PROJECT PIPELINE

LY-23-09 | Lynchburg Franklin Turnpike (VA 41) | Pittsylvania County

DRPT Virginia Department of Rail and Public Transportation

Office of INTERMODAL Planning and Investment

VDOT Virginia Department of Transportation

Franklin Turnpike from Hunting Hills Road to Orphanage Road

Final Report

July 2024

Prepared for

VDOT Virginia Department of Transportation

Office of INTERMODAL Planning and Investment

Prepared by

Michael Baker INTERNATIONAL

EPRPC

Table of Contents

List of Figures

List of Tables

Appendices

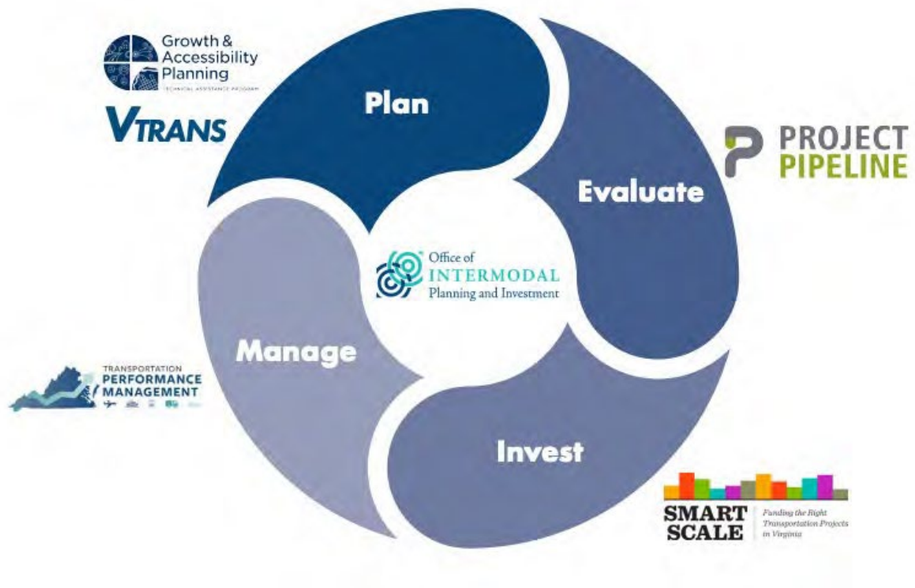
Chapter 1 – Needs Evaluation and Diagnosis

Introduction

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

This study focuses on concepts targeting identified needs including improving safety and access for pedestrians and bicyclists, and motorist safety. The objectives of Project Pipeline are shown below in **Figure 1.**

Figure 1: Project Pipeline Objectives



Background

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

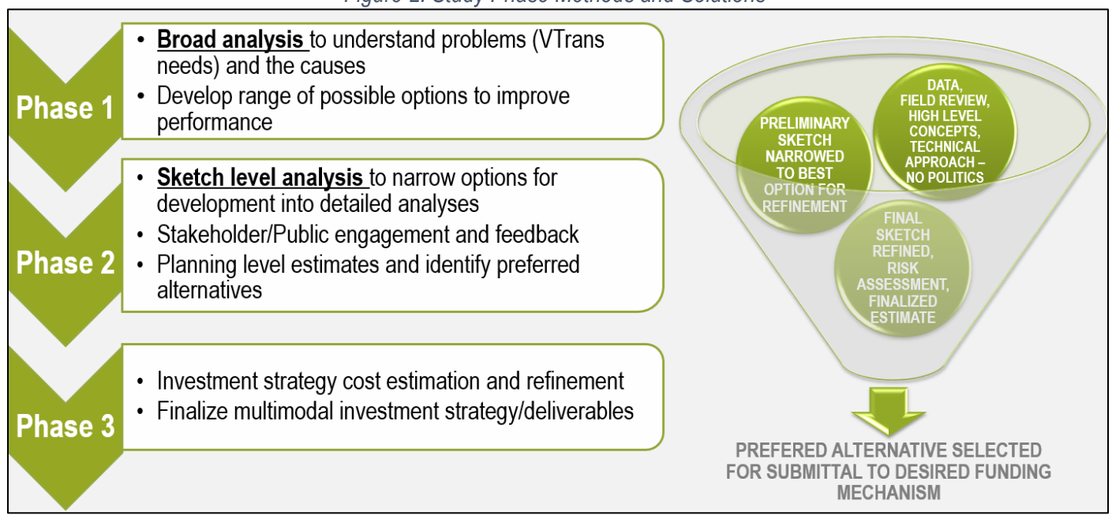
Table 1: List of VTrans Needs

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

Methodology

The study is broken down into three phases. Phase I is the problem diagnosis and brainstorming alternatives, Phase II is the alternative evaluation and sketch level analysis, and Phase III is the investment strategy and cost estimates. Details on methods and solutions for each study phase are outlined below in **Figure 2**.

Figure 2: Study Phase Methods and Solutions



The study team is broken down into Technical Teams to improve the efficiency and effectiveness of the study process through extensive collaboration and synchronicity. To achieve the intended efficiency and consistency, it is generally expected that the same Technical Team will be responsible for all studies within a district for the duration of the cycle.

Each Technical Team will include certain leadership and technical roles that will be needed for each study, including the following:

- VDOT District Planning Project Manager – Provides leadership and direction; has overall responsibility for the study progress and outcomes.
- Consultant Team Manager – Provides direct support to the VDOT District Planning Project Manager; coordinates the work and technical efforts of consultant staff.
- District Planning Staff – Provides technical input regarding capacity, forecasting, land use, multimodal, and planning.
- District Traffic Engineering Staff – Provide technical input regarding safety and operations.
- Consultant Team Technical Staff – Provides multidisciplinary input, analysis, technical support, and expertise for the identified VTrans need categories.

A sample organizational chart, including the roles, responsibilities, and structure of a Technical Team is shown below in **Figure 3**.

Figure 3: Structure of a Technical Team

Additional team members and roles should be considered where appropriate. Certain roles may not be necessary for all studies. However, the following roles may contribute to study success during different stages and/or for different types of study areas, as shown in **Table 2**.

Table 2: Roles and Responsibilities for the Technical Team and SWGs

Phase	Responsibility	Role					
		OIPI/Program Support	District	Consultant	DRPT	Locality	VDOT Central Office
Study Selection & Initiation	Identify Study Needs and Priorities		X		X	X	
	Coordinate with CTB Members	X	X				
	Approve final study locations	X					
	Data Collection Planning		X				
	Data Dashboards	X					
	Assign Consultants & Issue Consultant Task Orders	X					X
Phase 1	Initiate Study & Hold Kickoff Meeting		X	X	X		
	Prepare Framework Document		X	X			
	Approve Framework Document		X		X	X	
	Provide Existing Data		X		X	X	
	Collect New Data			X			
	Coordinate with local leaders					X	
	Conduct & Support Initial Public Outreach (if desired)	X	X	X		X	X
	Diagnose Existing Needs			X			
	Brainstorm & Develop Preliminary Alternatives		X	X	X		X
	Present Diagnosis & Alternatives to SWG			X			
	Provide Feedback and Input on Analysis & Alternatives					X	
	Develop Phase 2 Scope of Work			X			
	Approve Scope & Issue Consultant Task Orders	X					X
Phase 2	Conduct Detailed Analysis of Alternatives			X			
	Develop Refinements to Alternatives		X	X	X		X
	Present Alternative Analysis Findings to SWG		X	X			
	Provide Feedback on Alternatives				X	X	X
	Prepare Planning Level Cost Estimates			X			
	Conduct & Support Public Outreach on Alternatives	X	X	X		X	
	Concurrence on Preferred Alternative(s)		X		X	X	X
	Develop Phase 3 Scope of Work			X			
	Approve Scope & Issue Consultant Task Orders	X					X
Phase 3	Conduct Alternative Risk Assessment		X	X			X
	Develop Practical Concept Design & Address Risk of Preferred Alternative		X	X			
	Prepare Cost Estimate with Workbook			X			
	Document Assumptions & Basis of Cost			X			
	Review & Concur with Concept & Estimate		X		X		X
Investment, Application, & Closeout	Prepare Final Study Deliverables, Design Packages, and Estimates			X			
	Apply for Funding of Preferred Alternative(s)				X	X	
	Application Support	X	X	X			
	Submit and Documentation and All Related Work			X			
	Review and approve final deliverables for public visibility		X		X		
	Program Closeout and Summary	X					

Study Area

The study area includes the roughly three-mile segment of VA 41 (Franklin Turnpike) in Pittsylvania County from 0.13 miles north of Hunting Hills Road (Route 864) to Vicar Place. The study area is shown in **Figure 4**.

There are no signalized intersections within the study area. The following unsignalized intersections were studied:

1. VA 41 at Hunting Hills Road
2. VA 41 at Golf Club Road
3. VA 41 at Mount Hermon Circle (north)
4. VA 41 at Oak Forest Circle
5. VA 41 at Mount Hermon Circle (south)
6. VA 41 at Ridgecrest Drive
7. VA 41 at Jeanette Drive
8. VA 41 at Eagle Lane
9. VA 41 at Afton Road
10. VA 41 at Orphanage Road

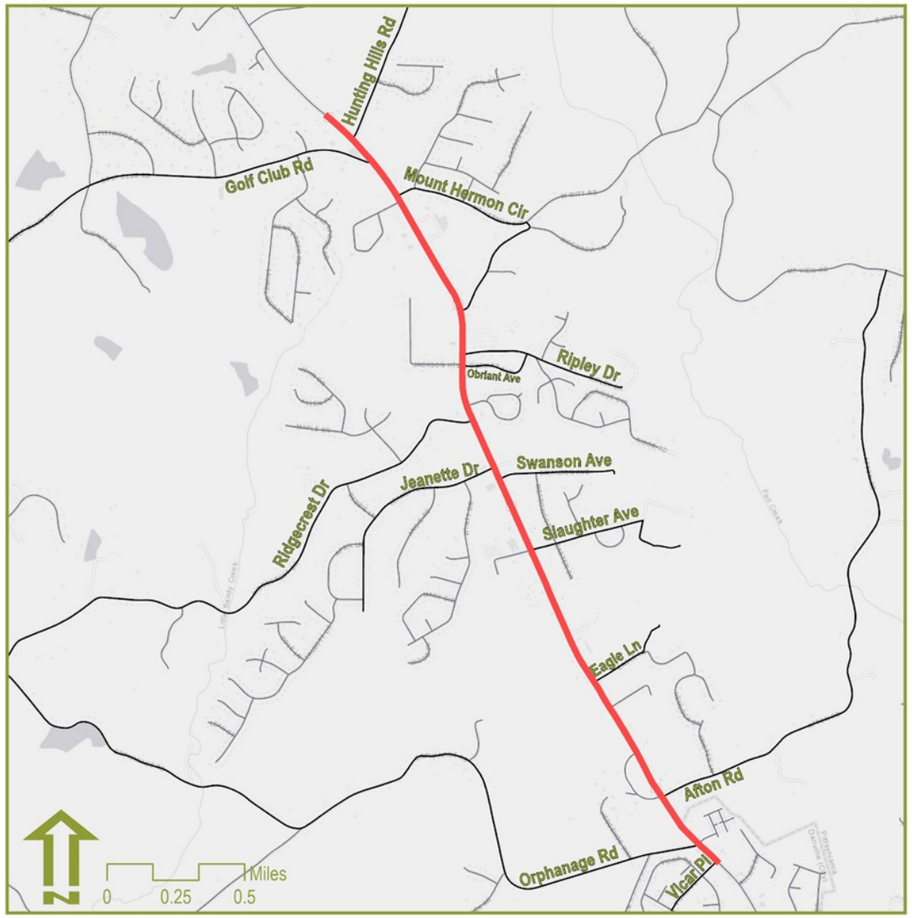
Originally the northern study area limit was Mount Hermon Circle (north). Based on crash data, local knowledge, and roadway conditions the study team proposed that the study area be extended and the SWG concurred.

VA 41 in the study area is functionally classified as a "Minor Arterial" and has a posted speed limit of 45 mph. The posted speed limit is 55 mph a quarter mile north of Hunting Hills Road, and 40 mph approaching the study area from Danville to the south. VA 41 generally has two through lanes in each direction and a center two-way-left-turn lane. No right-turn lanes are present along the corridor; however, there are right-turn tapers at a few of the intersections. North of the LY09 study area, VA 41 is a two-lane undivided highway.

VA 41 provides local communities and commuters access to Danville. Twin Springs Elementary School lies just to the north of the study area. Residential subdivisions such as Evergreen, Fairfield Park, Ridgecrest, and Tuscarora Farms are set back from the roadway. Some residences have direct access to VA 41 along with a variety of businesses. The Hughes Center provides youth psychiatric residential treatment and day program educational services for adolescents and young adults with intellectual and developmental disabilities.

A framework document was developed and outlines the study methods and assumptions. The signed framework document is in **Appendix A**. A kickoff meeting with the SWG was held on July 15, 2023 and the meeting materials are in **Appendix A**.

Figure 4: Franklin Turnpike Study Area Map



VTrans is Virginia's statewide transportation plan. It identifies and prioritizes locations with transportation needs using data-informed transparent processes. The policy for identifying VTrans mid-term needs establishes multimodal need categories that correspond to the Commonwealth Transportation Board-

adopted VTrans visions, goals, and objectives.[1] Each need category has one or more performance measures and thresholds to identify one or more needs. Visit the Vtrans policy guide for additional information: https://vtrans.org/resources/VTrans_Policy_Guide_v6.pdf.

The mid-term needs, as identified in VTrans for the Franklin Turnpike corridor, were identified as "High" for Safety Improvement and "Low" for Bicycle Access, Pedestrian Access, Pedestrian Safety Improvement, Transit Access, Transit Access for Equity Emphasis Area, and Transportation Demand Management as shown in **Table 3**.

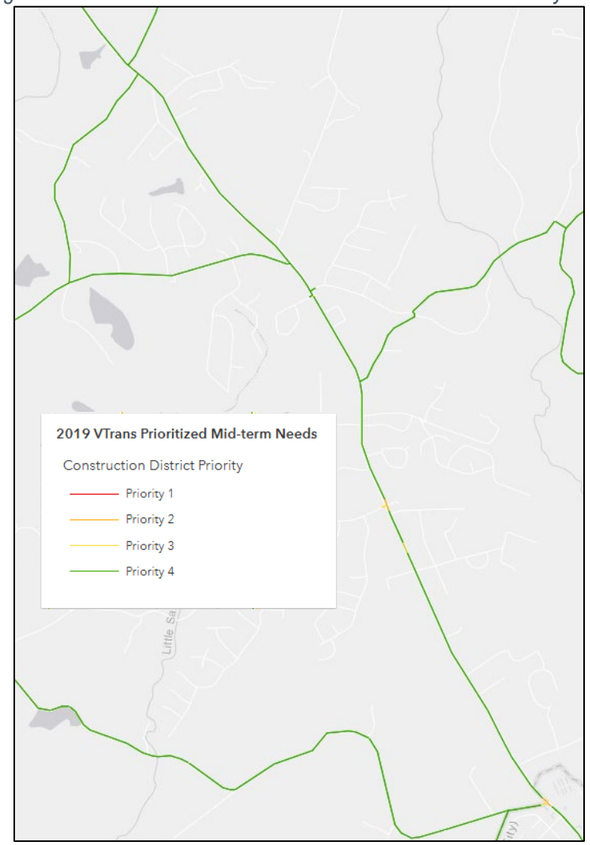
Table 3. VTrans Needs in Study Area

Need	Priority
Safety Improvement	High
Bicycle Access	Low
Pedestrian Access	Low
Pedestrian Safety Improvement	Low
Transit Access	Low
Transit Access for Equity Emphasis Area	Low
Transportation Demand Management	Low
Capacity Preservation	None
Congestion Mitigation	None
IEDA (UDA) Access	None
Reliability	None
Rail On-Time Performance	None

The VA 41 corridor was identified as a Project Pipeline study location due to the presence of these overlapping VTrans needs. More information on the VTrans needs, including the process to identify the needs, is available at www.vtrans.org. The 2019 VTrans Prioritized Mid-term Needs are shown in **Figure 5.**

A field visit was conducted June 27 and 28, 2023.

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



https://vtrans.org/interactvtrans/map-explorer

Previous Study Efforts

As discussed in the stakeholder meeting held on September 7, 2023, a traffic signal warrant analysis was prepared by VDOT for the intersection of Franklin Turnpike and Orphanage Road in September 2021. Installation of a traffic signal was not warranted at the time of the study.

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

FHWA STEAP Tool Analysis

The FHWA Screening for Equity Analysis of Projects (STEAP) Tool was reviewed for the corridor and surrounding areas. This tool is used to discover the key population metrics and needs of the study area to raise awareness of equity needs in the selection of alternatives. The data source used for the analysis was the American Community Survey 2016 – 2020 and a 0.5-mile radius was used for the analysis buffer. The results of the STEAP Tool analysis are presented below:

- The majority of the population (61%) within the study area is between ages 18 and 64 as shown in **Figure 6**.
- 10% of households do not own a personal vehicle as shown in **Figure 7**. This is greater than Pittsylvania County and the State of Virginia.
- When compared to the State of Virginia, the study area has a higher than average number of people with disabilities, households with no computers, and households without internet connections, as shown in **Figure 8**.
- Of all the households in the study area, 29% have household income greater than $75,000, as shown in **Figure 9**.

Appendix B provides the full STEAP-generated equity analysis project profile report.

Figure 6: STEAP Tool Analysis Population by Age Group

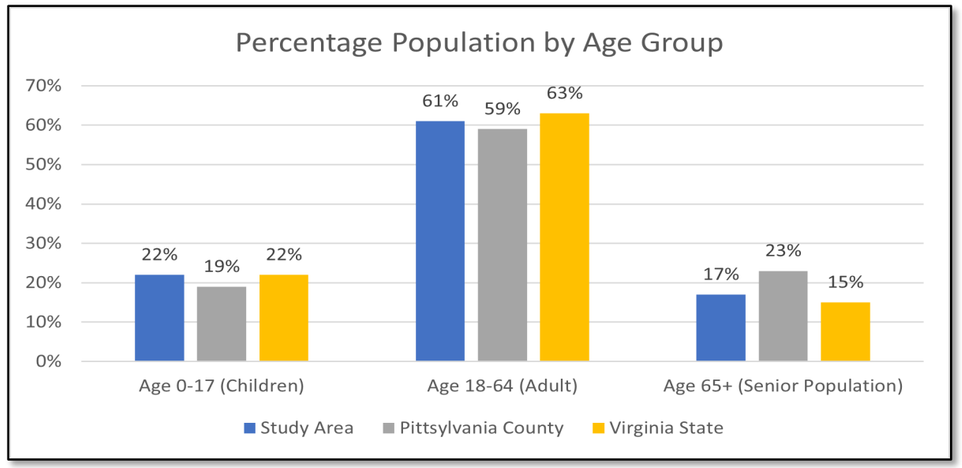


Figure 7: STEAP Tool Analysis Vehicle Ownership

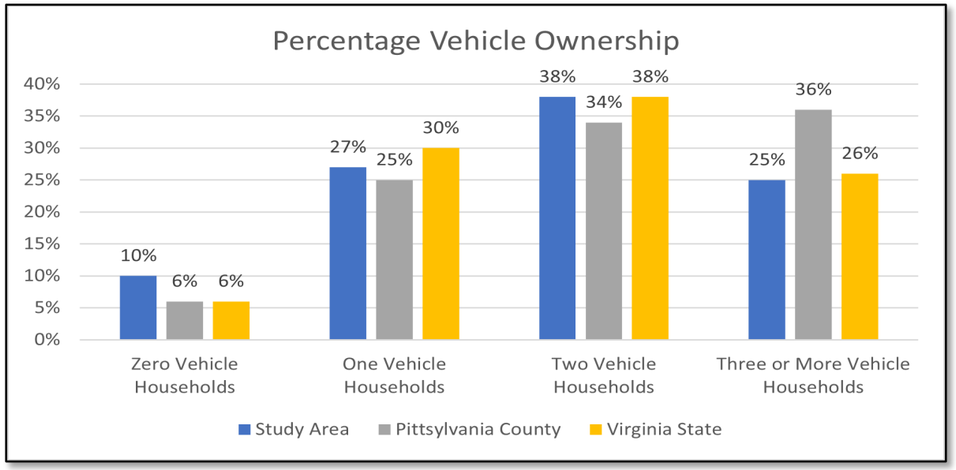


Figure 8: STEAP Tool Analysis Vulnerable Populations

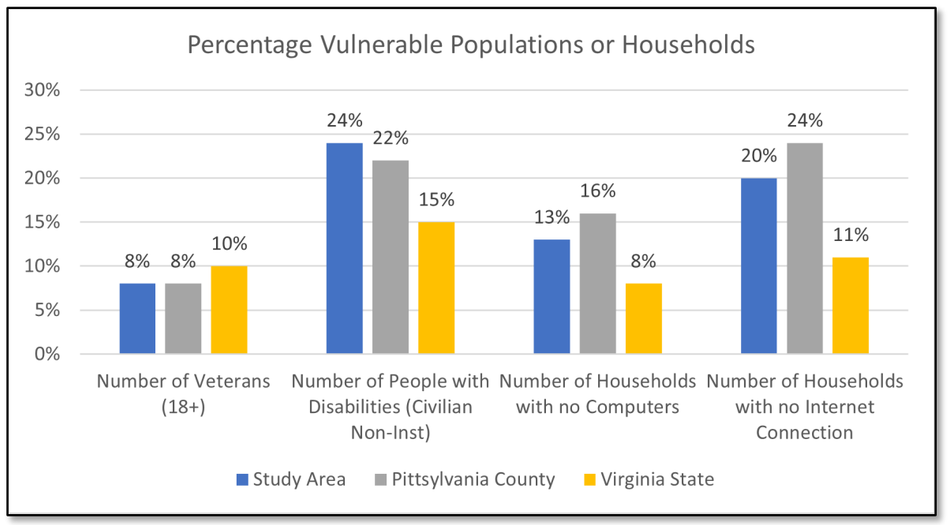
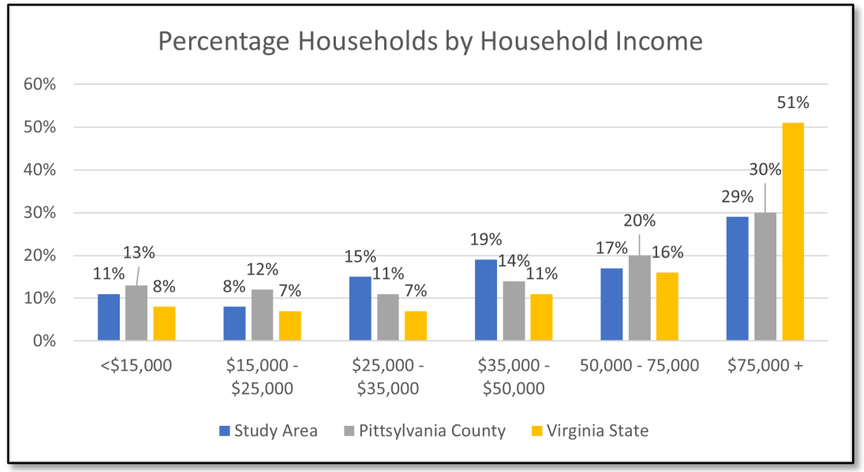


Figure 9: STEAP Tool Analysis Household Income



Traffic Operations and Accessibility

Traffic operational analysis was performed using Synchro 11 and SimTraffic 11 software for all study intersections along the Franklin Turnpike corridor. Inputs and analysis methodologies were consistent with the VDOT Traffic Operations and Safety Analysis Manual (TOSAM) guidelines. Both AM and PM peak hour analyses were performed for the existing year 2023 and future year 2045.

Traffic Data

12-hour turning movement counts (7 AM to 7 PM) were collected at 10 intersections within the study corridor. These intersections are listed in **Table 4** from north to south. Counts at 3 intersections were collected on Thursday, May 11, 2023. Counts at the remaining 7 intersections were collected on Tuesday, September 12, 2023.

The corridor AM peak hour was determined to be 7:30 AM to 8:30 AM for the northern intersections (Hunting Hills Road through Mount Hermon Circle south) and 7:15 AM to 8:15 AM for the southern intersections (Ridgecrest Drive through Orphanage Road). The corridor PM peak hour was determined to be 4:45 PM to 5:45 PM. The peak hour traffic volumes are available in **Appendix B** and shown in **Figure 10** and **Figure 11**.

Table 4: Intersection Turning Movement Count Data Collection Locations and Dates

ID	Intersection	Date of Data Collection
1	VA 41 at Hunting Hills Road	9/12/2023
2	VA 41 at Golf Club Road	9/12/2023
3	VA 41 at Mount Hermon Circle (north)	5/11/2023
4	VA 41 at Oak Forest Circle	5/11/2023
5	VA 41 at Mount Hermon Circle (south)	9/12/2023
6	VA 41 at Ridgecrest Drive	9/12/2023
7	VA 41 at Jeanette Drive	9/12/2023
8	VA 41 at Eagle Lane	9/12/2023
9	VA 41 at Afton Road	9/12/2023
10	VA 41 at Orphanage Road	5/11/2023

48-hour tube counts were collected beginning at 12:00AM on Wednesday May 10, 2023, and concluding at 11:59PM on Thursday May 11, 2023, to obtain 15-minute counts of southbound and northbound vehicles on VA 41 at two locations:

- Between Matthew Circle and O'Briant Avenue
- Between Berkley Street and Eagle Lane

The average speed, 85th percentile speed, and percent of vehicles traveling in excess of the posted speed limit are shown in **Figure 12** and the daily traffic volumes are listed in **Table 5.**

Table 5: VA 41 Daily Traffic Volumes

Count Location	Daily Traffic Volume
Between Matthew Circle and O'Briant Avenue	14,000
Between Berkley Street and Eagle Lane	16,400

As shown in **Figure 12**, the average speed and 85th percentile speeds observed exceed the posted speed limit in both count locations, northbound and southbound, and in both the inside and outside travel lanes. The data indicates that speeding is an issue in the corridor with 85th percentile speeds ranging from 52-56 mph. The percentage of vehicles exceeding the posted speed limit is greater at the southern count location with the greatest percentage, 87%, in the northbound inside travel lane.

Figure 10: Existing 2023 Peak Hour Traffic Volumes

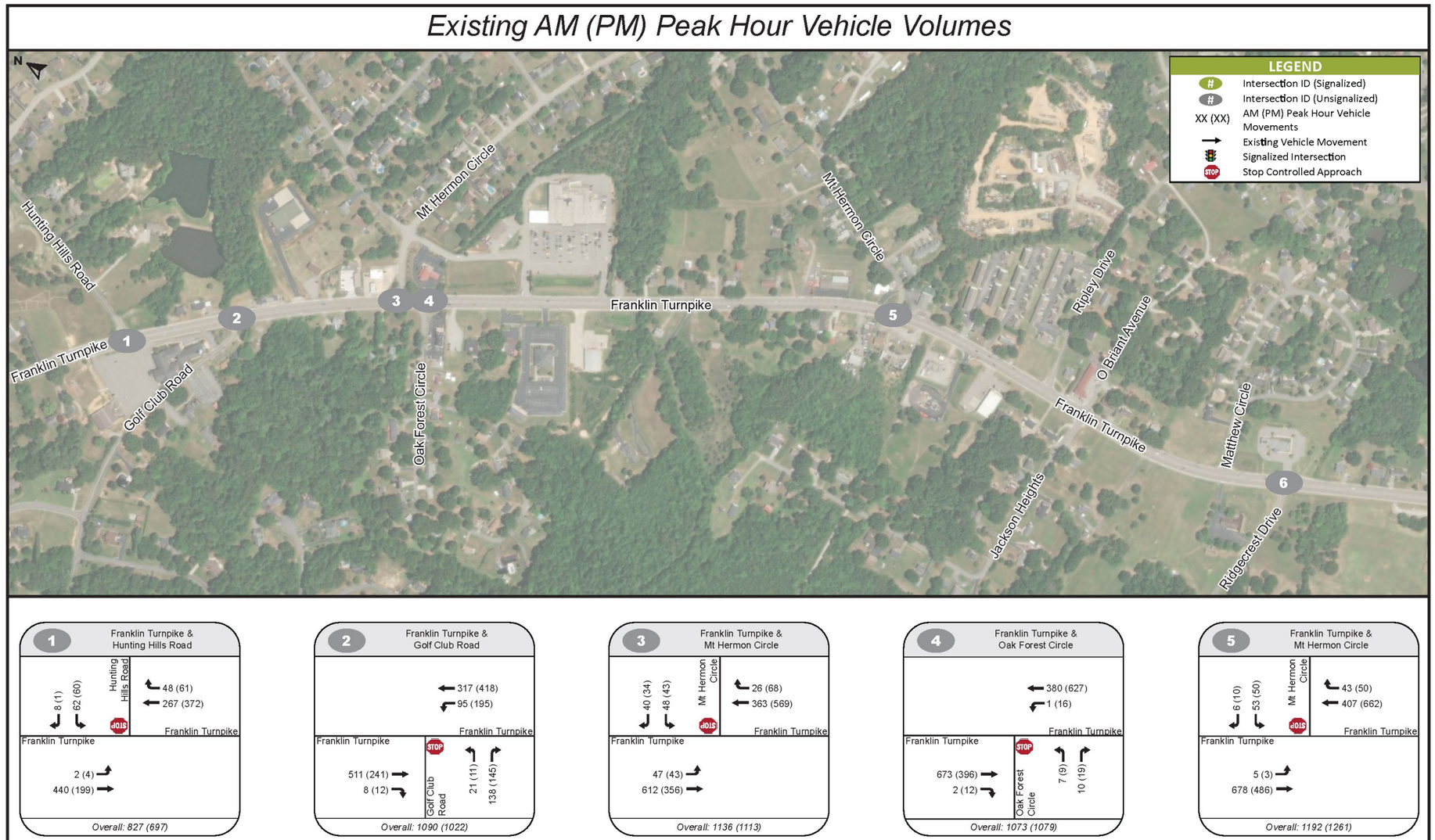


Figure 11: Existing 2023 Peak Hour Traffic Volumes

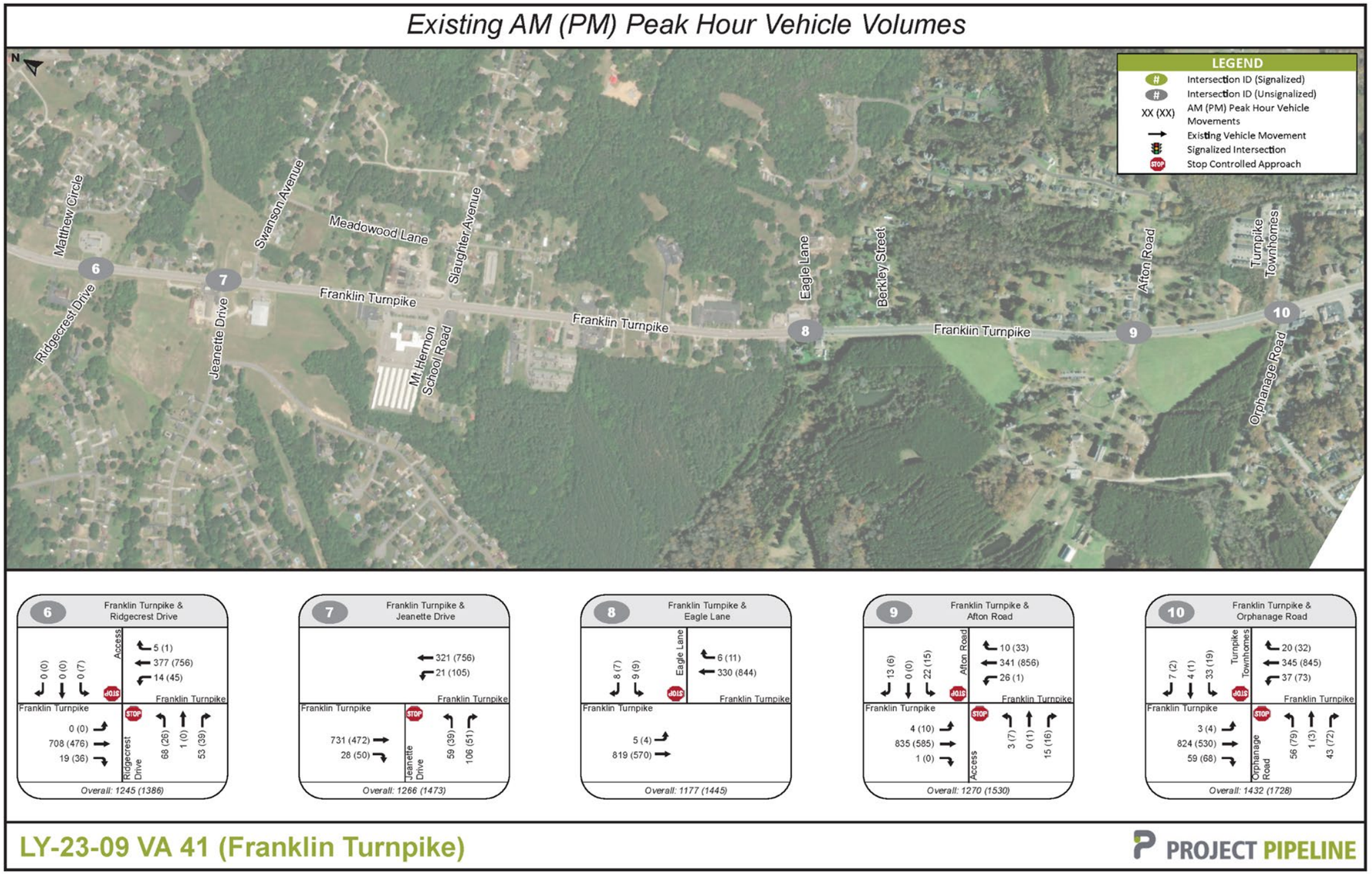
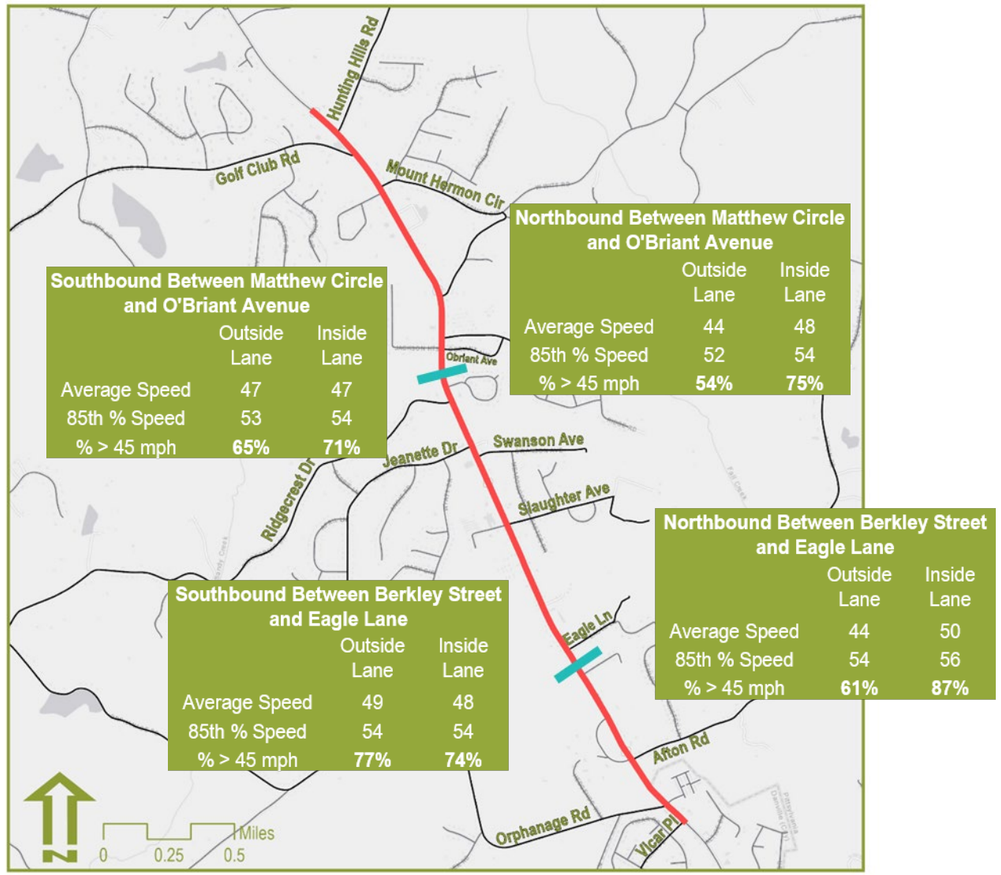


Figure 12: 2023 Daily Traffic Volumes and Travel Speeds



Notable findings from the traffic volumes are provided below:

- VA 41 through volumes are directional by time of day. The southbound through volumes are greater in the AM peak hour and the northbound through volumes are greater in the PM peak hour reflecting commuting patterns into Danville.
- VA 41 through volumes are greater at the southern end of the corridor than the northern end of the corridor.
  - Daily traffic volumes between Matthew Circle and O'Briant Avenue are 14,000 vpd.
  - Daily traffic volumes between Berkley Street and Eagle Lane are 16,400 vpd.
  - At Orphanage Road, 1,169 and 1,375 vehicles travel through the intersection during the AM and PM peak hours, respectively. At Mount Hermon Circle (north), 975 and 925 vehicles travel through the intersection during the AM and PM peak hours, respectively.

Measures of Effectiveness

There are many measures of effectiveness (MOE) in traffic operations analysis to quantify operational and safety objectives and provide a basis for evaluating the performance of a transportation network. Several MOEs for intersection analyses can be reported from Synchro/SimTraffic, VDOT Junction Screening Tool (VJuST), and SIDRA. For the purposes of this study, guidance for reporting MOEs for signalized and unsignalized intersections was obtained from Chapter 4 of the VDOT TOSAM. A summary of the MOEs evaluated for the study intersections is presented below:

- Control Delay (measured in seconds per vehicle – sec/veh)
- Level of service (LOS)
- Maximum Queue Length for SimTraffic (measured in feet – ft)
- Volume-to-Capacity (v/c) Ratio

The HCM 6th Edition methodology was used to analyze the unsignalized intersections. Control delay and LOS are reported from the Synchro analysis. Maximum queue length is reported from SimTraffic.

Traffic Operations Analysis Results

A table summarizing the Existing Conditions (2023) model outputs is provided in **Appendix B**. Generally, the study area intersections along the Franklin Turnpike corridor are currently operating under capacity. The model outputs are summarized below.

- The eastbound approach at Ridgecrest Drive, westbound approach at Afton Road, and eastbound approach at Orphanage Road operate at LOS E during one of the peak hours.
- The eastbound and westbound approaches at Orphanage Road operate at LOS F during the PM peak hour.
- Aside from the movements previously noted, all movements at the study intersections operate at LOS D or better and the queues are less than five vehicles at most.

Pedestrian and Bicycle Access

Sidewalks currently exist on both sides of VA 41 throughout the entire study area. However, as shown in **Figure 13**, the sidewalks are of substandard width and are located in close proximity to high-speed vehicular traffic. There are currently no marked crosswalks across VA 41 in the study area.

There are no bike lanes or facilities for bicyclists on VA 41 in the LY09 study area. The WPPDC 2018 Bike Plan shows the entire study corridor as a bicycle route.

VA 41 is not listed as a top PSAP priority corridor or cluster based on 2016-2020 data. Based on 2014-2018 data there is a PSAP cluster in the corridor and based on 2012-2016 data there is a PSAP cluster and the corridor is a top 1% PSAP priority corridor.

Figure 13: VA 41 Existing Sidewalks

Safety and Reliability

For the analysis of existing safety conditions, the VDOT Crash Analysis PowerBI Tool was utilized to determine the crash history at the study intersections and along Franklin Turnpike. Crash data was collected and analyzed for a five-year period spanning from April 2018 through March 2023. The study team reviewed the FR-300 reports provided by VDOT to determine specific trends and "hot spot" areas for consideration in developing alternative improvement concepts. For the purposes of this analysis, "injury crashes" is defined as the sum of type A (severe injury), B (visible injury), and C (non-visible injury) crashes.

Safety Analysis Results

The crashes within the study area are summarized by severity and type in **Table 6** and **Table 7**, respectively. A comparison of the Franklin Turnpike, Lynchburg District, and statewide average crash rates for rural minor arterial roadways with a five lane typical section are shown in **Table 8** and crash locations and crash types for each of the study intersections are shown in **Figure 14.**

Table 6: Study Area Crash Severity by Location

Location	K. Fatal Injury	A. Severe Injury	B. Visible Injury	C. Non-visible Injury	PDO. Property Damage Only	Total
Golf Club Road	1	0	0	0	2	**3**
Mount Hermon Circle (north)	0	1	5	0	4	**10**
Tuscarora Village Shopping Center	1	0	1	0	0	**2**
Jeanette Drive	1	0	1	0	3	**5**
Orphanage Road	1	2	2	3	8	**16**
Rest of Corridor	0	5	17	5	30	**57**
Total	**4**	**8**	**26**	**8**	**47**	**93**

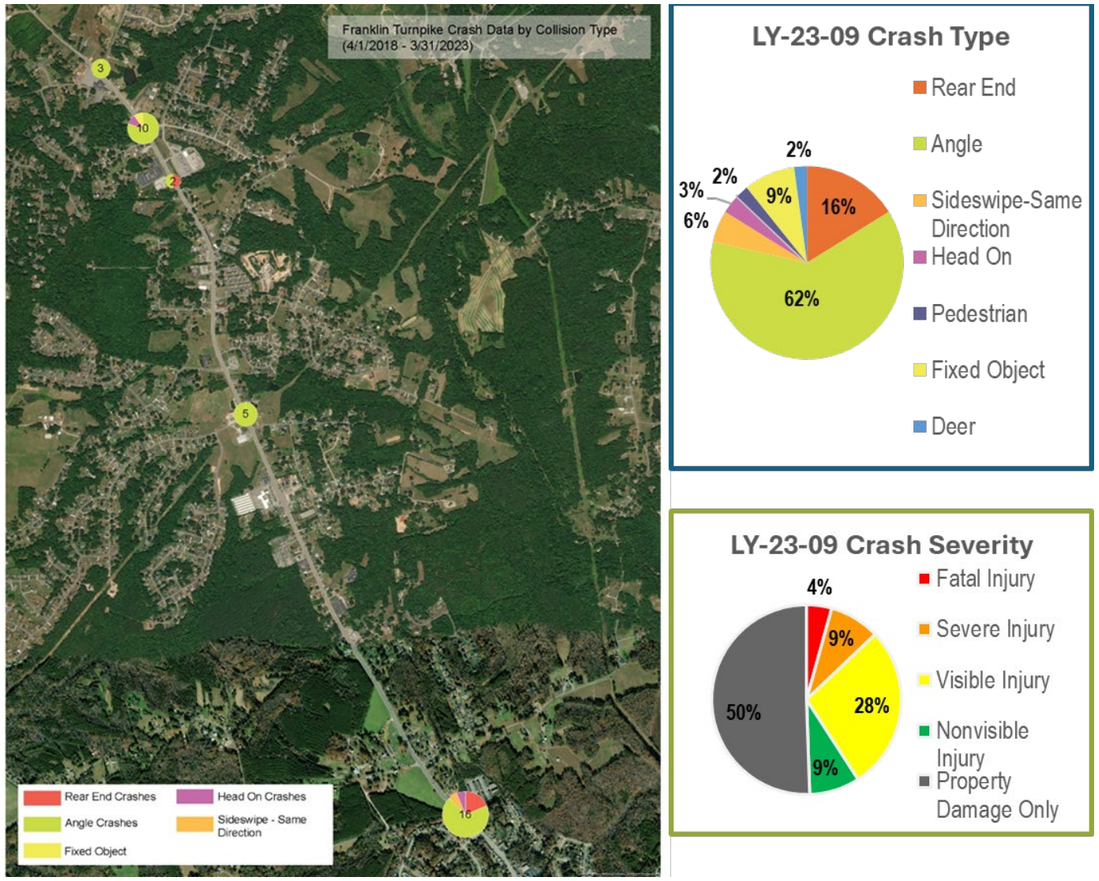
Table 7: Study Area Crash Type by Location

Location	Rear End	Angle	Head On	Fixed Object	Side-swipe	Deer	Ped	Total
Golf Club Road	0	3	0	0	0	0	0	**3**
Mount Hermon Circle (north)	0	8	1	1	0	0	0	**10**
Tuscarora Village Shopping Center	1	1	0	0	0	0	0	**2**
Jeanette Drive	0	5	0	0	0	0	0	**5**
Orphanage Road	3	11	1	0	1	0	0	**16**
Rest of Corridor	11	30	1	7	4	2	2	**57**
Total	**15**	**58**	**3**	**8**	**5**	**2**	**2**	**93**

Table 8: Study Area Annual Crash Rate Comparison

	Fatal Crash Rate	Severe Injury Crash Rate	Injury Crash Rate	Total Crash Rate
VA 41	**5.17**	10.33	**59.42**	120.13
Lynchburg District	2.20	10.02	39.12	115.00
Statewide	1.92	8.96	39.16	123.93

Figure 14: Franklin Turnpike Crashes by Collision Type and Severity



A total of 93 crashes were reported within the Franklin Turnpike corridor study area during the five-year study period.

Key takeaways from the crash data are as follows:

1. 100% of fatal crashes were angle crashes
2. 64% of injury crashes were angle crashes
3. 43% of crashes involved seniors
4. Angle crashes (62%) and rear end crashes (16%) were the highest reported crashes along the corridor.
5. Four fatal crashes (4%) occurred.
6. A total of 42 reported crashes were associated with injuries, accounting for approximately 45% of the reported crashes along the corridor.
7. The number of fatal and injury crashes is greater than would be expected. The fatal crash rate of the study corridor is 2.35 times greater than the Lynchburg District and 2.69 times greater than the statewide average.

The detailed collision diagrams are shown in **Appendix B**.

Figure 15 shows the location of the fatal crashes along the study corridor. The fatal crashes are located at intersections and the entrance to the Tuscarora Village Shopping Center. The crash data in the time frame shown in **Figure 15** extends slightly beyond the five-year period, to include all of 2018, when an additional fatal crash occurred at the Golf Club Road intersection. It should be noted that upon review of the crash data, two of the fatal crashes that were classified as head on collisions were actually angle collisions. One of these crashes occurred at Golf Club Road and the other at Jeanette Drive.

Locations with Potential for Safety Improvement

PSI is a calculation that determines if the observed crash frequency exceeds the expected crash frequency on a road with similar characteristics and traffic volumes. PSI is the best available measure for understanding whether crashes at an intersection are higher or lower than expected.

VDOT publishes a ranking of intersections and road segments with PSI for each VDOT District. The PSI rankings used in this study use 2016-2020 crash data.

Figure 16 shows the locations of segments and intersections in the LY09 study area that have PSI and the PSI rankings.

Figure 15: Fatal Injury Crash Locations by Collision Type (1/1/2018-2/21/2023)

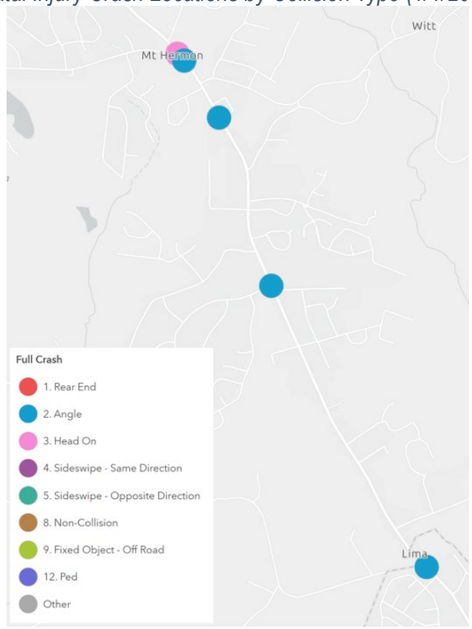


Figure 16: Potential for Safety Improvement (PSI) Locations (2016-2020)

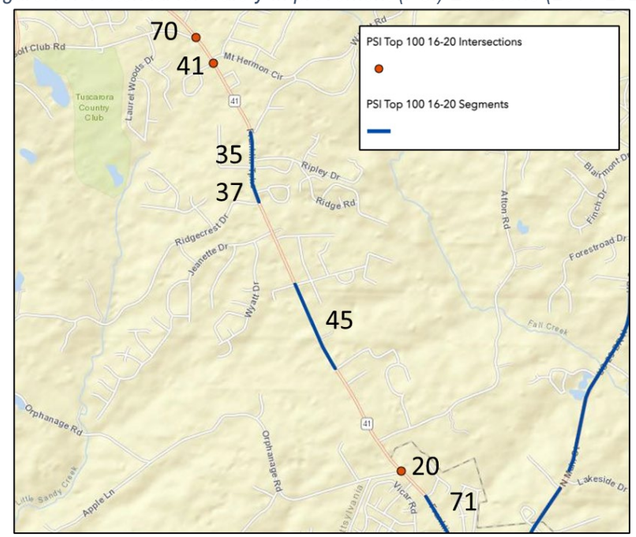


Table 9: Study Area Crash Conditions and Severity by Crash Type

Crash Type and Other Related Factors	Lighting Conditions Daylight	Lighting Conditions Dawn/ Dusk	Lighting Conditions Darkness	Weather Conditions No Adverse Conditions	Weather Conditions Rain
Angle	50	3	5	55	3
Rear End	11	1	3	15	0
Fixed Object – Off Road	3	1	4	6	2
Sideswipe – Same Direction	4	0	1	5	0
Head On	3	0	0	2	1
Deer	0	0	2	2	0
Ped	0	0	2	2	0
Total	**71**	**5**	**17**	**87**	**6**
%	**76%**	**5%**	**18%**	**94%**	**6%**

Crash Type and Other Related Factors	Alcohol or Drug Related	Speed Related	Distracted	Drowsy	Senior	Young	Motor-cycle
Angle	1	5	3	1	32	13	0
Rear End	1	5	4	0	6	4	1
Fixed Object – Off Road	0	2	1	1	0	2	0
Sideswipe – Same Direction	0	1	0	0	1	0	0
Head On	0	0	0	0	1	0	0
Deer	0	0	0	0	0	0	0
Ped	0	0	0	0	0	0	0
Total	**2**	**13**	**8**	**2**	**40**	**19**	**1**
%	**2%**	**14%**	**9%**	**2%**	**43%**	**20%**	**1%**

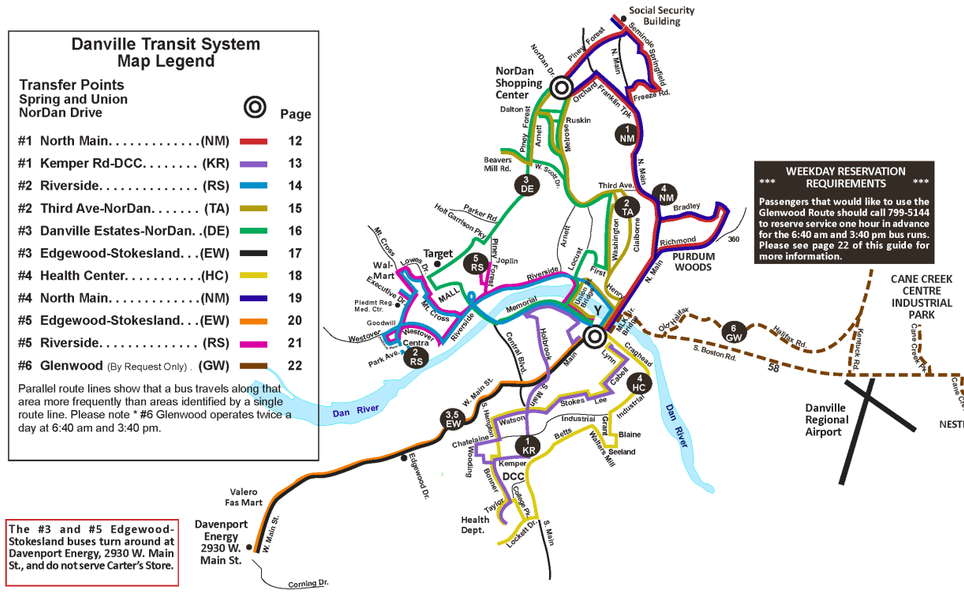
Crash Type and Other Related Factors	Fatal	Severe	Visible	Non-Visible	PDO	Total
Angle	4	4	16	6	28	58
Rear End	0	0	3	1	11	15
Fixed Object – Off Road	0	1	3	0	4	8
Sideswipe – Same Direction	0	0	1	0	4	5
Head On	0	1	2	0	0	3
Deer	0	0	0	0	2	2
Ped	0	2	0	0	0	2
Total	**4**	**8**	**25**	**7**	**49**	**93**
%	**4%**	**9%**	**27%**	**8%**	**53%**	**100%**

Rail, Transit, and TDM

As shown in **Table 3**, VTrans identified Transit Access, Transit Access for Equity Emphasis Area, and Transportation Demand Management as “Low” needs.

The existing transit and TDM services in the LY09 study area are limited. The LY09 study area does not have any current fixed route or on-demand transit service or park-and-ride lots. Danville Transit currently only provides bus transit service within the Danville City limits as shown in **Figure 17**. As shown in **Figure 18**, no park-and-ride lots currently serve to intercept trips in the study area.

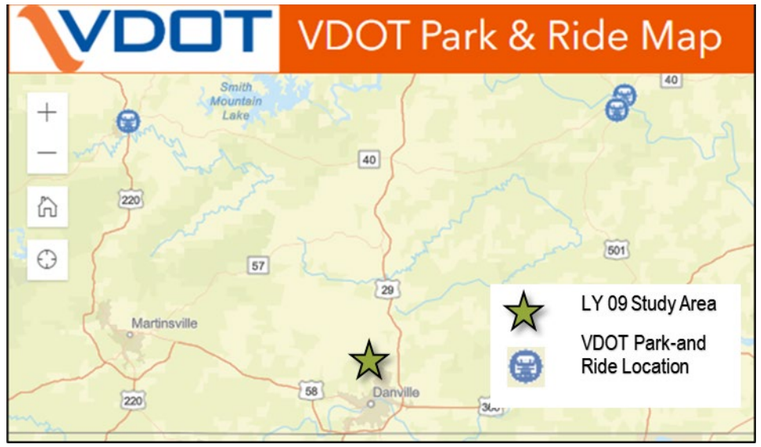
Figure 17: Danville Transit System Map



The RIDE Solutions Agency and commuter services program is operated by the Roanoke Valley-Alleghany Regional Commission in cooperation with the West Piedmont Planning District Commission. RIDE Solutions provides multimodal trip planning services for citizens and employers through Central and Southwest Virginia including trip matching for carpooling.

The study team contacted Danville Transit and no new transit routes or park-and-ride facilities are planned to serve the study area.

Figure 18: VDOT Park-and-Ride Locations



To further determine the propensity for transit services along and near Franklin Turnpike in the future a Transit Propensity Analysis was conducted and is included in **Appendix B.** Based on this analysis, the study team concluded that the demographic and land use analysis does not identify the LY09 Project Pipeline study area as a need for transit service or Travel Demand Management and that the existing Danville Transit routes and RIDE Solutions agency services meet the needs.

The results of the existing conditions analysis are summarized in the Phase 1 Executive Summary in **Appendix B**.

Phase 1 Public Outreach

The goal of public outreach during Phase 1 of the LY09 Project Pipeline study was to solicit public feedback on existing conditions, including the public's priorities and perceptions of the corridor, and inform the public of the study efforts and goals.

Public outreach during Phase 1 consisted of an online survey using PublicInput.com. This survey listed the needs identified for VA 41 and asked the public if they agree with these needs. The survey also asked the public to rank the most important issues and identify other issues along the study corridor not already identified.

The survey was open for public responses from September 7, 2023, through September 21, 2023. A total of 245 participants responded to the survey and provided 376 individual comments in addition to answering the survey questions. **Figures 19** and **20** show the survey response statistics and answers to the survey questions. The full survey responses including all comments are provided in **Appendix B**. Common themes from the written comments included:

- Safety concerns: speeding, aggressive drivers, near miss head-on collisions at Jeanette Drive
- Need for traffic lights along corridor: specifically noted Food Lion shopping center, Orphanage Road, and Jeanette Drive
- Access management: specifically noted Fairfield Park development and closely-spaced driveways
- Bicycle and pedestrian safety: need expressed for better access but also not receptive due to lack of safety

The survey responses were processed, summarized, and presented to the study work group in Phase 2.

Figure 19: LY09 Phase 1 Public Input Survey Statistics and Responses to Question 1

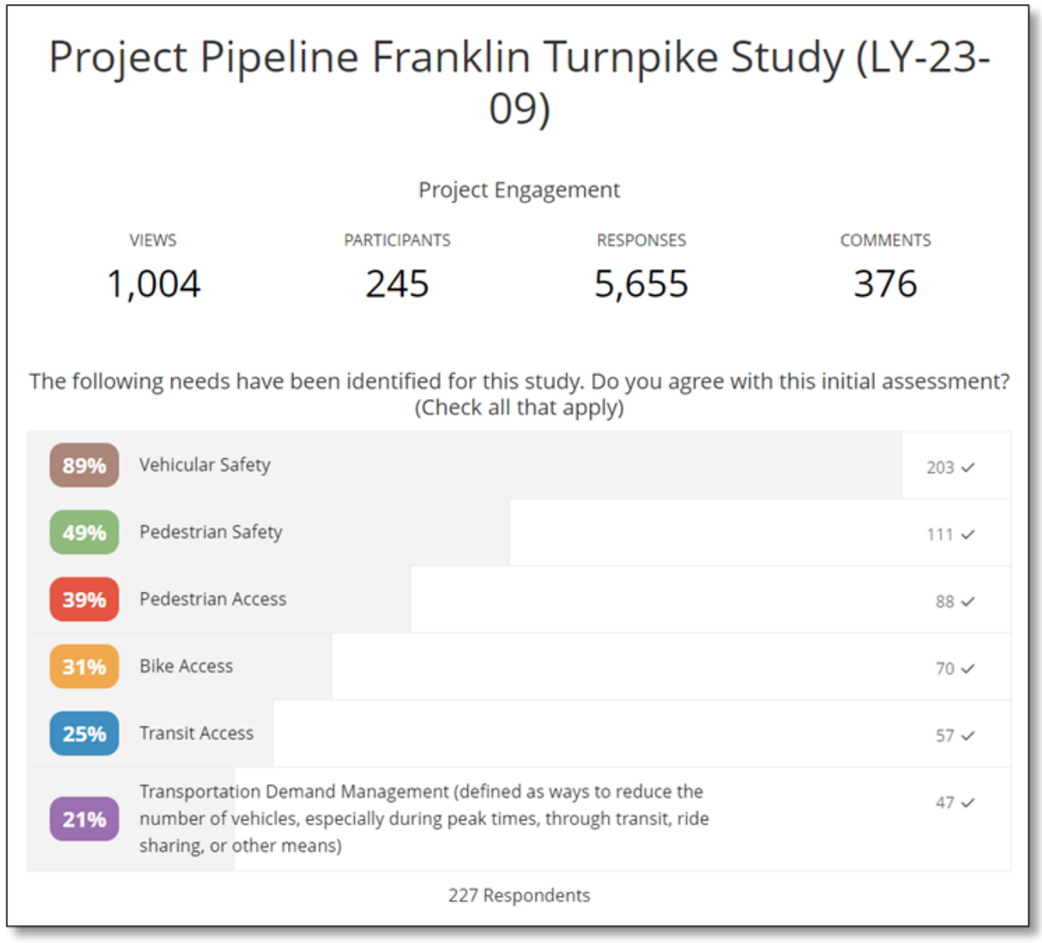


Figure 20: LY09 Phase 1 Public Input Survey Responses

Rank what is the most important issue to you along the study area.

78%	Speeding / aggressive driving	Rank: 2.20	128 ✓
67%	Corridor safety / intersection safety	Rank: 2.28	111 ✓
62%	Reducing traffic congestion	Rank: 3.05	103 ✓
56%	Proper pavement marking and signage	Rank: 3.33	92 ✓
55%	Pedestrian safety and accessibility	Rank: 3.33	90 ✓
46%	Bicycle safety and accessibility	Rank: 5.12	76 ✓
44%	Public transit access and service	Rank: 5.44	72 ✓

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

97%	Personal vehicle	182 ✓
10%	Walking	19 ✓
7%	Cycling	13 ✓
6%	Truck or commercial vehicle	12 ✓
2%	Other	3 ✓
1%	Carpool / Vanpool	2 ✓
0%	Taxi / Uber / Lyft	0 ✓

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

81%	Speeding / aggressive driving	158 ✓
47%	Sudden stopping / rear-end crashes	91 ✓
45%	Side-impact crashes	88 ✓
37%	Inadequate lighting	72 ✓
27%	Inadequate pavement marking and signage	52 ✓
21%	Insufficient / missing crosswalks	41 ✓
21%	Lack of sidewalks / missing sidewalks	41 ✓
18%	Closely spaced driveways	35 ✓
16%	Inadequate bicycle facilities	32 ✓
8%	Inadequate transit / bus stops	16 ✓
6%	Other	11 ✓
5%	Lack of ADA ramps and accessibility	9 ✓

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

79%	Shopping / Errands	148 ✓
70%	Home	131 ✓
46%	Work	87 ✓
32%	Passing through	60 ✓
23%	Entertainment	43 ✓
12%	Other	22 ✓

What multimodal facilities are needed along this study area? (Check all that apply)

46%	Crosswalks / pedestrian signals	66 ✓
38%	Sidewalks	55 ✓
29%	Bicycle lanes	42 ✓
23%	Other	33 ✓
18%	Shared-use path	26 ✓
10%	Transit service bus shelters	15 ✓
9%	Park & ride lot	13 ✓
6%	Bus transfer station	8 ✓

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

59%	Difficulty making left turns	97 ✓
29%	Lack of turn lanes	47 ✓
20%	Difficulty accessing businesses	33 ✓
20%	Vehicles blocking entrances	33 ✓
15%	Difficulty when walking	25 ✓
15%	Difficulty when riding a bicycle	25 ✓
12%	Other	19 ✓

Chapter 2 – Alternative Development and Refinement

Alternative Development and Screening

In order to develop alternative concepts to address the needs identified in Chapter 1, a thorough review of the existing conditions data was conducted. VJuST was used as a high-level screening tool to identify potential alternative concepts at appropriate study area intersections along the Franklin Turnpike corridor. These concepts were further screened manually based on a number of factors including operational and safety benefits, costs and right-of-way impacts. The remaining concepts were modeled in Synchro and/or Sidra Intersection.

To enhance bicycle and pedestrian access along Franklin Turnpike, a road diet including on-street bicycle facilities and an off-road shared-use path (SUP) concept were explored. The road diet concept was modeled in Synchro.

The primary goal of the Phase 2 alternatives development effort was to prepare a refined set of alternatives to present to the public and solicit feedback. The study team compared each alternative across several metrics, including traffic operations, safety, pedestrian and bicycle access, and cost, to determine the refined list of concepts to present to the public.

Future Traffic Forecasting

Traffic operational analyses were conducted to evaluate the overall performance of the study corridor in 2045 AM and PM peak hour conditions. The intent of the future No Build conditions analysis is to provide a general understanding of the baseline future traffic conditions as a starting point for developing improvement concepts.

To estimate the traffic volumes, growth rates were developed along the Franklin Turnpike corridor and other study area roadways, using Pathways for Planning and 10-year historic growth. Traffic volumes from the travel demand model were the same for the base and future years and thus, not considered. The VDOT approved recommended growth rates are shown in **Figure 21** along with the growth rates from Pathways for Planning. **Table 10** shows the historic traffic volumes.

The approved growth rates are as follows:

- Franklin Turnpike– 1.4%
- Orphanage Road – 1.25%
- Hunting Hills Road – 0.85%
- Golf Club Road, Mount Hermon Circle, Ridgecrest Drive and Afton Road – 0.5%

The resulting 2045 turning movement volumes for the study area intersections are presented in **Figure 22** and **Figure 23**.

Figure 21: LY09 Recommended and Pathways for Planning Growth Rates

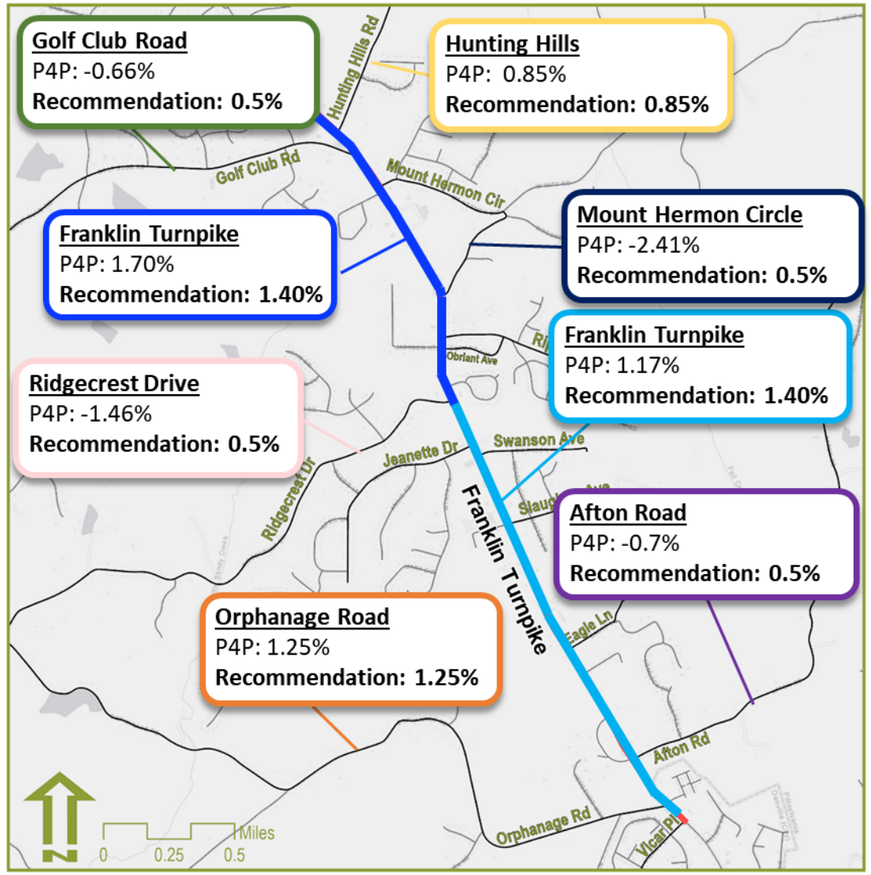


Table 10: Franklin Turnpike Historic AADT

Location	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2021*
Hunting Hills Rd to Ridgecrest Dr	12,000	12,000	12,000	12,000	14,000	13,000	13,000	13,000	13,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	15,000	15,000	13,000	14,000
Ridgecrest Dr to Jeanette Dr	4,400	5,300	5,300	5,300	4,900	4,900	4,400	13,000	13,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	15,000	15,000	13,000	14,000
Jeanette Dr to Orphanage Rd	12,000	12,000	12,000	12,000	14,000	13,000	13,000	13,000	13,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	15,000	15,000	13,000	14,000

*COVID and Recovery

Figure 22: 2045 Future AM and PM Peak Hour Turning Movement Volumes

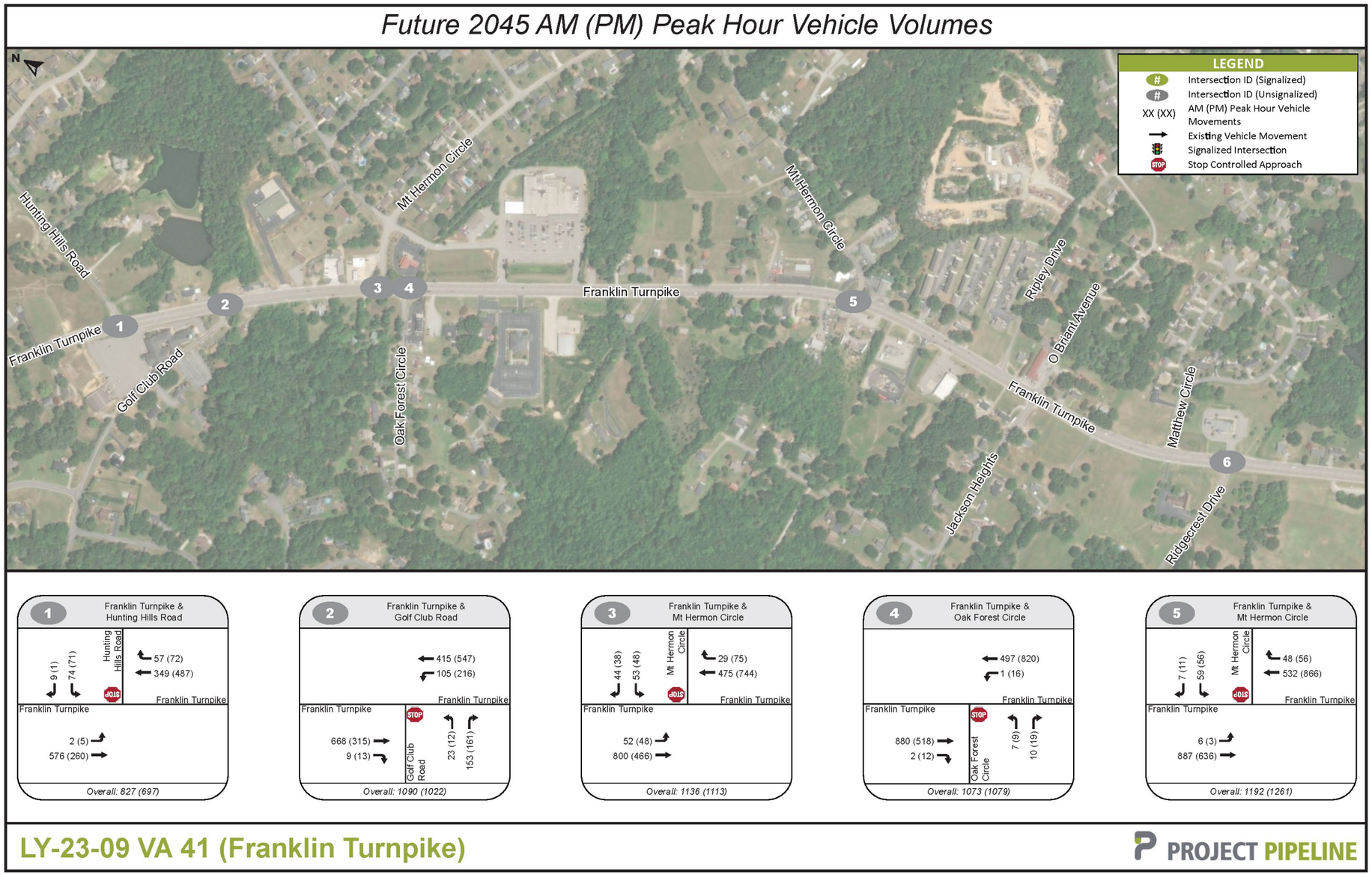
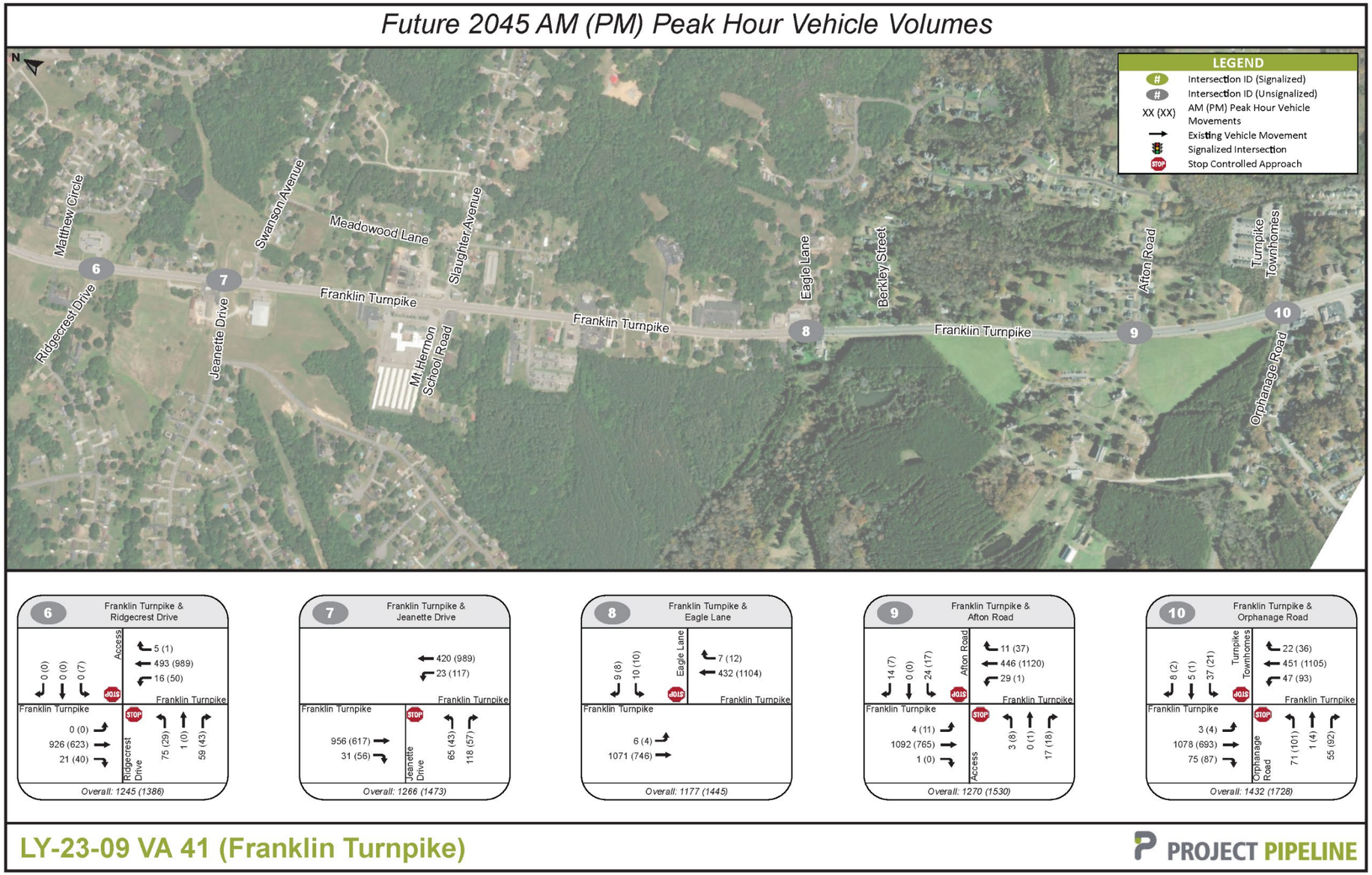


Figure 23: 2045 Future AM and PM Peak Hour Turning Movement Volumes



No-Build Traffic Operations Analysis

No-Build conditions were modeled using Synchro 11 and SimTraffic 11 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. The models were updated with the projected 2045 No-Build traffic volumes. No-Build inputs and analysis methodologies were applied consistently with TOSAM Version 2.0.

Ten simulations were conducted for both the AM and PM No-Build SimTraffic models. The same measures of effectiveness of control delay (seconds per vehicle), LOS, and maximum queue lengths (feet) as in the existing conditions were selected to quantitatively report the performance of each study intersection. The full Synchro and SimTraffic reports are included in **Appendix C** and shown in **Table 11**.

Findings from the No-Build traffic analysis are summarized below:

- The eastbound approach and westbound shared through/left turn movement at Ridgecrest Drive operate at LOS F during one of the peak hours.
- The westbound approach at Afton Road operates at LOS F during the afternoon peak hour.
- The eastbound approach at Orphanage Road operates at LOS F during both peak hours with a delay of nearly 10 minutes during the PM peak hour. The westbound approach at Orphanage Road operates at LOS E during the AM peak hour and LOS F during the afternoon peak hour.
- The Orphanage Road westbound queue is nearly 900 feet during the PM peak hour.
- Aside from the movements previously noted, all movements at the study intersections operate at LOS D or better and the queues are less than eight vehicles at most.

Table 11: 2045 No-Build Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
1. Hunting Hills Road										
Hunting Hills Road	WBL/R	-	-	-	B	14.2	80	B	14.7	71
Franklin Turnpike	NBT	-	-	-	A	0.0	10	A	0.0	0
Franklin Turnpike	NBT/R	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBL	100	100	150	A	8.2	6	A	8.7	29
Franklin Turnpike	SBT	-	-	-	A	0.0	22	A	0.0	0
2. Golf Club Road										
Golf Club Road	EBL/R	-	-	-	C	15.3	125	B	11.5	112
Franklin Turnpike	NBL	200	200	300	A	9.9	83	A	8.7	84
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT/R	-	-	-	A	0.0	6	A	0.0	5
3. Mt Hermon Circle (north)										
Mt Hermon Circle	WBL/R	-	-	-	C	15.7	103	C	18.6	102
Franklin Turnpike	NBT	75	0	75	A	0.0	0	A	0.0	0
Franklin Turnpike	NBT/R	75	0	75	A	0.0	3	A	0.0	2
Franklin Turnpike	SBL	200	200	300	A	8.8	54	B	10.0	52
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	0
4. Oak Forest Circle										
Oak Forest Circle	EBL/R	-	-	-	C	15.6	63	B	12.1	54
Franklin Turnpike	NBL	200	200	300	C	16.0	5	A	8.6	33
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	75	0	75	A	0.0	4	A	0.0	12
Franklin Turnpike	SBT/R	75	0	75	A	0.0	0	A	0.0	6
5. Mt Hermon Circle (south)										
Mt Hermon Circle	WBL/R	-	-	-	C	17.4	73	C	21.3	80
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	NBT/R	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBL	200	200	300	A	8.8	25	B	10.0	18
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	0

Table 11: 2045 No-Build Traffic Operations Analysis Results (continued)

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
6. Ridgecrest Drive										
Ridgecrest Drive	EBL/T/R	-	-	-	F	88.4	159	D	32.8	86
Business	WBL/T	50	0	50	A	0.0	0	F	60.0	25
Business	WBR	50	0	50	A	0.0	0	A	0.0	0
Franklin Turnpike	NBL	200	200	300	B	10.4	39	A	9.3	40
Franklin Turnpike	NBT	-	-	-	A	0.0	30	A	0.0	0
Franklin Turnpike	NBR	50	100	100	A	0.0	0	A	0.0	0
Franklin Turnpike	SBL	200	200	300	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	28	A	0.0	0
Franklin Turnpike	SBT/R	-	-	-	A	0.0	38	A	0.0	0
7. Jeanette Drive										
Jeanette Drive	EBL/R	-	-	-	D	28.4	176	C	19.2	106
Franklin Turnpike	NBL	200	200	300	B	11.0	41	A	9.8	84
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	2	A	0.0	0
Franklin Turnpike	SBT/R	-	-	-	A	0.0	4	A	0.0	13
8. Eagle Lane										
Eagle Lane	WBL/R	-	-	-	B	13.6	68	C	19.8	50
Franklin Turnpike	NBT	-	-	-	A	0.0	20	A	0.0	0
Franklin Turnpike	NBT/R	-	-	-	A	0.0	8	A	0.0	0
Franklin Turnpike	SBL	200	200	300	A	8.8	30	B	11.2	27
Franklin Turnpike	SBT	-	-	-	A	0.0	55	A	0.0	0
9. Afton Road										
Access	EBL/T/R	-	-	-	D	28.2	63	D	27.2	47
Afton Road	WBL/T/R	-	-	-	D	28.1	61	F	78.1	60
Franklin Turnpike	NBL	200	200	300	B	11.7	42	A	9.5	11
Franklin Turnpike	NBT	-	-	-	A	0.0	35	A	0.0	0
Franklin Turnpike	NBT/R	-	-	-	A	0.0	17	A	0.0	0
Franklin Turnpike	SBL	200	200	300	A	8.9	20	B	12.3	28
Franklin Turnpike	SBT	-	-	-	A	0.0	36	A	0.0	0
Franklin Turnpike	SBT/R	-	-	-	A	0.0	56	A	0.0	0

Table 11: 2045 No-Build Traffic Operations Analysis Results (continued)

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
10. Orphanage Road										
Orphanage Road	EBL/T/R	-	-	-	F	202.0	227	F	595.1	897
Turnpike Townhomes	WBL/T/R	-	-	-	E	47.8	86	F	234.0	59
Franklin Turnpike	NBL	200	200	300	B	12.4	72	B	10.2	66
Franklin Turnpike	NBT	-	-	-	A	0.0	31	A	0.0	21
Franklin Turnpike	NBT/R	-	-	-	A	0.0	18	A	0.0	30
Franklin Turnpike	SBL	200	200	300	A	8.3	12	B	11.4	21
Franklin Turnpike	SBT	-	-	-	A	0.0	62	A	0.0	25
Franklin Turnpike	SBT/R	-	-	-	A	0.0	73	A	0.0	47

Alternatives Analysis

The following sections describe the process used to develop Phase 1 alternatives encompassing various categories of needs.

The study team developed alternative concepts along Franklin Turnpike to enhance multimodal access and address safety, geometric, and operational deficiencies in the study area. The study team then screened the alternatives based on anticipated safety benefits, operational performance, multimodal access, constructability, and input from the SWG. At both the September 17, 2023 and February 15, 2024 SWG meetings the group reviewed preliminary alternatives. The meeting materials can be found in **Appendix D**.

The Virginia Junction Screening Tool (VJuST) and Interchange Control Assessment Program (iCAP) tools, which are used to screen intersection and interchange alternatives based on impacts to traffic operations, pedestrian accommodations, safety, and cost were used to develop initial alternatives, including innovative intersection configurations, to improve traffic operations and address safety issues identified in **Chapter 1**.

VJuST Analysis

VJuST was used as a high-level screening tool to identify potential alternative concepts at study area intersections where the existing conditions safety and operations analyses indicated that future improvements would likely be needed. These concepts were further screened manually based on a number of factors including operational and safety benefits, costs and right-of-way impacts.

For the initial VJuST screening, the 2023 Existing PM peak hour volumes were used; however, a subsequent screening was developed using the forecasted 2045 No-Build AM and PM peak hour volumes. The results of the 2045 No-Build PM peak hour VJuST screening for the following intersections are shown in **Figure 24** through **Figure 29**:

- Golf Club Road
- Mount Hermon Circle (north)
- Oak Forest Circle
- Ridgecrest Drive
- Jeanette Drive
- Orphanage Road

Figure 24: 2045 No-Build PM Peak Hour VJuST Results for Golf Club Road

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Conventional	-	0.37		48	$	
Continuous Green-T	-	0.26	-	12*	$$	
Restricted Crossing U-Turn	-	0.21		20	$$	
Roundabout	-	0.35		8	$$	
Two-Way Stop Control	-	0.23		48	$	

Figure 25: 2045 No-Build PM Peak Hour VJuST Results for Mount Hermon Circle (north)

Intersection Results						
		Congestion	Pedestrian	Safety	Planning Level Costs	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	
Conventional	-	0.33		48	$	
Continuous Green-T	-	0.30	-	12*	$$	
Restricted Crossing U-Turn	-	0.23		20	$$	
Roundabout	-	0.33		8	$$	
Two-Way Stop Control	-	0.21		48	$	

Figure 26: 2045 No-Build PM Peak Hour VJuST Results for Oak Forest Circle

Intersection Results

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Notes
Conventional	-	0.28		48	$	
Continuous Green-T	-	0.26	-	12*	$$	
Restricted Crossing U-Turn	-	0.23		20	$$	
Roundabout	-	0.31		8	$$	
Two-Way Stop Control	-	0.23		48	$	

Figure 27: 2045 No-Build PM Peak Hour VJuST Results for Ridgecrest Drive

Intersection Results

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Notes
Conventional	-	0.36		48	$	
Continuous Green-T	-	0.31	-	12*	$$	
Restricted Crossing U-Turn	-	0.29		20	$$	
Roundabout	-	0.40		8	$$	
Two-Way Stop Control	-	0.27		48	$	

Figure 28: 2045 No-Build PM Peak Hour VJuST Results for Jeanette Drive

Intersection Results

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Notes
Conventional	-	0.38		48	$	
Continuous Green-T	-	0.32	-	12*	$$	
Restricted Crossing U-Turn	-	0.31		20	$$	
Roundabout	-	0.45		8	$$	
Two-Way Stop Control	-	0.27		48	$	

Figure 29: 2045 No-Build PM Peak Hour VJuST Results for Orphanage Road

Intersection Results

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Notes
Conventional	-	0.50		48	$	
Continuous Green-T	-	0.35	-	12*	$$	
Restricted Crossing U-Turn	-	0.34		20	$$	
Roundabout	-	0.51		8	$$	
Two-Way Stop Control	-	0.66		48	$	

Traffic Operations Analysis

After further considering the needs and constraints of the intersections along with SWG input, a number of the alternative concepts were further analyzed using Synchro 11/SimTraffic 11 and/or SIDRA. In addition to the intersection concepts, corridor-wide concepts including a road diet and the addition of a median were analyzed. The analysis results can be found in **Appendix E**.

Intersection specific improvements were not analyzed at the Franklin Turnpike intersections with Hunting Hills Road, Golf Club Road, Mount Hermon Circle (south), Eagle Lane, or Afton Road.

Franklin Turnpike at Mount Hermon Circle (north) and Oak Forest Circle

The distance between the intersection of Mount Hermon Circle (north) and Oak Forest Circle is approximately 120 feet. Given their close proximity, improvements at these intersections were considered together. As shown in **Table 11**, traffic operations are not a concern. Safety is the primary concern as indicated by the PSI designation.

Two potential concepts were considered for these intersections, an oval roundabout and right-in/right-out only access at Oak Forest Circle. Both improvement concepts reduce the number of conflict points, therefore improving safety at the intersections.

Oval Roundabout

This concept includes constructing a single lane oval roundabout that spans both intersections. A conceptual sketch of the improvement is shown in **Figure 30** and the SIDRA results are shown in **Table 12.**

Table 12: Mount Hermon Circle (north) and Oak Forest Circle Oval Roundabout Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM 95% Queue (feet)	PM LOS	PM Delay (sec)	PM 95% Queue (feet)
Oak Forest Circle	EBL/T/R	-	-	-	A	7.6	7	A	4.2	5
Mt Hermon Circle	WBL/T/R	-	-	-	A	4.9	17	A	6.7	23
Franklin Turnpike	NBL/T/R	-	-	-	A	6.8	83	B	10.7	184
Franklin Turnpike	SBL/T/R	-	-	-	B	11.6	221	A	6.5	83
				Overall	A	9.5		A	8.9	

Right-In/Right-Out Only Access at Oak Forest Circle

This concept adds a median to Franklin Turnpike which allows all traffic movements at Mount Hermon Circle (north) and limits traffic movements to right-in-right-out only at Oak Forest Circle. A conceptual sketch of the improvement is shown in **Figure 31** and the Synchro/SimTraffic results are shown in **Table 13.**

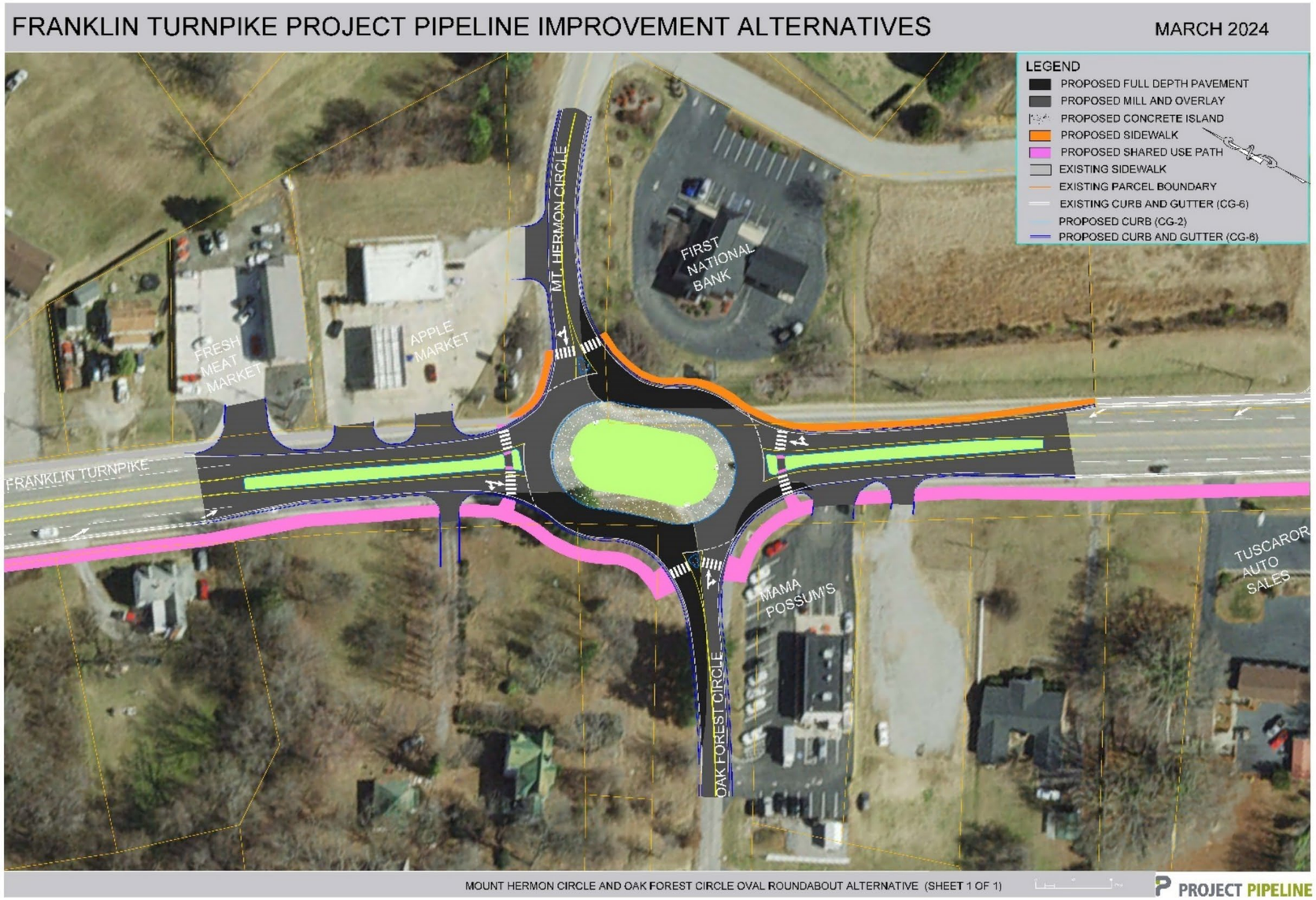
Table 13: Mount Hermon Circle (north) and Oak Forest Circle Right-In/Right-Out Only Concept Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
3. Mt Hermon Circle N										
Mt Hermon Circle	WBL/R	-	-	-	C	16.0	100	C	20.3	116
Franklin Turnpike	NBT	75	0	75	A	0.0	0	A	0.0	0
Franklin Turnpike	NBT/R	75	0	75	A	0.0	10	A	0.0	11
Franklin Turnpike	SBL	200	200	300	A	8.8	48	A	10.0	54
	SBT	-	-	-	A	0.0	0	A	0.0	0
4. Oak Forest Circle										
Oak Forest Circle	EBR	-	-	-	B	12.3	56	B	10.3	38
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	75	0	75	A	0.0	0	A	0.0	0
	SBT/R	75	0	75	A	0.0	0	A	0.0	5

As shown in **Tables 12** and **13** both improvement concepts are expected to provide acceptable traffic operations.

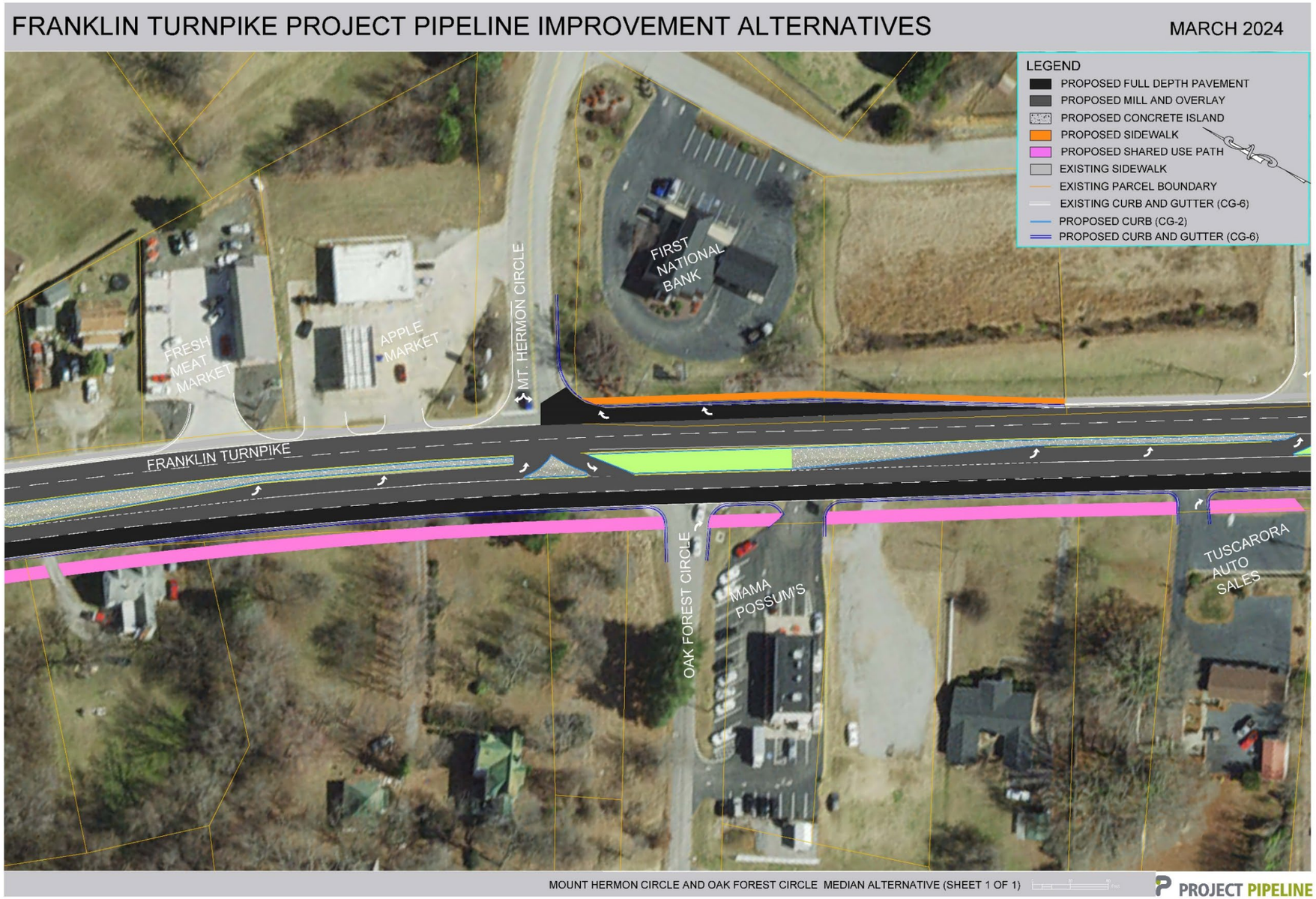
The right-in/right-out only concept was presented to the SWG at the February 15, 2024 meeting. As a result of the discussion the oval roundabout concept was developed. The SWG chose to present both concepts in the survey for public feedback.

Figure 30: Mount Hermon Circle (north) and Oak Forest Circle Oval Roundabout Improvement Concept



.

Figure 31: Mount Hermon Circle (north) and Oak Forest Circle Right-In/Right-Out Only Improvement Concept



Franklin Turnpike at Ridgecrest Drive and Jeanette Drive

Ridgecrest Drive and Jeanette Drive connect to the west of Franklin Turnpike. Given the parallel roadway network connection, the two intersections were considered together. As shown in **Table 11**, the eastbound approach and westbound shared through/left turn movement at Ridgecrest Drive are expected to experience delays and LOS F in 2045.

Three potential concepts were considered for the intersection of Ridgecrest Drive: a reduced conflict intersection (RCI), roundabout, and traffic signal. At the intersection of Jeanette Drive only an RCI was considered. It was assumed that the RCI at Jeanette Drive would work in conjunction with either a roundabout or traffic signal at Ridgecrest Drive.

Ridgecrest Drive Traffic Signal

This concept includes constructing a traffic signal. A conceptual sketch of the improvement is shown in **Figure 32** and the Synchro/SimTraffic results are shown in **Table 14.**

Table 14: Ridgecrest Drive Traffic Signal Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
Ridgecrest Drive	EBL	-	-	-	B	17.4	114	B	15.0	82
Ridgecrest Drive	EBT/R	-	-	-	B	15.5	56	A	0.0	44
Business	WBL	50	0	50	A	0.0	0	B	16.3	33
Business	WBT/R	50	0	50	A	0.0	0	A	0.0	0
Franklin Turnpike	NBL	200	200	300	A	7.6	44	A	7.1	50
Franklin Turnpike	NBT	-	-	-	A	4.0	85	A	4.7	105
Franklin Turnpike	NBR	0	200	100	A	0.0	21	A	0.0	0
Franklin Turnpike	SBL	200	200	300	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	B	10.3	126	A	9.9	112
Franklin Turnpike	SBR	0	200	100	A	0.0	58	A	0.0	71
				Overall	A	9.2		A	7.1	

Ridgecrest Drive Roundabout

This concept includes constructing a single lane roundabout. A conceptual sketch of the improvement is shown in **Figure 33** and the SIDRA results are shown in **Table 15.**

Table 15: Ridgecrest Drive Oval Roundabout Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM 95% Queue (feet)	PM LOS	PM Delay (sec)	PM 95% Queue (feet)
Ridgecrest Drive	EBL/T/R	-	-	-	B	14.5	82	A	7.2	27
Business	WBL/T/R	-	-	-	A	5.0	1	B	10.6	5
Franklin Turnpike	NBL/T	-	-	-	A	6.5	79	B	14.0	293
Franklin Turnpike	NBR	200	200	300	A	2.4	1	A	2.3	0
Franklin Turnpike	SBL/T	-	-	-	B	10.6	223	A	7.0	102
Franklin Turnpike	SBR	200	200	300	A	2.8	2	A	2.7	4
				Overall	A	9.8		B	10.8	

Jeanette Drive RCI with either Traffic Signal or Roundabout at Ridgecrest Drive

This concept was considered in conjunction with both the traffic signal and roundabout at Ridgecrest Drive. A conceptual sketch of the improvement is shown in **Figure 34** and the Synchro/SimTraffic results are shown in **Table 16.**

Table 16: Jeanette Drive RCI Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
Jeanette Drive	EBR	-	-	-	B	14.7	83	B	11.0	43
Franklin Turnpike	NBL	200	200	300	B	11.0	43	A	9.8	76
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	2
Franklin Turnpike	SBR	0	200	100	A	0.0	0	A	0.0	26

Ridgecrest Drive and Jeanette Drive Reduced Conflict Intersections (RCI)

This concept includes constructing a reduced conflict intersection at both Ridgecrest Drive and Jeanette Drive. The Synchro/SimTraffic results are shown in **Table 17.**

Table 17: Ridgecrest Drive and Jeanette Drive RCI Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
6. Ridgecrest Drive										
Ridgecrest Drive	EBL	-	-	-	F	84.4		F	95.5	
Ridgecrest Drive	EBT	-	-	-	F	84.4		F	95.5	
Ridgecrest Drive	EBR	-	-	-	B	14.7	93	B	11.3	68
Business	WBL	-	-	-	A	0.0		E	44.0	
Business	WBT	-	-	-	A	0.0		E	44.0	
Business	WBR	50	0	50	A	0.0	0	B	12.6	28
Franklin Turnpike	NBL	200	200	300	B	10.4	33	A	9.3	46
Franklin Turnpike	NBT	-	-	-	A	0.0	16	A	0.0	0
Franklin Turnpike	NBR	0	200	100	A	0.0	0	A	0.0	0
Franklin Turnpike	SBL	200	200	300	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	47	A	0.0	0
Franklin Turnpike	SBR	0	200	100	A	0.0	8	A	0.0	0
7. Jeanette Drive										
Jeanette Drive	EBL	-	-	-	F	56.4		F	63.6	
Jeanette Drive	EBR	-	-	-	C	18.4	112	B	11.6	64
Franklin Turnpike	NBL	200	200	300	B	11.5	41	A	10.0	72
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	2	A	0.0	0
Franklin Turnpike	SBR	0	200	100	A	0.0	0	A	0.0	17
71. South U-turn Location										
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBU	200	200	300	B	11.4	72	D	26.3	57
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	0
72. North U-turn Location										
Franklin Turnpike	NBU	200	200	300	A	0.0	0	B	12.2	28
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	0

As shown in **Tables 14** through **16** the traffic signal and roundabout concepts at Ridgecrest Drive paired with the RCI at Jeanette Drive are both expected to provide acceptable traffic operations. As shown in **Table 17**, the RCI concept at Ridgecrest Drive is expected to experience delay for the side street movements that are forced to make right-turns followed by u-turns.

The RCI concepts were presented to the SWG at the February 15, 2024 meeting. As a result of the discussion, the roundabout and traffic signal concepts were developed. The SWG chose to present the roundabout, traffic signal, and Jeanette Drive RCI concepts in the survey for public feedback.

Figure 32: Ridgecrest Drive Traffic Signal Improvement Concept

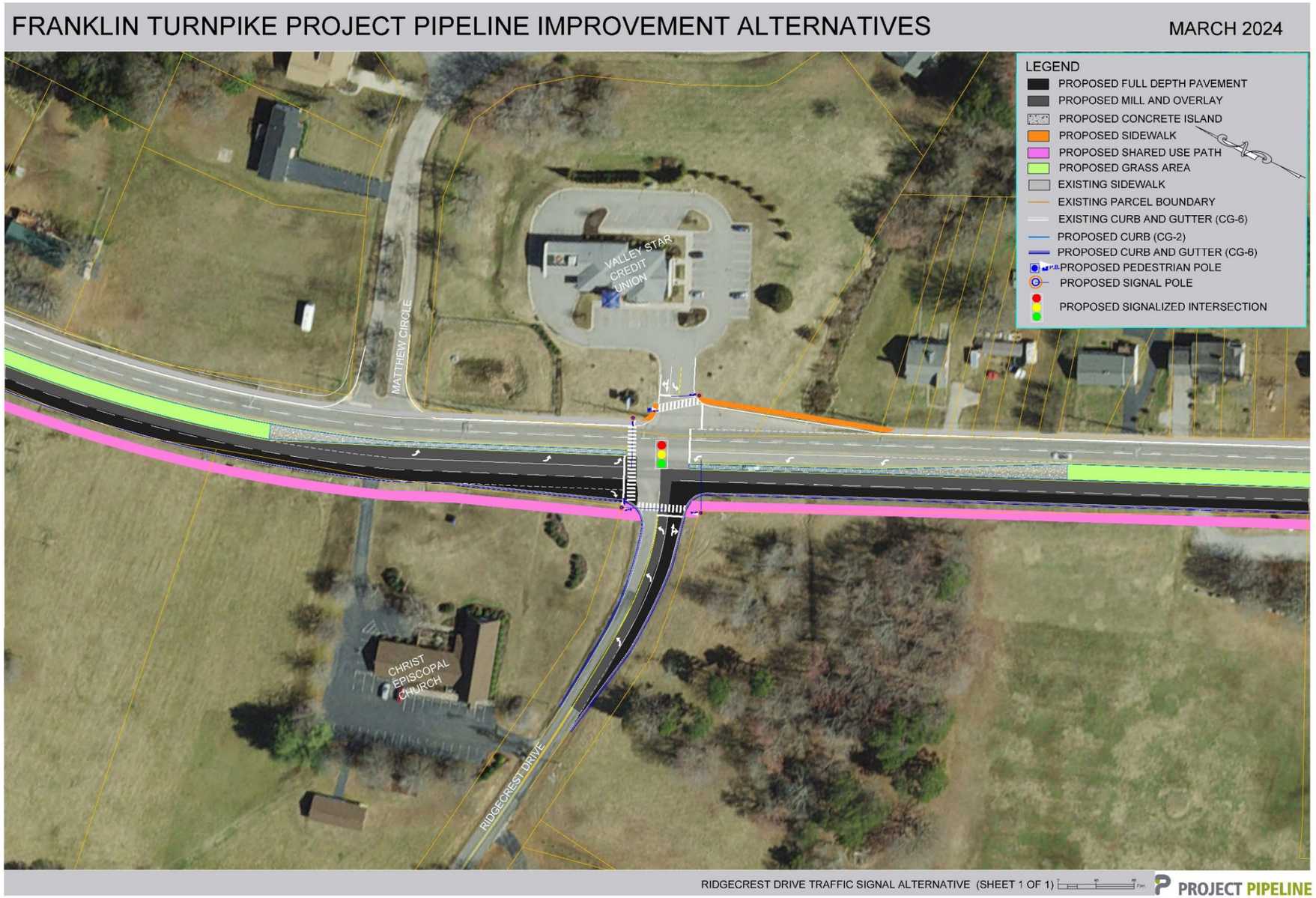


Figure 33: Ridgecrest Drive Roundabout Improvement Concept

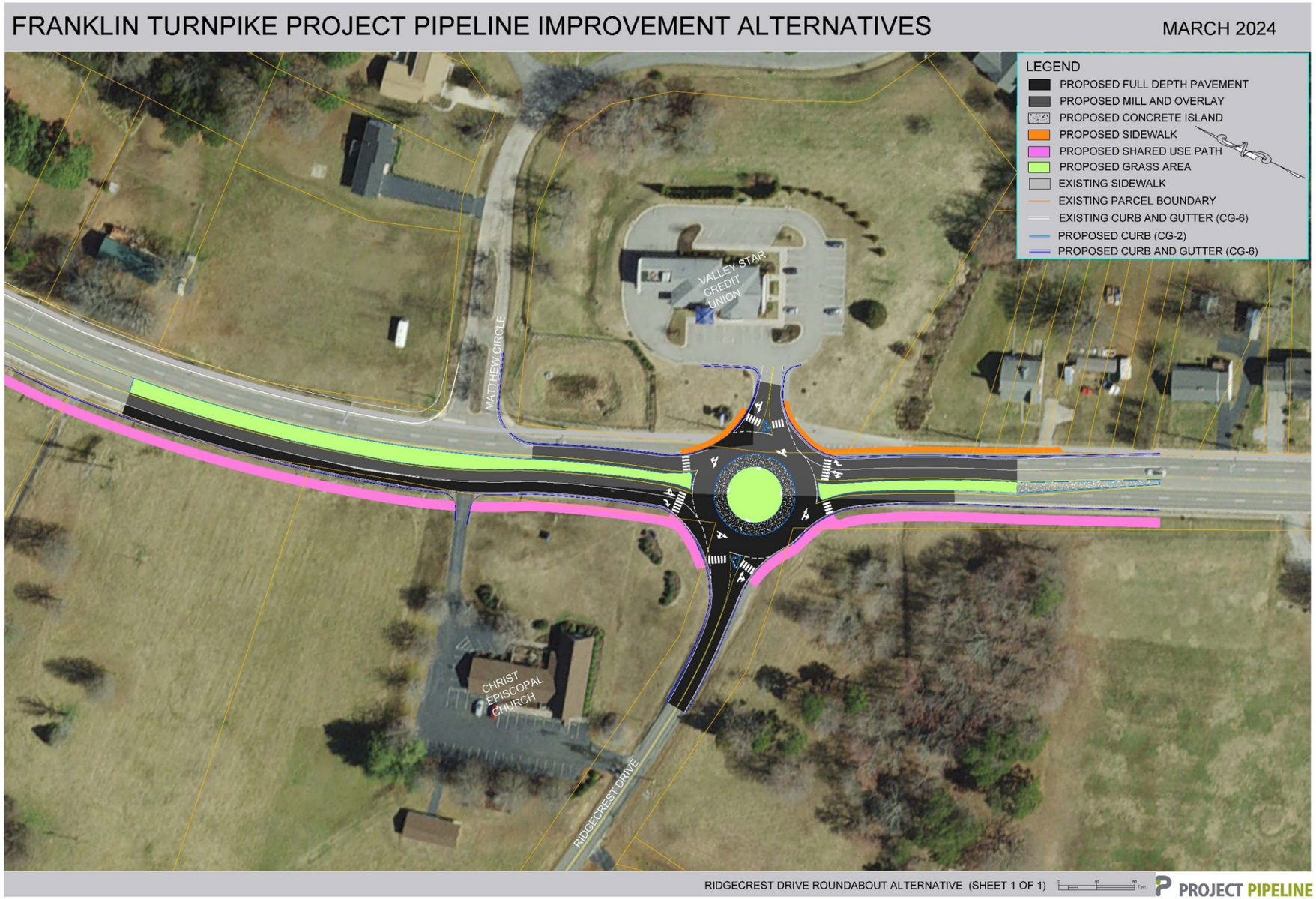
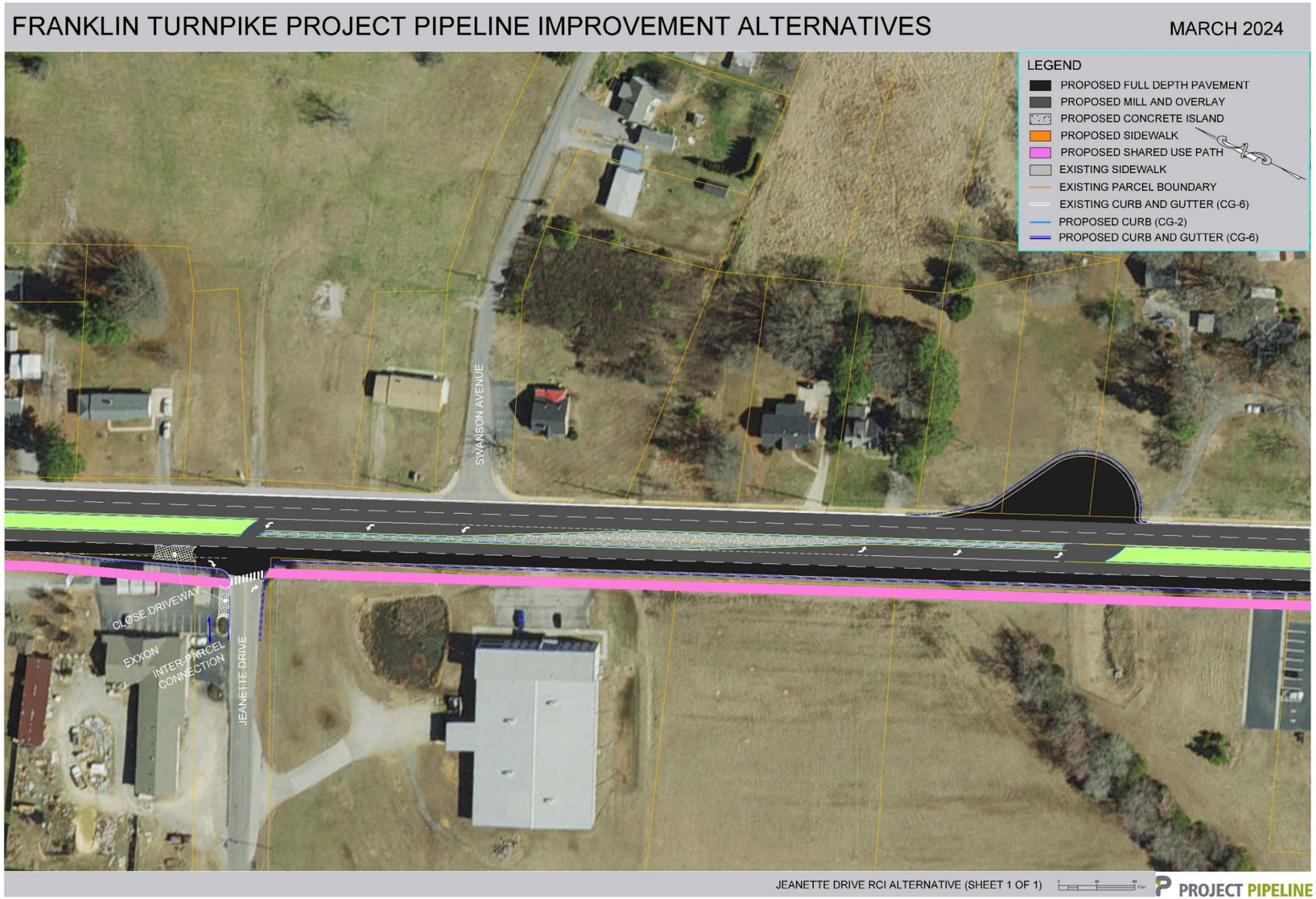


Figure 34: Jeanette Drive RCI Improvement Concept



Franklin Turnpike at Orphanage Road

As shown in **Table 11**, the eastbound and westbound approaches are expected to experience long delays and very long queues in 2045.

Four potential concepts were considered for the intersection of Orphanage Road: a reduced conflict intersection (RCI), a single lane roundabout, a hybrid roundabout, and a traffic signal. The single lane roundabout was dismissed due to lengthy queues, greater than 1,000 feet.

Orphanage Road Traffic Signal

This concept includes constructing a traffic signal. A conceptual sketch of the improvement is shown in **Figure 35** and the Synchro/SimTraffic results are shown in **Table 18.**

Table 18: Orphanage Road Traffic Signal Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
Orphanage Road	EBL	200	200	300	C	21.8	94	C	22.3	95
Orphanage Road	EBT/R	-	-	-	C	23.2	70	C	22.6	56
Turnpike Townhomes	WBL	200	200	300	C	21.2	60	C	20.9	47
Turnpike Townhomes	WBT/R	-	-	-	C	23.9	36	C	24.3	33
Franklin Turnpike	NBL	200	200	300	B	11.7	68	B	11.0	77
Franklin Turnpike	NBT	-	-	-	B	10.5	126	B	18.5	147
Franklin Turnpike	NBT/R	-	-	-	B	10.5	76	B	18.3	139
Franklin Turnpike	SBL	200	200	300	A	9.0	12	B	11.6	19
Franklin Turnpike	SBT	-	-	-	B	18.3	209	B	15.0	135
Franklin Turnpike	SBR	200	200	300	A	0.0	49	A	0.0	56
				Overall	B	16.3		B	17.2	

Orphanage Road Reduced Conflict Intersection (RCI)

This concept includes constructing a reduced conflict intersection at Orphanage Road. A conceptual sketch of the improvement is shown in **Figure 36** and the Synchro/SimTraffic results are shown in **Table 19.**

Table 19: Orphanage Road RCI Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
10. Orphanage Road										
Orphanage Road	EBL	-	-	-	E	46.5		F	76.3	
Orphanage Road	EBT	-	-	-	E	46.5		F	76.3	
Orphanage Road	EBR	-	-	-	C	17.2	104	C	15.3	92
Orphanage Road				**Approach**	**D**	**33.8**		**E**	**47.8**	
Turnpike Townhomes	WBL	-	-	-	F	54.1		E	48.1	
Turnpike Townhomes	WBT	-	-	-	F	54.1		E	48.1	
Turnpike Townhomes	WBR	-	-	-	B	10.5	52	B	14.7	51
Turnpike Townhomes					**E**	**47.1**		**E**	**45.3**	
Franklin Turnpike	NBL	200	200	300	B	12.7	82	B	10.3	67
Franklin Turnpike	NBT	-	-	-	A	0.0	21	A	0.0	28
Franklin Turnpike	NBT/R	-	-	-	A	0.0	14	A	0.0	27
Franklin Turnpike				**Approach**	**A**	**1.0**		**A**	**0.7**	
Franklin Turnpike	SBL	200	200	300	A	8.6	13	B	12.1	22
Franklin Turnpike	SBT	-	-	-	A	0.0	34	A	0.0	18
Franklin Turnpike	SBT/R	-	-	-	A	0.0	51	A	0.0	33
Franklin Turnpike				**Approach**	**A**	**0.0**		**A**	**0.1**	
1001. North U-turn Location										
Franklin Turnpike	NBU	200	200	300	C	24.5	52	B	14.1	33
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	0
1002. South U-turn Location										
Franklin Turnpike	NBT	-	-	-	A	0.0	0	A	0.0	0
Franklin Turnpike	SBU	200	200	300	B	11.4	55	E	43.0	79
Franklin Turnpike	SBT	-	-	-	A	0.0	0	A	0.0	0

Orphanage Road Single Lane Roundabout

This concept includes constructing a single lane roundabout. The SIDRA results are shown in **Table 20.**

Table 20: Orphanage Road Single Lane Roundabout Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM 95% Queue (feet)	PM LOS	PM Delay (sec)	PM 95% Queue (feet)
Orphanage Road	EBL/T/R	-	-	-	C	23.2	84	B	10.6	59
Turnpike Townhomes	WBL/T/R	-	-	-	A	5.4	9	D	26.9	30
Franklin Turnpike	NBL/T	-	-	-	A	6.1	84	D	30.7	1066
Franklin Turnpike	NBR	200	200	300	A	4.0	3	A	5.0	6
Franklin Turnpike	SBL/T	-	-	-	B	14.4	297	A	8.5	139
Franklin Turnpike	SBR	200	200	300	A	4.6	11	A	5.0	15
				Overall	B	12.0		C	20.3	

Orphanage Road Hybrid Roundabout

This concept includes constructing a 2-1 hybrid roundabout. A conceptual sketch of the improvement is shown in **Figure 37** and the SIDRA results are shown in **Table 21.**

Table 21: Orphanage Road Hybrid Roundabout Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM 95% Queue (feet)	PM LOS	PM Delay (sec)	PM 95% Queue (feet)
Orphanage Road	EBL/T/R	-	-	-	A	9.1	23	A	7.6	29
Turnpike Townhomes	WBL/T/R	-	-	-	A	4.7	6	A	6.7	5
Franklin Turnpike	NBL/T	-	-	-	A	4.3	32	A	7.3	100
Franklin Turnpike	NBT/R	-	-	-	A	3.9	32	A	6.7	102
Franklin Turnpike	SBL/T	-	-	-	A	6.4	75	A	5.3	49
Franklin Turnpike	SBT/R	-	-	-	A	5.9	76	A	4.8	50
				Overall	A	5.7		A	6.4	

As shown in **Tables 18 and 21** the traffic signal and hybrid roundabout concepts at Orphanage Road provide acceptable traffic operations. As shown in **Table 19**, the RCI concept is expected to experience delay for the side street movements that are forced to make right-turns followed by u-turns. **Table 20** includes the lengthy queue expected with a single lane roundabout.

The RCI and roundabout concepts were presented to the SWG at the February 15, 2024 meeting. As a result of the discussion the traffic signal concept was developed. The SWG chose to present all three in the survey for public feedback.

Corridor-wide Improvements

Three potential concepts were considered for the length of the Frankin Turnpike corridor: a road diet, replacing the two-way left turn lane with a median, and constructing a shared use path along the west side of Franklin Turnpike. The shared use path was not modeled. The road diet and median concepts were modeled in Synchro/SimTraffic and the results follow.

Table 22: Comparison of Road Diet Traffic Operations to No-Build

Measure Direction/Location	AM No Build	AM Road Diet	PM No Build	PM Road Diet
Travel Time (seconds)				
Northbound	246.6	265.2	260.9	295.2
Southbound	264.0	295.8	250.1	274.6
Delay (sec) LOS E and F Movements				
6. Ridgecrest Drive EB	88.4	210.4	32.8	97.7
6. Ridgecrest Drive WB			60.0	100.6
7. Jeanette Drive EB	28.4	54.0		
9. Afton Road EB	28.2	37.9	27.2	60.6
9. Afton Road WB	28.1	82.2	78.1	169.1
10. Orphanage Road EB	202.0	362.3	595.1	1,728.8
10. Orphanage Road WB	47.8	208.4	234.0	630.7
Maximum Queues in feet*				
Orphanage Road EB	177	632	738	936

*included if exceed storage or beyond 200 feet

As shown in **Table 22** the road diet increases the travel time through the corridor and dramatically increases the side street delays at the intersections noted. Travel time for the median concept is expected to be the same as no build conditions for northbound and southbound through travel. The side street delay is also expected to be similar with the exception of locations where left turns are restricted by the median.

The road diet, median, and shared use path concepts were presented to the SWG at the February 15, 2024 meeting. The SWG chose to present all three in the survey for public feedback.

Figure 35: Orphanage Road Traffic Signal Improvement Concept

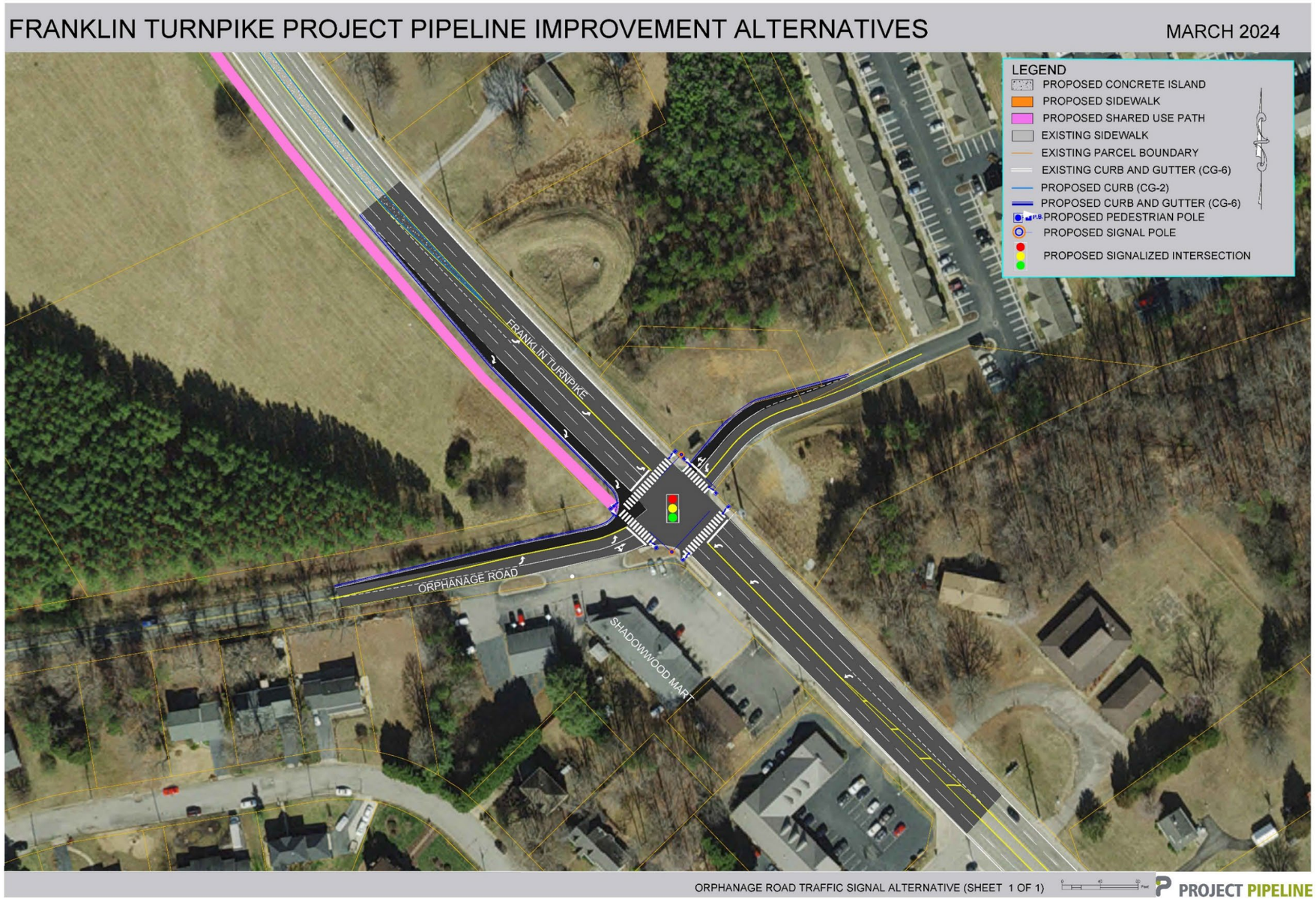


Figure 36: Orphanage Road RCI Improvement Concept

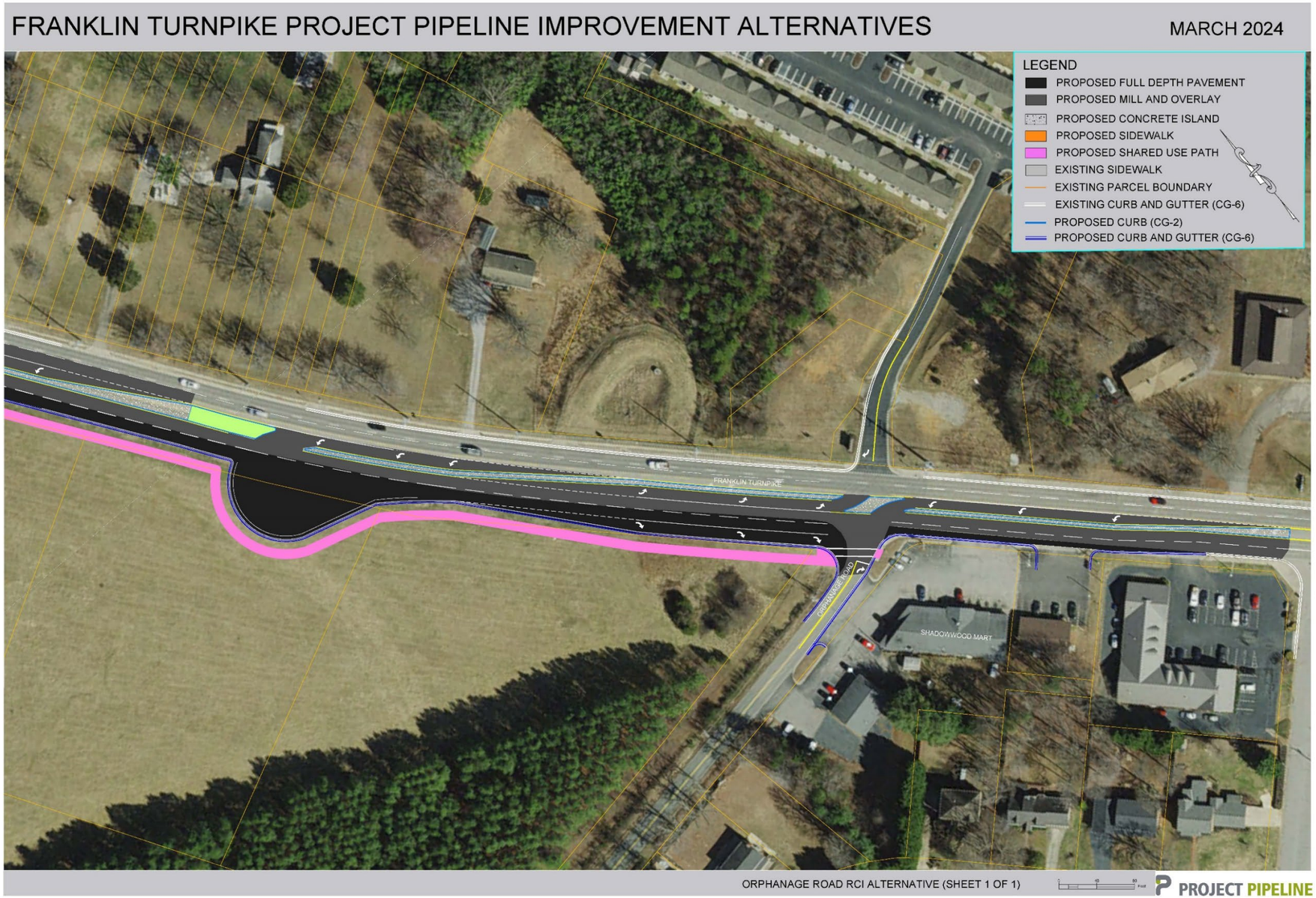
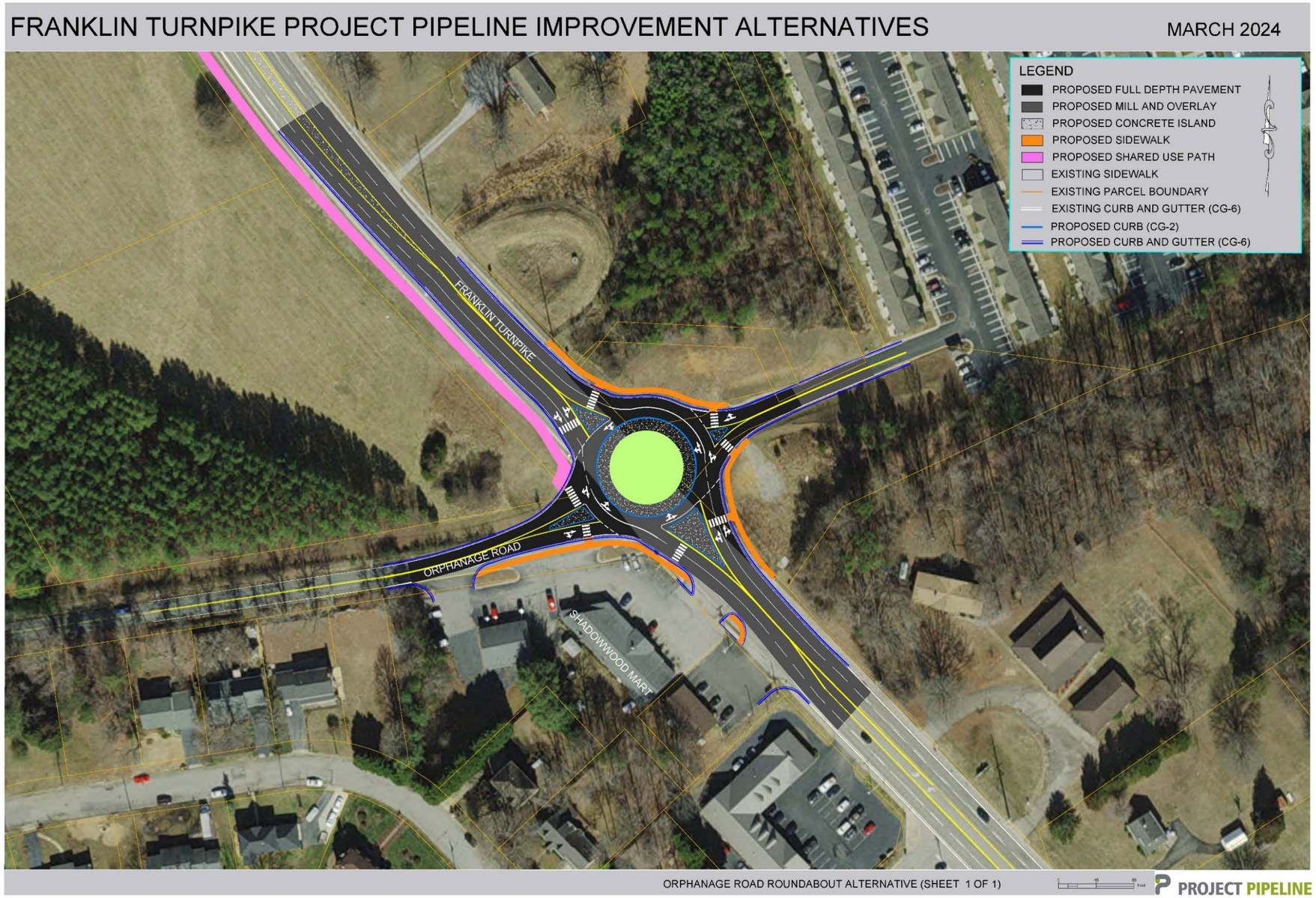


Figure 37: Orphanage Road Hybrid Roundabout Improvement Concept



Expected Crash Reduction

Crash Modification Factors

The Virginia State Preferred Crash Modification Factor list was reviewed for each of the improvements to determine what changes may be expected in crash frequency. The CMF resulting in the highest anticipated crash reduction was applied to crashes within the influence area of each intersection. **Table 23** summarizes the location, improvement, countermeasure description, and CMF used.

Table 23: Crash Modification Factors

Location	Improvement	Countermeasure	CMF
Mount Hermon Circle & Oak Forest Circle	Oval Roundabout	Convert Stop-Controlled Intersection to Roundabout	0.56 KO, 0.18 ABC
Mount Hermon Circle & Oak Forest Circle	Right-In/Right-Out Only	Install right-in/right-out operations at stop-controlled intersections	0.55 all*
Ridgecrest Drive	Traffic Signal	Convert Stop-Controlled Intersection to Signalized Intersection	0.642 KABC, 0.639 O
Ridgecrest Drive	Roundabout	Convert Stop-Controlled Intersection to Roundabout	0.56 KO, 0.18 ABC
Ridgecrest Drive	RCUT (RCI)	Convert Stop-Controlled Intersection to Unsignalized RCUT	0.37 KABC, 0.54 O
Jeanette Drive	RCUT (RCI)	Convert Stop-Controlled Intersection to Unsignalized RCUT	0.37 KABC, 0.54 O
Orphanage Road	Traffic Signal	Convert Stop-Controlled Intersection to Signalized Intersection	0.642 KABC, 0.639 O
Orphanage Road	RCUT (RCI)	Convert Stop-Controlled Intersection to Unsignalized RCUT	0.37 KABC, 0.54 O
Orphanage Road	Single Lane Roundabout	Convert Stop-Controlled Intersection to Roundabout	0.56 KO, 0.18 ABC
Orphanage Road	Multi Lane Roundabout	Convert Stop-Controlled Intersection to Multi-Lane Roundabout	0.95 all*
Entire Corridor	Road Diet	Road Diet	0.55 all
Entire Corridor	Median	Replace TWLTL with Raised Median	0.29 all*

*CMF Clearinghouse

The expected crash reductions associated with the improvements shown in **Table 23** are summarized in **Table 24**.

As shown, the greatest reduction in crashes is expected with the corridorwide improvements. Installing roundabouts is also expected to reduce the number of crashes at various intersections as is installation of a traffic signal at Orphanage Road.

Table 24: Expected Crash Reductions

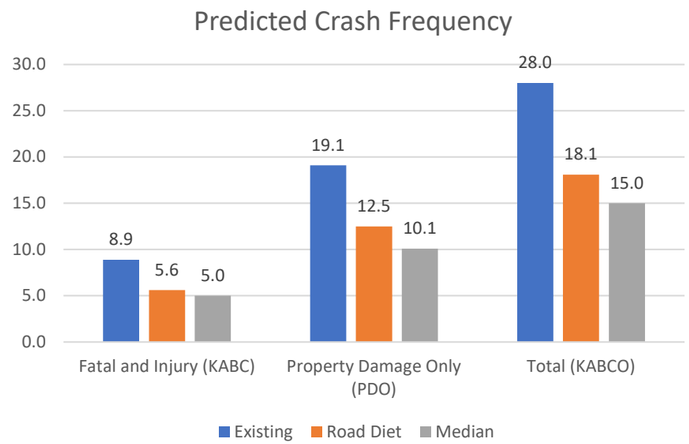
Location	Improvement	K	A	B	C	O	Total	Crash Reduction
Mount Hermon Circle & Oak Forest Circle Oval Roundabout	Historic Crashes	0	1	3	0	3	7	
	Reduction	0	0.18	0.54	0	1.68	2.40	**4.60**
Oak Forest Circle Right-In/Right-Out Only	Historic Crashes	0	0	2	0	1	3	
	Reduction	0	0	1.1	0	0.55	1.65	**1.35**
Ridgecrest Drive	Historic Crashes	0	0	3	0	0	3	
	Traffic Signal Reduction	0	0	1.93	0	0	1.93	**1.07**
	Roundabout Reduction	0	0	0.54	0	0	0.54	**2.46**
	RCI Reduction	0	0	1.11	0	0	1.11	**1.89**
Jeanette Drive	Historic Crashes	1	0	1	0	3	5	
	RCI Reduction	0.37	0	0.37	0	1.62	2.36	**2.64**
Orphanage Road	Historic Crashes	1	1	2	3	6	13	
	Traffic Signal	0.64	0.64	1.28	2	3.83	8.33	**4.67**
	RCUT (RCI)	0.36	0.12	0.23	0	2.15	3.20	**1.80**
	Single Lane Roundabout	0.56	0.18	0.36	0.54	3.36	5.00	**8.00**
	Multi Lane Roundabout	0.95	0.95	1.90	2.85	5.70	12.35	**0.65**
Entire Corridor	Historic Crashes*	1	6	13	4	33	57	
	Road Diet	0.29	1.74	3.77	1.16	9.57	16.53	**40.47**
	Historic Crashes	4	8	25	7	49	93	
	Median	2.2	4.4	13.75	3.85	26.95	51.15	**41.85**

*Excludes crashes at Hunting Hills Road, Golf Club Road, Mount Hermon Circle (north), Oak Forest Circle, Mount Hermon Circle (south), Ridgecrest Drive, Jeanette Drive, and Orphanage Road.

Highway Safety Manual

Potential safety improvements were also quantified using the Highway Safety Manual Part C Spreadsheets for the corridorwide improvements. **Figure 38** illustrates the predicted crash frequency for the existing roadway, implementation of a road diet, and installation of a median. As shown, installation of a median is predicted to have the lowest crash frequency for all crash severities.

Figure 38: HSM Predicted Crash Frequency



Chapter 3 – Public and Stakeholder Outreach and Feedback

The Project Pipeline process involved targeted outreach and stakeholder input for the alternative concepts in the study area. The study team developed concept sketches, prepared presentation materials, created public surveys, and held a public meeting to meet the public engagement needs for this study.

Stakeholder Coordination

The stakeholders provided regional and local knowledge about the study area and helped guide the study direction. The project stakeholders identified in **Chapter 1** were involved in all steps of the Project Pipeline process and assisted in making decisions about which concepts to move forward to public engagement.

As part of Phase 2, a stakeholder meeting was held on February 15, 2024 to discuss the alternative concepts at the study area intersections and segments along the Franklin Turnpike corridor that were developed during Phase 1 and Phase 2.

Public Involvement

Two surveys were developed as part of this Pipeline corridor study using the PublicInput.com platform. The initial survey focused on soliciting public feedback regarding their use of the corridor and identifying issues and needs along the corridor. It was available for public feedback from September 7, 2023 – September 21, 2023 and the results are summarized in **Chapter 1**.

A second survey was prepared soliciting public feedback on potential improvements. This survey was open from March 18, 2024 to April 1, 2024. The results of the second survey follow.

Public Meeting

A public meeting was held on March 25, 2024 at the Mount Hermon Fire and Rescue facility. The study team presented information about the Project Pipeline study process, general information about potential improvements, and directed attendees to the display boards. Sixty-one people signed in to the meeting, however, a head count indicates that attendance was closer to 100 people. Attendees were encouraged to provide input via the survey. Comments on the information displayed were received via post-it notes given to attendees and staff note-taking on flip charts. A summary of the input received at the meeting is included in **Appendix E**.

Survey Questions and Results

There were 1,462 participants and 27,434 responses to the Phase 2 survey. Each preferred concept was presented visually with feedback solicited via a 5-point Likert scale, as follows:

- Strongly Oppose
- Somewhat Oppose
- Neutral
- Somewhat Support
- Strongly Support

Figure 39 through **Figure 43** summarize the average ranking for each concept presented in the survey. A rating of 5.0 represents a strongly supported concept and a rating of 1.0 represents a strongly opposed concept. **Figure 44** summarizes the rankings for possible pedestrian crossing locations. A ranking of 1.0 represents the most desirable location.

Many of the concepts presented in the survey were not well received by the public. Opposition ("somewhat oppose" and "strongly oppose") to roundabouts at any location ranged from 61% to 67% and opposition to RCIs ranged from 64% to 71%. The greatest opposition to any of the concepts was to the road diet at 74%.

The concepts that received a positive response include the traffic signal at Orphanage Road, median concept, and shared use path. 62% of respondents support ("somewhat support" and "strongly support") the traffic signal at Orphanage Road, 56% support the shared use path, and 50% support the median.

More details on the public responses to the survey are available in **Appendix E** along with a full list of written comments.

Figure 39: Average Rating of Alternatives – Mount Hermon Circle (north) and Oak Forest Circle

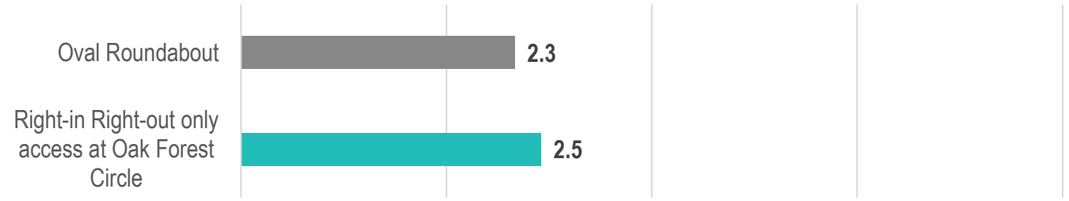


Figure 40: Average Rating of Alternatives – Tuscarora Village Area

Figure 41: Average Rating of Alternatives – Ridgecrest Drive and Jeanette Drive

Figure 42: Average Rating of Alternatives – Orphanage Road

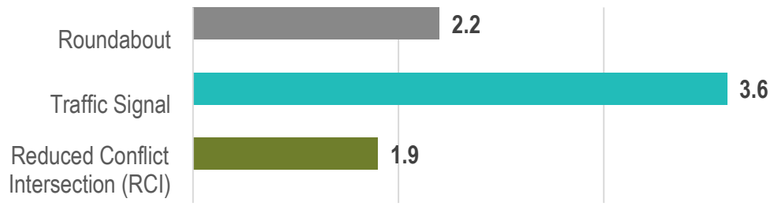


Figure 43: Average Rating of Alternatives – Entire Corridor

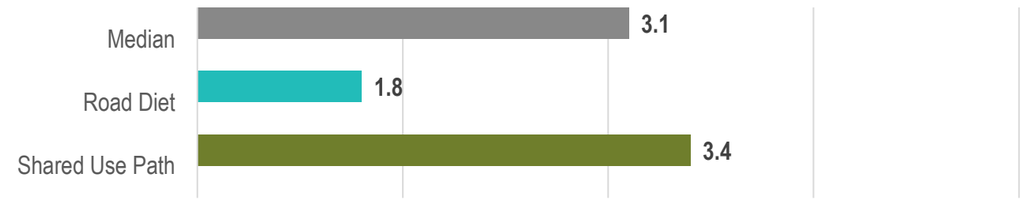


Figure 44: Ranking of Pedestrian Crossing Locations

Preferred Alternative

Upon review of the survey results, public meeting input, and coordination with SWG members, the Orphanage Road traffic signal concept was moved forward into Phase 3 for further design and SMART SCALE application development.

While not submitted for SMART SCALE funding, the shared use path and median were also identified as preferred alternatives.

Chapter 4 – Preferred Alternative Design Refinement and Investment Strategy

Input from the public meeting and survey was shared with SWG members. While no formal SWG meeting was held, a series of discussions amongst VDOT and Pittsylvania County staff occurred, arriving at a preferred alternative at the intersection of Franklin Turnpike and Orphanage Road. On April 1, 2024 Pittsylvania County submitted a SMART SCALE pre-application for a traffic signal at Franklin Turnpike and Orphanage Road.

No clear preferred alternative was defined by the SWG for the entire study area, however, the shared use path and median were identified by the study team as preferred alternatives.

Phase 3 of the study included revision of the conceptual drawings, cost estimate documentation, risk assessment, a Signal Justification Report, and traffic operations analysis of the preferred alternative.

Preferred Alternative Refinement

Adjustments were made to the Phase 2 design based on right of way information and the Phase 3 field review. The changes are listed below.

- Removal of the westbound left turn lane: It was discovered that the Turnpike Townhomes entrance is entirely private property. As a result, the proposed left turn lane on the westbound approach of the intersection was removed from the design.
- Closure of the eastern commercial entrance on Orphanage Road: The Shadowood Mart on the southwest corner of the intersection currently has three entrances, two of the entrances are located on Orphanage Road.

Figure 45 presents the preferred alternative updated concept.

Traffic Operations Analysis Results

The study team conducted Synchro and SimTraffic analyses to reflect the updated geometry of the preferred alternative and quantify the anticipated future traffic operations. Only the intersection of Franklin Turnpike and Orphanage Road was updated. While installation of a median throughout the corridor is the preferred alternative for the corridor, individual intersection preferred alternatives were not selected.

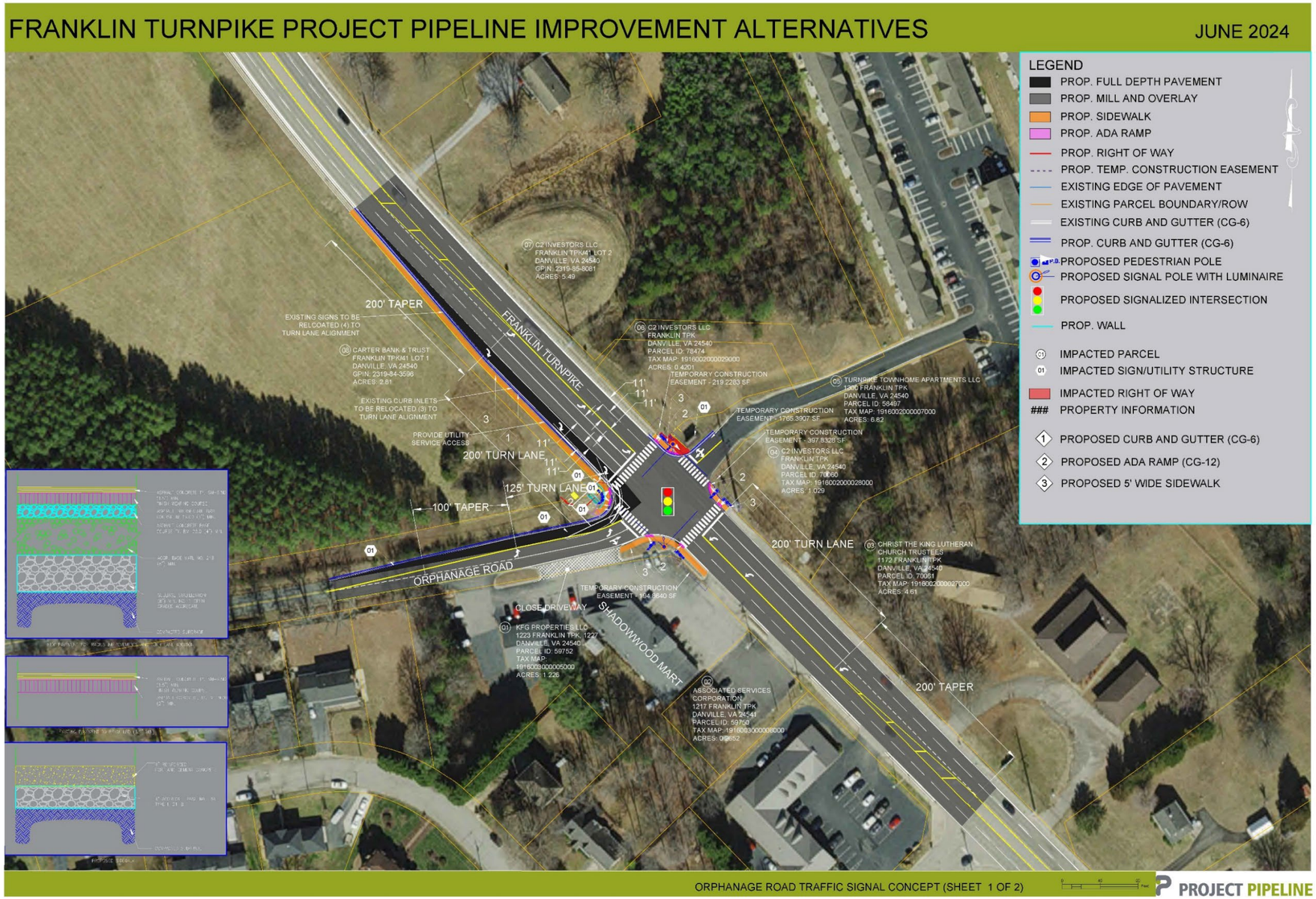
Build conditions analyses were conducted for the AM and PM peak periods. **Table 25** summarizes the control delay and SimTraffic maximum queue lengths. Traffic operations generally improve in the Build conditions compared to the No Build conditions. The delays, levels of service, and queuing improve significantly on Orphanage Road with the addition of the traffic signal. The eastbound delays are reduced such that the levels of service improve from LOS F to LOS C during both peak periods and the queues are reduced from nearly 900 feet in the PM peak hour to approximately 100 feet. The delays and queueing on the northbound and southbound Franklin Turnpike approaches increase somewhat with traffic signal control, however, all levels of service are B or better and the longest queue is approximately 250 feet.

Appendix F includes the Synchro and SimTraffic reports for the preferred alternative analysis.

Table 25: Orphanage Road Traffic Signal Preferred Alternative Traffic Operations Analysis Results

Approach	Movement	Storage	Taper	Effective Storage	AM LOS	AM Delay (sec)	AM Max Queue (feet)	PM LOS	PM Delay (sec)	PM Max Queue (feet)
Orphanage Road	EBL	200	200	300	C	31.1	91	C	28.3	96
Orphanage Road	EBT/R	-	-	-	C	25.3	60	C	23.5	56
Turnpike Townhomes	WBL/T/R	200	200	300	C	29.8	76	C	29.3	63
Franklin Turnpike	NBL	200	200	300	B	11.1	79	B	10.6	79
Franklin Turnpike	NBT	-	-	-	B	10.0	138	B	16.9	230
Franklin Turnpike	NBT/R	-	-	-	B	10.0	92	B	16.8	222
Franklin Turnpike	SBL	200	200	300	A	8.6	15	B	11.2	19
Franklin Turnpike	SBT	-	-	-	B	15.7	254	B	14.5	193
Franklin Turnpike	SBR	200	200	300	A	0.0	78	A	0.0	59
				Overall	B	16.3		B	B	15.1

Figure 45: Orphanage Road Traffic Signal Concept – Preferred Alternative



Planning Level Cost Estimates

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 FY2024 dollars, as shown in **Table 26**. Detailed cost estimates are included in **Appendix F** along with the Basis of Design Memo detailing the established design criteria, field review notes, risk assessment, and assumptions made during the design effort.

Table 26: LY-09 Phase 3 Cost Estimate

Phase Description	Cost Estimate
Preliminary Engineering	$ 453,800
Right of Way and Utility Relocation	$ 1,248,500
Construction	$ 2,951,200
CEI	$ 295,100
Total Project Budget	**$ 4,948,600**

Schedule Estimates

A schedule estimate was developed for the preferred alternative. **Table 27** summarizes the projected timeframes for the preliminary engineering (PE), right of way (RW), and construction (CN) phases.

Table 27: LY-09 Phase 3 Schedule Estimate – Duration of Construction Phases (months)

PE	RW	CN	Total
13	6	15	**34**

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 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 F** includes the risk analysis matrix with details on the risk assessment and mitigation strategy.

Risk/Issue: Utilities

There were above ground appurtenances observed during the field visit signifying the presence of underground utilities such as water lines and a pump station. Power poles were also identified within the project limits. The Phase 3 concept has been designed to avoid utility impacts where possible.

Pittsylvania County is planning to improve the existing Mt Hermon Booster Station located on the northwest corner of the intersection. The preliminary plans were included in the development of the preferred alternative.

Risk/Issue: Coordination with other Ongoing Projects

As previously noted, Pittsylvania County is improving the Mt Hermon Booster Station. The preferred alternative has been designed to avoid impacts to the booster station.

Risk/Issue: Right of Way

Three parcels will be impacted at the intersection. Two of the parcels will require right of way acquisition and all three will have temporary construction easements.

Possible Funding Sources

Pittsylvania County submitted the preferred alternative concepts for the Franklin Turnpike and Orphanage Road intersection for SMART SCALE funding. Other potential funding sources that could be explored for the improvements identified in this study include: later SMART SCALE rounds, HSIP, and federal discretionary grants.