a safety issue and difficulty making left turns at this location, the overall sentiment towards the project was negative. Town officials decided to proceed with the project.

Risk/Issue: Additional Issues

True inflation exceeds anticipated inflation applied through SMART SCALE and makes project exceed budget.

3.5 Possible Funding Sources

The Town of Richlands elected to submit the preferred alternative for SMART SCALE funding, which includes converting the 5-lane road section to 3 lanes with raised median chicanes, upgrading existing pedestrian facilities to meet ADA standards, and upgrading existing stormwater system within project area.