



PROJECT PIPELINE

Sudley Manor Drive | Bethlehem Road to Sudley Road

**Northern Virginia District
NV-25-01**

**PHASE 3 REPORT
July 2026**

Prepared for



Prepared by



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Chapter 1: Needs Evaluation and Alternatives Development

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 NV-25-01 – Sudley Manor Drive from Bethlehem Road to Sudley Road, focuses on concepts targeting identified needs including congestion mitigation, safety improvements, pedestrian and bicycle infrastructure along the corridor, and transit 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

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.

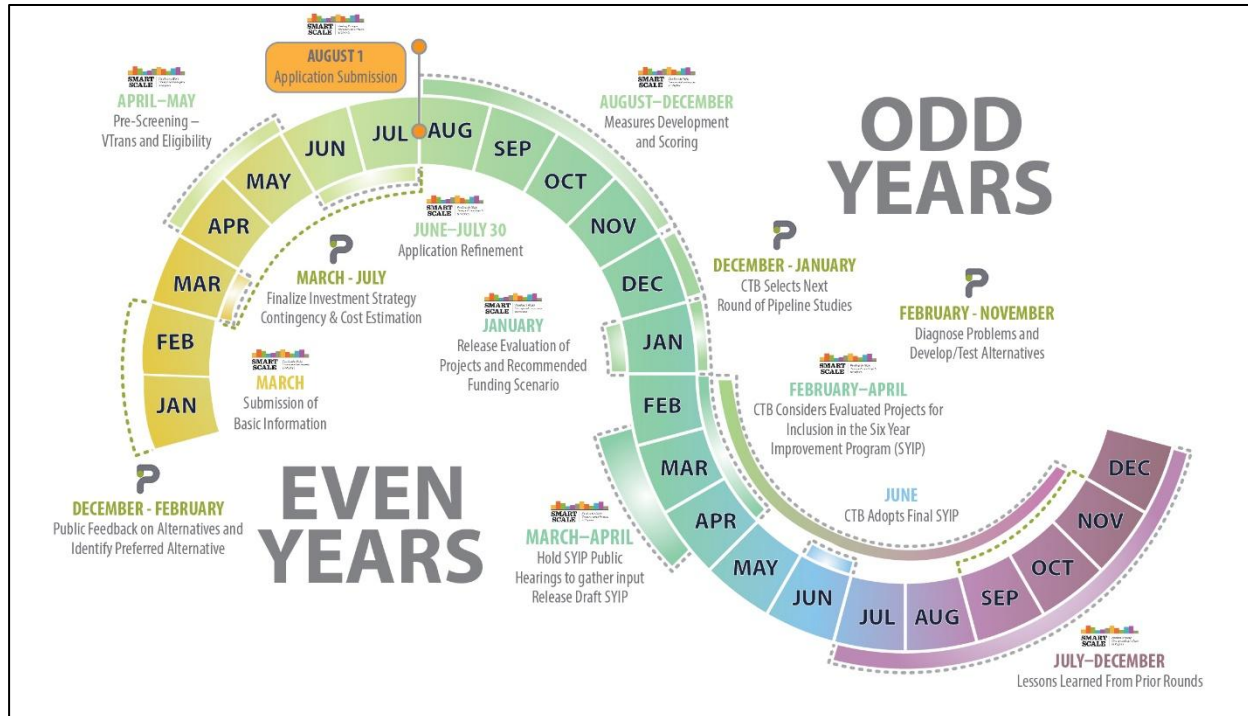


Figure 2: Study Phase Methods and Solutions

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
- Metropolitan Planning Organizations (MPOs) or Planning District Commissions (PDCs), if applicable

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

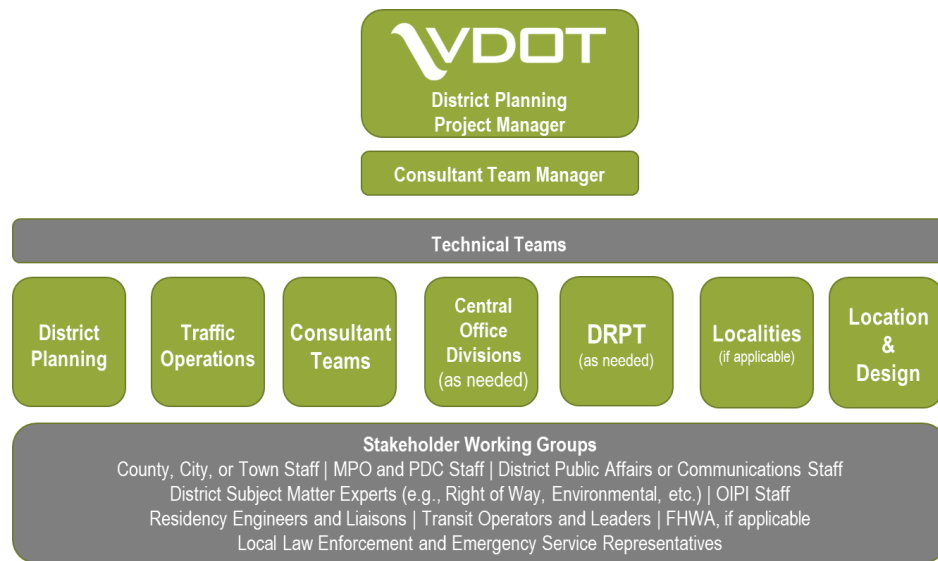


Figure 3: Structure of a Technical Team

Study Background

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

- Virginia Department of Transportation (VDOT)
- Office of Intermodal Planning and Investment (OIPI)
- Prince William County
- OmniRide
- Virginia Department of Rail and Public Transportation (DRPT)
- Northern Virginia Transportation Authority (NVTA)
- Michael Baker International

As shown in **Figure 4**, the study area along Sudley Manor Drive extends from Bethlehem Road to Sudley Road. The typical section along Sudley Manor Drive is a four-lane, median divided roadway. Sudley Manor Drive is functionally classified as a minor arterial between Bethlehem Road and Sudley Road. East of Sudley Road, it transitions to a major collector. Within the study area, the posted speed limit along Sudley Manor Drive is 45 miles per hour (mph) from west of Bethlehem Road to Chatsworth Drive, 40 mph between Chatsworth Drive and Ashton Avenue and 35 mph from Ashton Avenue to east of Sudley Road. The land uses along Sudley Manor Drive within the study area are primarily residential and commercial.

As shown in **Table 1**, the study area includes ten at-grade intersections, including seven signalized intersections and three unsignalized intersections.

Table 1: Study Intersections

#	Intersection Name	Control Type
1	Sudley Manor Drive and Bethlehem Road	Unsignalized
2	Sudley Manor Drive and Chatsworth Drive	Signalized
3	Sudley Manor Drive and Humphrey Lane/Wallace Lane	Unsignalized
4	Sudley Manor Drive and Rodes Drive/Schofield Way	Signalized
5	Sudley Manor Drive and Raven Crest Court	Unsignalized
6	Sudley Manor Drive and Seymour Road	Signalized
7	Sudley Manor Drive and Ashton Avenue	Signalized
8	Sudley Manor Drive and Giant Food Entrance	Signalized
9	Sudley Manor Drive and Marshalls Entrance	Signalized
10	Sudley Manor Drive and Sudley Road	Signalized

The study team collected data including 14-hour turning movement counts (Wednesday, May 21, 2025), 48-hour tube counts (Wednesday, May 21, 2025 – Thursday, May 22, 2025), travel time runs (Wednesday, May 21, 2025 – Thursday, May 22, 2025), traffic signal timings, and pedestrian and bicycle counts to assist with the transportation analysis in the study area.

In addition to the turning movement counts collected at the study intersections listed in **Table 1** and the 48-hour tube counts collected at the following intersections to aid in calibrating the existing *SimTraffic* model:

- Sudley Manor Drive and Prince William Parkway
- Sudley Manor Drive and Sudley Manor Square Entrance

A framework document was developed prior to commencing the study which outlined the study methods and assumptions. The signed framework document is in **Appendix A**. A kickoff meeting with the SWG was held on May 13, 2025, to provide an overview of the study and obtain feedback on the study's assumptions.

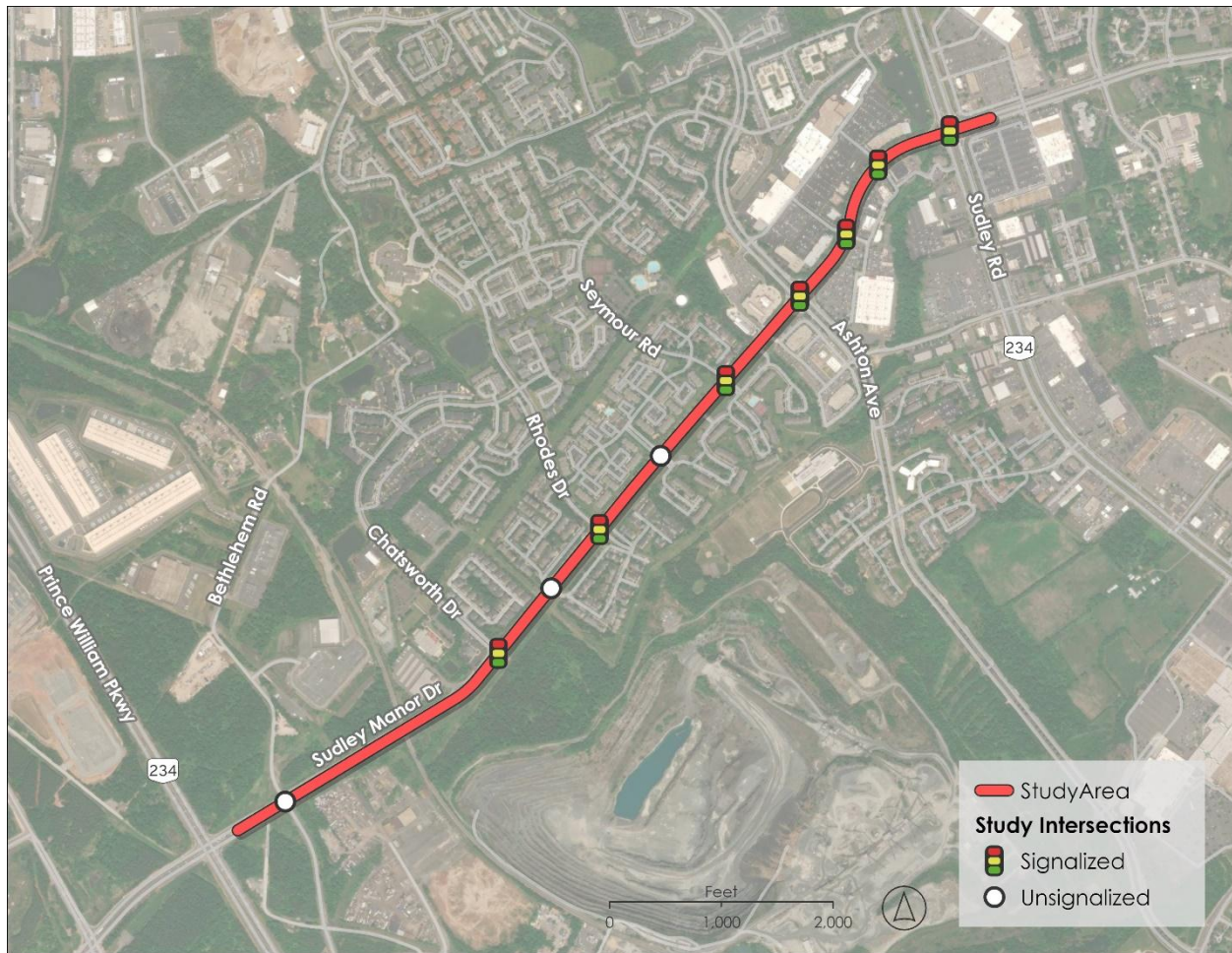


Figure 4: Project Study Area

VTrans Needs

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

Table 2: VTrans Needs Identified in the Study Area

VTrans 2023 Mid-Term Need	Priority
 Congestion Mitigation	Low
 Capacity Preservation	Very High
 Reliability	No Need
 Safety Improvement	Very High
 Pedestrian Safety Improvement	High
 Transportation Demand Management (TDM)	High
 Pedestrian Access	No Need
 Bicycle Access	High
 Transit Access	Low
 Transit Access for Equity Emphasis Areas	Need
 Urban Development Area Access	Need
 Rail On-Time Performance	Need

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

- Reviewed the Project Pipeline data dashboards to identify issues and transportation trends in the study area
- Conducted a field review of the study area to observe issues and document existing conditions
- Collected traffic counts at the study area intersections
- Reviewed relevant studies and plans near the study area to inform the alternative development
- Conducted detailed existing conditions and no-build conditions traffic operational analyses using *SimTraffic*.
- Assessed existing transit service, multimodal infrastructure, and the suitability for additional transit service within the study area

High-Level Needs Diagnosis

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

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

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

1.1.1. Operations and Access Needs

The study area has a low Congestion Mitigation VTrans need, which is based on the Travel Time Index (TTI) and the proportion of travel taking place during excessively congested conditions. Additionally, the study area has a very high Capacity Preservation VTrans need and a high Bicycle Access VTrans need.

Travel Time Index (TTI) data was not available from VDOT along the corridor. Therefore, travel time runs along the corridor were conducted over a two-day period. Runs that were completed within the AM (7:30 AM – 8:30 AM) and PM (4:30 PM – 5:30 PM) peak hours were used to calibrate the *SimTraffic* model. A summary of the peak hour travel times runs across the two-day period are shown in **Table 3**.

Where the travel time runs are longer than expected, the detailed travel times runs showed excessive delays at certain intersections and times along the corridor. The intersections where these excessive delays were noted the most were at the Ashton Avenue and Sudley Road intersections along the corridor.

The collected travel time run data is in the traffic data included in **Appendix C**.

Table 3: Peak Hour Travel Times (seconds)

Route	Peak Hour	Day 1	Day 2
Sudley Manor Drive EB Bethlehem Road to Sudley Manor Square	AM	399	215
	AM	292	232
	AM	312	320
	AM	314	370
	PM	314	433
	PM	335	443
Sudley Manor Drive WB Sudley Manor Square to Bethlehem Road	AM	316	319
	AM	203	202
	AM	214	276
	PM	308	462
	PM	377	419

¹Observed AM (PM) travel times

Along eastbound Sudley Manor Drive, the TTI ranges from 0.99 during off-peak hours to 1.22 during the AM peak period. With a corridor length of 1.10 miles, it takes approximately 2.51 minutes to travel the entire

length of the corridor during the AM peak hour, according to VDOT's TTI Dashboard tool. During the PM peak, the TTI is 1.19, with an average corridor travel time of 2.46 minutes. The average speeds in the eastbound direction range from 26 to 28 miles per hour (mph) throughout the day, almost 9 mph below the posted speed limit of 35 mph, while speeds exceed 30 mph during off-peak hours from 8 AM to 4 PM.

The TTI along the westbound direction varies between 0.99 during off-peak hours to 1.26 during the AM peak period. During the AM peak, the average speed along the corridor is almost 8 mph below the speed limit at 27.25 mph. Average speeds remain under 30 mph between 7 PM and 5 AM.

1.1.2. Safety and Reliability Needs

The study area has very high Statewide Safety Improvement VTrans need and a high Pedestrian Safety Improvement VTrans Need. The study team reviewed the VDOT crash data from 2019 and 2021 – 2024 to identify high-level crash trends in the study corridor.

In total, there were 487 reported crashes in the study area during the study analysis years (2019,2021-2024), including 147 injury crashes. Rear-end crashes (47%) and angle crashes (38%) were the most common crash types. Three fatal crashes occurred within the study area; one angle collision at Seymour Road in 2019 (prior to signalization in 2021) and two crashes that involved pedestrian being struck by vehicles – one north of Chatsworth Drive along Sudley Road, north of Sudley Manor Drive. In the fatal crashes involving pedestrians, neither was within a marked crosswalk. **Figure 5** shows the crashes by type along the corridor.

The portion of Sudley Manor Drive between Bethlehem Road and Sudley Road was identified as a Statewide Top 5% VDOT Pedestrian and Bicycle Safety Action Plan (PBSAP) priority corridor. The segment between Seymour Road and Sudley Road was identified as a Statewide Top 1% priority corridor.

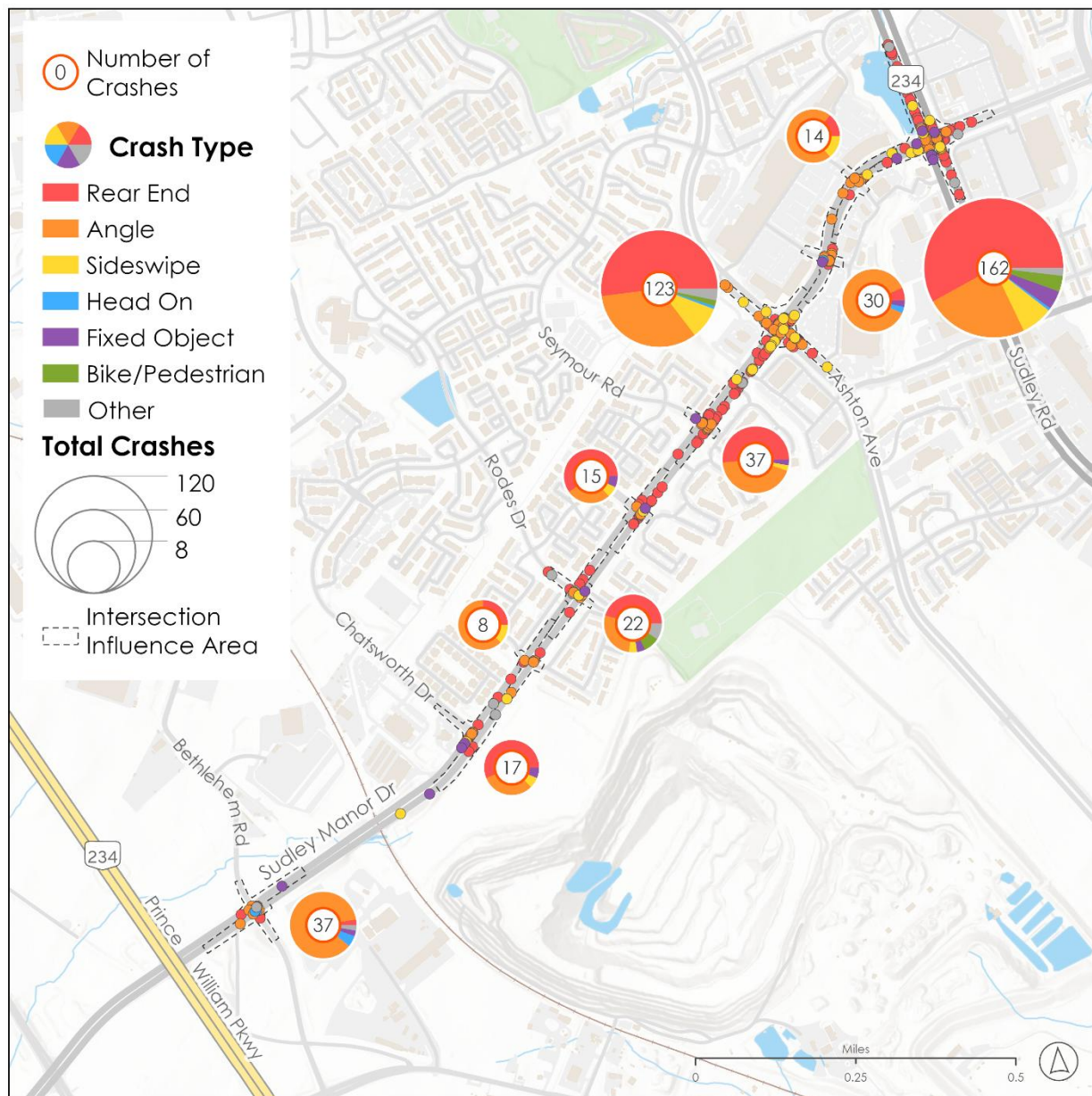


Figure 5: Crashes by Type (2019 – 2024, excluding 2020)

1.1.3. Transit and Transportation Demand Management Needs

The study area has a low Transit Access VTrans need and a high Transportation Demand Management VTrans need. The study team reviewed existing Prince William County transit service in the study area and noted two bus routes that traverse portions of the study area – the Manassas Metro Express to Tyson Corner (Manassas Metro Express Bus Route 60) and the Manassas OmniRide Local North/NOVA Campus (Manassas Local North Bus Route 65). The Manassas Metro Express Bus Route 60 has two bus stops at the Sudley Manor Road and Ashton Avenue intersection, while the Manassas Local North Bus Route 65 has two stops (at NTB and AutoZone) along Sudley Manor Drive, between Sudley Road and Williamson

Boulevard. **Figure 6** shows the Manassas Metro Express Bus Route 60, while **Figure 7** shows Manassas Local North Bus Route 65.

As shown in **Figure 8**, there are several park-and-ride lots in the area with the closest being the Portsmouth Road Commuter Lot, approximately 0.64 miles southeast of the Sudley Manor Drive and Sudley Road intersection.

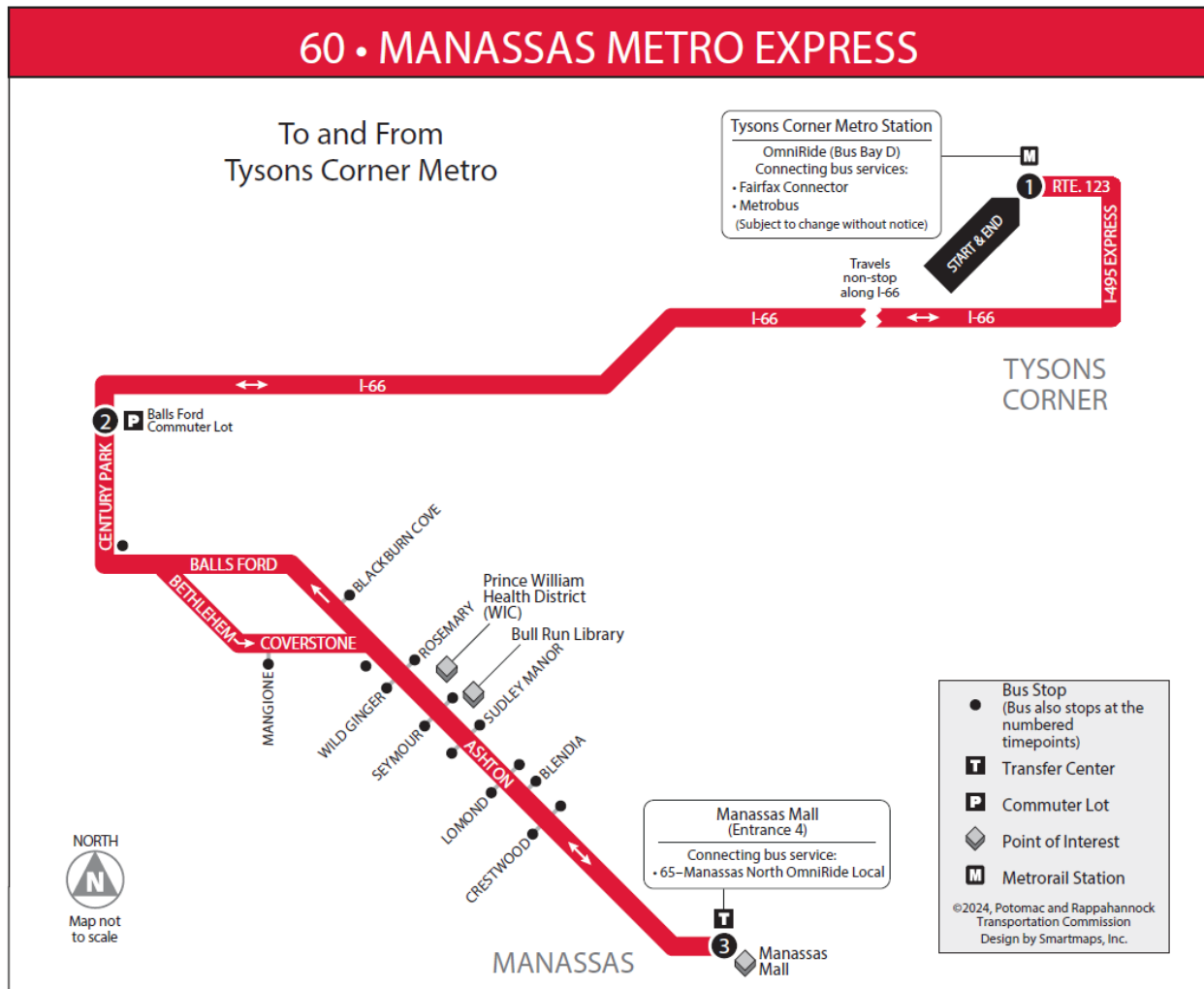


Figure 6: Metro Express Bus Route 60

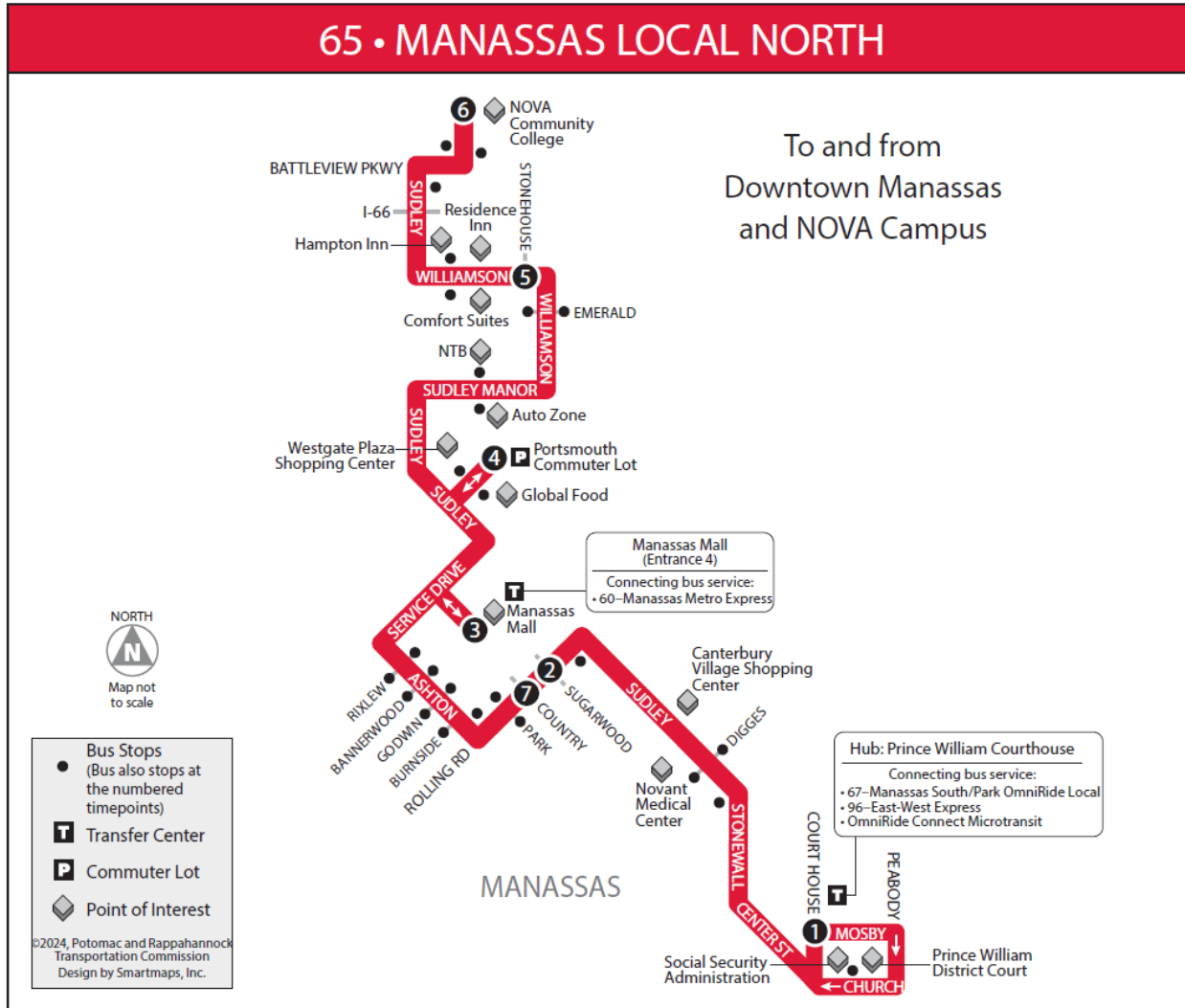


Figure 7: OmniRide Local Bus Route 65

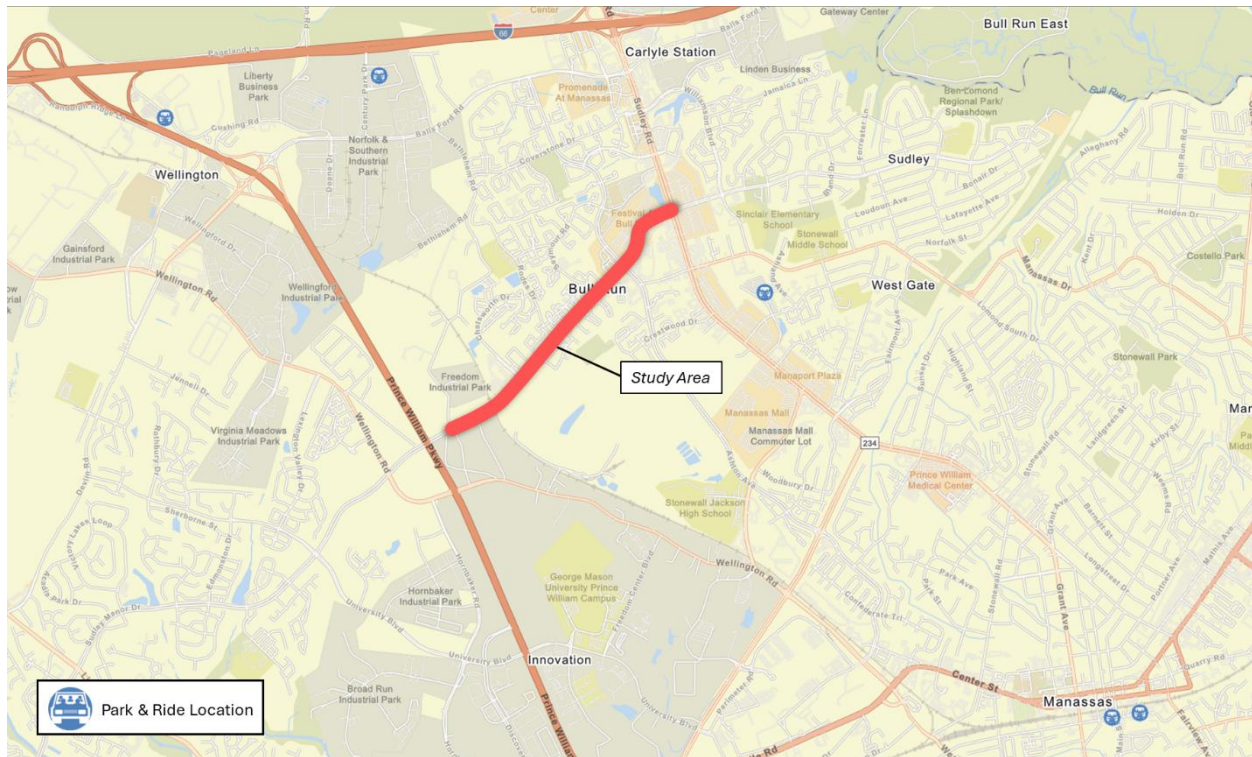


Figure 8: Prince William County Park-and-Ride Lots

1.1.4. 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. The tool helps to ensure that environmental actions and policies are equitable and effectively benefit all residents, particularly those disproportionately affected by environmental hazards. **Table 4** provides a summary of the existing environmental conditions, while **Figure 9** presents a map of the existing environmental conditions of the study area.

EJScreen+ identified the community surrounding the study area limits (Block Group ID: 511539016011) to be a “Low Income Communities” (30% or More of Population Under HUD 80% AML and Under Two Times Federal Poverty Level) since the percentage of the population is 47%. **Figure 10** shows the communities surrounding the study area limits (Block Group ID: 511539014032, 511539014033, 511539016011, 511539014091, and 511539016025) that EJScreen+ identified as a “Community of Color – Over Statewide Average (37.8%)” since the percentage of the population of color within these communities range from 46% to 77%. Additionally, the EJScreen+ tool identified a childcare center located in the northwest quadrant of the Sudley Manor and Ashton Avenue intersection.

Table 4: Existing Environmental Conditions Summary

Environmental Resource	Description	Source	Existing Resources in Study Area
Environmental Justice	Identifying minority and low-income populations adjacent to the project corridor, as defined by the VDOT Environmental Division Instructional and Informational Memorandum and determining if a disproportionately high and adverse effect is anticipated.	Environmental Justice (EJ) Screen: Low Income Communities - 30% or more of the Population Under HUD 80% AMI and Under Two Times Federal Poverty Level (2011-2018 ACS), Communities of Color – Over Statewide Average (37.8%) (2014-2018 ACS)	Within the study area, there is a low-income community with a population percentage of 47.8%. There are also communities of color with population percentages ranging between 46.1-76.5%.
Limited English Proficiency	Populations who speak English less than very well within and adjacent to the project corridor.	United States Census Bureau	A total of 35.5% of the population within the study area Block Groups are considered LEP.
Recreational Facilities	Places available for recreational or communal use, such as a YMCA or community parks.	Virginia Department of Conservation and Recreation (VDCR) Outdoor Plan Mapper Prince William County GIS Data Google Maps	Rosemount Lewis Park, Bull Run Swim & Raquet Club, and the Pat White Center at Ben Lomond are the three recreational and communal facilities located in the vicinity of the study area.
Community Services	Places available to the public such as hospitals, schools, and churches.	Virginia Geographic Information Network (VGIN) Prince William County GIS Data Google Maps	Stone House Volunteer Fire Station 11, Bull Run High School, and C.A. Sinclair Elementary School are located in the vicinity of the study area.

Environmental Resource	Description	Source	Existing Resources in Study Area
Bike/Pedestrian Facilities	Existing sidewalks, bike paths, and trails.	Prince William County GIS Data Google Maps VDCR Virginia Outdoor Plan Mapper	Continuous paved sidewalks are provided along both sides of Sudley Manor Drive throughout the study area corridor, with additional sidewalk connections extending onto numerous adjacent side streets.
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 VDOT Pathways for Planning	Several conservation areas and easements were identified surrounding the study area to the south, west, and north.
Section 106* Resources	Known historic architectural or archaeological sites within or immediately adjacent to the project corridor including sites that are listed or eligible for listing on the National Register of Historic Places (NRHP) and sites that have not been evaluated are potentially eligible, or any other status as noted on the VDHR V-CRIS website.	Virginia Department of Historic Resources (VDHR) Virginia Cultural Resource Information System (V-CRIS) National Register of Historic Places (NRHP)	A few locations within and surrounding the study area were listed or determined eligible as historic resources, including 10321 Sudley Manor Drive near the eastern terminus of the corridor.
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 Prince William County GIS Data	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.

Environmental Resource	Description	Source	Existing Resources in Study Area
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) 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 IPaC</u> – Northern Long-Eared Bat is listed an endangered species. The Tri-colored Bat is listed as a proposed endangered species. The Monarch Butterfly is listed as a proposed threatened species. There are no refuge lands, fish hatcheries, or threatened habitats located within a 2-mile radius of the study area. <u>VDWR NLEB</u>- The study area is not located within the NLEB Year-Round Presence area. <u>CCB</u>- No eagle nests were located within the study area.
Floodplains	Areas considered at risk for flooding during 100-year and 500-year storms.	Federal Emergency Management Agency (FEMA) Flood Hazard Areas	The majority of the study area is not located in a Floodway or 500-Year Floodplain area. However from Chatsworth Road to the power line towers there are wetlands.
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)	A groundwater well is located near the eastern terminus of the study area. Multiple wetlands are scattered within and around the study area. There are several pounds located in the surrounding vicinity of the study area near the Bull Run Plaza as well as the western terminus. Portions of the study area and surrounding vicinity are located within the Chesapeake Bay Preservation Area

Environmental Resource	Description	Source	Existing Resources in Study Area
Hazardous Materials	Any documented spills, releases, or history of contamination on surrounding sites that may be impacted by the proposed project.	Virginia Department of Environmental Quality (DEQ) Environmental Data Mapper	Multiple registered petroleum tank facilities and closed petroleum release cases are located within and directly outside the eastern terminus of the 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 Outdoors Plan Mapper Prince William County GIS Data The Virginia Outdoor Foundation The Nature Conservancy	Several protected open spaces are located within and surrounding the study area including Rosemount Lewis Park.
Farmland	Lands with soils that are considered prime farmland and outside a census-designated urban area.	United States Census Bureau Urban Area Maps Natural Resources Conservation Service Web Soil Survey VDCR Outdoors Plan Mapper Prince William County GIS Data	There are not any designated farmland areas along the study area corridor. All the parcels along the corridor are either designated Urban or Suburban communities.
Noise	Determining whether the subject project may be considered a Type I project based on VDOT and FHWA guidance.	VDOT and FHWA Noise Guidance	Based on VDOT and FHWA guidance, it is not anticipated that the project will be considered a Type I noise project.

Environmental Resource	Description	Source	Existing Resources in Study Area
Land Use	Land Area that has been given a specific use based on local jurisdiction land use designations.	Prince William County GIS Data	The study area is primarily classified as residential and general business with heavy industrial areas at the western terminus of the project.
Air Quality	Determine whether the subject project is in an air quality attainment area and whether a qualitative analysis may be required.	Office of Air Quality Planning and Standards EPA	The study area is with a non-attainment area therefore a project may need a qualitative analysis depending on the project type.

Figure 9: Existing Environmental Conditions

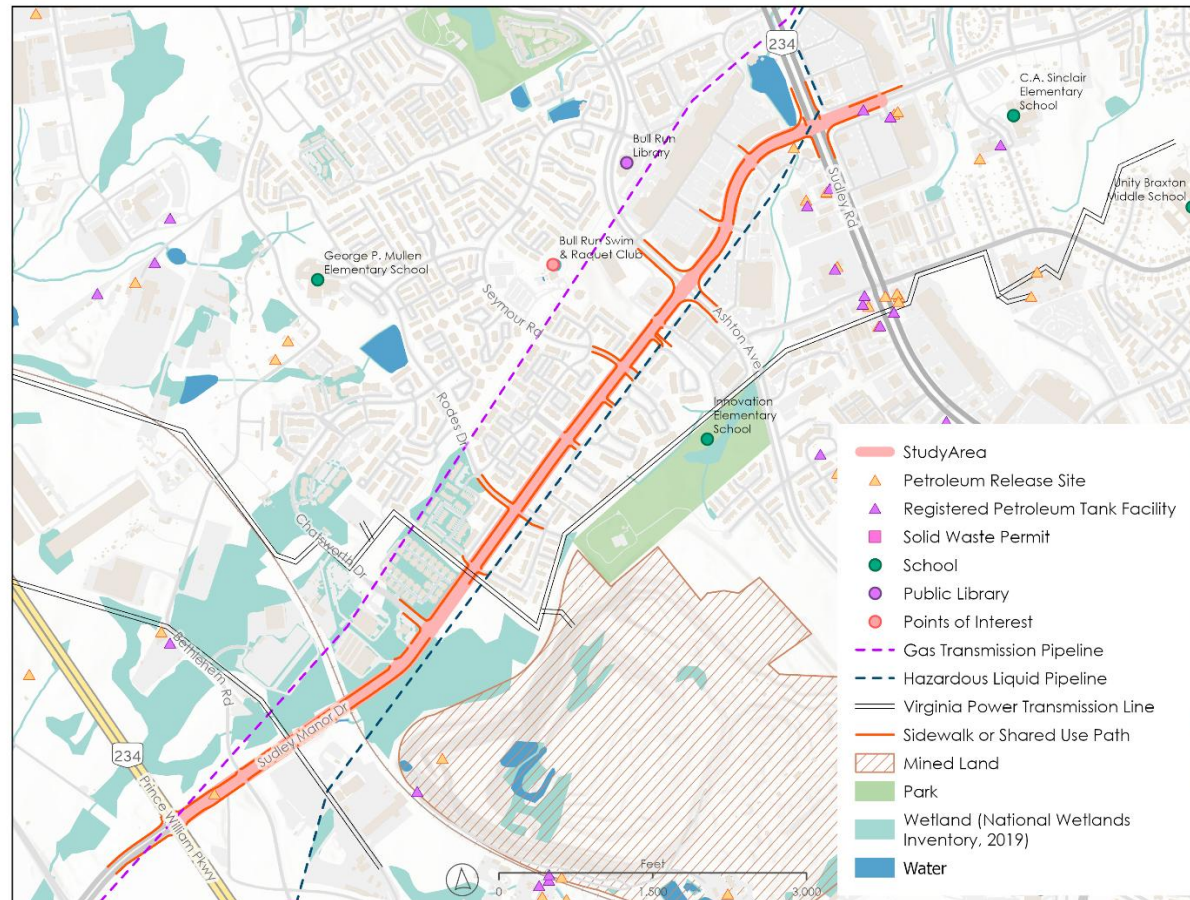
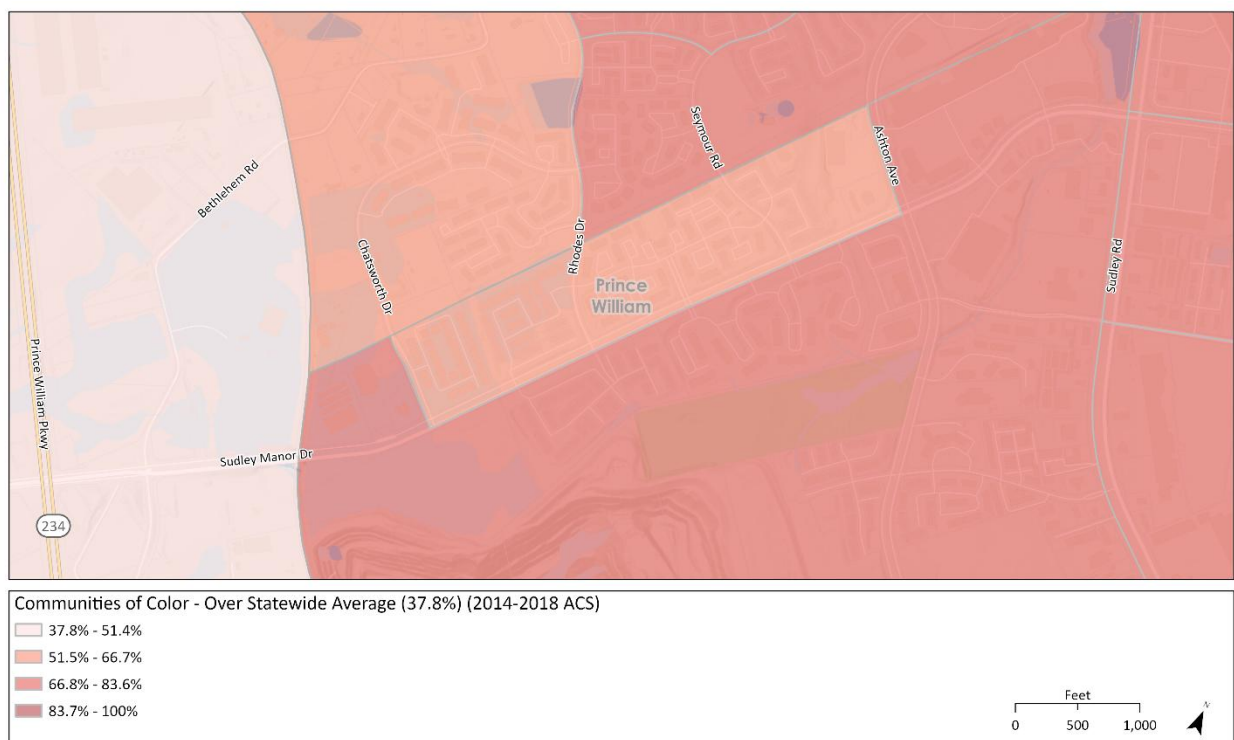
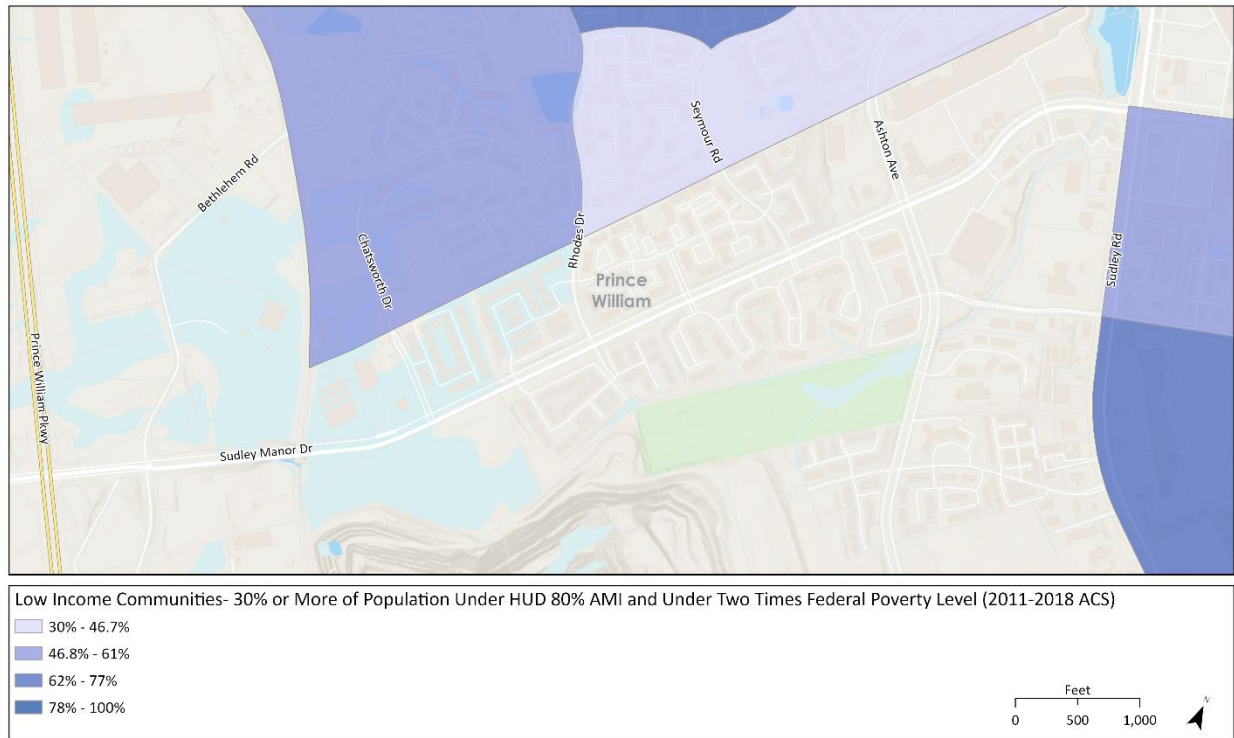


Figure 10: EJScreen+ Low Income Communities



Detailed Needs Validation

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

1.1.5. 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 *SimTraffic*, and reviewing of pedestrian, bicycle, and transit activity.

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:

- National Capital Regional Transportation Planning Board Visualize 2045
- National Capital Regional Transportation Planning Board FY 2023 – 2026 Transportation Improvement Program
- National Capital Regional Transportation Planning Board Transportation Resilience Improvement Plan
- Northern Virginia Transportation Authority FY 2024 – 2029 Six Year Program | Route 234 and Sudley Manor Drive Interchange | Application # PWC-040
- Prince William County 2040 Comprehensive Plan
- Prince William County Comprehensive Plan Update | Sudley Rd (Manassas-I-66) Redevelopment Corridor Work Session
- Public-Private Transportation Act Unsolicited Proposal for the Route 234 and Sudley Manor Drive Interchange Project | Wagman & RDA

Safety Analysis

A safety analysis was conducted using crash data from the VDOT Crash Database over five-year period (2019, 2021 – 2024). In total, 487 crashes were reported in the study area, including 337 property damage only (PDO) crashes, 147 injury crashes and 3 fatal crashes.

Summaries of crashes in the study area by severity and type are shown in **Table 5** and **Table 6**, respectively. **Appendix D** includes a detailed crash summary for the study area.

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

- K—Fatality
- A—Suspected Serious Injury
- B—Suspected Minor Injury
- C—Possible Injury
- PDO—Property Damage Only

The majority of the crashes occurred at the signalized Sudley Manor Drive and Sudley Road intersection (162 crashes | 33%), followed by the signalized Sudley Manor Drive and Ashton Avenue intersection (123 crashes | 25%). No other study intersection had more than 37 crashes.

As noted previously, most of the crashes (337 crashes | 69%) were PDO crashes, with 112 (23% of the total crashes) occurring at the signalized Sudley Manor Drive intersection and 80 crashes (16% of the total crashes) occurring at the signalized Sudley Manor Drive and Ashton Avenue intersection. Of the 147 injury crashes, 49 crashes (33%) occurred at the signalized Sudley Manor Drive intersection and 43 crashes (29%) occurred at the signalized Sudley Manor Drive and Ashton Avenue intersection. Three fatal crashes occurred within the study area; one angle collision at Seymour Road in 2019 (prior to signalization in 2021), and a pedestrian crash east of Chatsworth Drive, where a pedestrian was struck by an eastbound-traveling vehicle. The pedestrian was not within a crosswalk. The third fatal crash occurred north of the Sudley Road / Sudley Manor Road intersection, where a pedestrian was struck after attempting to cross Sudley Road at a mid-block location. Both pedestrian fatalities occurred at night, at mid-block locations.

In terms of crash types along the corridor, 227 (47%) of the 487 crashes were rear end crashes, while 186 (38%) were angle crashes. As with the total number of overall crashes, these crash types were most prevalent at the Sudley Manor Drive and Sudley Road intersection and the Sudley Manor Drive and Ashton Avenue intersection.

Table 5: Study Area Crashes by Crash Severity

Intersection	# of Crashes—K	# of Crashes—A	# of Crashes—B	# of Crashes—C	# of Crashes—PDO	Total
Sudley Manor Drive and Bethlehem Road	0	1	11	1	24	37
Sudley Manor Drive and Chatsworth Drive	0	0	4	1	12	17
Sudley Manor Drive and Humphrey Lane/Wallace Lane	0	0	1	0	7	8
Sudley Manor Drive and Rodes Drive/Schofield Way	0	1	6	1	14	22
Sudley Manor Drive and Raven Crest Court	0	1	1	0	13	15
Sudley Manor Drive and Seymour Road	1	0	9	2	25	37
Sudley Manor Drive and Ashton Avenue	0	0	40	3	80	123
Sudley Manor Drive and Giant Food Entrance	0	0	9	0	21	30
Sudley Manor Drive and Marshalls Entrance	0	0	3	0	11	14
Sudley Manor Drive and Sudley Road	1	3	43	3	112	162
Rest of Corridor	1	0	2	1	18	22
Total	3	6	129	12	337	487

Table 6: Study Area Crashes by Crash Type

Intersection	# of Crashes – Angle	# of Crashes – Rear End	# of Crashes – Head-On	# of Crashes – Fixed Object	# of Crashes – Side-swipe	# of Crashes – Pedestrian	# of Crashes – Other	# of Crashes – Total
Sudley Manor Drive and Bethlehem Road	32	1	2	1	0	0	1	37
Sudley Manor Drive and Chatsworth Drive	5	9	0	1	1	0	1	17
Sudley Manor Drive and Humphrey Lane/Wallace Lane	5	2	0	0	1	0	0	8
Sudley Manor Drive and Rodes Drive/Schofield Way	6	10	0	1	1	0	4	22
Sudley Manor Drive and Raven Crest Court	4	9	0	1	1	0	0	15
Sudley Manor Drive and Seymour Road	16	19	0	1	1	0	0	37
Sudley Manor Drive and Ashton Avenue	41	64	1	0	11	0	6	123
Sudley Manor Drive and Giant Food Entrance	26	2	1	1	0	0	0	30
Sudley Manor Drive and Marshalls Entrance	10	2	0	0	2	0	0	14
Sudley Manor Drive and Sudley Road	39	94	1	7	12	6	3	162
Rest of Corridor	2	15	0	2	1	0	2	22
Total	186	227	5	15	31	6	17	487

All intersection and roadway segments within the VDOT linear referencing system (LRS) are evaluated annually for the potential for safety improvement (PSI) based on the Highway Safety Manual (HSM) methodology by VDOT. The crash frequency, severity of crashes, volume, and length of segment are contributing factors in the predictive analysis. Crash predictions, based on the safety performance function (SPF) crash data files, are made for intersection and segments. The top 100 intersections and 100 miles of 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. PSI segments and intersections were identified at the following locations:

Segments:

- Sudley Manor Drive, between Ravens Crest Court and Ashton Avenue (ranked 83rd in the District)
- Sudley Manor Drive, between Costco Entrance and Chick-fil-A Entrance (ranked 156th in the District)
- Ashton Avenue, between Sudley Manor Drive and Donegan Drive (ranked 115th in the District)
- Sudley Road, between Sudley Manor Drive and Rosemary Drive (ranked 79th in the District)
- Sudley Road, between Sudley Manor Drive and Lomond Drive (ranked 122nd in the District)

Intersections:

- Sudley Manor Drive and Ashton Avenue (ranked 9th in the District)
- Sudley Manor Drive and Sudley Road (ranked 4th in the District)

Field Review Observations

A preliminary field review of the study area was conducted on Tuesday, June 10, 2025, to verify existing conditions, confirm traffic control devices and lane configurations, and observed peak hour traffic conditions and driver behavior. The existing lane configurations for each of the study intersections are shown in **Figure 11**.

Segment between Bull Run Plaza and Ashton Avenue

- Narrow sidewalks with small buffer along both sides of Sudley Manor Drive.
- There are sightline issues from side streets due to landscaping on the west side (Bull Run Plaza), but maintenance activities (trimming and/or mowing) cannot be performed since it lies outside of VDOT's right-of-way.
- Wide intersection crossing for both pedestrians and vehicles.
 - The group discussed the possibility of interim solutions to include using the curb lane (outside, third lane) as a right-turn lane and shorten the crossing distances via a taper.

Costco Entrance and Sudley Manor Drive

- The entrance to Costco has a stop sign which causes backups into Sudley Manor Drive on the weekends.
 - The southbound left-turn from Sudley Manor Drive into Costco and northbound right-turn into Costco back up into upstream intersections due to the Costco entrance stop sign.
- Drivers entering Costco approach from Sudley Manor Drive were observed to be confused based on lane usage.
- This entrance is private.

Ashton Avenue and Sudley Manor Drive

- Most slip lanes are blocked by through vehicles during most of the peak periods. The following additional observations were made:
 - All drivers were observed having to turn their heads back to see oncoming traffic.
 - Uncontrolled high-speed crossing for pedestrians at slip lanes.
 - All slip lane island curb ramps were not PROWAG compliant.
- Prince William County indicated that Ashton Avenue is being considered for a bike/pedestrian backbone and is interested in improving mobility through this intersection.
- Lighting is currently not present, and the signal heads are on span wire.

Seymour Road and Sudley Manor Drive

- The group discussed concerns with the length of the pedestrian crossing distances.
- Observed that parking along Seymour Road is close to the curb radii at Sudley Manor Drive or blocking the right-turn lanes along Seymour Road.
- Discussed that the landscaping may be blocking permissive left-turning vehicles from Sudley Manor Drive onto side streets.

Ravens Crest Court and Sudley Manor Drive

- Observed that a development sign is impacting the drivers' view, requiring vehicles to stop in front of the stop bar.
- The intersection has full access with no traffic signal. Again, landscaping requires drivers to sit between the median to see oncoming traffic.

Rodes Drive and Sudley Manor Drive

- Observed that parking along Rodes Drive is close to blocking right-turn lanes on Rodes Drive.
- The crosswalks crossing Sudley Manor Drive extend over 100 feet with no pedestrian refuges provided.
- Refuges are also not present on the crosswalk crossing Rodes Drive, which is shorter, at approximately 55 feet.

Chatsworth Drive and Sudley Manor Drive

- There are pedestrian crossings with refuges on all legs.
- Sight lines at this intersection are primarily unobstructed, with no issues noted on any approach.

Segment between Chatsworth Drive and Humphrey Lane

- There is a missing sidewalk segment, but a "goat path" made by pedestrians is present.

Segment between Humphrey Lane and Ashton Avenue

- Prince William County indicated that the east side of the corridor is the preferred location for the shared use path.
 - There's more room on this side; however, it may impact a gas line and there are some steeper grades at some of the locations in front of developments.

Figure 11: 2025 Existing Laneage

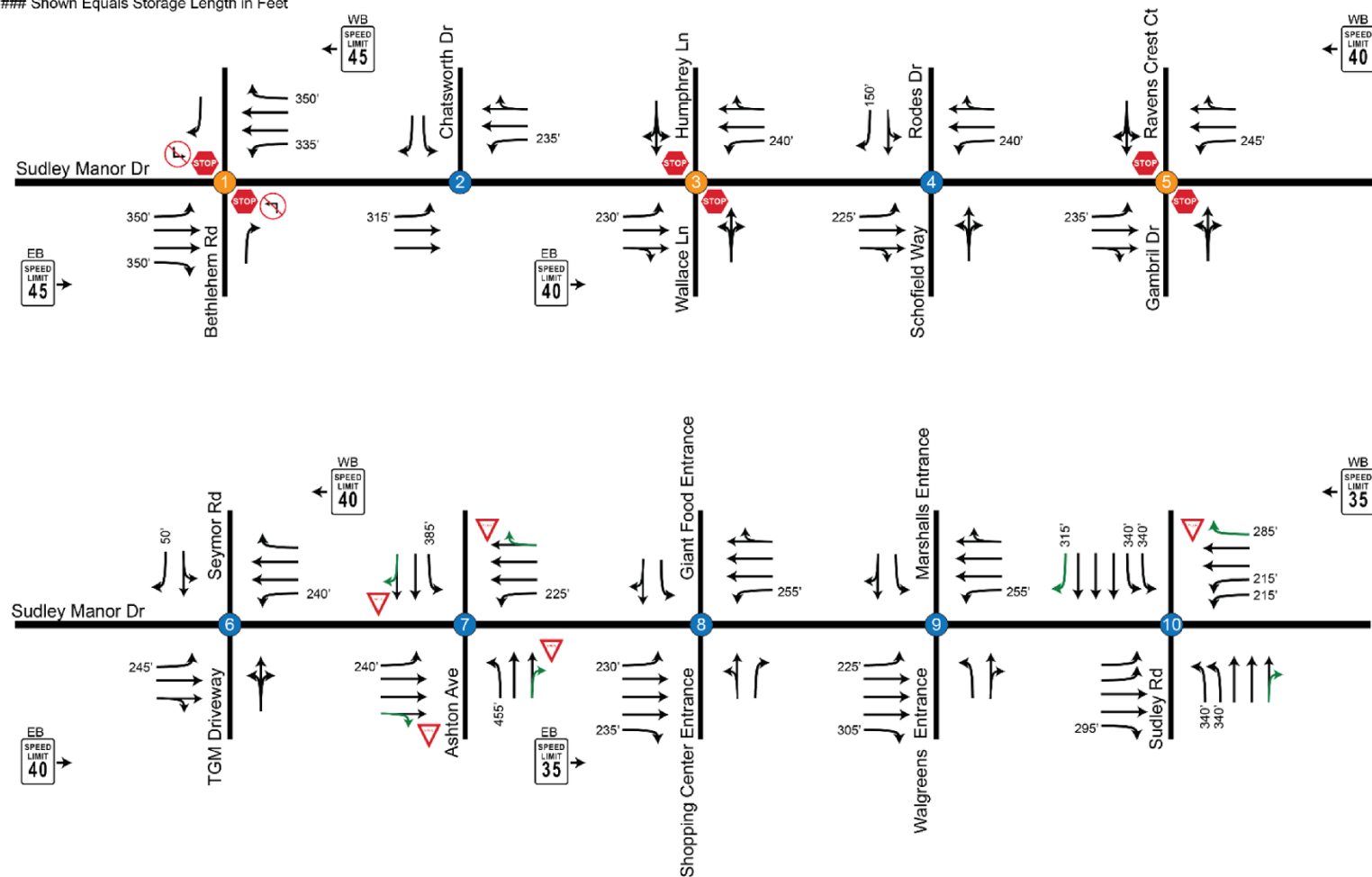
Legend

● Signalized Intersection

● Unsignalized Intersection

→ Channelized Right Turn Lane

Shown Equals Storage Length in Feet



Synchro - 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, which were modeled in *SimTraffic 11* based on the existing roadway geometry, recently collected turning movement counts and signal information from VDOT. Inputs and analysis methodologies were consistent with the VDOT *Traffic Operations and Safety Analysis Manual (TOSAM), Version 2.0*.

Traffic Data

Fourteen-hour vehicle turning movement, pedestrian, and bicycle counts were collected at the study intersections on Wednesday, May 21, 2025. Additionally, two 48-hour vehicle classification counts were collected along Sudley Manor Drive – one between Bethlehem Road and Humphrey Lane/Wallace Lane, and one between Seymour Road and Ashton Avenue, both on Tuesday May 21, 2025 and Wednesday, May 22, 2025.

Based on the data collected, system peak hours were developed for the AM peak hour (7:30 AM – 8:30 AM) and PM peak hour (4:30 PM – 5:30 PM). The raw traffic data is included in **Appendix C**.

All peak hour volumes were balanced between each of intersections. These balanced volumes were used as the 2025 Existing volumes as shown in **Figure 12**. The heavy vehicle percentages and peak hour factors are included in **Figure 13**, respectively.

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

Table 7: 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

Figure 12: 2025 Existing Peak Hour Volumes

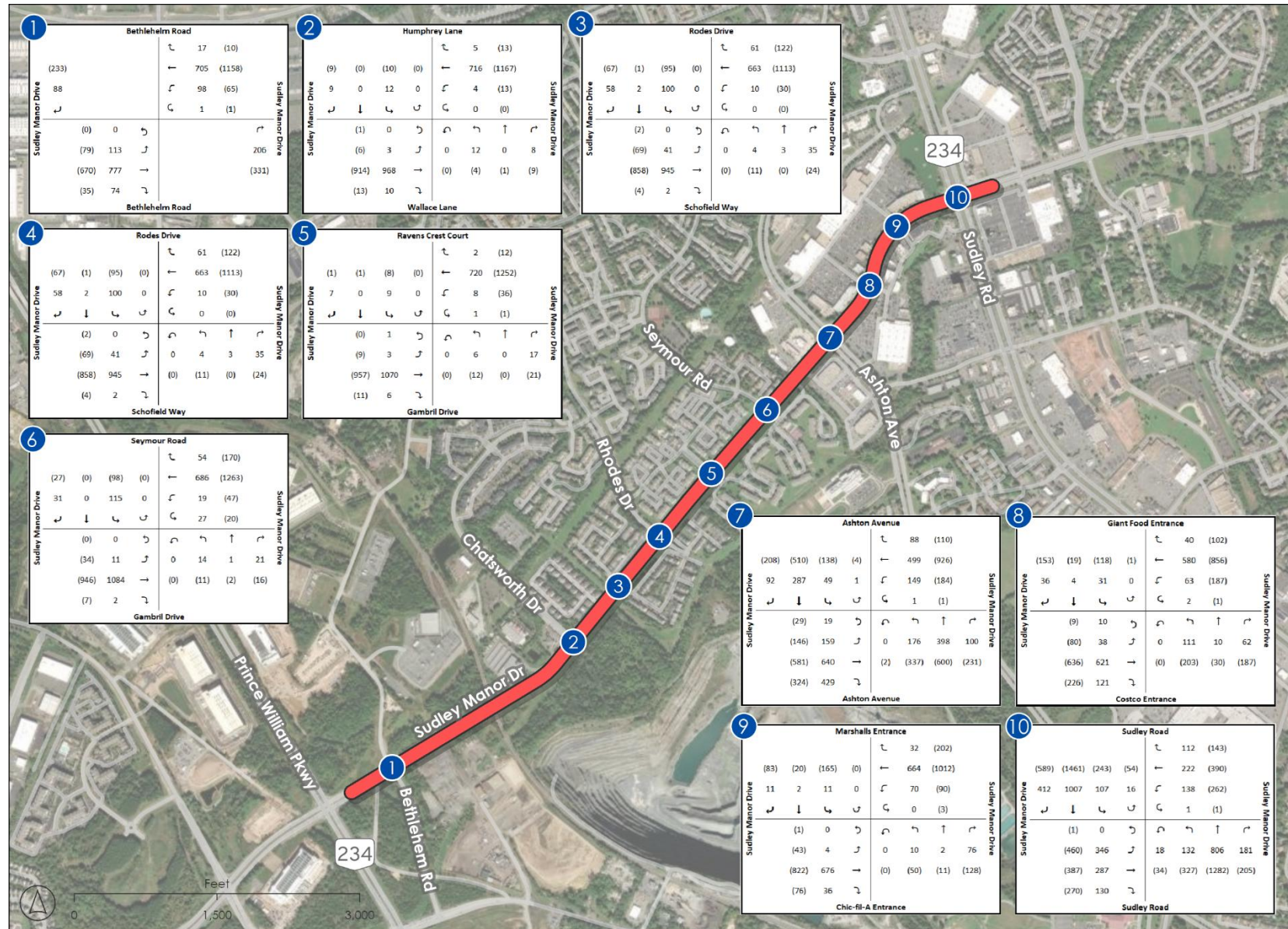
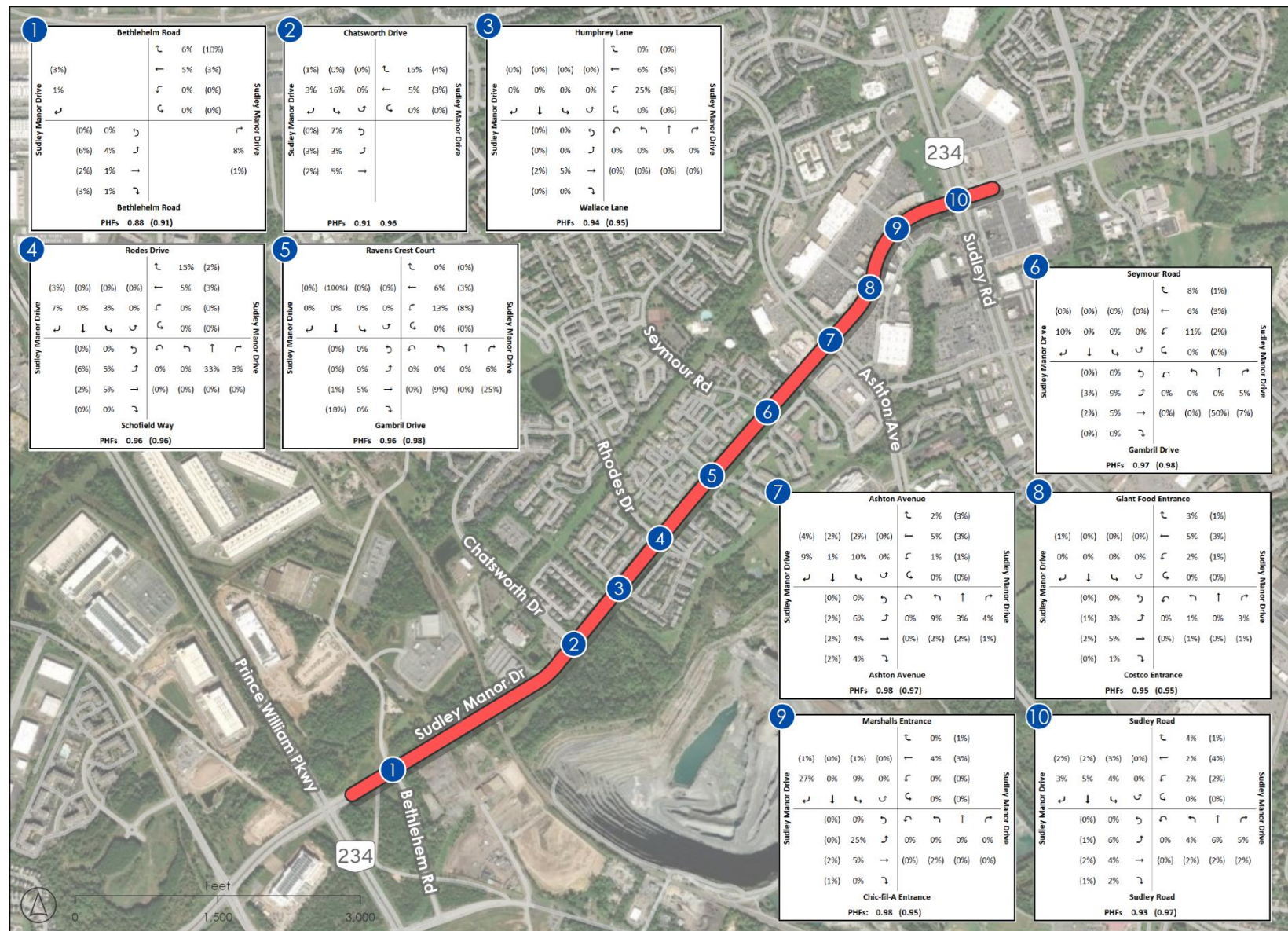


Figure 13: 2025 Existing Heavy Vehicle Percentages & Peak Hour Factors



Traffic Analysis Results

Control delay (seconds per vehicle), LOS, maximum queue lengths (feet), and travel times were selected as measures of effectiveness to quantitatively report the performance of each study intersection. **Table 8** summarizes the *SimTraffic* reports used to determine the measures of effectiveness for each intersection. *SimTraffic 11* was used as part of this analysis.

Ten simulations were run for both the AM and PM peak hours. The *VDOT Sample Size Determination Tool* was used to confirm that number of *SimTraffic* runs necessary (10).

SimTraffic results for the 2025 Existing LOS, maximum queues, and travel times are included in **Table 9**, **Table 10**, and **Table 11**, respectively. The *SimTraffic* Calibration memo is included in **Appendix E** and the 2025 Existing AM and PM peak hour *SimTraffic* reports are included in **Appendix F**.

Table 8: *SimTraffic* Reports for Control Delay

Intersection Name [<i>SimTraffic</i> Node #]	<i>SimTraffic</i> Reports
Sudley Manor Drive & Bethlehem Road [1]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Chatsworth Drive [2]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Humphrey Lane/Wallace Lane [3]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Rodes Drive/Schofield Way [4]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Ravens Crest Court/Gambriel Drive [5]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Seymour Road/Gambriel Drive [6]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Ashton Avenue [7]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Giant Food Entrance [8]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Marshalls Entrance [9]	Simulation Summary Queuing Information Performance Report
Sudley Manor Drive & Sudley Road [10]	Simulation Summary Queuing Information Performance Report

As shown in **Table 9**, *SimTraffic* indicates that five of the seven signalized intersections are currently operating at LOS C or better in both peak hours. The two signalized intersections that are operating in which an approaching failing or failing condition exists during at least one peak hour include the following:

- Sudley Manor Drive and Ashton Avenue. This intersection operates at an overall LOS D in the AM peak hour and LOS E in the PM peak hour. Additionally, seven of the movements operate under failing conditions in at least one peak hour.
- Sudley Manor Drive and Sudley Road. This intersection operates at an overall LOS D in the AM peak hour and LOS F in the PM peak hour. Additionally, six of the movements operate under failing conditions in at least one peak hour.

At the signalized intersections that are currently operating at LOS C or better, the Sudley Manor Drive and Seymour Road/Gambril Drive intersection has one movement operating at LOS E in PM peak hour, while the Sudley Manor Drive and Marshalls/CFA Entrance intersection has one movement operating at LOS E in the AM peak hour and one movement operating at LOS E in the PM peak hour.

The majority of the stop- and yield-controlled movements are currently operating at LOS D or better in both the AM and PM peak hours, with a few exceptions. At the Sudley Manor Drive and Bethlehem Road intersection, the southbound Bethlehem Road right-turn movement is currently operating at LOS F in the PM peak hour. At the Sudley Manor Drive and Humphrey Lane/Wallace Lane intersection, the northbound Wallace Lane through movement is currently operating at LOS F in the PM peak hour. The northbound Gambril Drive left-turn lane and southbound Ravens Crest Court left-turn lane along Sudley Manor Drive are both operating at LOS E in the AM peak hour, while the southbound through lane at this intersection is operating at LOS F in the PM peak hour.

SimTraffic reported that the majority of the maximum queues are currently contained within the existing storages for all of the exclusive turn lanes at the study intersections, with exceptions noted at locations where the maximum queue reported in *SimTraffic* equaled the storage coded in the *Synchro* model. Since *SimTraffic* does not report maximum storage lengths longer than the available storage, the actual queue spills out of the available storage on the westbound left-turn lane and the northbound left-turn lane at the Sudley Manor Drive and Sudley Road intersection in the PM peak hour.

Table 9: 2025 Existing Level of Service

Intersection Number and Description		Type of Control	Lane Group	Eastbound				Westbound				Northbound				Southbound				Overall		
				AM		PM		AM		PM		AM		PM		AM		PM				
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	AM
1	Bethlehem Road	Two-Way Stop			Sudley Manor Drive				Sudley Manor Drive				Bethlehem Road				Bethlehem Road				Delay	Delay
			Left	15.4	C	28.7	D	14.7	B	20.6	C	--	---	--	---	--	---	--	---	--	--	
			Through	4.3	A	5.0	A	2.6	A	17.5	C	--	---	--	---	--	---	--	---	--	--	
			Right	3.7	A	4.1	A	2.1	A	5.0	A	11.0	B	18.5	C	7.8	A	247.8	F	--	--	
2	Chatsworth Drive	Signal			Sudley Manor Drive				Sudley Manor Drive				Chatsworth Drive				Chatsworth Drive				Delay	Delay
			Left	17.0	B	33.7	C	--	--	--	--	---	---	---	---	44.7	D	46.3	D	6.2	10.2	
			Through	5.3	A	6.2	A	3.7	A	8.4	A	---	---	---	---	--	--	--	--	--	--	
			Right	--	--	--	--	1.8	A	6.0	A	---	---	---	---	10.0	A	13.4	B	A	B	
3	Humphrey Lane / Wallace Lane	Two-Way Stop			Sudley Manor Drive				Sudley Manor Drive				Wallace Lane				Humphrey Lane				Delay	Delay
			Left	7.4	A	11.6	B	19.2	C	12.5	B	28.2	D	24.5	C	27.8	D	23.0	C	--	--	
			Through	1.8	A	1.7	A	1.8	A	3.1	A	---	---	68.3	F	--	--	--	--	--	--	
			Right	1.6	A	3.1	A	2.2	A	5.9	A	10.9	B	10.0	A	8.8	A	10.6	B	--	--	
4	Rodes Drive / Schofield Way	Signal			Sudley Manor Drive				Sudley Manor Drive				Schofield Way				Rodes Way					
			Left	13.1	B	34.2	C	16.4	B	5.4	A	32.3	C	10.5	B	38.1	D	44.3	D	8.6	12.8	
			Through	6.4	A	23.8	C	6.7	A	15.7	B	44.1	D	44.4	D	49.2	D	51.6	D	A	B	
			Right	7.1	A	8.3	A	4.8	A	12.5	B	13.1	B	13.0	B	8.3	A	12.8	B			
5	Ravens Crest Court / Gambрил Drive	Two-Way Stop			Sudley Manor Drive				Sudley Manor Drive				Gambрил Drive				Ravens Crest Court				Delay	Delay
			Left	11.3	B	14.6	B	13.1	B	12.1	B	35.1	E	32.9	D	46.8	E	27.2	D	--	--	
			Through	2.3	A	2.3	A	1.0	A	2.5	A	---	--	---	--	--	--	63.9	F	--	--	
			Right	1.9	A	4.6	A	1.3	A	4.1	A	14.2	B	11.1	B	7.2	A	16.0	C	--	--	
6	Seymour Road / Gambрил Drive	Signal			Sudley Manor Drive				Sudley Manor Drive				Gambрил Drive				Seymour Road				Delay	Delay
			Left	10.3	B	20.1	C	19.3	B	23.3	C	33.2	C	35.2	D	41.2	D	42.2	D	10.1	13.4	
			Through	8.7	A	10.7	B	6.2	A	13.2	B	49.1	D	61.3	E	--	--	--	--	B	B	
			Right	12.0	B	9.4	A	3.5	A	6.7	A	15.2	B	12.9	B	9.5	A	18.4	B			
7	Ashton Avenue	Signal			Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue				Delay	Delay
			Left	95.2	F	85.8	F	73.3	E	90.6	F	88.1	F	116.7	F	125.5	F	87.5	F	47.8	60.6	
			Through	39.2	D	66.0	E	31.2	C	43.1	D	65.6	E	60.1	E	75.0	E	73.7	E	D	E	
			Right	21.1	C	46.6	D	4.1	A	7.0	A	14.6	B	25.3	C	11.5	B	25.6	C			
8	Giant Food / Costco	Signal			Sudley Manor Drive				Sudley Manor Drive				Costco				Giant Food				Delay	Delay
			Left	12.8	B	26.1	C	10.8	B	24.5	C	36.0	D	41.1	D	37.9	D	47.5	D	11.1	18.9	
			Through	12.7	B	20.8	C	4.1	A	9.8	A	35.9	D	46.5	D	41.7	D	41.5	D	B	B	
			Right	9.5	A	12.4	B	2.1	A	6.9	A	7.3	A	9.5	A	5.1	A	16.1	B			
9	Marshalls / CFA Entrance	Signal			Sudley Manor Drive				Sudley Manor Drive				CFA Entrance				Marshalls				Delay	Delay
			Left	66.1	E	42.7	D	54.3	D	49.5	D	45.7	D	43.4	D	50.9	D	70.9	E	8.7	28.6	
			Through	3.9	A	34.0	C	7.8	A	19.3	B	40.2	D	41.4	D	39.3	D	32.0	C	A	C	
			Right	2.2	A	8.4	A	7.0	A	17.7	B	8.7	A	29.4	C	7.3	A	12.0	B			
10	Sudley Road	Signal			Sudley Manor Drive				Sudley Manor Drive				Sudley Road				Sudley Road				Delay	Delay
			Left	52.7	D	191.6	F	76.9	E	157.6	F	94.9	F	255.2	F	80.3	F	114.6	F	36.1	81.9	
			Through	53.5	D	133.9	F	74.0	E	166.1	F	27.3	C	46.5	D	29.1	C	42.3	D			
			Right	7.0	A	37.3	D	3.2	A	9.3	A	5.4	A	19.2	B	6.4	A	9.1	A	D	F	

Table 10: 2025 Existing Maximum Queues

Intersection Number and Description	Type of Control	Lane Group	Eastbound			Westbound			Northbound			Southbound		
			Storage	AM	PM	Storage	AM	PM	Storage	AM	PM	Storage	AM	PM
			Bay Length	Queue (ft)	Queue (ft)	Bay Length	Queue (ft)	Queue (ft)	Bay Length	Queue (ft)	Queue (ft)	Bay Length	Queue (ft)	Queue (ft)
1 Bethlehem Road	Two-Way Stop	Left	Sudley Manor Drive			Sudley Manor Drive			Bethlehem Road			Bethlehem Road		
		Through	420	151	142	420	102	248	---	150	220	---	76	841
		Right	--	0	0	--	0	471	---	---	---	---	---	---
		Right	410	14	2	410	2	0	---	---	---	---	---	---
2 Chatsworth Drive	Signal	Left	Sudley Manor Drive			Sudley Manor Drive			Chatsworth Drive			Chatsworth Drive		
		Through	375	73	175	240	---	---	↑	↑	↑	---	123	125
		Right	---	174	169	---	152	291	↑	↑	↑	↑	↑	↑
		Right	↑	↑	↑	---	---	---	↑	↑	↑	---	88	80
3 Humphrey Lane / Wallace Lane	Two-Way Stop	Left	Sudley Manor Drive			Sudley Manor Drive			Wallace Lane			Humphrey Lane		
		Through	280	26	31	290	35	44	---	54	39	---	55	45
		Right	---	0	4	---	0	0	---	---	---	---	---	---
		Right	---	0	---	---	0	0	---	---	---	---	---	---
4 Rodes Drive / Schofield Way	Signal	Left	Sudley Manor Drive			Sudley Manor Drive			Schofield Way			Rodes Drive		
		Through	300	69	109	290	35	129	---	65	64	---	---	---
		Right	---	263	266	---	222	378	---	---	---	---	145	164
		Right	---	---	---	---	---	---	---	---	---	165	105	94
5 Ravens Crest Court / Gambriel Drive	Two-Way Stop	Left	Sudley Manor Drive			Sudley Manor Drive			Gambriel Drive			Ravens Crest Court		
		Through	280	22	31	290	37	60	---	60	86	---	48	60
		Right	---	---	13	---	---	---	---	---	---	---	---	---
		Right	---	---	---	---	---	---	---	---	---	---	---	---
6 Seymour Road / Gambriel Drive	Signal	Left	Sudley Manor Drive			Sudley Manor Drive			Gambriel Drive			Seymour Road		
		Through	290	45	61	285	76	92	---	---	---	---	---	---
		Right	---	337	369	---	123	549	---	50	59	---	153	156
		Right	---	---	---	---	36	54	---	51	56	100	99	90
7 Ashton Avenue	Signal	Left	Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
		Through	280	279	274	265	254	264	560	344	541	460	169	322
		Right	---	662	771	---	236	422	---	359	585	---	309	490
		Right	---	---	---	---	---	---	---	---	---	---	---	---
8 Giant Food / Costco	Signal	Left	Sudley Manor Drive			Sudley Manor Drive			Costco			Giant Food		
		Through	280	56	114	275	65	216	---	---	---	---	66	200
		Right	---	220	254	---	93	207	---	129	136	---	49	183
		Right	275	75	129	---	---	---	---	67	123	---	---	---
9 Marshalls / CFA Entrance	Signal	Left	Sudley Manor Drive			Sudley Manor Drive			CFA Entrance			Marshalls		
		Through	260	48	117	295	103	199	---	65	177	---	45	164
		Right	---	135	529	---	81	338	---	66	85	---	67	145
		Right	350	27	296	---	---	---	85	---	---	---	---	---
10 Sudley Road	Signal	Left	Sudley Manor Drive			Sudley Manor Drive			Sudley Road			Sudley Road		
		Through	---	271	575	250	176	250	350	224	350	650	151	394
		Right	---	214	592	---	221	573	---	300	919	---	343	500
		Right	325	76	316	450	---	450	---	---	---	410	---	164

Table 11:2025 Existing Travel Times

Route Name	Start Intersection (included)	End Intersection (not included)	AM Peak
			SimTraffic Travel Time [sec]
Sudley Manor Dr EB	Bethlehem Road	Sudley Manor Square	289.3
Sudley Manor Dr WB	Sudley Manor Square	Bethlehem Road	289.7
			PM Peak
Sudley Manor Dr EB	Bethlehem Road	Sudley Manor Square	445.9
Sudley Manor Dr WB	Sudley Manor Square	Bethlehem Road	450.2

EB – Eastbound / WB – Westbound

Phase 1 Public Outreach

The Phase 1 PublicInput.com survey was held from June 2, 2025 to June 16, 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 979 participants and received 1,150 comments.

As shown in **Figure 14**, participants ranked capacity preservation as the most important issue in the study area, followed by congestion mitigation and safety.

The following needs have been identified for this study. Do you agree with these needs? (Check all that apply)

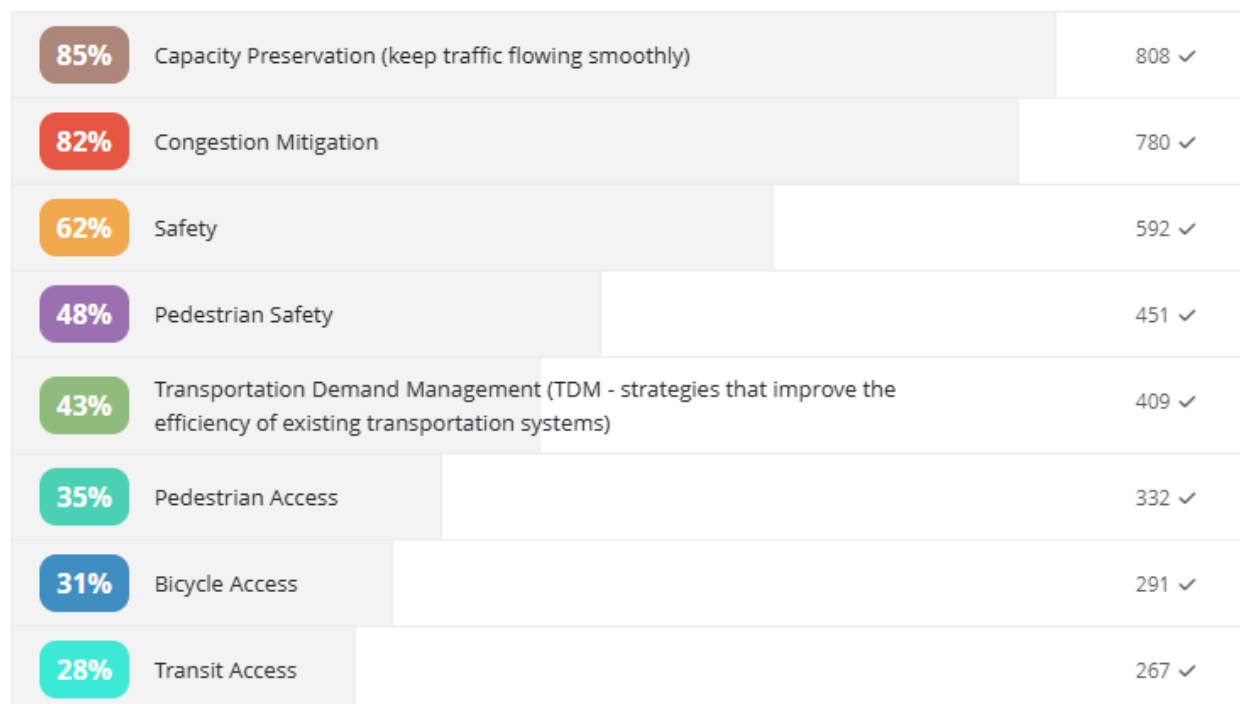


Figure 14: VTrans Needs Along the Corridor

As shown in **Figure 15**, reducing traffic congestion was identified as the greatest safety issue, followed by corridor safety/intersection safety, pedestrian safety and accessibility, speeding/aggressive driving and proper pavement marking and signage.

Rank the following needs in order of importance to you along the study area.

96%	Reducing traffic congestion	Rank: 1.79	505 ✓
79%	Corridor safety / intersection safety	Rank: 2.89	418 ✓
71%	Pedestrian safety and accessibility	Rank: 3.77	375 ✓
73%	Speeding / aggressive driving	Rank: 3.84	387 ✓
73%	Proper pavement marking and signage	Rank: 4.08	386 ✓
68%	Public transit access and service	Rank: 4.95	359 ✓
66%	Bicycle safety and accessibility	Rank: 5.32	349 ✓

Figure 15: Needs Along the Corridor

Speeding/aggressive driving was the greatest safety concern, followed by running red lights and sudden stopping/rear end crashes, as shown in **Figure 16**.

Which of the following safety issues concern you? (Check all that apply)

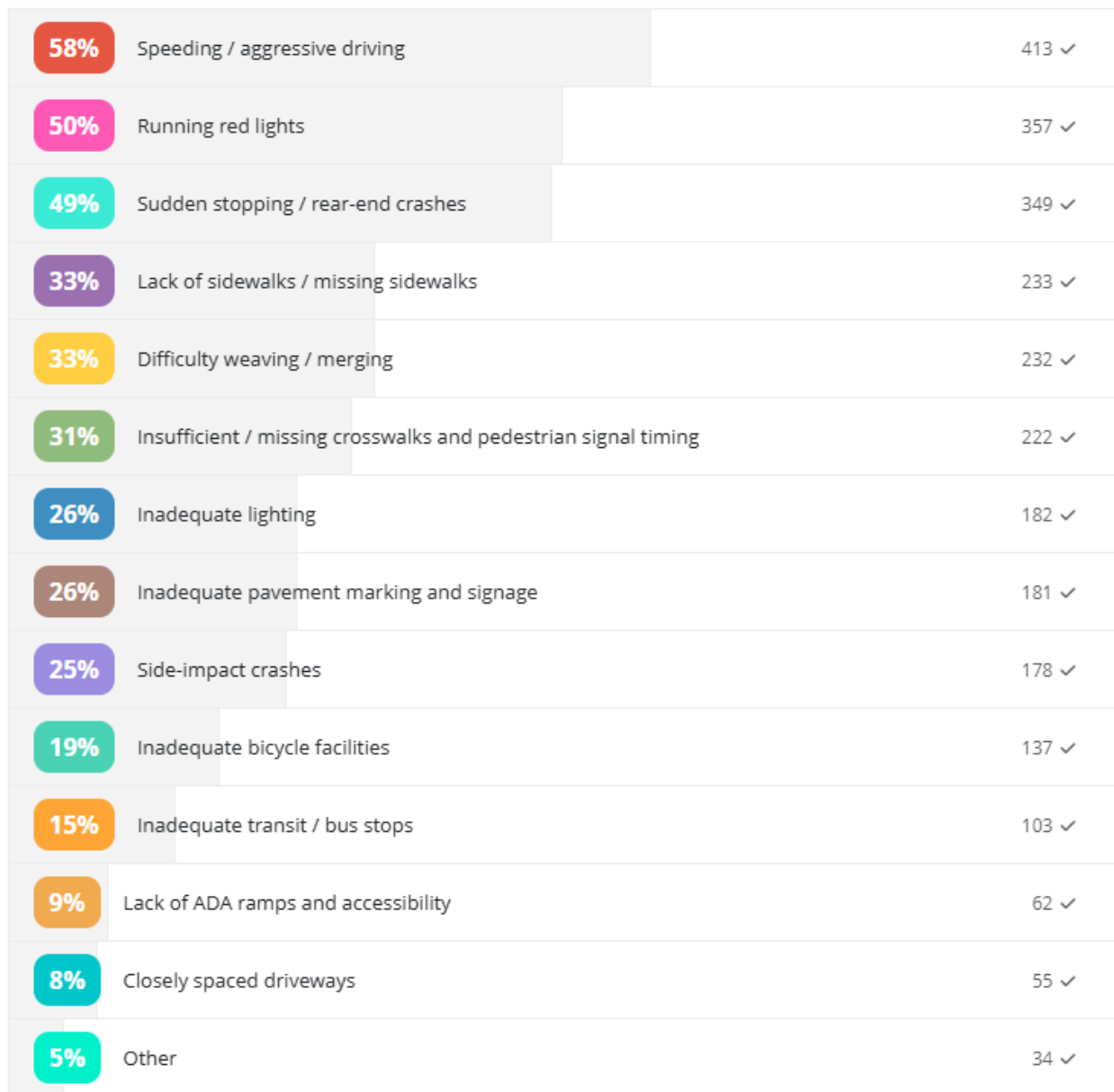


Figure 16: Safety Issues Along the Corridor

Common themes among written comments included the following:

Operations

- Heavy congestion noted during the peak hours, particularly in the PM peak hours.
- Bottlenecks identified at the intersections.
- Safety
- Speeding and aggressive driving.
- Frequent rear-end and side-impact crashes.
- Running red lights and sudden stops.
- Pedestrian and Bicycle Accessibility

- Lack of sidewalks or missing sidewalk segments.
- Inadequate or missing crosswalks and pedestrian signals.
- Poor lighting and ADA accessibility issues.
- Limited or unsafe bicycle facilities.

Transit Access

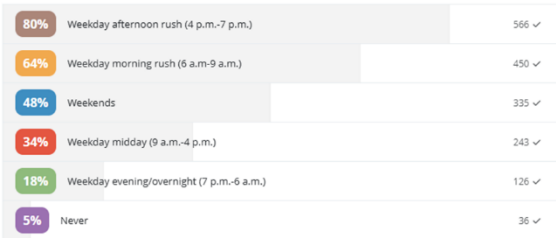
- Inadequate or poorly located bus stops.
- Limited public transit options along the corridor.

Intersection and Corridor Design

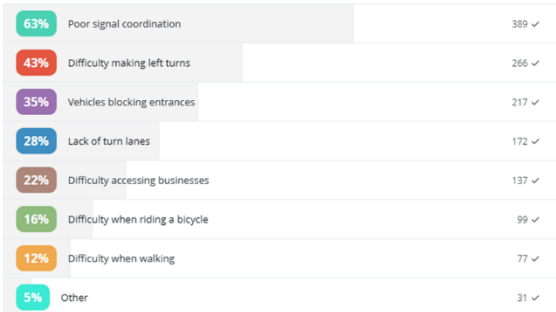
- Closely spaced driveway causing issues with vehicles entering and exiting the corridor.
- Poor pavement markings and signage.
- Difficult making left turns or accessing businesses.

Most of the respondents traveled during the weekday afternoon (4:00 PM – 7:00 PM) and morning (6:00 AM – 9:00 AM) rushes and experienced mobility concerns during these times, including making left-turns, poor signal coordination and vehicles blocking entrances. Most respondents indicated that they traveled along the corridor a few times a week (45%), while 35% indicated that they traveled along the corridor daily. Personal vehicle (99%) was the mode of choice when traveling along the corridor, followed by walking (14%) and cycling (11%), with shopping/errands (86%) being the predominant reason, followed by passing through (48%), work (48%) and home (42%). Respondents indicated that crosswalks/pedestrian signals (59%), sidewalks (46%), shared-use paths (37%) and bicycle lanes (32%) are needed along the corridor. **Figure 17** summarizes some of the additional responses.

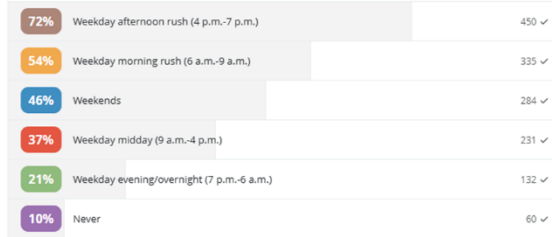
Do you experience congestion when traveling along the study area? If so, when? (Check all that apply)



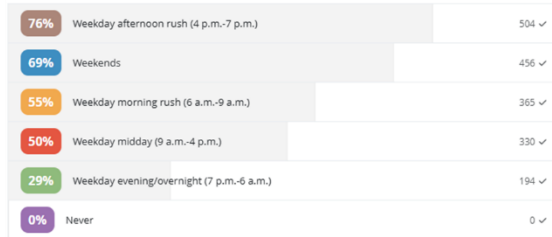
What mobility issues do you typically experience when using the study area? (Check all that apply)



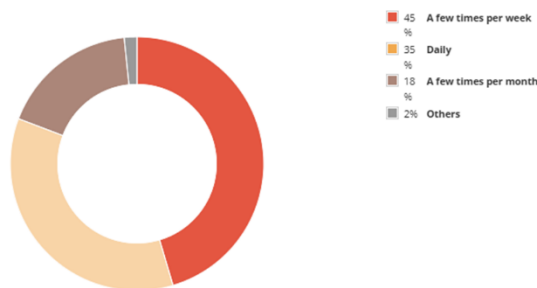
When do you typically experience mobility issues in the study area? (Check all that apply)



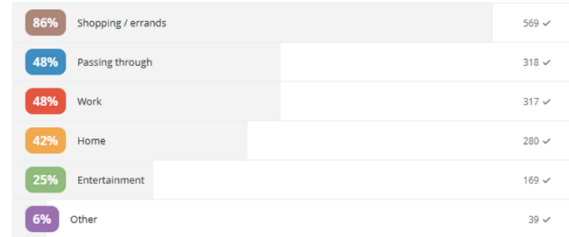
When do you typically travel in the study area? (Check all that apply)



How often do you travel along the study area?



Why do you travel along the study area? (Check all that apply)



What mode(s) of travel do you use when traveling along the study area? (Check all that apply)

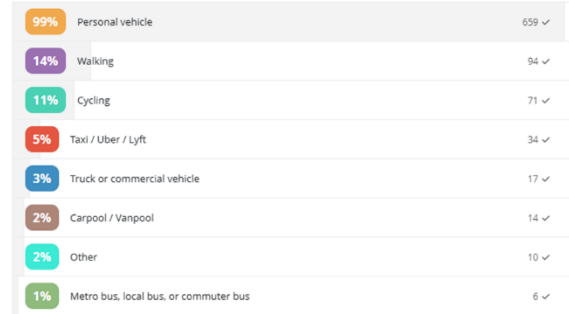


Figure 17: Additional Survey Responses

1.1.6. No-Build Conditions Traffic Operations Analysis

No-Build 2055 Volume Development

Traffic operational analyses were conducted to evaluate the overall performance of the study corridor under No-Build (2055) AM and PM peak hour conditions. The intent of the no-build conditions analysis is to provide a general understanding of the baseline future traffic conditions as a starting point for developing improvement concepts.

The following sources were reviewed to determine the growth rates to apply to existing traffic volumes to forecast future (2055) traffic volumes.

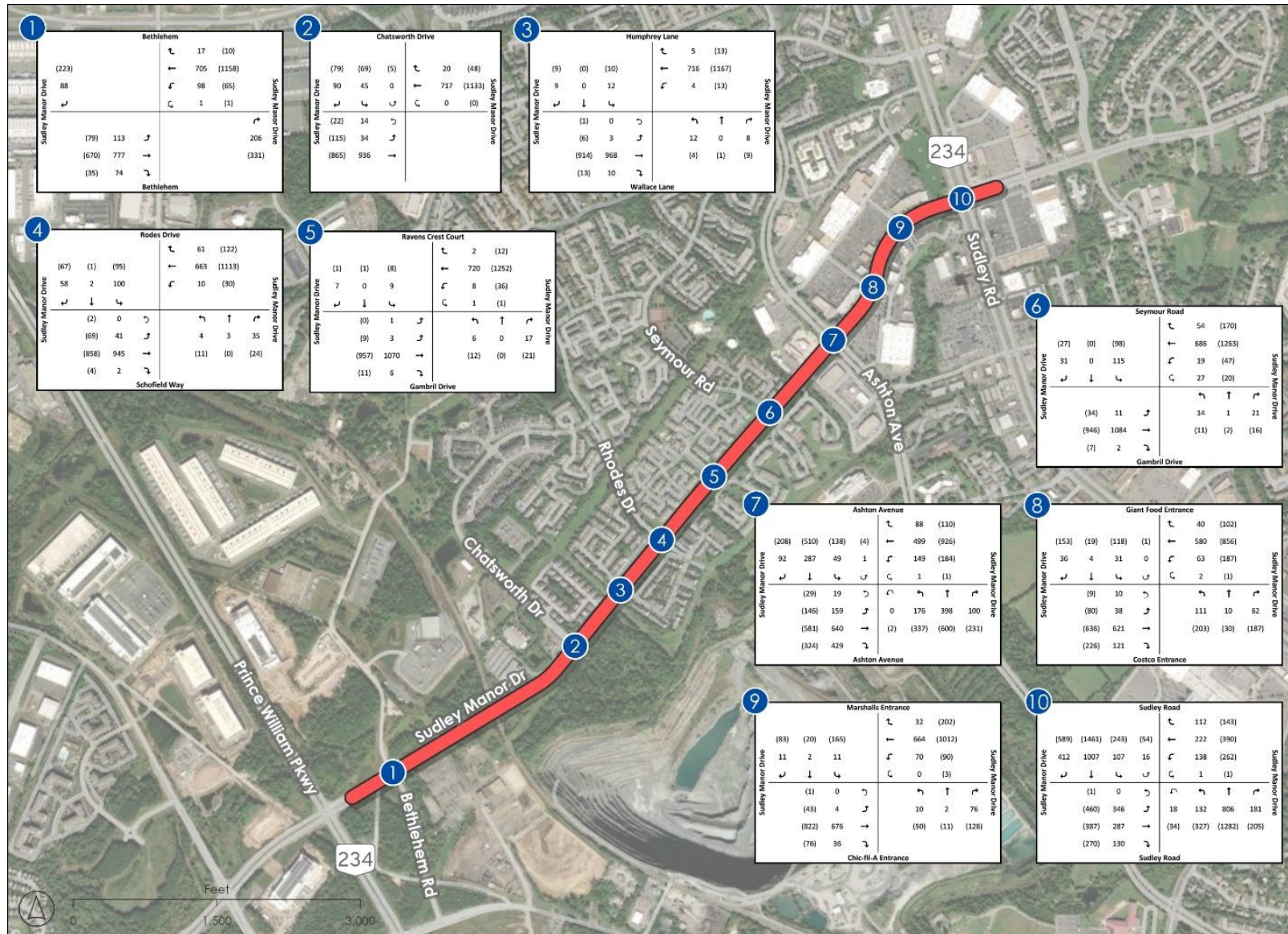
- Historical Annual Average Daily Traffic (AADT) data published by VDOT
- VDOT's Pathways for Planning (P4P) Traffic Forecast
- Metropolitan Washington Council of Governments (MWCOC) Travel Demand Model (TDM)
- Manassas Mall Redevelopment Traffic Impact Study (TIS)

From these sources, the linear growth rates used to develop the future traffic volumes are as follows:

- Sudley Manor Drive, Ashton Avenue, Sudley Road – 1.0%
- Prince William Parkway – 2.0%
- Northbound Bethlehem Road – 0.5%
- All other roadways – 0%

The growth rates and future year volumes were approved by VDOT on October 22, 2025. The approved future growth rates memo is included in **Appendix G**, and the 2055 Future No-Build volumes are shown in **Figure 18**.

Figure 18: 2055 No-Build Peak Hour Volumes



Synchro Analysis

Traffic operational analyses were conducted to evaluate the overall performance of the study intersections under No-Build (2055) AM and PM peak hour conditions. The intent of no-build conditions 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 *SimTraffic* for the entire study area.

The existing conditions Synchro models were used as a basis to develop the No-Build models for the AM and PM peak hour conditions. Two funded, approved projects within the study area were added to the Synchro models:

- Prince William Parkway and Sudley Manor Drive Interchange Improvements (includes signalization at Bethlehem Road)
- Sudley Manor Drive and Sudley Road STARS Improvements

The models were updated with the projected 2055 No-Build traffic volumes, while traffic signal cycle lengths, splits and offsets were kept consistent with existing conditions. No-Build inputs and analysis methodologies were applied in accordance with TOSAM guidance. Control delay (seconds per vehicle), LOS, and maximum queue length (feet) were selected as measures of effectiveness to quantitatively report the performance of each study intersection. The *SimTraffic* reports for the No-Build condition are included in **Appendix H**.

Operations across the corridor are projected to deteriorate to unacceptable levels of service in the no-build condition. Several movements and approaches operate at LOS F, especially during the PM peak hour. Ashton Avenue operates at LOS E or worse during both peak periods, failing in the PM peak hour, while Sudley Road operates at LOS D or worse during both peak periods. It was found that the Sudley Road intersection controls the vehicular flow of Sudley Manor Drive.

The following trends were observed under no-build conditions; the results for the level of service, maximum and average queue lengths are shown in **Table 12** and **Table 13** respectively:

AM Peak Hour

- The Ashton Avenue intersection operates at LOS E with 60 seconds per vehicle of overall intersection delay. The eastbound, northbound and southbound left-turn movements operate at LOS F with at least 105 seconds of delay.
- The northbound and southbound Ashton Avenue through movements operate at LOS E during the AM peak, with at least 66 seconds of delay.
- The eastbound and westbound left turn maximum queue lengths at Ashton Avenue reach or exceed the storage bay lengths (280 feet and 265 feet respectively).
- The Sudley Manor Drive left-turn and through movements operate at LOS F at Sudley Road. The northbound and southbound Sudley Road left-turn movements experience over 109 seconds of delay.
- The northbound left turn at Wallace Lane deteriorates from LOS D to LOS E compared to the existing condition.

PM Peak Hour

- The northbound approach at Wallace Lane/Humphrey Lane is anticipated to operate at LOS F, while the southbound approach is anticipated at LOS C.
- Ashton Avenue has an overall intersection delay of 115 seconds during the PM peak hour, with several failing movements including the entire eastbound and southbound approaches. The northbound left-turn movement experiences almost 250 seconds of delay.
- All movements are failing at Sudley Road apart from the westbound and southbound right turns, which each operate at LOS D. The northbound left turn experiences over 975 seconds of delay per vehicle.
- The maximum queue lengths exceed the storage bay lengths for each left-turn movement the Ashton Avenue and Sudley Road intersections.
- Due to the interchange improvement project, operations improved at Prince William Parkway, operating at LOS C in both AM and PM peak periods.

Table 12: 2055 No-Build Level of Service

Intersection Number and Description	Type of Control	Lane Group	Eastbound				Westbound				Northbound				Southbound				Overall		
			AM		PM		AM		PM		AM		PM		AM		PM				
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	
Bethlehem Road	Signal		Sudley Manor Drive				Sudley Manor Drive				Bethlehem Road				Bethlehem Road				AM	PM	
		Left	28.3	C	29.3	C	†	†	†	†	†	†	†	†	43.0	D	32.9	C	Delay	Delay	
		Through	9.4	A	9.5	A	6.3	A	12.1	B	†	†	†	†	†	†	†	†	†	9.3	12.6
		Right	†	†	†	†	4.5	A	7.1	A	†	†	†	†	10.7	B	24.1	C	A	B	
Chatsworth Drive	Signal		Sudley Manor Drive				Sudley Manor Drive				Chatsworth Drive				Chatsworth Drive				Delay	Delay	
		Left	20.1	C	43.2	D	†	†	†	†	†	†	†	†	48.9	D	52.9	D	8.9	14.7	
		Through	9.2	A	16.1	B	6.1	A	9.1	A	†	†	†	†	†	†	†	†	8.9	14.7	
		Right	†	†	†	†	5.3	A	7.5	A	†	†	†	†	12.6	B	14.8	B	A	B	
Humphrey Lane / Wallace Lane	Two-Way Stop		Sudley Manor Drive				Sudley Manor Drive				Wallace Lane				Humphrey Lane				Delay	Delay	
		Left	12.4	B	18.7	C	21.8	C	21.9	C	36.4	E	77.7	F	45.3	E	60.5	F	--	--	
		Through	2.7	A	12.8	B	2.6	A	3.6	A	---	---	81.3	F	---	---	---	---	--	--	
		Right	3	A	18.8	C	2.9	A	5.7	A	20.0	C	64.2	F	16.7	C	23.9	C	--	--	
Rodes Drive / Schofield Way	Signal		Sudley Manor Drive				Sudley Manor Drive				Schofield Way				Rodes Way				Delay	Delay	
		Left	14.7	B	32.3	C	20.6	C	19.3	B	40.0	D	45.6	D	39.7	D	53.8	D	10.3	23.5	
		Through	6.8	A	31.9	C	11.1	B	14.1	B	40.5	D	--	--	26.7	C	49.4	D	B	C	
		Right	2.7	A	25.0	C	9.8	A	12.1	B	17.9	B	24.9	C	10.2	B	18.7	B	--	--	
Ravens Crest Court / Gambрил Drive	Two-Way Stop		Sudley Manor Drive				Sudley Manor Drive				Gambрил Drive				Ravens Crest Court				Delay	Delay	
		Left	12.9	B	38.0	E	26.1	D	61.4	F	54.0	F	162.0	F	66.9	F	332.5	F	--	--	
		Through	2.8	A	44.3	E	2.4	A	3.6	A	---	--	---	--	--	--	537.4	F	--	--	
		Right	3.0	A	63.8	F	1.9	A	5.8	A	21.7	C	167.1	F	13.5	B	255.3	F	--	--	
Seymour Road / Gambрил Drive	Signal		Sudley Manor Drive				Sudley Manor Drive				Gambрил Drive				Seymour Road				Delay	Delay	
		Left	15.5	B	52.9	D	29.9	C	73.0	E	39.8	D	31.2	C	41.3	D	81.9	F	15.3	50.2	
		Through	13.7	B	85.8	F	14.2	B	21.4	C	39.9	D	32.0	C	--	--	--	---	--	--	
		Right	17	B	93.7	F	4.8	A	8.4	A	17.1	B	53.3	D	12.6	B	27.4	C	B	D	
Ashton Avenue	Signal		Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue				Delay	Delay	
		Left	105.1	F	143.9	F	76.3	E	121.4	F	133.0	F	249.4	F	124.2	F	146.5	F	60.0	115.3	
		Through	52.3	D	102.9	F	46.7	D	74.3	E	66.7	E	79.0	E	73.3	E	165.9	F	E	F	
		Right	36.7	D	122.4	F	5.4	A	21.9	C	26.9	C	55.3	E	16.6	B	127.5	F	E	F	
Giant Food / Costco	Signal		Sudley Manor Drive				Sudley Manor Drive				Costco				Giant Food				Delay	Delay	
		Left	17.1	B	30.5	C	16.2	B	28.0	C	38.4	D	47.2	D	42.4	D	203.3	F	11.7	39.5	
		Through	12.1	B	43.4	D	6.2	A	20.2	C	38.2	D	51.8	D	32.5	C	60.2	E	B	D	
		Right	8.8	A	26.6	C	3.2	A	13.3	B	13.0	B	52.6	D	9.2	A	42.2	D	--	--	
Marshalls / CFA Entrance	Signal		Sudley Manor Drive				Sudley Manor Drive				CFA Entrance				Marshalls				Delay	Delay	
		Left	52.9	D	54.5	D	57.2	E	96.3	F	47.4	D	77.0	E	69.9	E	191.3	F	14.1	68.5	
		Through	14.4	B	111.6	F	8.7	A	21.3	C	52.7	D	107.4	F	39.2	D	52.3	D	B	E	
		Right	5.8	A	63.6	E	7.5	A	19.9	B	23.7	C	102.1	F	7.9	A	19.0	B	--	--	
Sudley Road	Signal		Sudley Manor Drive				Sudley Manor Drive				Sudley Road				Sudley Road				Delay	Delay	
		Left	107.1	F	175.1	F	84.3	F	261.5	F	170.9	F	979.7	F	109.3	F	365.6	F	54.9	167.5	
		Through	128.1	F	206.1	F	91.2	F	297.2	F	34.0	C	100.0	F	37.4	D	79.4	E	D	F	
		Right	30.4	C	96.2	F	3.8	A	44.4	D	9.5	A	64.4	E	7.9	A	39.2	D	--	--	
Prince William Parkway (234 Bypass)	Signal		Sudley Manor Drive				Sudley Manor Drive				Prince William Parkway				Prince William Parkway				Delay	Delay	
		Left	41.0	D	41.4	D	42.7	D	82.1	F	46.4	D	48.1	D	37.2	D	39.1	D	22.7	28.1	
		Through	17.1	B	17.7	B	18.8	B	17.3	B	0.3	A	0.7	A	0.5	A	0.9	A	C	C	
		Right	3.8	A	4.3	A	6.0	A	6.0	A	5.7	A	2.3	A	4.9	A	5.7	A	--	--	
Sudley Manor Square	Signal		Sudley Manor Drive				Sudley Manor Drive				Sudley Manor Square				Sudley Manor Square				Delay	Delay	
		Left	13.4	B	144.4	F	12.3	B	70.2	E	47.0	D	536.1	F	48.6	D	113.1	F	6.5	120.6	
		Through	7.4	A	22.9	C	3.4	A	174.9	F	39.2	D	489.3	F	--	--	108.8	F	A	F	
		Right	5.7	A	10.6	B	0.4	A	4.9	A	3.6	A	472.5	F	5.3	A	177.8	F	--	--	

Table 13: 2055 No-Build Max Queues

Intersection Number and Description	Type of Control	Lane Group	Eastbound			Westbound			Northbound			Southbound		
			Storage Bay Length	AM Queue (ft)	PM Queue (ft)	Storage Bay Length	AM Queue (ft)	PM Queue (ft)	Storage Bay Length	AM Queue (ft)	PM Queue (ft)	Storage Bay Length	AM Queue (ft)	PM Queue (ft)
1 Bethlehem Road	Signal	Sudley Manor Drive			Sudley Manor Drive			Bethlehem Road			Bethlehem Road			
		Left	420	132	115	↑	↑	↑	↑	↑	↑	---	56	54
		Through	---	146	155	---	186	355	↑	↑	↑	↑	↑	↑
		Right	↑	↑	↑	410	28	28	↑	↑	↑	---	93	212
2 Chatsworth Drive	Signal	Sudley Manor Drive			Sudley Manor Drive			Chatsworth Drive			Chatsworth Drive			
		Left	375	92	178	240	---	---	↑	↑	↑	---	121	141
		Through	---	340	552	---	264	407	↑	↑	↑	↑	↑	↑
		Right	↑	↑	↑	---	---	---	↑	↑	↑	---	92	87
3 Humphrey Lane / Wallace Lane	Two-Way Stop	Sudley Manor Drive			Sudley Manor Drive			Wallace Lane			Humphrey Lane			
		Left	280	26	80	290	38	42	---	58	58	---	58	61
		Through	---	8	250	---	0	9						
		Right	---	---	---	---	---	---						
4 Rodes Drive / Schofield Way	Signal	Sudley Manor Drive			Sudley Manor Drive			Schofield Way			Rodes Drive			
		Left	300	58	200	290	37	121	---	93	70	---	---	---
		Through	---	249	467	---	385	431				---	162	216
		Right	---	---	---	---	---	---				165	113	120
5 Ravens Crest Court / Gambrit Drive	Two-Way Stop	Sudley Manor Drive			Sudley Manor Drive			Gambrit Drive			Ravens Crest Court			
		Left	280	29	181	290	2	63	---	51	110	---	0	112
		Through	---	43	565	---	64	6						
		Right	---	---	---	---	---	---						
6 Seymour Road / Gambrit Drive	Signal	Sudley Manor Drive			Sudley Manor Drive			Gambrit Drive			Seymour Road			
		Left	290	44	245	285	126	249	---	---	---	---	---	---
		Through	---	532	793	---	429	546	---	49	46	---	168	239
		Right	---	---	---	---	143	148	---	56	76	100	94	96
7 Ashton Avenue	Signal	Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue			
		Left	280	280	280	265	264	265	560	523	560	460	207	460
		Through	---	833	891	---	371	577	---	540	684	---	373	643
		Right	---	---	---	---	---	---	---	---	---	---	---	
8 Giant Food / Costco	Signal	Sudley Manor Drive			Sudley Manor Drive			Costco			Giant Food			
		Left	280	108	159	275	88	178	---	---	---	---	74	265
		Through	---	202	595	---	152	295	---	129	139	---	70	266
		Right	275	70	275	---	---	---	---	68	138	---	---	---
9 Marshalls / CFA Entrance	Signal	Sudley Manor Drive			Sudley Manor Drive			CFA Entrance			Marshalls			
		Left	260	37	223	295	122	224	---	102	213	---	56	177
		Through	---	280	605	---	206	472	---	77	85	---	58	133
		Right	350	129	350	---	---	---	85	---	---	---	---	---
10 Sudley Road	Signal	Sudley Manor Drive			Sudley Manor Drive			Sudley Road			Sudley Road			
		Left	---	576	612	250	440	578	350	327	350	650	225	650
		Through	---	576	603	---	440	580	---	436	1,584	---	468	1336
		Right	325	312	316	450	90	450	---	368	1,558	410	81	410
11 Prince William Parkway (234 Bypass)	Signal	Sudley Manor Drive			Sudley Manor Drive			Prince William Parkway (234 Bypass)			Prince William Parkway (234 Bypass)			
		Left	620	166	153	540	297	463	400	54	52	400	186	123
		Through	---	269	273	---	218	449	---	0	0	---	0	0
		Right	425	0	0	400	0	62	CONT.	168	0	CONT.	0	91
12 Sudley Manor Square	Signal	Sudley Manor Drive			Sudley Manor Drive			Sudley Manor Square			Sudley Manor Square			
		Left	270	52	220	270	25	270	---	---	---	---	---	---
		Through	---	124	390	---	137	392	---	62	652	---	42	388
		Right	---	---	---	---	14	113	65	59	65	85	26	85

Phase 1 Alternatives Development

The study team developed preliminary alternatives in parallel with the high-level needs diagnosis efforts documented in **Chapter 1**. The proposed Phase 1 alternatives were developed to meet the following criteria:

- Improve operations and safety at the intersection of Ashton Avenue
- Enhance bike and pedestrian access and safety throughout the study area

In order to develop alternative concepts to address the needs identified in Chapter 1, a thorough review of the existing conditions data was conducted. Virginia's Junction Screening Tool (VJuST) was used as a high-level screening tool to identify potential alternative concepts at the Ashton Avenue intersection. These concepts were further screened manually based on several factors including operational and safety benefits, costs, and right-of-way impacts. The remaining concepts were modeled in Synchro and/or Sidra Intersection.

1.1.7. Initial Alternatives

The needs evaluation, diagnosis, and initial alternatives were presented in SWG Meeting #2, held on September 12, 2025. Baker conveyed to the SWG that the initial alternatives would be centered around the following intersections and segments:

- Bethlehem Road & Sudley Manor Drive
- Ashton Avenue & Sudley Manor Drive
- Bull Run Plaza/Costco Entrance & Sudley Manor Drive
- Sudley Manor Drive from Chatsworth Drive to Ashton Avenue
- Sudley Manor Drive from Ashton Avenue to Sudley Road

Bethlehem Road & Sudley Manor Drive

At the Bethlehem Road and Sudley Manor Drive intersection, it is anticipated that the Prince William Parkway and Sudley Manor Drive interchange project will impact and modify this intersection by 2032. Baker presented alternatives that could be implemented on an interim basis or could be included as part of the interchange project:

- Flashing “Intersection Ahead” warning signs
- Temporary traffic signal
- Offset left-turn lanes

The study team indicated that these alternatives should be evaluated as part of the Prince William Parkway interchange study and was not carried forward into Phase 2.

Ashton Avenue and Sudley Manor Drive

With multiple VTrans needs at this location, the SWG stressed the importance of finding solutions that would address the pattern of angle and rear-end crashes, mitigating congestion and queueing, and improving safety and access for pedestrians and cyclists. Citing the crash history outlined in the Existing Conditions section, several concepts were identified that could be implemented at Ashton Avenue and Sudley Manor Drive:

- Extend left-turn lanes
- Reduce radii of the right-turn slip lanes
- Replace right-turn slip lanes with traditional right-turn lanes with storage
- Reconfigure outside travel lanes to dedicated right-turn lanes
- Construct northbound dual left-turn lanes on northbound Ashton Avenue
- Upgrade all ADA curb ramps
- Provide intersection lighting

A preliminary VJuST analysis was conducted to screen the turn lane alternatives, including the northbound dual left-turn lanes, restriping Sudley Manor Drive for right-turn lanes, and providing dedicated right-turn lanes on all approaches.

Figure 19 presents the results of the VJuST analysis, showing that each alternative provides an improvement in volume-to-capacity (V/C) ratio compared to the existing condition.

Figure 19: VJuST Turn Lane Analysis - Ashton Avenue and Sudley Manor Drive

VJuST Intersection V/C - Individual Improvements							
Existing		1. Dedicated Right-turn Lanes on All Approaches		2. Restripe Sudley Manor Drive for Right-turn Lanes		3. Northbound Ashton Avenue Dual Left-Turn Lanes	
AM	PM	AM	PM	AM	PM	AM	PM
0.59	(0.81)	0.51	(0.70)	0.55	(0.88)	0.54	(0.72)

Each of the listed alternatives were carried forward to Phase 2. The SWG favored combining the alternatives to provide maximum benefit for the entire intersection. The dual left-turn concept was advanced with the request to also analyze the need for dual left-turn lanes along the southbound approach.

Bull Run Plaza/Costco Entrance & Sudley Manor Drive

The existing conditions analysis revealed that the eastbound right turn and the westbound left turn queues extend back into the adjacent through lanes. The crash analysis showed multiple angle crashes involving mainline left turns and mainline through movements. Baker presented two concepts aimed at mitigating queue spillback for the eastbound right turn:

- Extend the eastbound Sudley Manor Drive right-turn lane
- Reconfigure the Sudley Manor Drive outside eastbound through lane as an extended right-turn lane

These alternatives could maximize eastbound storage space and minimize queue spillback into mainline Sudley Manor Drive; the SWG elected to advance both alternatives into Phase 2.

Bicycle and Pedestrian Concepts

In addition to concepts addressing vehicular operations and safety, the study team reviewed alternatives addressing bicycle and pedestrian access. Citing a history of pedestrian-related crashes through this segment, concepts were developed aimed at mitigating the risk of pedestrian crashes through the implementation of alternatives that would enhance safety and/or improve access:

- Installation of pedestrian median refuge islands with optional two-stage crossings
- Construct shared-use path on the east side of Sudley Manor Drive
- Construct parallel facilities east and west of Sudley Manor Drive

The SWG preferred concepts that separate vehicles from pedestrians and advanced the shared-use path and parallel facilities alternatives for further analysis in Phase 2. The median refuge islands were not advanced due to cited concerns by VDOT District Traffic Engineering.

1.1.8. Phase 1 Alternatives Summary

The operational and safety benefits of each alternative were presented at SWG Meeting #2, where it was decided which concepts would move forward to Phase 2. In total, the SWG agreed to carry forward several of the alternatives forward to Phase 2 for further refinement. The alternatives at Ashton Avenue were evaluated in VJuST, and the results for Ashton Avenue are summarized in **Figure 19**, and the Stage 1 iCAP

results are summarized in **Figure 20**. **Table 14** summarizes the alternatives considered in Phase 1 and gives the justification of moving (or not moving) the concept forward to Phase 2.

At the request of the SWG, several alternatives presented at SWG Meeting #2 for Ashton Avenue and Bull Run Plaza/Costco Entrance were combined into one or a set of alternatives, to be evaluated further in *SimTraffic* to determine which alternatives to advance for public input. These options included combining the northbound dual left-turns at Ashton Avenue with providing dedicated right-turn lanes for all approaches. Each option included an extended eastbound left-turn lane at Ashton Avenue, pedestrian improvements, intersection lighting and traffic signal upgrades. A more detailed description of the alternatives and the analysis of the combined options are presented in Chapter 2 of this report.

Figure 20: Virginia iCAP Stage 1 Results - PM Peak Hour (Ashton Avenue)

Metric Weighting (Based on Purpose and Need)			Traffic Operations		Pedestrian		Safety		Stage 1 Cost		Total Possible Score	
			Traffic Operations Weight		Pedestrian Weight		Safety Weight		Stage 1 Cost Weight		11	
			3		3		3		2			
Alternatives	Source / Additional Details		VjuST Maximum V/C Ratio	Traffic Operations Metric MOE Score	VjuST Accommodation Compared to Conventional	Pedestrian Metric MOE Score	VjuST Weighted Total Conflict Points	Safety Metric MOE Score	VjuST Planning Level Cost Category	Stage 1 Cost Metric MOE Score	Total Stage 1 Score	
Existing	Conventional		0.81	--		--		--		--		
Option 1	Conventional	Option 1: NB Dual Left-Turn Lanes, Sudley Manor Restriping, Ashton Avenue Right-Turn Lanes	0.70	0.5	0	0.5	48	1.0	\$\$	1.0	8 out of 11	
Option 2	Conventional	Option 2: NB Dual Left-Turn Lanes, Ashton Avenue Right-Turn Lanes	0.63	0.9	0	0.5	48	1.0	\$\$	1.0	9.2 out of 11	
Option 3	Conventional	Option 3: NB Dual Left-Turn Lanes & Dedicated RT Lanes on all approaches	0.60	1.0	0	0.5	48	1.0	\$\$	1.0	9.5 out of 11	
Option 4	Conventional	Option 4: Ashton Ave Dual LT Lanes, Sudley Manor Restriping, Ashton Avenue RT Lanes	0.62	0.9	0	0.5	48	1.0	\$\$	1.0	9.2 out of 11	

Table 14: Phase 1 Intersection Alternatives to Move Forward to Phase 2

Intersection	Alternative	Move Forward to Phase 2?	Justification
Sudley Manor Drive and Ashton Avenue	Dedicated right-turn lanes	Yes	Safety and traffic operations improvement
	Sudley Manor Drive restriping to provide right turn lanes	Yes	Safety and traffic operations improvement
	Dual northbound left-turn lanes	Yes	Safety and traffic operations improvement
	Extend Left-turn Lanes along all approaches	Yes	Safety improvement
	Reduce radii or eliminate right-turn slip lanes	Yes	Safety improvement
	Provide intersection lighting	Yes	Provides safety improvement
	Pedestrian median refuges	No	SWG decided to omit refuge islands in favor of providing dedicated pedestrian/bicyclist infrastructure along the corridor.
Sudley Manor Drive and Bethlehem Road	Flashing "Intersection Ahead" Warning Signs	No	To be analyzed as part of Prince William Parkway interchange project
	Temporary Traffic Signal	No	To be analyzed as part of Prince William Parkway interchange project
	Offset Left-turn Lanes	No	To be analyzed as part of Prince William Parkway interchange project
Sudley Manor Drive and Bull Run Plaza/Costco	Extend eastbound Sudley Manor Drive Right-turn lane	Yes	Safety and traffic operations improvement
	Reconfigure Sudley Manor Drive inside eastbound through lane as extended right-turn lane	Yes	Safety and traffic operations improvement

Chapter 2: Alternatives Refinement

Alternatives Refinement Overview

The study team refined 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 prepare a refined set of alternatives to present to the public and solicit feedback. The study team compared each alternative using *SimTraffic* and the Virginia iCAP to determine the refined list of alternatives to present to the public.

SWG Meeting #3 was held on December 15, 2025, to gather feedback on the draft concept sketches and cost estimates, and to share the concept screening results in advance of public outreach. During SWG Meeting #3, the study team discussed each alternative based on impacts to safety, traffic operations, cost, and right-of-way impacts and chose which concepts to be shared during public outreach.

Phase 2 Alternatives Description

The following section gives a description of each of the combined alternatives and provides a conceptual sketch of the alternative. These alternatives were initially individual alternatives that were combined to provide maximum benefit, where possible.

2.1.1. Sudley Manor Drive and Ashton Avenue Alternatives

Option 1: Restripe Sudley Manor Drive with Right-turn Lanes on Ashton Avenue and Dual Left-turn lanes on Northbound Ashton Avenue

This option includes a restriping of mainline Sudley Manor Drive from three through lanes to two through lanes in order to provide a dedicated right-turn lane in the eastbound and westbound directions, as well as the addition of dedicated right-turn lanes along northbound and southbound Ashton Avenue. A second northbound left-turn lane along Ashton Avenue will also be provided, as shown in **Figure 21**.

Figure 21: Dual Left-turn Lanes, Sudley Restripe, & Ashton Avenue Right-turn Lanes



PROJECT PIPELINE

Option 2: Right-turn Lanes on Ashton Avenue and Dual Left-turn Lanes on Northbound Ashton Avenue

This option is similar to Option 1; however, it does not include a restriping of mainline Sudley Manor Drive. The eastbound and westbound right-turn lanes feature reduced radii to reduce right-turn speed conflicts with pedestrians. Dedicated right-turn lanes along northbound and southbound Ashton Avenue and the second northbound left-turn lane along Ashton Avenue will be provided, as shown in **Figure 22**.

Figure 22: Dual Left-turn Lanes & Ashton Avenue Right-turn Lanes

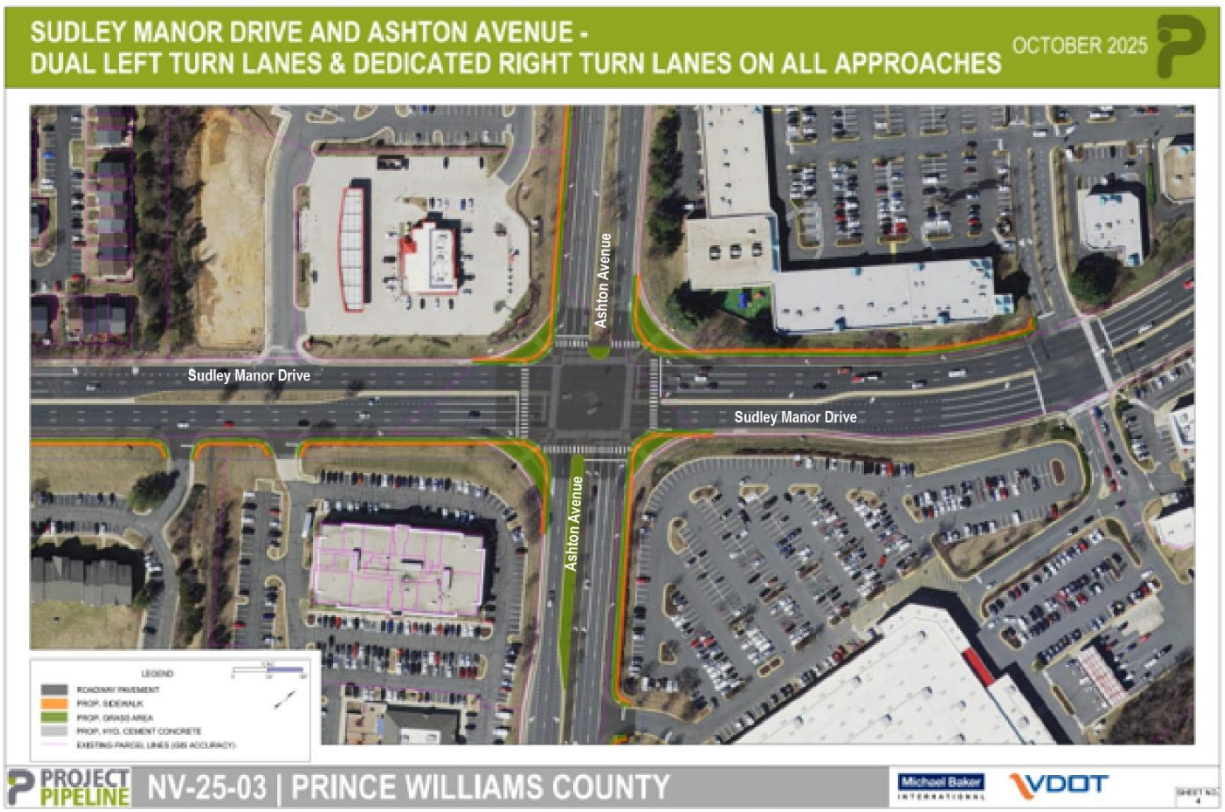


PROJECT PIPELINE

Option 3: Dual Left-turn Lanes on Northbound Ashton Avenue and Dedicated Right-turn Lanes on All Approaches

This alternative provides dedicated right-turn lanes along all approaches in addition to the dual left-turn lanes on northbound Ashton Avenue. The dedicated right-turn lanes would remove the channelization, as shown in **Figure 23**.

Figure 23: Dual Left-turn Lanes & Dedicated Right-turn Lanes on All Approaches



Option 4: Dual Left-turn Lanes, Dedicated Right-turn Lanes on Ashton Avenue and Sudley Manor Drive Restriping

This alternative combines the previous three options; Sudley Manor Drive is restriped to show dedicated eastbound right-turn lane (westbound approach remains a shared through-right lane), dual left turns are installed on both Ashton Avenue approaches, and channelized right turns are provided along every approach. The channelized right turns feature reduced radii compared to existing, which are expected to improve sight distance and reduce vehicle turning speeds for pedestrians. A concept sketch is shown below in **Figure 24**.

Figure 24: Dual Left-turn Lanes, Sudley Manor Restripe, & Ashton Avenue Right-turn Lanes



2.1.2. Sudley Manor Drive and Bull Run Plaza/Costco Entrance Alternatives

Eastbound Sudley Manor Drive Right-turn Lane Improvements

Two alternatives were proposed for this location: extending the eastbound right-turn lane back to Ashton Avenue and restriping the inside eastbound through lane to provide an offset right-turn lane. Both alternatives would increase storage while improving lane utilization. Both alternatives are presented below in **Figure 25**. Ultimately, neither alternative was advanced further by the stakeholder group due to its minimal operational and safety benefits as shown in the subsequent section.

Figure 25: Sudley Manor Drive and Bull Run Plaza/Costco Entrance Right-turn Alternatives



Traffic Operations and Safety Results

The study team conducted a screening-level traffic operations analysis and safety analysis. Improvement alternatives were further screened to aid in selecting a preferred alternative using the Virginia iCAP to rank each alternative based on traffic operations, safety, pedestrian accommodations, and cost.

Anticipated Traffic Operations Results for Alternatives

Intersection operations were evaluated to compare projected operations between the different alternatives using *Synchro 11* and *SimTraffic*. The study team analyzed AM and PM future year (2055) traffic volumes to evaluate the operational benefits of the alternatives. Several options combining the alternatives carried forward from phase 1 were analyzed in *SimTraffic*; a description of each option is presented below in **Table 15**. Control delay (seconds per vehicle), LOS, and maximum queue length (feet) were used as measures of effectiveness. The results were entered into the iCAP Stage 2 Input Worksheet as a guiding tool to assist with *SimTraffic* operational analysis.

Figure 26 summarizes the iCAP Stage 2 traffic operations results for Ashton Avenue. The *SimTraffic* operational analysis results for Ashton Avenue are shown in **Table 16** and **Table 17**, while the results for Bull Run Plaza/Costco Entrance are shown in **Table 18** and **Table 19**.

The 2055 Build *SimTraffic* results are included in **Appendix I**.

Table 15: SimTraffic Analysis - Option Descriptions

SimTraffic Option	Option Description
Sudley Manor Drive and Ashton Ave	
Option 1	Restripe Sudley Manor Drive with Right-turn Lanes on Ashton Avenue and construction of Dual Left-turn lanes on Northbound Ashton Avenue
Option 2	Construct Dual Left-turn Lanes on Northbound Ashton Avenue and Right-turn Lanes on Ashton Avenue
Option 3	Construct Dual Left-turn Lanes on Northbound Ashton Avenue and Dedicated Right-turn Lanes on All Approaches
Option 4	Restripe Eastbound Sudley Manor Drive with Right-turn Lane. no changes on Westbound Sudley Manor Drive. Construct Right-turn Lanes on Ashton Avenue. Construct Dual Left-turn lanes on Northbound and Southbound Ashton Avenue. All right-turn lanes have modified slip lanes.
Sudley Manor Drive and Costco Entrance	
Option 1	Extend Eastbound Sudley Manor Drive Right-turn Lane
Option 2	Reconfigure Sudley Manor Drive Inside Eastbound Lane as extended Right-turn lane

Table 16: 2055 Build Level of Service Comparison - Ashton Avenue

The image shows an intersection operations comparison table for the Sudley Manor Drive and Ashton Avenue intersection under four build options. The table lists AM and PM delay and level of service for left, through, and right lane groups on the eastbound and westbound Sudley Manor Drive approaches and the northbound and southbound Ashton Avenue approaches, along with overall intersection performance. It shows that all four build options still experience substantial delays, particularly for left-turn movements, with Build Option 4 performing best overall by producing the lowest overall delay at 48.5 seconds in the AM peak and 60.0 seconds in the PM peak, while Build Option 2 has the highest overall delays at 52.1 seconds AM and 74.2 seconds PM.

Scenario	Type of Control	Lane Group	Eastbound				Westbound				Northbound				Southbound				Overall	
			AM		PM		AM		PM		AM		PM		AM		PM			
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Build Option 1	Signal		Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue					
		Left	96.6	F	131.0	F	77.3	E	125.9	F	78.2	E	119.5	F	84.0	F	155.9	F	Delay	Delay
		Through	44.7	D	95.5	F	42.4	D	81.1	F	65.5	E	59.7	E	72.3	E	71.1	E	50.4	71.8
		Right	20.6	C	26.4	C	8.8	A	12.9	B	15.6	B	37.5	D	3.1	A	5.8	A	D	E
Build Option 2	Signal		Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue					
		Left	104.4	F	99.3	F	75.7	E	101.6	F	78.3	E	77.0	E	84.3	F	139.6	F	Delay	Delay
		Through	47.2	D	100.7	F	40.7	D	58.2	E	64.6	E	60.0	E	70.6	E	73.5	E	52.1	74.2
		Right	32.8	C	132.5	F	5.2	A	14.1	B	8.2	A	36.1	D	3.2	A	4.8	A	D	E
Build Option 3	Signal		Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue					
		Left	94.7	F	117.6	F	73.7	E	92.4	F	76.1	E	92.5	F	83.4	F	229.4	F	Delay	Delay
		Through	40.4	D	100.4	F	41.8	D	51.5	D	64.6	E	63.8	E	72.6	E	75.4	E	49.0	71.3
		Right	19.8	B	22.9	C	9.8	A	13.0	B	10.5	B	66.4	E	3.0	A	4.4	A	D	E
Build Option 4	Signal		Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue					
		Left	99.5	F	98.8	F	87.1	F	98.9	F	78.3	E	83.1	F	85.7	F	97.0	F	Delay	Delay
		Through	42.3	D	77.0	E	40.6	D	57.1	E	64.5	E	57.6	E	73.9	E	72.7	E	48.5	60.0
		Right	14.8	B	18.5	B	16.0	B	35.1	D	3.8	A	19.9	B	1.8	A	7.2	A	D	E

Table 17: 2055 Maximum Queue Length Comparison - Ashton Avenue

Intersection Number and Description	Type of Control	Lane Group	Eastbound			Westbound			Northbound			Southbound		
			Storage Bay Length	AM Queue (ft)	PM Queue (ft)	Storage Bay Length	AM Queue (ft)	PM Queue (ft)	Storage Bay Length	AM Queue (ft)	PM Queue (ft)	Storage Bay Length	AM Queue (ft)	PM Queue (ft)
Build Option 1	Signal		Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
		Left	500	422	471	265	264	265	560	286	410	460	179	425
		Through	---	499	725	---	447	580	---	402	484	---	301	542
		Right	650	335	509	---	90	296	---	127	433	---	0	302
Build Option 2	Signal		Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
		Left	500	446	391	265	264	265	560	294	409	460	187	459
		Through	---	522	865	---	357	542	---	412	496	---	303	563
		Right	---	840	889	---	260	496	---	97	403	---	0	195
Build Option 3	Signal		Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
		Left	500	418	472	265	264	265	560	274	436	460	165	439
		Through	---	354	650	---	376	481	---	392	510	---	305	559
		Right	---	410	505	---	96	111	---	102	460	---	0	208
Build Option 4	Signal		Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
		Left	500	415	434	265	264	265	560	267	402	460	151	408
		Through	---	455	733	---	384	546	---	400	474	---	314	508
		Right	650	366	586	---	---	---	---	142	358	---	66	185

Figure 26: Virginia iCAP Stage 2 Traffic Operations Results – Ashton Avenue

Alternative	Traffic Operations Metric			Pedestrian Metric Score	Safety Metric		Stage 2 Cost Metric		Total Stage 2 Score
	MOE 1 Score	MOE 2 Score	Total Score		Annual F+I Crash Reduction	Score	VJuST-C Cost Estimate	Score	
Option 1	0.5		0.5	0.5	1.08	1.0	\$ 6,800,000	1.0	8 out of 11
Option 2	0.5		0.5	0.5	1.08	1.0	\$ 6,800,000	1.0	8 out of 11
Option 3	0.5		0.5	0.5	0.22	0.2	\$ 6,700,000	1.0	5.6 out of 11
Option 4	1.0		1.0	0.5	1.08	1.0	\$ 7,500,000	0.9	9.3 out of 11

Table 18: 2055 Build Level of Service Comparison - Bull Run Plaza/Costco Entrance

Scenario	Type of Control	Lane Group	Eastbound				Westbound				Northbound				Southbound				Overall	
			AM		PM		AM		PM		AM		PM		AM		PM			
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	AM	PM
Build Option 1			Sudley Manor Drive				Sudley Manor Drive				Costco				Giant Food					
	Signal	Left	14.0	B	32.3	C	14.1	B	42.1	D	38.6	D	77.6	E	37.6	D	275.9	F	Delay	Delay
		Through	6.2	A	65.6	E	6.2	A	38.9	D	42.0	D	66.0	E	37.4	D	82.6	F	8.7	59.4
		Right	2.7	A	49.1	D	1.4	A	4.8	A	10.8	B	74.9	E	9.5	A	60.5	E	A	E
			Sudley Manor Drive				Sudley Manor Drive				Costco				Giant Food					
Build Option 2	Signal	Left	14.6	B	38.0	D	19.9	B	163.0	F	37.1	D	79.4	E	39.5	D	177.5	F	Delay	Delay
		Through	9.0	A	59.9	E	6.9	A	35.1	D	42.9	D	83.4	F	31.7	C	53.8	D	10.0	50.4
		Right	3.8	A	9.6	A	1.5	A	3.7	A	6.7	A	55.1	E	9.0	A	44.3	D	A	D

Table 19: 2055 Build Maximum Queue Lengths Comparison - Bull Run Plaza/Costco Entrance

Intersection Number and Description	Type of Control	Lane Group	Eastbound			Westbound			Northbound			Southbound		
			Storage Bay Length	AM	PM	Storage Bay Length	AM	PM	Storage Bay Length	AM	PM	Storage Bay Length	AM	PM
				Queue (ft)	Queue (ft)		Queue (ft)	Queue (ft)		Queue (ft)	Queue (ft)		Queue (ft)	
Build Option 1			Sudley Manor Drive			Sudley Manor Drive			Costco			Giant Food		
	Signal	Left	280	100	186	275	97	267	---	---	---	---	69	262
		Through	---	196	548	---	188	490	---	128	135	---	62	256
		Right	---	64	551	---	41	218	---	64	143	---	---	---
Build Option 2			Sudley Manor Drive			Sudley Manor Drive			Costco			Giant Food		
	Signal	Left	280	124	271	275	78	264	---	---	---	---	72	253
		Through	---	284	562	---	183	517	---	137	150	---	52	256
		Right	500	44	460	---	45	289	---	76	151	---	---	---

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 Planning Level CMF List from Round 7; when a CMF was not available from the SMART SCALE Planning Level CMF List, the SMART SCALE Round 7 CMF Calculator spreadsheet tool was used.

The CMF resulting in the highest anticipated crash reduction was applied to fatal and injury crashes within the influence area of Ashton Avenue and Bull Run Plaza, as shown in **Table 20** and **Table 21**, respectively. **Table 20** shows that the proposed alternatives provide an annual reduction in crashes, particularly for the right turn alternatives. An annual crash reduction was not calculated at Bull Run Plaza because there were no applicable injury crashes related to the right-turn lane.

Table 22 shows the CMFs for bicyclists and pedestrians for the shared-use path alternative. An annual crash reduction was not calculated for bicyclists, as there were no bicycle-related injury crashes within the study area.

Table 20: CMF and Crash Reduction Summary – Ashton Avenue

Alternative	F+I CMF	Annual Crash Reduction (F+I)
Dual Left-turns	0.97	1.23
Add Right-turn Lane (To Existing)	0.97	1.23
Add Right-turn Lane (None Present)	0.85*	6.15
Extend Turn Lane	0.85	6.15

*CMF value calculated via SMART SCALE Round 7 CMF Calculator

Table 21: CMF and Crash Reduction Summary – Bull Run Plaza/Costco Entrance

Alternative	F+I CMF	Annual Crash Reduction (F+I)
Extend Right-turn Lane	0.85	N/A
Offset Right-turn Lane	0.70	N/A

Table 22: CMF and Crash Reduction Summary - Bicycle and Pedestrian Improvements

Alternative	F+I CMF	Annual Crash Reduction (F+I)
Add Shared-Use Path	0.598 (Pedestrian)	2.41
	0.269 (Bicyclists)	0.00

Phase 2 Public Involvement

The Phase 2 PublicInput survey was held from January 26, 2026 through February 9, 2026 to collect feedback on the potential improvements within the study corridor. The survey provided the study team with an understanding of how the public viewed each alternative before selecting the preferred option. The survey had 539 participants and 4,899 responses with 299 comments made. **Figure 27** summarizes the average ranking for each alternative presented in the survey at the intersection of Sudley Manor Drive and Ashton Avenue. A rating of 5.0 represents a strongly supported concept and a rating of 1.0 represents a strongly opposed concept.

The survey results indicate that the third recommendation featuring the improvement of the right-turn lane areas on the Ashton Avenue approaches of the intersection received the most support, with 84 percent of the 518 responses indicating support. The reconfiguration of the eastbound travel lane garnered the least support but still with 72 percent of respondents indicating support for the project.

Figure 28 summarizes the average ranking for the proposed shared-use path along eastbound Sudley Manor Drive from Chatsworth Drive to Sudley Road. A rating of 5.0 represents a strongly supported concept and a rating of 1.0 represents a strongly opposed concept. Of the 438 responses, 68 percent indicated support or strong support for the shared-use path. 8 percent opposed the alternative.

Figure 27: Public Engagement – Public Support Responses (Ashton Avenue)

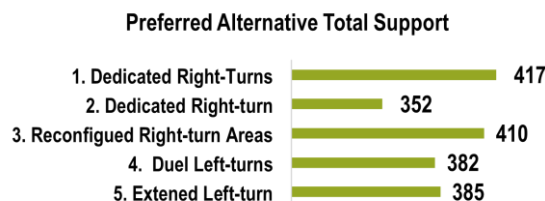
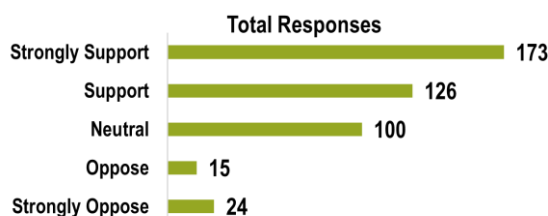


Figure 28: Public Engagement – Public Support Responses (Shared-Use Path)



Preferred Alternative Selection

Michael Baker presented the PublicInput survey results to the SWG on February 19, 2026. During this meeting Michael Baker suggested a set of alternatives to advance towards the development of a preferred alternative as outlined in **Chapter 1**. The SWG decided to advance the entire list of recommended intersection treatments at the intersection of Ashton Avenue and Sudley Manor Drive due to all having support by the community, the operational benefits in which queueing and delay would be reduced, and safety improvements targeting pedestrian crossings and angle crashes. The SWG advanced the following as the preferred alternatives:

- Ashton Avenue and Sudley Manor Drive:
 - Reconstruct traffic signal to a mast-arm configuration with lighting
 - Construct dedicated right-turn and dual-left-turn lanes on Ashton Avenue.
 - Reconfigure the eastbound Sudley Manor Drive inside through lane to a dedicated right-turn lane.
 - Extend the eastbound Sudley Manor Drive left-turn lane.
 - Reconfigure the right-turn slip lane areas.
- Construct a Shared-use path along south side of Sudley Manor Drive between Chatsworth Drive and Sudley Road.

Appendix J presents the Phase 2 Executive Summary.

Chapter 3: Preferred Alternative Analysis and Investment Strategy

Phase 3 of the study included a detailed design, cost estimate, risk assessment, and further operations assessment of the selected preferred alternative. As discussed in **Section 2.1**, the SWG chose to advance the shared-use-path between Chatsworth Drive and Sudley Road and intersection improvements at the intersection of Ashton Avenue and Sudley Manor Drive which include:

- Reconstruct traffic signal to a mast-arm configuration with lighting
- Construct dedicated right-turn and dual-left-turn lanes on Ashton Avenue.
- Reconfigure the eastbound Sudley Manor Drive inside through lane to a dedicated right-turn lane.
- Extend the eastbound Sudley Manor Drive left-turn lane.
- Reconfigure the right-turn slip lane areas.

Table 23 and **Table 24** summarize the preferred alternative results for the intersection improvements at Ashton Avenue and Sudley Manor Drive which shows both the overall delay and queue reductions. In addition, as summarized in Chapter 2, the recommendation will improve safety by improving the lighting of the intersection by both extending and providing dedicated turn lanes which reduce the risk of rear-end crashes, and the focused improvements at the right-turn lane areas will improve vehicle and pedestrian interactions. In addition to providing more mode options along Sudley Manor Drive, the shared use path will also provide both a safer and more comfortable east-west connection for those who walk, bike, or roll along the corridor.

Table 23: Preferred Alternative Level of Service Summary

Scenario	Type of Control	Lane Group	Eastbound				Westbound				Northbound				Southbound				Overall	
			AM		PM		AM		PM		AM		PM		AM		PM			
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Existing			Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue					
	Signal	Left	95.2	F	85.8	F	73.3	E	90.6	F	88.1	F	116.7	F	125.5	F	87.5	F	Delay	Delay
		Through	39.2	D	66.0	E	31.2	C	43.1	D	65.6	E	60.1	E	75.0	E	73.7	E	47.8	60.6
		Right	21.1	C	46.6	D	4.1	A	7.0	A	14.6	B	25.3	C	11.5	B	25.6	C	D	E
No-Build			Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue					
	Signal	Left	105.1	F	143.9	F	76.3	E	121.4	F	133.0	F	249.4	F	124.2	F	146.5	F	Delay	Delay
		Through	52.3	D	102.9	F	46.7	D	74.3	E	66.7	E	79.0	E	73.3	E	165.9	F	60.0	115.3
		Right	36.7	D	122.4	F	5.4	A	21.9	C	26.9	C	55.3	E	16.6	B	127.5	F	E	F
Build			Sudley Manor Drive				Sudley Manor Drive				Ashton Avenue				Ashton Avenue					
	Signal	Left	99.5	F	98.8	F	87.1	F	98.9	F	78.3	E	83.1	F	85.7	F	97.0	F	Delay	Delay
		Through	42.3	D	77.0	E	40.6	D	57.1	E	64.5	E	57.6	E	73.9	E	72.7	E	48.5	60.0
		Right	14.8	B	18.5	B	16.0	B	35.1	D	3.8	A	19.9	B	1.8	A	7.2	A	D	E

Table 24: Preferred Alternative Maximum Queues Summary

Intersection Number and Description	Type of Control	Lane Group	Eastbound			Westbound			Northbound			Southbound		
			Storage Bay	AM	PM	Storage Bay	AM	PM	Storage Bay	AM	PM	Storage Bay	AM	PM
			Length	Queue (ft)	Queue (ft)	Length	Queue (ft)	Queue (ft)	Length	Queue (ft)	Queue (ft)	Length	Queue (ft)	Queue (ft)
Existing			Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
	Signal	Left	280	279	274	265	254	264	560	344	541	460	169	322
		Through	---	662	771	---	236	422	---	359	585	---	309	490
		Right	---	---	---	---	---	---	---	---	---	---	---	---
No Build			Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
	Signal	Left	280	280	280	265	264	265	560	523	560	460	207	460
		Through	---	833	891	---	371	577	---	540	684	---	373	643
		Right	---	---	---	---	---	---	---	---	---	---	---	---
Build			Sudley Manor Drive			Sudley Manor Drive			Ashton Avenue			Ashton Avenue		
	Signal	Left	500	415	434	265	264	265	560	267	402	460	151	408
		Through	---	455	733	---	384	546	---	400	474	---	314	508
		Right	650	366	586	---	---	---	---	142	358	---	66	185

3.1 Conceptual Sketch and Cost Estimates

Appendix K 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 29** through **Figure 32** present the preferred alternative planning level sketches.

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 25**. Detailed cost estimates are included in the Basis of Design Memo found in **Appendix K**.

Table 25: Preferred Alternative Improvements

Phase Description	Budget (FY 2026)
Preliminary Engineering	\$ 2,801,000
Right of Way and Utility Relocation	\$ 9,240,700
Construction	\$17,451,136
Total Project Budget	\$29,492,836

3.2 Schedule Estimates

A schedule estimate was developed for the preferred alternative. **Table 26** summarizes the projected timeframes for the preliminary engineering (PE), right of way (RW), and construction (CN) phases.

Table 26: Schedule Estimate

Estimated Schedule by Phase	PE	RW	CN	Total
Preferred Concept (all inclusive, months)	27	18	30	75

Preferred Concept (all inclusive)	Estimated Schedule by Phase (months)
Preliminary Engineering	27
Right of Way and Utility Relocation	18
Construction	30
Total	75

Figure 29: Preferred Alternative Conceptual Sketch between Chatsworth Drive and Gambrill Drive

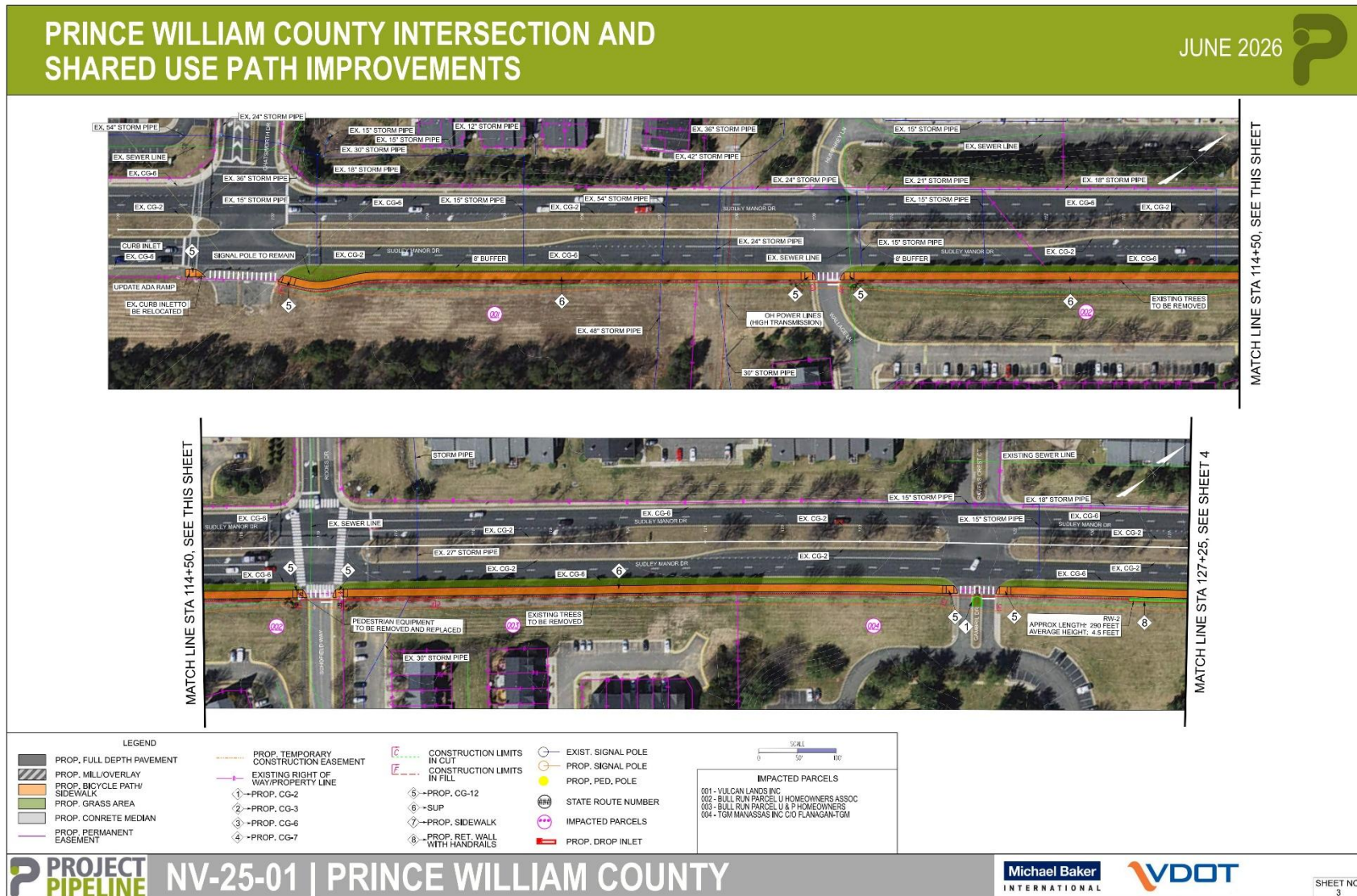


Figure 30: Preferred Alternative Conceptual Sketch between Gambrill Drive and Ashton Avenue

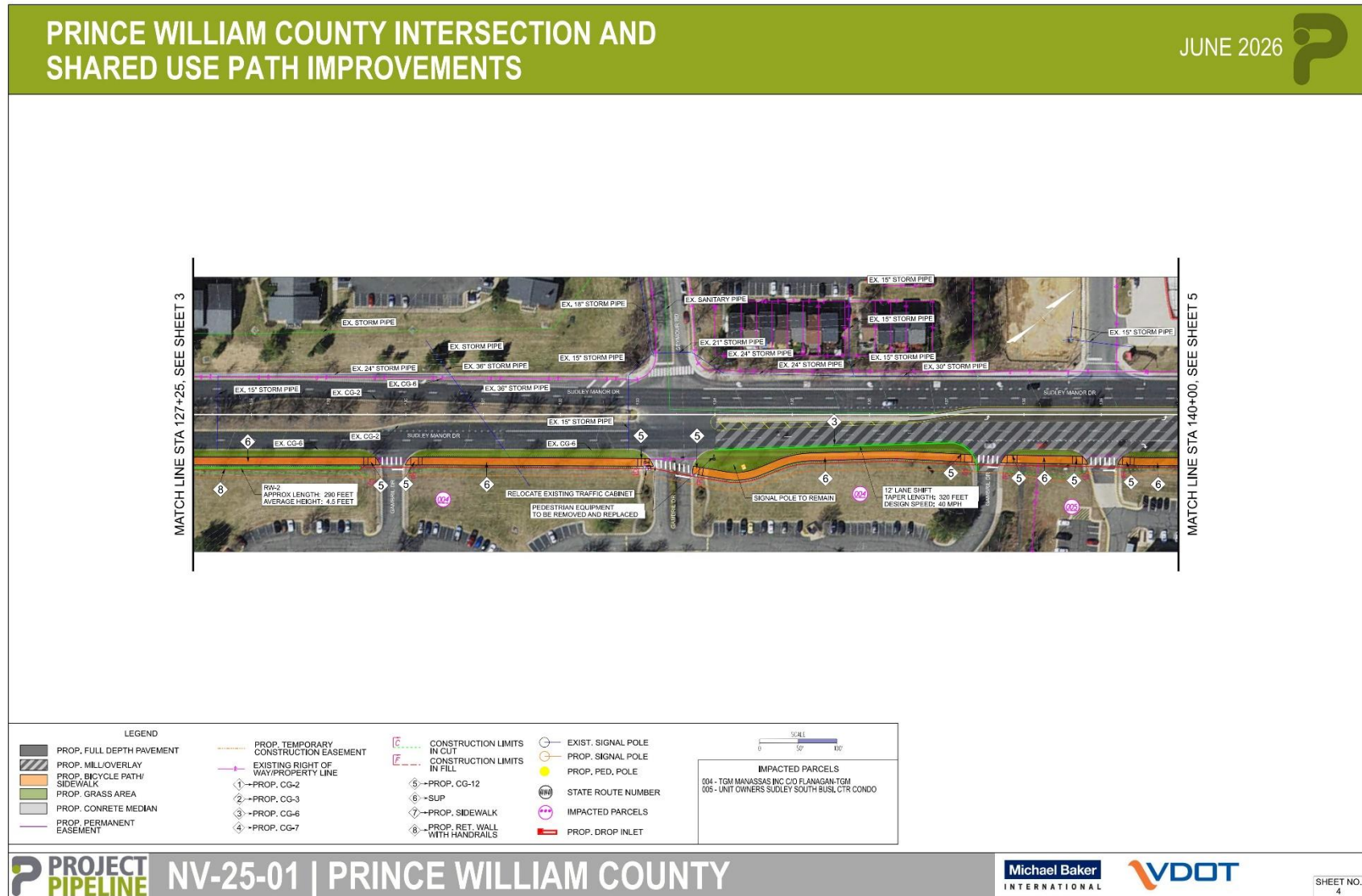


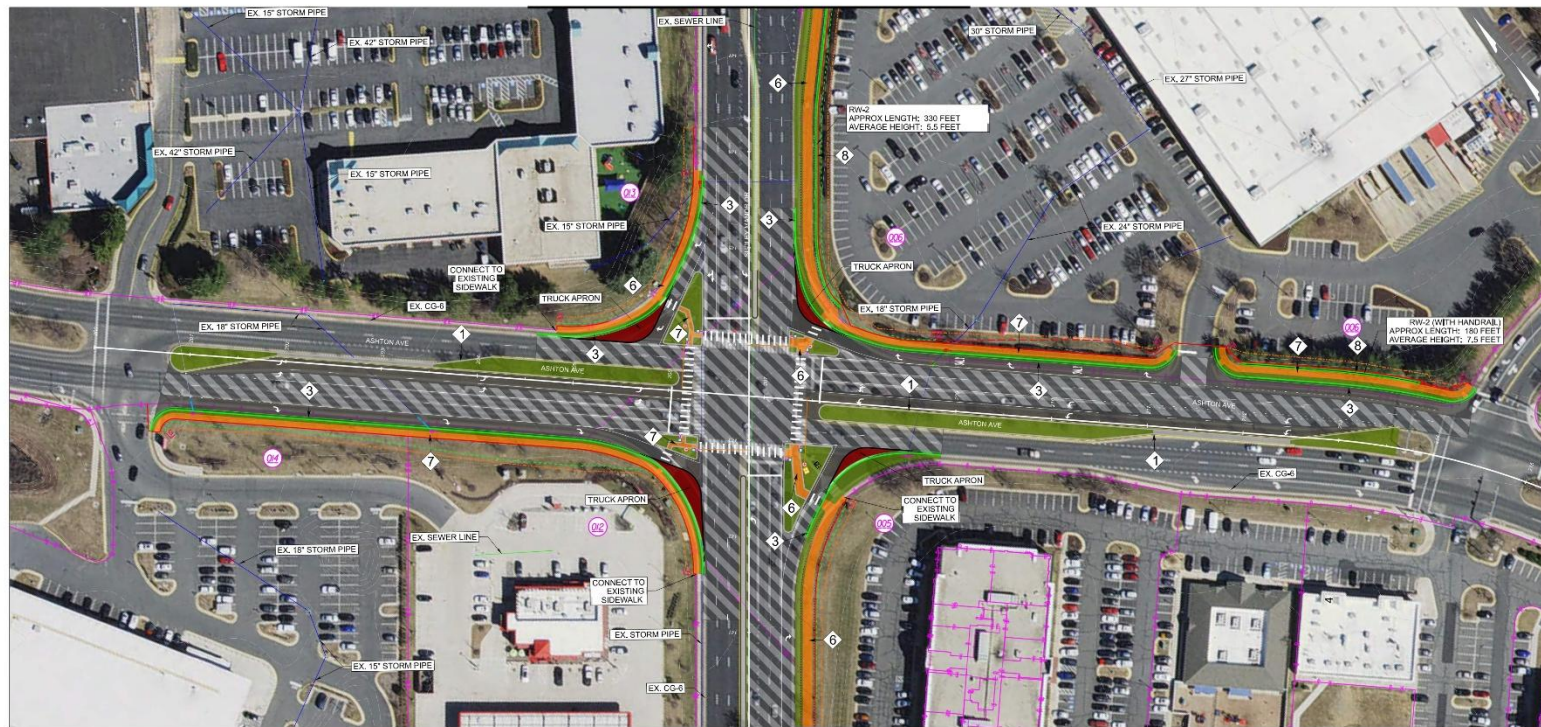
Figure 31: Preferred Alternative Conceptual Sketch of the intersection of Ashton Avenue and Sudley Manor Drive

PRINCE WILLIAM COUNTY INTERSECTION AND SHARED USE PATH IMPROVEMENTS

JUNE 2026



MATCH LINE STA 147+50, SEE SHEET 6



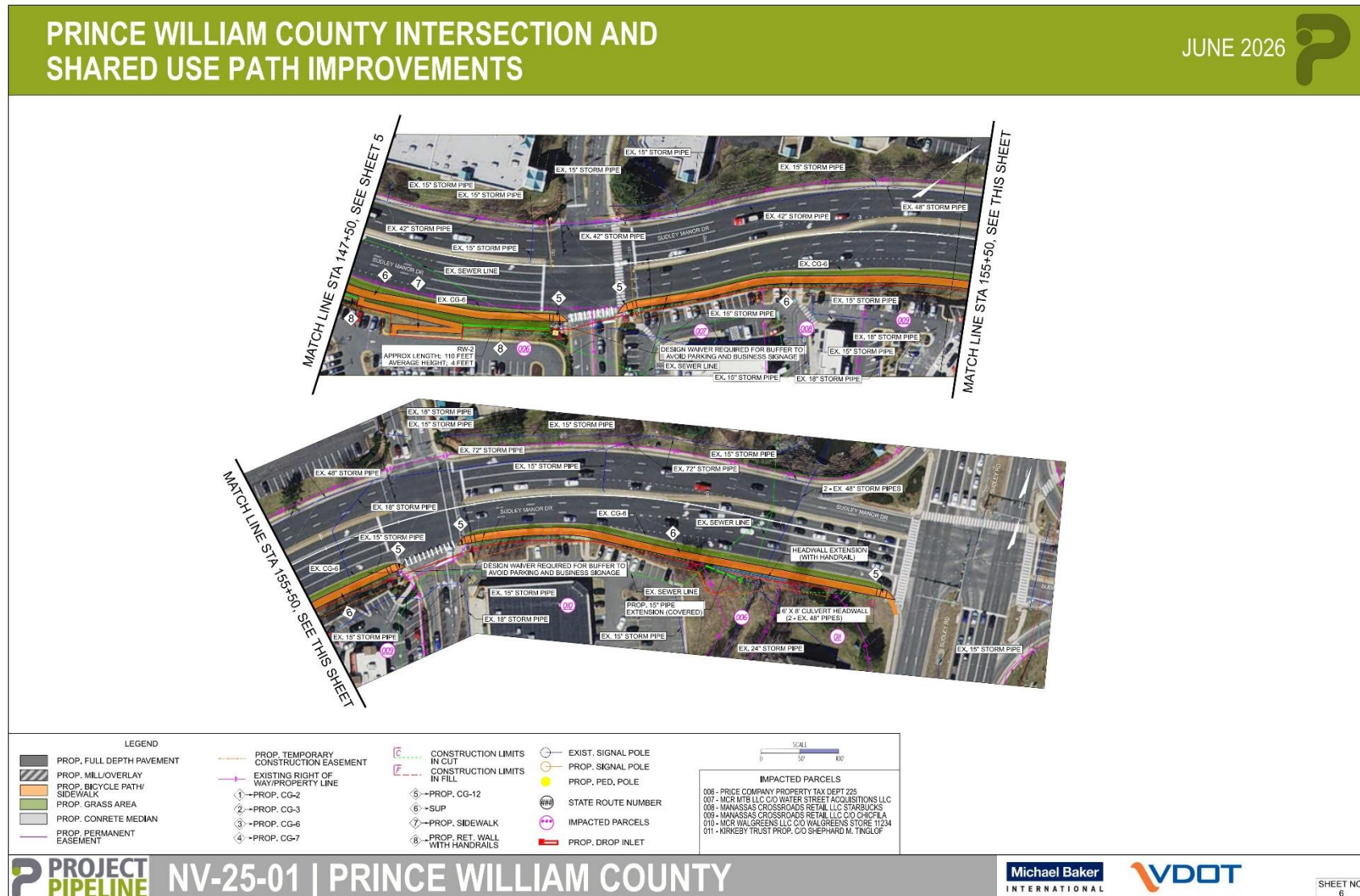
MATCH LINE STA 140+00, SEE SHEET 4

LEGEND			
	PROP. FULL DEPTH PAVEMENT		PROP. TEMPORARY CONSTRUCTION EASEMENT
	PROP. MILL/OVERLAY		EXISTING RIGHT OF WAY/PROPERTY LINE
	PROP. BICYCLE PATH/ SIDEWALK		1-PROP. CG-2
	PROP. GRASS AREA		2-PROP. CG-3
	PROP. CONCRETE MEDIAN		3-PROP. CG-6
	PROP. PERMANENT EASEMENT		4-PROP. CG-7
	CONSTRUCTION LIMITS IN CUT		5-PROP. CG-12
	CONSTRUCTION LIMITS IN FILL		6-SUP
	EXIST. SIGNAL POLE		7-PROP. SIDEWALK
	PROP. SIGNAL POLE		8-PROP. RET. WALL WITH HANDRAILS
	PROP. PED. POLE		
	STATE ROUTE NUMBER		
	IMPACTED PARCELS		
	PROP. DROP INLET		

SCALE 0 50' 100'

IMPACTED PARCELS
005 - UNIT OWNERS SUDLEY SOUTH BUSI. CTR CONDO
006 - PRICE COMPANY PROPERTY TAX DEPT 228
012 - ZUMPREZ PROPERTIES LLC
013 - BULL RUN PLAZA LLC CO RAPPAHPORT MNGMNT CO
014 - LIDL US OPERATIONS LLC ATTN: TAX DEPARTMENT

Figure 32: Preferred Alternative Conceptual Sketch between Ashton Avenue and Sudley Road



3.3 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.

The stakeholder group, which included VDOT and Prince William County, attended a site visit on March 24th, 2026. During this site visit the project concept was discussed and it was key to identify critical risks. The group identified that the proposed shared use path between Chatsworth Drive and Ashton Avenue should follow the existing sidewalk alignment instead of going over the pipelines. The pipelines, 32" petroleum and 36" petroleum, are owned and operated by Colonial Gas which largely follow the alignment of Sudley Manor Drive offset by about 40 feet to 40 feet from back of curb until Ashton Avenue in which the pipelines turn into the southern parking lot areas and ultimately cross Sudley Manor Drive again at the intersection of Sudley Road and Sudley Manor Drive. By following the existing sidewalk alignment it minimizes the amount of right-of-way required but does require more retaining wall due to the number of berms. In addition, the group discussed strategies to minimize impact to the right-of-way and parking between the Costco entrance and the Chick-fil-A entrance. This included a reduced buffer distance between shared-use-path and the roadway, for which a design waiver will be required. A detailed concept and estimate meeting was also held with VDOT on April 20th, 2026.

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 K**, Basis of Design Memo, includes the risk analysis matrix with details on the risk assessment, mitigation strategy, and site visit photos.

Risk/Issue: Roadway Design

There is an existing non-compliant ADA ramp that extends from Sudley Manor Drive (at the low point) to the Costco Parking (at the high point) which will be impacted by the path construction and is not PROWAG compliant. It has been accepted that this ramp will be reconstructed in this project, but it is possible the ramp will need a larger footprint to meet PROWAG, this could result in more right-of-way or materials due to switchback design.

Risk/Issue: Right of Way

It is accepted and assumed that right-of-way will be required within the project area and is relatively accounted for by generating a 3D model of the shared use path to properly assess both fee takes and construction easements. However, in the area between the Costco entrance and Chick-fil-A, the right-of-way is tighter and there is nearby parking. It was determined that parking impacts would be high, so within this section the group sought a design waiver to achieve a 5-foot buffer between the path and road. However, due to the level of survey and geometric data at this stage, it is possible that achieving that 5-foot buffer beyond the intersection areas could be challenging and additional right-of-way or parking modifications could impact one or two parking spaces.

Risk/Issue: Drainage

The group identified that the most significant risk to this project is the stormwater facility culvert located near Sudley Manor Drive. In order to provide the preferred shared use path cross-section, the path will not extend beyond the culvert based on field measures, but it will require a headwall extension. VDOT NOVA District has performed similar work in other areas, but there are risks such as the condition or construction properties of the culvert at the time of construction.

Risk/Issue: Construction Phasing/MOT

The construction of a shared-use-path and the modification of multiple ramps and pedestrian crossings within the intersection of Ashton Avenue and Sudley Road will require multiple phases to ensure an accessible and continuous path. As such, this will increase maintenance traffic costs to accommodate these phases. This will most likely result in additional temporary pedestrian signals, temporary curb ramps or sidewalks, and longer construction schedules.

3.4 Possible Funding Sources

Prince William County elected to submit the preferred alternative for SMART SCALE funding, which includes the intersection improvements at Ashton Avenue and Sudley Manor Drive. In addition, the SMART SCALE application will include the shared use path improvements between Chatsworth Drive and Sudley Road.