Eastern Frederick County Transportation Study (EFCTS)

MAY 2024

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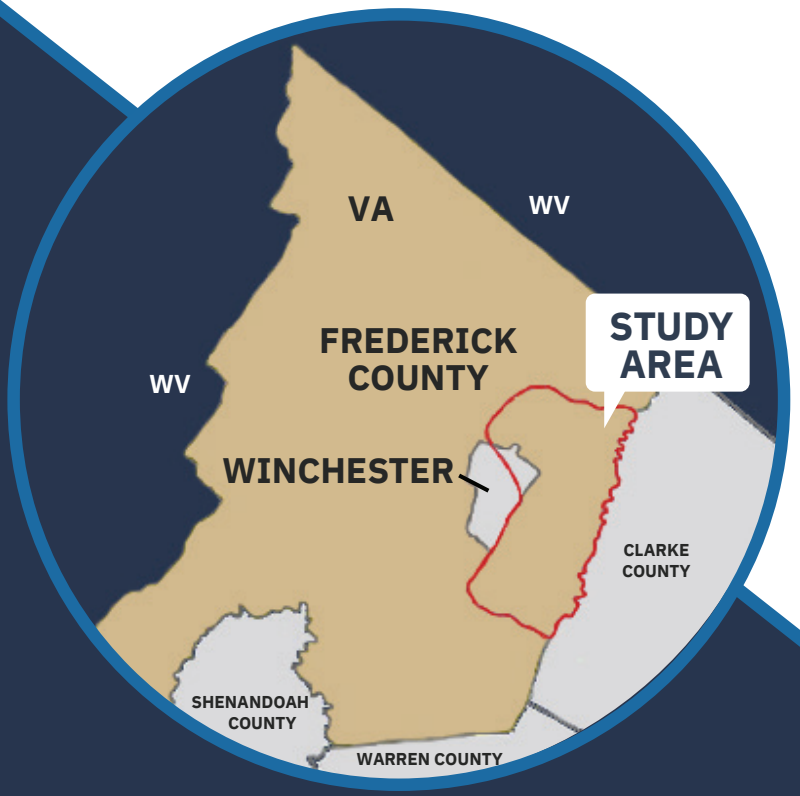

McCORMICK TAYLOR

EASTERN FREDERICK COUNTY
TRANSPORTATION STUDY

www.FCVA.us/Departments/Planning-Development/Transportation

Acknowledgments

The following individuals and groups have been instrumental to this report:

Frederick County

including John Bishop, Wyatt Pearson, and Kayla Peloquin;

Virginia Department of Transportation

including Brad Reed;

McCormick Taylor

The lead consultant for the Eastern Frederick County Transportation Study (EFCTS)

Study Overview

Frederick County, Virginia is pursuing this study of transportation needs and possible solutions for the area to the east of the City of Winchester. As shown in ***Figure 1***, the study area will include Interstate 81 (I-81) in the west to the Frederick County/Clarke County line in the east; and will extend from Route 761 on the north side of the city to the Tasker Road area east of the I-81 Exit 310.

The study identified and documented specific transportation needs before developing potential solutions as concepts. The public had opportunities to provide input on both the needs and conceptual solutions. Conceptual solutions were refined for public comment and an implementation plan was developed to include a prioritized list of improvements with estimates of probable costs. This plan will be used by the County for funding transportation improvements in the study area.

The study team was aware of previous efforts to pursue a Route 37 east bypass around Winchester. A bypass was considered, along with other possible transportation improvements, during the conceptual solution development and analysis process. The goal of the study is to develop a well-defined set of transportation needs to be addressed by a fiscally implementable set of transportation improvements. Additional recommendations, such as land use or access management controls, will also be included in the final plan. Additional alternatives analyses as a part of a Phase II study will be required to further develop alternatives to be viable for grant funding such as SMART SCALE.

Figure 1: Study Area

Demographics and Socioeconomics

The study area is primarily located within the Urban Development Area (UDA) of Frederick County. To accommodate anticipated residential growth, this portion of the County has been identified as the area where more intensive forms of residential development will occur. While the UDA currently consists of primarily suburban residential types of development, with some multifamily units, particular areas have been identified to accommodate a more intensive mix of land uses and residential housing opportunities.[1]

According to the Comprehensive Plan, Frederick County has grown significantly in the past two decades in both population and economic development. One of the contributors to the County's population growth was the migration of people from inside of the Washington Metropolitan Statistical Area (WMSA) to Frederick County for a higher quality of life including lower housing costs and a lower tax rate. Frederick County, because of its location and excellent access to Northern Virginia and Washington, D.C., has become a desirable place to live for those commuters. Frederick County has also become an attractive place to live for retirees. The UDA should allow for housing that will meet the needs of first-time buyers, retirees, move-up residents, and seniors.[2]

While the Comprehensive Plan does not state projected numbers for the total population or jobs in 2035, the WinFred MPO shared combined projections for the City of Winchester and Frederick County in their Transportation Plan 2040 (see ***Figure 2***).

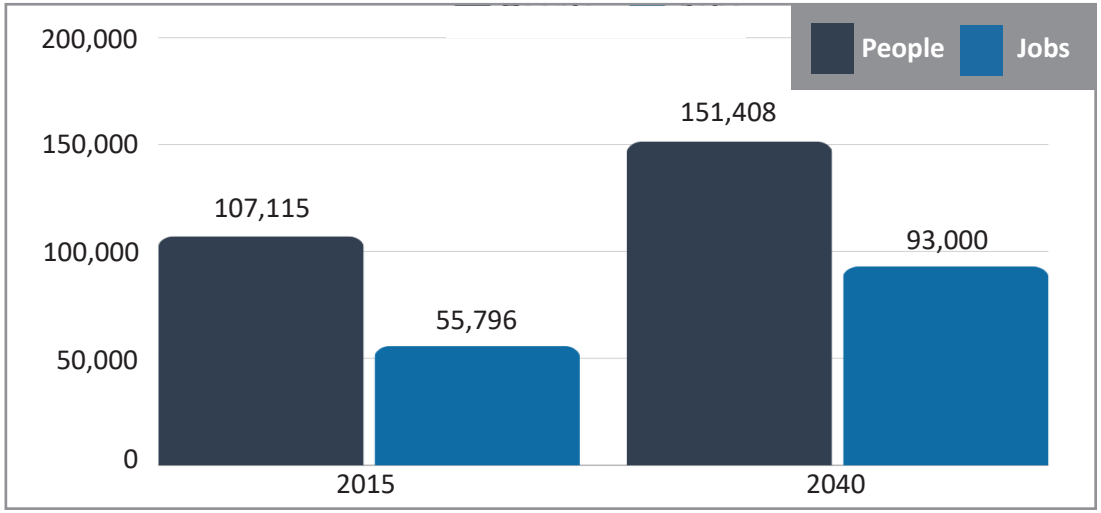

Figure 2: Combined Projected Growth | Source: WinFred MPO Trasnsportation Plan 2040

1 Frederick County, "Residential Development: Current Conditions", Frederick County Comprehensive Plan
2 Frederick County, "Residential Development: Focus for the Future", Frederick County Comprehensive Plan

Project Purpose & Need

Given the nature of the study area, a specific point was made to identify problems throughout as opposed to focusing solely on the original Route 37 Bypass study and EIS statements. Original segments of the Route 37 Bypass were analyzed to determine logical termini and independent utility, and whether they would effectively address current and future problems identified during the problem assessment phase of the study.

To create the purpose and needs statements, an evaluation of the most recent studies and existing comprehensive plan was completed. Additionally, conversations with staff at Frederick County Planning and VDOT helped to provide context and frame these statements. A review of the PSI segments and intersections was also conducted, and the needs statements reflect improvements proposed in that list. A thorough region wide travel demand model analysis was completed to determine areas of traffic growth in 2050, and origin and destination of these trip pairs as noted earlier in the report.

Project Purpose

The purpose of this study is to develop and evaluate a range of alternatives to improve mobility and safety for all road users, reduce congestion, and enhance system continuity while meeting the needs of interstate, regional, and local traffic passing through and moving within the study area, including the evaluation of the proposed Route 37 bypass.

The purpose and needs statements were included in a survey for public input and presented at a public meeting, and the results are discussed in the following section.

Project Needs

Bicycle/Pedestrian

As indicated in the 2014 Bicycle and Pedestrian Plan Update[3], the existing bicycle network lacks infrastructure and 62% of roadways have LOS D (adequate for advanced riders) or worse. The pedestrian results showed that 60% of the network was either deemed adequate or adequate but not likely used for choice users (people who prefer to use walking as their primary mode of transportation). With land development since 2014, it is likely that bicycle and pedestrian needs have only increased since this time and linkages are desired to regional parks, schools, and commercial development.

Congestion

Virginia State Route 7 between the Frederick/Clarke County line and the City of Winchester is the major link between Frederick County and destinations in Northern Virginia. Volumes from the STARS study in 2017 indicate that the average daily traffic (ADT) on this corridor is projected to reach 40,800 vehicles per day (VPD) by 2047. There is a current SMART SCALE project aimed at improving safety and traffic flow on Route 7 between Route 815/Millbrook Drive/Blossom Drive and Route 656/First Woods Drive/Greenwood Drive; however, additional segments have been identified in the PSI. In addition, two segments of Route 7 within the study area fall within the 1.5 > V/C > 1.

- The intersection of I-81 Exit 317 and Route 11 is the most congested intersection in the Staunton District and is currently being redesigned as a diverging diamond interchange. Additionally, improved connectivity is needed between Route 7 and Route 11 to alleviate congestion.
- Development in the area near the airport along both the Route 50 and Route 522 corridors has the potential to create congestion issues in the future, both at Exit 313 and at intersections along both corridors and the intersection with Crossover Boulevard. The extension of Crossover Boulevard to US 17/50 has been identified in the Frederick County Comprehensive Plan as an important connection and will offer improved access to the Virginia Inland Port.

3 NSVRC, WinFred MPO, Bicycle and Pedestrian Master Plan Update

- Large-scale residential land development on the study area's southern end uses Warrior Drive and Tasker Road to access I-81 and Route 37. Additional interstate or state route connectivity from Warrior Drive is critical to continue residential development in this area and relieve congestion on Tasker Road. The Comprehensive plan includes a proposed link to extend Warrior Drive to the proposed Route 37 alignment as a potential solution to redistribute traffic in this area.

Safety

Upon reviewing the VDOT crash data from 2017 to 2021 and the top PSI intersections, it became apparent that there is a significant safety issue on Route 7.

- Since 2017, there have been 206 reportable crashes in the 3.76-mile stretch of roadway on Route 7 between the City of Winchester and the Frederick/Clarke County line. The 1.28-mile segment between Greenwood Road and Valley Mill Road has been identified as the #7 top PSI priority by VDOT statewide. A SMART SCALE project is in the design phase to add capacity and reduce conflict points to a 0.52-mile segment of roadway in this crash cluster area, but this project only addresses a portion of the study area.
- The VA 7 and US 11 corridors have two of the more prominent crash histories, including significant numbers of fatal and injury (FI) crashes.
    - ADT on Route 7 Eastbound[4]: 14,000 VPD; Route 7 Westbound: 14,000 VPD; Total Crashes = 735; FI = 176
    - ADT on Route 11 Northbound[5]: 14,000 VPD; Route 11 Southbound: 14,000 VPD; Total Crashes = 347; FI = 71
- The study area includes 24 intersections and 15 segments in the Statewide VDOT 2017-2021 Top 100 PSI list.
    - Six of the 15 segments are located on Route 7:
        - Begin milepost (MP) 1.75, end MP 2.00: Total Crashes = 23; FI = 8 (VDOT District Rank 26)

4 ArcGIS, VDOT, https://vdot.maps.arcgis.com/apps/mapviewer/index.html?layers=a8da35dd9ce54993b25f64487c3717ec
5 ArcGIS, VDOT, https://vdot.maps.arcgis.com/apps/mapviewer/index.html?layers=a8da35dd9ce54993b25f64487c3717ec

- Begin MP 2.10, end MP 2.26: Total Crashes = 52; FI = 10 (VDOT District Rank 2)
- Begin MP 2.26, end MP 2.51: Total Crashes = 16; FI = 3 (VDOT District Rank 60)
- Begin MP 2.51, end MP 2.82: Total Crashes = 21; FI = 6 (VDOT District Rank 13)
- Begin MP 2.82, end MP 3.26: Total Crashes = 17; FI = 3 (VDOT District Rank 94)
- Begin MP 3.48, end MP 4.76: Total Crashes = 59; FI = 14 (VDOT District Rank 7) – improvements to this segment have been committed in the Six Year Improvement Program (SYIP), with construction completed in 2026.

I-81 Needs – Identified in the I-81 Corridor Improvement Plan (CIP):

- While not specifically identified in the I-81 CIP and outside of the study area, improvements are warranted at the intersection of I-81 Exit 307 to address safety and congestion. A project Pipeline study has been completed at this interchange to identify cost effective solutions to address safety and congestion concerns.
- Recent improvements were completed at the I-81 and Route 37 interchange at Exit 310. The installation of a changeable message sign (CMS) is proposed as a safety measure.
- Safety and congestion are an issue at the I-81 and Route 50 interchange at Exit 313. CMSs are proposed at this interchange, however that does not address the existing congestion issue.
- Widening I-81 to three lanes between Exits 313 and 317 (both Northbound and Southbound) was recommended for funding.
- The addition of an auxiliary lane is a recommended improvement between Exits 313 and 315.
- The addition of traffic cameras was recommended at Exit 317.
- A design concept was created for a diverging diamond interchange at Exit 317 to address congestion and safety (this is a funded project).

Agency & Public Engagement

The McCormick Taylor project team collaborated with VDOT, Frederick County, the City of Winchester, the Northern Shenandoah Valley Regional Commission (NSVRC) and the WinFred MPO over the course of this project. Bi-weekly project status meetings were conducted with Frederick County, and project status reports, including PowerPoint presentations, were regularly delivered to the Frederick County Transportation Committee by the McCormick Taylor consultant team Project Managers, Brian St. John, P.E., PTOE, and Alexandra Castrechini, P.E.

The communications protocols and public outreach practices utilized for this project were developed to align with VDOT's Governance Document Public Involvement Manual (revised November 2021). The draft Public Engagement Plan (PEP) was shared with the public for review and comment and presented to Frederick County for implementation approval. The draft Purpose and Needs statements were also shared with the public for review and comment and were overwhelmingly accepted as depicted in ***Figure 17***.

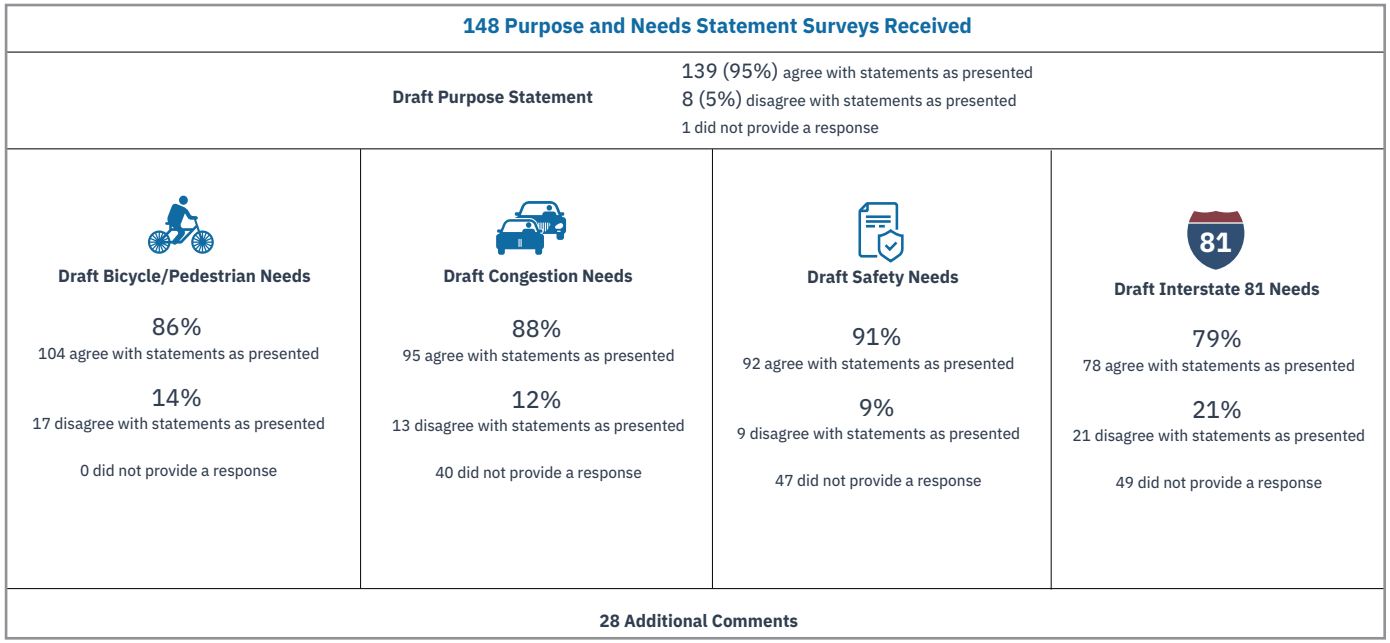

Figure 17: Purpose & Needs Survey Results

Project Outreach and Coordination

This report was initially completed in May 2024 and reviewed by Frederick County staff. Upon completion of updates to staff comments, this report was submitted to VDOT Planning staff for their review and comments. The project team met with VDOT staff to discuss their comments on August 26 and September 11, 2024. The project was presented to the Frederick County Transportation Committee on October 24, 2024, the Planning Commission on November 20, 2024, and the Board of Supervisors on January 22, 2025. The project team developed a comment response form in order to document and respond to the comments received for this study. This form can be found in ***Appendix G***.

Traffic Analyses

Data collection and analysis efforts focused on using existing available traffic data, including current and future projections (generally a 20-year horizon). No additional traffic counts were completed as part of the study. Traffic generated by new and pending development within, or that influence the transportation network in the study area, was included in the updated demographic forecasts used in the model.

The traffic model used 2019 as the base year and forecasted traffic volumes in 2050. Overall growth in vehicle-miles traveled (VMT) between 2019 and 2050 is 1.7% using a linear growth rate. This growth aligns with that in households (1.2% per year) and external traffic (1.8% per year).

The study area was broken up into TAZs and an analysis was completed to determine what the existing and future traffic patterns look like between these zones. Details of this analysis are included in the report. Another aspect of the analysis was to look at volume to capacity (V/C) ratios. V/C ratios provide a measurement of how well a facility can accommodate traffic. For instance, a ratio of 0 indicates free flow traffic and a ratio of 1 or greater indicates severe congestion. Level of service (LOS) is another metric used to describe traffic flow and the quality of traffic services. It is used to examine highways by categorizing traffic flow and allocating quality levels based on performances like speed, density, delay and many more. The key to an effective LOS is the ability of a transportation system to provide safe and reliable service for its users. LOS ranges from A (best quality of traffic/free flow of traffic) to F (worst quality of traffic/breakdown of traffic flow). Frederick County ordinance requires a minimum LOS C for transportation impact analyses (TIAs) for new development.

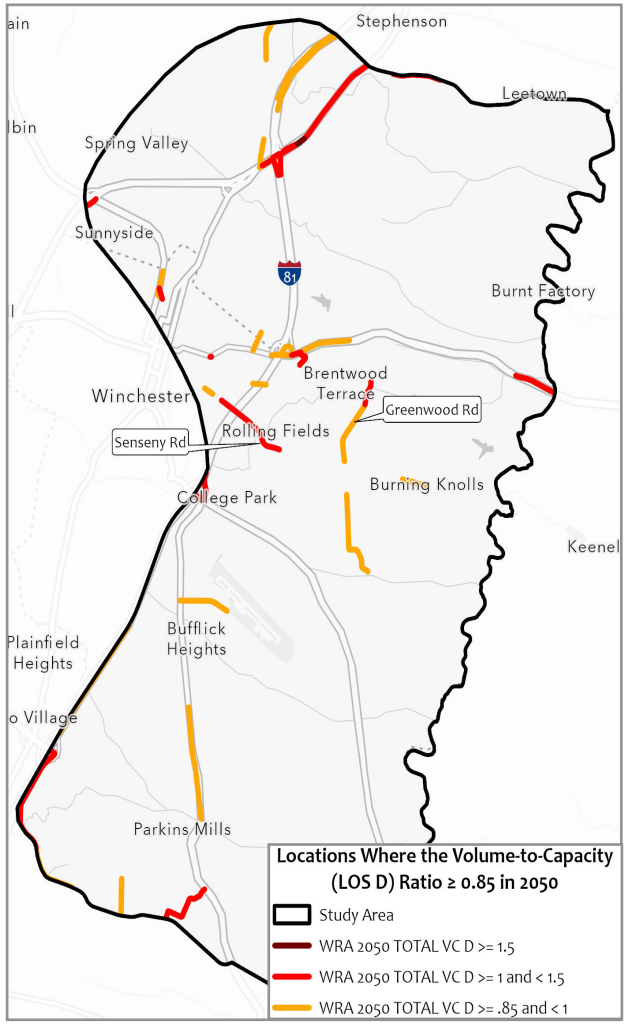

Figure 11: Locations Where V/C (LOS D) Ratio 0.85 ≥ in 2050 | Source: WRA

Original Route 37 Bypass Assessment

Each segment of the original bypass was considered, and an evaluation completed. Detailed cost estimates were not developed for the original proposed four lane full limited access configuration, but engineering judgement and comparable facilities were used to develop costs referenced in this section of the report. Detailed work was completed to develop potential solutions to address the needs noted earlier in the document. Refer to ***Figure 18*** on page 47 for a map showing each of the following segments.

Bypass Segment 1 from Route 37 on the west side of I-81 to Route 11 includes a system interchange with Route 37 on the west and a cloverleaf interchange with I-81. The cloverleaf interchange as proposed would be difficult, if not impossible, to meet interchange spacing requirements and would require significant additional improvements on I-81 and sideroads to meet current design criteria. This segment had the least traffic volume in the updated travel demand model at approximately 13,000 VPD and it is the most expensive segment of the original bypass. Engineering judgement would lead to a cost of over half a billion dollars for that segment of the original bypass including the interchange with I-81 and Route 37.

Bypass Segment 2 from Route 11 to Route 7 (Berryville Pike) attracts about 18,000 VPD and is in an area that is rapidly growing from both a residential and employment perspective. It would also allow some relief to Berryville Pike which is one of the corridors with high V/C ratios in 2050. This segment in the four-lane limited access configuration would likely be over $250 million dollars given the interchanges, right of way (ROW), and structures required.

Figure 18: Original Bypass Segments

Bypass Segment 3 from Route 7, Berryville Pike to US 17/50 (Millwood Pike) is a link through relatively undeveloped land and may increase sprawl and encourage development that is not desirable. This segment of the original bypass attracts approximately 22,000 VPD in 2050 but has less independent value as it relates to the needs identified in this study. This segment would also likely cost over $200 million in the prior configuration. The segment from Berryville Pike to Senseny Road has more value and could reduce traffic on Senseny Road and Greenwood Road and provide an alternative to Route 7 Berryville Pike. The segment south of Senseny Road to Millwood Pike traverses significant topography and an alternatives analysis would be recommended to find the best and most economically feasible route.

Bypass Segment 4 from US 17/50 (Millwood Pike) to US 522 (Front Royal Pike) is another link through relatively undeveloped land but would provide access to appropriately zoned land and areas targeted for development in and around the airport and along both Millwood Pike and Front Royal Pike. It would also provide for alternate connections to Papermill and Airport Road/Crossover Boulevard for future relief. This segment would also likely cost over $200 million dollars in the prior configuration and would attract approximately 26,000 VPD in the 2050 forecast.

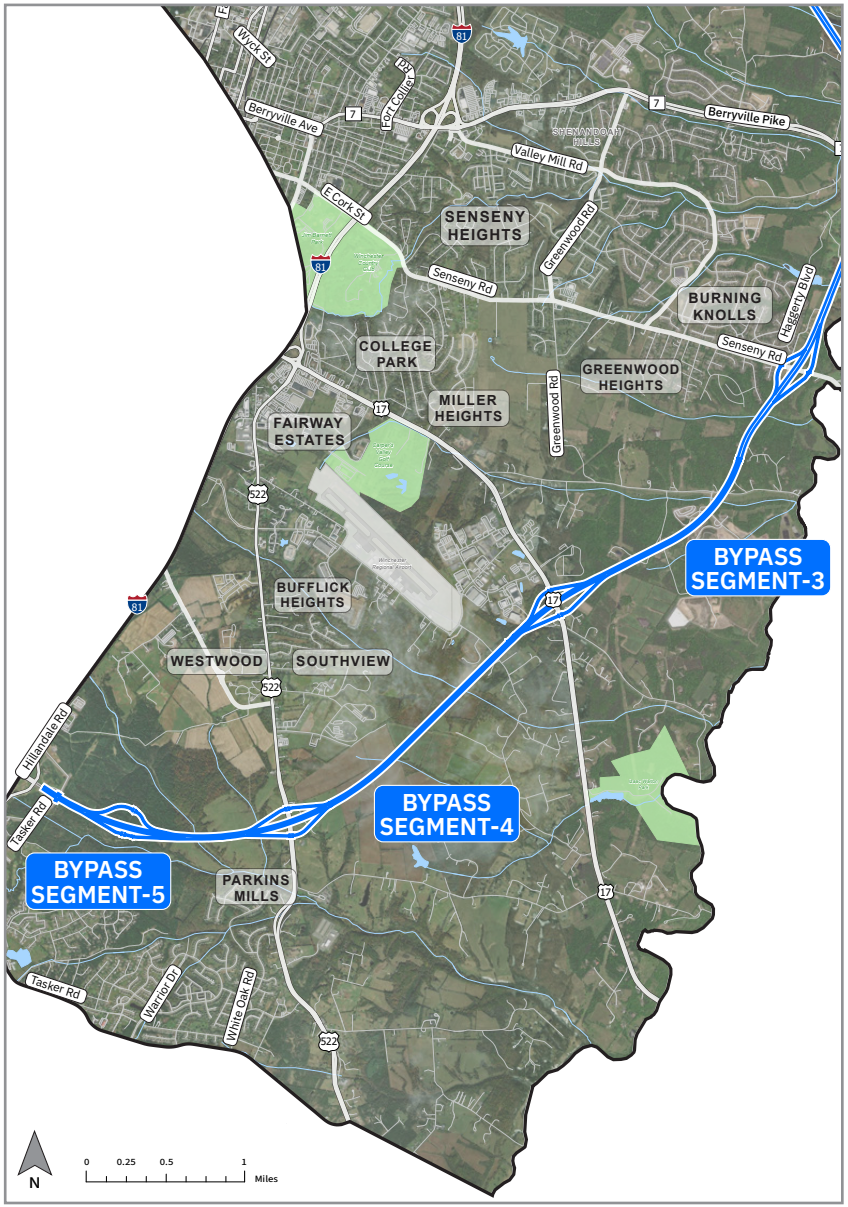

Figure 18: Original Bypass Segments

Bypass Segment 5 from US 522 (Front Royal Pike) to I-81/Tasker Road is the most southern section of the original Route 37 bypass and attracts a significant amount of traffic both in the total bypass configuration and independently by itself in the 2050 travel demand model. It is a costly segment in the original configuration and also in the new alternate configuration due to number of structures and wetland/floodplain impact. It does, however, provide for addressing congestion needs in this area and a future connection to Warrior Drive. The segment of the bypass between Tasker Road and the Warrior Drive extension is forecasted to have about 50,000 VPD and would require a four-lane typical section; the capacity of a two-lane roadway with minimal access points is approximately 23,000 to 29,000 VPD. From the Warrior Drive extension to US 17/50, a two-lane roadway would be sufficient for the 2050 forecasted demand of approximately 27,000 VPD.

Using a maximum of 29,000 VPD capacity for a two-lane roadway as a guide, each segment of the Route 37 bypass would be sufficiently served in 2050 with a two-lane roadway, except for the segment between Tasker Road and the Warrior Drive extension which would warrant a four-lane highway based on projected volumes.

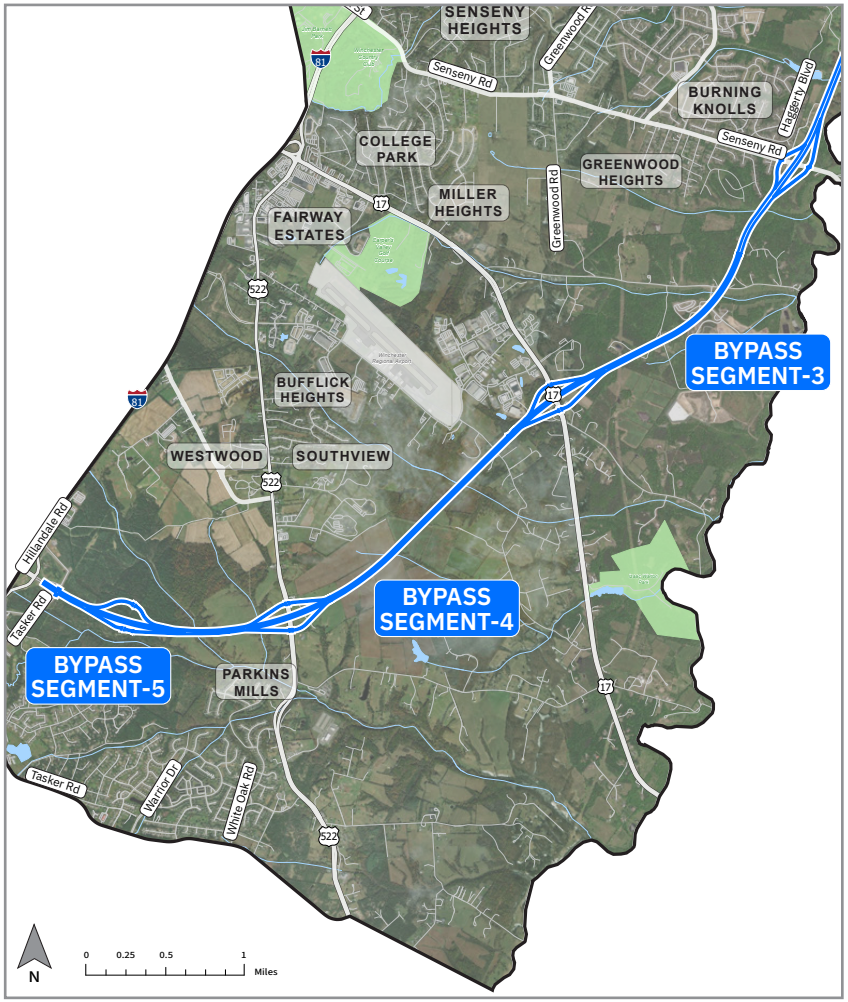

Figure 18: Original Bypass Segments

Concept Development & Potential Solutions

Formulation of different concepts and solutions were centered around the needs identified and presented to the public. The Partial Limited Access Concept is defined by the following characteristics in VDOTs Roadway Design Manual: provides access to select public roads, crossings at grade, and some private driveway connections. Project cost summaries for the following Potential Improvement Projects are shown on ***Figure 19*** on page 51 and summarized in ***Table 13*** on page 52.

Taking the conglomerate dataset of the public feedback, the 2050 forecasted volumes and V/C ratios, and analysis of the sections of the Route 37 bypass from the 2001 EIS, the following concepts were formulated and proposed to the public in March 2024 for feedback. This study focused on providing cost-effective alternatives and volume appropriate solutions to address the 2050 forecasted volumes. This includes a look at the sections of the Route 37 Bypass to determine if a two-lane partial limited access roadway in lieu of a four-lane highway full limited access could adequately meet future needs.

Included in the following discussion are findings from the analysis of Potential Projects 1, 3 and 4 and design considerations that were examined or warrant further analysis. The alignments from the Route 37 bypass in the 2001 EIS and UPC 85972 Study Update were used as a basis for these discussions. Since 2001, there has been land development which occurred either in or in proximity to these alignments. The following paragraphs discuss some of the challenges which warrant further analysis during a potential preliminary engineering phase.

Potential Improvement Project 1: Route 37 extension from Route 11 to Route 7 as a two-lane partial limited access roadway (anticipated Major Collector).

Potential Improvement Project 2: Widening Airport Road from its current configuration of two lanes to four lanes between US 522 and Admiral Byrd Drive (anticipated Major Collector) to help alleviate congestion (1 > V/C > 0.85) entering the Airport from I-81.

Potential Improvement Project 3: Tasker Road/Route 37 to US 522 (anticipated Major Collector/Minor Arterial) as a full limited access highway from Tasker Road/Route 37 to Warrior Drive and partial limited access roadway from Warrior Drive to US 522.

Potential Improvement Project 4: This project entails the extension of Haggerty Boulevard/Hallowed Crossings Way (anticipated Major Collector).

Potential Improvement Project 5: This proposed improvement includes the addition of a center turn lane to Senseny Road between I-81 and Greenwood Road.

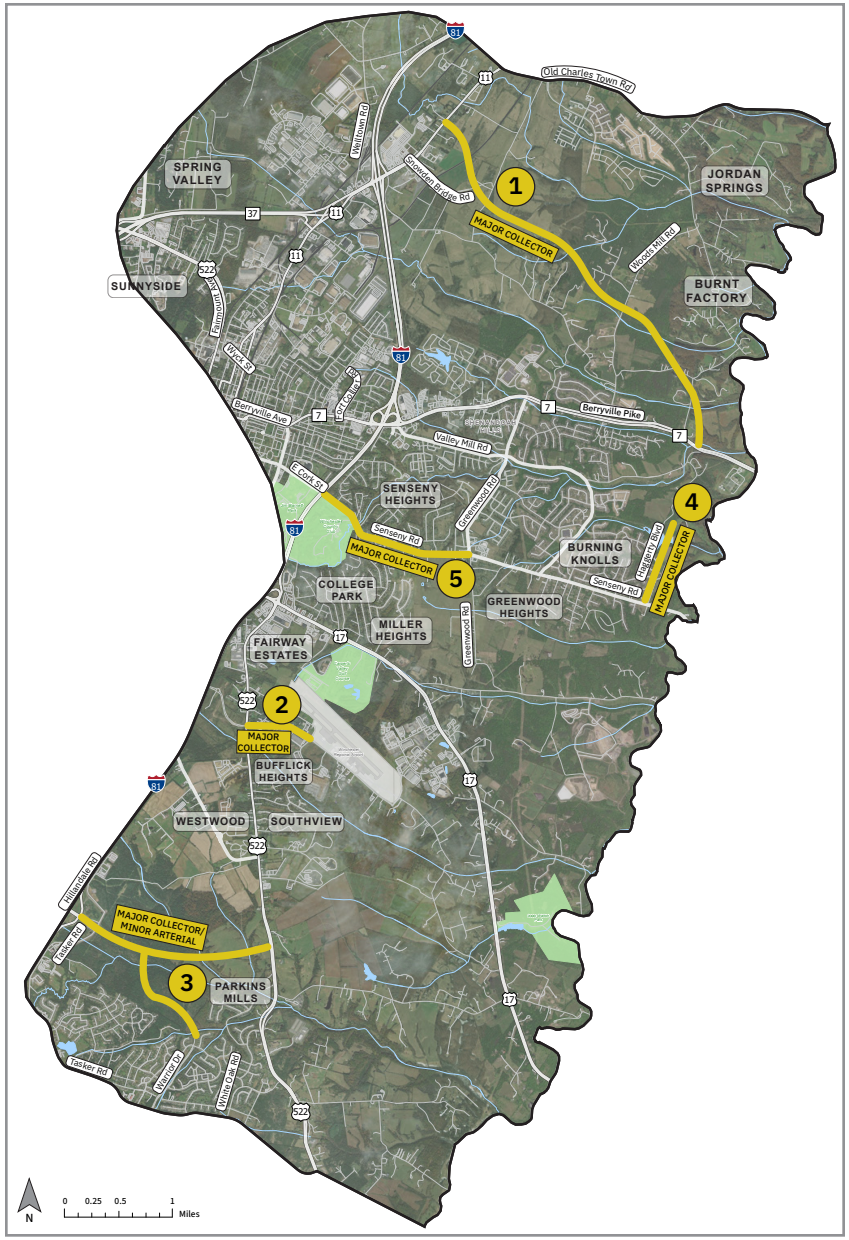

Figure 19: Potential Improvement Projects

Planning Level Cost Estimates

The cost estimate summary can be found in ***Table 13***.

May 2024			Inflation Increase of 5% Compounded Each Year				
Project #	Description	Project Total With Contingencies (millions)	2025 (millions)	2026 (millions)	2027 (millions)	2028 (millions)	2029 (millions)
1	Route 37 from Route 11 to Route 7	$179.5	$188.5	$198	$208	$218	$229
2	Widening Airport Road	$13.5	$14	$15	$16	$17	$17.5
3	New Roadway from Route 37 to US 522	$196	$206	$216	$227	$238.5	$250
4	Extension of Haggerty Blvd/Hallowed Crossings Way	$49	$51.5	$54	$56.5	$59.5	$62.5
5	Center turn lane on Senseny Road	$25.5	$27	$28	$29.5	$31	$33
TOTAL		**$463.5**	**$487**	**$511**	**$537**	**$564**	**$592**

Table 13: Construction Cost Estimate – Side-By-Side Costs

These planning level estimates included the following assumptions:

- Drainage/Stormwater Management (SWM)/Erosion and Sedimentation Control (ESC) is 25% of the subtotal of major roadway quantities
- Utilities is 3% of the subtotal of major roadway quantities
- Signal Performance Measures (SPM)/Maintenance of Traffic (MOT) is 8% of the subtotal of major roadway quantities
- Preliminary Engineering is 10% of the construction subtotal
- Final Design is 7% of the construction subtotal
- ROW is 5% of the construction subtotal
- Construction Engineering & Inspection (CEI) is 17.5% of the construction subtotal

Next Steps

In addition to searching for grant opportunities to fund the potential solutions proposed, this study can be used in many ways. Reviewing the information provided in this study to re-calibrate the thought process behind the necessity of constructing the Route 37 Eastern bypass is an important one. Consideration should be made to update the Comprehensive Transportation Plan/Eastern Frederick County Road Plan to show that a two-lane roadway can meet the future transportation needs in certain segments of the bypass. Additionally, consider adding the other proposed improvements in this study to support long term transportation planning goals to increase mobility and safety for the residents of Frederick County and the traveling public. Examples include capacity preservation on US 522 and US 17/50 as this intersection and segments/intersections along US 522 were identified on VDOT's Top PSI list. As development increases in Frederick County, these areas of preservation should receive special attention and consideration.

It is also a recommendation to find a mechanism to ensure that future development will not interfere with projects included in the Transportation Plan. As noted previously, sections of the Route 37 Eastern Bypass will not be constructable on the alignment scoped in the 2001 EIS due to development that has occurred since. Consider asking developers to provide a GIS layer with the proposed footprint to avoid these conflicts in the future.

This study is intended to precipitate a Phase II analysis to fully vet the alternatives so that the County and Commonwealth make the best-informed decisions possible with tax funds. As noted in the section above, SMART SCALE applications in the 6th round now require the following for roadways on new alignments: "Provide a Planning Study/Safety Study, which includes an operational analysis and documents a preferred alternative that is consistent with the scope described in the application to support this feature. The study must include an alternatives analysis that considers improvements not on a new alignment"[6]. It was not within this study's scope to do this detailed analysis for the proposed roadways on new alignment; therefore, a Phase II is necessary to enable the County to apply for SMART SCALE funding in the future.

6 Commonwealth Transportation Board, "SMART SCALE Technical Guide", Table 2.6, https://smartscale.virginia.gov/media/smartscale/documents/508_R6_Technical-Guide_FINAL_FINAL_acc043024_PM.pdf