PROJECT PIPELINE

RI-23-10: City of Hopewell- VA 10 (Randolph Road)

From W. Cawson Street to N. Terminal Street/Rev CW Harris Street

DRPT Virginia Department of Rail and Public Transportation

Office of INTERMODAL Planning and Investment

VDOT Virginia Department of Transportation

PROJECT PIPELINE

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DRAFT Final Report

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Prepared for

Prepared by

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

PROJECT PIPELINE

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 Error! Reference source not found..

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.

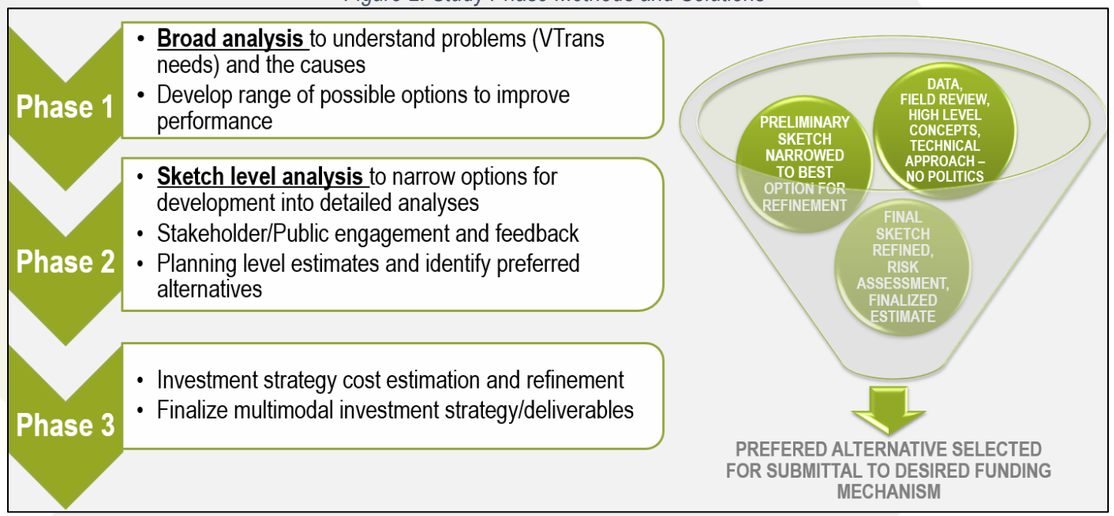
Table 1: List of VTrans Needs

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 final concept, 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 Work Group

The Study Work Group (SWG) includes local and regional stakeholders, who provide local and institutional knowledge of the corridor, review study goals and methodologies, provide input on key assumptions, and review and approve proposed improvement concepts developed through the study process. The key members of the SWG include:

- VDOT Richmond District
- Office of Intermodal Planning and Investment (OIPI)
- City of Hopewell
- Tri-Cities Area Metropolitan Planning Organization (MPO)
- Crater Planning District Commission (PDC)
- Petersburg Area Transit (PAT)

- Virginia Department of Rail and Public Transportation (DRPT)
- WSP Consultant Team
- Jacobs Consultant Team

Study Area

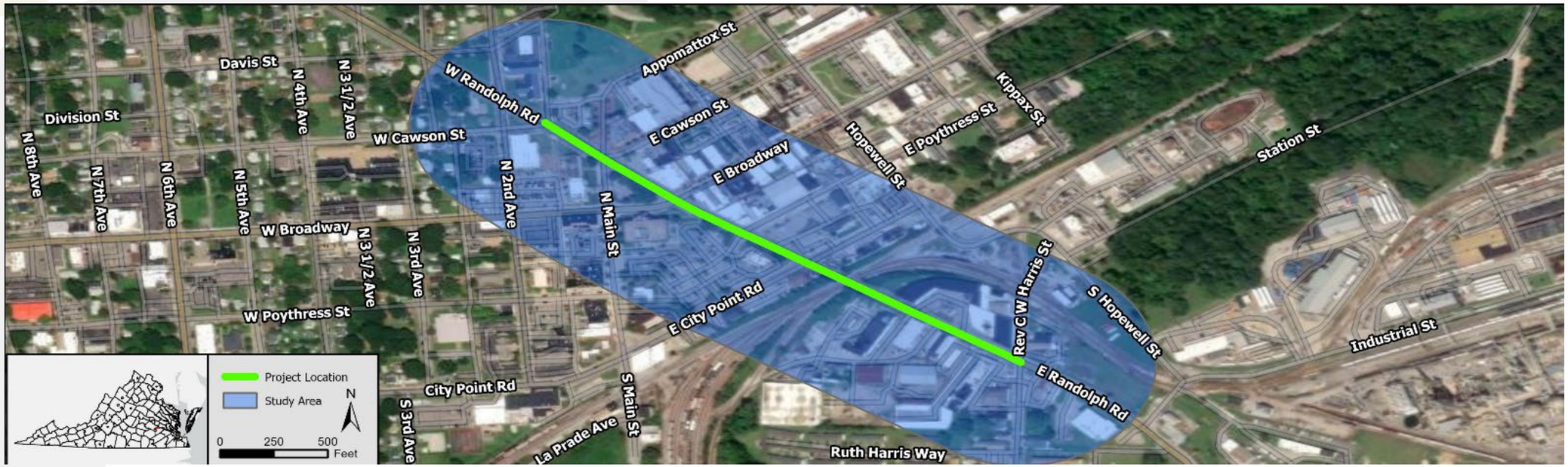
The study area includes approximately .4 miles or E. Randolph Road (Route 10) through downtown Hopewell. The project area begins at West Cawson Street and traverses to the east to East Terminal Street/Rev C. W. Harris Street.

The corridor is classified as Other Principal Arterial within the study area and has a posted speed of 35 miles per hour. The corridor provides access to numerous businesses and residential areas in City of Hopewell. Randolph Road is a four-lane undivided roadway between West Cawson Street and E. City Point Road. East of E. City Point Road the typical section transitions to two lanes. The area immediately surrounding the study corridor is primarily the central business district between West Cawson Street and East City Point Road and then transitions to industrial east of E. City Point Road. The study area includes three signalized intersections and three unsignalized intersections. A map detailing the extents of the study corridor and surrounding area is shown below in **Figure 4.**

The study area intersections include:

1. Randolph Rd and W. Cawson St (Unsignalized)
2. Randolph Rd and N. Main St and E. Cawson St (Signalized)
3. Randolph Rd and Broadway (Signalized)
4. Randolph Rd and E. Poythress St (Unsignalized)
5. Randolph Rd and E. City Point Rd (Signalized)
6. Randolph Rd and N. Terminal St/Rev CW Harris St (Unsignalized)

Figure 4. Study Area



Previous Study Efforts

No specific transportation plans were identified as previous studies, however, the City's Comprehensive Plan (2018) describes deep interest in improving the transportation system to provide for more mobility options and also to enhancing the downtown environment. Representative items from this plan include:

Planning Goal #7 – "Transportation & Infrastructure is to plan and advance an effective transportation system–serving pedestrians, bicyclists, and motorists alike–that is compatible with the Future Land Use Plan and the Comprehensive Plan's goals for economic prosperity as well as the safety and livability of our community".

The Transportation Chapter (7) further articulates: "The Goal: Plan and advance an effective transportation system–serving pedestrians, bicyclists, and motorists alike–that is compatible with the Future Land Use Plan and the Comprehensive Plan's goals for economic prosperity as well as the safety, livability, and value of our community. Establish and maintain safe, attractive, and efficient urban infrastructure sidewalks, street lighting, public water and sewer, storm drainage, environmental improvements that better serve the physical and environmental demands of our population, workers, and enterprise base."

This project falls within the City 'Priority Planning Area 1. E. Randolph Road is repeatedly described as an essential element within this planning area that should be enhanced to provide complete street mobility options and streetscape enhancements to complement the ongoing development initiatives. An example statement is "11. Pedestrian and Bike Improvements: City Hall Initiative - Implement Complete Streets plan on Rt. 10 Corridor and Selected City Streets…".

In the 2003 Downtown Hopewell Vision plan, the vision for E. Randolph Road in the downtown core is to provide an enhanced environment that will include street trees and aesthetic lighting, among other improvements to enhance the downtown environment.

Finally, it should be noted that the City has an approved and funded project to construct a shared use path along the south side of E. Randolph Road terminating at N. Main Street. This Project Pipeline project, as described in this report, will include an extension of that shared use path further to the east along E. Randolph Road.

FHWA STEAP Tool Analysis

An equity analysis was performed along the study area corridor to determine the demographics of the population around the project area. This equity analysis was performed using the Federal Highway Administration (FHWA) online tool - Screening Tool for Equity Analysis of Projects (STEAP). This tool assesses a geographic area of 0.5 miles on each side of the corridor and utilizes survey data between 2016 and 2020 to report demographics of the corridor area as compared to the city and state.

STEAP results are included in **Appendix C**.

VTrans and Related Project Background Information

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-tern needs establishes multimodal need categories that correspond to the Commonwealth Transportation Board-adopted VTrans visions, goals, and objectives. 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.

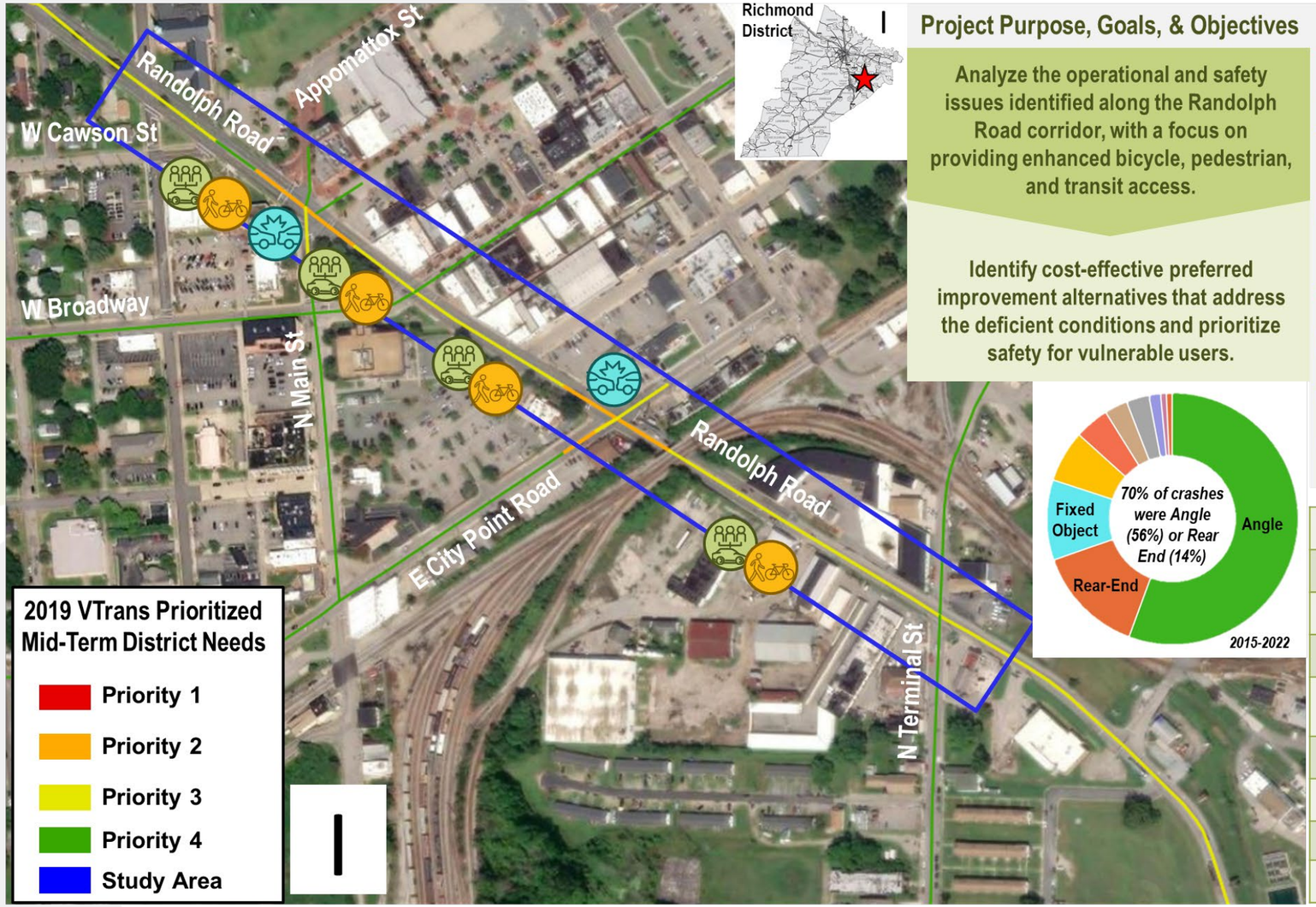
The mid-term needs, as identified in VTrans for the study corridor, were identified as 'Very High' for Bicycle Access and Safety Improvement, 'High' for Pedestrian Access, and 'Low' for Transit Access and Transportation Demand Management, as presented in **Table 3.**

Table 3. VTrans Needs in Study Area

	VTrans Identified Needs	Priorities	Priority Level
Operations	Capacity Preservation	None	--
	Congestion Mitigation	None	--
Pedestrian / Bicycle Access	IEDA (UDA) Access	None	--
	Bicycle Access	Very High	4
	Pedestrian Access	High	3
Safety & Reliability	Safety Improvement	Very High	4
	Pedestrian Safety Improvement	None	--
	Reliability	None	--
Transit / TDM / Rail	Rail On-time Performance	None	--
	Transit Access	Low	1
	Transit Access for Equity Emphasis Areas	None	--
	Transportation Demand Management	Low	1

At the VDOT Construction District level, each identified need location is assigned a tier from 1 to 4, with Tier 1 representing the most critical needs and Tier 4 representing the least critical. The segments ranked as "Priority 1" represent those with multiple categories identified as high in need. ***Figure 5*** *presents a map of the study area with 2019 VTrans mid-term need locations by priority tier for the study corridor.*

Figure 5. VTrans 2019 Mid-Term Needs



Project Purpose, Goals, & Objectives

Analyze the operational and safety issues identified along the Randolph Road corridor, with a focus on providing enhanced bicycle, pedestrian, and transit access.

Identify cost-effective preferred improvement alternatives that address the deficient conditions and prioritize safety for vulnerable users.

Identified Issues in the Study Area

Significant angle crash trend related to intersections. 12% truck crashes, which is in line with truck volume percentage.

No bike lanes or shared-use paths exist along Randolph Road. Existing bike lanes are located along Appomattox Street. Existing sidewalks along the corridor are not ADA compliant and crosswalks are only present at two intersections.

No identified VTRANS Congestion Mitigation or Capacity Preservation Needs; however, VA-10 is a designated truck route.

There are no existing bus stops along the corridor, but two PAT bus stops are adjacently located nearby. There are no existing park and ride facilities in the area.

Project Fact Sheet

VDOT District	Richmond
Locality	City of Hopewell
# of Study Intersections	6
Transit Routes *Petersburg Area Transit (PAT)*	PAT Hopewell Circulator
Intermodal Connections	None
Nearby Bikeways	Appomattox River Trail
Functional Classification	Other Principal Arterial
Speed Limit	35 mph

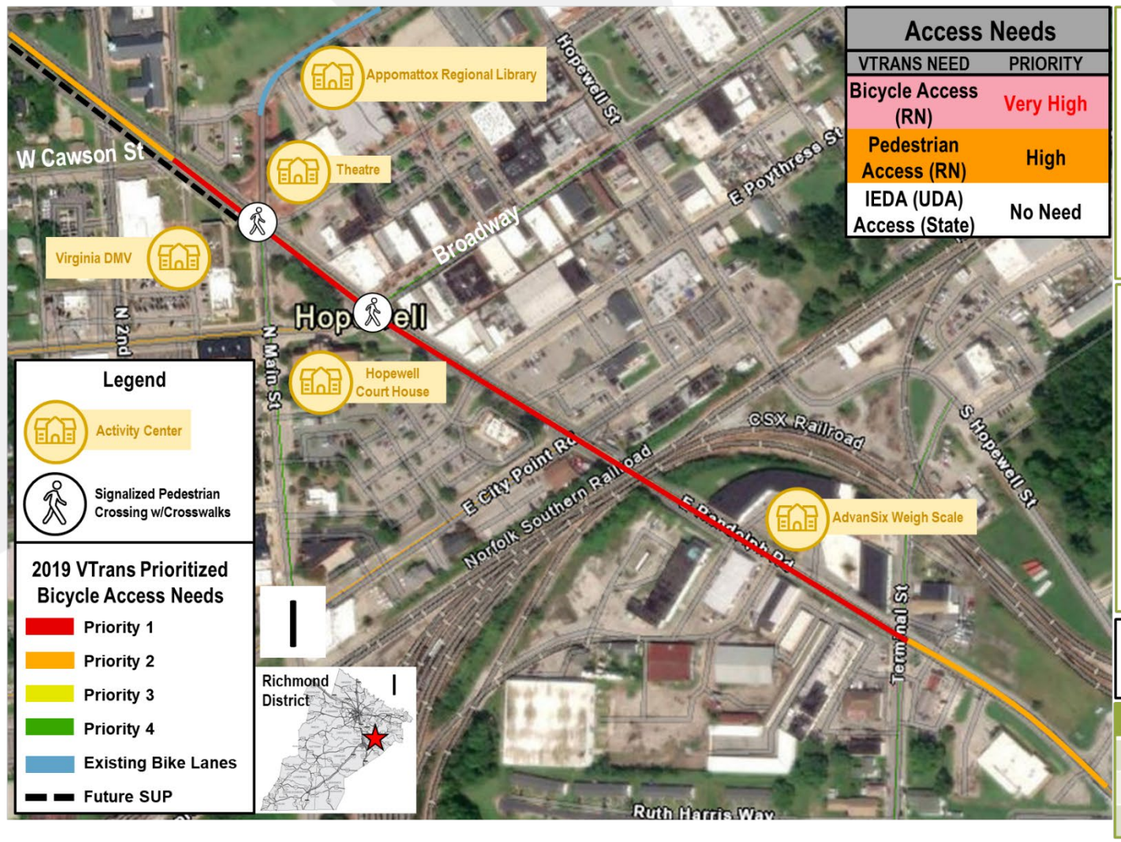
Pedestrian and Bicycle Access

In an effort to identify the needs with respect to accessibility, the study team reviewed existing conditions for pedestrian and bicycle accommodations. There are sidewalks along both sides of much of the corridor, however conditions do not meet current ADA requirements for the majority of the existing sidewalk facilities and crossings. There is no sidewalk just east of the railroad overpass. Crosswalks and pedestrian signals exist only at two intersections:

- Randolph Road & N. Main Street
- Randolph Road & Broadway

There are no accommodations specific to cyclists along the study corridor. **Figure 6** summarizes these findings.

Figure 6. Pedestrian Facilities



Access Needs	
VTRANS NEED	PRIORITY
Bicycle Access (RN)	Very High
Pedestrian Access (RN)	High
IEDA (UDA) Access (State)	No Need

Bicycle Accessibility Summary

- No existing bike lanes or shared-use paths along VA-10,
- Existing (new) bike lanes along Appomattox Street as part of the Appomattox River Trail,
- Planned West Randolph Road Shared Use Path (Funded),
- No crashes involving a bicyclist between 2015-2022.
- The **Bicycle Access** VTrans Need is Very High based on "*Applicable roadway segments within biking distance (seven miles) of VTrans Activity Centers, fixed-guideway transit stations, or BRT lines.*[1]"

Pedestrian Accessibility Summary

- Existing sidewalks along both sides of Randolph Road from W. Cawson Street to just east of the Railroad Overpass.
- Crosswalks only present at two intersections (signalized with pedestrian push buttons):
  - VA-10 (Randolph Rd) & N. Main Street
  - VA-10 (Randolph Rd) & Broadway
- No crashes involving pedestrians between 2015-2022.
- The **Pedestrian Access** VTrans Need is High based on "*Applicable roadway segments within walking distance (one mile) of VTrans Activity Centers, fixed-guideway transit stations, or BRT lines.*[1]"

1. *Technical Guide for the Identification and Prioritization of the VTRANS Mid-Term Needs*, Office of Intermodal Planning and Investment (OIPI), November 2021.

ACCESS MANAGEMENT SUMMARY	ACCESS POINTS/MILE
Corridor-Wide	**26.3**
Randolph Road Eastbound	22.5
Randolph Road Westbound	30.0

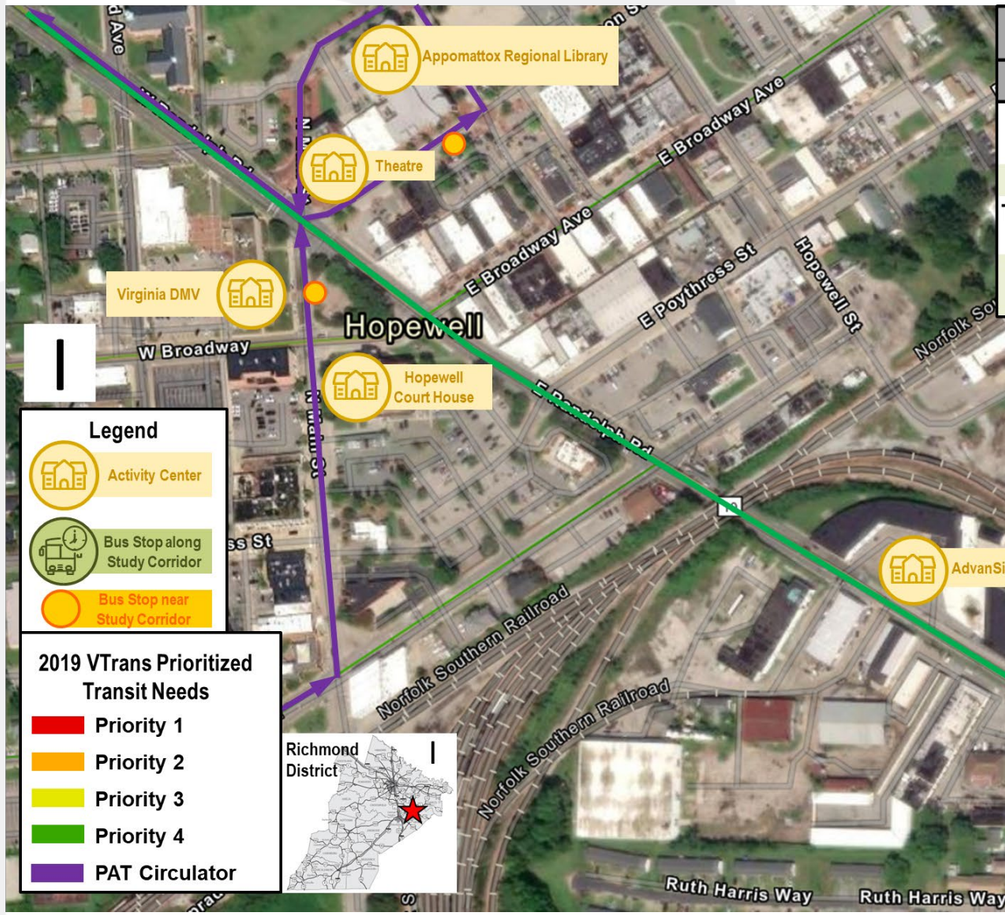
Rail, Transit, and TDM

With support from DRPT, the study team reviewed the existing rail infrastructure, Park and Ride locations, and public transit routes in the study area.

Transit service in the study area is provided by Petersburg Area Transit (PAT)'s Hopewell Circulator. The route makes 13 trips on weekdays, from 5:45 am to 6:45 pm, and 12 trips on Saturdays from 6:45 am to 6:45 pm, with each round trip taking one hour. No bus stops are located along the corridor, but there are stops located along some of the side roads, on N. Main St and E. Cawson St. Ridership is low but typical for this type of rural system.

There is no park-and-ride located along the corridor. The rail, transit, and TDM needs identified by the study team are presented in **Figure 7**.

Figure 7. Rail, Transit, and TDM Needs and Diagnosis



Transit Needs	
VTRANS NEED	PRIORITY
Rail On-Time Performance (CoSS)	No Need
Transit Access (RN)	Low
Transit Access for Equity Emphasis Areas (RN)	No Need
Transportation Demand Management (RN)	Low

Transportation Demand Management (TDM) Summary

- No existing park and ride or other intermodal facilities exist along or near the study area.
- The **TDM** VTrans Need is Low based on "*Roadway segments where TDM strategies such as new or expanded public transportation services/facilities, new or expanded bicycle and pedestrian facilities, or coordination of commuter assistance programs can be beneficial to reduce vehicle miles traveled.[1]*"

Transit Accessibility Summary

- Petersburg Area Transit (PAT) Hopewell Circulator runs in one direction along the north end of the Randolph Road corridor.
- No bus stops are located directly along the corridor; however, there are two stops nearby. Each stop has sidewalks, but no shelters.
  - 1 Stop along N Main Street (no benches).
  - 1 Stop along E Cawson Street with a bench.
- The **Transit Access** VTrans Need is Low based on "*The number of workers that can access a given VTrans Activity Center via public transit within 45 minutes versus a private automobile. Any transit deficit greater than zero constitutes a need.[1]*"

1. *Technical Guide for the Identification and Prioritization of the VTRANS Mid-Term Needs*, Office of Intermodal Planning and Investment (OIPI), November 2021.

Traffic Operation and Accessibility

Traffic operational analysis was performed using Synchro 11 software for all study intersections along the Randolph Rd corridor. Inputs and analysis methodologies are consistent with the VDOT Traffic Operations and Safety Analysis Manual (TOSAM) guidelines. Both AM and PM peak hour analyses were performed for both the existing conditions.

Traffic Data

Intersection turning movement counts were collected at each study intersection in May 2023. The AM peak hour was determined to be between 6:30 and 7:30 AM, the PM peak hour was determined to be between 4:30 and 5:30 PM. The raw turning movement counts are provided in Appendix A. In the volume settings in Synchro, an overall Peak Hour Factor (PHF) was used per intersection as recommended by the Highway Capacity Manual. If PHFs for each individual approach or movement are used, they are likely to create demand volumes from one 15-minute period that are in apparent conflict with demand volumes from another 15-minute period, but in reality, these peak volumes do not occur at the same time.

Truck percentages for each movement were calculated and used in the models. Synchro roadway speeds were assumed to be the posted speed limit.

Levels of Service

Level of Service (LOS) is a graded scale used to represent intersection delay (the delay associated with vehicles slowing in advance of an intersection, the time spent stopped on an intersection approach, the time spent as vehicles move up in the queue, and the time needed for vehicles to accelerate to their desired speed). It is important to point out that delay calculations from the Highway Capacity Manual (HCM) methodology (deterministic) and simulation (stochastic) are different, especially for congested conditions (e.g., queue spillover between intersections, etc.). Therefore, the LOS represented in the results tables does not necessarily provide information on congestion caused by complicated interactions between intersections. LOS is measured on a scale of “A” through “F,” with LOS A representing the best operating conditions and LOS F representing the worst, based on the delay experienced at the intersection during the analysis period.

As indicated in the 2010 Highway Capacity Manual, LOS at an intersection is based upon the average amount of delay (seconds/vehicle) experienced by vehicles approaching the intersection. LOS thresholds for signalized and unsignalized intersections are shown in **Table 4**.

Table 4. Level of Service Delay Thresholds

LOS	Signalized Delay (sec/veh)	Unsignalized Delay (sec/veh)	Traffic Flow Conditions
A	≤ 10	≤ 10	Free flow
B	10-20	10-15	Reasonably Free flow
C	20-35	15-25	Stable/Near Free flow
D	35-55	25-35	Near Unstable
E	55-80	35-50	Unstable
F	≥ 80	≥ 50	Congested

Measures of Effectiveness

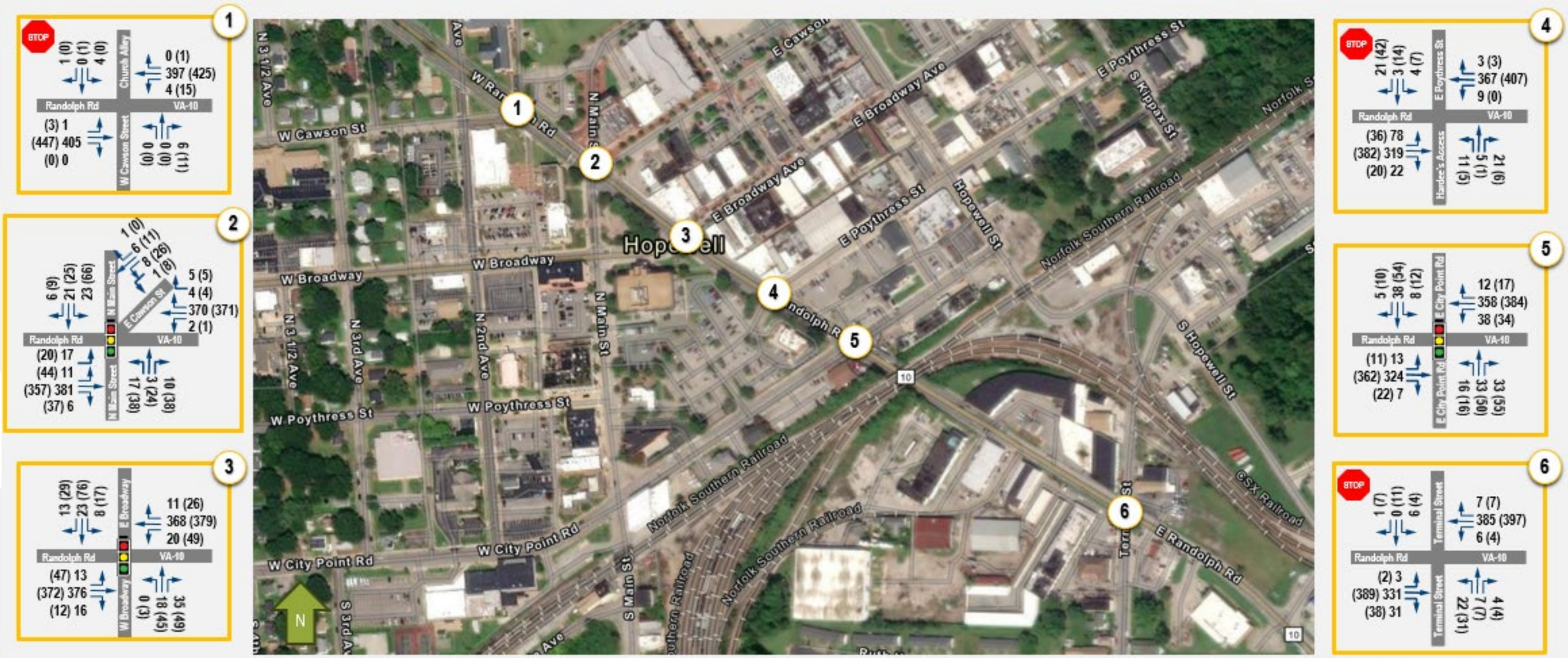
There are many measures of effectiveness (MOE) in traffic operations analysis to quantify operational and safety objectives and provide a basis for evaluating the performance of a transportation network. Several MOEs for intersection analyses can be reported from Synchro.

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)
- 95th Percentile Queue Length via Synchro (measured in feet – ft)
- Volume-to-Capacity (v/c) Ratio

The existing (2023) balanced peak hour volumes are summarized in **Figure 8.**

Figure 8. Existing AM and PM Peak Hour Volumes



Traffic Operations Analysis and Results

In an effort to identify operational and accessibility needs along the study corridor, Synchro analysis was performed for the existing year 2023. Analysis was completed for the AM and PM peak hours.

Table 5 presents the AM and PM peak hour Synchro analysis results summary for 2023 existing conditions. The Synchro reports are included in **Appendix B.**

The operational analysis shows that all study intersections operate at a Level of Service (LOS) C or better during both the AM and PM peak hours as summarized in **Figure 9**. The analysis also shows that, during both existing conditions, there is insignificant congestion and queuing. No intersections operate with an overall delay of 35 sec/veh; however, some movements do, as summarized below. 35 sec/veh is used as the threshold for the existing conditions evaluation because these delays have the potential to increase to unacceptable delays in the future year conditions.

- Intersection 2: Randolph Road and N Main Street/E Cawson Street; delay of 36.3 seconds in the AM Peak for the E Cawson Street approach
- Intersection 5: Randolph Road and E City Point Road; delay of 35.2 seconds and 37.3 seconds in the PM Peak for the NB E City Point Road approach

Figure 9. LOS Summary

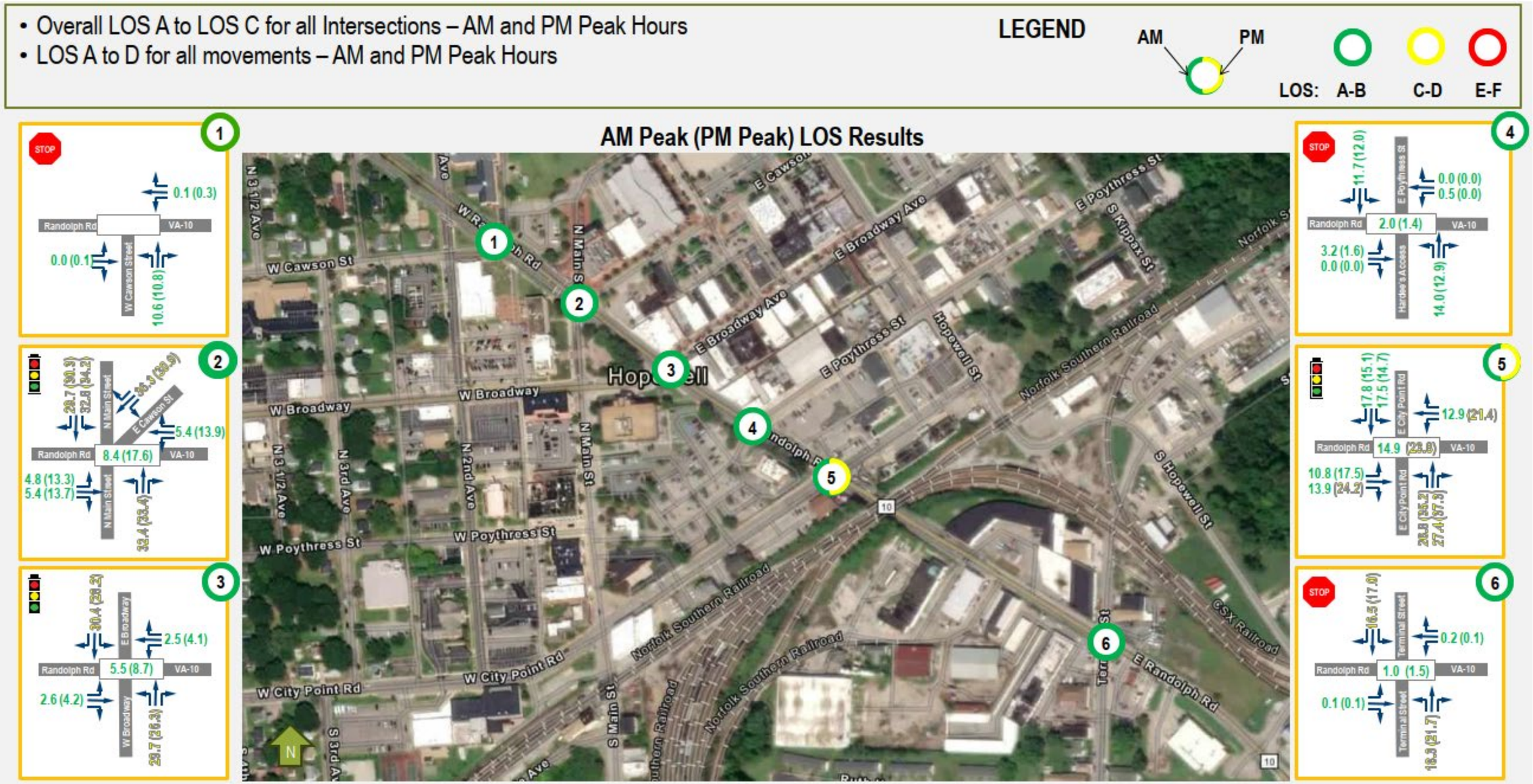


Table 5. Synchro Analysis for Existing Conditions

Intersection		Control	Overall Delay (LOS)	Average Delay (sec/veh) and Level of Service			
				Eastbound	Westbound	Northbound	Southbound
				LTR	LTR	LTR	LTR
1	Terminal Street & VA-10 Randolph Road (two way stop)	Stop		AM Peak Hour			
			1 (A)	0.1 (A)	0.2 (A)	18.3 (C)	16.5 (C)
				0.1	0.2	18.3	16.5
				A	A	C	C
				PM Peak Hour			
			1.5 (A)	0.1 (A)	0.1 (A)	21.7 (C)	17 (C)
				0.1	0.1	21.7	17
				A	A	C	C

Intersection		Control	Overall Delay (LOS)	Eastbound		Westbound	Northeast		Southwest	
				LT	TH/RT	LTR	LT	TH/RT	LT	TH/RT
2	E. City Point Road & VA-10 Randolph Road (Signal)	Signal		AM Peak Hour						
			14.9 (B)	13.8 (B)		12.9 (B)	27.3 (C)		17.7 (B)	
				10.8	13.9	12.9	26.8	27.4	17.5	17.8
				B	B	B	C	C	B	B
				PM Peak Hour						
			23.8 (C)	24.1 (C)		21.4 (C)	37 (D)		15.1 (B)	
				17.5	24.2	21.4	35.2	37.3	14.7	15.1
				B	C	C	D	D	B	B

Intersection		Control	Overall Delay (LOS)	Eastbound		Westbound	Northeast		Southwest
				LT/TH	TH/RT	LT/TH	TH/RT	LTR	LTR
3	E. Poythress Street & VA-10 Randolph Road (two way stop)	Stop		AM Peak Hour					
			2 (A)	18.4 (B)		0.2 (A)	14 (B)		11.7 (B)
				3.2	0	0.5	0	14	11.7
				A	A	A	A	B	B
				PM Peak Hour					
			1.4 (A)	0.8 (A)		0 (A)	12.9 (B)		12 (B)
				1.6	0	0	0	12.9	12
				A	A	A	A	B	B

Table 5 Continued

Intersection		Control	Overall Delay (LOS)	Average Delay (sec/veh) and Level of Service			
				Eastbound	Westbound	Northeast	Southwest
				LTR	LTR	LTR	LTR
4	E. Broadway & VA-10 Randolph Road (Signal)	Signal		AM Peak Hour			
			5.5 (A)	2.6 (A)	2.5 (A)	29.7 (C)	30.4 (C)
				2.6	2.5	29.7	30.4
				A	A	C	C
				PM Peak Hour			
			8.7 (A)	4.2 (A)	4.1 (A)	26.3 (C)	28.2 (C)
				4.2	4.1	26.3	28.2
				A	A	C	C

Intersection		Control	Overall Delay (LOS)	Westbound	Northbound	Southbound		Southeast		Northwest
				LTR	LTR	LT/TH	RT	LT	TH/RT	LTR
5	N. Main St/E. Cawson St & VA-10 Randolph Road (two way stop)	Signal		AM Peak Hour						
			8.4 (A)	36.3 (D)	32.4 (C)	32.4 (C)		5.4 (A)		5.4 (A)
				36.3	32.4	32.8	29.7	4.8	5.4	5.4
				D	C	C	C	A	A	A
				PM Peak Hour						
			17.6 (B)	30.9 (C)	33.4 (C)	33.9 (C)		13.6 (B)		13.9 (B)
				30.9	33.4	34.2	30.3	13.3	13.7	13.9
				C	C	C	C	B	B	B

Intersection		Control	Overall Delay (LOS)	Eastbound	Southbound	Southeast	Northwest
				LTR	LTR	LTR	LTR
6	W. Cawson St & VA-10 Randolph Road (Signal)	Stop		AM Peak Hour			
			0.2 (A)	10.6 (B)	14.4 (B)	0 (A)	0.1 (A)
				10.6	14.4	0	0
				B	B	A	A
				PM Peak Hour			
			0.3 (A)	10.8 (B)	9.6 (A)	0.1 (A)	0.3 (A)
				10.8	9.6	0.1	0.3
				B	A	A	A

Queue length, or the distance to which stopped vehicles accumulate in a lane at an intersection, is another performance measure of intersection operation. Lengthy queues may be indicative of intersection capacity or operational issues, such as absence of or insufficient dedicated turn lanes, inefficient signal timings or phasing. A queuing analysis was completed for the study intersections during the AM and PM peak hours. **Table 6** provides a summary of the 95th percentile queue lengths during the AM and PM peak hours. There are no movements where the reported 95th percentile queue length value exceeds the storage length available for that turning movement. The Synchro output sheets including the queue lengths are included in the Appendix. The operations analysis results indicate no extensive queuing.

Table 6. 95th Percentile Queue Lengths for Existing Conditions

	Intersection	Control	Peak Hour	95th Percentile Queue (ft)							
				Eastbound		Westbound		Northbound		Southbound	
				LTR		LTR		LTR		LTR	
1	Terminal Street & VA-10 Randolph Road	Stop	AM	0		0		10		2	
			PM	0		0		16		6	
	Intersection	Control	Peak Hour	Eastbound		Westbound		Northeast		Southwest	
				LT	TH/RT	LTR		LT	TH/RT	LT	TH/RT
2	E. City Point Road & VA-10 Randolph Road	Signal	AM	13	186	103		26	52	13	37
			PM	16	309	398		30	94	15	47
	Intersection	Control	Peak Hour	Eastbound		Westbound		Northeast		Southwest	
				LT/TH	TH/RT	LT/TH	TH/RT	LTR		LTR	
3	E. Poythress Street & VA-10 Randolph Road	Stop	AM	6	0	1	0	8		5	
			PM	3	0	0	0	2		11	
	Intersection	Control	Peak Hour	Eastbound		Westbound		Northeast		Southwest	
				LTR		LTR		LTR		LTR	
4	E. Broadway & VA-10 Randolph Road	Signal	AM	40		39		36		40	
			PM	62		63		57		89	
	Intersection	Control	Peak Hour	Westbound		Northbound		Southbound		Southeast		Northwest
				LTR		LTR		LT/TH	RT	LT	TH/RT	LTR
5	N. Main St/E. Cawson St & VA-10 Randolph Road	Signal	AM	0		37		49	0	19	78	77
			PM	57		103		95	0	52	110	249
	Intersection	Control	Peak Hour	Eastbound		Southbound		Southeast		Northwest	
				LTR		LTR		LTR		LTR	
6	W. Cawson St & VA-10 Randolph Road	Stop	AM	0		0		0		0	
			PM	2		0		0		0	

Safety Analysis

For the analysis of existing safety conditions, areas with a higher calculated risk of crashes based on roadway characteristics and observed crash data was identified through the VDOT pathways for planning tool. The data was reduced per the 2019 VTrans mid-term needs. Furthermore, the VDOT crash database Power BI was utilized to determine the crash history at the study intersections and along the study corridor on Randolph Road. The VDOT dashboard crash data for the project id RI-23-10 was collected and analyzed for a nine-year period spanning from 2015 to 2023. 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 2019 VTrans needs indicate the entire segment of (VA-10) Randolph Road between N. Terminal Street and N. Main Street is a “Potential Safety Improvement” (PSI) Segment. However, no PSI Intersections were identified. The crash severities of crashes within the study area are summarized by year and by crash type in **Table 7** and **Table 8**, respectively.

Table 7. Crashes by Year

Crash Year and Severity	A. Severe Injury	B. Visible Injury	C. Nonvisible Injury	O. Property Damage Only	Total
2015	1	2	5	5	13
2016	1	4	2	5	12
2017	1	4	8	3	16
2018	1	5	7	6	19
2019	1	6	11	3	21
2020	0	7	8	4	19
2021	0	3	9	3	15
2022	0	9	9	2	20
2023	0	0	5	3	8
Total	5	40	64	34	143

Table 8. Crashes by Type

Crash Type and Severity	A. Severe Injury	B. Visible Injury	C. Nonvisible Injury	O. Property Damage Only	Total
Rear End	1	4	9	6	20
Angle	4	26	33	16	79
Head On	0	2	3	1	6
Sideswipe - Same Direction	0	0	5	5	10
Sideswipe - Opposite Direction	0	0	4	0	4
Fixed Object in Road	0	1	1	0	2
Non-Collision	0	0	0	0	0
Fixed Object - Off Road	0	5	5	4	14
Deer	0	0	0	1	1
Ped	0	0	0	0	0
Backed Into	0	0	1	0	1
Other	0	2	3	1	6
Total	5	40	64	34	143

A total of 156 Crashes were listed on the VDOT dashboard crash data for the project id RI-23-10. The Crash data was investigated to reduce the crashes to the actual number of crashes along the study corridor. In summary, 143 crashes were reported along Randolph Road Corridor within the study area during the nine-year study period. Details on crashes by collision type and the percentage splits of collision types are outlined in **Figure 10** and details on crashes by severity are outlined in **Figure 11**.

Key takeaways from the corridor wide crash data are as follows:

1. Majority of the crashes have occurred to the west of City Point Road. It is to be noted that the safety needs to the west of W. Cawson Street have been identified under 2019 VTrans mid-term needs.
2. The majority of reported crashes within the corridor are rear-end and angle crashes. Combined, these constitute approximately 71% of the total crashes. Nearly 57% of crashes were angle crashes (79 of 143)
3. Highest number of crashes were recorded during the year 2019 (21 crashes)
4. 36 crashes have been recorded during the nighttime
5. 9 crashes have been recorded due to speeding.
6. A total of 109 crashes resulted in injuries, which account for approximately 75% of the total reported crashes within the corridor. There were no crashes that led to a fatality.
7. 45% of crashes were Nonvisible injury crashes (64 of 143)
8. 3 of 5 severe injury crashes has been recorded at the intersection of City Point Road
9. 4 of 5 severe injury crashes has been an Angle crash type.
10. Five crashes were reported as severe (A) injury crashes, including one rear-end crashes and four angle crashes.
11. A significant concentration of crashes was reported at the intersections, with few crashes occurring on the segments between intersections.

Figure 10. Corridor wide – Crashes by Type

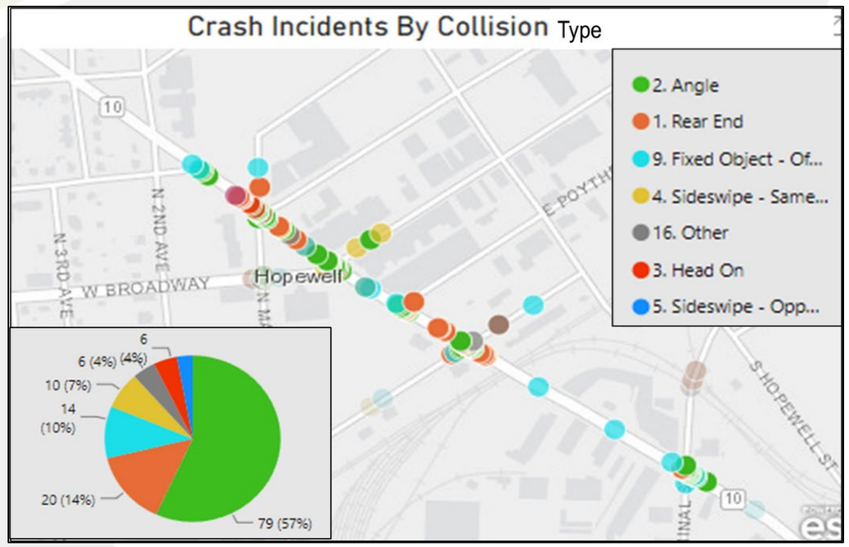
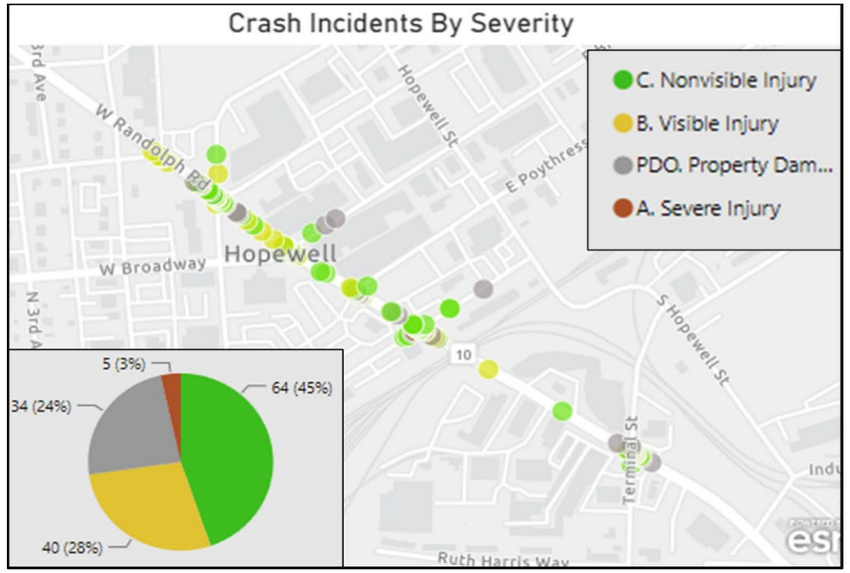


Figure 11. Corridor wide – Crashes by Severity



The 2019 VTRANS Needs indicate the intersection of Randolph Road at N. Main Street and E. Cawson Street as a Priority 3 medium safety need intersection. A total of 33 crashes were recorded at this intersection. These crashes are from the years 2015 through 2023, no crashes were recorded during the year 2016. Details on crashes by collision type and the percentage splits of collision types at N. Main Street are outlined in **Figure 12** and details on crashes by severity are outlined in **Figure 13**.

Key takeaways from the N. Main Street crash data are as follows:

1. The majority of reported crashes at the N. Main Street intersection are rear-end and angle crashes. Combined, these constitute approximately 69% of the total crashes. Nearly 45% of crashes were angle crashes (15 of 33)
2. Highest number of crashes were recorded during the year 2019 (6 crashes)
3. 4 crashes have been recorded during the nighttime.
4. 2 crashes have been recorded due to speeding.
5. Skewed and 5-legged geometric layout could be a major contributing factor for the angle crashes.
6. 26 injury incidents have been recorded at this intersection and 55% of crashes were Nonvisible injury crashes (18 of 33)
6. 1 of 5 severe injury crashes has been recorded at the intersection of N. Main Street

Figure 12. Randolph Road and N. Main Street Intersection – Crashes by Collision Type

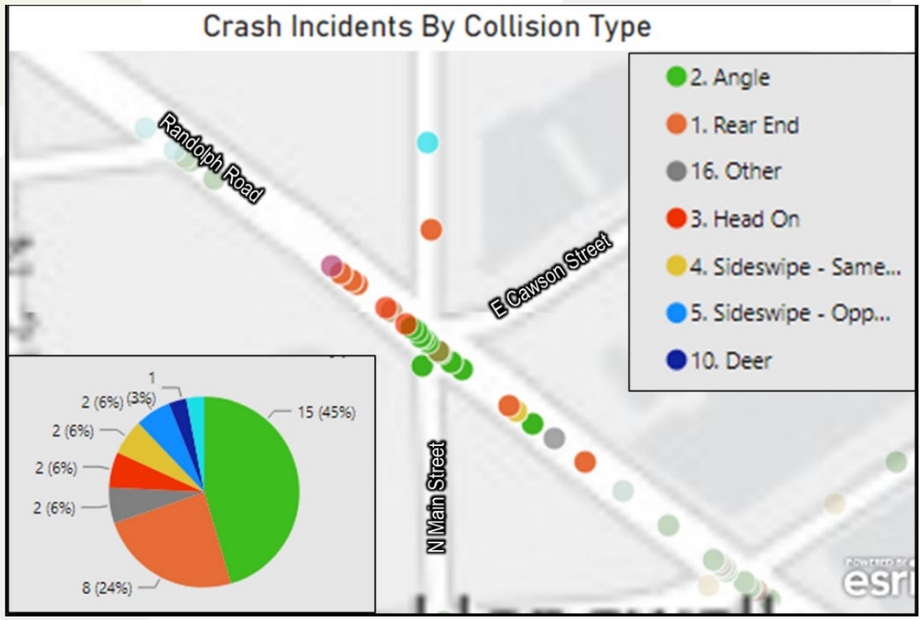
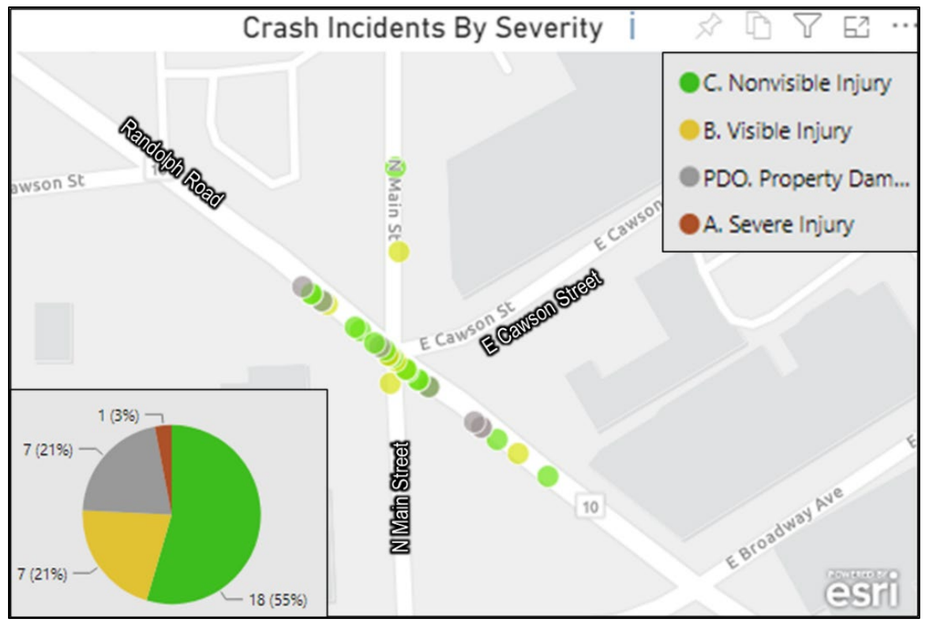


Figure 13. Randolph Road and N. Main Street Intersection – Crashes by Severity



The 2019 VTRANS Needs indicate the intersection of VA-10 (Randolph Road) at E. City Point Road as a Priority 1 Very High safety need intersection. A total of 41 crashes were recorded at this intersection. These crashes are from the years 2015 through 2023. Details on crashes by collision type and the percentage splits of collision types at E. City Point Road are outlined in **Figure 14** and details on crashes by severity are outlined in **Figure 15**.

Key takeaways from the E. City Point Road crash data are as follows:

1. The majority of reported crashes at the E. City Point Road intersection are rear-end and angle crashes. Combined, these constitute approximately 69% of the total crashes. Nearly 56% of crashes were angle crashes (23 of 41)
2. Highest number of crashes were recorded during the year 2019 (8 crashes)
3. 6 crashes have been recorded during the nighttime.
4. 3 crashes have been recorded due to speeding.
5. 32 injury incidents have been recorded at this intersection and 51% of crashes were Nonvisible injury crashes (21 of 41)
6. 3 of 5 severe injury crashes has been recorded at the intersection of City Point Road

Figure 14. Randolph Road and E. City Point Road Intersection – Crashes by Collision Type

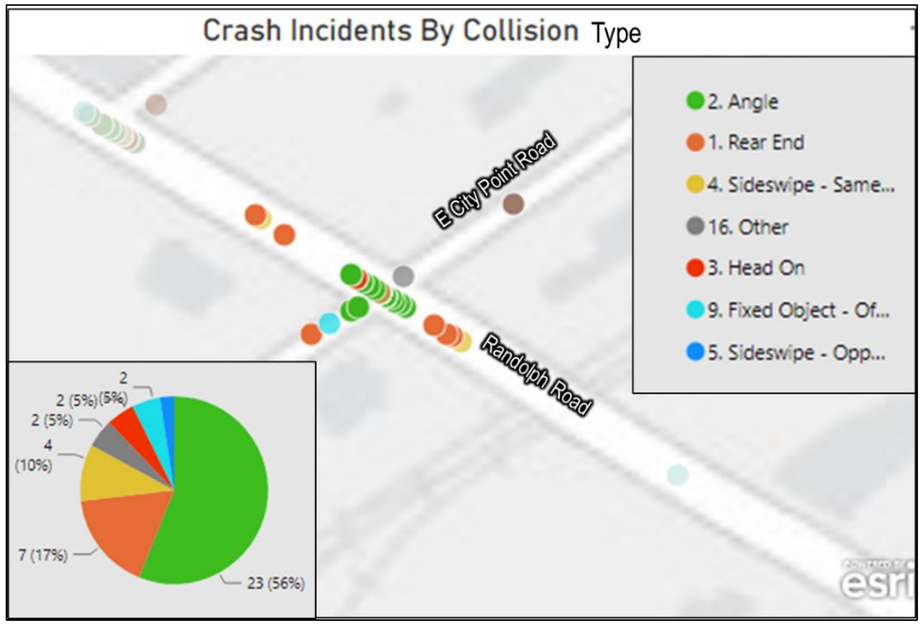
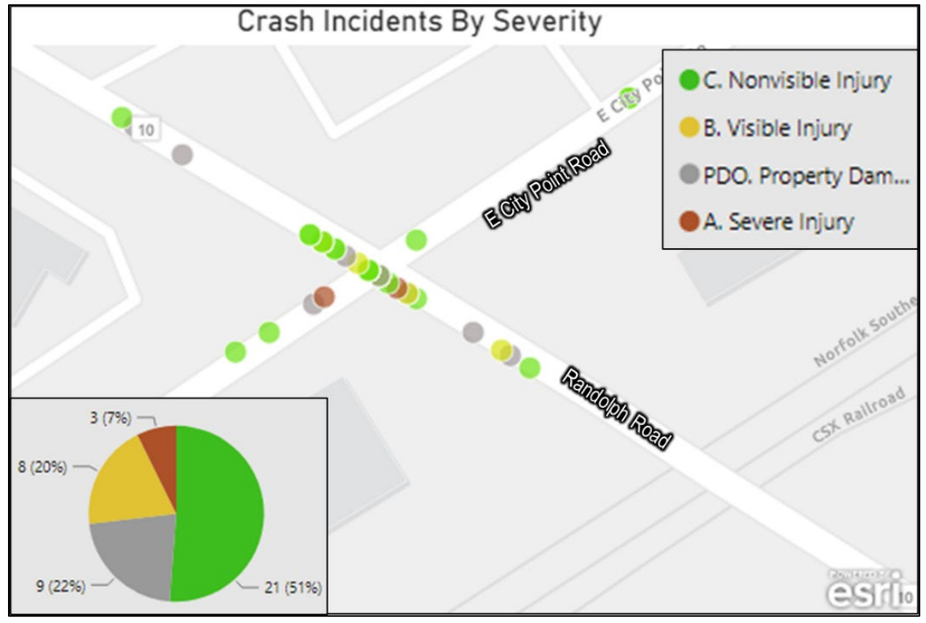


Figure 15. Randolph Road and E. City Point Road Intersection – Crashes by Severity



Chapter 2 – Alternative Development and Refinement

Alternative Development and Screening

To address the safety, access, and operational issues identified in the previous chapter Phase 1, preliminary potential improvement concepts were developed. These concepts were scoping level alternatives that were developed and shared with the study work group in Fall 2024. They included changes to intersections to restrict turns, new and improved facilities for bicyclists and pedestrians, intersection improvements, and access management.

No analysis was performed on the scoping level concepts in Phase 1. They were conceived simply to imagine options for what might be possible to address the needs and issues confirmed in the Needs Evaluation and Diagnosis explained in the previous chapter and to define potential concepts for further exploration in Phase 2. The following **Figure 16** illustrates the type of improvements brought forward for discussion the Phase 1 effort.

Figure 16. Summary of Phase 1 Identified Improvement Options

Legend: VTRANS Needs Addressed

Pedestrian Access	Bicycle Access
Transit/TDM	Safety Improvement

Corridor Wide Pedestrian and Bicycle Improvements
- New and upgraded ped crossings, ADA review
- Leading pedestrian intervals
- Pedestrian warning and regulatory signing
- Remove/Relocate Utility Poles from Middle of Sidewalks
- New VA-10 Cross-Section to Include Bike Lanes
- Relocate VA-10 Truck Route

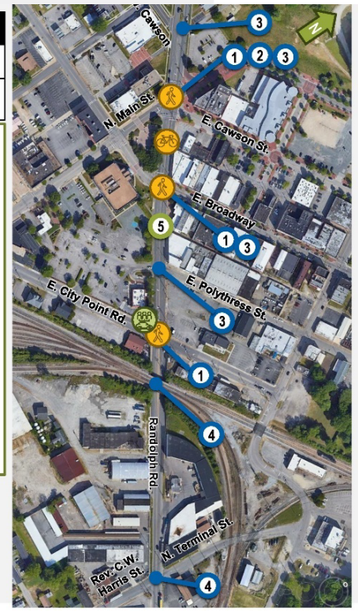
Transit and TDM Improvements
- Modify Hopewell Circulator route, add/relocate stops
- Improve existing bus stop amenities (shelters, benches)
- RideFinders Ride-Share Options

* Denotes an innovative intersection concept. More information on innovative intersections and real-world examples can be found at https://www.virginiadot.org/innovativeintersections/

Safety and Operations Improvements
1. Signal phasing modifications
2. Roundabout*
3. Turn movement restrictions
4. Traffic barrier

Corridor Wide Operations and Safety Improvements 5

The improvements proposed along this corridor include:
- Road diet / complete streets
- Access management review
- Lighting upgrades
- Signing and marking upgrades
- Signal timing/phasing optimization



VJuST Screening

VJuST is a VDOT tool used to identify innovative intersections that may be appropriate based on geometry and volumes. It calculates the volume-to-capacity (V/C) ratio and number of conflict points for each innovative intersection type. It is a preliminary screening tool and does not look at adjacent intersections or right-of-way impacts. Considering that traffic capacity is not an identified need for any of the intersections in the corridor, per both VJuST and inspect of the existing traffic operations analysis, the focus was instead on identifying potential innovative intersection types that would help to address the ongoing safety concerns at the E. Randolph Road / N. Main St/E. Cawson Street 5-way intersection as shown in **Figure 17** below. **Figure 18** on the following page shows the VJuST workbook output with the roundabout option.

Figure 17. Plan view of existing 5-way intersection- priority one safety intersection

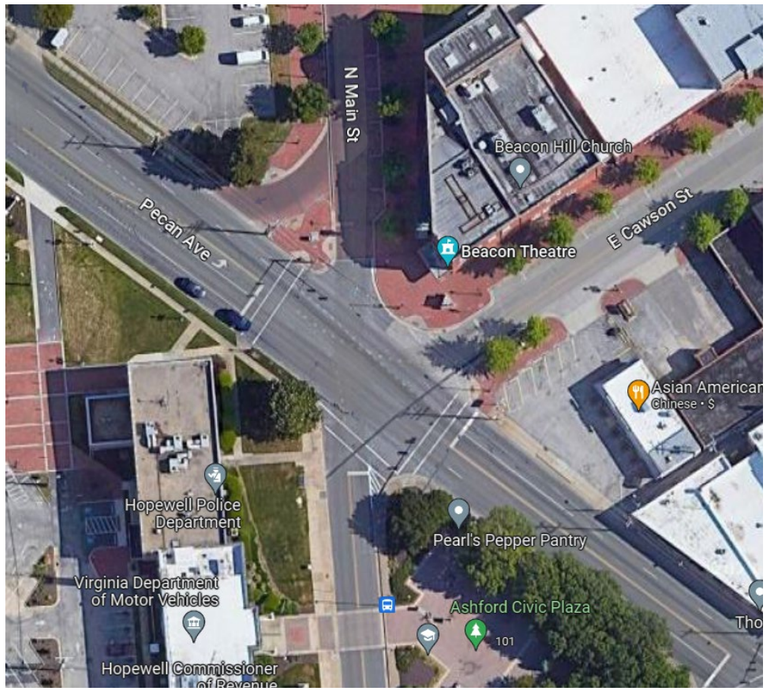


Figure 18. VJuST input and output considering a potential roundabout

PM Peak Hour (Heavier Traffic)

VJuST
VDOT Junction Screening Tool

Volumes (veh/hr)	U-Turn / Left	Through		Right
Eastbound	64	357	64	37
Westbound	5	383	64	23
Northbound	38	24	64	38
Southbound	74	51	64	20

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Notes
Conventional	-	0.37		48	$	
Roundabout	-	0.34		8	$$	

Congestion
Pedestrian
Safety
Planning Level Costs

VJuST indicated that the Roundabout innovative intersection could potentially be applicable to the intersection of E. Randolph Rd and Main St. The study team sketched a roundabout that would accommodate the WB-67 truck traffic that is present on this section of E. Randolph Road, and it was found that the resulting size of the roundabout would not fit within the constrained environment between the existing buildings. After review by the SWG, the roundabout option was dropped from further consideration.

Phase 2 Refinement and Screening of Potential Concepts

Phase 2 began in November 2023 and included further development and refinement of the concepts identified in Phase 1 concepts. Per input of the SWG, the various turn restriction concepts were eliminated from further consideration. The road diet concept, however, continued forward with further analysis and comparison of alternative configurations and features. The study team continued developing the potential Phase 1 concepts. The study team advanced the Phase 1 concepts in terms of level of detail to identify potential sidewalk and shared use path alignments as well as to identify commercial entrances that could be closed or consolidated. The following concepts, shown in **Table 9**, were advanced to Phase 2. **Figures 19 and 20** on the following page provide street section illustrations for the two alternatives being considered.

Tier 2 Screening

Table 9. Phase 2 Concepts

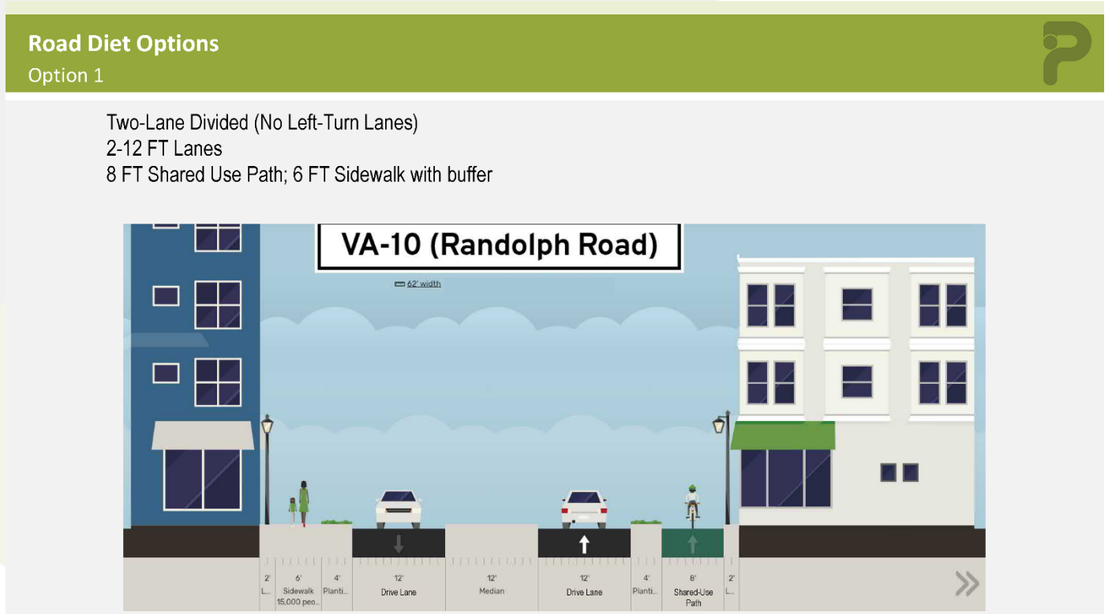
Option #1	
Road Diet with Two Thru Lanes and Median	Pedestrian Facilities improvements on the north and south
Option #2A	
Road Diet with Two Thru Lanes and TWLTL	Pedestrian Facilities improvements on the north and south
Option #2B	
Road Diet with Two Thru Lanes and TWLTL	Pedestrian Facilities improvements on the south side only
Option #2C	
Road Diet with Two Thru Lanes and TWLTL	Bike lanes on the north and south sides
Option #3	
Roundabout	The intersection of Randolph Rd and Main St/ E. Cawson Rd
Option #4	
Safety Improvements	Signages and markings recommendations at various intersections

Option # 1:

Road Diet/ 2 Thru Lanes W/ Median

- 8’ Shared Use Path on the north side
- 4’ Green Buffer on the north side
- 12’ Thru lane each direction
- 12’ Median
- 4’ Green Buffer on the south side
- 6’ Sidewalk to the south side
- Total ROW width 62’

Figure 19. Road Diet Option 1 street section

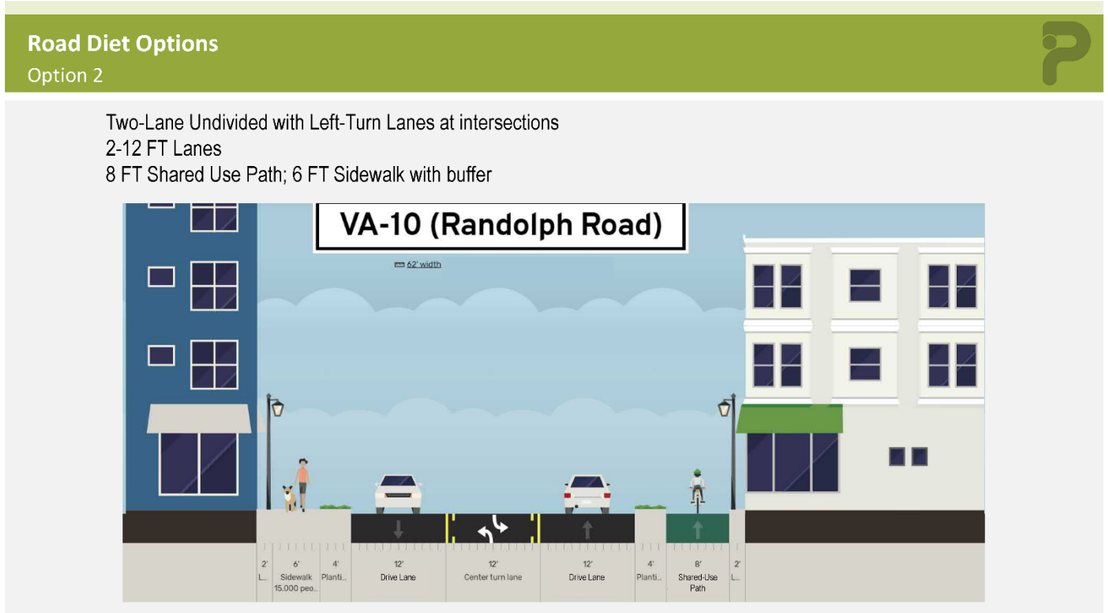


Option # 2A:

Road Diet/ 2 Thru Lanes and TWLTL

- 8’ Shared Use Path on the north side
- 4’ Green Buffer on the north side
- 12’ Thru lane each direction
- 12’ lane TWLTL
- 4’ Green Buffer on the south side
- 6’ Sidewalk to the south side
- Total ROW width 62’

Figure 20. Road Diet Option 2 street section



The two alternatives were compared, using existing volumes, in terms of traffic operations and the results are as shown below in **Table 10**. It was found that option 2 which includes turn lanes at intersections, as anticipated, performed better, with less delay and queuing, than option 1.

Table 10 Alternatives Comparison Summary.

INTERSECTION	DIRECTION	ROADWAY	CONTROL	EXISTING (PM)	OPTION 1	OPTION 2
				DELAY (s/veh)	DELAY (s/veh)	DELAY (s/veh)
VA-10 (Randolph Road) & N. Terminal Street	Eastbound	VA-10	Free	0.1 (A)	0.1 (A)	0.1 (A)
	Westbound	VA-10	Free	0.1 (A)	0.1 (A)	0.1 (A)
	Northbound	N. Terminal St.	Stop	21.7 (C)	21.8 (C)	21.8 (C)
	Southbound	N. Terminal St.	Stop	17.0 (C)	17.0 (C)	17.0 (C)
			INTERSECTION	**1.5 (A)**	**1.5 (A)**	**1.5 (A)**
VA-10 (Randolph Road) & E. City Point Road	Eastbound	VA-10	SIGNAL	24.1 (C)	9.1 (A)	8.2 (A)
	Westbound	VA-10		21.4 (C)	15.7 (B)	14.1 (B)
	Northbound	E. City Point Rd.		37.0 (D)	32.6 (C)	32.6 (C)
	Southbound	E. City Point Rd.		15.1 (B)	20.0 (B)	20.0 (B)
			INTERSECTION	**23.8 (C)**	**15.5 (B)**	**14.4 (B)**
VA-10 (Randolph Road) & E. Poythress Street	Eastbound	VA-10	Free	0.8 (A)	1.1 (A)	0.7 (A)
	Westbound	VA-10	Free	0.0 (A)	0.0 (A)	0.0 (B)
	Northbound	Hardee's Access	Stop	12.9 (B)	14.6 (B)	15.2 (C)
	Southbound	E. Poythress St.	Stop	12.0 (B)	13.7 (B)	14.0 (B)
			INTERSECTION	**1.4 (A)**	**1.6 (A)**	**1.5 (A)**
VA-10 (Randolph Road) & Broadway	Eastbound	VA-10	SIGNAL	4.2 (A)	4.4 (A)	3.5 (A)
	Westbound	VA-10		4.1 (A)	3.3 (A)	2.2 (A)
	Northbound	W. Broadway		26.3 (C)	44.3 (D)	43.3 (D)
	Southbound	E. Broadway		28.2 (C)	31.6 (C)	31.4 (C)
			INTERSECTION	**8.7 (A)**	**12.7 (B)**	**11.7 (B)**
VA-10 (Randolph Road) & N. Main Street	Eastbound	VA-10	SIGNAL	13.6 (B)	15.2 (B)	16.6 (B)
	Westbound	VA-10		13.9 (B)	13.3 (B)	11.5 (B)
	Northbound	N. Main Street		33.4 (C)	Removed	Removed
	Southbound	N. Main Street		33.9 (C)	37.6 (D)	46.5 (D)
	Southwestbound	E. Cawson Street		30.9 (C)	34.4 (C)	33.9 (C)
			INTERSECTION	**17.6 (B)**	**17.1 (B)**	**17.7 (B)**
VA-10 (Randolph Road) & E. Cawson Street	Eastbound	VA-10	Free	0.1 (A)	0.1 (A)	0.1 (A)
	Westbound	VA-10	Free	0.3 (A)	0.3 (A)	0.3 (A)
	Northbound	W. Cawson Street	Stop	10.8 (B)	10.7 (B)	10.7 (B)
	Southbound	Alleyway	Stop	9.6 (A)	0.0 (A)	0.0 (A)
			INTERSECTION	**0.3 (A)**	**0.3 (A)**	**0.3 (A)**

INTERSECTION	DIRECTION	ROADWAY	CONTROL	STORAGE (FT)	EXISTING (PM)	OPTION 1	OPTION 2
					95th % Queue	95th % Queue	95th % Queue
VA-10 (Randolph Road) & N. Terminal Street	Eastbound	VA-10	Free	440	0	0	0
	Westbound	VA-10	Free	515	0	0	0
	Northbound	N. Terminal St.	Stop	425	16	16	16
	Southbound	N. Terminal St.	Stop	285	6	6	6
VA-10 (Randolph Road) & E. City Point Road	Eastbound	VA-10	SIGNAL	180	309	124	111
	Westbound	VA-10		415	155	267	231
	Northbound	E. City Point Rd.		305	94	74	74
	Southbound	E. City Point Rd.		390	47	51	51
VA-10 (Randolph Road) & E. Poythress Street	Eastbound	VA-10	Free	250	3	3	0
	Westbound	VA-10	Free	180	0	0	0
	Northbound	Hardee's Access	Stop	120	2	3	3
	Southbound	E. Poythress St.	Stop	555	11	13	14
VA-10 (Randolph Road) & Broadway	Eastbound	VA-10	SIGNAL	210	62	107	86
	Westbound	VA-10		250	63	57	42
	Northbound	W. Broadway		180	57	173	167
	Southbound	E. Broadway		270	89	101	98
VA-10 (Randolph Road) & N. Main Street	Eastbound	VA-10	SIGNAL	170	110	245	268
	Westbound	VA-10		210	118	209	162
	Northbound	N. Main Street		155	103	N/A	N/A
	Southbound	N. Main Street		240	95	99	102
	Southwestbound	E. Cawson Street		350	57	57	57
VA-10 (Randolph Road) & E. Cawson Street	Eastbound	VA-10	Free	110	0	0	0
	Westbound	VA-10	Free	170	0	0	0
	Northbound	W. Cawson Street	Stop	100	0	0	0
	Southbound	Alleyway	Stop	475	0	0	0

- The analysis considers the worst-case hour: PM Peak
- Highlighted values indicate delay and queues worse than the baseline condition

Concepts Advanced to Tier 2 Screening

With further discussion with the SWG it was determined that road diet option 2 would be preferable. However, due to discomfort with locating bicycles immediately adjacent to the travel lanes, the preference was that bicycles to be accommodated with a shared use path, similar to the path that is currently funded and planned for construction along the south side of East Randolph Road west of the project limits.

The road diet concept was advanced into a draft configuration, for further exploration and discussion, as shown in the following **Figures 21 and 22.** Note that two major refinements are reflected in these graphics, including:

1. Closing N. Main Street on the east side of E. Randolph Street and west side of E. Randolph Street to vehicular traffic, and
2. Relocating Appomattox Street to intersect E. Randolph Street across from West Cawson Street.

A primary need with this project is to address safety concerns at the existing 5-leg intersection of E. Cawson Street / N. Main Street / E. Randolph Road, hence the concept to reconfigure the E.Cawson Street intersection by constructing improvements as described under items 1 and 2 above.

Note that Chapter 4 includes the final concept configuration after continued refinements per the Phase 3 field review and additional input from the SWG.

Figure 21. Road Diet early draft preferred configuration (1 of 2)

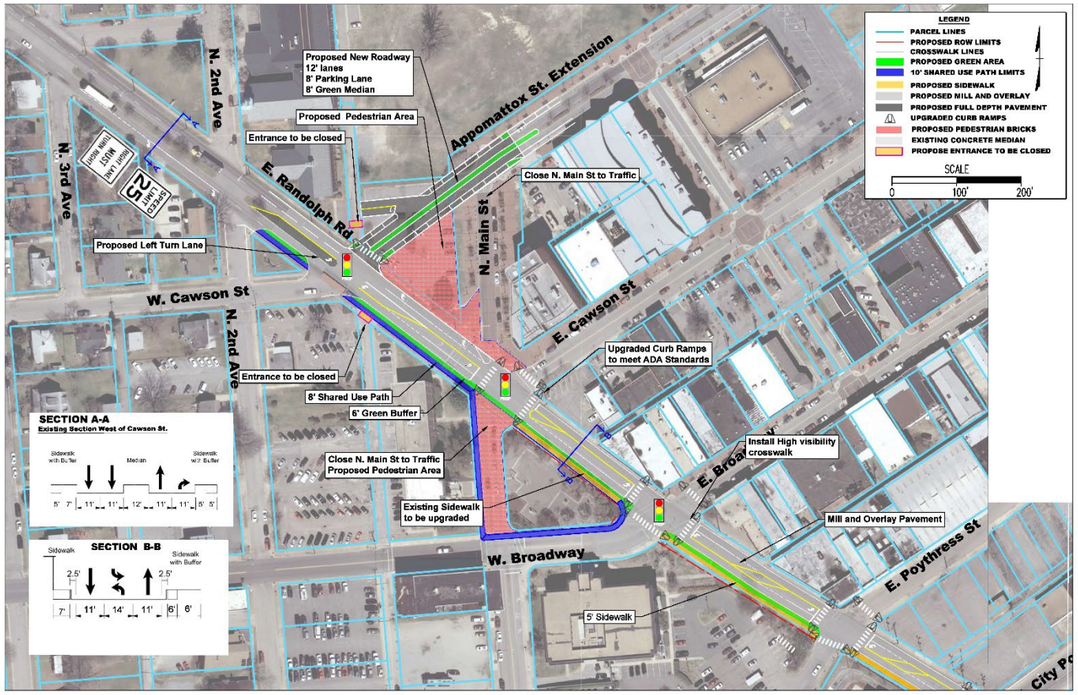
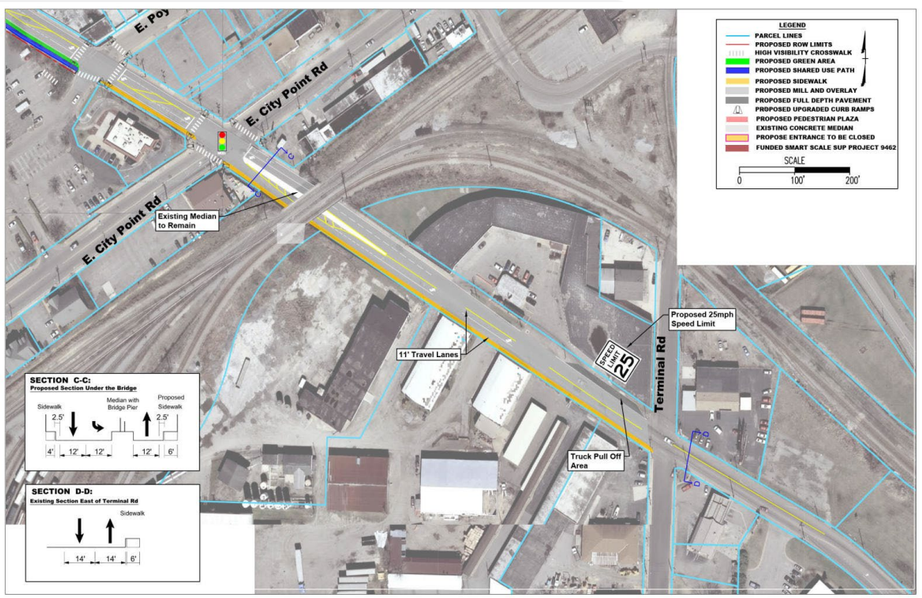


Figure 22. Road Diet early draft preferred configuration (1 of 2)

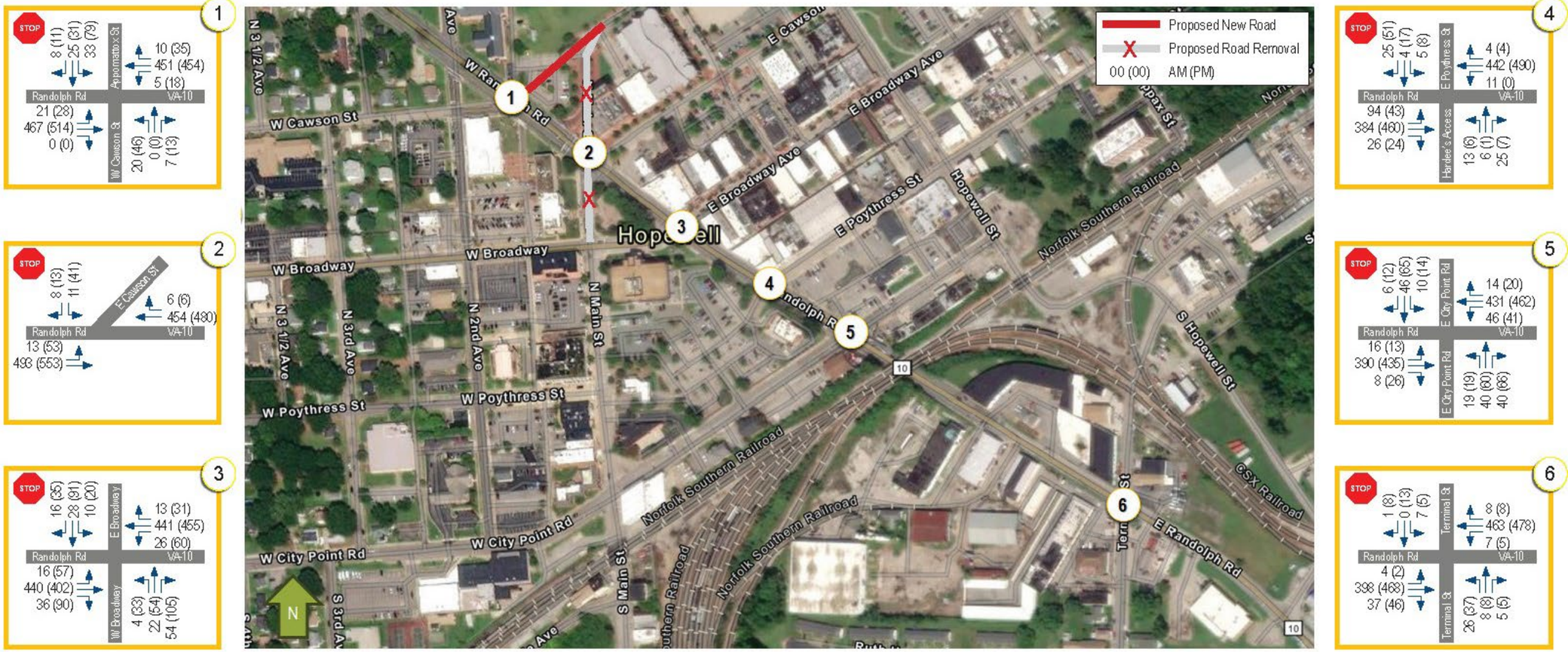


Future Traffic Forecasting

The study team worked through the traffic forecasting process based on VDOT required procedures. The traffic forecasting memorandum is provided in the **Appendix D** to this document.

The agreed upon growth rate to apply to the existing traffic volumes was .7%/yr. The following **Figure 23** illustrates the future year build traffic volumes once re-routed per the closure of North Main Street and relocation of Appomattox Street. These volumes are the design horizon year 2052 build conditions volumes.

Figure 23. Future year 2052 volumes (with assumed modifications to intersections 1 and 2)



Traffic Operations Analysis

Traffic operational analyses were conducted to evaluate the overall performance of the study corridor in 2052 AM and PM peak hour conditions. This project is unique as the existing conditions analysis, nor the VTRANS needs, point to capacity concerns in the corridor. Instead, the focus is on the VTRANS needs of improving bicycle, pedestrian, and safety conditions in the corridor. With this in mind, a no-build scenario was not analyzed but instead the focus is on verifying that the build condition with road diet geometry, modified intersection at E. Cawson Street / N. Main Street, and the new intersection at Appomattox Street extended will function satisfactorily from a traffic operational perspective.

Note that a planning level signal warrant evaluation was conducted and an SJR was developed to explore the potential need for a traffic signal at the new Appomattox Street extended connection to E. Randolph Road. As part of this effort the study team developed both year 2032 and the 2052 volumes (shown in Figure 23) to see if the peak hours would exceed threshold volumes in the MUTCD warrants. Also, the VDOT planning warrant was evaluated based on considering the projected peak hour counts and using a “k” factor of .9 to develop projected ADT volumes. The SJR concluded that a signal could not be warranted with the volume set that we have to work with at this time. To supplement this analysis, the projected volumes were run in Synchro, and it was found that the resulting LOS’ and delays were similar between the unsignalized and signalized scenarios. The 2032 and 2052 volume sets and analysis comparison tables were provided in the SJR. Without a signal, the PM peak hour year 2052 sidestreet delay results in LOS E, however the projected queue is less than what would occur with a traffic signal. With these findings, the concept drawings and cost estimates proceeded without further consideration of signalization at that new intersection.

The base year model was updated to reflect:

1. the road diet geometry and:
2. modifications to the Appomattox Street / West Cawson Street intersection to bring in the fourth leg on the east side, and
3. the intersection of E. Cawson Street / N. Main Street to remove the two N. Main Street intersections.

The results of the Tier 2 screening are shown in **Tables 12 and 13 on the following pages**.

Table 11 Preferred Configuration Traffic Analysis Results – LOS and Delays

Intersection		Control	Overall Delay (LOS)	Average Delay (sec/veh) and Level of Service							
				Eastbound		Westbound		Northbound		Southbound	
				LTR		LTR		LTR		LTR	
1	Terminal Street & VA-10 Randolph Road (two way stop)	Stop		AM Peak Hour							
			1.0 (A)	0.1 (A)		0.1 (A)		19.7 (C)		18.0 (C)	
				0.1		0.1		19.7		18.0	
				A		A		C		C	
				PM Peak Hour							
			1.6 (A)	0.0 (A)		0.1 (A)		23.5 (C)		18.3 (C)	
				0.0		0.1		23.5		18.3	
				A		A		C		C	
Intersection		Control	Overall Delay (LOS)	Eastbound		Westbound		Northeast		Southwest	
				LT	TH/RT	LT	TH/RT	LT	TH/RT	LT	TH/RT
2	E. City Point Road & VA-10 Randolph Road (Signal)	Signal		AM Peak Hour							
			11.4 (B)	8.3 (A)		8.6 (A)		30.5 (C)		25.0 (C)	
				6.1	8.4	6.4	8.8	30.0	30.7	24.6	25.1
				A	A	A	A	C	C	C	C
				PM Peak Hour							
			12.6 (B)	8.4 (A)		8.7 (A)		32.0 (C)		25.8 (C)	
				5.8	8.5	6.2	9.0	30.4	32.2	25.2	26.0
				A	A	A	A	C	C	C	C
Intersection		Control	Overall Delay (LOS)	Eastbound		Westbound		Northeast		Southwest	
				LT	TH/RT	LT	TH/RT	LTR		LTR	
3	E. Poythress Street & VA-10 Randolph Road (two way stop)	Stop		AM Peak Hour							
			2.1 (A)	1.6 (A)		0.2 (A)		17.8 (C)		14.4 (B)	
				8.5	0	8.1	0	17.8		14.4	
				A	A	A	A	C		B	
				PM Peak Hour							
			1.7 (A)	0.7 (A)		0 (A)		18.3 (C)		16.7 (C)	
				8.4	0	0	0	18.3		16.7	
				A	A	A	A	C		C	

Table 11 - continued

	Intersection	Control	Overall Delay (LOS)	Average Delay (sec/veh) and Level of Service					
				Eastbound		Westbound		Northeast	Southwest
				LT	TH/RT	LT	TH/RT	LTR	LTR
4	E. Broadway & VA-10 Randolph Road (Signal)	Signal		AM Peak Hour					
			7.4 (A)	2.9 (A)		2.7 (A)		41.0 (D)	41.5 (D)
				1.8	2.9	1.8	2.8	41.0	41.5
				A	A	A	A	D	D
				PM Peak Hour					
			12.6 (B)	5.3 (A)		5.3 (A)		37.6 (D)	34.2 (C)
				3.8	5.5	3.9	5.4	37.6	34.2
				A	A	A	A	D	C
	Intersection	Control	Overall Delay (LOS)	Eastbound		Westbound		n/a	Southwest
				LT	TH	TH/RT		n/a	LT/RT
5	E. Cawson Street & VA-10 Randolph Road (Signal)	Signal		AM Peak Hour					
			2.8 (A)	1.8 (A)		1.7 (A)		n/a	49.9 (D)
				1.0	1.9	1.7		n/a	49.9
				A	A	A		n/a	D
				PM Peak Hour					
			4.9 (A)	2.8 (A)		2.6 (A)		n/a	47.8 (D)
				1.8	2.9	2.6		n/a	47.8
				A	A	A		n/a	D
	Intersection	Control	Overall Delay (LOS)	Eastbound		Westbound		Northeast	Southwest
				LT	TH/RT	LT	TH	RT	LTR	LTR
6	W. Cawson Street/Appomattox Street & VA-10 Randolph Road (two way stop)	Stop		AM Peak Hour						
			2.2 (A)	0.4 (A)		0.1 (A)			21.1 (C)	22.8 (C)
				8.2	0	8.2	0	0	21.1	22.8
				A	A	A	A	A	C	C
				PM Peak Hour						
			5.6 (A)	0.4 (A)		0.3 (A)			29.8 (D)	39.3 (E)
				8.3	0	8.5	0	0	29.8	39.3
				A	A	A	A	A	D	E

Table 12 Preferred Configuration Traffic Analysis Results Year 2052 - Queues

Intersection		Control	Peak Hour	95th Percentile Queue (ft)							
				Eastbound		Westbound		Northbound		Southbound	
				LTR		LTR		LTR		LTR	
1	Terminal Street & VA-10 Randolph Road	Stop	AM	0		0		15		3	
			PM	0		0		28		10	
Intersection		Control	Peak Hour	Eastbound		Westbound		Northeast		Southwest	
				LT	TH/RT	LT	TH/RT	LT	TH/RT	LT	TH/RT
2	E. City Point Road & VA-10 Randolph Road	Signal	AM	14	219	32	251	32	63	17	49
			PM	13	263	30	287	31	101	21	66
Intersection		Control	Peak Hour	Eastbound		Westbound		Northeast		Southwest	
				LT	TH/RT	LT	TH/RT	LTR		LTR	
3	E. Poythress Street & VA-10 Randolph Road	Stop	AM	8	0	0	0	15		10	
			PM	3	0	0	0	5		25	
Intersection		Control	Peak Hour	Eastbound		Westbound		Northeast		Southwest	
				LT	TH/RT	LT	TH/RT	LTR		LTR	
4	E. Broadway & VA-10 Randolph Road	Signal	AM	6	123	9	115	58		57	
			PM	29	216	31	218	147		129	
Intersection		Control	Peak Hour	Eastbound		Westbound		n/a		Southwest	
				LT	TH	TH/RT		n/a		LT/RT	
5	E. Cawson Street & VA-10 Randolph Road	Signal	AM	4	103	92		n/a		33	
			PM	16	153	124		n/a		68	
Intersection		Control	Peak Hour	Eastbound		Westbound			Northeast	Southwest	
				LT	TH/RT	LT	TH	RT	LTR	LTR	
6	W. Cawson Street / Appomattox Street & VA-10 Randolph Road	Stop	AM	3	0	0	0	0	13	35	
			PM	3	0	3	0	0	45	120	

Expected Crash Reduction

The SMART SCALE Planning Level Crash Modification Factors (CMFs) for Round 5 were reviewed for each of the improvements included at the study area segments and intersections along the E. Randolph Road corridor to determine what changes may be expected in crash frequency. The safety metrics used in this screening are based on crash modification factors (CMFs). CMFs were selected from the SMART SCALE Planning Level CMF List from Round 5. The CMF resulting in the highest anticipated crash reduction was applied to fatal and injury (F+I) crashes within the influence area of each intersection. There were 105 combined F+I crashes in the study period. **Table 11** summarizes the CMF used for the study corridor study area.

Table 13 Proposed Crash Modification Factors

Applicable Crash Modification Factors		
Source	**Description**	**Factor**
VDOT - State Preferred CMF List	Road Diet (4U to 3T)	.71 (apply to all types)

Expected project impact would be 104-(.71*104) = 30 crashes, with a reduction of 74 for the same period.

This project removes two legs from the five-legged intersection at E. Cawson Street /N. Main Street. This intersection is a VTrans priority location for safety and will be improved by simplifying the movements and providing a turn lane from E. Randolph Road onto E. Cawson Street. During the study period there were 33 crashes (see report page 18) at this intersection with 69% of those being angle and rear-end crashes. There were 26 incidences of injuries with 1 being severe. The road diet project (adding a left turn lane on E. Randolph Road) will help to cure some of these, however, removing two of the approaches from the five-approach intersection will have a substantial safety benefit. A CMF was not located for this condition, however.

Chapter 3 – Public and Stakeholder Outreach and Feedback

Public & Stakeholder Outreach & 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, and created a public survey to meet the public engagement needs for this study.

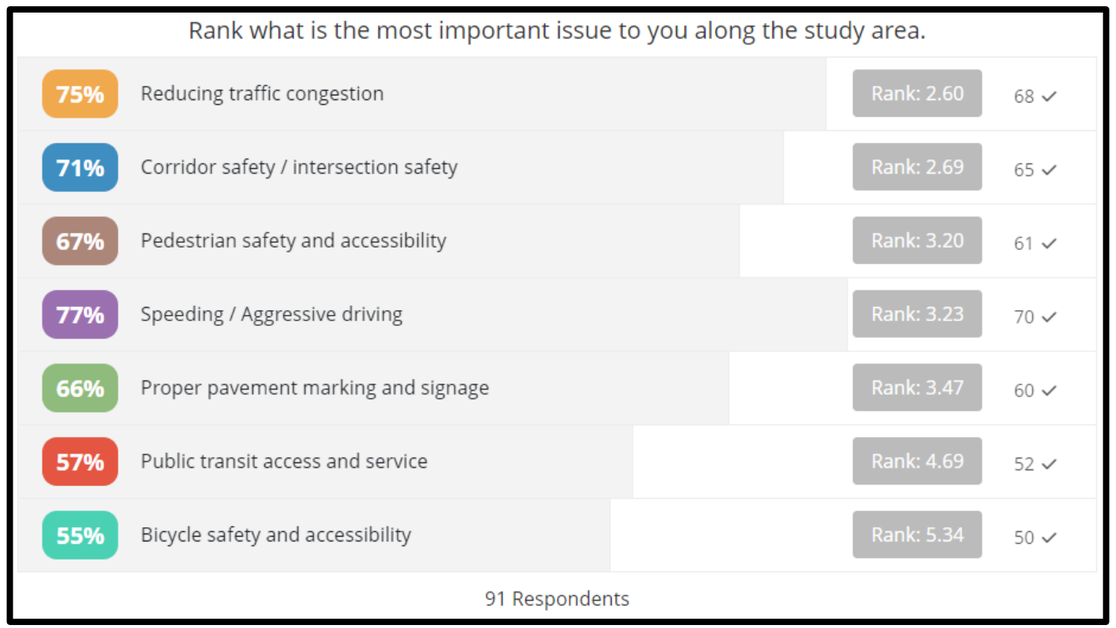
Stakeholder Coordination

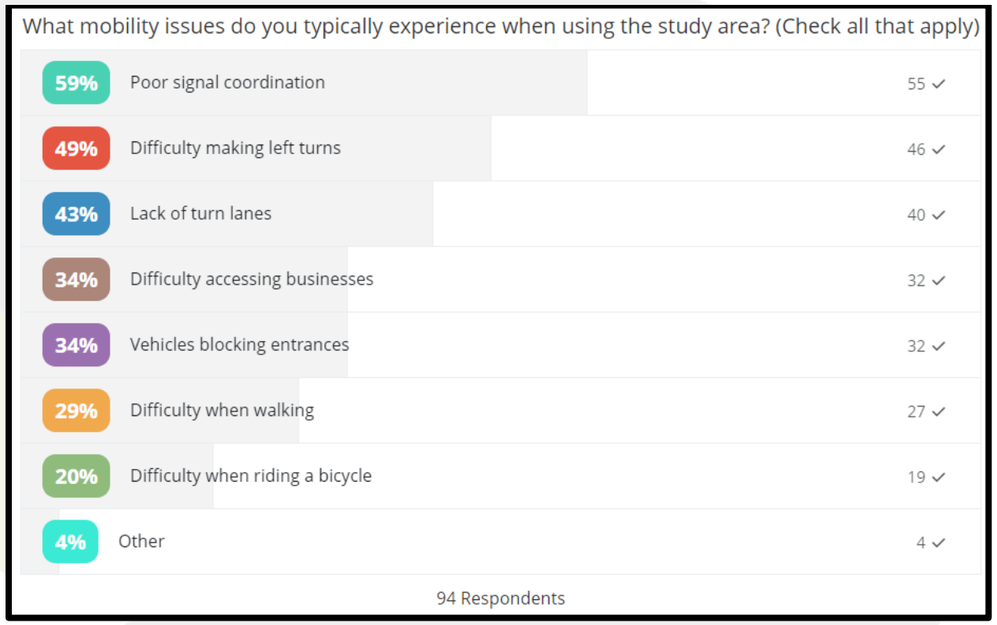
Stakeholder engagement is a key part in making the recommendations of the study successful from more than a traffic operation standpoint. The stakeholders provide local knowledge about the study area and help guide the study direction. The project stakeholders identified in Chapter 1 were involved in all steps of the Project Pipeline process and assisted in making decisions about which concepts to move forward to public engagement.

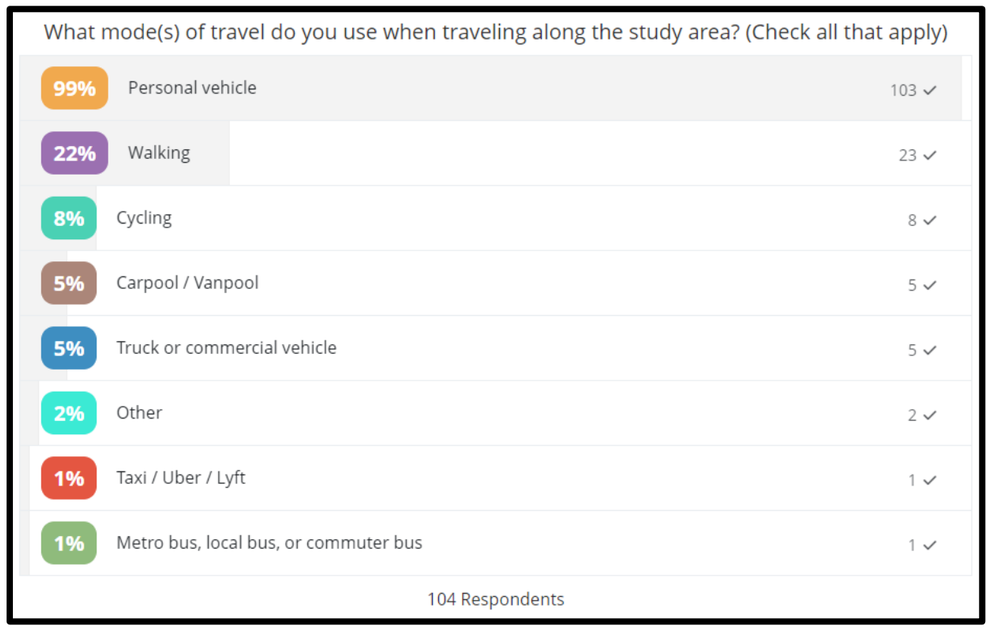
Public Involvement

Two public surveys were issued as part of this planning process.

In the first PublicInput.com survey, there were 139 participants who provided 171 comments and 3,494 comments. The following summary graphics are provided for the first survey. Note that the speeding/aggressive driving percentage appears to be a miscalculation from publicinput.com, however the data still indicates that it is a high priority concern.




What mobility issues do you typically experience when using the study area? (Check all that apply)
59% Poor signal coordination 55 ✓
49% Difficulty making left turns 46 ✓
43% Lack of turn lanes 40 ✓
34% Difficulty accessing businesses 32 ✓
34% Vehicles blocking entrances 32 ✓
29% Difficulty when walking 27 ✓
20% Difficulty when riding a bicycle 19 ✓
4% Other 4 ✓
94 Respondents


What mode(s) of travel do you use when traveling along the study area? (Check all that apply)
99% Personal vehicle 103 ✓
22% Walking 23 ✓
8% Cycling 8 ✓
5% Carpool / Vanpool 5 ✓
5% Truck or commercial vehicle 5 ✓
2% Other 2 ✓
1% Taxi / Uber / Lyft 1 ✓
1% Metro bus, local bus, or commuter bus 1 ✓
104 Respondents

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

75%	Crosswalks / pedestrian signals	62 ✓
54%	Sidewalks	45 ✓
37%	Transit service bus shelters	31 ✓
27%	Bicycle lanes	22 ✓
24%	Shared-use path	20 ✓
19%	Park & ride lot	16 ✓
13%	Bus transfer station	11 ✓
8%	Other	7 ✓

83 Respondents

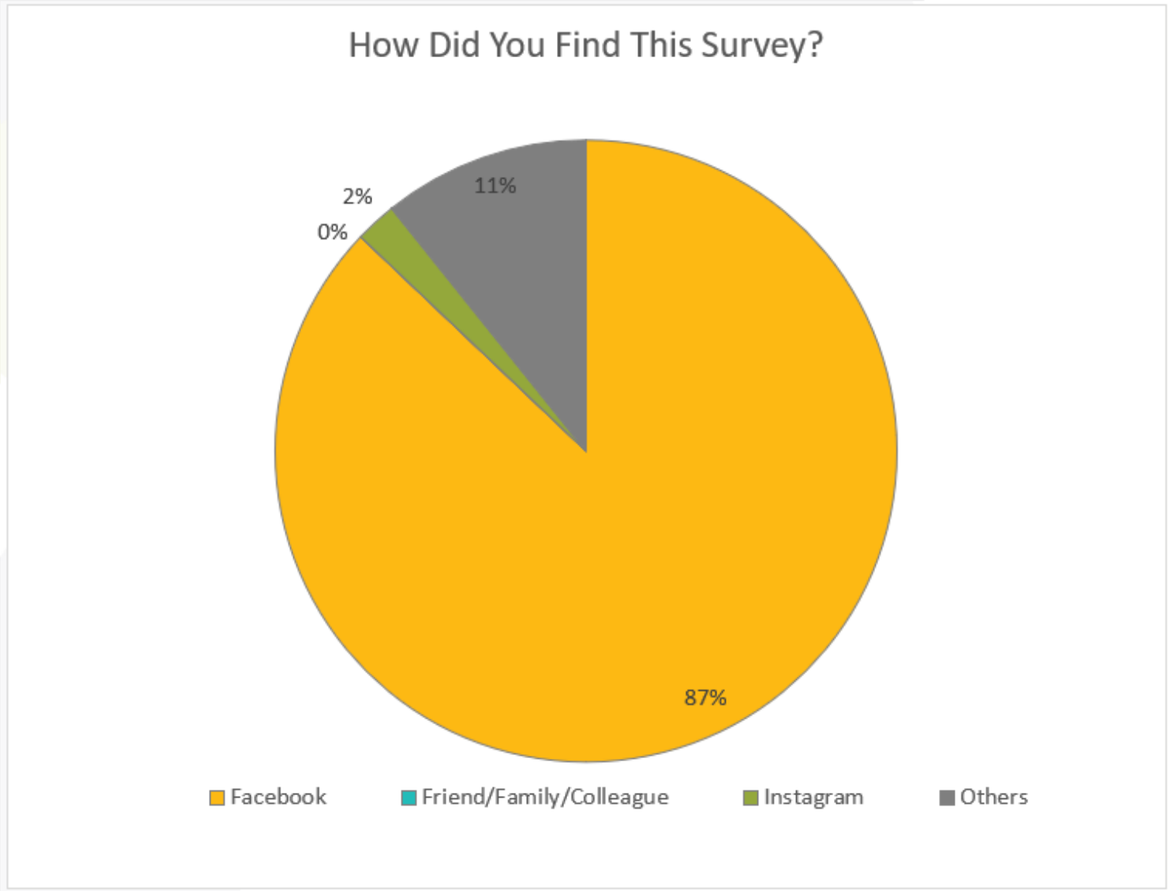
Which of the following safety issues concern you? (Check all that apply)

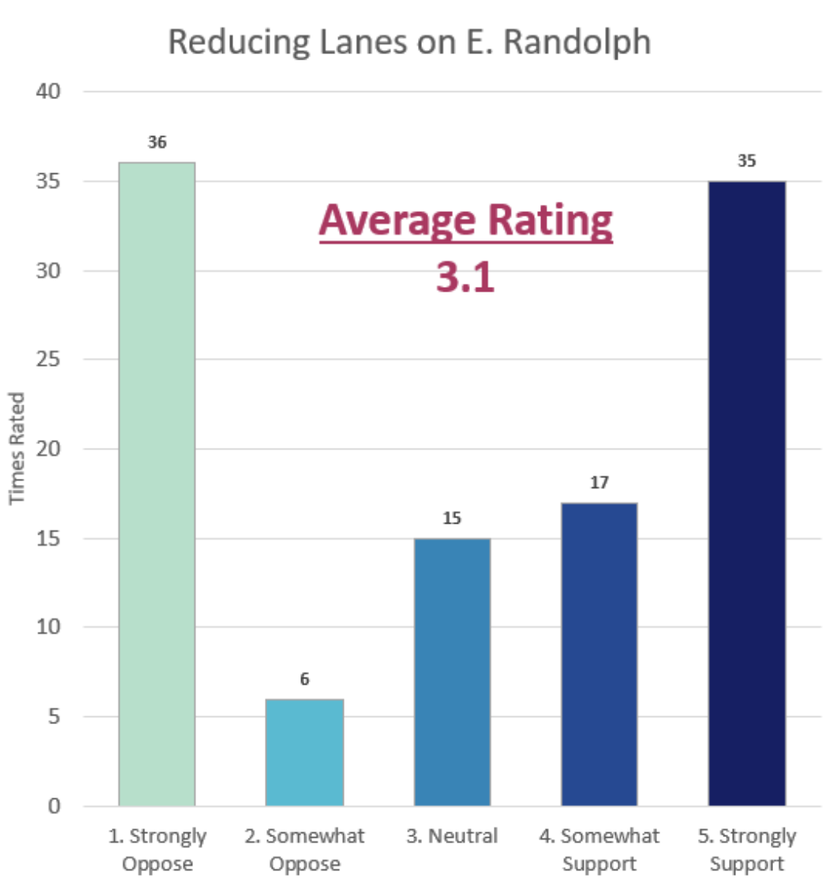
66%	Speeding / Aggressive driving	70 ✓
58%	Inadequate pavement marking and signage	61 ✓
51%	Insufficient / Missing crosswalks and pedestrian signal timing	54 ✓
49%	Running red lights	52 ✓
46%	Inadequate lighting	49 ✓
44%	Lack of sidewalks / missing sidewalks	47 ✓
42%	Difficulty Weaving / Merging	45 ✓
28%	Sudden stopping / rear-end crashes	30 ✓
26%	Lack of ADA ramps and accessibility	28 ✓
22%	Inadequate bicycle facilities	23 ✓
19%	Side-Impact crashes	20 ✓
19%	Inadequate Transit / Bus stops	20 ✓
11%	Closely spaced driveways	12 ✓
9%	Other	10 ✓

106 Respondents

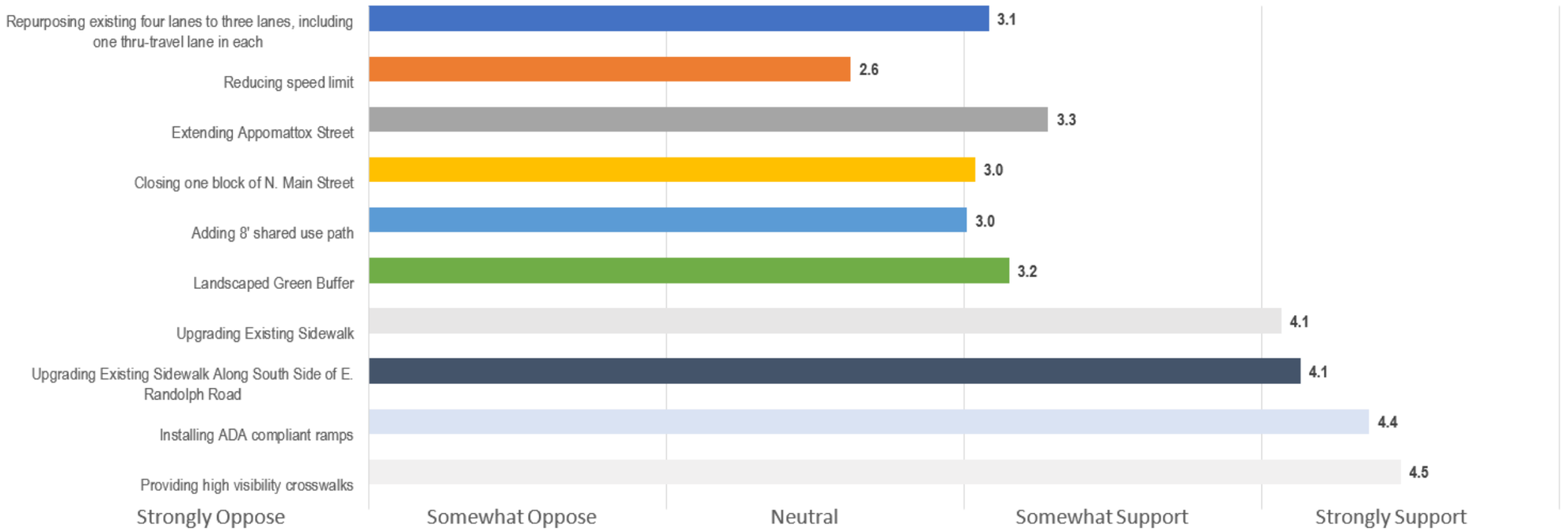
The input received in the initial survey was used to inform concept development. Once concepts were identified and vetted with the SWG and stakeholder group, a 2nd survey, again using the PublicInput.com platform, was conducted from April 8 to April 23, 2024. The early draft of the preferred concept was shared with the public to garner feedback and input. The survey had 161 participants who provided 117 responses.

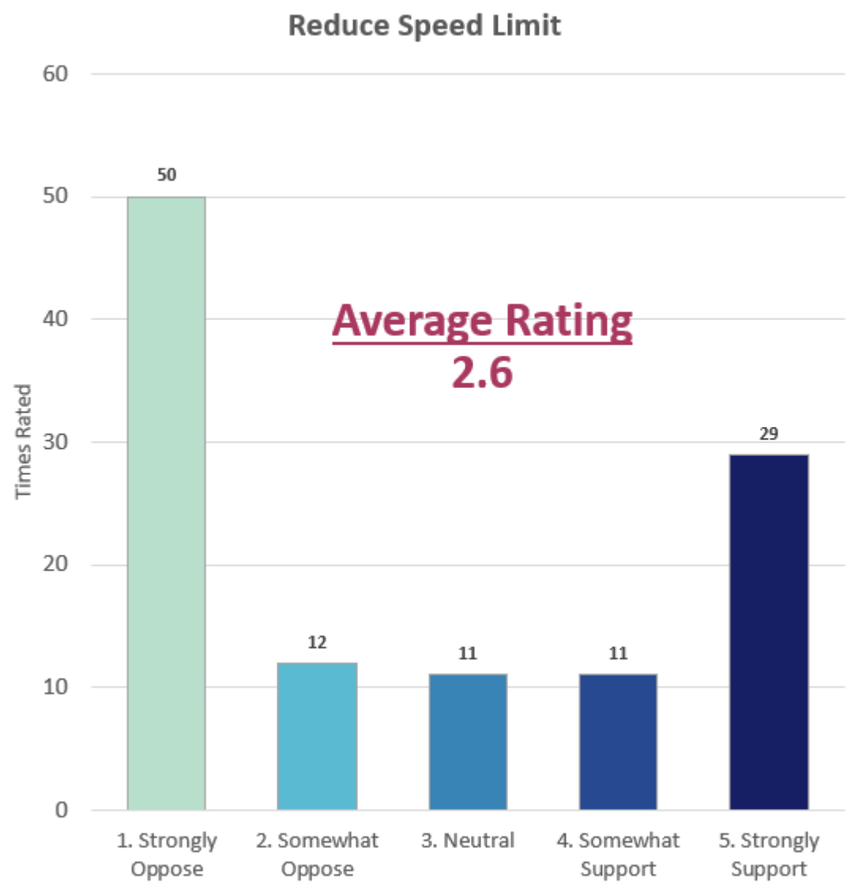
The following graphics are provided to summarize the input collected in that survey. Note that the summaries show the average ranking for each concept presented in the survey. A rating of 5.0 represents a strongly supported concept and a rating of 1.0 represents a strongly opposed concept.

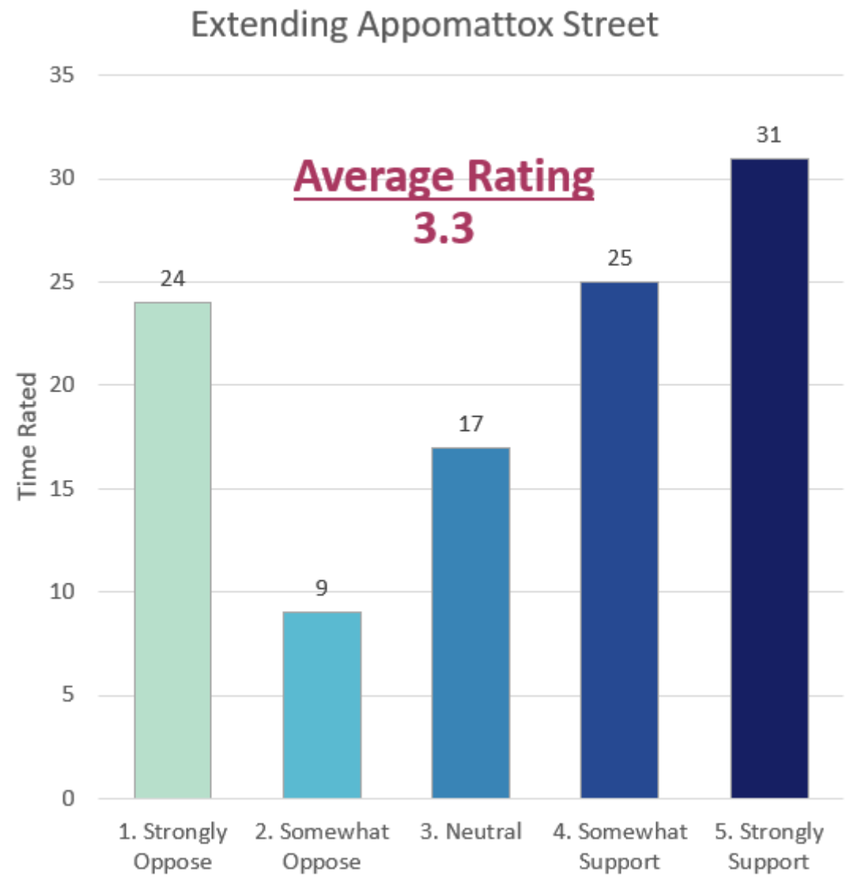




Average Improvement Concept Rating

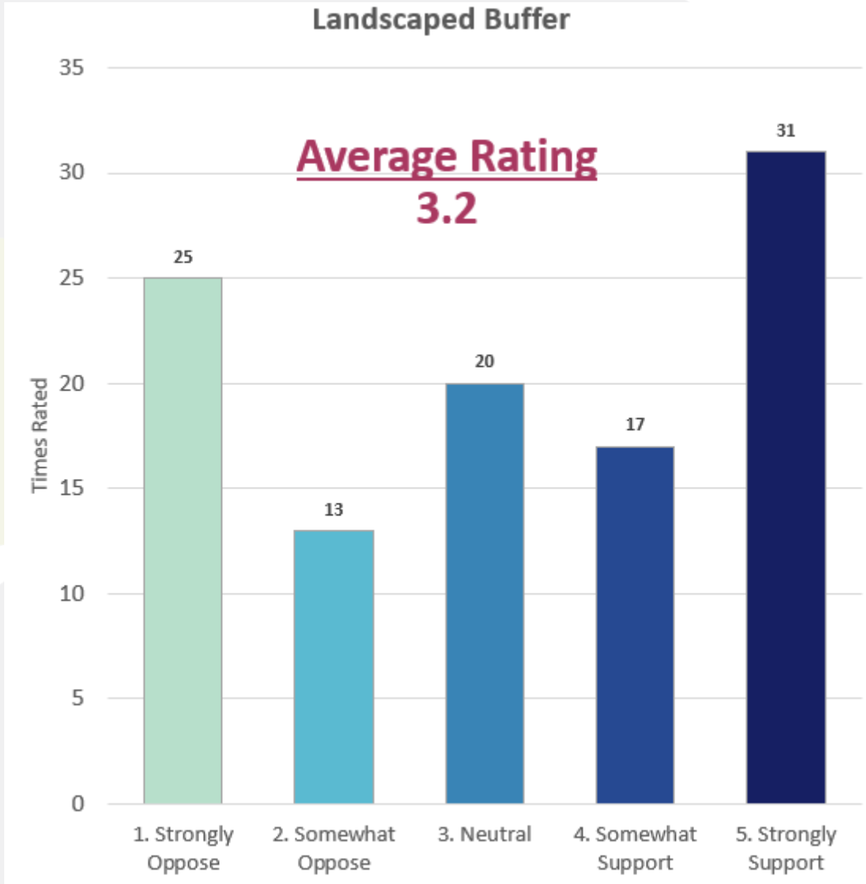


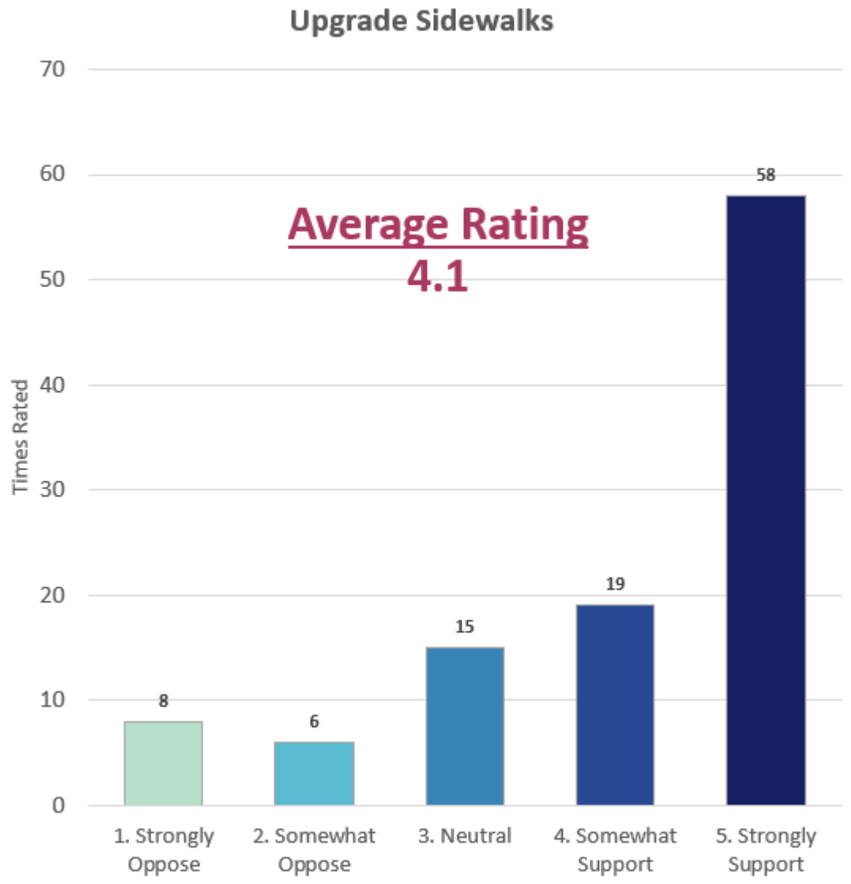

Reduce Speed Limit
Average Rating
2.6
Times Rated
60
50
40
30
20
10
0
50
12
11
11
29
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support

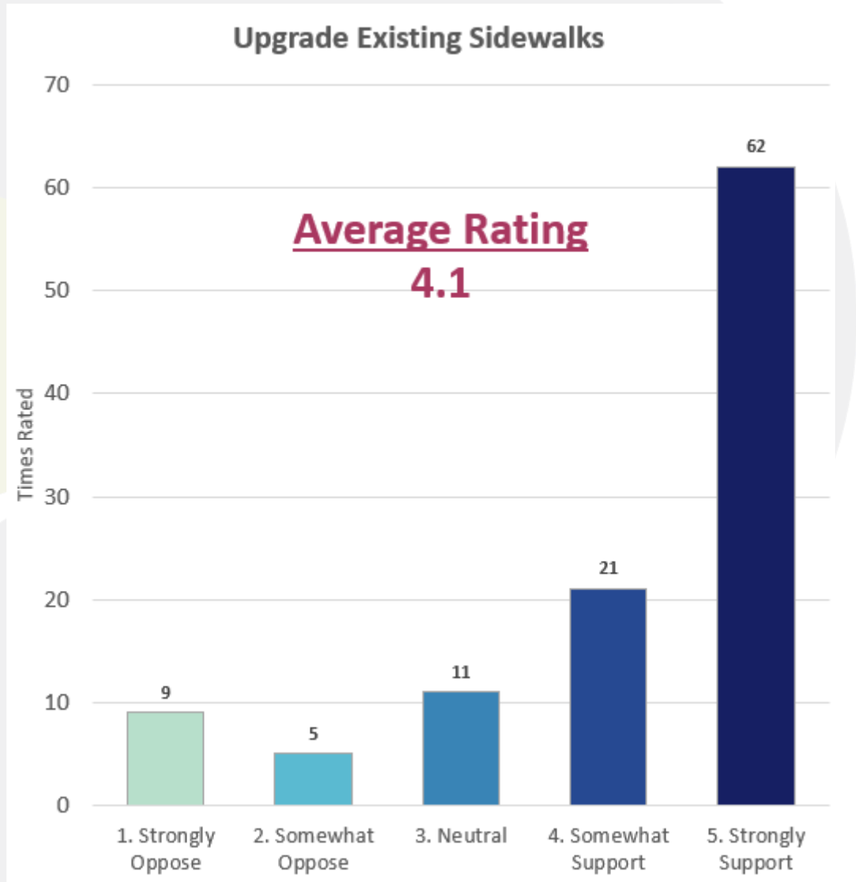

Extending Appomattox Street
Average Rating
3.3
Time Rated
35
30
25
20
15
10
5
0
24
9
17
25
31
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support

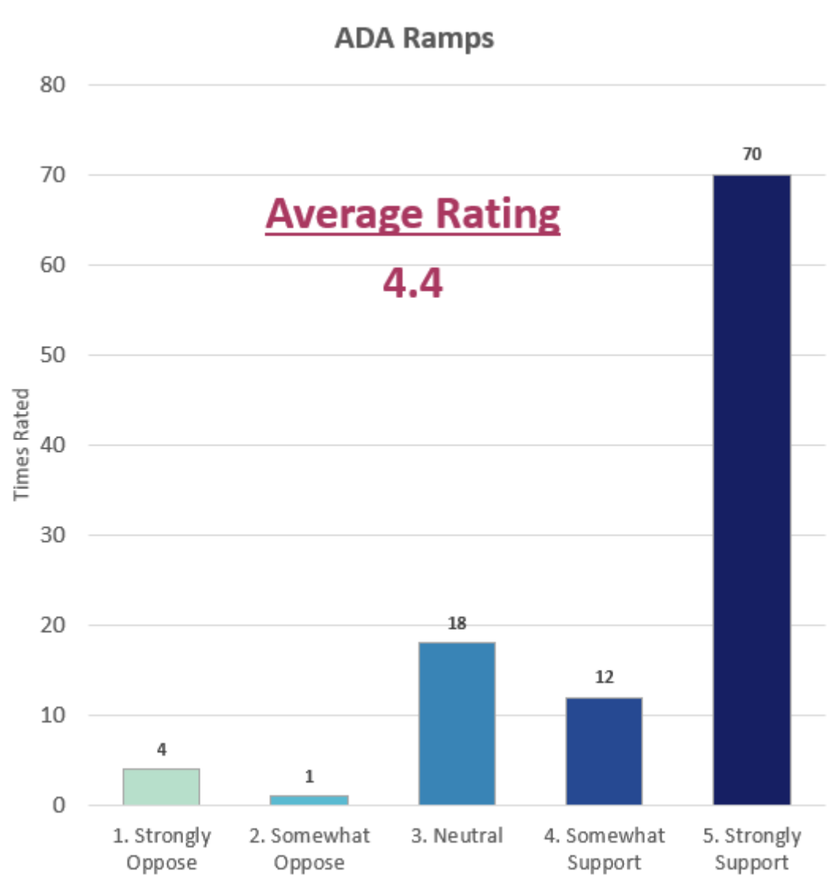

Closing N. Main Street
Average Rating
3.0
Times Rated
35
30
25
20
15
10
5
0
33
10
17
14
33
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support


Shared-Use Path
Average Rating
3.0
Times Rated
30
25
20
15
10
5
0
28
12
23
17
26
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support


Landscaped Buffer
Average Rating
3.2
Times Rated
35
30
25
20
15
10
5
0
25
13
20
17
31
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support


Upgrade Sidewalks
Average Rating
4.1
Times Rated
70
60
50
40
30
20
10
0
8
6
15
19
58
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support


Upgrade Existing Sidewalks
Average Rating
4.1
Times Rated
70
60
50
40
30
20
10
0
9
5
11
21
62
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support


ADA Ramps
Average Rating
4.4
Times Rated
80
70
60
50
40
30
20
10
0
4
1
18
12
70
1. Strongly Oppose
2. Somewhat Oppose
3. Neutral
4. Somewhat Support
5. Strongly Support

The SWG reviewed the survey responses on May 2nd, 2024, and concluded that based on the input received, it appeared that there is support for this project as currently defined. The question about reducing the speed limit was borderline. The City has indicated that they intend to pursue a speed limit reduction if this project is funded.

Chapter 4 – Preferred Alternative Design Refinement and Investment Strategy

Phase 3 of the study included continued advancement of the draft concept drawings to more detailed concept design, preparing the cost estimate documentation, developing the risk assessment, preparing the SJR as previously described, preparing the mid-block crossing documentation, and conducting a final evaluation of traffic operations.

Preferred Alternative Refinements

In the Phase III field review, the sidewalks on the north side of E. Randolph Road were added to the project to create a continuous compliant sidewalk between E. Cawson Street and E. City Point Road. Concepts refinements identified as part of the field review and work on the north side included:

1. consolidation of two commercial entrances just east of E. Cawson Street.
2. closure of obsolete curb cuts along E. Randolph
3. determination to save as much of the existing brick work in this section as possible where new curb ramps will be constructed
4. consistent with the rest of the project, utilize stamped concrete for all concrete surfaces.
5. on the east end approaching E. City Point Road, the sidewalk will need to be re-routed around a major utility pole in the sidewalk. This will require a short wall (~24" max) and right-of-way impacts.

In discussions with City staff, it was determined to preserve emergency and special event access to both sides of the closed off North Main Street. This will be accomplished by a combination of removable bollards.

As was emphasized to the design team, the plan will include maximizing incorporation of landscaping / street trees into the buffer and green spaces. The replaced traffic signals will need to utilize the City's specifications for aesthetic painted period style signal poles and arms to match the historical context of the City's Central Business District. Similarly, future light poles and luminaires should also use aesthetic design standards.

The City has a funded shared use path project that is currently under design. The concept design included the approximate location of that new project with the intention of this Project Pipeline project providing a continuation of that shared use path to the east to Poythress Street.

A mid-block crossing was requested at Poythress Street. A mid-block crossing study was performed and recommended inclusion of rapid flash beacons into the project.

The detailed concept sketches utilize an extensive array of legend colors to depict the features necessary to meet the need and City's vision for this project.

The shared use path with tree wells shown on Appomattox Street may require further refinement in the design phase due to the impact to usable space along the path.

Figures 24 through 28 present the preferred alternative planning level sketch.

Traffic Operations Analysis

The traffic operational analysis documentation was summarized in Tables 12 and 13 in Chapter 2 earlier in this document

Figure 24. Preferred Concept Sheet 1 of 5

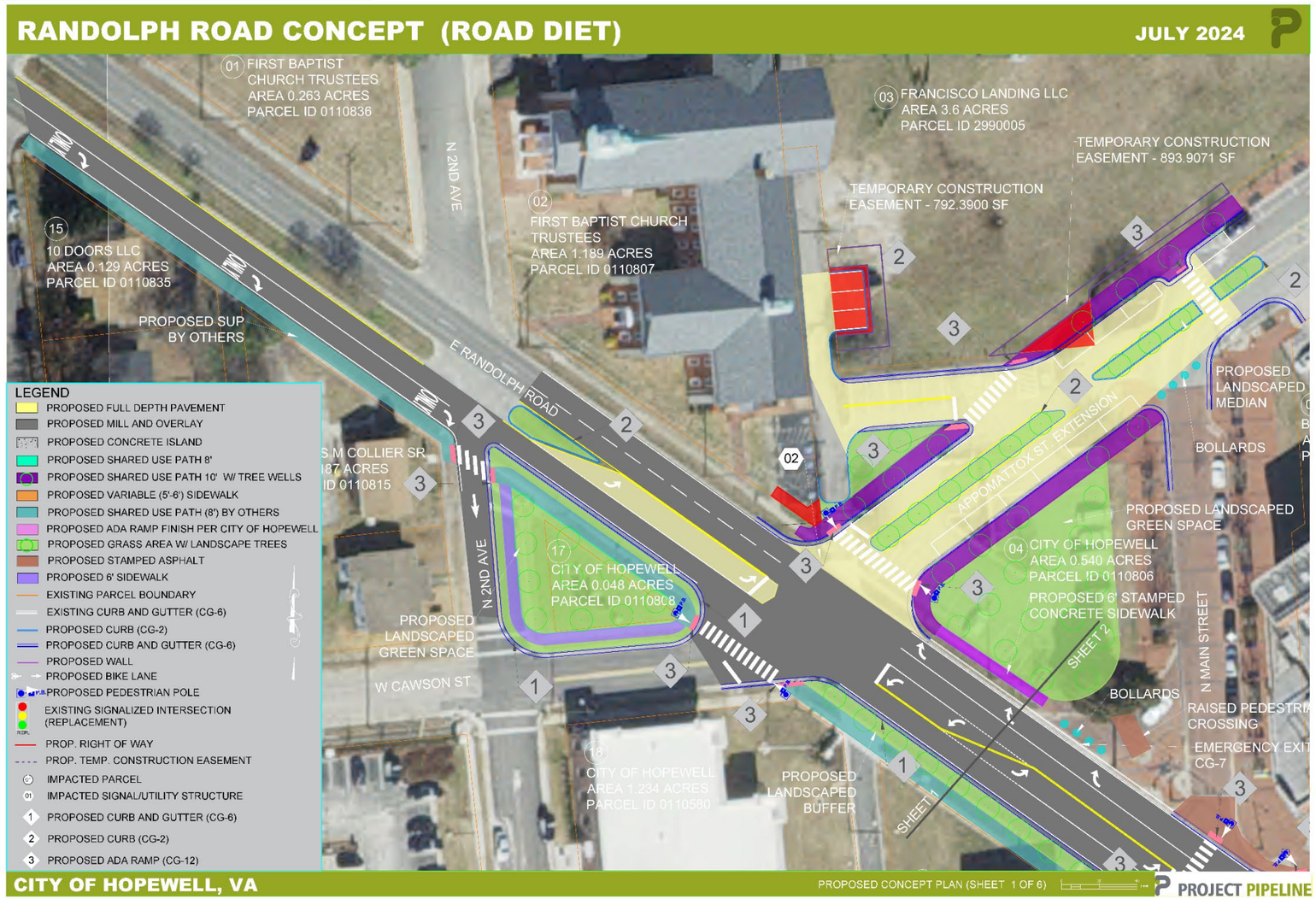


Figure 25 Preferred Concept Sheet 2 of 5

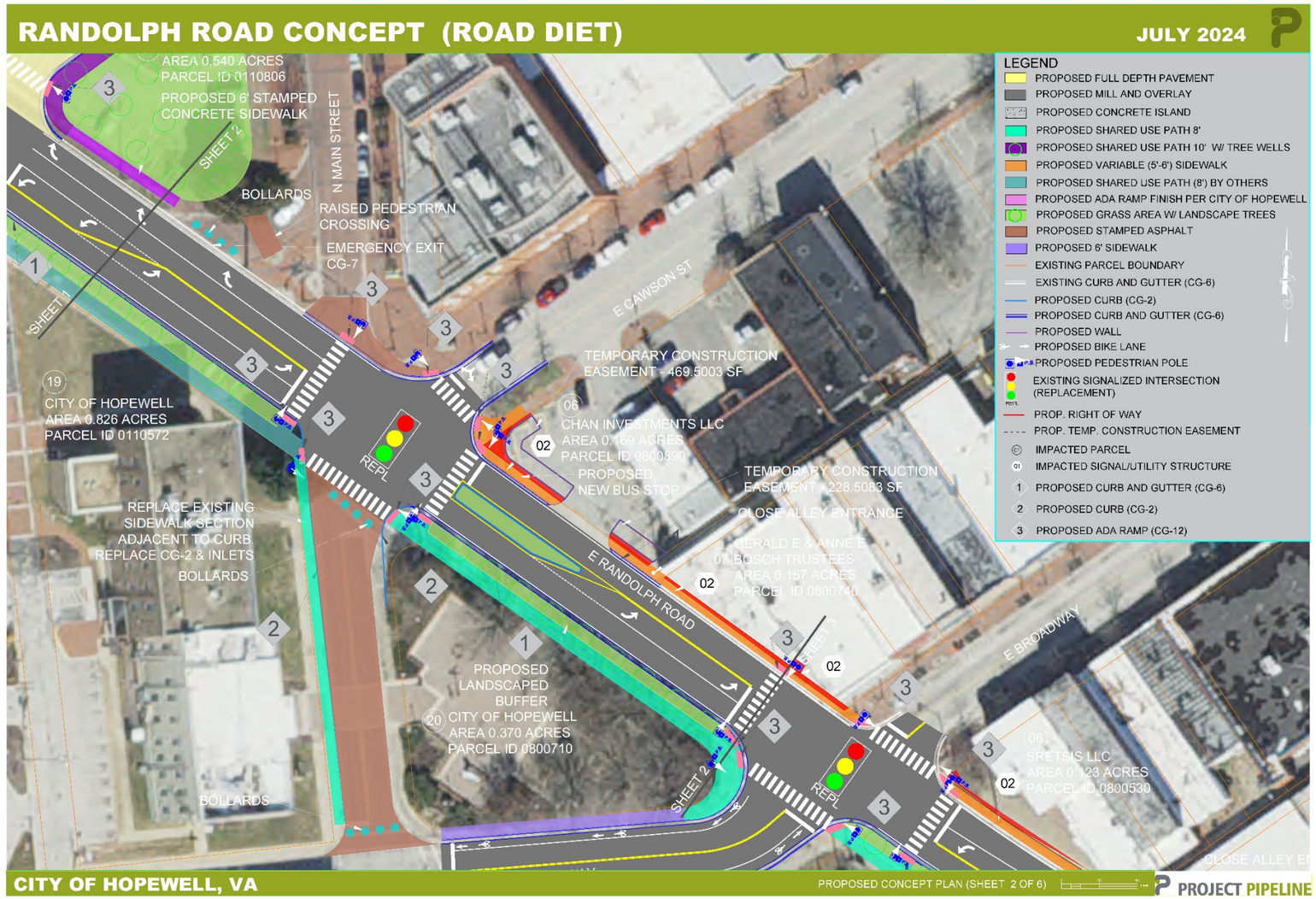


Figure 26 Preferred Concept Sheet 3 of 5

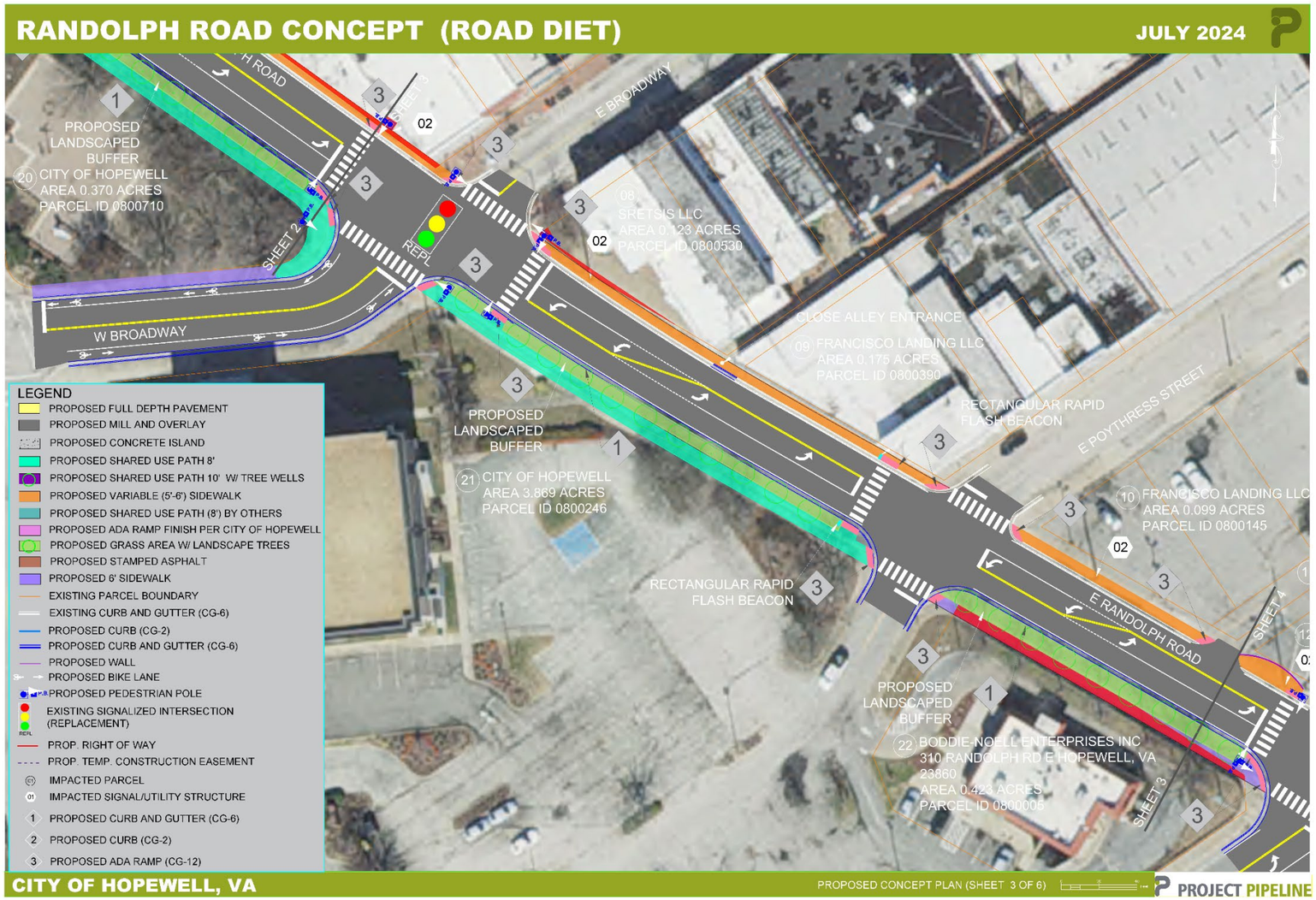


Figure 27 Preferred Concept Sheet 4 of 5

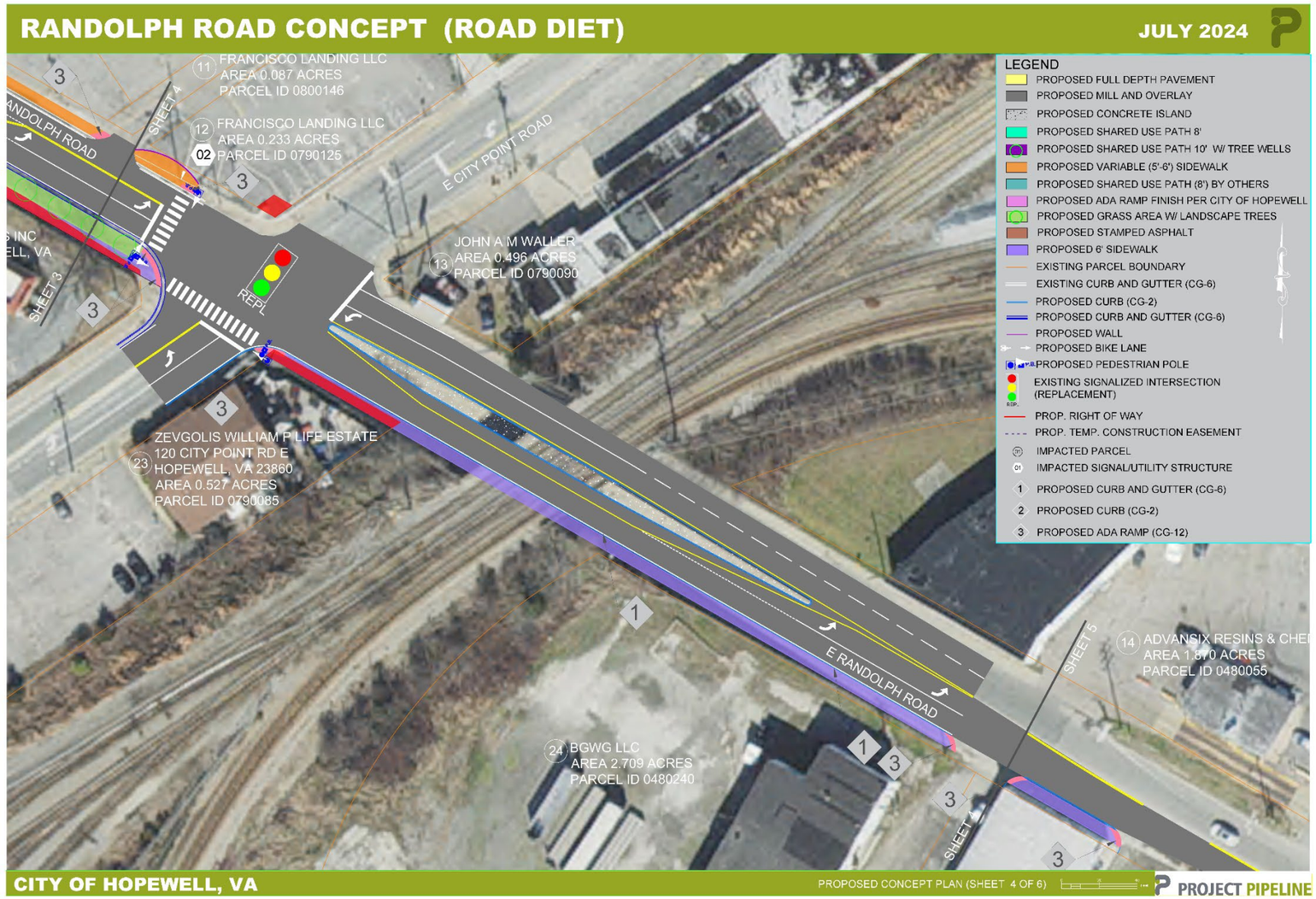
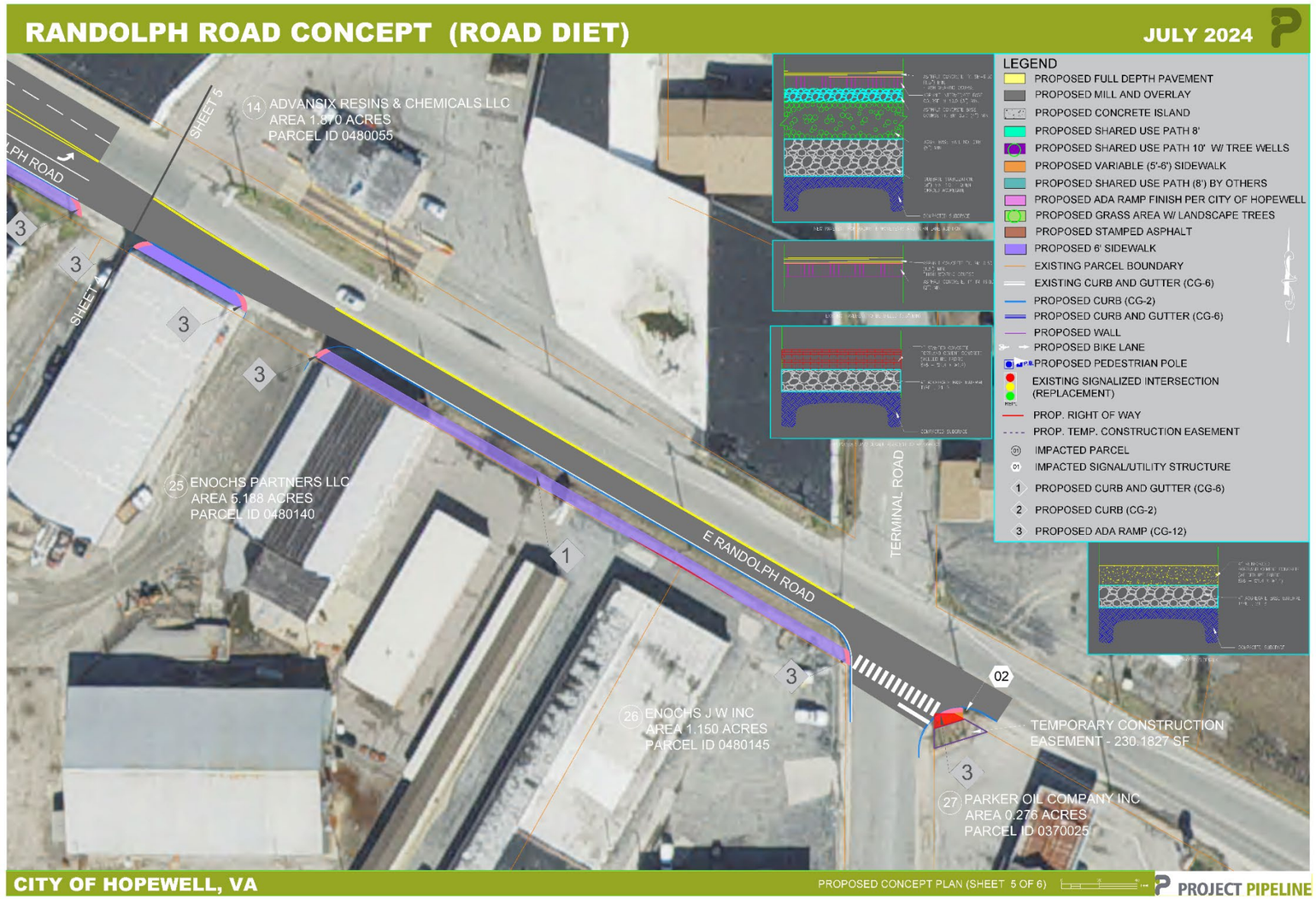


Figure 28. Preferred Concept Sheet 5 of 5



Appendix G includes the Basis of Design summary. **Appendix H** includes the Risk Evaluation matrix summary.

Planning-Level Cost Estimates

An engineer's planning level cost estimate was created for construction costs, right of way acquisition costs, and utility relocation costs for the preferred alternative. These planning level costs established the project budget, in FY2024 dollars, as shown in **Table 14**. Detailed cost estimates are included in **Appendix I**.

Table 14: RI-23-10 Cost Summary for the Preferred Alternative Improvements

Estimate From CEWB (7/14/24)	Current Cost
PE Phase Estimate	$ 2,230,608.00
RW Phase Estimate	$ 3,803,566.00
CN Phase Estimate (w/CEI)	$16,903,120.00
Total Estimate	$22,937,294.00

Schedule Estimates

A schedule estimate was developed for the preferred alternative. **Table 15** summarizes the projected timeframes for the preliminary engineering (PE), right of way (RW), and construction (CN) phases.

Table 15: Schedule Estimate

Estimated Schedule by Phase (months)	PE	RW	CN	Total
Preferred Concept (all inclusive)	18	18	24	**60**

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

Risk/Issue: Roadway Design

The posted speed limit of 30 is used as the proposed design speed to align with adjacent City's commitment to reducing the posted speed from 35mph to 25mph. Note however that E. Randolph Road is has a straight alignment through the project area meaning there are no curves. Also, the corridor is an urban typical section so that regardless of 30mph or 40mph there shouldn't be any impact on the overall design, waivers, or costs. With the roadway design, there will be waivers required for sidewalk buffer, sidewalk width at spot locations, crosswalk cross slope at E. City Point Road., and an existing commercial entrance in the functional area of the intersection at E. Cawson St.

Risk/Issue: Right of Way

Eleven parcels will be impacted along Randolph Road for the road diet improvements. The impacted parcels will have right of way and/or temporary construction easements. These temporary construction easements will be required to tie in the proposed improvements to the existing conditions.

Risk/Issue: Environmental

Based on initial environmental reviews, the project area may require additional studies or data analysis: The study area is located within northern long-eared bat (NLEB) year-round preservation area. There is no tree clearing anticipated based on the proposed improvements, but a bat survey may be required for storm sewer modifications. The road corridor is also located within or proximate to several historic sites, and the study area has a higher-than-average population of minority and low-income residents. See Appendix J for a full environmental input report.

Risk/Issue: Utilities

There were above ground appurtenances observed during the field visit signifying the presence of underground utilities such as fiber optic communication lines, gas, water, and sewer (force main and gravity). Based on observed above ground appurtenances and available GIS data, there are areas with overhead power poles, light poles, storm sewer, and water identified to be relocated to avoid impacts with proposed road diet, curb and gutter, sidewalk, and shared use path.

Risk/Issue: Geotechnical

No significant areas of unsuitable material have been assumed for this project.

Risk/Issue: Drainage

There were several drop inlets observed within the road diet footprint that will need to be modified and/or replaced in addition to several utility junction box tops that will need to be reset.

Risk/Issue: Coordination with other Ongoing Projects

The proposed improvements will likely require coordination with the City of Hopewell based on plans currently under development for a shared use path starting at N Main Street along Randolph Road and running to the west and extends beyond the limits of this project.

Risk/Issue: Additional Issues

The City would like to have the handicap ramps and signal poles meet the preferred downtown finishes. Lighting improvements have been included with this project and will require analysis for best placement. The proposed 10' SUP along Appomattox Street will have tree wells to match existing typical. All grass areas shall be landscaped with Trees.

Possible Funding Sources

The City of Hopewell elected has identified the SMART SCALE grant program as the only viable funding source to accomplish this project.

PROJECT PIPELINE

Appendix A:

Existing Turning Movement Counts

PROJECT PIPELINE

Appendix B:

Synchro Reports – Delay and Queuing

PROJECT PIPELINE

Appendix C:

STEAP Analysis Reports

PROJECT PIPELINE

Appendix D:

Traffic Forecasting Memorandum

PROJECT PIPELINE

Appendix E:

Mid-block Crossing Study Documentation

PROJECT PIPELINE

Appendix F:

Signal Justification Report

PROJECT PIPELINE

Appendix G:

Basis of Design

PROJECT PIPELINE

Appendix H:

Risk Matrix

PROJECT PIPELINE

Appendix I:

Cost Estimate Workbook / Summary

PROJECT PIPELINE

Appendix J:

Environmental Input for Project Pipeline