



ZION CROSSROADS GATEWAY PLAN

August 2022



Contents

INTRODUCTION	3
Zion Crossroads Gateway Plan Purpose	3
Study Area	3
Area Goals.....	4
Relationship to Comprehensive Plan	4
Urban Development Areas.....	5
Market Potential	7
Infrastructure.....	8
Planning Process	10
STEERING COMMITTEE	10
SURVEYS	11
PUBLIC MEETINGS	11
PLANNING CONTEXT.....	12
EXISTING CONDITIONS.....	14
Zoning.....	14
Planned Unit Developments	15
Transportation System	16
Louisa County Survey.....	21
Fluvanna County Survey	23
Discussion	28
Louisa County Zoning Ordinance Updates	29
RECOMMENDATIONS.....	30
APPENDIX	34
Appendix A: Typical Street Cross Sections Found in Zion Crossroads	35
Appendix B: Zion Crossroads Small Area Study Retail Marketplace Profile	37
Appendix C: Fluvanna and Louisa Counties Zoning District Definitions	38
Appendix D: Zion Crossroads Small Area Study – Existing and Future No-Build Conditions Technical Memorandum	39
Appendix E: Esri Business Summary for Zion Crossroads Study Area.....	40
Appendix F: Esri Retail Demand Outlook for Zion Crossroads Study Area	41
Appendix G: Esri Retail MarketPlace Profile for Zion Crossroads Study Area	42

LIST OF FIGURES

Figure 1. Aerial Map of the Zion Crossroads Gateway Plan Study Area.3
Figure 2. Map of VTrans Intersection Safety Improvement Needs6
Figure 3. VTrans UDA Mid-term Needs and Priorities7
Figure 4: VATI Service Area9
Figure 5. Zoning Map of the Zion Crossroads study area.15
Figure 6. Zion Intersections Reference Map. Prepared by Kittelson & Associates.18

LIST OF TABLES

Table 1. Zoning within the Zion Crossroads study area.14
Table 2. Summary of Intersection Operations19

INTRODUCTION

Zion Crossroads Gateway Plan Purpose

The purpose of the Zion Crossroads Gateway Plan is to create a unified vision for a rapidly developing area that encompasses land in both Fluvanna and Louisa counties. Zion Crossroads is located at a critical intersection of Interstate 64 and US 15, as well as the intersection of US 15 and US 250. These are all major corridors that are used for travelers throughout the region.

Development pressure in the area has led to a heightened need to proactively establish a transportation network that serves to effectively move both local and through-traffic throughout the project area. There are additional challenges related to the supply of existing infrastructure and the mixture of land uses to support the increased commercial interest in the area.

The Thomas Jefferson Planning District Commission was designated to orchestrate a robust, comprehensive process to coordinate the development plans for this area among the multiple interested parties. The gateway planning process entailed the cooperation of both localities and the Virginia Department of Transportation to develop strategies that serve to alleviate pressure on the existing infrastructure and facilitate the establishment of a unified Zion Crossroads neighborhood atmosphere. A successful plan will establish Zion Crossroads as an area that people only have to leave as a choice; in other words, the vision for Zion Crossroads is as a community where people can live, work, play, and shop without going anywhere else.

Study Area

The study area was determined by the Stakeholder Committee based on the boundaries of the existing Urban Development Area in Fluvanna County and where impacts would most likely be experienced.



Figure 1. Aerial Map of the Zion Crossroads Gateway Plan Study Area.

Area Goals

This plan builds on previous work that has been completed for the Zion Crossroads area by both localities, as well as on current development trends in the area. The overarching goal of the plan is to improve traffic circulation throughout the project area and establish a stronger sense of community identity. The following goals have been identified to achieve this vision.

1. Establish Zion Crossroads as a mixed-use center that is an attractive gateway both between Fluvanna and Louisa Counties and for visitors traveling into the area.
2. Develop a framework to establish a unified sense of place for the Zion Crossroads Development Area that can be implemented by both localities.
3. Identify opportunities to develop a robust, integrated transportation network to support continued commercial development.
4. Create a walkable community by incorporating pedestrian- and bike-friendly design principles in both land use and transportation planning decisions.
5. Identify gaps in facilities and services that would enhance the sense of community.
6. Prevent growth from impeding the character of the Green Springs Historic District.

Relationship to Comprehensive Plan

Given that Louisa County has recently completed a full update to their Comprehensive Plan, the work they did for that update largely informed the process and recommendations for this small area plan. Based on extensive collaboration between the community, planning staff, the Planning Commission, and the Board of Supervisors, three main themes emerged from their planning process:

1. Conserve and preserve the County's rural character and way of life.
2. Recognize that, while change is inevitable, growth management tools can help the community prepare and plan for its future.
3. Protect established and future communities.

The Comprehensive Plan identified Zion Crossroads as a designated growth area where mixed-use and residential uses complement the surrounding less-intensive land uses. Transportation and utility infrastructure limitations in the greater Zion Crossroads area were specifically mentioned and that future investments within these areas will need to be made to sufficiently accommodate growth. Based on community feedback, Louisa County residents would like Zion Crossroads to:

- Have controlled or managed growth
- Ensure a sufficient water supply and protect its quality
- Continue using growth areas to manage growth
- Preserve and protect the rural areas of the County
- Ensure county roads support future development
- Protect the Green Springs National Historical Landmark District

To that end, the Zion Crossroads Gateway Plan aims to provide strategic recommendations to adequately plan for anticipated growth while promoting the areas unique sense of place. Transportation infrastructure improvements identified by the consultant team and vetted by the Steering Committee provide Louisa County stakeholders with a set of options for addressing concerns. The land use and community recommendations support the consensus built in Louisa's community engagement efforts.

Fluvanna County is in the beginning stages of their Comprehensive Plan, so this small area plan will be incorporated into that plan update. Based on the most recent 2015 Comprehensive Plan, Fluvanna County identified the Zion Crossroads area as a regional mixed-use and employment center. Marked as a primary gateway into the County, the Comprehensive Plan recommended enhancement of the corridor to provide a more welcoming entrance and provide underlying land uses that would drive investment and development into the area to become one of the main economic engines of the County.

Urban Development Areas

Fluvanna has designated the Zion Crossroads area as an urban development area (UDA) in its comprehensive plan. UDAs are areas designated by localities where growth *shall* be promoted based on state code requirements. The primary purpose of establishing a UDA is to concentrate public infrastructure, including transportation, housing, and utilities, in high density areas in order to improve the efficiency of investment into future infrastructure. Ideally, the establishment of UDAs will take additional growth pressure off of other areas throughout the counties where additional commercial and residential growth is less desirable, and allow more rural areas to be preserved. As such, designated UDAs must adhere to traditional neighborhood design principles, aspects of which include higher densities, mixed uses, and support for bike and pedestrian access.

The designation of UDAs has become especially important as the Commonwealth of Virginia has moved to a competitive application process of allocating funding for transportation improvements. In 2014, the Commonwealth passed House Bill 2 which provided for the development of a prioritization process for funding transportation projects throughout the Commonwealth. That process was renamed SMART SCALE in 2016. SMART SCALE is the most significant funding source for localities to leverage in order to implement critical improvements, but in order to be eligible for funding, the projects have to meet a need identified in the statewide transportation plan, VTrans.

SMART SCALE identified four eligible categories of projects:

- Corridors of Statewide Significance: includes projects along the I-64/US 250 Corridor
- Regional Network: Defined in the statewide transportation plan and based on MPO area travel markets
- Urban Development Area
- Safety

Because the Zion Crossroads area is outside the boundaries of the Charlottesville-Albemarle MPO area, it does not meet eligibility for Regional Network projects. This means that any projects in the Zion Crossroads area outside of improvements to the I-64/US 250 Corridor must meet either a safety need or be in a designated UDA and contribute to supporting the established goals of the UDA to qualify for funding through SMART SCALE.

Figure 2 shows a map of the intersection safety improvement needs and Figure 3 shows a map of the UDA needs identified through the statewide planning process. These two maps show the projects that are currently eligible for funding through SMART SCALE. Since Louisa County has not designated Zion Crossroads as a UDA, all of the eligible needs shown in Figure 3 are in Fluvanna County.



Figure 2. Map of VTrans Intersection Safety Improvement Needs



Figure 3. VTrans UDA Mid-term Needs and Priorities

Market Potential

The Zion Crossroads area boasts 159 businesses and 1,812 employees (Data Axle 2021). The majority of these businesses are in the retail and services industries. There is significant leakage into other markets (such as Charlottesville and Richmond) for the following retail service areas: automobile dealers, furniture stores, electronics and appliance stores, clothing stores, florists, vending machine operators, and others. See appendix B for more detailed information. The retail demand outlook for the Zion Crossroads area has projected growth of over one million dollars in the next five years for the areas of food establishments, financial services, and home services (Esri forecasts for 2021 and 2026, based on 2018 data from US Census Consumer Expenditure Surveys).

Infrastructure

Zion Crossroads is one of Louisa County's Growth Development Areas, and as such, attention has been given to the infrastructure within Zion Crossroads. As the fastest growth area in the county, the Louisa comprehensive plan lists ensuring sufficient water supply and county roads that support future development. The county recognizes that improvements in transportation and public utility infrastructure will be necessary as new development occurs. The James River Water Project will support this growth area's water and sewer needs at full build-out.

When established, the Zion Crossroad Utility Service District would serve and support the more intense land use designations in this growth area. Publicly funded water and sewer utilities, operated by the Louisa County Water Authority, will provide services to the mixed-use designated parts of the vicinity.

Fluvanna County is currently working on its 2040 Comprehensive Plan Update. Zion Crossroads is part of the county's urban development area. The county is aware that it needs to expand the water and sewer lines to Zion Crossroads for new businesses and commercial development and is looking at various options.

Fluvanna and Louisa have benefitted from the presence of Central Virginia Electric Cooperative (CVEC) in their counties. As CVEC worked to upgrade its electric transmission system across its service territory, its wholly-owned subsidiary, Firefly Fiber Broadband, offered fiber-to-the-home internet to its electric customers. The counties then partnered with Firefly, Rappahannock Electric Cooperative (REC), and Dominion Energy Virginia to seek Virginia Telecommunication Initiative (VATI) funding to support the construction of high-speed internet access for all homes and businesses in the counties. The Thomas Jefferson Planning District Commission (TJPDC) and co-applicant Firefly were awarded \$79 million to expand broadband access across Fluvanna, Louisa, and 11 other counties in the Central Virginia region.

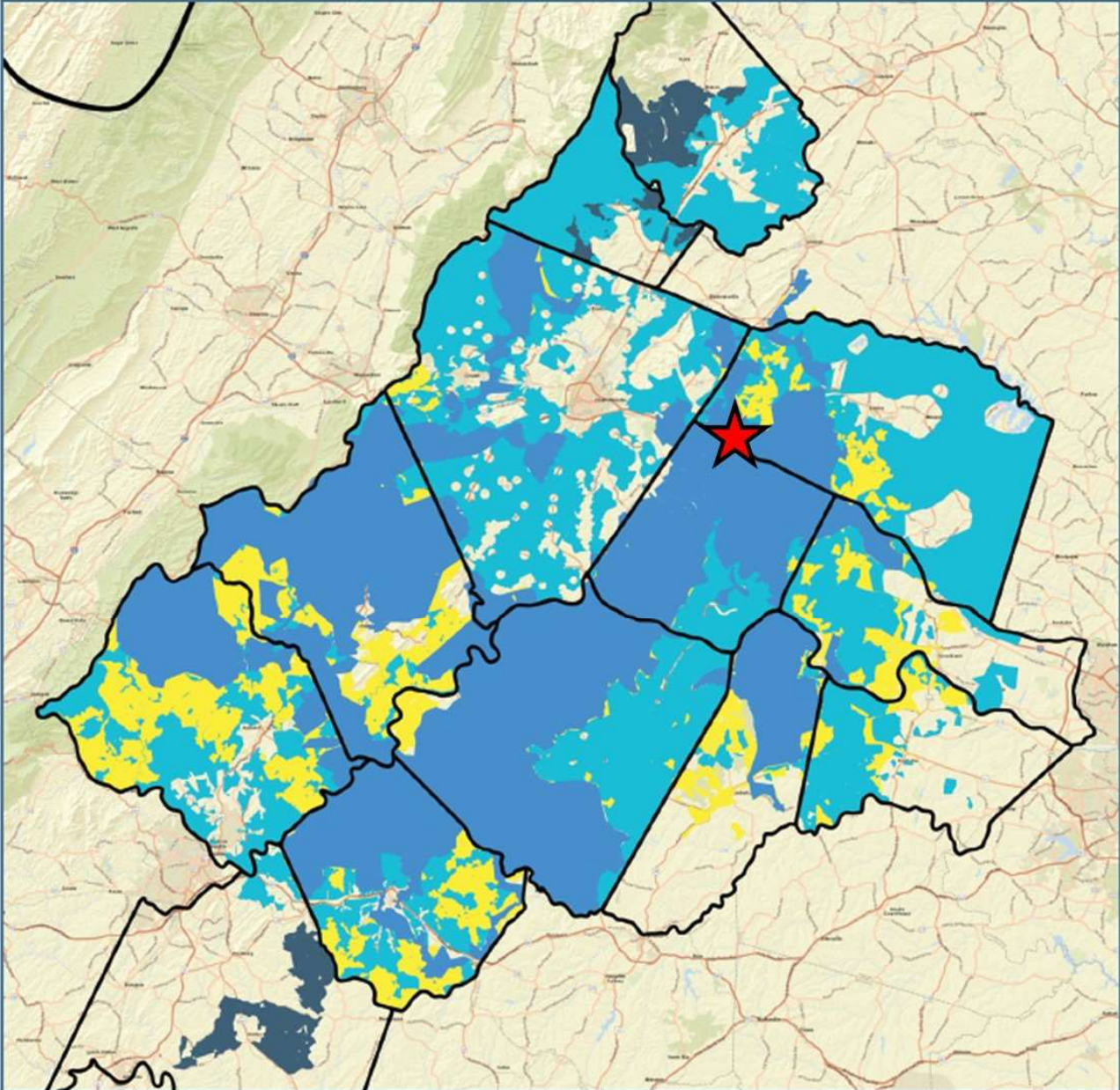


Figure 4: VATI Service Area

Planning Process

Fluvanna and Louisa counties were in different steps of their Comprehensive Plan update process when the small area planning process began. Louisa County completed an in-depth review and update of their county-wide Comprehensive Plan that was adopted in August of 2019. Fluvanna County was in the early stages of preparing for their next five-year county-wide plan update. One of the most important facets of this plan is to build off of the work that Louisa County has already completed, while also providing ample opportunities for Fluvanna County stakeholders to have meaningful opportunities for input into developing the goals for the area.

To do this, an initial public engagement effort was planned for Fluvanna County to solicit feedback on the preferred pattern of development from those citizens. While initial plans were made to conduct that public engagement effort in March of 2020, the COVID-19 pandemic and following shelter-in-place orders required the project team to restructure the outreach efforts to focus on virtual opportunities, and a survey was sent out to Fluvanna County stakeholders, as identified by Fluvanna County planning and economic development staff.

One of the most important motivators for selecting this area for a planning process is the current demand on the transportation network. As such, the Thomas Jefferson Planning District Commission partnered with the Virginia Department of Transportation and the transportation engineering consulting firm, Kittelson & Associates, Inc. to ensure that transportation needs were analyzed and evaluated and that solutions were generated to facilitate improvements across a wide range of impact areas.

STEERING COMMITTEE

To assist in guiding the planning process, a steering committee made up of local stakeholders, elected officials, VDOT representatives, and staff from Kittelson & Associates, the consulting firm selected to lead the transportation analysis, was formed. The Steering Committee was tasked with defining the study area, reviewing deliverables, and providing guidance and feedback on plan recommendations. The Steering Committee held its first meeting in August of 2019, serving as the official kick-off to the project. The committee continued to meet regularly throughout the planning process.

Membership of the committee consisted of representation from the following:

- Fluvanna County Planning
- Fluvanna Economic Development Department
- Fluvanna County Administration
- Louisa County Administration
- Fluvanna County Elected Official
- Louisa County Elected Official
- Louisa Economic Development
- VDOT Culpeper District Staff
- TJPDC Staff
- Kittelson & Associates Staff

SURVEYS

To gain a better understanding of the opportunities and challenges within the study area, staff launched a public survey for Fluvanna County stakeholders. The survey was available both online and in paper format and was made available for 30 days. Engagement for the public survey was directed towards Fluvanna residents and stakeholders because of previous efforts undertaken by Louisa County. Louisa County recently completed extensive community engagement around the update to their Comprehensive Plan, and provided TJPDC staff with the results of their surveying effort. Together, these two surveys provide a snapshot of the community vision for the Zion Crossroads area and highlight challenges that this plan aims to alleviate. Detailed results from those surveys can be found in the Existing Conditions section.

In addition to the survey created by TJPDC staff, Kittelson & Associates along with VDOT staff developed an online survey using MetroQuest, a visual, online engagement platform. This survey was designed to solicit feedback on the transportation system within the study area. It looked to identify how stakeholders use the system (i.e. commuting through, live or work in the area, etc.), identify problem areas, and assess public buy-in for potential solutions.

PUBLIC MEETINGS

Initially, the TJPDC planned to coordinate with VDOT and Kittelson on two public meetings to solicit input and feedback on the priorities for the local community and develop project recommendations. Due to the COVID-19 pandemic, however, opportunities for in-person public engagement were limited during the majority of the project. To accommodate the health and safety measures that were in place during the pandemic, the initial public meeting was transitioned into a virtual public workshop. Kittelson & Associates developed a virtual platform that provided the public with background information on the study goals for the transportation analysis, existing transportation system conditions, and opportunities to provide input.

A second public meeting was held virtually focused on transportation system improvements throughout the study area. Kittelson & Associates shared a presentation and reviewed the existing conditions and future no-build conditions, and then presented the recommendations that they developed through the analysis process to best address the system deficiencies identified. Due to the technical nature of the material presented and the limited interaction that the virtual format provided, an additional public meeting was held in person to provide a more interactive opportunity for the public to learn about the recommendations developed from the analysis that Kittelson completed.

This third public engagement meeting was held in April, and was attended by eighty participants. VDOT staff presented reviewed the goals of the project and explained the recommendations that were developed. There was an opportunity for attendees to view posters of the proposed improvements and to ask locality and VDOT staff questions about the recommendations in a more informal format.

PLANNING CONTEXT

Zion Crossroads has been highlighted as an important location for Fluvanna and Louisa counties in many of their planning documents as summarized below:

Fluvanna County Comprehensive Plan: Fluvanna County adopted its current Comprehensive Plan in 2015, projecting a vision for the county through 2035. In this plan, the county identified Zion Crossroads as an Urban Development Area, also referred to as a Community Planning Area throughout the plan, and highlights its importance in attracting industrial and commercial activity to the county.

Zion Crossroads Community Plan: The Fluvanna County Comprehensive Plan also includes a Community Plan for Zion Crossroads. The Community Plan states that Zion Crossroads will be the most intensely developed area of Fluvanna County, and emphasizes the importance of creating a scenic welcome to residents and tourists. The recommendations in the Community Plan focus on creating identity in the Zion Crossroads area through the establishment of a gateway, development of a Main Street with concentrated commercial and recreational activity, and incentivizing mixed uses.

There is also a strong emphasis on improvements that are needed to the transportation system, both to improve safety and efficiency for vehicular traffic, as well as creating better accessibility for alternative modes of transportation.

Louisa County Comprehensive Plan: Louisa County adopted its current Comprehensive Plan in August 2019, projecting a vision for the county through 2040. In this plan, Zion Crossroads is recognized as being the fastest growing census tract in the county and maintains that additional growth is expected in this area throughout the span of the current plan's time frame. Louisa County's Comprehensive Plan also indicates that this is an important gateway into the county. Louisa County's recommendations in their Comprehensive Plan include prioritizing controlled and managed growth, ensuring sufficient water supply, supporting future development by maintaining and enhancing the local transportation system, and protecting the neighboring Green Springs National Historical Landmark District.

Northwest Fluvanna / Southwest Louisa Multimodal Corridor Study

The Northwest Fluvanna / Southwest Louisa Multimodal Corridor Study, developed in conjunction with the Thomas Jefferson Planning District Commission in 2007, projected that there would be 28,000 additional jobs in the area by 2050. The vision for the Zion Crossroads area as identified in this planning effort included:

- Creating a distinct identity for the Zion Crossroads area;
- Improving the safety and efficiency of the transportation system;
- Protecting rural and environmental features; and
- Supporting economic development and community-based services.

This plan recommended that development, including establishing a significant employment center, mixed-use area, and residential neighborhoods, be focused in the Zion Crossroads area, with lower levels of development planned for Lake Monticello and Palmyra.

2040 Rural Long Range Transportation Plan (RLRP)

Zion Crossroads has the second most utilized Park and Ride lot in the Thomas Jefferson Planning District Commission RideShare system (which also includes the area encompassed by the Central Shenandoah Planning District Commission and metro Harrisonburg).

The RLRP identifies the I-64 segment from the MPO limits to Zion Crossroads as experiencing high levels of congestion currently, with the Average Annual Daily Traffic (AADT) forecast to increase by more than 10,000 trips by 2035. The AADT for US 15 segments from Zion Crossroads to Dixie in Fluvanna County are forecast to increase by between 5,000 and 10,000 trips during the same time frame. The segments are also projected to see increases in the volume to capacity ratios. In addition US 250 in Zion Crossroads was identified as experiencing “poor” or “very poor” pavement condition. Zion Crossroads was also identified as a crash “hot spot” due to the concentration of vehicle crashes that occurred between 2011 and 2016.

EXISTING CONDITIONS

Zoning

On the Fluvanna side of Zion Crossroads, there is a concentration of industrial and commercial zoning on both sides of Route 250, as well as to a lesser extent on Route 15. This pocket of commercial and industrial land is in stark contrast to the majority of the rest of the County, which is predominately zoned for agricultural use.

There is a greater diversity of zoning districts in the Louisa County portion of the study area. Commercial, industrial, Planned Unit Development, and Resort Development comprise the Louisa County sections, with agricultural zoning surrounding these other uses. The central portion of this pocket of development is primarily zoned for general commercial use, with the Industrial and Planned Unit Development zoning more predominant towards the perimeter, and the Resort Development all concentrated in the northwest section of the study boundary (see Appendix B).

Table 1. Zoning within the Zion Crossroads study area.

Zoning District	Fluvanna		Louisa	
	# Parcels	Acres	# Parcels	Acres
A-1	4	459	3	5.8
A-2	0	0	7	1278.7
B-1/C-2	5	68.3	10	704.1
I-1	10	277.9	3	45.5
I-2	3	26.1	1	8.6
IND	0	0	6	210.5
PUD	0	0	1	27.4
R-2	0	0	2	82.9
RD	0	0	2	892.9

It's also important to note that the boundary of Louisa County's Zion Crossroads Growth Area is adjacent to the Green Springs National Historic Landmark District, which encompasses approximately 14,000 acres of nationally significant landscapes and buildings, many of which predate the Civil War. Protecting this important community asset has to be a priority as plans for the development of the Zion Crossroads area are considered.

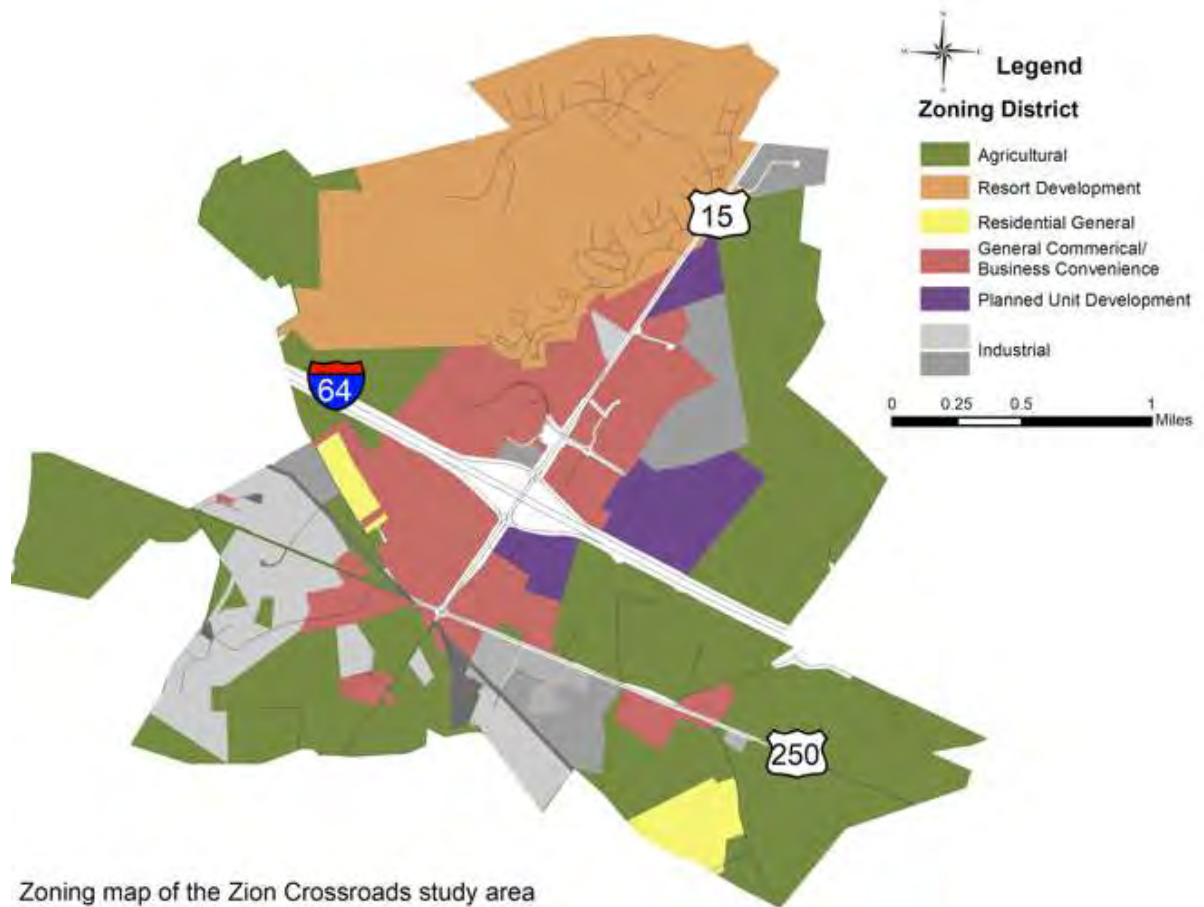


Figure 5. Zoning Map of the Zion Crossroads study area.

Planned Unit Developments

Both Fluvanna and Louisa County allow Planned Unit Developments (PUDs) in their Zion Crossroads growth areas.

In addition to the concentration of commercial and industrial property, Zion Crossroads is the only part of Fluvanna County where Planned Unit Developments are permitted. Per the Fluvanna County Zoning Ordinance,

*Planned unit developments (PUDs) are intended to promote the efficient use of land by allowing flexibility in design standards and variety in densities and land uses to preserve the rural areas of the County... Planned unit developments should provide unified development that incorporates new urbanism and traditional neighborhood development principles, which includes **a mix of residential and commercial uses, an interconnected system of internal roads, pedestrian sidewalks and walkways and well planned access points along existing roadways.** In addition to a mix of residential and commercial uses, planned developments should also provide a mix and variety of housing types.*

The statement of intent for the Planned Unit Development Zoning District in Louisa County is similar, and also more explicitly states that “benefits of a planned development include less infrastructure

costs, more efficient provision of public safety services, less environmental impact, and through the provision of affordable housing achieve significant economic and social integration.”

The allowance for PUDs in both the Zion Crossroads growth areas is the primary opportunity to meet the stated goals of achieving traditional neighborhood design throughout the established UDA in Fluvanna County.

In Fluvanna County, the Zion Crossroads Community Planning Area contains the UDA, but expands beyond the boundaries of the UDA itself. Within the UDA boundaries, the Fluvanna County Zoning Ordinance allows for a greater amount of flexibility to allow smaller mixed use developments to progress. There is no minimum area for a PUD within the Zion Crossroads UDA, for example, and smaller PUDs have the option to contribute to a pro-rata share fund lieu of provision for all or a portion of the required open space allotment.

Transportation System

Zion Crossroads is a high-growth area facing significant development pressure. This has led to strains on the existing transportation system. Two intersections, namely the intersection between US 15 and US 250 and the intersection between US 15 and Camp Creek Parkway/Spring Creek Parkway, are in the VDOT Culpeper Construction District’s top 100 crash location list. Identifying solutions to improve operations and address safety concerns at these critical intersections is an essential step to support the continued development goals for Zion Crossroads.

Kittelson & Associates completed a detailed analysis of the existing transportation system conditions as well as a no-build analysis which relied on forecasting system performance assuming the full build out of transportation improvements that have already been identified, but with no other improvements being made. The consultants used a no-build year of 2040 and estimated growth projections for development throughout the project area to assess future system conditions. Kittelson reviewed nineteen intersections along US 15 and US 250 collecting information regarding site conditions, land use, existing traffic operations, and transportation facilities within the study area.

Kittelson also documented the limited existing pedestrian and bicycle facilities and transit facilities within the study area.

Kittelson provided a detailed analysis for each of the roadway segments included as part of the study area, including the VDOT Functional Classification, number of lanes, speed limit, and existing lane configurations. They also broke the US 15 and US 250 corridors into segments based on access management and the general character/feel of the road segments due to changes in zoning and adjacent land uses along the corridors.

Level of Service (LOS) is used to evaluate the performance of intersections in terms of the average total vehicle delay of all movements through that intersection. Intersections are evaluated and given a LOS “score” of A, B, C, D, E, or F based on how well they are performing. For signalized intersections, the following criteria is used to determine the LOS:

A: Very low average control delay, less than 10 second per vehicle.

B: Average control delay is greater than 10 seconds per vehicle and less than or equal to 20 seconds per vehicle.

C: Average control delay is greater than 20 seconds per vehicle and less than or equal to 35 seconds per vehicle.

D: Average control delay is greater than 35 seconds per vehicle and less than or equal to 55 seconds per vehicle.

E: Average control delay is greater than 55 seconds per vehicle and less than or equal to 80 seconds per vehicle.

F: Average control delay is in excess of 80 seconds per vehicle.

The delay time experienced at an intersection is a factor of many variables including signal phasing, signal cycle length, and traffic volumes moving through the intersection. LOS of A, B, or C is considered acceptable indicating that the capacity and operation of the intersection is functioning as intended. LOS D indicates that the delay time is approaching unacceptable levels, and LOS E and F indicate that the delays experienced at the intersections are not acceptable.

Kittelson evaluated the LOS at the nineteen intersections in the study area considering both the existing and future no-build conditions and documented the number of crashes over the five-year period from 2014 to 2018. While only two intersections are eligible to receive funding through the SMART SCALE program due to the safety needs identified through the statewide mid-term planning process (Spring Creek Parkway/Camp Creek Parkway/US 15 and US 250/US 15), four other intersections were also identified as benefitting from improvements potentially through other funding programs due to the number of crashes experienced at these intersections and the declining LOS:

- Spring Creek Parkway/Stonegate Drive/US 15
- Liberty Trail/US 15
- Crossing Pointe Drive/US 15
- Poindexter Road/US 250

Improvements at these four additional intersections are considered to be lower priority and could be pursued pending eligibility in future SMART SCALE rounds or implemented through other funding programs or policy mechanisms.

The full existing conditions report prepared by Kittelson and Associates can be referenced in Appendix D.

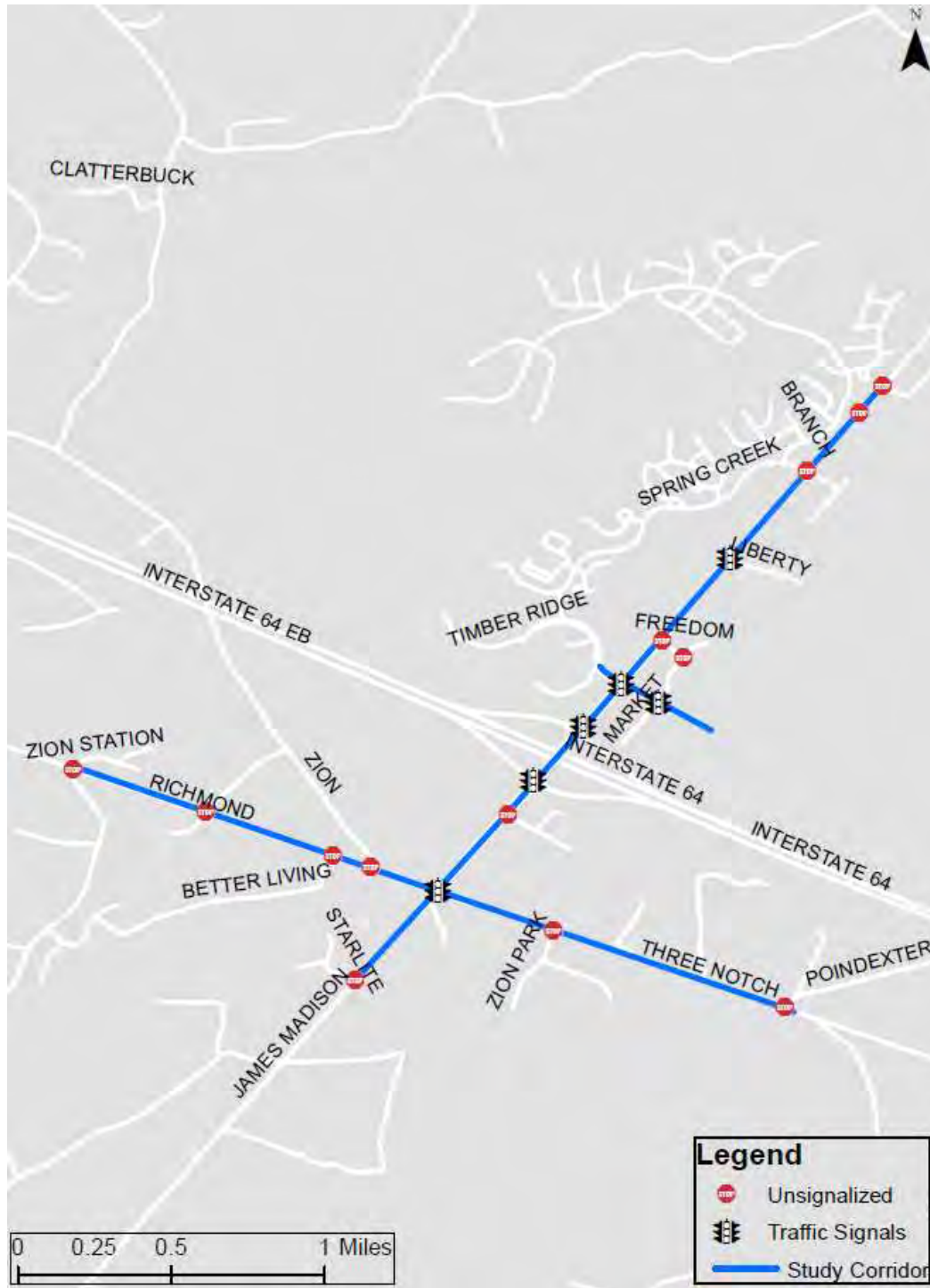
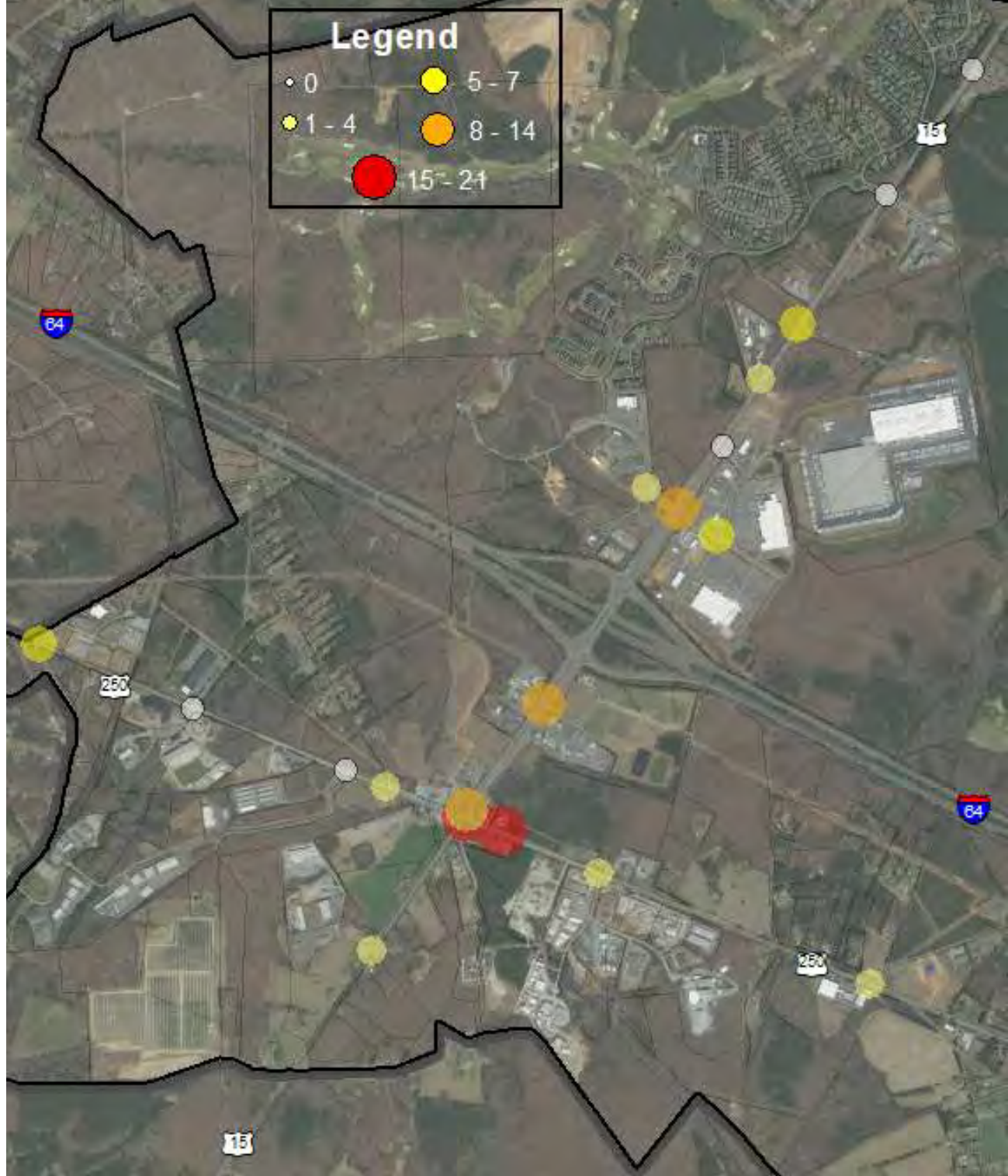


Figure 6. Zion Intersections Reference Map. Prepared by Kittelson & Associates.

Table 2. Summary of Intersection Operations

Intersection	Level of Service			# Crashes 2014-2018	
		AM	PM		SAT
Sommerfield Business Park/US 15	Existing	B	C	C	0
	2040 No-Build	C	D	D	
Spring Creek Parkway/Stonegate Drive/US 15	Existing	C	D	D	0
	2040 No-Build	F	F	F	
Liberty Trail/US 15	Existing	C	D	E	7
	2040 No-Build	E	E	F	
Freedom Trail/US 15	Existing	C	C	C	0
	2040 No-Build	C	D	D	
Freedom Drive/US 15	Existing	A	B	B	2
	2040 No-Build	B	B	B	
Spring Creek Parkway/Camp Creek Parkway/US 15	Existing	D	D	E	14
	2040 No-Build	F	F	F	
Spring Creek Parkway/Wood Ridge Terrace	Existing	B	B	A	2
	2040 No-Build	B	B	B	
Camp Creek Parkway/Market Street	Existing	C	D	C	6
	2040 No-Build	C	C	D	
North DDI Ramp Terminal/US 15	Existing	C	C	C	20
	2040 No-Build	C	D	D	
South DDI Ramp	Existing	C	C	B	10
	2040 No-Build	B	C	C	
Crossing Pointe Drive/US 15	Existing	D	E	F	12
	2040 No-Build	F	F	F	
US 250/US 15	Existing	C	C	C	21
	2040 No-Build	C	D	C	
Starlite Park/US 15	Existing	C	C	B	4
	2040 No-Build	C	D	C	
Troy Road/Zion Station Court/US 250	Existing	B	B	B	6
	2040 No-Build	B	B	B	
Hunters Branch Road/US 250/Edgecomb Road	Existing	B	B	B	0
	2040 No-Build	B	B	B	
Better Living Drive/US 250	Existing	B	B	A	0
	2040 No-Build	B	B	A	
Zion Road/US 250	Existing	B	B	B	3
	2040 No-Build	B	B	B	
Zion Park Road/US 250	Existing	B	B	B	2
	2040 No-Build	C	C	C	
Poindexter Road/US 250	Existing	B	B	B	3
	2040 No-Build	C	B	B	

2014-2018 Vehicular Crashes (Reported) at Selected Intersections Zion Crossroads I-64/US250/US15 Area



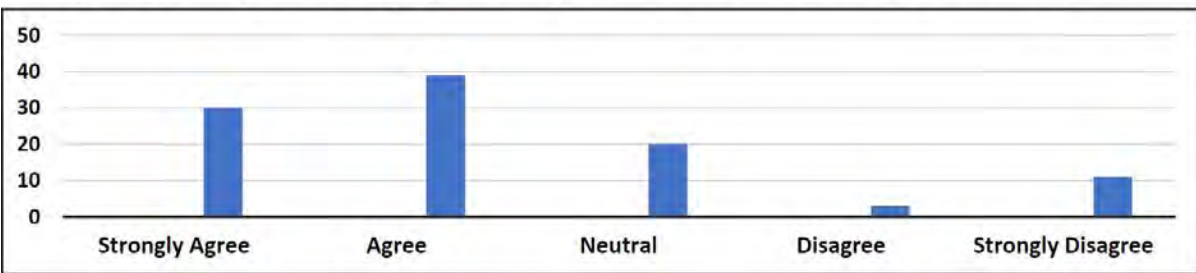
Louisa County Survey

As part of its Comprehensive Plan update, participating Louisa County residents and stakeholders completed surveys on how they wanted to see development occur throughout the County. The survey identified several growth areas, one of which was Zion Crossroads, and then asked respondents if they supported the proposed concepts.

Louisa's plan is based on the concept that growth management is a community's use of various techniques that determine the amount, type, and rate of growth, and further enable development to be channeled into justifiable designated areas.

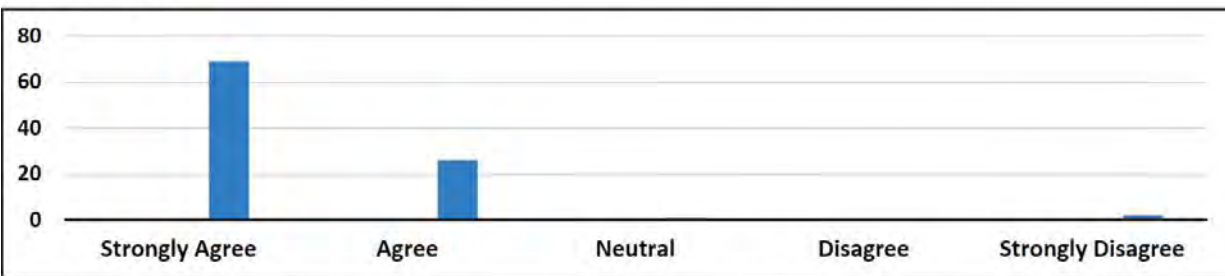
Respondents were asked if they generally agreed or disagreed with the proposed concepts for the Zion Crossroads Growth Area. Respondent were able to select "Strongly Agree," "Agree," "Neutral," "Disagree," or "Strongly Disagree" as options. A clear majority of respondents selected "Agree" or "Strongly Agree."

3. Do you agree/disagree with the proposed concepts used for the Zion Crossroads Growth Area?



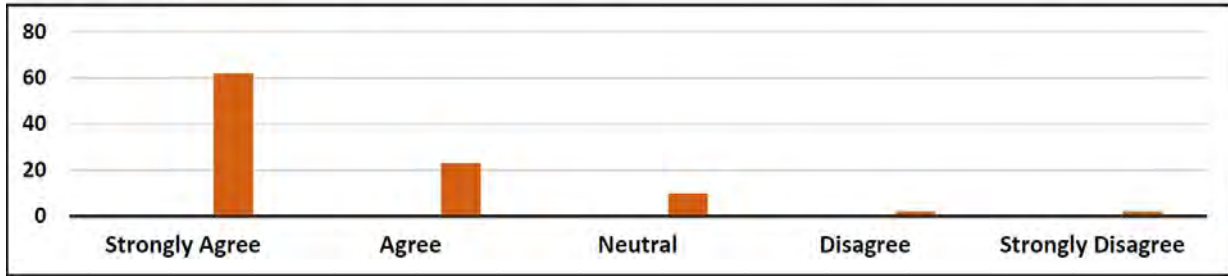
Respondents were also asked a series of questions regarding landscaping and buffering concepts. The first question asked if they agreed or disagreed with the concept of requiring landscaping for commercial projects inside of Mixed-Use area. On the same five-point scale with response options ranging from "Strongly Agree" to "Strongly Disagree," there were a very limited number of responses other than "Strongly Agree" or "Agree."

1. Do you agree/disagree with the concept of requiring landscaping for commercial projects inside of Mixed-Use areas?



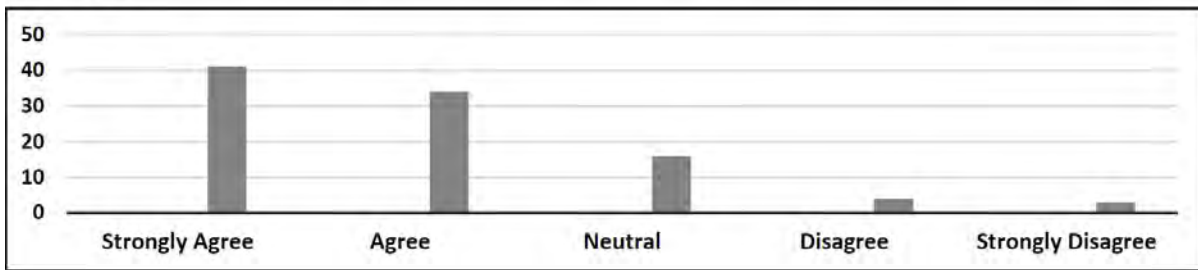
When asked if they agreed or disagreed with the concept of increased buffering for commercial projects inside of industrial areas, there were a few more "Neutral" responses, but otherwise, there was strong support for that concept.

2. Do you agree/disagree with the concept of requiring increased buffering for commercial projects inside of Industrial Areas?



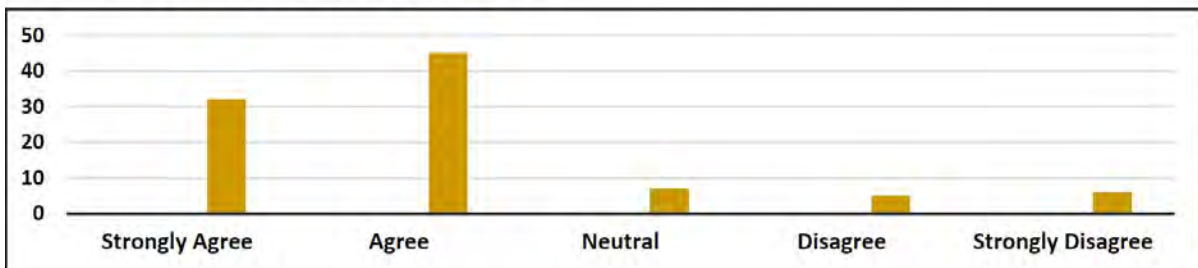
When asked if they agreed or disagreed with the concept of requiring landscaped buffers or screening along County roadways, support, while still clearly strong, was slightly more mixed. There was a larger number of respondents that selected a response of “Neutral” and a small handful that selected “Disagree” or “Strongly Disagree.”

3. Do you agree/disagree with the concept of requiring landscaped buffers/screening along County roadways?



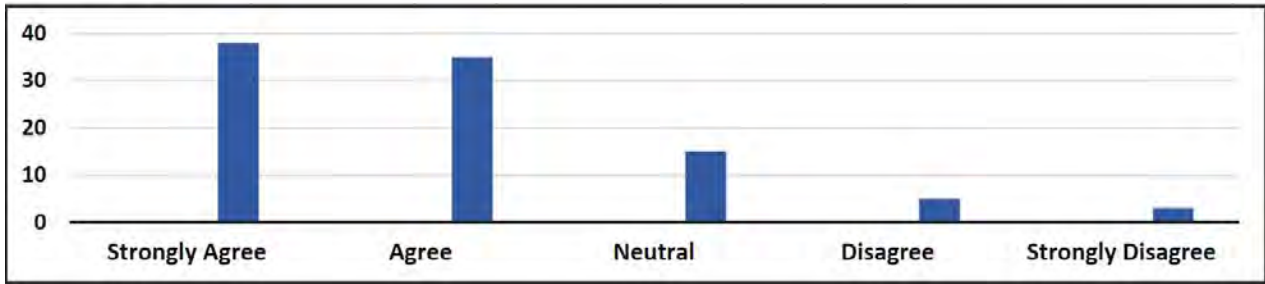
When asked if they agreed or disagreed with the concept of having different landscaping standards for commercial/industrial uses within the growth areas, there were again a small number of respondents that selected “Disagree” or “Strongly Disagree,” but respondents generally supported the concept.

4. Do you agree/disagree with the concept of having different landscaping standards for commercial/industrial uses with in growth areas?



Finally, respondents were asked if they agreed or disagreed with the concept of designated gateway corridors along certain primary routes in Louisa County, one of which was identified as Route 15. Similarly to the responses for the other questions, a definitive majority of respondents selected “Strongly Agree” or “Agree” with a smaller number selecting “Neutral” and just a few selecting a response of “Disagree” or “Strongly Disagree.”

5. Do you agree/disagree with the concept of designated Gateway Corridors along some primary routes in the County?



Fluvanna County Survey

To get an initial idea for the desires of the Fluvanna County residents and property owners in the Zion Crossroads area, the TJPDC staff conducted an initial survey. The survey was sent out to a stakeholder list provided by Fluvanna County staff. The first questions captured the demographic information of those responding to the survey.

The survey respondents were predominately those aged 35 and older (see Figure 1). There was a good mixture of respondents based on their primary association with Zion Crossroads (residents, property owners, business owners, workers, and those that travel to the area shop or visit) and based on the length of time they have had associations with the area (see Figures 2 and 3).

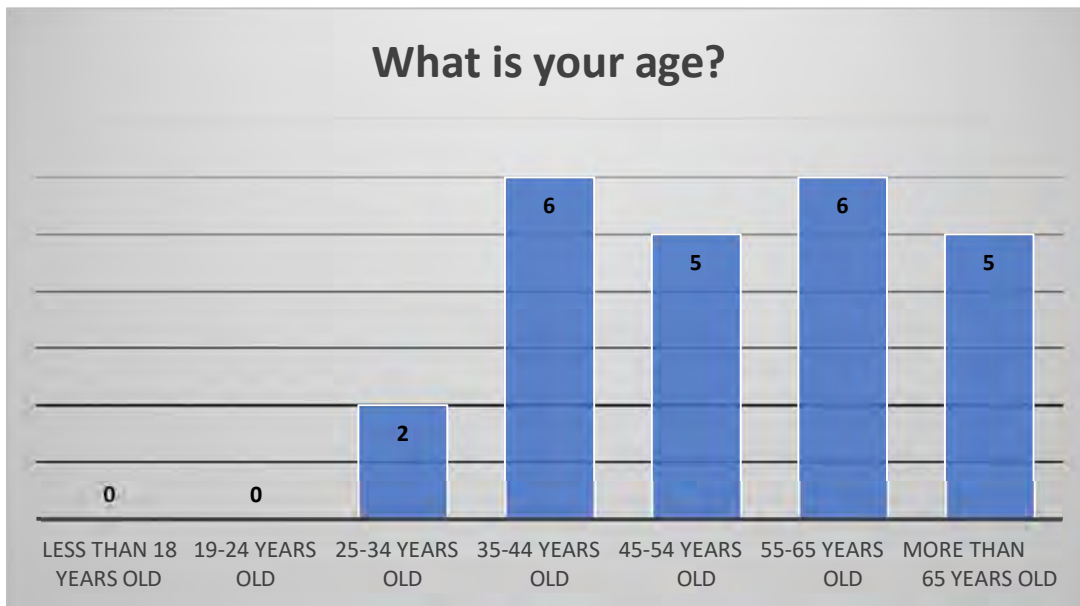


Figure 1

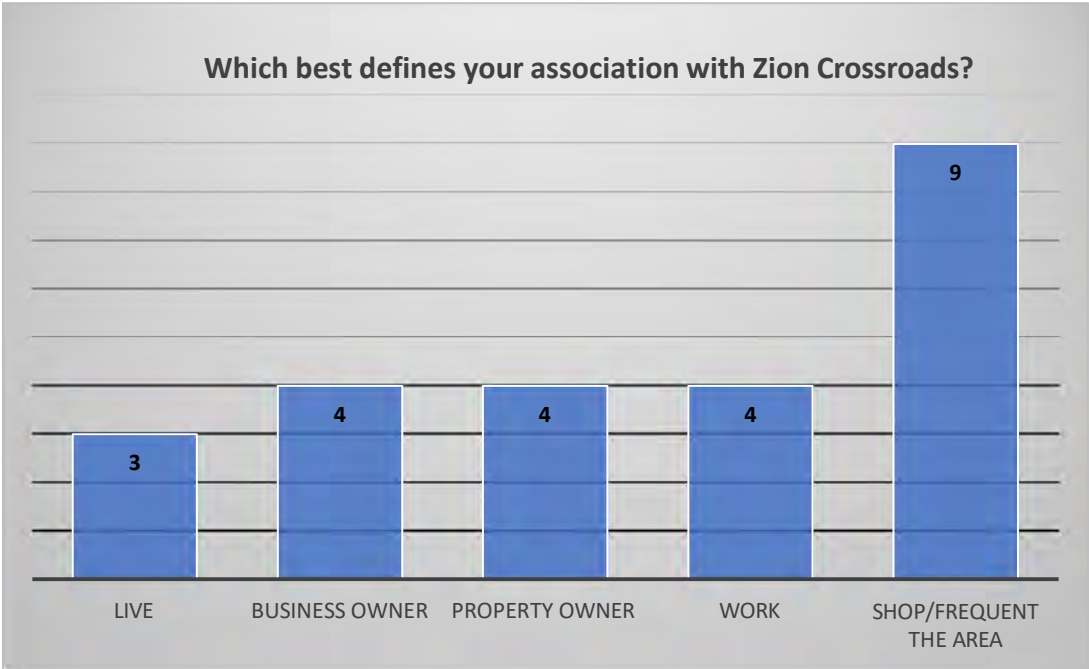


Figure 2

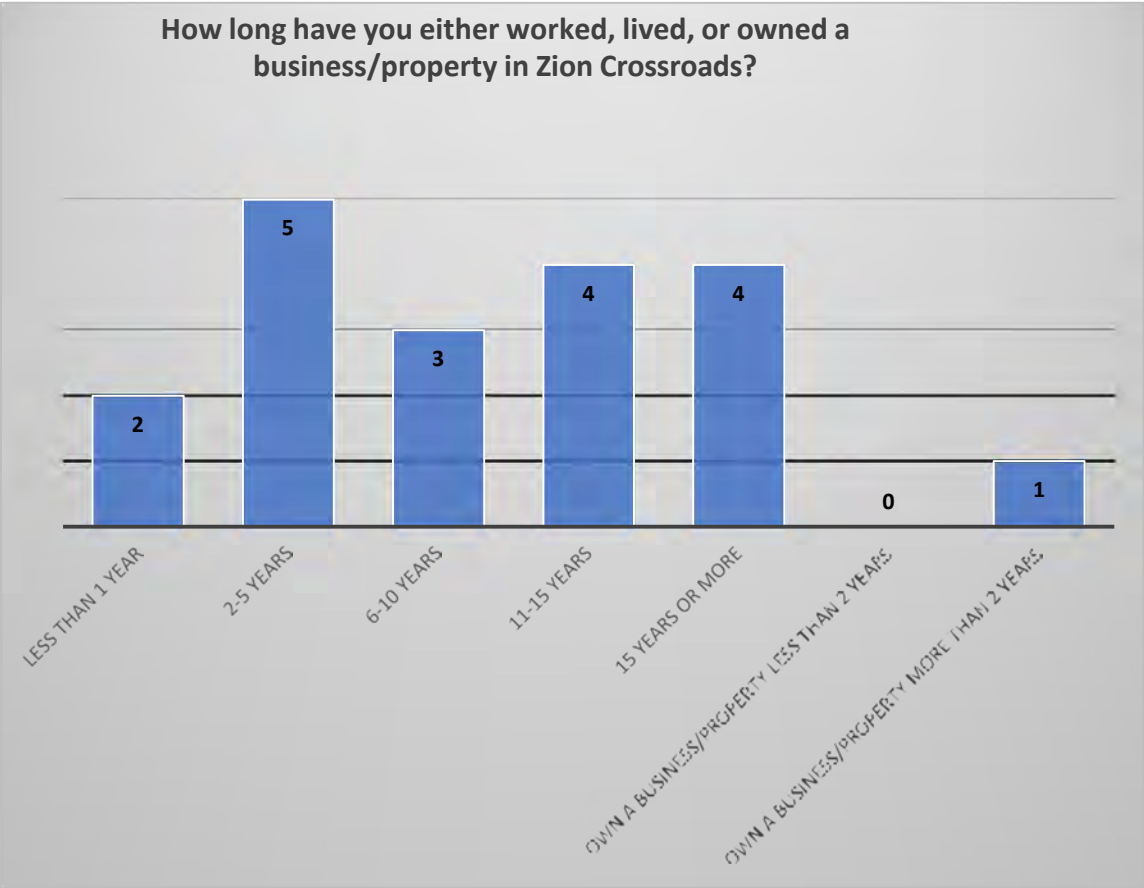


Figure 3

Respondents were asked about their reasons for locating in the Zion Crossroads area. As seen in Figure 4, the primary reasons were based on affordability, employment, and for business owners, demographics. While a number of respondents did reference that they were attracted to their property, a smaller number selected that they were drawn to the local character of the area.

This feedback confirms the assumptions going into the planning process that most people are currently choosing to locate to the Zion Crossroads area for practical purposes versus a general attraction to the neighborhood or community.

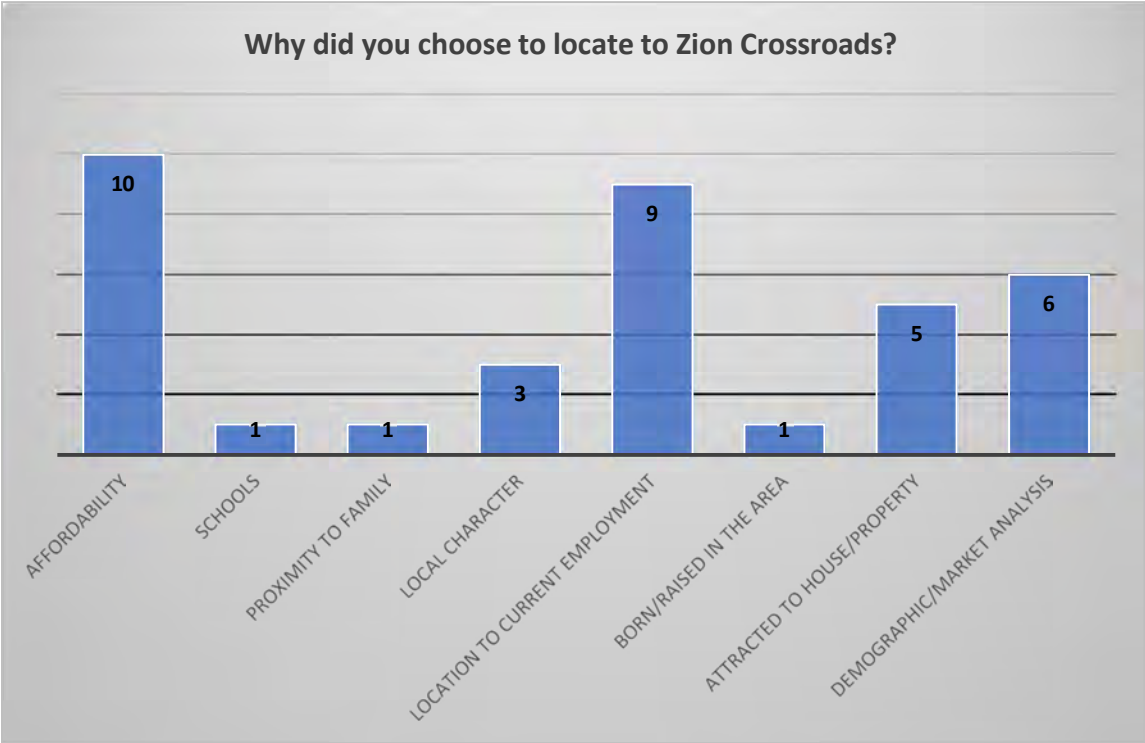


Figure 4

The next two survey questions asked respondents to rate current characteristics of the Zion Crossroads and then to rate how important different characteristics were in establishing a sense of community for the area. For the first question, respondents were asked to rate the characteristics as either poor, average, or good. To compare across the different categories, a rating of poor was assigned a value of -1, a rating of average was assigned a value of 0, and a rating of good was assigned a value of 1. The average ratings were then calculated for each characteristic in order to compare how the Zion Crossroads area was perceived between the different characteristics. This breakdown is shown in Figure 5.

Based on how the responses were tabulated, the possible range for the average characteristic ratings is from -1 to 1. A score of -1 would mean that every respondent thought that characteristic was poor, and a rating of 1 would mean that every respondent thought that characteristic was good. Figure 5 shows that proximity to other localities and places of employment, affordability, and safety were all characteristics that were generally perceived favorably. Community atmosphere had an average rating of 0, which means that while the sense of community is not perceived negatively, it's also not a prominent aspect for which Zion Crossroads is known. And then proximity to shopping was the only

characteristic that actually had a negative average rating, meaning that this is the category where respondents would potentially like to see the most improvement.

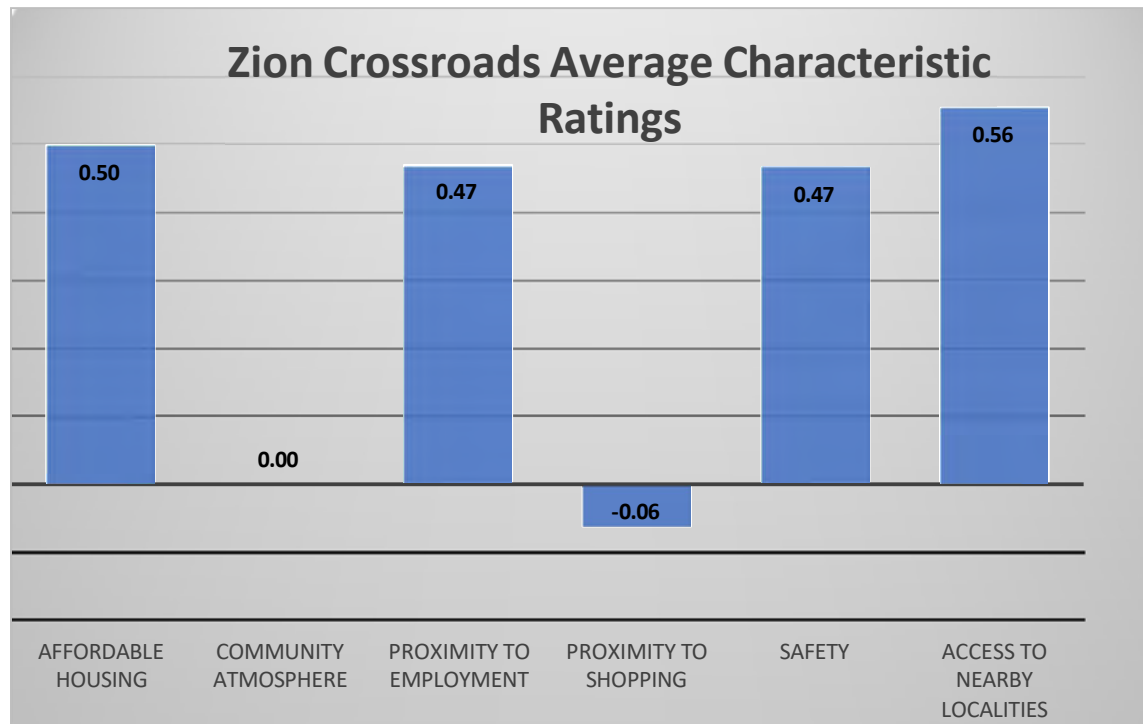


Figure 5

The next question asked respondents about potential factors that would help the area develop a stronger sense of community. For each of the listed factors, respondents were able to choose yes, no, or not sure as options. A yes response was assigned a value of 1, a no response was assigned a value of -1, and then a not sure response was given a value of 0. The responses were again averaged to be able to compare where respondents felt that the greatest opportunities were for developing a sense of community.

Figure 6 shows the average response for each of the factors. Proximity to employment and shopping, as well as access to nearby localities were all rated very highly as being important for establishing a sense of community. While proximity to employment and access to nearby localities were both rated as above average in the previous question, proximity to shopping was the only category that was rated as poor once all the responses were averaged. This demonstrates that proximity to shopping is the factor that has the biggest disparity between the current conditions and what respondents would like to see accomplished to foster a greater sense of community.

Figure 6 also shows that there is strong support for the importance of working and living in the same area to develop a sense of community. Respondents were less enthusiastic that architectural guidelines would positively contribute to a strong sense of community. And regardless of any other changes, the feeling of maintaining a safe community should be preserved as any changes are implemented.

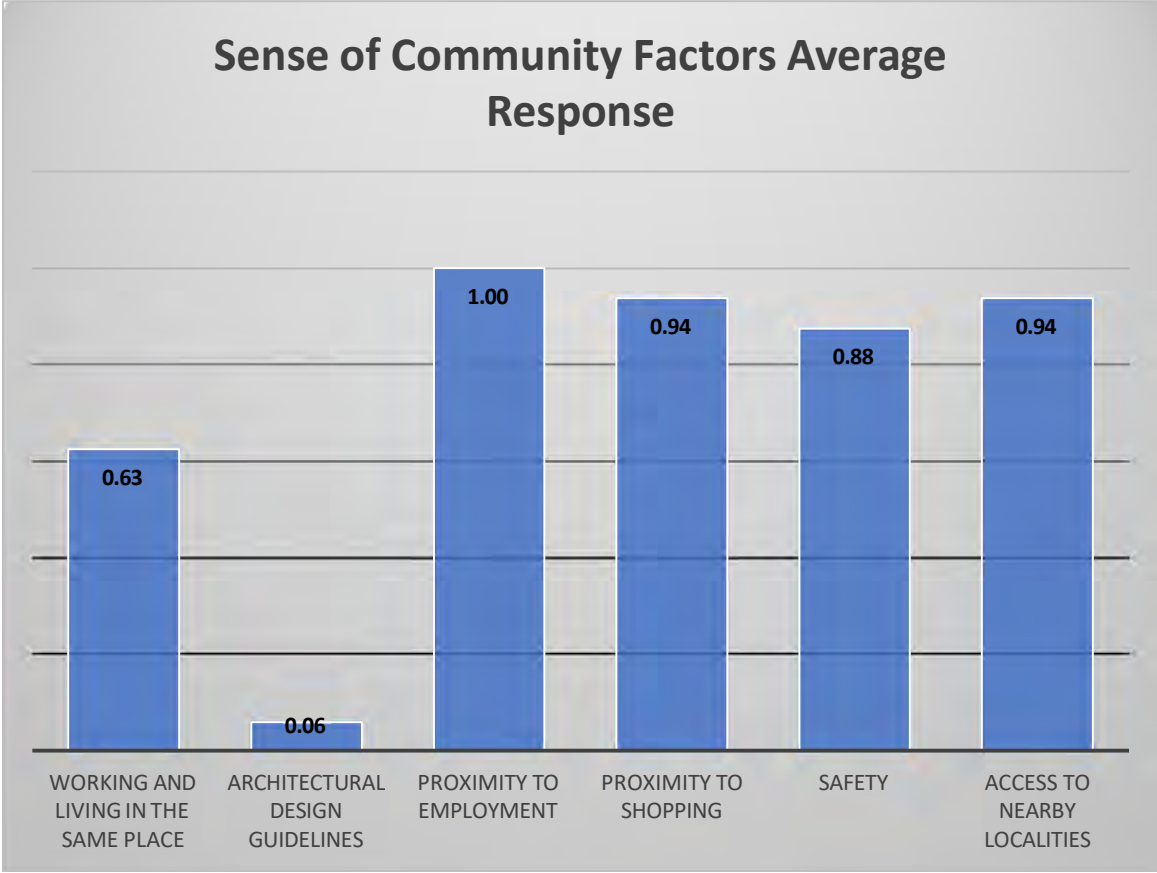


Figure 6

The final survey question asked respondents if they agreed with different potential development concepts that could be considered for the Zion Crossroads area. Respondents were able to respond that they strongly agreed, agreed, neither agreed nor disagreed, disagreed, or strongly disagreed. Each of these responses were assigned a value (2 for strongly agree, 1 for agree, 0 for nearly agree nor disagree, -1 for disagree, and -2 for strongly disagree) and these responses were then averaged as in the other questions. Figure 7 summarizes the average ratings for each factor that respondents were asked about.

The first concept option, which also had a large amount of support from the survey respondents, was regarding whether a business-centered planned development that integrated commercial, industrial, and office space uses was the most appropriate land use for the Fluvanna side of Zion Crossroads. Overwhelmingly, respondents agreed with this development concept. There were three comments that also stated that this development scenario also needed to include housing and not strictly just rely on the housing developments in Louisa County to meet the residential needs in the area.

There was also generally strong support for establishing landscaping requirements for commercial projects inside of mixed-use areas as long as the landscaping did not result in a loss of visibility of businesses from public access points, as well as for the establishing a designated Gateway Corridor along Routes 15 and 250 to serve as a visual welcome into the area.

Support for landscaped buffers or screening along County roadways and for commercial and industrial uses within the growth area was more modest. Comments submitted for those questions mostly highlighted concerns with requirements being overly restrictive or impeding business visibility.

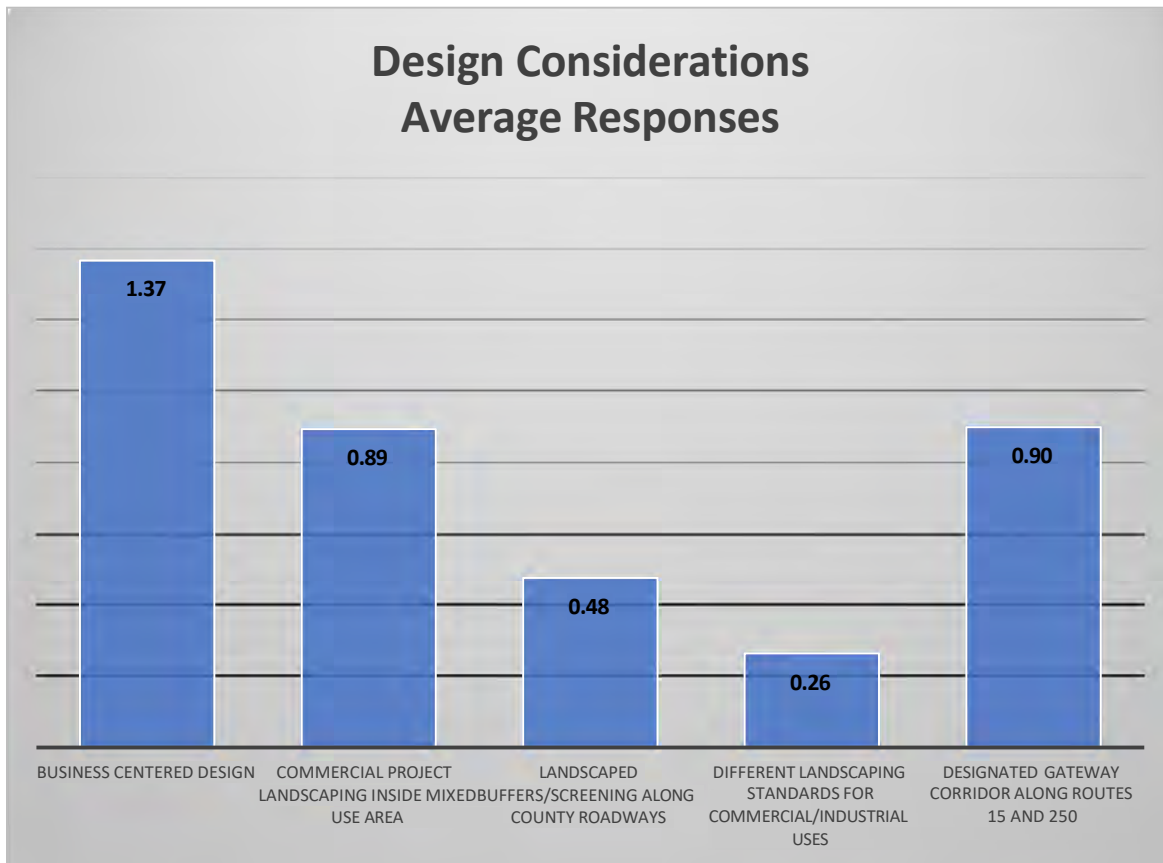


Figure 7

In addition to the closed-ended survey questions, survey respondents were also asked the open-ended question of what their vision for what the Zion Crossroads area could become in the future was. Seventeen respondents submitted a response. Of those 17 responses, 14 specifically mentioned additional retail, shopping, or commercial use. There were other comments that this economic development should also be contextualized and done in a way that is welcoming, vibrant, convenient, and supported by other community development uses such as recreational spaces, educational facilities, and residential units.

Based on the survey responses, it is clear that the most important priority is to support economic development in the Zion Crossroads area.

Discussion

There are some limitations to the combination of these two survey efforts. Louisa County’s survey was conducted over the entirety of their population, so respondents were not necessarily those that had a strong affiliation or connection to Zion Crossroads as either a resident, property, or business owner. TJPDC staff also used the high-level summary of the data available on Louisa County’s Comprehensive

Plan update website, so the same level of precision in reviewing the responses was not provided in both scenarios.

That said, there was much stronger support for landscaping and buffering concepts based on the Louisa County survey responses compared to the Fluvanna County survey responses. This could be due to any number of factors including the small number of respondents in the Fluvanna survey, differences in the demographics of who is responding to each of the surveys, and just general differences in preferences from those that live in different communities.

Louisa County Zoning Ordinance Updates

To implement the goals of their Comprehensive Plan, Louisa County adopted a number of Zoning Ordinance amendments related to their growth areas, which includes Zion Crossroads. Based on overwhelming public support for requiring landscaped buffers/screening along County roadways, the updated ordinances guide how trees and shrubs should appear in commercial, civic use, and multi-family developments. Louisa County also developed separate landscaping standards for commercial and industrial corridors within growth areas. The updated Zoning Ordinance mentions that one of the purposes of the comprehensive plan is to improve the visual character of gateway corridors and roadways. Setback regulation guidance for growth areas is given that encouraged a unified appearance with already established parts of the County.

Rural protection of growth areas was another favorable theme mentioned within the survey. As stated within the Architectural Development Guidelines section of the updated Zoning Ordinance, the County will use lighting that reduces glare, building materials and colors that blend into the surrounding environment and have an earth-tone palette, and give guidance on permissible architectural styles consistent with the regional vernacular. Agricultural districts within growth areas are expected to support related farm activities essential to the community's rural economy and agrarian character.

Light or medium industrial operations are expected within growth areas that have designated industrial zones. The specific intent is to encourage the development of and continued use of the land for such operations. There will also be light commercial use permitted in the growth areas with limited businesses designed to serve the surrounding residential districts. Traffic and parking within these areas will be controlled.

RECOMMENDATIONS

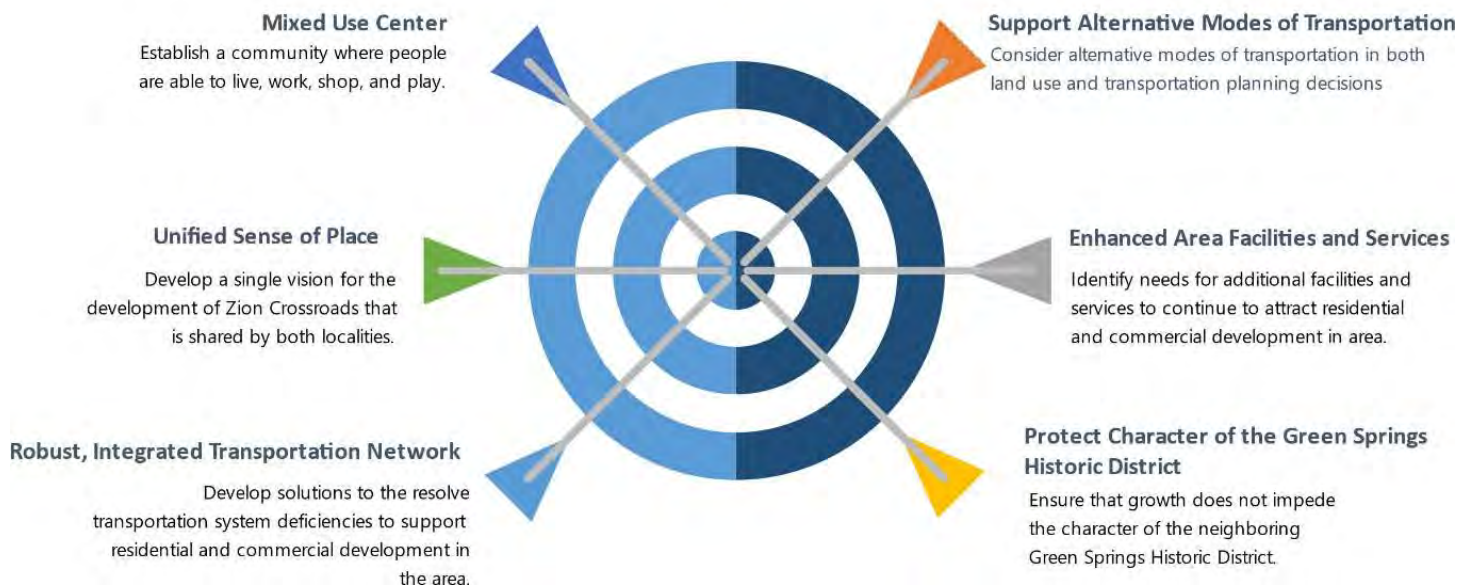
There are two types of recommendations that were developed as part of the Zion Crossroads Small Area Plan. Recommendations developed by Kittelson & Associates focused on specific roadway and intersection improvements based on their analysis of traffic safety and operations and future transportation demand models to develop solutions that will most cost effectively address current and future transportation system needs.

During this process, there were certain improvements that were not identified as a critical need based on the analyses completed by Kittelson & Associates, but were still identified as priorities by the local government stakeholders. These transportation improvements were included in a separate section referred to as Transportation Infrastructure Vision Recommendations.

TJPDC staff also worked with the local stakeholders to identify higher level and transportation vision goals that needed to be considered to establish the type of community that was envisioned as part of this planning process. Transportation improvements are a critical need for Zion Crossroads, but it cannot be addressed without also considering the larger goals of establishing a community where people can enjoy working, living, and recreating. In addition, there were some road projects that were identified in the stakeholder discussions that would not necessarily merit needed improvements based on the

The recommendations were developed based on a variety of input including public feedback, stakeholder group discussions, and consideration of recommendations from previous plans based on the goals that were identified by the stakeholder group early in the process.

Goal Setting



Goal: Establish Zion Crossroads as a mixed-use community where people can live, work, shop, and play.

1. Corporate mixed-use site development that includes business incubators, public meeting spaces/facilities to more comprehensively develop large parcels (Fluvanna).
 - Incorporate transportation connectivity into site development
 - Consider trade-offs in required on-site facilities (reduced parking in exchange for TDM infrastructure)
2. Establish the portion of Zion Crossroads in Louisa County as an Urban Development Area.

Goal: Develop a unified vision for the development of Zion Crossroads that is shared by both localities.

1. Incorporate placemaking into roadway improvements.
 - Install gateway signage and landscaping features in new roundabouts.
 - Incorporate “Complete Street” principles into roadway design and upgrades of collector and local roads.
2. Collaborate on a unified branding and marketing campaign for Zion Crossroads.
 - Develop a unique Zion Crossroads brand that is used by both Fluvanna and Louisa County for placemaking and marketing.
 - Develop a joint planning strategy that builds on each localities’ unique characteristics and strengths.
 - Promote the use of wayfinding signs along I-64 by local businesses.
3. Consider opportunities to incorporate coordinated design standards into site and building development.
4. Consider opportunities to incorporate coordinated landscaping and buffering standards.
 - Identify an organization to provide maintenance of corridor landscaping.
5. Consider opportunities to develop coordinated Planned Unit Development and Resort Development ordinances.
 - Lighting
 - Pedestrian facilities

Goal: Develop a robust, integrated transportation network to support residential and commercial development in the area.

1. Pursue funding for transportation system improvements through Smart Scale or other funding sources.
 - Develop projects that will score competitively for Smart Scale funding.

- Consider mechanisms to generate additional local revenue that could be contributed to projects to reduce requested costs and improve likelihood that project funding will be awarded.
- 2. Create local transportation network redundancy.
- 3. Reduce conflicts between commercial trucks and single occupancy vehicles when traveling within the local area.
- 4. Manage access off of US 250 AND US 15 as new sites are developed.
 - Consider establishment of an overlay district that requires commercial driveways to be spaced at minimum intervals.
 - Encourage use of shared commercial entrances as new sites are developed.

Goal: Consider alternative modes of transportation in both land use and transportation planning decisions.

1. Create an integrated network of bicycle and pedestrian facilities to allow connection between major destination centers within the study area.
 - Collaborate with developers to plan for future facilities and construct on-site facilities during site development.
 - Incorporate bicycle and pedestrian infrastructure improvements during planned roadway maintenance.
 - Develop partnerships with existing property owners to gain access to right-of-way for future facility development.
 - Pursue funding to construct new infrastructure through grant opportunities such as Smart Scale, Transportation Alternatives, and/or Revenue Sharing.
 - Coordinate planned bicycle and pedestrian facilities with planning for the potential regional Three Notch'd Trail through the Zion Crossroads area.
 - Utilize shared use paths outside of the VDOT right-of-way to support bicycle and pedestrian network infrastructure.
 - Integrate the local bicycle network with the bicycle network used to travel to scenic locations north of the study area.
2. Direct bike and pedestrian facilities along local street networks.
3. Increase Park & Ride lot capacity through expansion of existing lot or development of a larger lot at a new location
 - Ensure safe bicycle and pedestrian access is available to the Zion Crossroads Park and Ride lot; consider options for bike storage at Park and Ride lot.
 - Incorporate transit operations and access needs into any improvements to existing lot or development of new lot.

4. Coordinate with Jaunt to consider the feasibility of a commuter route between Zion Crossroads and Charlottesville.
5. Consider training and programming opportunities to support greater utilization of Jaunt services in collaboration with community partners.
6. Consider implementing on-demand transit to support travel throughout the local Zion Crossroads area.
7. Facilitate alternative transportation access across I-64.
 - Bike/pedestrian crossing
 - Microtransit/shuttle services offered between multi-family housing developments and employment/commercial centers
 - Evaluate the feasibility of a connection between Camp Creek Parkway and Poindexter Road to accommodate bicycle and pedestrian access across I-64.
8. Encourage the inclusion of electric vehicle charging station in site development for industrial, commercial, and multi-family developments.

Goal: Identify needs for additional facilities and services to continue to attract residential and commercial development to the area.

1. Assess the need and opportunities for additional public community amenities.
 - Library, public park, athletic fields, recreational facilities, community meeting space, etc.
2. Assess the need for additional public safety services.
 - Law enforcement
 - Fire department
 - EMS

Goal: Protect the character of the Green Springs Historic District.

1. Maintain existing gravel roads located in the designated historic district in a rustic, unpaved state.

APPENDIX

The in-document referenced appendices are listed below. The appendices offer more details and context to the findings of the Zion's Crossroads Gateway Plan.

Appendix A: Typical Street Cross Sections Found in Zion Crossroads

Appendix B: Zion Crossroads Small Area Study Retail Marketplace Profile

Appendix C: Fluvanna and Louisa Counties Zoning District Definitions

Appendix D: Zion Crossroads Small Area Study – Existing and Future No-Build Conditions Technical Memorandum

Appendix E: Esri Business Summary for Zion Crossroads Study Area

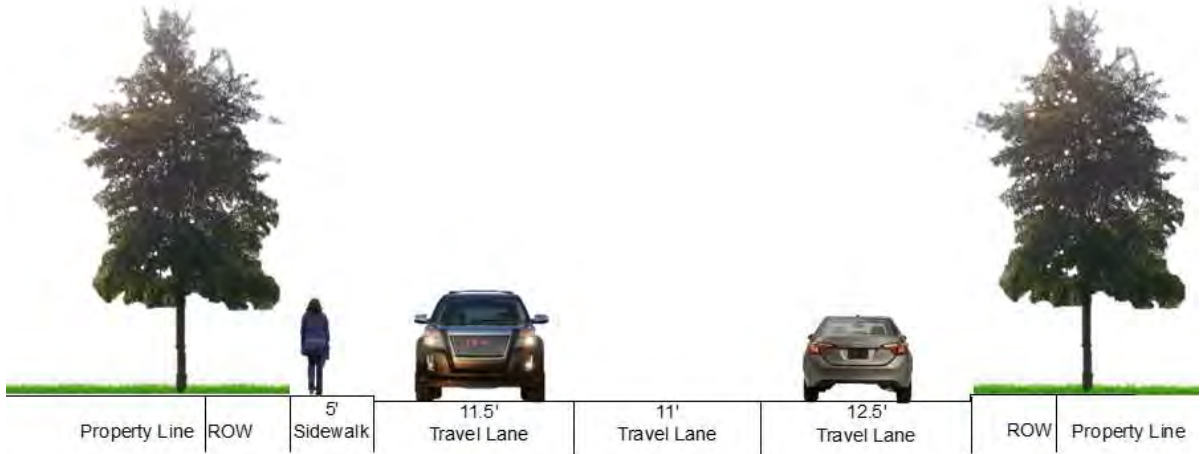
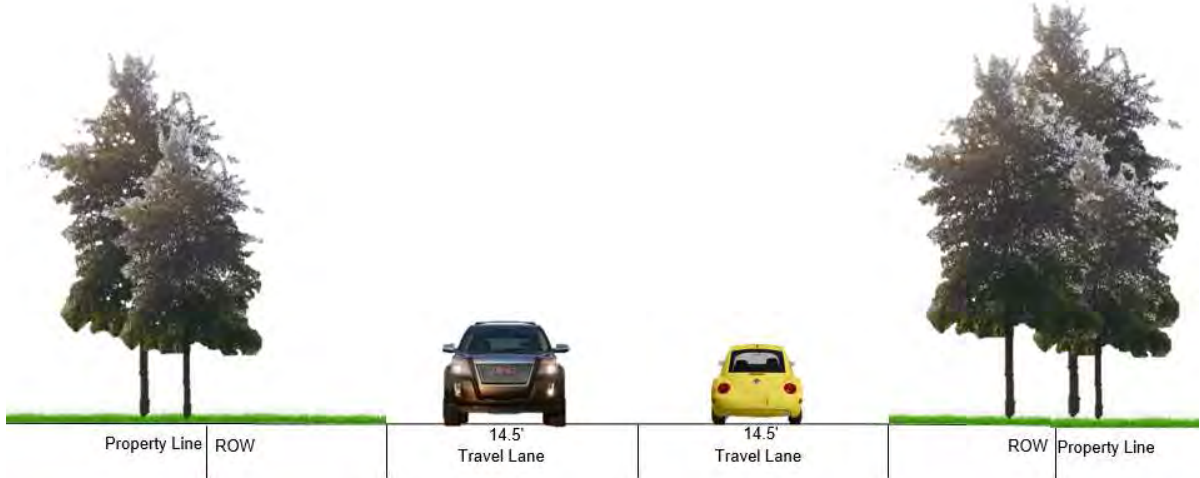
Appendix F: Esri Retail Demand Outlook for Zion Crossroads Study Area

Appendix G: Esri Retail MarketPlace Profile for Zion Crossroads Study Area

Appendix A: Typical Street Cross Sections Found in Zion Crossroads



Typical Street Cross Sections Found in Zion Crossroads



Appendix B: Zion Crossroads Small Area Study Retail Marketplace Profile

The Zion Crossroads area has market potential for the following retail industry groups:

- Automobile Dealers
- Other Motor Vehicle Dealers
- Furniture Stores
- Electronics & Appliance Stores
- Lawn and Garden Equipment and Supplies Stores
- Specialty Food Stores
- Beer, Wine, and Liquor Stores
- Health & Personal Care Stores
- Clothing Stores
- Shoe Stores
- Jewelry, Luggage, and Leather Goods Stores
- Book, Periodical, and Music Stores
- Florists
- Office Supplies, Stationery, and Gift Stores
- Electronic Shopping and Mail-Order Houses
- Vending Machine Operators
- Direct Selling Establishments
- Special Food Services
- Drinking Places (Alcoholic Beverages)

The retail market is currently saturated in the following areas:

- Auto Parts, Accessories, and Tire Stores
- Building Material and Supplies Dealers
- Gasoline Stations
- Department Stores (Excluding Leased Depts.)

For additional information, see appendices E, F, and G.

Source: Data Axle (2017) and Esri 2017 Retail Marketplace Profile.

ARTICLE 4. - AGRICULTURAL, GENERAL, DISTRICT A-1

Sec. 22-4-1. - Statement of intent.

This district covers areas of the County consisting of woodland, farmland, open space, mountains and areas of low density residential development. The primary objectives of this district are to conserve water and other natural resources, reduce soil erosion, protect watersheds and reduce hazards from floods; to preserve the rural character of the County; to promote existing and future farming and forestry operations; and to promote the retention of undisturbed open space. Limited residential development, and limited commercial and industrial uses which are supportive of and directly related to agriculture, forestry or other traditionally rural uses, are to be permitted, but only in a manner consistent with the primary objectives of the district. In particular, the provisions of this district are intended to significantly limit conventional and roadside strip development, especially on major arteries and commuter routes.

ARTICLE 5. - RESIDENTIAL, LIMITED, DISTRICT R-1

Sec. 22-5-1. - Statement of intent.

This district is composed of certain quiet, low density residential areas, plus certain open areas where similar residential development appears likely to occur. It is intended that this district be established in the appropriate areas designated in the Comprehensive Plan for primary residential development. The regulations for this district are designed to stabilize and protect the essential characteristics of the district.

ARTICLE 6. - RESIDENTIAL, GENERAL, DISTRICT R-2

Sec. 22-6-1. - Statement of intent.

This district is composed of certain low to medium density concentrations of residential uses, plus certain open areas where similar development appears likely to occur. It is intended that this district be established in areas designated as community planning areas in the Comprehensive Plan. The regulations for this district are designed to stabilize and protect the essential characteristics of the district, to promote and encourage, insofar as compatible with the intensity of land use, a suitable environment for family life. To these ends, retail activity is sharply limited and this district is protected against encroachment of general commercial or industrial uses. This residential district is not completely residential as it includes public and semi-public, institutional, and other related uses. However, it is basically residential in character, and, as such, should not be spotted with commercial and industrial uses.

ARTICLE 7. - RESIDENTIAL, PLANNED COMMUNITY, DISTRICT R-3

Sec. 22-7-1. - Statement of intent.

This district is intended to permit compact village-style residential development and associated institutional uses, community serving mixed uses, open spaces, and creative design in accordance with a master plan. The development should occur in a manner that will protect and preserve the natural resources, trees, watersheds, contours and topographic features of the land; and to protect and enhance the natural scenic beauty of the area and support. The scale of the housing and the commercial use should be appropriate to support the residential needs at a neighborhood scale.

ARTICLE 8. - RESIDENTIAL, LIMITED, DISTRICT R-4

Sec. 22-8-1. - Statement of intent.

This district is composed of certain low to medium density concentrations of residential uses, together with certain complementary public, semi-public, institutional, commercial and recreational uses, all of which are intended to be at a scale appropriate to support the residential needs of the district. It is intended that this district be applied to the existing community of Lake Monticello and Community Planning Areas as defined by the Comprehensive Plan. The regulations for this district are designed to stabilize and protect the essential characteristics of the district, to promote and encourage, insofar as compatible with the intensity of land use, a suitable environment for family life and to permit certain related public, semi-public, institutional and recreational uses and certain commercial uses of a character compatible with such residential uses and which are unlikely to develop general concentrations of traffic, crowds of customers, and general outdoor advertising. To these ends, retail activity is sharply limited and this district is protected against encroachment of general commercial or industrial uses.

ARTICLE 9. - BUSINESS, GENERAL, DISTRICT B-1

Sec. 22-9-1. - Statement of intent.

Generally this district covers those areas of the County as defined by the Comprehensive Plan that are intended for the conduct of general business to which the public requires direct and frequent access, but which is not characterized either by constant heavy trucking other than stocking and delivery of light retail goods, or by any nuisance factors other than occasioned by incidental light and noise of congregation of people and passenger vehicles.

ARTICLE 10. - BUSINESS, CONVENIENCE, DISTRICT B-C

Sec. 22-10-1. - Statement of intent.

This district is for those areas of the County, adjacent to residential and/or agricultural areas, where it is in the public interest to establish retail and service businesses of a type which are ordinarily and necessarily convenient to and designed primarily to serve adjacent residential uses and which are not characterized either by trucking other than stocking and delivery of light retail goods, or by any nuisance factors other than those occasioned by incidental light and noise of congregation of people and passenger vehicles. This includes such uses as retail convenience stores, banks, business and professional offices and service stations.

ARTICLE 11. - INDUSTRIAL, LIMITED, DISTRICT I-1

Sec. 22-11-1. - Statement of intent.

The primary purpose of this district is to permit certain light industries. The limitations on (or provisions relating to) height of building, horsepower, heating, flammable liquids or explosives, controlling emission of fumes, odors and/or noise, landscaping, and the number of persons employed are imposed to protect and foster adjacent residential property while permitting certain light industries to locate near a labor supply.

ARTICLE 12. - INDUSTRIAL, GENERAL, DISTRICT I-2

Sec. 22-12-1. - Statement of intent.

The primary purpose of this district is to establish an area as defined by the Comprehensive Plan where the principal use of land is for heavy commercial and industrial operations, which may create some nuisance, and which are not properly associated with, nor particularly compatible with, residential, institutional, and neighborhood commercial service establishments. The specific intent of this district is to:

- (A) Encourage the construction of and the continued use of the land for heavy commercial and industrial purposes;
- (B) Prohibit residential and neighborhood commercial use of the land and to prohibit any other use which would substantially interfere with the development, continuation or expansion of commercial and industrial uses in the district;
- (C) To encourage the discontinuance of existing uses that would not be permitted as new uses under the provisions of this ordinance.

ARTICLE 13. - MANUFACTURED HOME PARK, DISTRICT MHP

Sec. 22-13-1. - Statement of intent.

This district is intended to accommodate manufactured home parks with lots for rent exclusively. This district is based on the premise that the demand for manufactured homes can best be supplied by manufactured home parks. The following regulations are designed to provide an attractive and harmonious environment for manufactured home dwellings, with all amenities normally found in a substantial residential neighborhood.

ARTICLE 14. - PLANNED UNIT DEVELOPMENT DISTRICT (PUD)[2]

Sec. 22-14-1. - Statement of intent.

Planned unit developments (PUDs) are intended to promote the efficient use of land by allowing flexibility in design standards and variety in densities and land uses to preserve the rural areas of the County. Development of such districts shall be in accordance with an approved PUD Application Package which should provide a variety and range of uses and densities in designated areas of the site.

Planned unit developments must be located within the Zion Crossroads Community Planning Area, as set forth in the Comprehensive Plan. Planned unit developments should provide unified development that incorporates new urbanism and traditional neighborhood development principles, which includes a mix of residential and commercial uses, an interconnected system of internal roads, pedestrian sidewalks and walkways and well planned access points along existing roadways. In addition to a mix of residential and commercial uses, planned developments should also provide a mix and variety of housing types.

The PUD District is intended to be applied to privately initiated zoning map amendments for land located within the Zion Crossroads Community Planning Area and the designated Zion Crossroads Urban Development Area (UDA). The Zion Crossroads[†] UDA is located internal to the Zion Crossroads Community Planning Area, as depicted on the Future Land Use Map, as amended.

Sec. 86-133. Agricultural (A-1) district—Statement of intent; policy guidance.

The agricultural (A-1) district is intended to accommodate farming, forestry, livestock maintenance and other related farm activities. Such uses are an essential part of the rural economy of the county and the agrarian character of the community. It comprises those areas dedicated to farming and agricultural use and is protected as a valuable part of the rural community. These activities shall not be compromised by development and shall be enhanced by the protection offered herein.

Sec. 86-151. Agricultural (A-2) district—Statement of intent; policy guidance.

- (a) The agricultural (A-2) district is provided to allow for the compatible mixture of agricultural uses and limited residential development in rural areas and protect and retain the rural open character of the countryside. Very low density residential uses are allowed along with agricultural uses that are compatible with residential activity to provide for community cohesion in the rural areas and encourage land use interdependence. Zoning standards are also included to ensure the co-existence of these uses with each other. The creation of lots fronting on existing state roads or federal highways is strongly discouraged.
- (b) Agricultural (A-2) district uses range from agricultural to neighborhood oriented commercial and community services. The use of development setbacks, shared access, reverse-front lots and roadside buffers are encouraged to retain the rural character of the county along-side the open farm activities prevalent in the county.

Sec. 86-168. Residential limited (R-1) district—Statement of intent; policy guidance.

The residential limited district (R-1) is composed of certain quiet, low density residential areas plus certain open areas where similar residential development appears likely to occur. The regulations for this district are designed to stabilize and protect the essential characteristics of the district, to promote and encourage an enjoyable environment for family life, and to prohibit activities of a commercial nature. To these ends, development is limited to single-unit dwellings providing homes for the residents, plus certain other uses, such as schools, parks, churches and public facilities that serve the residents of the district.

Sec. 86-186. Residential general (R-2) district—Statement of intent; policy guidance.

The residential general district (R-2) is composed of certain quiet, low density residential uses plus certain open areas where similar development appears likely to occur. The regulations for this district are designed to stabilize and protect the essential characteristics of the district, to promote and encourage a suitable environment for family life where there are children, and to prohibit activities of a commercial nature. In order to enhance compatibility between dwellings of different types, protect the natural environment, and achieve attractive and well-coordinated designs for building groups, dwelling types other than single-family dwelling, detached are to be permitted only with a conditional use permit.

Sec. 86-203. Light commercial (C-1) district—Statement of intent; policy guidance.

The primary purpose of the light commercial district (C-1) is to establish and protect a limited business district that will serve the surrounding residential districts. Traffic and parking shall be well controlled to protect and preserve property values in the surrounding residential districts and, insofar as possible, all neighborhood business development shall take place in a limited business district. In the rural areas of the county, commercial uses should be limited and allowed by conditional use permits only. Future development should align more appropriately with the rural character of the county.

Sec. 86-221. General commercial (C-2) district—Statement of intent; policy guidance.

Generally, the general commercial district (C-2) covers that portion of the community intended for the conduct of general business to which the public requires direct and frequent access. In the rural areas of the county, commercial uses should be limited and allowed by conditional use permits only. Future development should align more appropriately with the rural character of the county.

Sec. 86-239. Industrial (IND) district—Statement of intent; policy guidance.

The primary purpose of the industrial (IND) district is to establish areas where the principal use of land is for light or medium industrial operations, that are capable of controlling external effects and that may not be particularly compatible with residential, institutional and neighborhood commercial service establishments. The specific intent of this district is to:

- (1) Encourage the development of and the continued use of land designated for light or medium industrial purposes; and
- (2) Discourage residential and general commercial use of the land, and to discourage any other use which would substantially interfere with the development, continuation or expansion of heavy commercial and industrial uses in the district; and
- (3) Apply only to properties currently zoned industrial (IND), as of December 12, 2007, and prohibit any additional properties to be reclassified to this industrial (IND) zoning district.

Sec. 86-258. Industrial limited (I-1) district—Statement of intent; policy guidance.

The primary purpose of the industrial limited (I-1) district is to establish areas where the principal use of land is for light or medium industrial operations, that are capable of controlling external effects and that may not be particularly compatible with residential, institutional and neighborhood commercial service establishments. The specific intent of this district is to:

- (1) Encourage the development of and the continued use of land designated for light or medium industrial purposes; and
- (2) Prohibit residential and general commercial use of the land, and to prohibit any other use which would substantially interfere with the development, continuation or expansion of light or medium industrial uses in the district.

Industrial (I-1) development in the rural areas of the county should primarily be permitted upon the issuance of a conditional use permit by the board of supervisors. This provides a means by which suitable development standards can be required to shield adjoining and adjacent agricultural areas from the more intensive industrial development.

Sec. 86-276. Industrial general (I-2) district—Statement of intent; policy guidance.

The primary purpose of the industrial general (I-2) district is to establish areas where the principal use of land is for medium or heavy industrial operations, that may create some nuisance, and that are not properly associated with, nor compatible with residential, institutional and neighborhood commercial service establishments. The specific intent of this district is to:

- (1) Encourage the development of and the continued use of land designated for medium or heavy industrial purposes; and

- (2) Prohibit residential and general commercial use of the land, and to prohibit any other use, which would substantially interfere with the development, continuation or expansion of medium or heavy industrial uses in the district.

Industrial (I-2) development in the rural areas of the county should primarily be permitted upon the issuance of a conditional use permit by the board of supervisors. This provides a means by which suitable development standards can be required to shield adjoining and adjacent agricultural areas from the more intensive industrial development.

Sec. 86-287. Subdivisions.

All divisions and/or subdivisions, are subject to the applicable provisions of the industrial general (I-2) zoning district and article III subdivision of this Code.

Sec. 86-292. Resort development district (RD)—Statement of intent; applicability of district regulation

- (a) The resort development district (RD) is intended to permit open area recreation facilities for private and public use or for profit, to permit commercial uses related to such recreation facilities, and to permit a variety of residential accommodations on a contiguous site under common ownership or control in accordance with a master plan in a manner that will conserve the natural resources and enhance the scenic beauty around by leaving as permanent open area not less than 25 percent of the total acreage. Within such resort development, the location of all improvements shall be controlled in such a manner as to accommodate permitted uses in an orderly relationship with one another, with the greatest amount of open area and with the least disturbance to natural features.
- (b) Open area shall include fields, forest, golf courses, tennis courts, and similar facilities, water features, paths and trails, but not roads and parking areas, surface easements for drainage and other utilities not included within the lines of any residential lot. The open area shall not be applicable to minimum lot sizes or other minimum requirements of this section and shall essentially require the developer to place 25 percent of his total acreage in permanent open area as defined in this section.
- (c) The resort development shall apply only to land having a minimum of 30 contiguous acres under common ownership or control. Additional land may subsequently be added to the approved resort development if the additional land adjoins or forms a logical addition to the approved resort development. The procedure for an addition shall be the same as if an original application were filed, and all requirements of this division shall apply except the minimum acreage requirement as specified in subsection (a) above.
- (d) No tract of land may be admitted to the resort development zoning district except with the submission of detailed plans as required by this division and/or other documents required by the governing body in order to enable it to make a comprehensive study of the proposed development. No tract of land may be admitted to the resort development zoning district unless recreational facilities are a primary part of the overall plan development. No tract of land may be admitted to the resort development district except after consideration by the planning commission after notice and hearing as required by Code of Virginia, § 15.2-2204.

Sec. 86-308. Planned unit development district (PUD)—Statement of intent.

Planned unit development districts are intended to provide for variety and flexibility in design necessary to implement the varied goals of the county as set forth in the comprehensive plan. Through a planned unit development district approach, the regulations of this division are intended to accomplish the purposes of zoning and other applicable regulations to the same extent as regulations of conventional districts.

Additionally, planned unit development districts are intended to implement the specific goals enunciated by the comprehensive plan.

It is intended that planned unit development districts be established along major corridors and in growth areas as designated in the comprehensive plan. Planned district master plans should demonstrate a unified development with an interconnected system of internal roads, sidewalks, and paths as well as manage access points along existing roads in order to maximize safety and the efficiency of existing roads. Pavement widths of internal and external roads shall minimize paving requirements as described in the comprehensive plan while accommodating projected traffic generated from the district.

Planned developments allow for a higher density of development for a more efficient use of the designated growth areas, and to more effectively preserve the rural areas of the county. Other benefits of a planned development include less infrastructure costs, more efficient provision of public safety services, less environmental impact, and through the provision of affordable housing achieve significant economic and social integration.

Sec. 86-326. Manufactured home park district (MHP)—Statement of intent.

The manufactured home park district (MHP) is established to provide for the development of manufactured home parks in accordance with sound planning principles and to regulate manufactured home parks so as to prevent detrimental effects to the use or development of adjacent properties. It is the intent of this district to provide sites for high density year round location of manufactured homes as a form of permanent or temporary affordable housing in appropriate locations in the county and to allow other selected uses which are compatible with the residential character of the district.

Sec. 86-336. Agricultural (A-1) district within the growth area overlay district—Statement of intent; policy guidance.

The agricultural (A-1) district within the growth area overlay district is intended to accommodate farming, forestry, livestock maintenance and other related farm activities within the established overlay district. Such uses are an essential part of the rural economy of the county and the agrarian character of the community. It comprises those areas dedicated to farming and agricultural use and is protected as a valuable part of the rural community. These activities shall not be compromised by development and shall be enhanced by the protection offered herein.

Sec. 86-356. Agricultural (A-2) district within the growth area overlay district—Statement of intent; policy guidance.

- (a) The agricultural (A-2) district within the growth area overlay district is provided to allow for the compatible mixture of agricultural uses and limited residential development in rural areas and protect and retain the rural open character of the countryside. Very low density residential uses are allowed along with agricultural uses that are compatible with residential activity to provide for community cohesion in the rural areas and encourage land use interdependence. Zoning standards are also included to ensure the co-existence of these uses with each other. The creation of lots fronting on existing state roads or federal highways is strongly discouraged.
- (b) Agricultural (A-2) District within the growth area overlay district uses range from agricultural to neighborhood oriented commercial and community services. The use of development setbacks, shared access, reverse-front lots and roadside buffers are encouraged to retain the rural character of the county along-side the open farm activities prevalent in the county.

**Sec. 86-375. Residential limited (R-1) district within the growth area overlay district—
Statement of intent; policy guidance.**

The residential limited district (R-1) within the growth area overlay district is composed of certain quiet, low density residential areas plus certain open areas where similar residential development appears likely to occur. The regulations for this district are designed to stabilize and protect the essential characteristics of the district, to promote and encourage an enjoyable environment for family life, and to prohibit activities of a commercial nature. To these ends, development is limited to single-unit dwellings providing homes for the residents, plus certain other uses, such as schools, parks, churches and public facilities that serve the residents of the district.

**Sec. 86-391. Residential general (R-2) district within the growth area overlay district—
Statement of intent; policy guidance.**

The residential general district (R-2) within the growth area overlay district is composed of certain quiet, low density residential uses plus certain open areas where similar development appears likely to occur. The regulations for this district are designed to stabilize and protect the essential characteristics of the district, to promote and encourage a suitable environment for family life where there are children, and to prohibit activities of a commercial nature. In order to enhance compatibility between dwellings of different types, protect the natural environment, and achieve attractive and well-coordinated designs for building groups, dwelling types other than single-family dwelling, detached are to be permitted only with a conditional use permit.

Development with a mix of dwelling types or uses should be performed under the PUD district.

**Sec. 86-409. Light commercial (C-1) district within the growth area overlay district—
Statement of intent; policy guidance.**

The primary purpose of the light commercial district (C-1) within the growth area overlay district is to establish and protect a limited business district that will serve the surrounding residential districts. Traffic and parking shall be well controlled to protect and preserve property values in the surrounding residential districts and, insofar as possible, all neighborhood business development shall take place in a limited business district.

**Sec. 86-428. General commercial (C-2) district within the growth area overlay district—
Statement of intent; policy guidance.**

Generally, the general commercial district (C-2) within the growth area overlay district covers that portion of the community intended for the conduct of general business to which the public requires direct and frequent access.

**Sec. 86-446. Industrial (IND) district within the growth area overlay district—Statement of
intent; policy guidance.**

The primary purpose of the industrial (IND) district within the growth area overlay district is to establish areas where the principal use of land is for light or medium industrial operations, that are capable of controlling external effects and that may not be particularly compatible with residential, institutional and neighborhood commercial service establishments. The specific intent of this district is to:

- (1) Encourage the development of and the continued use of land designated for light or medium industrial purposes; and

- (2) Discourage residential and general commercial use of the land, and to discourage any other use which would substantially interfere with the development, continuation or expansion of heavy commercial and industrial uses in the district; and
- (3) Apply only to properties currently zoned industrial (IND), as of December 12, 2007, and prohibit any additional properties to be reclassified to this industrial (IND) zoning district.

Sec. 86-464. Industrial limited (I-1) district within the growth area overlay district—Statement of intent; policy guidance.

The primary purpose of the industrial limited (I-1) district within the growth area overlay district is to establish areas where the principal use of land is for light or medium industrial operations, that are capable of controlling external effects and that may not be particularly compatible with residential, institutional and neighborhood commercial service establishments. The specific intent of this district is to:

- (1) Encourage the development of and the continued use of land designated for light or medium industrial purposes; and
- (2) Prohibit residential and general commercial use of the land, and to prohibit any other use which would substantially interfere with the development, continuation or expansion of light or medium industrial uses in the district.

Sec. 86-481. Industrial general (I-2) district within the growth area overlay district—Statement of intent; policy guidance.

The primary purpose of the industrial general (I-2) district within the growth area overlay district is to establish areas where the principal use of land is for medium or heavy industrial operations, that may create some nuisance, and that are not properly associated with, nor compatible with residential, institutional and neighborhood commercial service establishments. The specific intent of this district is to:

- (1) Encourage the development of and the continued use of land designated for medium or heavy industrial purposes; and
- (2) Prohibit residential and general commercial use of the land, and to prohibit any other use, which would substantially interfere with the development, continuation or expansion of medium or heavy industrial uses in the district.



Zion Crossroads
Small Area Study

AUGUST 2022

FINAL REPORT

CONTENTS

Introduction	3
Study Background	4
Study Location and Timeline	4
A Regional Opportunity	5
The Public ENGAGEMENT Process	8
Stakeholder Group Meetings	8
Public Outreach.....	8
Why Zion Crossroads and Why Now?	10
Corridor Opportunities & Challenges.....	10
How do we evaluate alternatives?	20
Goals and Objectives	20
Screening Criteria & Alternatives Analysis.....	20
What are the alternatives?	23
Transportation Solutions for Zion Crossroads.....	23
US 15 and Sommerfield Drive.....	27
US 15 and Stonegate Drive/Spring Creek Parkway	29
US 15 and Liberty Trail	33
US 15 and The Shoppes at Spring Creek/Spring Creek Business Park	38
US 15 and I-64 DDI	52
US 15 and Crossing Pointe Drive	56
US 15 and US 250.....	61
US 15 and Starlite Park.....	65
US 250 and Route 631 (Troy Road)/Zion Station Court.....	67
US 250 and Route 689 (Hunters Branch Road)/Edgecomb Road	69
US 250 and Better Living Drive.....	71
US 250 and Route 615 (Zion Road)	73
US 250 and Zion Park Road	75
US 250 and Poindexter Road.....	77
Priority Recommendations.....	80
Implementing Recommendations in Zion Crossroads	82
Funding Sources.....	82
Be a Champion for Zion Crossroads!	83

INTRODUCTION

This report compiles the results of the Zion Crossroads Small Area Study and includes:

- Findings from the study, which examined existing and future conditions in the Zion Crossroads area along US 15 (James Madison Highway) and US 250 (Richmond Road/3 Notch Road). This area extends along US 15 from Sommerfield Drive to Starlite Park and along US 250 from Route 631 (Troy Road)/Zion Station Court to Route 613 (Poindexter Road) spanning both Fluvanna and Louisa Counties.
- Recommendations for intersection and area-wide improvements.
- Next steps for implementing the recommendations.

This effort is a product of collaboration between the Virginia Department of Transportation (VDOT), Fluvanna County, Louisa County, and the Thomas Jefferson Planning District Commission (TJPDC) [hereby referred to as the Stakeholder Group or Stakeholders]. This Stakeholder Group engaged the community at each stage of the study. Community input helped inform the vision for Zion Crossroads as an area that supports future development and provides safe and comfortable travel for all uses and users of the roadway.

This study establishes a roadmap; one that is long and complex as it is taken from vision to reality. VDOT is ready and able to champion this effort but will need the support of community leaders, transportation and planning organizations, and community members.

To see how you can help, please read on and visit:

<https://www.virginiadot.org/projects/culpeper/zion-crossroads-study.asp>

THANK YOU TO ALL THE ZION CROSSROADS STAKEHOLDERS, COMMUNITY CHAMPIONS, AND CITIZENS FOR YOUR PARTICIPATION IN AND SUPPORT OF THE ZION CROSSROADS SMALL AREA STUDY!

YOUR CONTRIBUTIONS WILL HELP TRANSFORM THE ZION CROSSROADS AREA INTO AN EVEN MORE TRANSFORMATIVE AND ACCESSIBLE COMMUNITY.



STUDY BACKGROUND

The Zion Crossroads Small Area Study was conducted to identify and advance solutions that foster safe and comfortable travel for all roadway users. The study's goal was to arrive at a shared vision for the US 15 and US 250 corridors in the Zion Crossroads area and to better define how the area can evolve as development changes the region's character and travel demand. The study focused on identifying the issues, opportunities, and mobility and access needs that must be met to support robust and successful multimodal travel within the area.

The completed study provided a clear understanding of:

- Multimodal travel needs;
- The range of potential solutions and potential benefits and impacts of those solutions; and
- A preferred set of alternatives that are implementable and supported by VDOT and its partner agencies.

Study Location and Timeline

The area within Zion Crossroads that was evaluated for the study extends along US 15 from Sommerfield Drive to Starlite Park and along US 250 from Troy Road/Zion Station Court to Poindexter Road spanning both Fluvanna and Louisa Counties. This study area is shown in **Figure 1**. This area in Zion Crossroads continues to experience residential and commercial growth and as such is expected to experience increasing safety and operational challenges.

QUESTIONS THIS SECTION ANSWERS:

- Why did VDOT conduct the Zion Crossroads Small Area Study?
- Where did the study occur?
- Which regional partners supported VDOT during the study?

Through coordination with the Stakeholder Group, the following 19 intersections along the study corridor were identified for evaluation:

- Sommerfield Drive/US 15
- Spring Creek Parkway/US 15
- Liberty Trail/US 15
- Freedom Trail/US 15
- Freedom Drive/US 15
- Spring Creek Parkway/Camp Creek Parkway/US 15
- Spring Creek Parkway/Wood Ridge Terrace
- Camp Creek Parkway/Market Street
- North DDI Ramp Terminal/US 15
- South DDI Ramp Terminal/US 15
- Crossing Pointe Drive/US 15
- US 250/US 15
- Starlite Park/US 15
- Troy Road/Zion Station Court/US 250
- Route 689 (Hunters Branch Road)/Edgecomb Road/US 250
- Better Living Drive/US 250
- Route 615 (Zion Road)/US 250
- Zion Park Road/US 250
- Poindexter Road/US 250

VDOT conducted the study between January 2020 and August 2022 (see the schedule in **Figure 2**). The project was organized into five overlapping

phases, with each phase encompassing various tasks, which are detailed in this report.

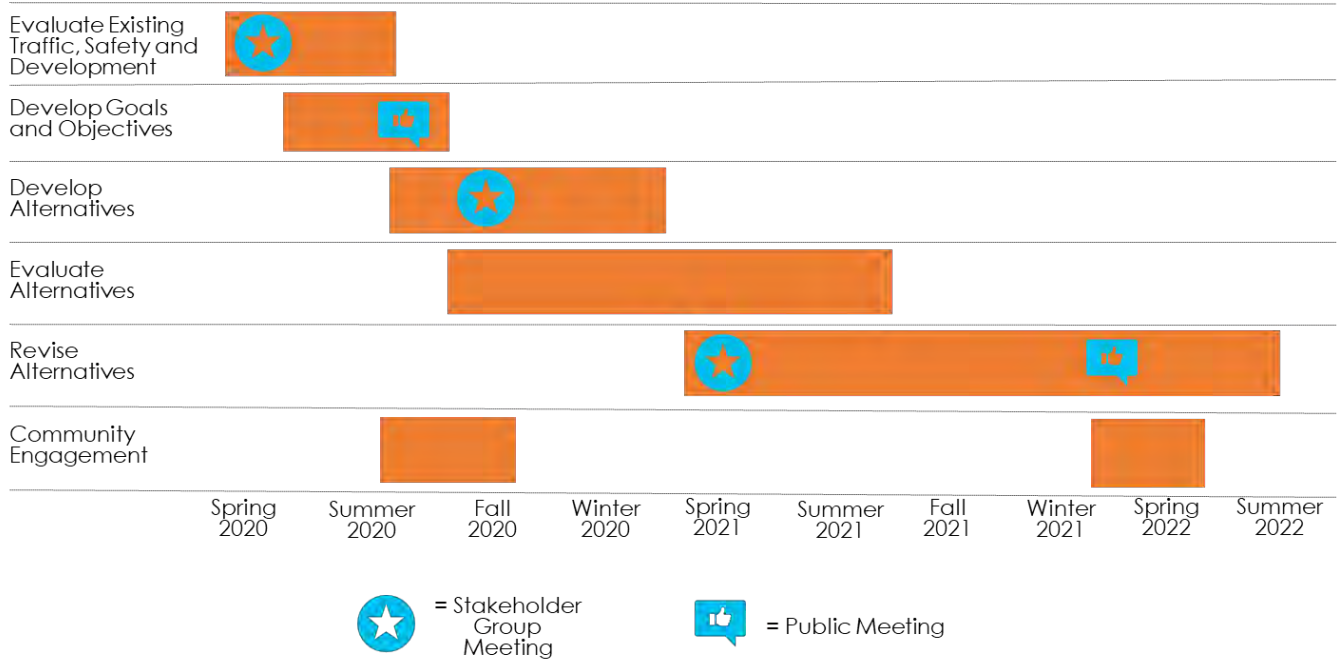
A Regional Opportunity

VDOT, Fluvanna County, Louisa County and TJPDC have advanced several transportation initiatives through Virginia’s SMART SCALE funding program over the past six years, including the proposed roundabouts at the US 250/Troy Road and US 15/US 250 intersections. Both projects are at intersections that were identified in the study area. The Zion Crossroads Small Area Study presents another important opportunity for VDOT’s partners to address regional mobility challenges, prepare for future developments, and connect these existing SMART SCALE projects.

VDOT convened a Stakeholder Group to represent local partners and serve as a sounding board for each step of the study. The Stakeholder Group members represented Virginia Department of Transportation (VDOT), Fluvanna County, Louisa County, and the Thomas Jefferson Planning District Commission (TJPDC). The Stakeholder Group guided the study and helped identify and evaluate alternatives that would best serve the communities living in Zion Crossroads and the greater region.

The Zion Crossroads Small Area Study presents an opportunity to address regional mobility challenges, prepare for future developments, and connect existing SMART SCALE projects.

Figure 2 Study Schedule



KEY TAKEAWAYS FROM THIS SECTION:

- The study’s purpose is to develop a shared vision for the Zion Crossroads area and identify transportation solutions to help the area adapt to new developments.
- The study area included US 15 from Sommerfield Drive to Starlite Park and US 250 from Troy Road (Route 631)/Zion Station Court to Poindexter Road (Route 613) in Louisa and Fluvanna counties.
- Stakeholders from VDOT, Louisa County, Fluvanna County, and the TJPDC participated.

THE PUBLIC ENGAGEMENT PROCESS

VDOT and the study team established early and continuous engagement through the public involvement process. The process engaged a diverse group of community members through a variety of channels and opportunities.

Stakeholder Group Meetings

The study team formally met with the Stakeholder Group four times at key study milestones. The Stakeholder Group helped establish the study’s vision, goals, and objectives, helped identify alternatives, and provided feedback during the alternatives analysis process. Members of the Stakeholder Group helped develop the final set of alternatives for the study. The Stakeholder Group meetings helped VDOT gather helpful feedback and provided an additional line of communication between the study team, communities in Zion Crossroads, and local leadership bodies.

Public Outreach

The study team gathered input and feedback from the public at virtual community meetings at two key phases of the study. The first set of meetings were held to evaluate the study’s draft vision, goals, and objectives. The second meeting gathered community feedback on the study alternatives.

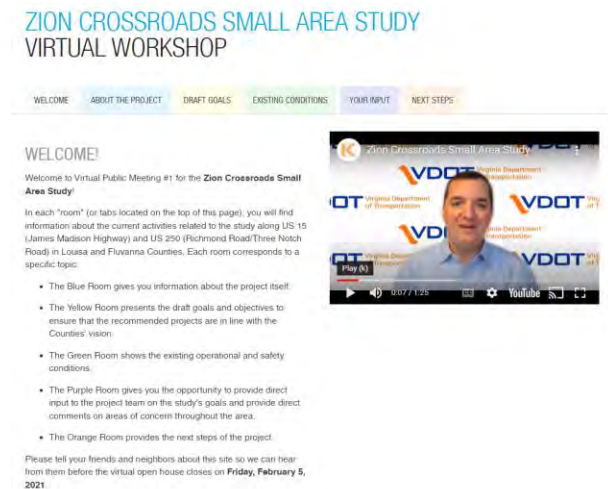
QUESTIONS THIS SECTION ANSWERS:

- How did VDOT engage local and regional decision-making entities in the study?
- How did VDOT engage community members in the study?

PHASE 1 GOALS AND PRIORITIES MEETINGS

The study team virtually engaged the public to review and assess the study planning process, vision, goals, objectives. Additionally, issues and opportunities identified through the existing conditions data collection and analysis were discussed. The study used both a study website and a survey to collect information. The survey sought public feedback on the study goals, priorities, and objectives and input on multimodal issues and opportunities on US 15 and US 250. 218 people participated in the survey, with 35 percent of participants living along US 15 or US 250 near the study area. The results were used to finalize the study’s vision, goals, and objectives and inform the initial study alternatives. The goals and priorities survey was open over a four-week period in January and February 2021.

Figure 3 Phase 1 Virtual Public Engagement



PHASE 2 ALTERNATIVES MEETING

The study team conducted an online public meeting with community members in February 2022 to present and solicit feedback on the alternatives being considered. 102 members of the public participated in the live meeting.

This meeting was supplemented with a survey to gather feedback on the design concepts described in the next section. The study team collected 78 responses to this survey. For each of the concepts presented, the public was able to describe what they liked about it and any concerns. In cases where multiple options were provided for an intersection, the public was able to indicate which concept they preferred. This feedback is provided in the following section as each alternative is discussed.

Figure 4 Phase 2 Public Engagement



KEY TAKEAWAYS FROM THIS SECTION:

- VDOT convened a Stakeholder Group composed of local and regional agency representatives to serve as a sounding board during every stage of the study.
- VDOT held virtual community meetings and hosted interactive online surveys to gather community input on study goals, priorities, and alternatives.

Figure 5 Example Comments from Phase 1 Public Engagement



WHY ZION CROSSROADS AND WHY NOW?

The study team reviewed existing conditions on US 15 and US 250 in Zion Crossroads to understand land uses, multimodal travel patterns, and safety trends. The review highlighted possible future improvement opportunities on the corridor. *See Appendix A for the full details of the existing and future no-build conditions analysis.*

Corridor Opportunities & Challenges

As a key regional connector and site of future developments, Zion Crossroads has unique opportunities but also faces distinctive challenges. These include:

- The existing multimodal facilities on US 15 and US 250 in the Zion Crossroads are concentrated around Spring Creek Parkway and Camp Creek Parkway on US 15, as shown in **Figure 6**. Sidewalks in this area are used to connect the retail and commercial spaces present in this area. Outside of this location, no pedestrian crossing infrastructure, including crosswalks, are present at any of the other study intersections. No protected bicycle infrastructure is present along the corridors. Zion Crossroads' Park and Ride on Wood Ridge Terrace is home to the only transit facility in this area. It is served by Jaunt Transit and is expected to be expanded by 2040. The Phase 2 Public Engagement revealed that only two percent of the survey participants currently walk and/or bike in this area, but 13 percent of respondents

QUESTIONS THIS SECTION ANSWERS:

- What are the land use and transportation challenges facing US 15 and US 250 in Zion Crossroads today?
- What opportunities exist to address the challenges facing US 15 and US 250 in Zion Crossroads?

expressed that they would be interested in biking or walking if improvements were implemented (see **Figure 7** and **Figure 8**).

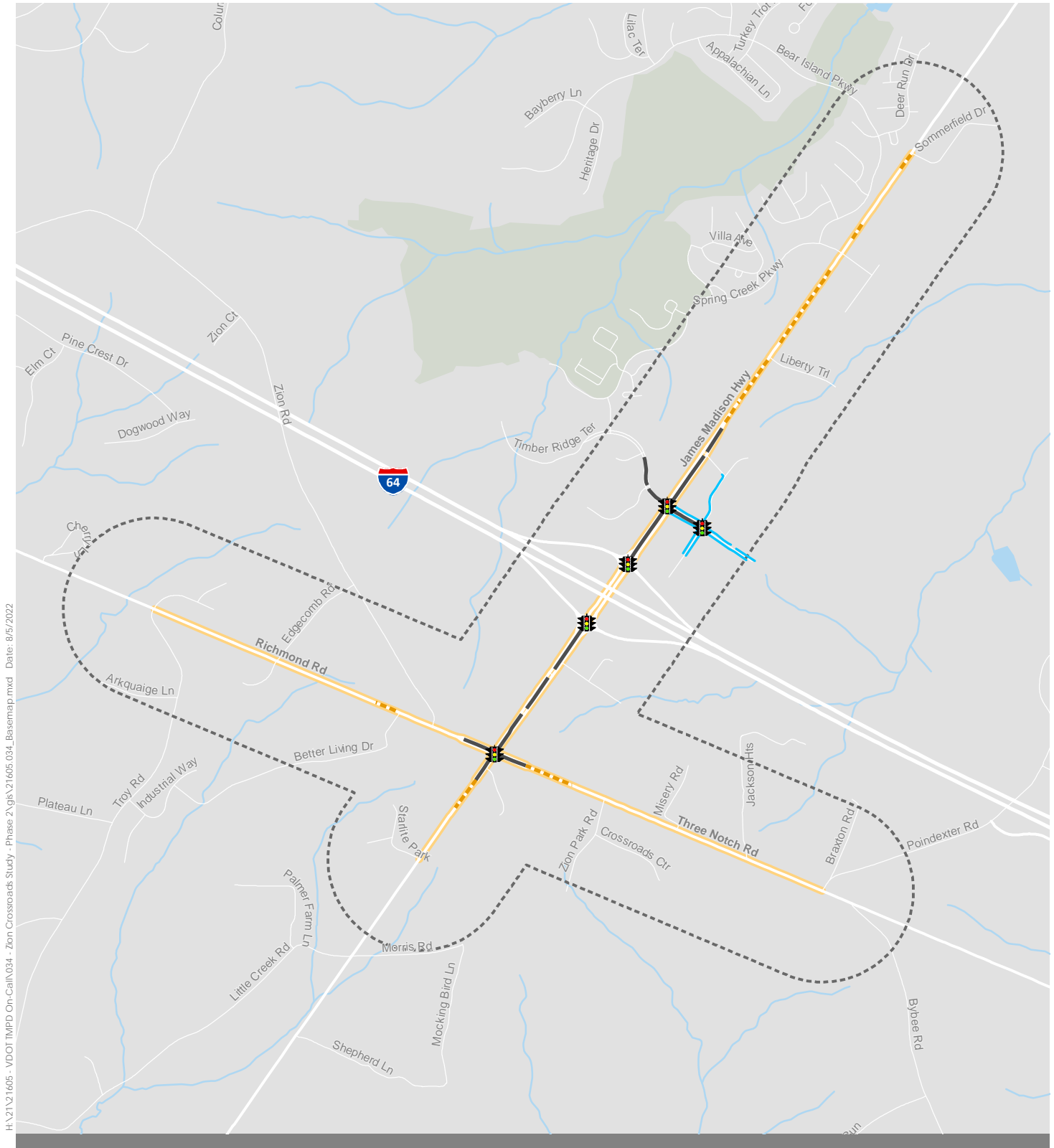
- During the Phase 1 Public Engagement, the top three transportation challenges survey participants observed along the study corridor included traffic congestion, speeding and lack of sidewalks. These results are shown in **Figure 9** below.
- As shown in **Figure 10**, rear-end crashes (52 total) and angle crashes (42 total) make up over 70 percent of crashes of the reported crashes between January 1, 2014, to December 31, 2018. Of the 52 rear-end crashes, 33 percent resulted in injury and the other 67 percent resulted in property-damage only. Twenty-six percent of the total angle crashes resulted in injury, two percent of the angle crashes resulted in fatality, and approximately 72 percent resulted in property-damage only. No other crash types exhibited a higher proportion of injuries than in the total reported crashes for the study corridor (26 percent of study corridor crashes resulted in injury or fatality). The two fatalities that occurred on this corridor had crash types of angle and "other." Approximately 84 percent of the crashes evaluated occurred at intersections, as shown in **Figure 11**. This suggests that study corridors in Zion Crossroads could benefit

from improvements at both the intersection and corridor-wide levels.

- The character and feel of Zion Crossroads vary throughout the study corridor, primarily due to changes in zoning and adjacent land uses within the various sections. Each section has different demands, but the region requires connectivity between them. **Figure 12** illustrates the various sections that existing within the study area.
- As shown in **Figure 13**, nearly all study intersections currently perform below capacity in both time periods, which is what traffic engineers aim for. One intersection, Crossing Pointe Drive, operates at capacity during the Saturday midday peak hour, which means that more vehicles are accessing the intersection than can be processed. This

intersection typically experiences significant delays, resulting in a stressful experience for motorists.

- The Zion Crossroads area is expected to experience significant increases of traffic through regional growth and in-process developments. **Figure 14** highlights the future developments anticipated to be built-out by 2040. This additional growth is expected to cause deterioration in the operational performance of several intersections along the study corridor. By 2040, US 15's intersections at Stonegate Drive, Freedom Trail, Liberty Trail, Camp Creek Parkway, and Crossing Pointe Drive will perform near or over capacity during the morning, evening, and Saturday Midday peak hours (shown in **Figure 15**).



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Legend







-  Traffic Signals
-  Study Corridor
-  1/4 Mile Corridor Buffer
-  Raised Median
-  Striped Median
-  Sidewalk



Figure 6

Figure 7 How Survey Respondents Normally Travel in Zion Crossroads

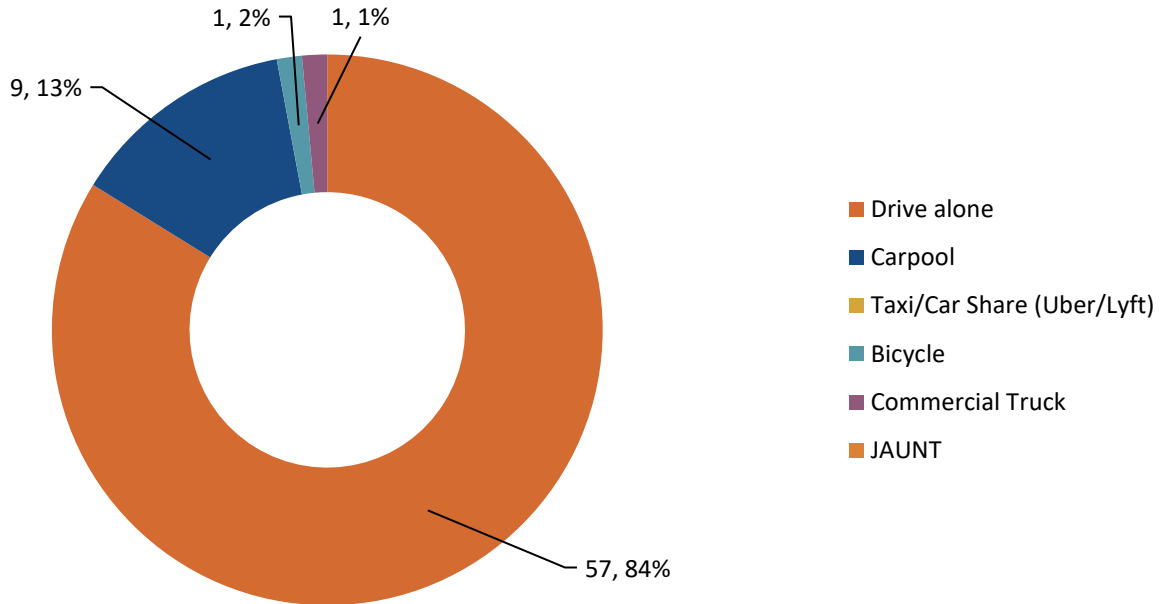


Figure 8 How Survey Respondents would prefer to travel in Zion Crossroads

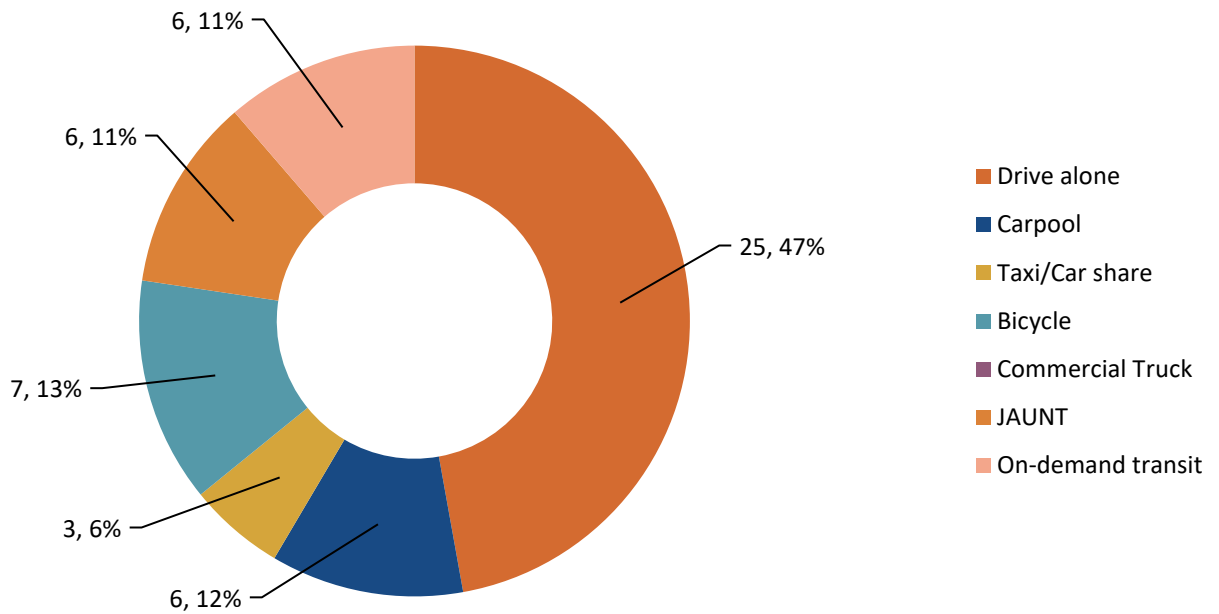


Figure 9 “What transportation problems have you observed along the study corridor?”

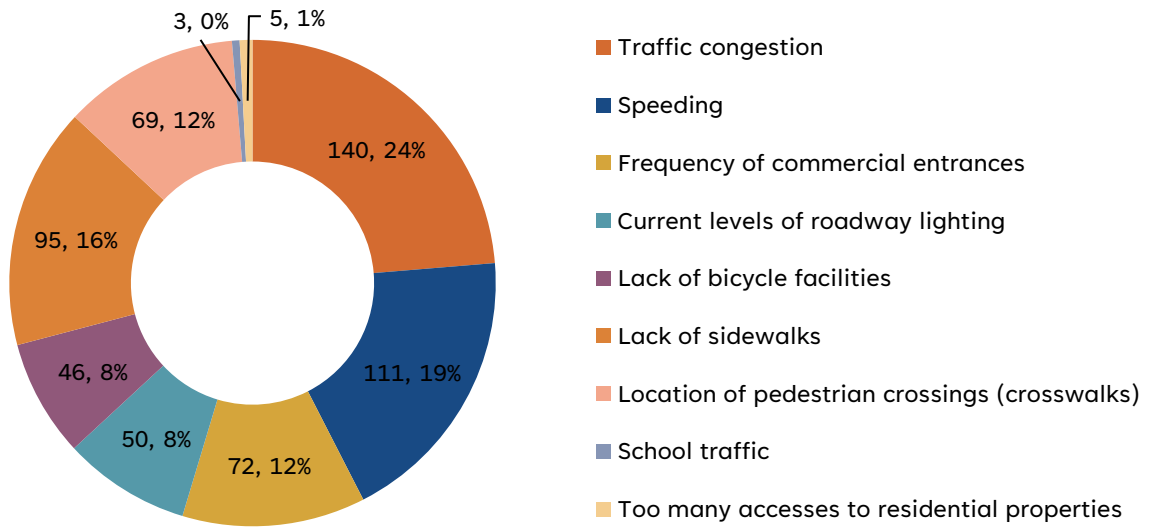
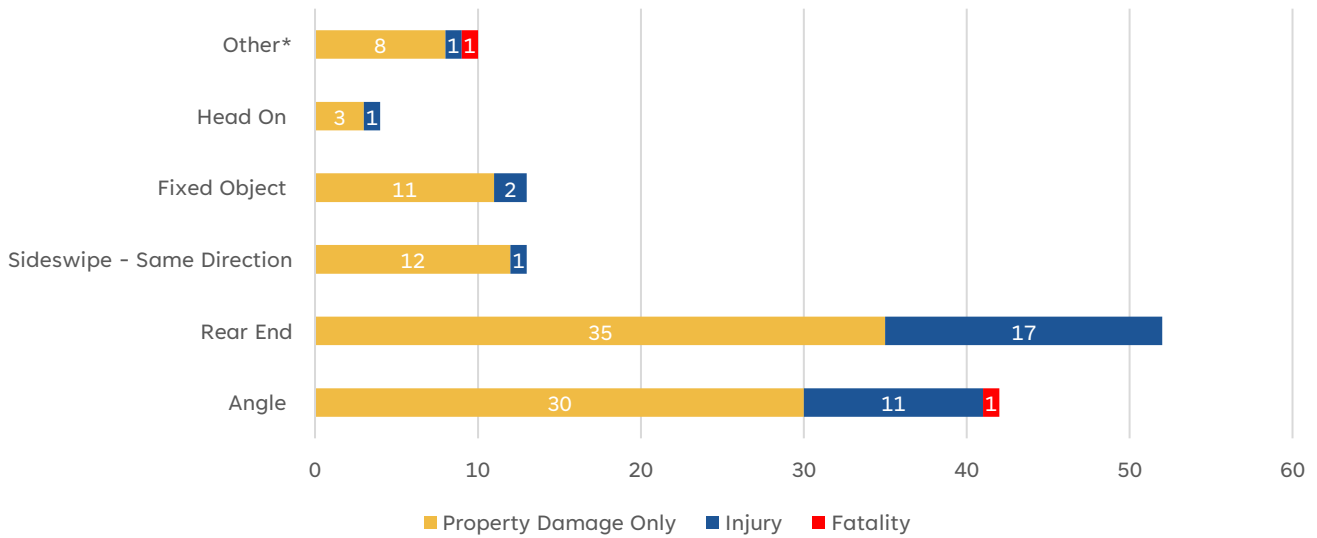
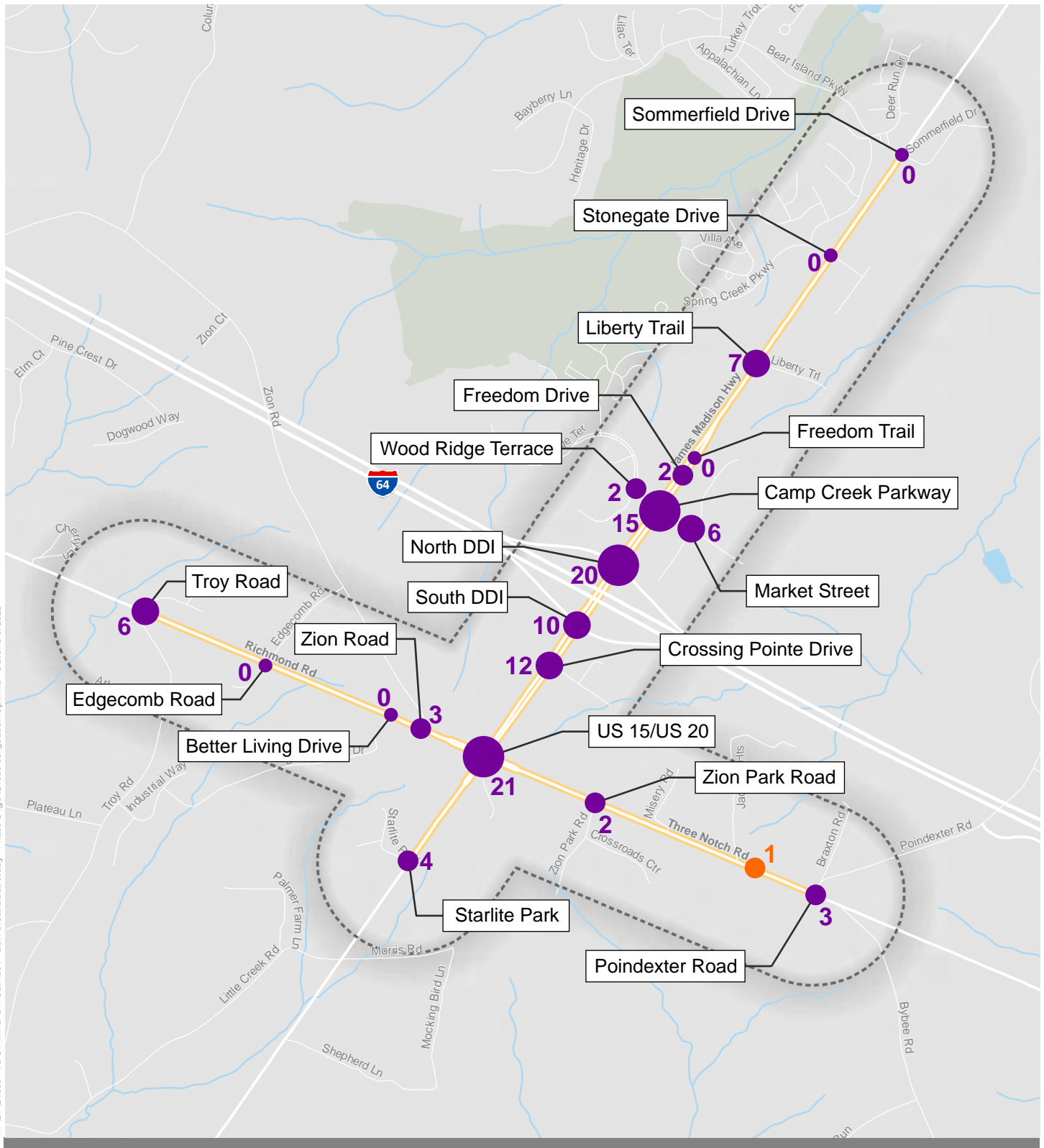


Figure 10 Reported Crashes by Collision Type and Severity, January 2014–December 2018.



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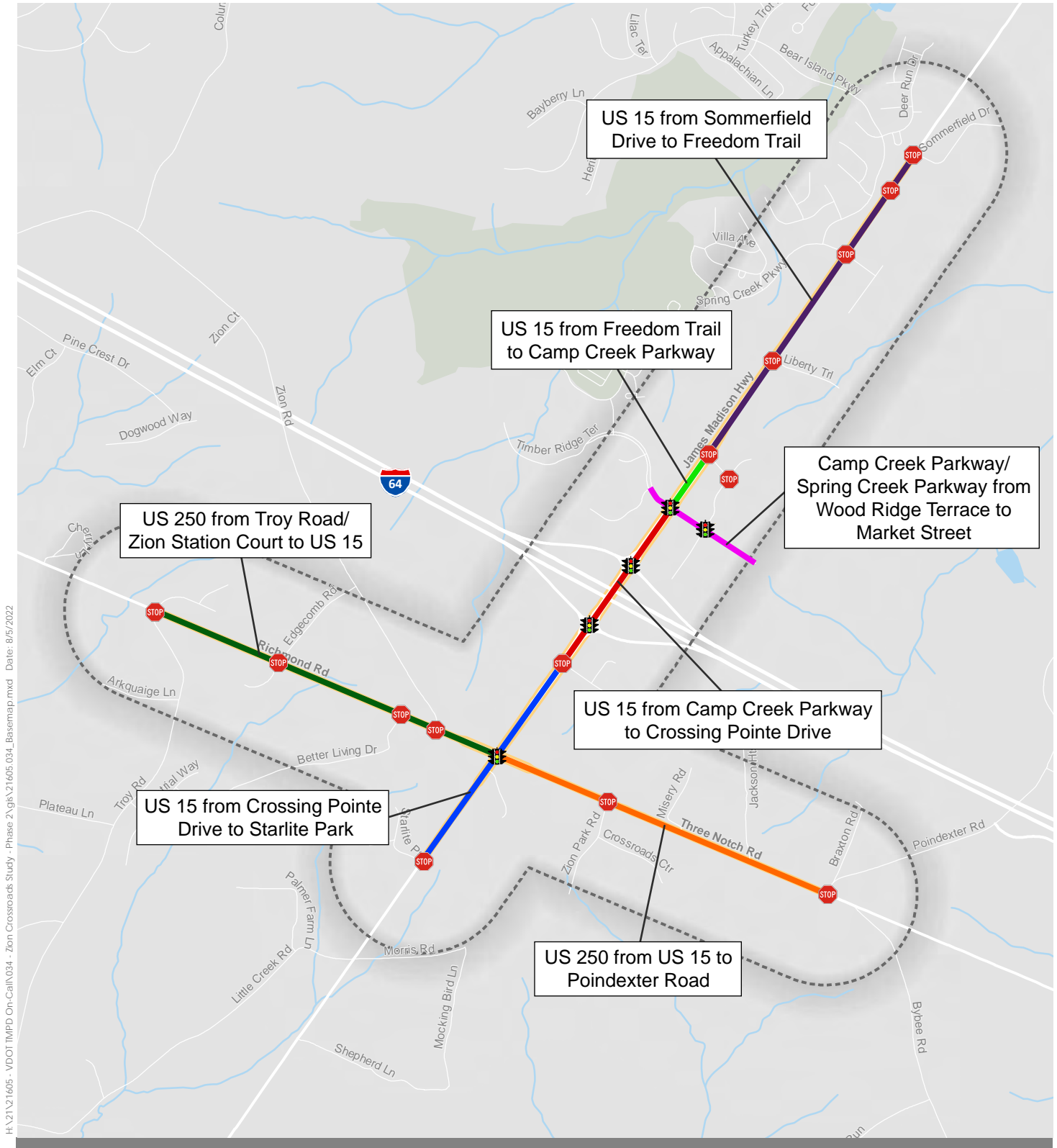


Legend

- Study Corridor
- 1/4 Mile Corridor Buffer
- Pedestrian Crash
- 0 Crashes
- 1-5 Crashes
- 6-12 Crashes
- 13-25 Crashes



Figure 11



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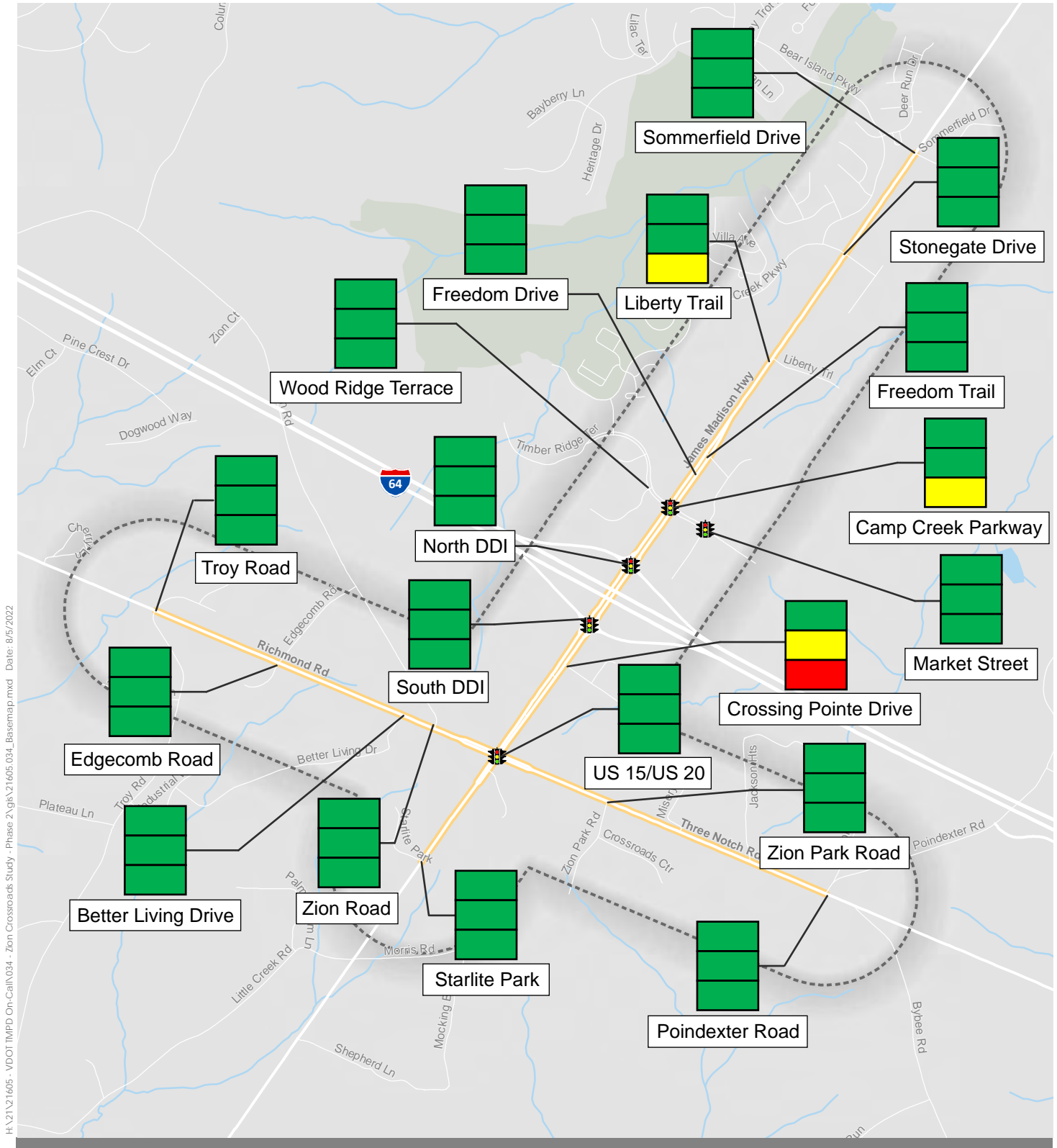
-  Unsignalized
-  Traffic Signals
-  Study Corridor
-  1/4 Mile Corridor Buffer






Figure 12



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Legend

-  Traffic Signals
-  Study Corridor
-  1/4 Mile Corridor Buffer







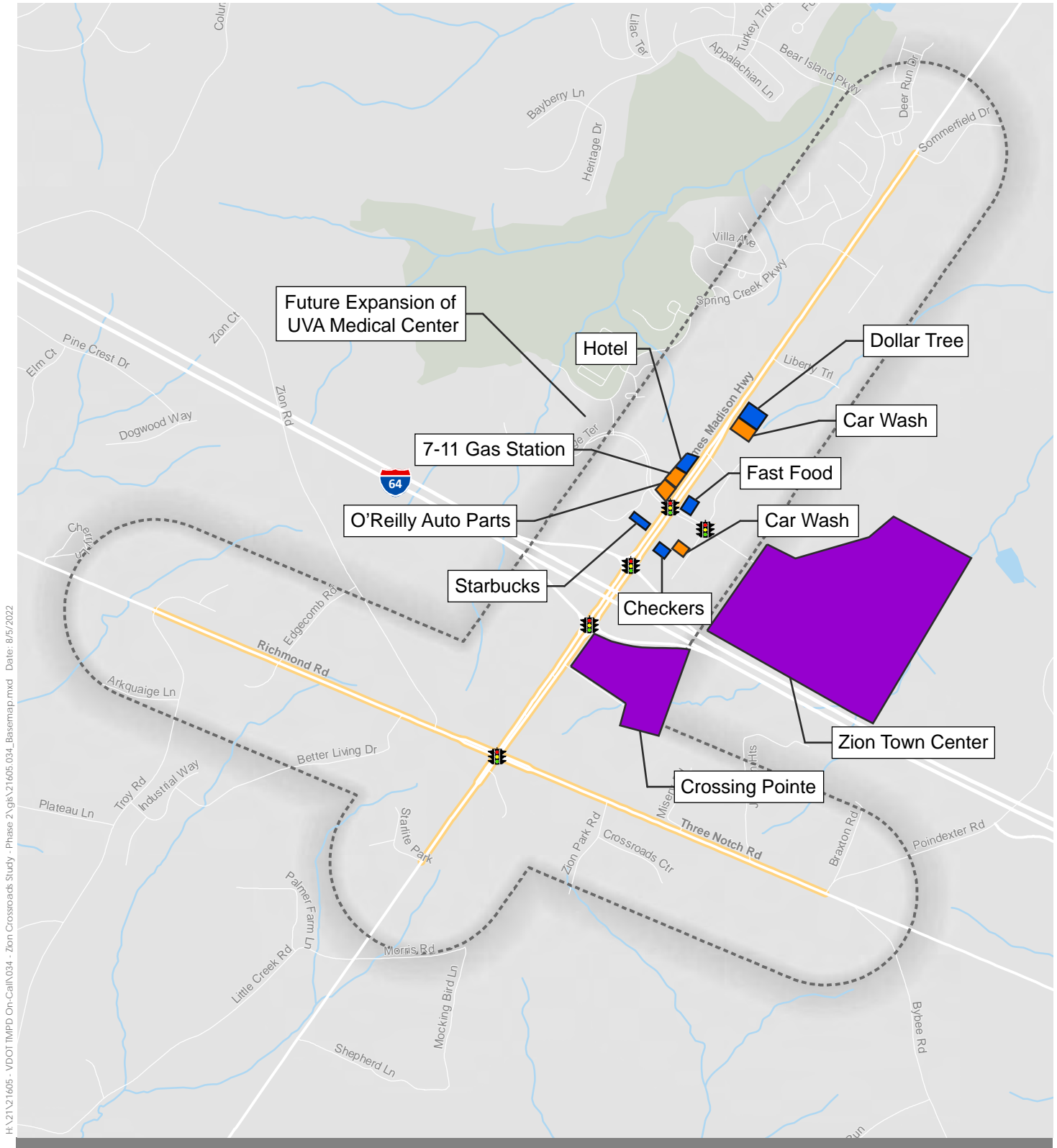
-  AM Peak Hour
-  PM Peak Hour
-  SAT Peak Hour
-  LOS D or better
-  LOS E - nearing capacity
-  LOS F - at or above capacity



Figure 13

**Existing Operational Conditions
Zion Crossroads Small Area Study**



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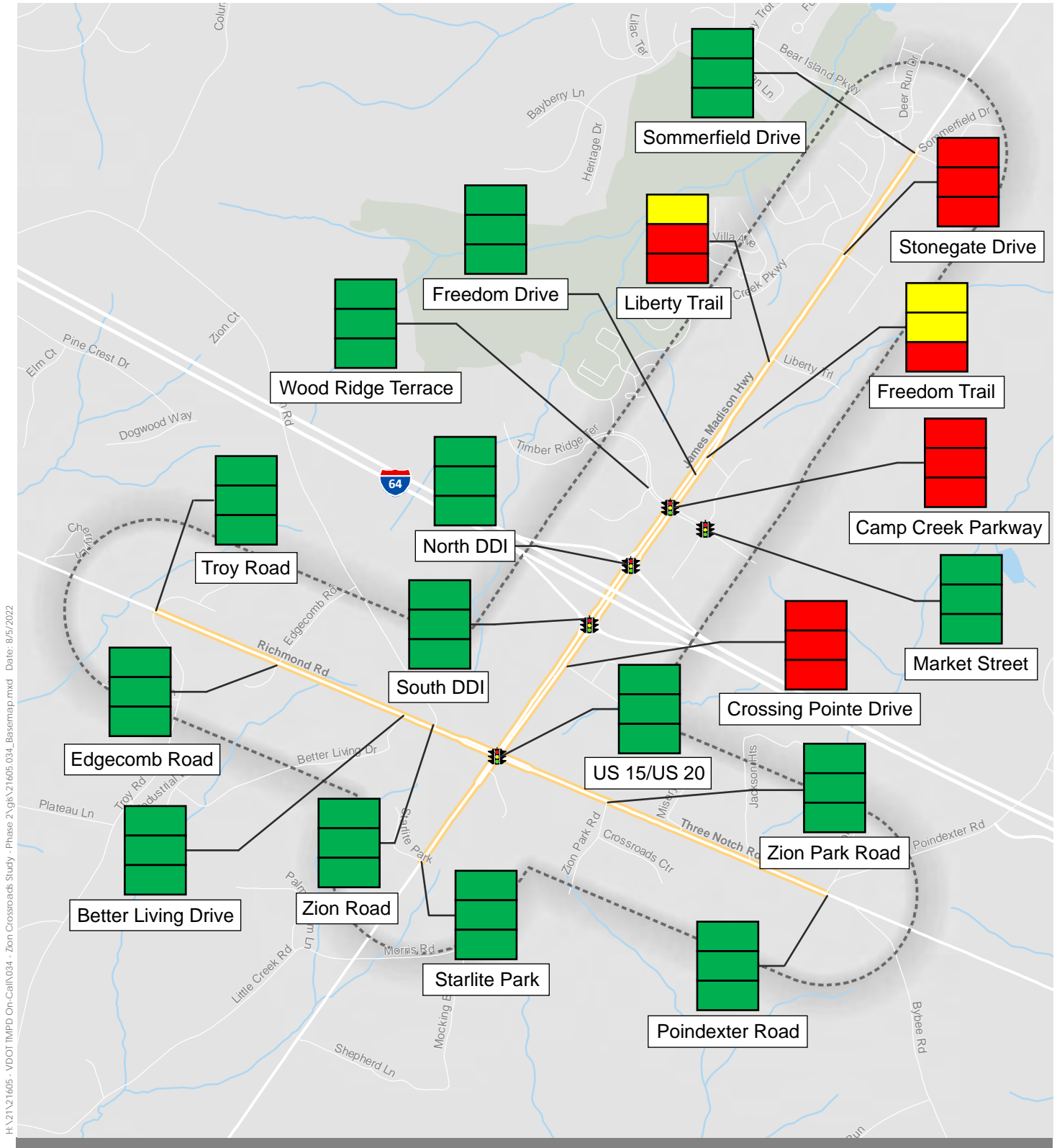
-  Traffic Signals
-  Study Corridor
-  1/4 Mile Corridor Buffer
-  Mixed Use
-  Commercial
-  Industrial






Figure 14



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Legend

-  Traffic Signals
-  Study Corridor
-  1/4 Mile Corridor Buffer







-  AM Peak Hour
-  PM Peak Hour
-  SAT Peak Hour
-  LOS D or better
-  LOS E - nearing capacity
-  LOS F - at or above capacity



Figure 15

**2040 Operational Conditions
Zion Crossroads Small Area Study**

HOW DO WE EVALUATE ALTERNATIVES?

The study team developed goals, objectives, and screening criteria aligned with VDOT, the Stakeholder Group, and public visions for the Zion Crossroads area. These became the basis for evaluating alternatives and determining if they respond to the needs and opportunities along the corridor.

Goals and Objectives

The study team and Stakeholder Group developed a project vision, goals, and objectives based on the issues and opportunities identified through the existing conditions analysis. These goals and objectives formed the framework for measuring the effectiveness of potential multimodal alternatives. **Figure 16** presents the project goals developed from feedback from the public and the Stakeholder Group.

Screening Criteria & Alternatives Analysis

Screening criteria were developed during the alternatives evaluation process and tied to each project’s goals and objectives. The alternatives analysis was based on the screening criteria, planning-level estimates of probable cost, and community feedback (see **Figure 17**).

The objective of the alternatives evaluation and refinement tasks was to compare the alternatives and provide decision-makers with the information they would need to select the best solutions to advance. Each of the alternatives

QUESTIONS THIS SECTION ANSWERS:

- How did VDOT develop the study vision, goals, and objectives?
- How did the study goals and objectives inform the alternatives comparison process?

KEY TAKEAWAYS FROM THIS SECTION:

- VDOT developed the study vision, goals, and objectives using findings from the existing conditions analysis, Stakeholder Group, and community feedback.
- Screening criteria related to each study goal and its objectives were used to inform the alternatives analysis process.

was evaluated using metrics related to the project’s goals and objectives.

VDOT JUNCTION SCREENING TOOL (VJUST)

The VDOT Junction Screening Tool (VJUST) was used to evaluate alternatives intersection configurations at each of the study locations in the Zion Crossroads area. VJUST helped in the decision-making process by identifying intersection configurations that could reduce congestion and improve safety. The tool considers 29 different intersection configuration types, including nine interchange types. These configuration types are ranked on congestion, pedestrian accommodations, and safety.

[VDOT’s Innovative Intersections and Interchanges database](#) provides more information about each

of the innovative intersection configurations evaluated by the study team.

It is important to note that not all configuration types were considered for each intersection. Reasons for a configuration type not being considered as a feasible improvement included:

- **Intersection Configuration:** Several improvements depend on the number of approaches, i.e., a bowtie configuration is only feasible for a four-legged intersection.
- **Topography/Context:** The safety benefits of several of these innovative intersection configurations diminishes when implemented in rolling or hilly terrain (i.e., there may be sight distance issues for a median U-turn in rolling terrain.)
- **Financial/Right-of-Way Acquisition constraints:** Several improvement types would require a high cost that would prevent the Stakeholder Group from implementing these configurations. An example of this would be a center turn overpass. This configuration would require extensive construction and right-of-way costs.

SIGNAL WARRANTS

For each of the existing unsignalized study intersections, the study team evaluated the volume-based signal timing warrants described in the *Manual on Uniform Traffic Control Devices (MUTCD)* using the intersections' projected 2040 traffic volumes. These include the eight-hour vehicular volume, four-hour vehicular volume, and peak hour volume warrants. By evaluating these warrants, the study team considered a signal as a potential intersection improvement and signalized versions of the innovative intersection configurations. If the volume-based signal warrants were not met, additional justification would be required to warrant the

installation of a signal along US 15 or US 250 in the Zion Crossroads area.

OPERATIONAL ANALYSES

Alternatives showing promise for meeting the study goals after the initial screening were evaluated further in the appropriate traffic analysis software, as specified in VDOT's *Traffic Operations and Safety Analysis Manual (TOSAM)*. For the at-grade study intersections, these primarily consisted of Synchro and SIDRA analyses. Operational metrics evaluated include, but are not limited to:

- Intersection and/or individual movement levels of service (LOS)
- 95th percentile queues
- Intersection and/or individual movement control delays
- Experienced travel time (ETT)
- Volume-to-capacity ratio (v/c)

COST ESTIMATES

The study team developed a planning-level estimate of probable cost for each alternative in which a concept was developed. This probable cost includes:

- Survey
- Traffic Control
- Excavation
- Construction Materials
- Engineering Support
- Right-of-Way Acquisition
- 20-30% Project Contingency

For intersections where a roundabout was considered as an alternative, the study team

utilized the VDOT Intersection Cost Comparison tool. This tool compares the cost of a roundabout to a traditional intersection type such as a stop-controlled or signalized intersection. Costs related to safety, operations, and maintenance were included in these calculations.

PUBLIC FEEDBACK

The team solicited community feedback on each of the alternatives during the Phase 2 Public Engagement. Members of the public were able to ask questions and provide feedback during a

virtual session. In addition, a survey was provided for the public to rank and provide feedback on each alternative. For each option, the public was asked:

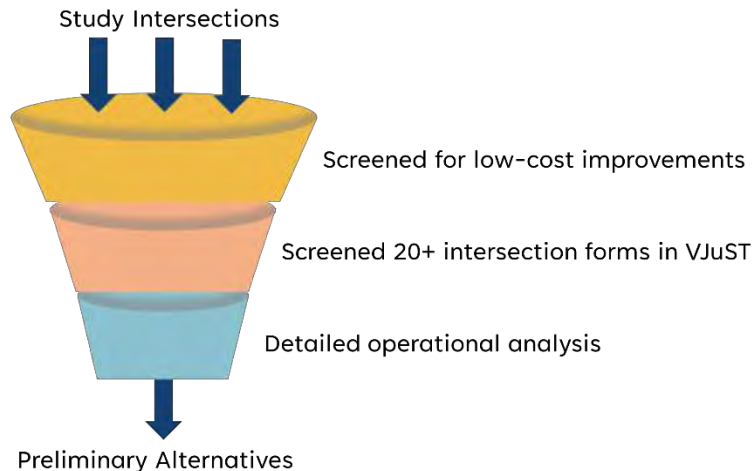
- What do you like about this option?
- What concerns do you have about this option?

In cases where multiple alternatives were presented for the same intersection, the public was able to indicate which option they preferred and why.

Figure 16 Vision and Goals



Figure 17 Alternatives Evaluation Process



WHAT ARE THE ALTERNATIVES?

This section describes the outcomes of the alternative development process. VDOT and the study team aimed to develop feasible alternatives that would be supported by the Stakeholder Group and meet the study’s goals and objectives.

Transportation Solutions for Zion Crossroads

The study team developed intersection-specific alternatives at each of the unsignalized and signalized locations along the study corridor. The study team also identified network alternatives that could increase safety and multimodal options along US 15 and US 250 in Zion Crossroads.

MULTIMODAL FACILITIES

Looking at the existing corridor, the Zion Crossroads Small Area is characterized by limited bicycle and pedestrian facilities. Sidewalks are only present near the Camp Creek Parkway and Market Street intersections. These sidewalks are used to connect the retail and commercial spaces present along this intersection. Outside of this area, no pedestrian crossing infrastructure (e.g., crosswalks, pedestrian signals) are present at any of the other study intersections. No protected bicycle infrastructure is present along the corridors.

Currently, there is one transit facility present in this area at the Zion Crossroads Park and Ride. This location is served by Jaunt Transit.

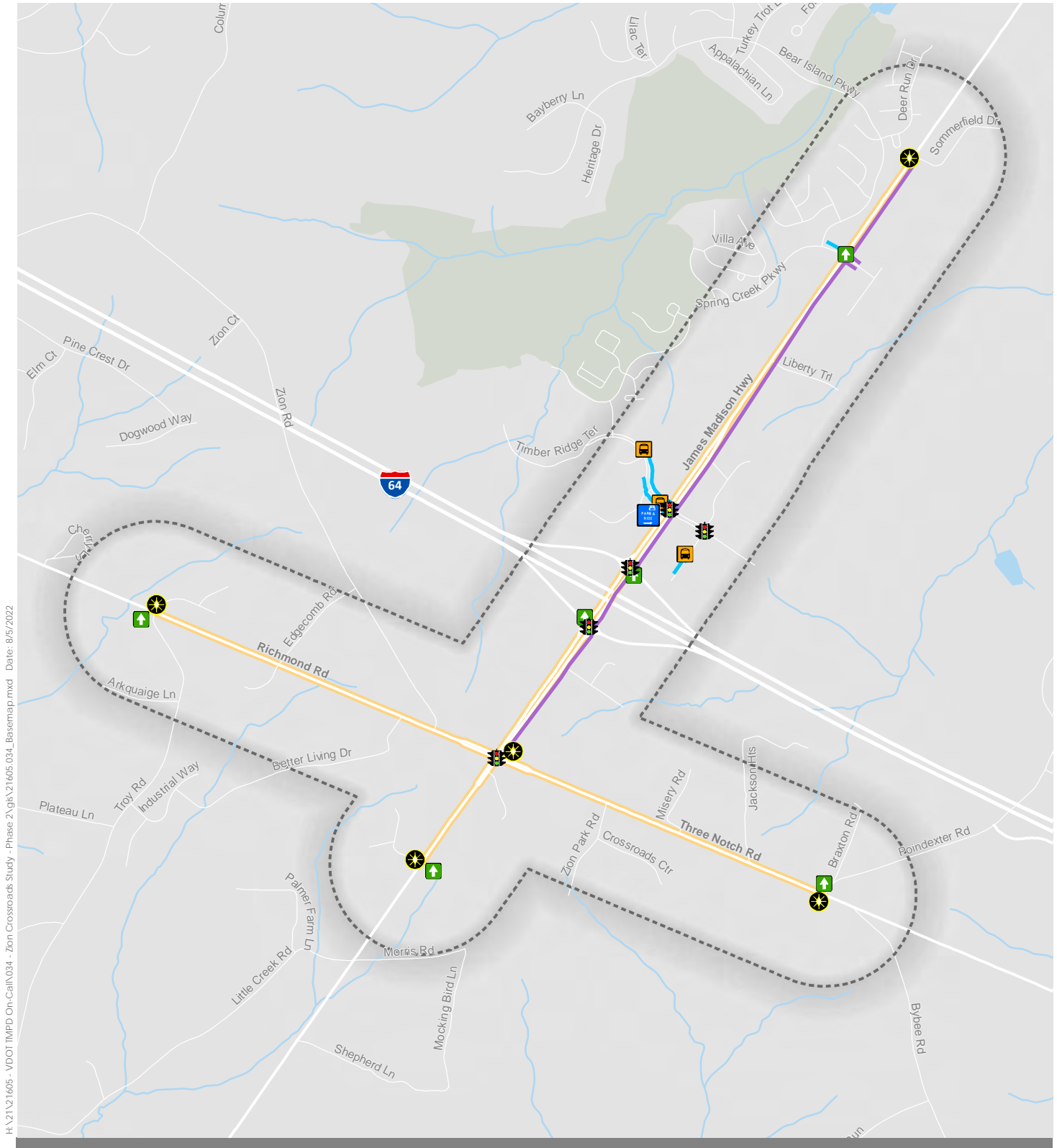
QUESTIONS THIS SECTION ANSWERS:

- How did VDOT develop the alternatives for US 15 and US 250 in Zion Crossroads?
- What are the alternatives for US 15 and US 250 in Zion Crossroads? How would each study alternative advance the study goals?
- How did the community feel about each study alternative?
- How much would each study alternative cost?

After reviewing the area’s crash history, its existing and future operations, and feedback from the public and Stakeholder Group, the study team is proposing several area-wide multimodal treatments. First, a shared use path is being proposed along the east side of US 15 from Sommerfield Drive to US 250. The proposed path is anticipated to be constructed within the existing right-of-way and will connect the expanded Spring Creek neighborhood with existing and proposed developments in the area. In addition, the study team is proposing to add gateway signage at key locations in the study area to showcase the community’s identity.




One additional goal of this study is to explore options to expand transit in Zion Crossroads. The existing park and ride lot is anticipated to be expanded and continue to be served by Jaunt Transit. The project team is also proposing to supplement this lot with new transit stops along Wood Ridge Terrace and Market Street. The study team encourages the local entities to conduct a future study on evaluating the ridership and service needed at these proposed locations.

These proposed multimodal facilities are shown in **Figure 18**.



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Legend

-  Traffic Signals
-  Study Corridor
-  1/4 Mile Corridor Buffer







-  Proposed Park and Ride Expansion
-  Proposed Lighting
-  Proposed Gateway Signage
-  Proposed Transit Stop
-  Proposed Shared-Use Path
-  Proposed Sidewalk



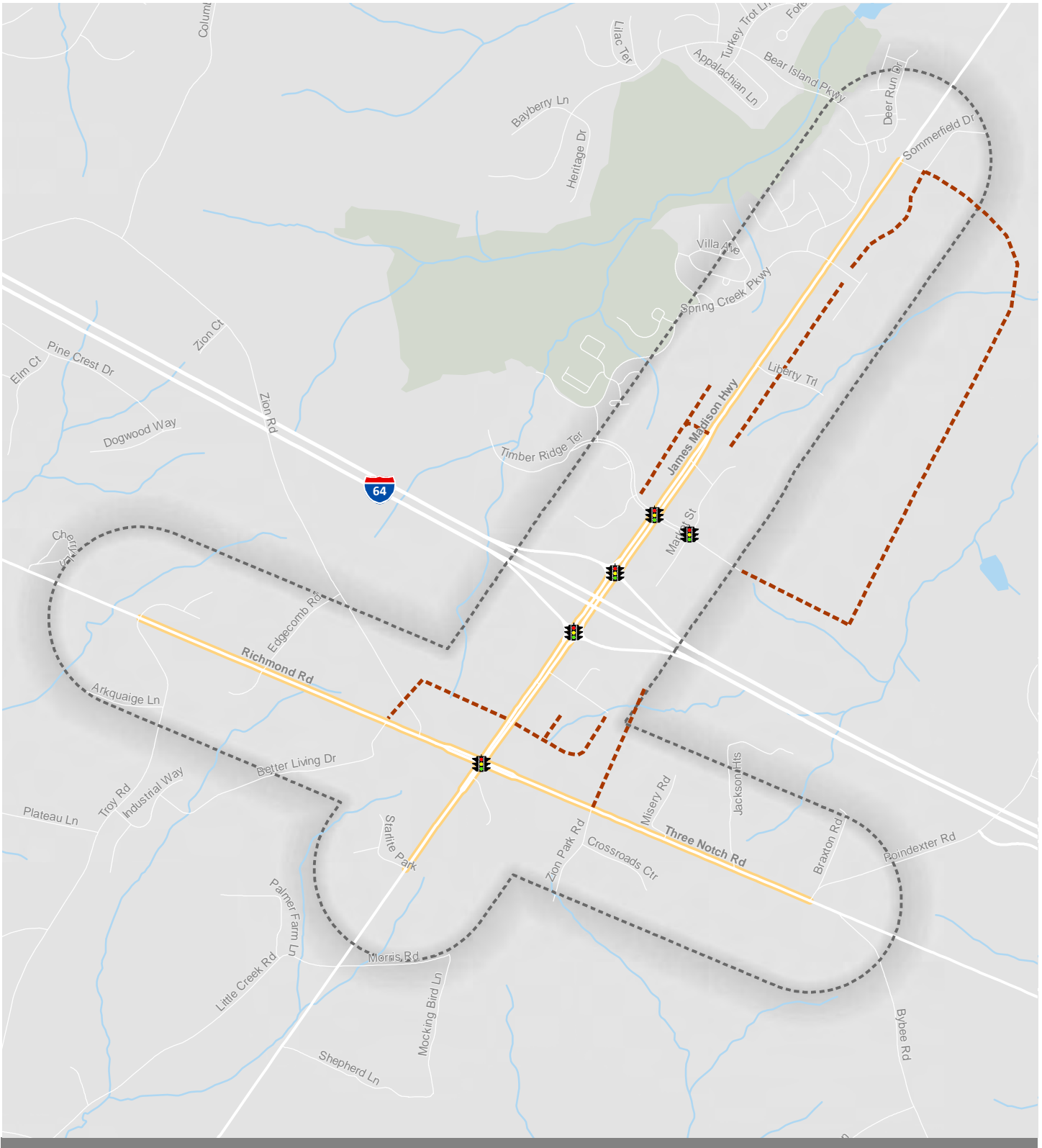
Figure 18

ACCESS MANAGEMENT

Through discussions with the Stakeholder Group and feedback from the public, several new roadway connections are proposed to support the development within the Zion Crossroads area, as shown in **Figure 19**. The goal of these proposed roadways is to help offload traffic, including truck traffic, from US 15. These connections may also serve as more desirable routes for pedestrians and bicyclists. The proposed connections for future consideration include:

- **Extension of Sommerfield Drive to Camp Creek Parkway:** This connection, running behind the Walmart distribution center, would provide access between various land uses along the east side of US 15, further avoiding the need to funnel all trips towards US 15.
- **Extension of Wood Ridge Terrace north of Spring Creek Parkway:** This connection provides inter-parcel connections between the various planned developments along the west side of US 15. It would also allow for the development of a future quadrant roadway, providing access to US 15 across from Freedom Trail.
- **Parallel roadway east of US 15 between Freedom Trail and Sommerfield Drive:** This connection would provide access between the residential developments to the north along US 15 and the commercial uses to the south without having to access US 15.
- **Crossing Pointe connections:** This set of internal roadways would provide alternative connection points to the Crossing Pointe development and surrounding uses from US 15 and US 250.
- **Quadrant roadway in the northwest quadrant of the US 15/US 250 Intersection:** This connection would extend Better Living Drive to US 15 and the future Crossing Pointe roadway network.

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Legend





-  Traffic Signals
-  Study Corridor
-  1/4 Mile Corridor Buffer
-  Theoretical Roadway Connections



Figure 19

US 15 and Sommerfield Drive

NO-BUILD CONDITIONS

The northern most intersection on US 15 identified in this study is at Sommerfield Drive. This three-legged intersection currently provides access to a bank and commercial business but has several available parcels to support future growth in the Zion Crossroads area.

Operations

If no additional improvements were to be made, the Sommerfield Drive in year 2040 is expected to operate at a LOS C in the weekday a.m. peak hour and LOS D in the weekday p.m. and Saturday midday peak hours. It is important to note that these volumes do not consider any additional traffic that may result as the Sommerfield Business Park is built out. As the parcels on Sommerfield Drive are developed, traffic impact studies should be completed.

Safety Performance

The study team also evaluated the crash history at the US 15/Sommer intersection. During the five years of data analyzed, no crashes occurred within 250 feet of the intersection.

ALTERNATIVES ANALYSIS

The forecasted 2040 volumes at Sommerfield Drive were tested in the VDOT’s VJuST tool, as shown in **Table 1**. In addition, **Table 2** summarizes the anticipated LOS of these improvements under 2040 conditions. Through this evaluation, it was determined that there would be very limited operational or safety improvements that would result from implementing an innovative intersection-form at this location. In addition, this intersection’s 2040 forecasted volumes are not anticipated to meet any signal warrants.

Appendix B contains the Synchro and SIDRA operational worksheets for the alternatives evaluated in greater detail.

Table 1 VJuST Results – US 15/Sommerfield Drive

US 15 and Sommerfield Drive					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.38	0.41	0.50
Median U-Turn	NB-SB	20	0.39	0.42	0.51
Partial Displaced Left Turn	NB-SB	44	0.38	0.41	0.50
Partial Median U-Turn	NB-SB	28	0.38	0.41	0.51
Roundabout	N/A	8	0.44	0.46	0.59

Table 2 Level of Service of Potential Improvements - US 15/Sommerfield Drive

Scenario	AM	PM	SAT
Existing	B	C	C
2040 No-Build	C	D	D

RECOMMENDED ROADWAY IMPROVEMENTS

The study team does not recommend any major roadway improvements at the US 15/Sommerfield Drive intersection due to the limited operational and safety benefits expected. However, state maintenance funds may be used to improve and maintain the pavement condition, particularly in the curb returns, near the Sommerfield Business Park.

US 15 and Stonegate Drive/Spring Creek Parkway

NO-BUILD CONDITIONS

The first intersection in which the study team is proposing improvements is at Stonegate Drive and Spring Creek Parkway. This intersection provides access to the growing Spring Creek Community along US 15. In 2040, this intersection is expected to operate at capacity as more vehicles traverse US 15 to visit the commercial and retail growth to the south.

Operations

If no additional improvements were to be made, vehicles exiting the Spring Creek development are anticipated to experience high delays due to heavy volumes expected on US 15. This results in forecasted LOS F conditions at this intersection during the weekday a.m., weekday p.m., and Saturday midday peak hours in 2040.

Safety Performance

The study team also evaluated the crash history at the Spring Creek Parkway/Stonegate Drive/US 15 intersection. During the five years of data analyzed, no crashes occurred with 250 feet of the intersection.

“A traffic circle at the entrance of Spring Creek would increase safety for residents on both sides of 15 trying to enter or exit.” -anonymous.

ALTERNATIVES ANALYSIS

The existing configuration of the Spring Creek Parkway/Stonegate Drive/US 15 intersection was

evaluated to alleviate the anticipated forecasted delay. Although vehicles at this intersection are anticipated to experience significant delays, no signals warrants are met under the expected 2040 volumes. Therefore, only unsignalized improvements were included in the evaluation. **Table 3** shows the results of the VJuST analysis of the intersections under forecast 2040 conditions. Several at-grade intersection control forms, such as a conventional signal, a partial displaced left-turn and the partial median U-Turn, showed promise under the planning-level capacity analysis in VJuST. However, they were ruled out due to the existing context of the intersection and adjacent land uses.

Additionally, the operational impacts of a roundabout and an unsignalized restricted crossing U-turn (RCUT), were explored at this intersection. **Table 4** illustrates the more detailed operational analysis results of each of the options evaluated further. As shown, each of the alternatives is anticipated to improve future operations relative to the no-build scenario.

A bowtie intersection, which could utilize the existing roundabouts on Spring Creek Parkway and Stonegate Drive, was not considered further after discussion with the Stakeholder Group. Access to Spring Creek Parkway is restricted for residents of the Spring Creek development, and the private gate/security would need to be removed.

Overall, the Stakeholder Group expressed preferences towards a roundabout to provide efficient movement for travelers, including both passenger and heavy vehicles, from all approaches. It would also limit roadwork along

US 15. The Stakeholder Group also noted interest in providing gateway signage to welcome travelers along US 15 into the Zion Crossroads area. The central island of a roundabout provides the opportunity for this.

The roundabout alternative was presented at the second public meeting. Over 50 percent of the survey respondents had a favorable opinion of the roundabout. However, several members of the public expressed concerns about heavy vehicles navigating the roundabout while others express preferences for traffic signals.

Appendix B contains the Synchro and SIDRA operational worksheets for alternatives evaluated in greater detail.

Table 3 VJuST Results – US 15/Stonegate Drive/Spring Creek Parkway

US 15 and Stonegate Drive/Spring Creek Parkway					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.53	0.43	0.55
Bowtie	EB-WB	24	0.54	0.46	0.60
Partial Displaced Left Turn	NB-SB	44	0.53	0.41	0.51
Partial Median U-Turn	NB-SB	28	0.53	0.49	0.65
Restricted Crossing U-Turn	NB-SB	20	0.55	0.48	0.58
Roundabout	N/A	8	0.54	0.56	0.66

Table 4 Level of Service of Potential Improvements - US 15/Stonegate Drive/Spring Creek Parkway

Scenario	AM	PM	SAT
Existing	C	D	D
2040 No-Build	F	F	F
Unsignalized Restricted Crossing U-Turn	C	B	C
Roundabout	A	A	B
Bowtie ¹	-	-	-

¹Operations not analyzed further after discussing feasibility of access to Spring Creek Parkway with Stakeholder Group

RECOMMENDED ROADWAY IMPROVEMENTS

As a result of the alternatives analysis and feedback from the public and Stakeholder Group, the roundabout is recommended. **Figure 20** illustrates the proposed layout of a roundabout. This intersection configuration would promote safer and more efficient movements into and out of the Spring Creek development and reduce the forecasted delay in 2040.

Appendix C contains a more detailed plan sheet illustrating anticipated easement and right-of-

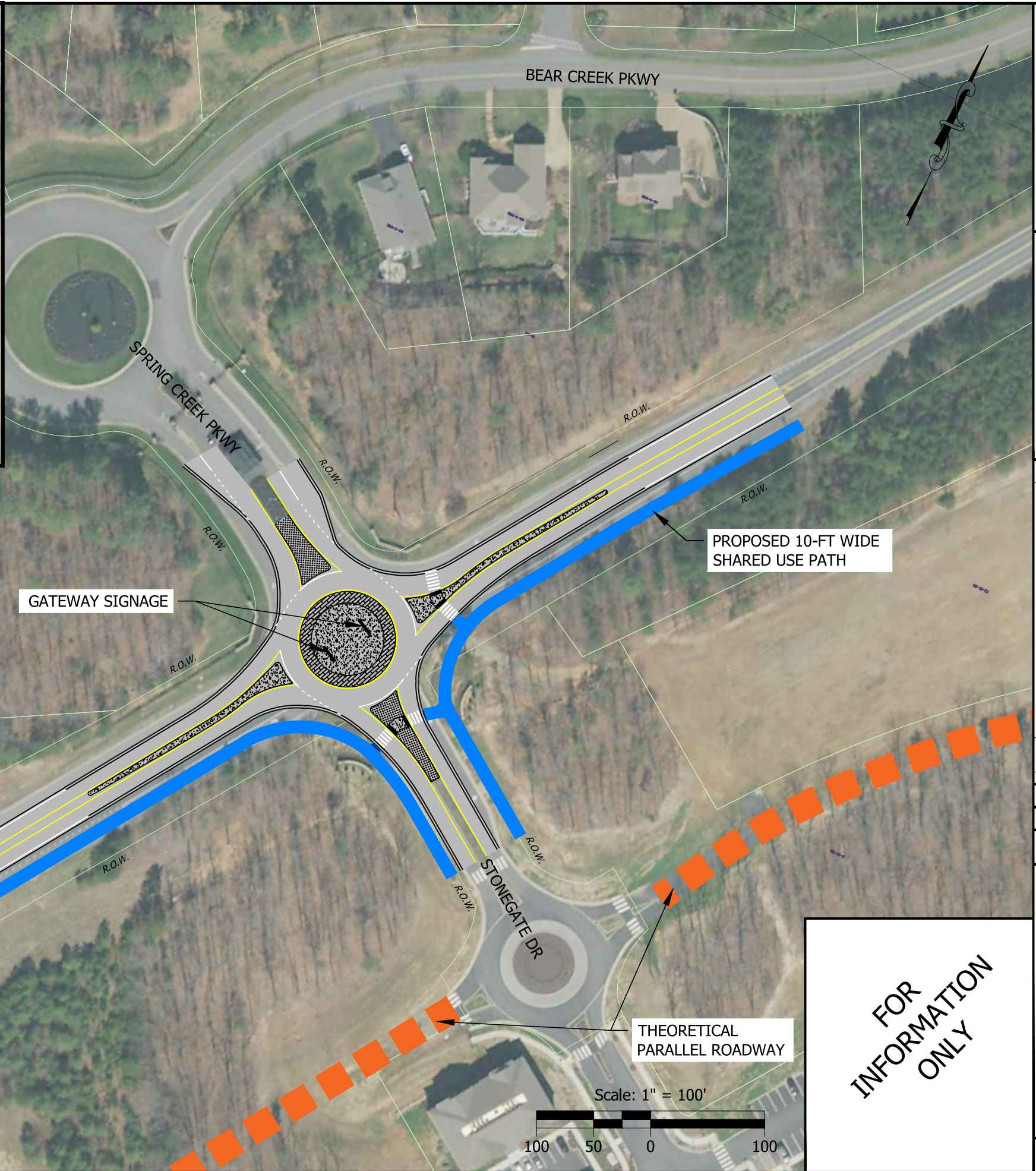
way acquisitions to accommodate the design. The proposed concept is anticipated to reduce delay for those exiting the Spring Creek development, reduce the potential for crashes, and reduce the anticipated severity of crashes. **Table 5** summarizes the alternatives analysis results and planning-level estimates of probable cost for the options at US 15 and Stonegate Drive/Spring Creek Parkway. **Appendix D** contains a more detailed breakdown of the cost estimates.

In the meantime, the study team encourages the local jurisdiction to explore gateway signage that can be implemented prior to the installation of a roundabout.

Table 5 Evaluation of Alternatives - US 15/Stonegate Drive/Spring Creek Parkway

Scenario	Improve Safety and Comfort	Manage Congestion	Manage Access	Provide Transit Options	Order of Magnitude of Costs
No-Build	★☆☆☆☆	★☆☆☆☆	★★☆☆☆	★☆☆☆☆	N/A
Roundabout	★★★★☆	★★★★☆	★★★☆☆	★☆☆☆☆	\$4,239,000

EXISTING INTERSECTION

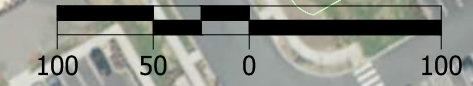


PROPOSED 10-FT WIDE SHARED USE PATH

GATEWAY SIGNAGE

THEORETICAL PARALLEL ROADWAY

Scale: 1" = 100'



FOR INFORMATION ONLY



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#	DATE	REVISION	APP'D

Submission Date: 08/15/2022
 Drawn: AJB Designed: AJB Checked: KJH
 PROJECT NO. 21605.034

Zion Crossroads Small Area
 Study: Louisa County
 Stonegate Dr/Spring Creek Pkwy Roundabout

SHEET NO. 20

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US 15 and Liberty Trail

NO-BUILD CONDITIONS

Continuing south, the next intersection is at US 15 and Liberty Trail. As this intersection provides access to the distribution facility to the east, larger commercial trucks are commonly present. This intersection experienced significant safety issues as passenger vehicles and commercial vehicles interact.

Operations

If no changes are made to this intersection, vehicles, especially trucks entering and exiting the Walmart Distribution Center, are anticipated to experience high delays in 2040. LOS E conditions are anticipated in the weekday a.m. and p.m. peak hours and LOS F conditions are expected in the Saturday midday peak hour. Despite these forecasted conditions, this intersection is not anticipated to meet volume-based signal warrants for peak-hour, four-hour or eight-hour volumes.

Safety Performance

This intersection experienced seven crashes during the five years of crash data analyzed. Of these, five were rear-end crashes and the other two crashes were angle crashes. Two of the rear-end crashes referenced drivers having difficulty understanding the existing flashing yellow arrow signals. The remaining three rear-end crashes resulted as northbound drivers were waiting to turn left into the nearby businesses. Challenges related to judging proper gaps in the opposing traffic was referenced to both angle crashes. By 2040, the high delays anticipated at this intersection could further lead to drivers forcing their way into smaller gaps in mainline traffic to

get out, which may lead to a potential increase in frontal impact crashes at the intersection.

The seven crashes at this intersection resulted in three visible (Level B) injury crashes, one non-visible injury crash (Level C) and three property-damage only (PDO) crash. This resulted in an Equivalent Property Damage Only (EPDO) score among the highest on the corridor.

“I’ve noticed that the Walmart trucks coming from the distribution center have a hard time getting out when taking a left.” -anonymous.

ALTERNATIVES ANALYSIS

Because the intersection of US 15 and Liberty Trail is not forecasted to meet volume-based traffic signal warrants in 2040, the study team focused the evaluation on unsignalized alternatives. **Table 6** illustrates the initial screening for alternatives conducted in VJuST. Several at-grade intersection control forms, such as a conventional signal and a partial displaced left-turn, showed promise under the planning-level capacity analysis in VJuST. However, they were ruled out due to the existing context of the intersection, and adjacent land uses.

Additionally, the operational impacts of a roundabout and an unsignalized Continuous Green-T were explored at this intersection using SIDRA and Synchro, respectively. Although the results of both configurations showed operational improvements (as shown in **Table 7**), the Stakeholder Group expressed preferences towards a roundabout. The stakeholders saw value in a series of roundabouts along US 15 to encourage safe, efficient movements along the corridor.

What are the alternatives?

The roundabout alternative was presented at the second public meeting. Like the previous intersection at Spring Creek Parkway/Stonegate

Drive, over 50 percent of the respondents expressed a favorable opinion of the roundabout.

Table 6 VJuST Results – US 15/Liberty Trail

US 15 and Liberty Trail					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.70	0.68	0.80
Continuous Green-T	WB	12*	0.66	0.68	0.80
Partial Displaced Left Turn	NB-SB	44	0.70	0.67	0.80
Partial Median U-Turn	NB-SB	28	0.70	0.68	0.80
Roundabout	N/A	8	0.82	0.78	0.92

Table 7 Level of Service of Potential Improvements – US 15/Liberty Trail

Scenario	AM	PM	SAT
Existing	C	D	E
2040 No-Build	E	E	F
Unsignalized Green T	B	C	C
Roundabout	A	A	B

RECOMMENDED ROADWAY IMPROVEMENTS

After reviewing the preliminary analysis at the US 15/Liberty Trail intersection, the study team recommends converting the intersection to a roundabout. The conceptual roundabout shown in **Figure 21** is designed to safely accommodate large trucks from the distribution center, as well as through trucks on US 15. This intersection configuration would promote safer and more efficient movements and reduce the forecasted delay in 2040. **Figure 22** illustrates how the proposed roundabouts at the US 15/Stonegate Drive/Spring Creek Parkway and US 15/Liberty

Trail intersections would operate in series to help calm traffic entering the Zion Crossroads area.

Appendix C contains a more detailed plan sheet illustrating anticipated easement and right-of-way acquisitions to accommodate the design. The proposed concept is anticipated to reduce delay, including that for the heavy vehicles entering and exiting the Walmart facility. The potential for crashes and anticipated severity of the crashes that occur at this intersection are also expected to be reduced. **Table 8** summarizes the alternatives analysis results and planning-level estimates of probable cost for the options at the US 15 and Liberty Trail intersection. **Appendix D** contains a more detailed breakdown of the cost estimates.

Table 8 Evaluation of Alternatives - US 15/Liberty Trail

Scenario	Improve Safety and Comfort	Manage Congestion	Manage Access	Provide Transit Options	Order of Magnitude of Costs
No-Build	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	N/A
Roundabout	★★★★☆	★★★★☆	★★★☆☆	★☆☆☆☆	\$4,136,800

EXISTING INTERSECTION



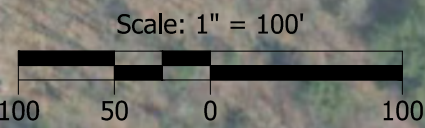
ZION CROSSROADS
MINI STORAGE ENTRANCE

PROPOSED SHARED
USE PATH

THEORETICAL
PARALLEL ROADWAY

LIBERTY
TRAIL

U.S. ROUTE 15



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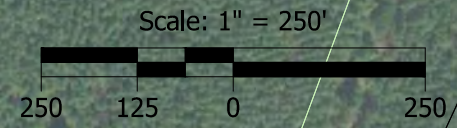
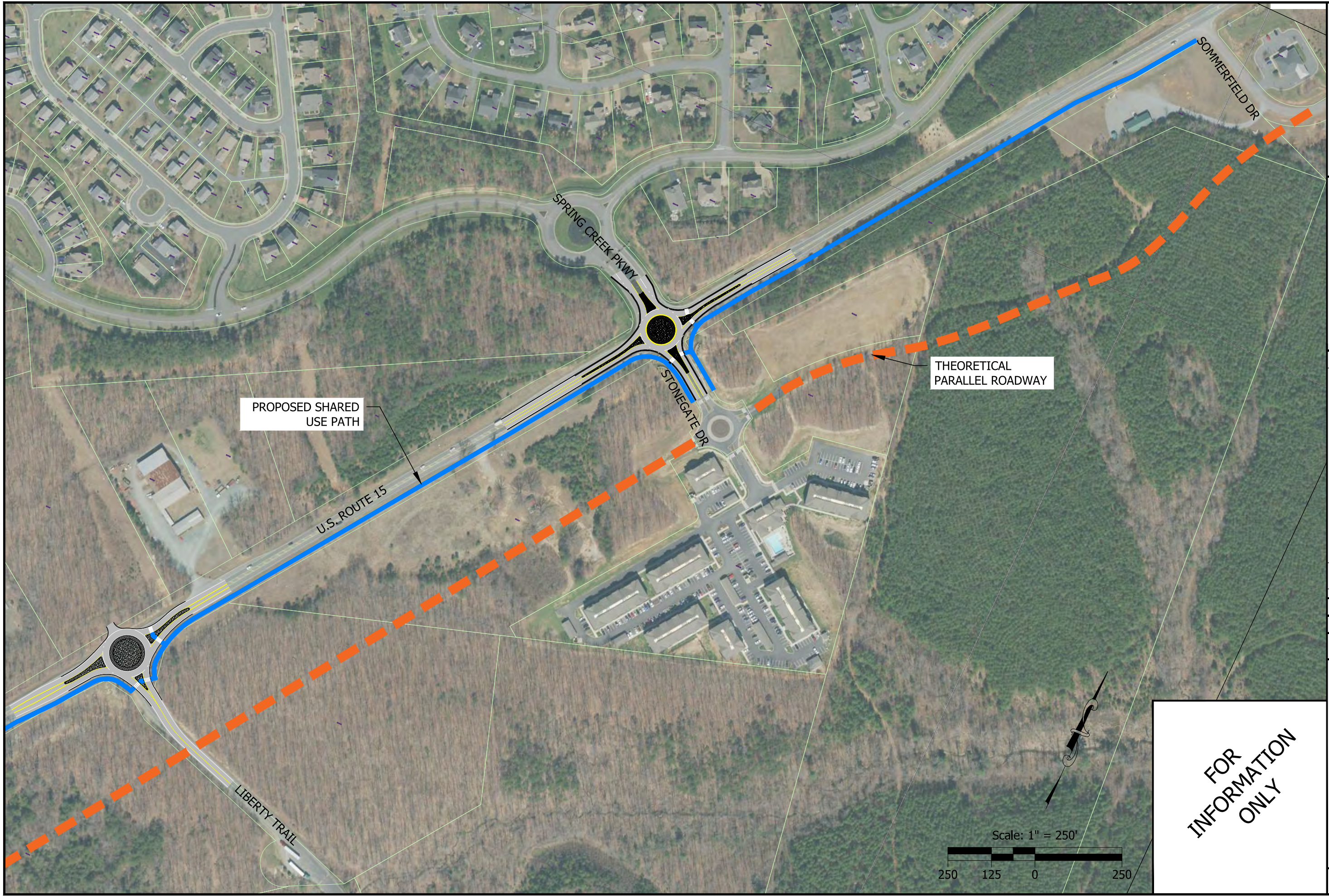
PROJECT NO.
21605.034

Zion Crossroads Small Area
Study: Louisa County
Liberty Trail
Roundabout

SHEET NO.
21

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#	DATE	REVISION	APP'D

Submission Date:
08/17/2022
 Drawn: AJB Designed: AJB Checked: KJH

PROJECT NO.
21605.034

Zion Crossroads Small Area
 Study: Louisa County
 Sommerfield Drive to
 Liberty Trail

SHEET NO.
22

US 15 and The Shoppes at Spring Creek/Spring Creek Business Park

NO-BUILD CONDITIONS

At the heart of the Zion Crossroads area is the Shoppes at Spring Creek along the east side of US 15 and Spring Creek Business Park on the west. Both centers currently and are expected to continue to be the center of the future commercial and retail growth within the region. These areas of regional importance are connected by a series of roadways that operate as a smaller system within the Zion Crossroads areas. The intersections that tie this system together include the following:

- US 15/Freedom Drive
- US 15/Freedom Trail
- US 15/Spring Creek Parkway/Camp Creek Parkway
- Spring Creek Parkway/Wood Ridge Terrace
- Camp Creek Parkway/Market Street

Figure 23 illustrates the area encompassed in this analysis zone.

OPERATIONS

US 15/Freedom Trail

The intersection of US 15 and Freedom Trail is the northernmost intersection into the Shoppes at Spring Creek. This intersection is currently unsignalized and primarily serves as an additional access point for trucks entering and exiting the Walmart Distribution Center. If no changes were to be made at this intersection by 2040, operational concerns are not anticipated as it is expected to operate as a LOS C in the weekday a.m. peak hour and LOS D in the

weekday p.m. and Saturday midday peak hours. The forecasted 2040 volumes are not anticipated to meet volume-based signal warrants for peak hour, four-hour or eight-hour volumes.

US 15/Freedom Drive

The intersection of US 15 and Freedom Drive serves as an additional access point into the Shoppes at Spring Creek develop. Freedom Drive currently operates as right-out only but allows turning movements from northbound and southbound US 15. In 2040, this intersection is anticipated to operate well below capacity in the weekday a.m. and p.m. and Saturday midday peak hours. Although there is operational capacity, this intersection is expected to meet the three volume-based signal warrants for peak hour, four-hour and eight-hour volumes in 2040.

US 15/Spring Creek Parkway/Camp Creek Parkway

The intersection of US 15 and Spring Creek Parkway/Camp Creek Parkway serves as the primary access to both the Shoppes at Spring Creek and the Spring Creek Business Park. As both areas are anticipated to experience tremendous growth by 2040, the US 15/Spring Creek Parkway/Camp Creek Parkway intersection is expected to operate above capacity at a LOS F in all three peak hours analyzed.

Spring Creek Parkway/Wood Ridge Terrace

The unsignalized intersection of Spring Creek Parkway and Wood Ridge Terrace provides access to restaurants, a hotel, and the park-and-ride lot. If no changes are made to the existing unsignalized intersection, it anticipated to

operate well below capacity (LOS B in the weekday a.m. and p.m. and Saturday midday peak hours). However, this operational performance does not consider any queues that may result from nearby intersections. In addition, the forecasted volumes at this intersection do not meet the three volume-based signal warrants.

Camp Creek Parkway/Market Street

The signalized intersection between Camp Creek Parkway and Market Street serves as a central hub of vehicular access for the Shoppes at Spring Creek. It is forecasted to operate at LOS C in the weekday a.m. and p.m. and Saturday midday peak hours in 2040. This means that the volumes anticipated at this intersection are well below capacity. However, this does not consider any queues from the US 15/Spring Creek Parkway/Camp Creek Parkway intersection that may impact the operational performance of this intersection.

“This is a very busy intersection with the current situation, and I feel that it will become strained once future development occurs.” -anonymous.

SAFETY PERFORMANCE

US 15/Freedom Trail

The study team also evaluated the crash history at each intersection that supports the roadway network near the Shoppes at Spring Creek and Spring Creek Business Park. During the five years of data analyzed, no crashes occurred within 250 feet of the US 15 and Freedom Trail intersection.

US 15/Freedom Drive

The intersection of US 15 and Freedom Drive experienced two crashes during the five years of data studies. This includes an angle crash that

resulted property damage only and a sideswipe crash that resulted in a visible injury (Level B).

US 15/Spring Creek Parkway/Camp Creek Parkway

The intersection of US 15 and Spring Creek Parkway/Camp Creek Parkway was identified as a priority intersection from a safety perspective. It was among those that experienced the highest frequency of crashes and highest EPDO score. During the five years of data analyzed, 15 crashes occurred at this intersection. This included eight rear-end crashes that resulted in five visible injuries and three property-damage only. Four angle crashes also occurred, resulting in one visible injury and three property damage only. Three property-damage only, same direction sideswipe crashes also occurred. Crash descriptions for these events attributed red-light running, issues judging gaps in the opposing traffic stream, and driver error as causes.

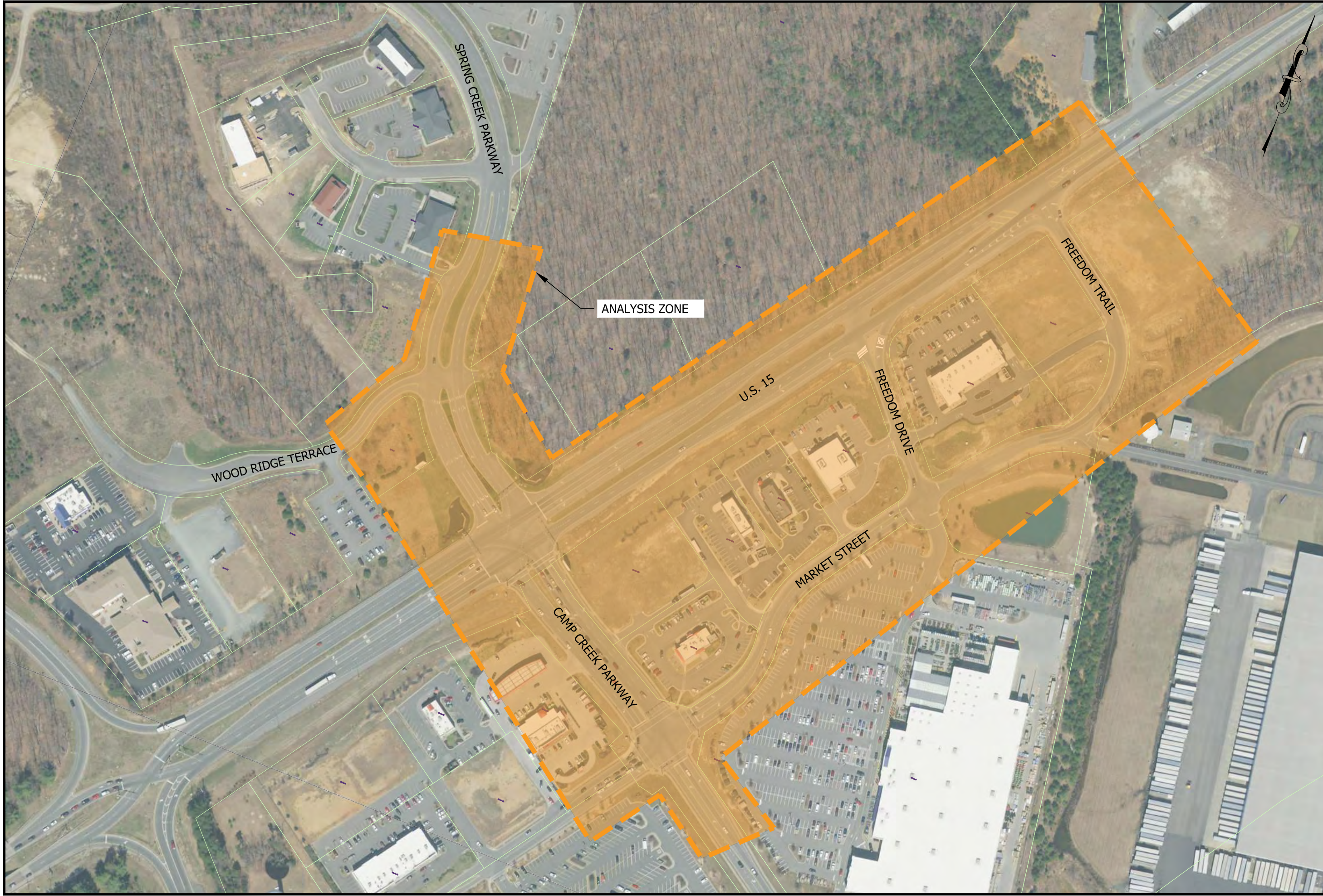
Spring Creek Parkway/Wood Ridge Terrace

During the five years of data analyzed, two property-damage only crashes occurred within 250 feet of the Spring Creek Parkway and Wood Ridge Terrace. One occurred as a same direction sideswipe crashes during a lane change and the other occurred as a nighttime run-off-road crash.

Camp Creek Parkway/Market Street

Six property-damage only crashes occurred at the Camp Creek Parkway and Market Street intersection in the five years of data analyzed. Four the six crashes were angle crashes and two were same direction sideswipe crashes. Of the six crashes at this intersection, three referenced possible red-light running by the at-fault drivers.

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#	DATE	REVISION	APP'D

Submission Date:
08/15/2022
Drawn: BK Designed: BK Checked: KJH

PROJECT NO.
21605.034
**Zion Crossroads Small Area
Study: Louisa County**
US 15/The Shoppes at Spring
Creek/Spring Creek Business Park
Analysis Zone

ALTERNATIVES ANALYSIS

Given the connectivity and proximity of these intersections relative to each other, any improvements or changes to traffic patterns at one intersection would likely impact the operations and safety performance of adjacent intersections. As such, improvements intersections were evaluated together.

Alternatives intersection forms at individual intersections were first screened using VJuST. However, VJuST does not account for existing/forecast volumes at adjacent intersections (e.g., for a bowtie intersection, it is not able to account for volumes at an existing side street intersection that would be converted to a roundabout). The results should therefore only be taken as a very preliminary look at potential alternatives. **Table 9** illustrates the VJuST results for each of the study intersections within the analysis zone.

Table 10 illustrates the system concepts evaluated in greater detail and the changes to individual intersections under each concept. Each concept is discussed below:

- **Northbound Receiving Lane:** Converts the existing northbound right-turn lane at the US 15/Camp Creek Parkway/Spring Creek Parkway intersection to a free-flow movement. This would substantially reduce delays for the anticipated near 1,000 weekday and Saturday peak hour vehicles anticipated to make this movement to access the shopping center and Zion Town Center development.
- **Superstreet:** Converts the US 15/Freedom Trail and US 15/Freedom Drive intersections into a series of unsignalized RCUTs to create the start of a superstreet. This would require new U-turn accommodations at the median opening to the north of Freedom Trail.
- **Quadrant Roadway (SE):** This concept would redirect northbound and westbound left-turns at the US 15/Spring Creek Parkway/Camp Creek Parkway intersection to utilize a new quadrant roadway in the southeast corner of the intersection. By redirecting the over 1,000 anticipated westbound left-turns, this would shift this high left-turn demand to a new intersection that has more capacity and improve operations at the main traffic signal. Implementing this concept would require a new connection to US 15 south of Camp Creek Parkway (likely south of the existing Arby's).
- **Quadrant Roadway (NE):** This concept redirects southbound and westbound left-turns at the US 15/Spring Creek Parkway/Camp Creek Parkway intersection to use Market Street via the US 15/Freedom Trail intersection. Similar to the quadrant roadway in the southeast corner of the intersection, this shifts the high demand for the westbound left-turn movement to an intersection with more capacity to spare. To accommodate the increased traffic at the US 15/Freedom Trail intersection, it would likely require the installation of a traffic signal or conversion to a roundabout.
- **Bowtie:** Under this concept, all left-turns at the US 15/Spring Creek Parkway/Camp Creek Parkway intersection would be redirected to make U-turns at roundabouts developed at the Camp Creek Parkway/Market Street and Spring Creek Parkway/Wood Ridge Terrace intersections.
- **Hybrid:** This concept combines elements from the Quadrant (NE) and Bowtie concepts. All left-turns at the main traffic signal would be redirected to utilize a roundabout at Spring Creek Parkway/Wood Ridge Terrace to make U-turns or use Market Street as a quadrant roadway.

Table 9 VJST Results - US 15 and The Shoppes at Spring Creek/Spring Creek Business Park Intersections

US 15 and Freedom Trail						
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C	
Conventional	N/A	48	0.52	0.54	0.61	
Continuous Green-T	WB	32	0.51	0.54	0.61	
Median U-Turn	NB-SB	20	0.56	0.54	0.61	
Partial Displaced Left Turn	NB-SB	44	0.52	0.52	0.60	
Partial Median U-Turn	NB-SB	28	0.54	0.54	0.61	
Quadrant Roadway, N-W	N/A	40	0.53	0.52	0.60	
Quadrant Roadway, S-E	N/A	40	0.54	0.54	0.61	
Restricted Crossing U-Turn	NB-SB	20	0.55	0.53	0.61	
Roundabout	N/A	8	0.63	0.61	0.70	
US 15 and Freedom Drive						
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C	
Conventional	N/A	48	0.35	0.51	0.59	
Continuous Green-T	WB	12*	0.35	0.51	0.59	
Median U-Turn	NB-SB	20	0.44	0.55	0.63	
Partial Displaced Left Turn	NB-SB	44	0.35	0.51	0.59	
Partial Median U-Turn	NB-SB	28	0.44	0.55	0.63	
Restricted Crossing U-Turn	NB-SB	20	0.40	0.51	0.59	
Roundabout	N/A	8	0.61	0.62	0.71	
US 15 and Spring Creek Parkway / Camp Creek Parkway						
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C	
Conventional	N/A	48	0.70	0.93	1.09	
Full Displaced Left Turn	N/A	40	0.56	0.86	1.00	
Median U-Turn	NB-SB	20	0.91	1.62	1.72	
Partial Displaced Left Turn	NB-SB	44	0.75	1.36	1.56	
Partial Median U-Turn	NB-SB	28	0.73	0.98	1.04	
Roundabout	N/A	8	1.25	1.78	1.94	

Spring Creek Parkway and Wood Ridge Terrace						
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C	
Conventional	N/A	48	0.13	0.17	0.15	
Continuous Green-T	NB	12*	0.13	0.17	0.15	
Restricted Crossing U-Turn	EB-WB	20	0.13	0.17	0.15	
50 Mini Roundabout	N/A	8	0.20	0.22	0.15	
75 Mini Roundabout	N/A	8	0.19	0.22	0.15	
Roundabout	N/A	8	0.14	0.16	0.11	

Camp Creek Parkway and Market Street						
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C	
Conventional	N/A	48	0.35	0.59	0.65	
Partial Displaced Left Turn	EB-WB	44	0.43	0.70	0.77	
Partial Median U-Turn	EB-WB	28	0.44	0.72	0.84	
Restricted Crossing U-Turn	EB-WB	20	0.45	0.76	0.83	
Roundabout	N/A	8	0.40	0.84	1.06	

Table 10 Concepts Evaluated Further and Changes at Individual Intersections - US 15 and The Shoppes at Spring Creek/Spring Creek Business Park Intersections

Scenario Name	Proposed Changes to Intersection				
	US 15/ Freedom Trail	US 15/ Freedom Drive	US 15/ Spring Creek Parkway/Camp Creek Parkway	Camp Creek Parkway/Market Street	Spring Creek Parkway/Wood Ridge Terrace
Northbound Receiving Lane	N/A	N/A	Create free-flow northbound right-turn lane	N/A	N/A
Superstreet	Unsignalized RCUT	Unsignalized RCUT	N/A	N/A	N/A
Quadrant (SE) ¹	N/A	N/A	Redirect northbound and westbound left turns	N/A	N/A
Quadrant (NE) ²	Traffic Signal or Roundabout	N/A	Redirect southbound and westbound left turns	N/A	N/A
Bowtie	N/A	N/A	Redirect left turns from all four approaches	Roundabout	Roundabout
Hybrid	Traffic Signal or Roundabout	N/A	Redirect left turns from all four approaches	N/A	Roundabout

¹Creates a new intersection along US 15 between Camp Creek Parkway and the I-64 interchange.

²Utilizes the existing Market Street alignment as a quadrant roadway between Market Street and Freedom Trail.

Table 11 illustrates the anticipated 2040 operations at each intersection under these concepts. **Appendix B** contains the Synchro and

SIDRA operational worksheets for alternatives evaluated in greater detail.

Table 11 Level of Service of Potential Improvements – US 15 and The Shoppes at Spring Creek/Spring Creek Business Park

US 15 and Freedom Trail				
Scenario	Traffic Control	AM	PM	SAT
Existing	Two-way stop-control	C	C	C
2040 No-Build	Two-way stop-control	C	D	D
Superstreet	RCUT (Unsignalized) ¹	B/C	C/B	C/C
Quadrant (NE)	Traffic Signal	B	D	D
	Roundabout	B	B	B
Hybrid	Traffic Signal	C	D	D
	Roundabout	B	B	B
US 15 and Freedom Drive				
Scenario	Traffic Control	AM	PM	SAT
Existing	Two-way stop-control	A	B	B
2040 No-Build	Two-way stop-control	B	B	B
Superstreet	RCUT (Unsignalized)	B	B	B
US 15 and Spring Creek Parkway/Camp Creek Parkway				
Scenario	Traffic Control	AM	PM	SAT
Existing	Conventional Traffic Signal	D	D	E
2040 No-Build	Conventional Traffic Signal	F	F	F
Northbound Receiving Lane	Conventional Traffic Signal	F	F	F
Quadrant Roadway – SE	Modified Traffic Signal ²	C/C	C/C	C/C
Quadrant Roadway – NE	Modified Traffic Signal	C	E	D
Bowtie	Modified Traffic Signal	C	B	C
Hybrid	Modified Traffic Signal	C	C	D
Spring Creek Parkway and Wood Ridge Terrace				
Scenario	Traffic Control	AM	PM	SAT
Existing	Two-way stop-control	B	B	A
2040 No-Build	Two-way stop-control	B	B	B
Bowtie	Roundabout	A	B	B
Hybrid	Roundabout	A	B	B
Camp Creek Parkway and Market Street				
Scenario	Traffic Control	AM	PM	SAT
Existing	Conventional Traffic Signal	C	D	C
2040 No-Build	Conventional Traffic Signal	C	C	D
Quadrant Roadway – SE	Conventional Traffic Signal	D	E	F
Quadrant Roadway – NE	Conventional Traffic Signal	C	C	D
Bowtie	Roundabout	A	B	B

¹Main node & U-turn location to the north

²US 15/Spring Creek Parkway/Camp Creek Parkway & US 15/New Quadrant Node

The more detailed operational analysis of the alternatives illustrated the following concepts were not viable:

- **Northbound Receiving Lane:** Not anticipated to alleviate LOS F conditions
- **Superstreet:** Does not address operational and safety concerns at the US 15/Spring Creek Parkway/Camp Creek Parkway intersection
- **Quadrant Roadway (SE):** Would require the installation of a new traffic signal on US 15 between Camp Creek Parkway/Spring Creek Parkway and the I-64 DDI, which would not meet VDOT spacing standards. The new signal on US 15 is anticipated to operate at LOS F during the Saturday midday peak hour.

Each of the remaining alternatives required out-of-direction travel for one or more movements. As a result, a comparison based solely on the individual intersection performance fails to

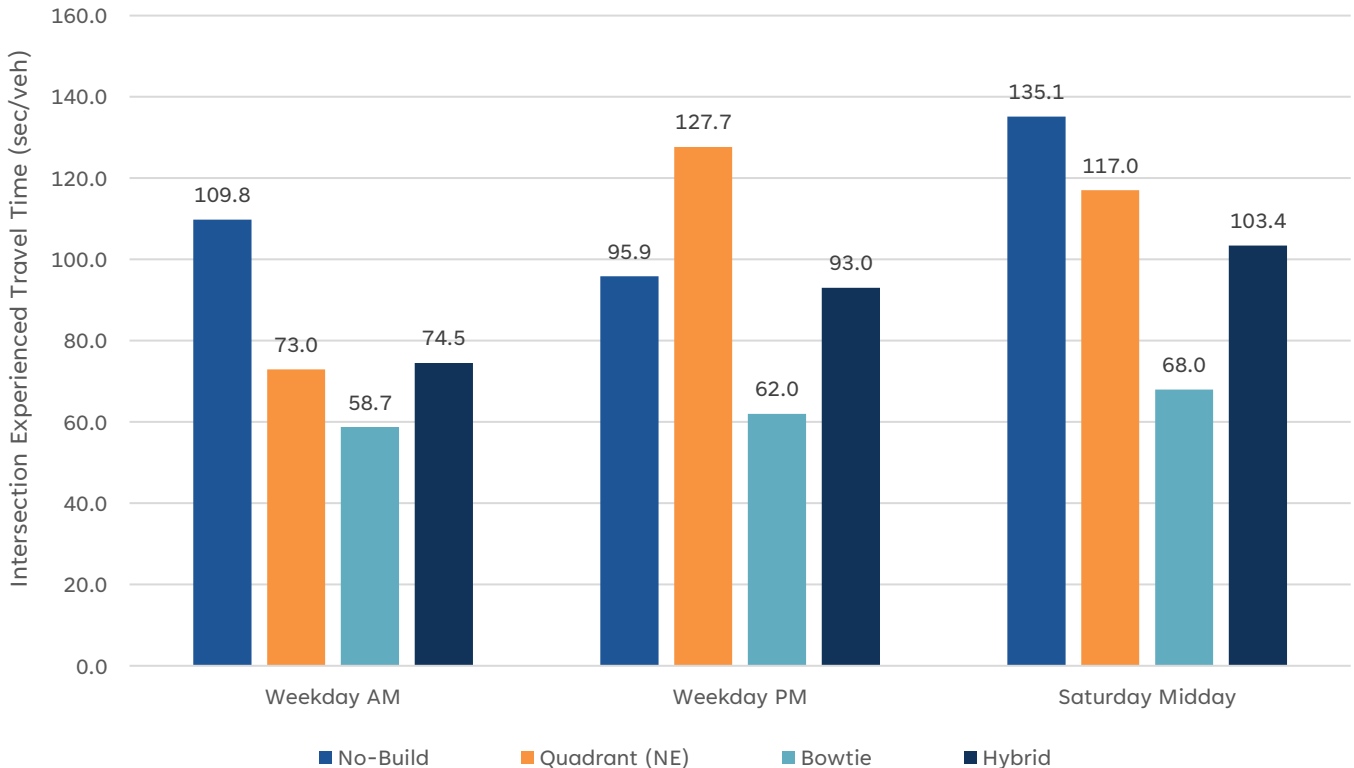
consider the additional travel time related to out-of-direction travel, as well as the additional delay incurred by navigating through intersections the driver would not otherwise encounter.

To create an equitable comparison between the Quadrant (NE), Bowtie, and Hybrid alternatives, the Experienced Travel Time (ETT) of all vehicles within the analysis zone was calculated. The ETT provides the estimated average travel time of all movements accounting for additional travel time related to out-of-direction travel and delay.

Figure 24 shows the ETT for each alternative.

As shown, the Bowtie alternative is anticipated to provide the greatest reduction in ETT during each of the peak periods, while the Quadrant alternative is anticipated to increase ETT during the weekday p.m. peak hour due to the out-of-direction travel for over 1,000 vehicles northbound along Market Street and back down US 15.

Figure 24 Experienced Travel Time - US 15 and The Shoppes at Spring Creek/Spring Creek Business Park



RECOMMENDED ROADWAY IMPROVEMENTS

Based on the operational analysis, the study team recommends implementing the Bowtie alternative at the US 15/Spring Creek Parkway/Camp Creek Parkway intersection. While it does introduce out-of-direction travel for left-turn movements at the main intersection, it is anticipated to reduce overall travel times within the study area (including for the redirected left-turn movements). The main traffic signal is anticipated to operate much more efficiently as a two-phase signal, reducing delays for all movements. Removing the left-turns from the main intersection is also anticipated to substantially reduce the risk of angle crashes, which often lead to higher severity crashes due to the impact location on vehicles. **Figure 30** illustrates the Bowtie alternative. To help unfamiliar drivers navigate the bowtie, the signing plan for the area will need to be carefully designed to clearly indicate permitted movements and provide lane guidance.

The Hybrid alternative also showed promise in reducing ETT. It may serve as a good alternative should the Bowtie alternative not be feasible for construction. **Figure 26** illustrates the Hybrid alternative near the US 15/Spring Creek Parkway/Camp Creek Parkway intersection, while **Figure 27** illustrates the roundabout concept at US 15/Freedom Trail. The roundabout was determined to be the more appropriate solution to the added traffic at US 15/Freedom Trail due to the additional safety benefits and reduced impact to adjacent developments required to accommodate a traffic signal. For the traffic signal to operate effectively, the westbound Freedom Trail approach would need to be widened to accommodate dual left-turn lanes. **Figure 28** shows the overall Hybrid alternative as it relates to the study area. As shown, the Hybrid

alternative also provides the opportunity to expand the existing park-and-ride lot and provide augmented transit services.

After presenting these alternatives at the public meeting, residents inquired about the potential for an overpass above US 15, allowing through traffic on US 15 to avoid stopping at Camp Creek Parkway/Spring Creek Parkway. This alternative was initially considered; however, it was not advanced for several reasons:

- **Cost:** To create grade separation between US 15 and Spring Creek Parkway/Camp Creek Parkway, it is likely US 15 would need dug out below the existing topography. Construction for an overpass would be orders of magnitude higher than other viable alternatives proposed.
- **Proximity to DDI:** Introducing a grade-separation between US 15 and Spring Creek Parkway/Camp Creek Parkway would establish a second grade-separated intersection within approximately 1,000 feet of the I-64 DDI to the south. This does not meet VDOT access spacing standards and could potentially introduce greater crash risks.
- **Restricted Access to Commercial Properties:** The short distance between US 15 and Market Street would result in a very short weaving distance between northbound right-turning vehicles from US 15 and eastbound vehicles coming over the overpass. The short weaving maneuver poses a substantial crash risk, and as such, access to Market Street would need to be restricted. Vehicles attempting to access the commercial properties to the north of Camp Creek Parkway from US 15 Northbound would need to utilize either Freedom Drive or Freedom Trail, rather than Market Street.

Appendix C contains a more detailed plan sheet illustrating anticipated easement and right-of-way acquisitions to accommodate the designs. Both the Bowtie and Hybrid concepts are anticipated to reduce delay, improve safety, increase options for non-motorized travelers, and provide greater opportunities for transit services.

Table 12 summarizes the alternatives analysis results and planning-level estimates of probable cost for the options in the US 15/The Shoppes at Spring Creek/Spring Creek Business Park area. **Appendix D** contains a more detailed breakdown of the cost estimates.

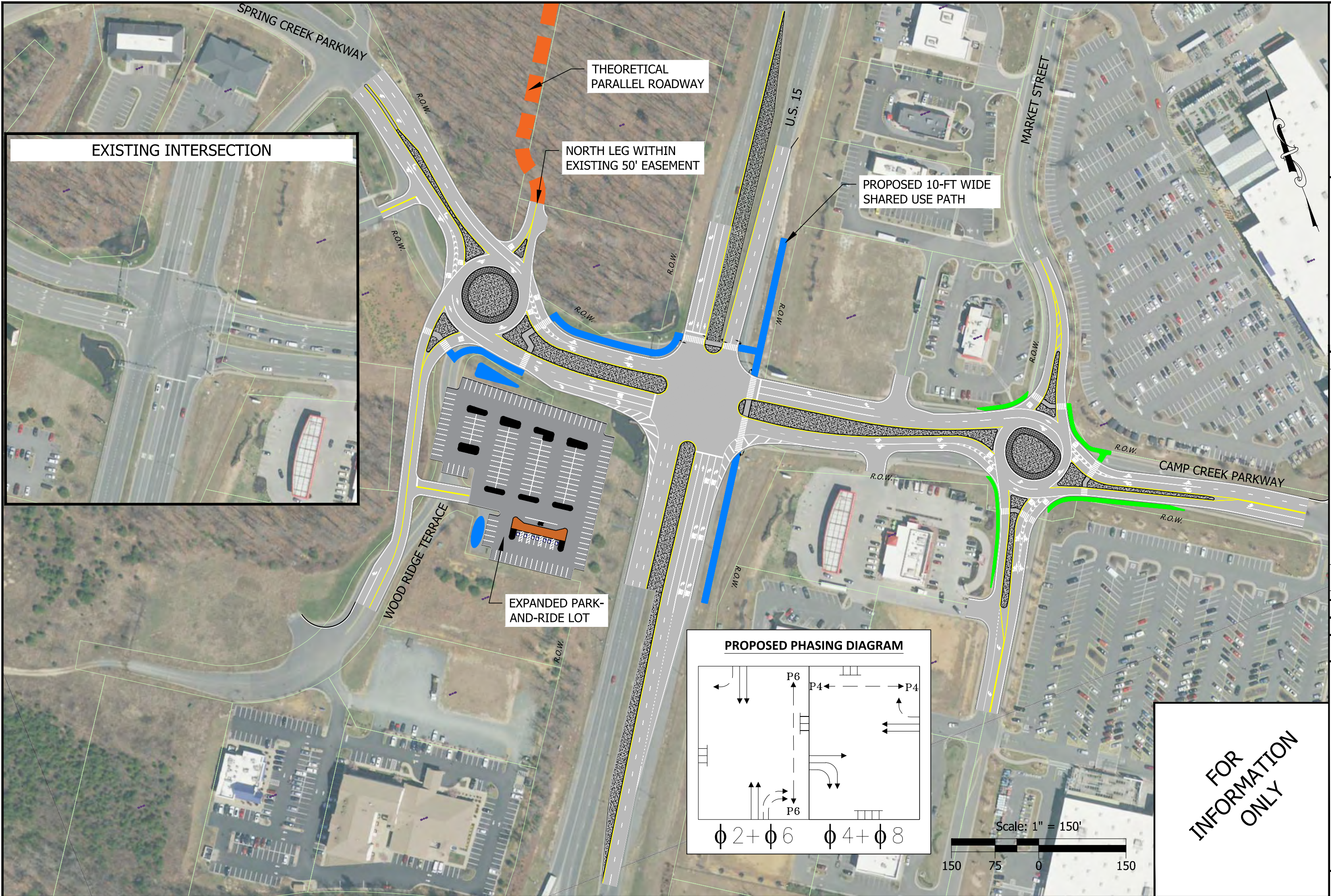
Table 12 Evaluation of Alternatives - US 15 and The Shoppes at Spring Creek/Spring Creek Business Park

Scenario	Improve Safety and Comfort	Manage Congestion	Manage Access	Provide Transit Options	Order of Magnitude of Costs
No-Build	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	N/A
Roundabout at Spring Creek Parkway/Wood Ridge Terrace	★★★★☆	★★★★☆	★★★★☆	★★★★☆	\$4,643,500
Roundabout at Camp Creek Parkway/Market Street	★★★★☆	★★★★★	★★★★☆	★★☆☆☆	\$4,492,000
Roundabout at US 15/Freedom Trail	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆	\$4,541,900
Improvements at US 15/Spring Creek Parkway/Camp Creek Parkway	★★☆☆☆	★★★★★	★★★★☆	★★★★☆	\$1,324,700
Bowtie Alternative	★★★★☆	★★★★★	★★★★☆	★★★★☆	\$8,493,900 ¹
Hybrid Alternative	★★★★☆	★★★★☆	★★★★☆	★★★★☆	\$7,200,000 ²

¹ Cost is inclusive of the roundabout at Spring Creek Parkway/Wood Ridge Terrace, the intersection improvements at US 15/Spring Creek Parkway/Camp Creek Parkway, and the roundabout at US 15/Freedom Trail. As shown, there are cost savings associated with constructing all three improvements at the same time.

² Cost is inclusive of the roundabout at Spring Creek Parkway/Wood Ridge Terrace, the intersection improvements at US 15/Spring Creek Parkway/Camp Creek Parkway, and the roundabout at US 15/Freedom Trail. As shown, there are cost savings associated with constructing all three improvements at the same time.

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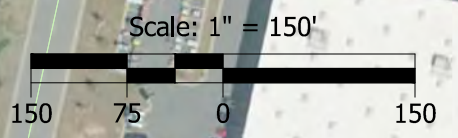
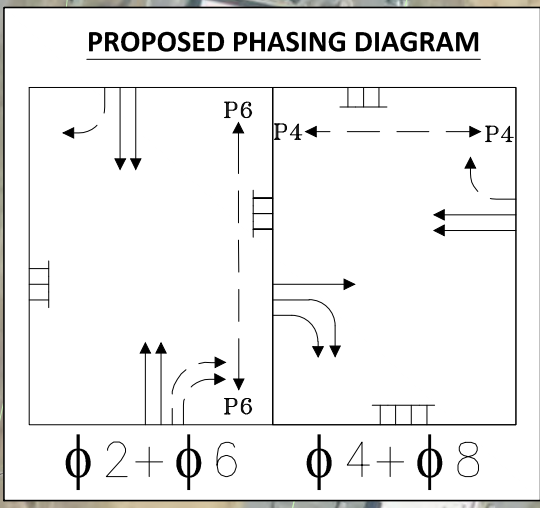


THEORETICAL
PARALLEL ROADWAY

NORTH LEG WITHIN
EXISTING 50' EASEMENT

PROPOSED 10-FT WIDE
SHARED USE PATH

EXPANDED PARK-
AND-RIDE LOT



**FOR
INFORMATION
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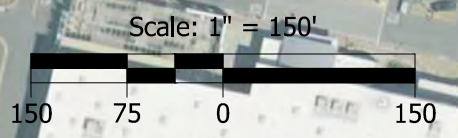
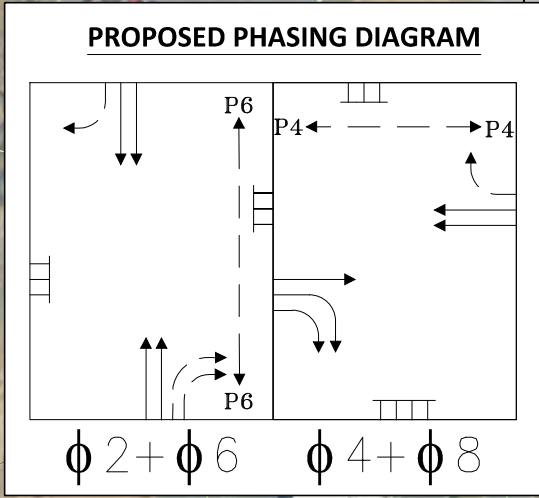
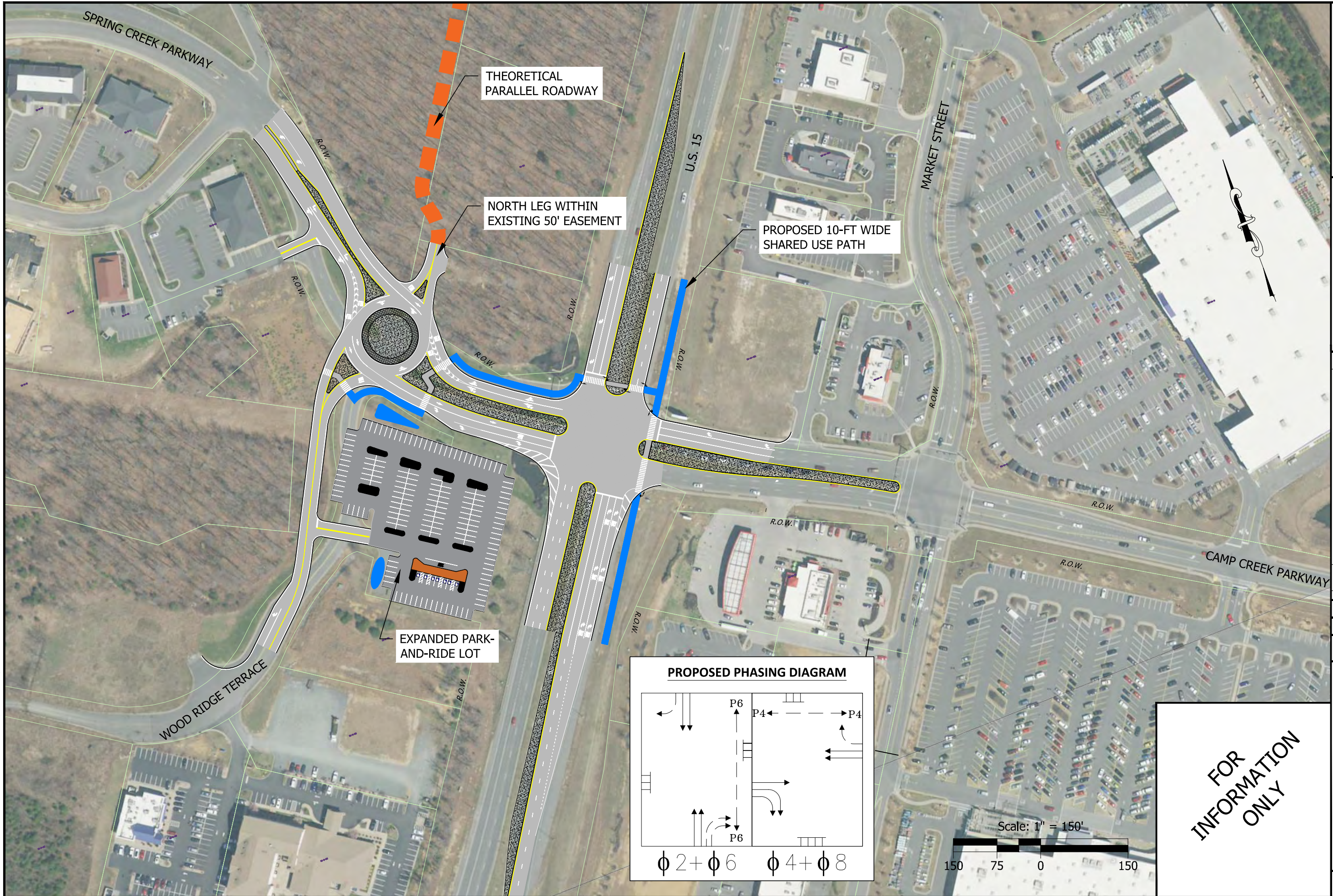
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Submission Date:
08/15/2022
 Drawn: BK Designed: BK Checked: KJH
 PROJECT NO.
21605.034

Zion Crossroads Small Area
 Study: Louisa County
 Spring Creek Pkwy/Camp
 Creek Pkwy: Bowtie

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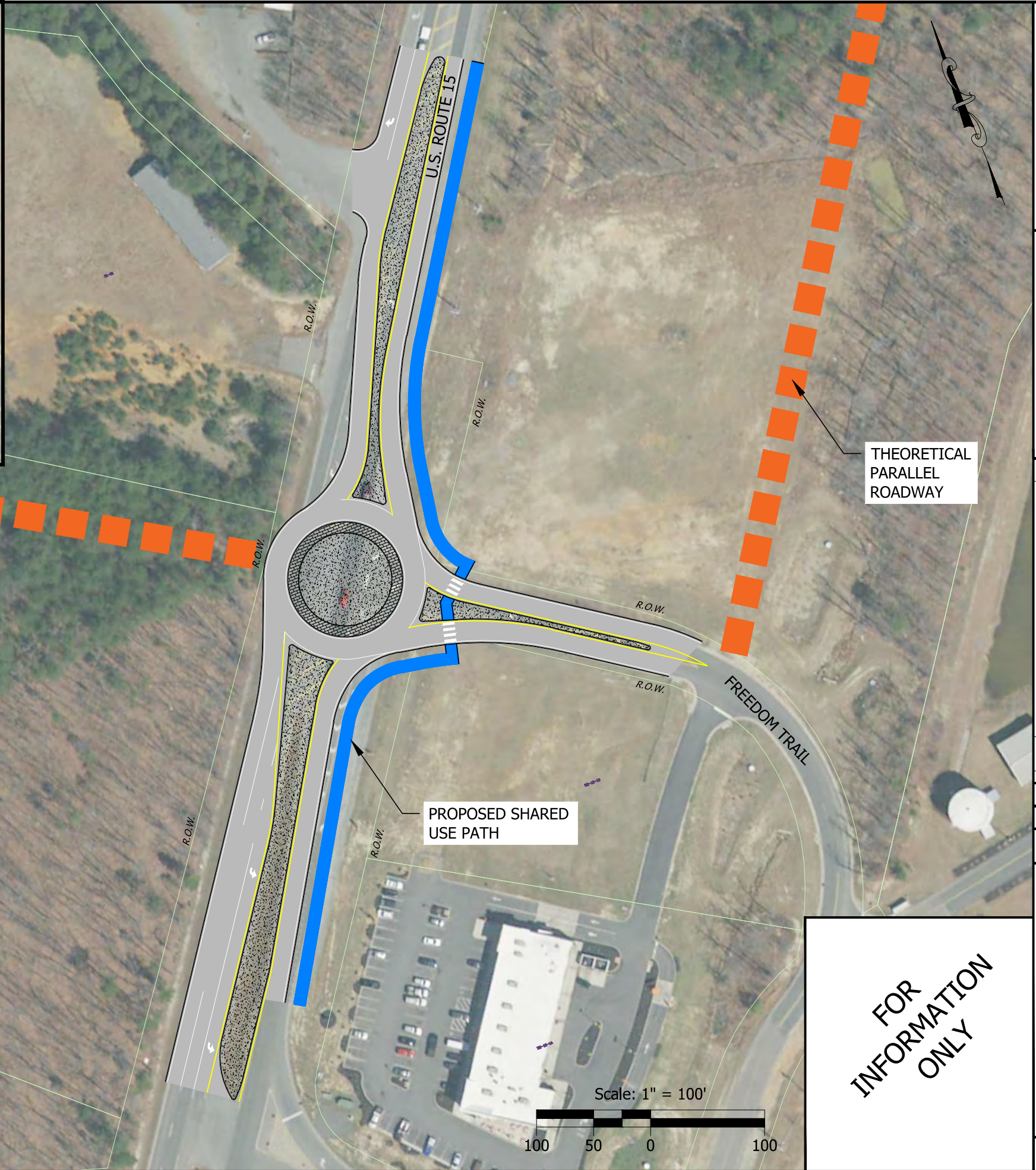
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Zion Crossroads Small Area
 Study: Louisa County
 Spring Creek Pkwy/Camp
 Creek Pkwy: Hybrid

EXISTING INTERSECTION



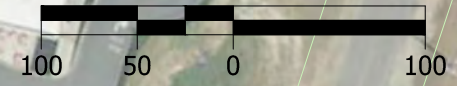
THEORETICAL PARALLEL ROADWAY

THEORETICAL PARALLEL ROADWAY

PROPOSED SHARED USE PATH

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Scale: 1" = 100'



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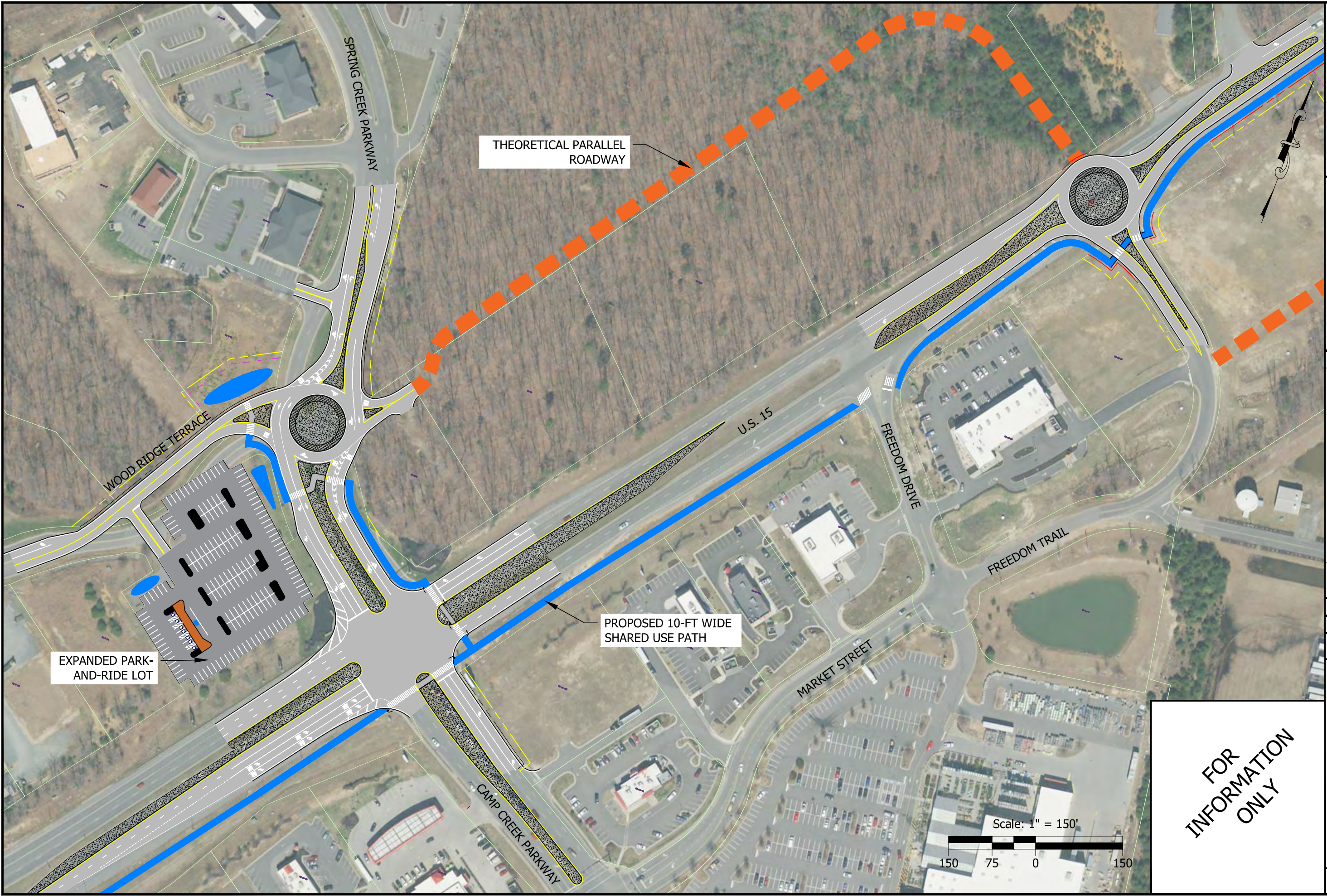
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Zion Crossroads Small Area Study: Louisa County
 Freedom Trail Roundabout for Hybrid Concept

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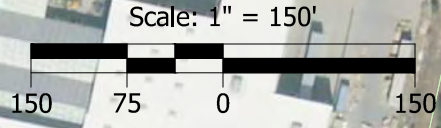
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PROJECT NO. 21605.034

Zion Crossroads Small Area Study: Louisa County
Freedom Trail to Spring Creek Parkway: Hybrid

SHEET NO. 28

FOR INFORMATION ONLY



US 15 and I-64 DDI

NO-BUILD CONDITIONS

The Diverging Diamond Interchange (DDI) along US 15 at I-64 opened in 2014. Since installation, the DDI has provided regional access into the Zion Crossroads area. The northern terminal of the DDI connects with I-64 westbound traffic and the southern terminal connects with I-64 eastbound traffic.

OPERATIONS

If no additional improvements were to be made by 2040, both nodes of the US 15 and I-64 DDI are anticipated to be below capacity. The northern terminal is expected to operate at LOS C in the weekday a.m. peak hour and LOS D in the weekday p.m. and Saturday midday peak hour. The southern node with I-64 eastbound traffic is anticipated to operate at LOS B in the weekday a.m. peak hour and LOS C in the weekday p.m. and Saturday midday peak hours. Although these intersections are expected to operate with excess capacity, the public expressed concern about the signal heads' visibility and signal timing progression of the DDI.

SAFETY PERFORMANCE

The intersection of US 15 and the northern terminal of the I-64 DDI was identified as a priority intersection from a safety perspective. It was among those that experienced the highest frequency of crashes and highest EPDO score. During the five years of data analyzed, 20 crashes occurred at this intersection. This included one fatality, two visible injuries (Level B), and 18 property-damage crashes. The fatality resulted from a southbound motorcyclist losing control as it approached this intersection. Rear-end crashes

were the most common crash type at this intersection, accounting for 13 of the 20 crashes. This included eight in the northbound direction, one in the southbound direction and four in the westbound direction. Three fixed object/run-off-road crashes also occurred at this intersection. All three referenced challenges navigating on or off the ramps. In addition, one angle and two same direction sideswipe crashes occurred.

Ten crashes occurred at the southern terminal of the I-64 DDI, resulting in two non-visible crashes and eight property-damage only crashes. Of the ten crashes, four were rear-end crashes (three in the northbound direction and one in the southbound direction). In addition, four were fixed object/run-off-road crashes by eastbound vehicles.

**“A pedestrian bridge would improve pedestrian access and safety crossing I-64 by accommodating controlled crosswalks at the interchange ramps.”
- anonymous.**

ALTERNATIVES ANALYSIS

As the recent investments in the DDI are anticipated to continue to result in operational and safety benefits at the I-64 interchange, potential improvements were targeted at improving the current interchange form. The crash analysis indicated a propensity for rear-end crashes, which may initially have been due to the unique nature of the crossover when it first opened. However, the public outreach indicated drivers on US 15 often get stopped at both DDI ramp signals, which may violate driver expectancy resulting in drivers stopping

unexpectedly. To help alleviate this condition, the study team evaluated changes to the existing coordination pattern between the two traffic signals at the DDI to help maintain progression on US 15 and reduce the potential for rear-end crashes.

The public outreach also indicated a clear desire for pedestrian and bicycle facilities across the DDI. The study team evaluated the potential for

adding signalized pedestrian crossings across the existing bridge structures, as well as creating a separate pedestrian bridge. **Table 13** illustrates the anticipated operations of the DDI ramp terminals after adding in pedestrian signals and adjusting the coordination pattern to improve progression. As shown, the addition of pedestrian crossings is not anticipated to noticeably impact operations at the DDI.

Table 13 Level of Service of Potential Improvements – US 15/I-64 DDI

Northern I-64 DDI Terminal			
Scenario	AM	PM	SAT
Existing	C	C	C
2040 No-Build	C	D	D
Pedestrian Accommodations	C	D	D
Southern I-64 DDI Terminal			
Scenario	AM	PM	SAT
Existing	C	C	B
2040 No-Build	B	C	C
Pedestrian Accommodations	B	C	C

RECOMMENDED ROADWAY IMPROVEMENTS

As a result of the alternatives analysis and feedback from the public and Stakeholder Group, adding pedestrian crossings along the outside shoulder of the existing bridge structure would be the most prudent means of improvement pedestrian and bicycle access across the DDI. The shoulder would either be raised up and protected by curbing and/or protected by a concrete barrier. Structural analysis of the bridge will need to be completed to ensure it can accommodate the additional weight of the barrier or curbing installed. Funding for a separate pedestrian bridge may be difficult to secure given the high costs.

The study team also recommends changes to the coordination pattern between the two DDI ramp terminal intersections to improve progression of mainline vehicles along US 15.

The pole-mounted signal heads on the southbound approach to the northern DDI ramp terminal can also be adjusted to improve signal visibility and reduce the potential for rear-end crashes. **Figure 29** illustrates the recommended improvements to the I-64/US 15 DDI interchange.

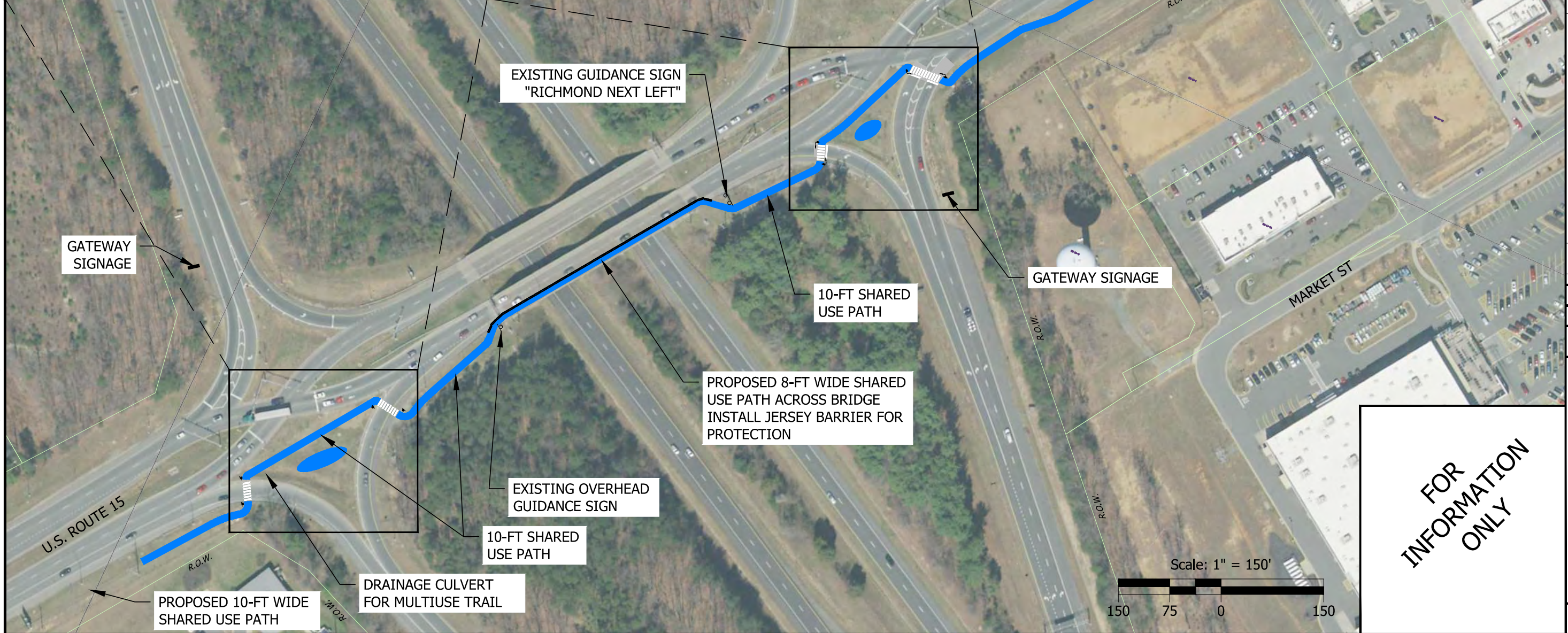
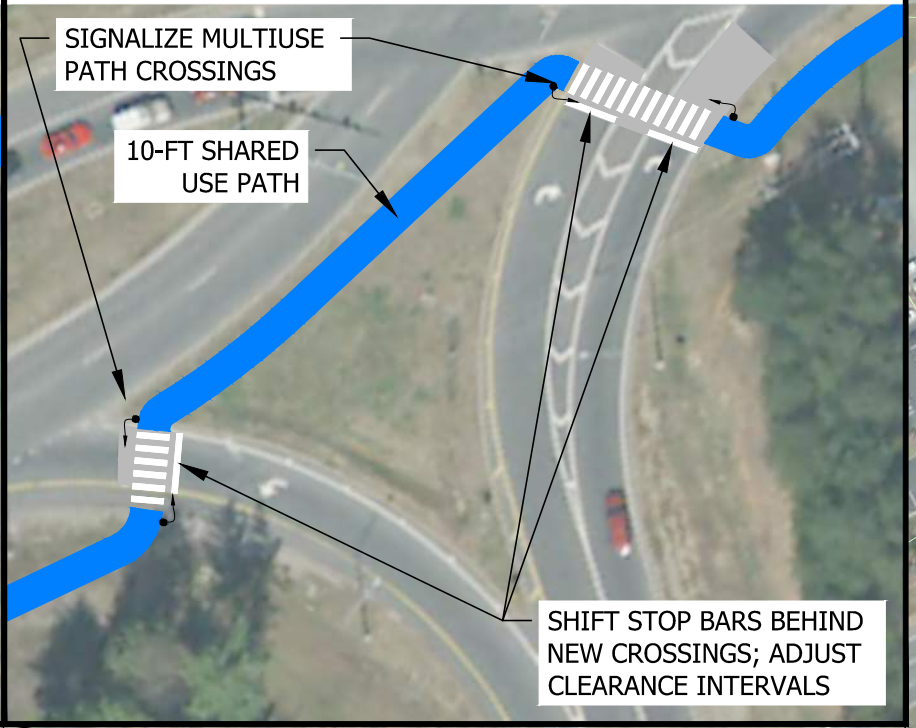
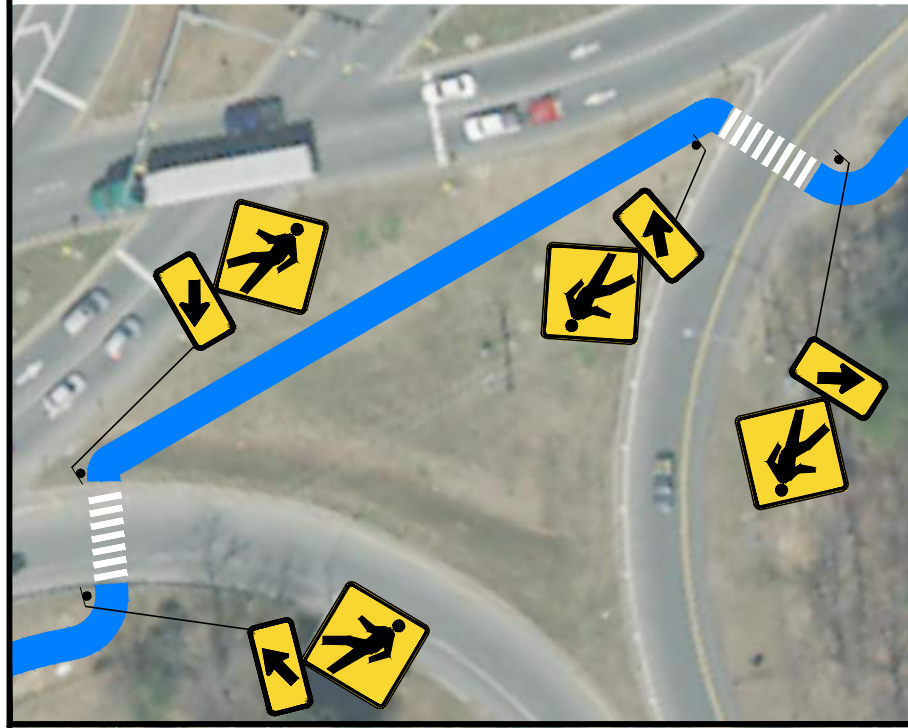
Appendix C contains a more detailed plan sheet illustrating anticipated easement and right-of-way acquisitions to accommodate the design. **Table 14** summarizes the alternatives analysis results and planning-level estimates of probable cost at the ramp terminals. **Appendix D** contains a more detailed breakdown of the cost estimate.

Table 14 Evaluation of Alternatives – US 15/I-64 DDI

Scenario	Improve Safety and Comfort	Manage Congestion	Manage Access	Provide Transit Options	Order of Magnitude of Costs
No-Build	★★★★☆☆	★★★★☆☆	★★★★☆☆	☆☆☆☆☆☆	N/A
Pedestrian Accommodations	★★★★☆☆	★★★★☆☆	★★★★☆☆	☆☆☆☆☆☆	\$1,750,400

SOUTH TRAIL CROSSINGS

NORTH TRAIL CROSSINGS



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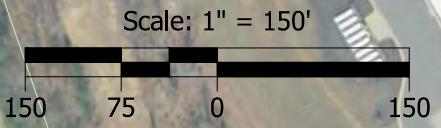
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Zion Crossroads Small Area Study: Louisa County
 I-64 Interchange Improvements

SHEET NO. 29

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US 15 and Crossing Pointe Drive

NO-BUILD CONDITIONS

The intersection of US 15 and Crossing Pointe Drive can be confusing for motorists as vehicles enter and exit the wide median opening for the gas stations, restaurants, and VDOT facility. Through public engagement responses and field visit observations, many drivers noted that they do not feel safe turning into or out of the driveways. This intersection is also expected to provide access to a large mixed-use development on the east side of US 15 by 2040. The intersection between Crossing Pointe Drive and US 15 is among the study intersections with the greatest potential for safety and operational improvements.

OPERATIONS

The large mixed-use development at Crossing Pointe Drive is expected to have a tremendous impact on the operational performance of this intersection. It is expected to operate over capacity and LOS F in the weekday a.m., weekday p.m., and Saturday midday peak hours. In addition, forecast traffic volumes are expected to meet the three volume-based signal warrants for peak hour, four-hour, and eight-hour volumes.

SAFETY PERFORMANCE

This intersection experienced 12 crashes during the five years of data evaluation. Of these 12 crashes, angle crashes (eight crashes) were the most common as vehicles cited issues finding gaps from the driveways. One rear-end crash, one fixed object crash and two same direction sideswipe crashes accounted for the remaining crashes. Only one visible (Level B) injury crash occurred at this intersection.

“Support economic growth by providing good roads that can handle the growth rather than wait until the growth is here and you cannot fix the problems.” - anonymous.

ALTERNATIVES ANALYSIS

The existing two-way, stop-controlled intersection is not anticipated to have the capacity to serve the future demand at this intersection, particularly with the addition of trips related to the Crossing Pointe development. Additionally, the wide median opening leads to numerous conflict points and driver confusion. As such, potential alternative intersection forms to the intersection were evaluated using VJuST, **Table 15** summarizes the results of the VJuST analysis for key alternatives.

The proximity of the US 15/Crossing Pointe Drive intersection to the DDI to the north limits the potential for alternatives requiring U-turns movements along US 15, as there is not sufficient spacing between the DDI and Crossing Pointe Drive to adequately accommodate a new median opening. Any alternatives requiring northbound U-turns (e.g., an RCUT) for minor street movements would need to be paired with an alternative means of accessing US 15 to avoid sending a substantial number of trips through the DDI unnecessarily to Spring Creek Parkway/Camp Creek Parkway to make a U-turn maneuver. One example of this additional connection is shown in **Figure 19**, where a new internal roadway would provide access from the Crossing Pointe development to a new median opening to the south of Crossing Pointe Drive.

One means of providing direct access for all movements would be to install a traffic signal at

this location. While operationally viable (as shown in **Table 16**), a traffic signal is anticipated present queuing concerns during the peak hours. The initial operational models illustrated the 95th percentile queues would be anticipated to spill back to the southern DDI ramp terminal. This would negatively impact the operations at the DDI.

Alternatively, a roundabout would be anticipated to both regulate access to the intersection, while also minimizing delay for all movements. As shown, a multi-lane roundabout is anticipated to operate at LOS A during each of the peak analysis periods. Southbound queues on US 15 are not anticipated to spill back to the southern DDI ramp terminal.

Table 15 VJuST Results - US 15/Crossing Pointe Drive

US 15 and Crossing Pointe Drive					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.60	0.56	0.69
Roundabout	N/A	8	1.34	1.27	1.48

Table 16 Level of Service of Potential Improvements - US 15/Crossing Pointe Drive

Scenario	AM	PM	SAT
Existing	D	E	F
2040 No-Build	F	F	F
Conventional Signal	B	C	C
Roundabout	A	A	A

RECOMMENDED ROADWAY IMPROVEMENTS

After input from the public and Stakeholder Group, the study team recommends implementing a roundabout to accommodate future demand from development along both sides of US 15, while also helping to maintain throughput on US 15 itself. A roundabout could be implemented in two ways depending on the timing of adjacent development build-out.

Figure 30 illustrates a conceptual design for a three-legged roundabout at the US 15/Crossing Pointe Drive intersection, allowing for direct

access to the Crossing Pointe development. This concept closes the existing median opening to the south, but accommodates left-turn movements out of adjacent land uses like the McDonalds by allowing for U-turns within close proximity to the existing median opening. With this concept, additional internal roadway connections on the eastern side of US 15 could also provide direct access to the roundabout for land uses to the south.

Figure 31 illustrates a conceptual design for a roundabout at a location south of the existing median opening. The existing median opening would be converted to an RCUT to help reduce the number of conflict points at the intersection

and more clearly define access. Under this concept, the new internal roadway connections between Crossing Pointe Drive and the roundabout to the south become essential for maintaining sufficient access to the Crossing Pointe development. As such, this concept would only be feasible if the new roadway connections can be provided.

Appendix C contains a more detailed plan sheet illustrating anticipated easement and right-of-

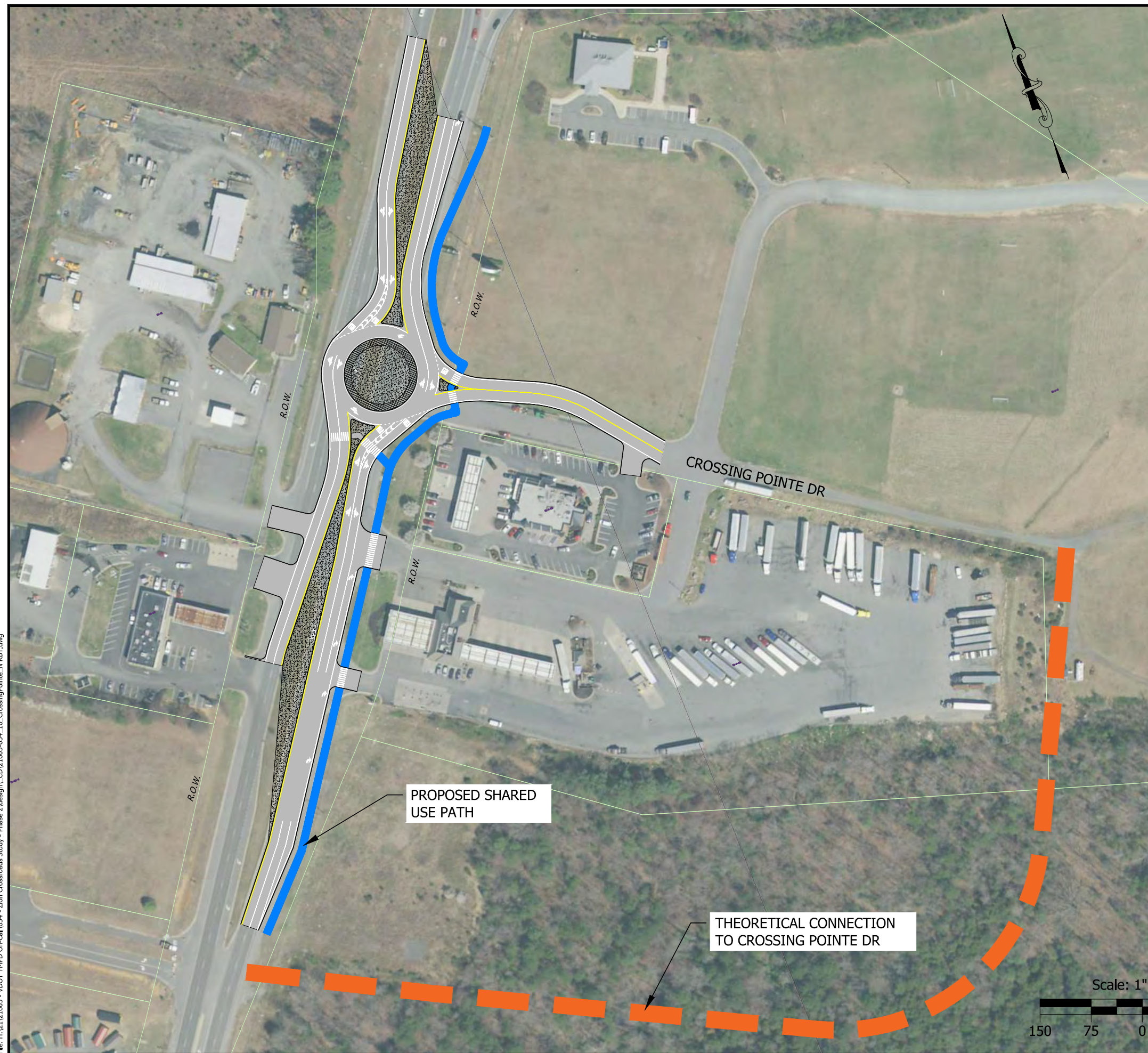
way acquisitions to accommodate the designs. Both of the proposed concepts are anticipated to reduce delay and reduce crash risk by more clearly managing access to adjacent land uses.

Table 17 summarizes the alternatives analysis results and planning-level estimates of probable cost for the options at the US 15 and Crossing Pointe Drive intersection. **Appendix D** contains a more detailed breakdown of the cost estimates.

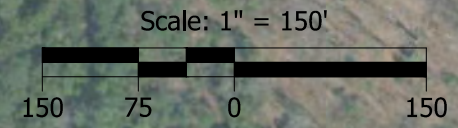
Table 17 Evaluation of Alternatives at Crossing Pointe Drive

Scenario	Improve Safety and Comfort	Manage Congestion	Manage Access	Provide Transit Options	Order of Magnitude of Costs
No-Build	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	N/A
Roundabout (Northern Location)	★★★★☆	★★★★☆	★★★★☆	★☆☆☆☆	\$5,214,900
RCUT & Roundabout (Southern Location)	★★★★☆	★★★★☆	★★★★☆	★☆☆☆☆	\$6,916,000

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EXISTING INTERSECTION



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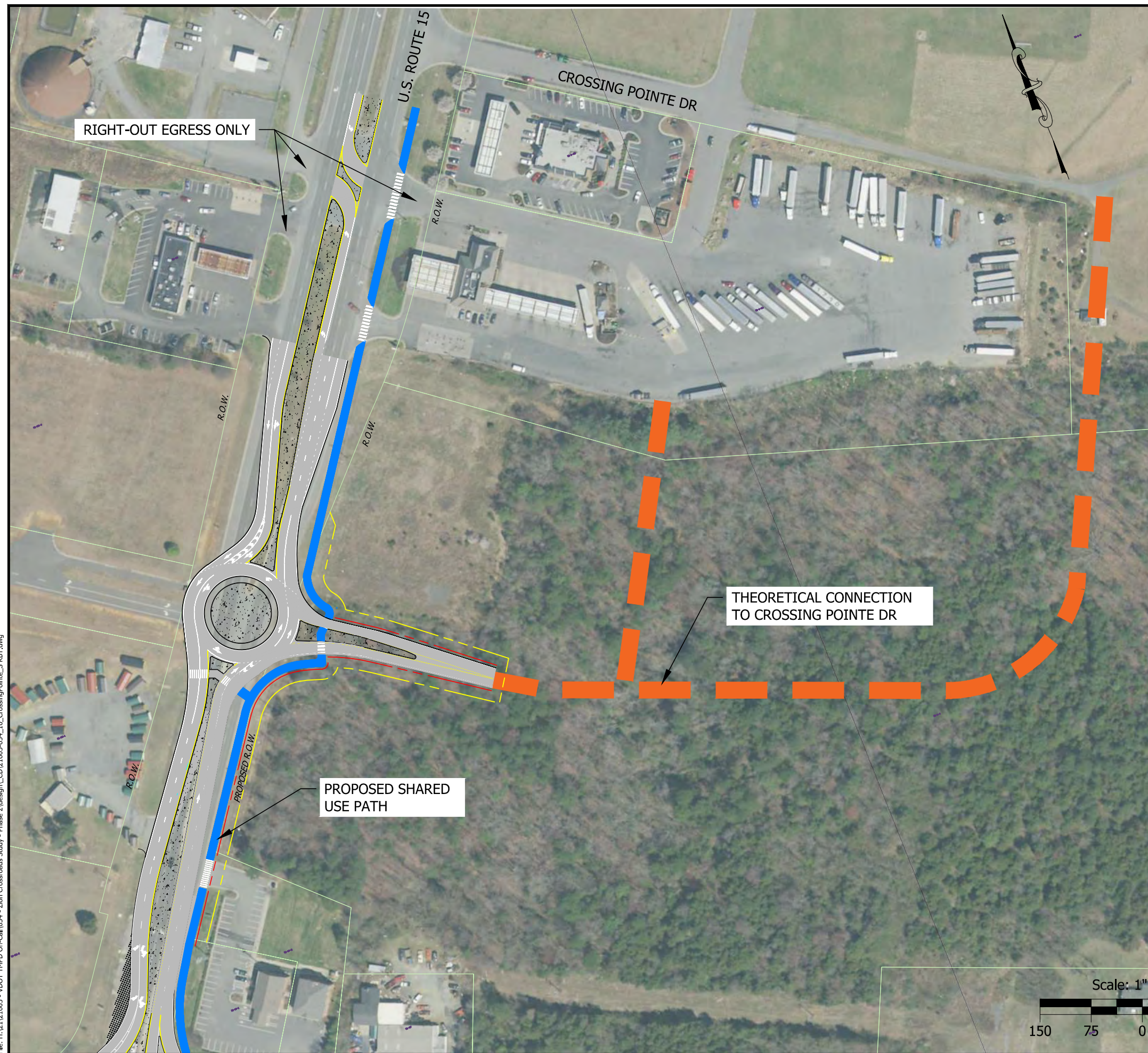
Submission Date:
 08/15/2022
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PROJECT NO.
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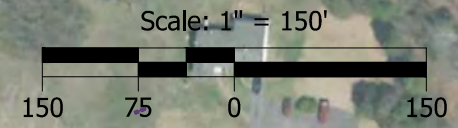
Zion Crossroads Small Area
 Study: Louisa County
 Crossing Pointe Drive
 Roundabout (Northern Loc.)

SHEET NO.
 30


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08/15/2022

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Zion Crossroads Small Area
Study: Louisa County

Crossing Pointe Drive
Right-Out & Roundabout

SHEET NO.
31

US 15 and US 250

NO-BUILD CONDITIONS

The intersection of US 15 and US 250 is a critical intersection between the two major corridors in the Zion Crossroads area. The primary concern at this location is safety as this intersection serves a mix of passenger and heavy vehicles. It also is a major transition point as the land use in Zion Crossroads transitions from rural to urban.

OPERATIONS

By 2040, this intersection is anticipated to be below capacity in all three time periods evaluated. It is expected to operate at a LOS C in the weekday a.m. and Saturday midday peak hour and at a LOS D in the weekday p.m. peak hour.

SAFETY PERFORMANCE

As mentioned, safety is the primary concern at the US 15 and US 250 intersection. It was among those that experienced the highest frequency of crashes and highest EPDO score. During the five years of data analyzed, 21 crashes were reported within 250 feet of the intersection. Of the 21 crashes one severe injury and seven visible injuries occurred. These resulted from ten rear-end crashes and ten angle crashes. Crash descriptions attributed these events to right-on-right maneuvers, distracted driving and issues judging gaps in the opposing traffic. As a result, it has been identified by VDOT as one with Potential Safety Improvements, or one that experienced a higher crash history than intersections with similar characteristics.

A traffic circle designed for current and future conditions would be both an aesthetic improvement and a tribute to the history of the area.”
- anonymous.

ALTERNATIVES ANALYSIS

Potential improvements to the US 15 and US 250 intersection were evaluated using VJuST, as shown in **Table 18**. Particular focus was placed on alternatives that would reduce the number of conflict points and help manage vehicle speeds to help reduce the potential for crashes at the intersection.

Early feedback from the Stakeholder Group, as well as the public, indicated a strong preference for a roundabout at this location. Not only would a roundabout reduce the potential for high-severity crashes, but it would also provide a gateway feel for the Zion Crossroads community. Stakeholders were also concerned about maintaining access for future development, which may include substantial heavy vehicle movements to- and from I-64. As such, the roundabout presented the greatest opportunity to maintain access, while not impeding existing or future development within proximity to the intersection. **Table 19** illustrates a roundabout is also anticipated to operation more efficiently than the existing signal in the design year 2040.

Table 18 VJuST Results - US 15/US 250

US 15 and US 250					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.71	0.61	0.62
Bowtie	EB-WB	24	0.87	0.97	0.91
Full Displaced Left Turn	N/A	40	0.61	0.48	0.50
Partial Displaced Left Turn	NB-SB	44	0.61	0.50	0.50
Roundabout	N/A	8	1.13	1.13	0.86

Table 19 Level of Service of Potential Improvements - US 15/US 250

Operational Improvement(s)	AM	PM	SAT
Existing	C	C	C
2040 No-Build	C	D	C
Roundabout	B	B	A

RECOMMENDED ROADWAY IMPROVEMENTS

After discussions with the Stakeholder Group and feedback from the public, it became clear a roundabout be considered as the improvement for the US 15/US 250 intersection. The roundabout is anticipated to create safer and more efficient operations for all approaches of the intersection. **Figure 32** illustrates the proposed roundabout, while **Figure 33** illustrates how the roundabout could operate in series with

the improvements at the adjacent US 15/Crossing Pointe Drive intersection. This concept was recently submitted for SMART SCALE funding by Louisa County.

Appendix C contains a more detailed plan sheet illustrating anticipated easement and right-of-way acquisitions to accommodate the design of a roundabout. **Table 20** summarizes the alternatives analysis results and planning-level estimates of probable cost. **Appendix D** contains a more detailed breakdown of the cost estimates.

Table 20 Evaluation of Alternatives at US 15/US 250

	Improve Safety and Comfort	Manage Congestion	Manage Access	Provide Transit Options	Order of Magnitude of Costs
No-Build	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★☆☆☆☆	N/A
Roundabout	★★★★☆	★★★★☆	★★★☆☆	★☆☆☆☆	\$5,604,400

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EXISTING INTERSECTION



PROPOSED SHARED USE PATH

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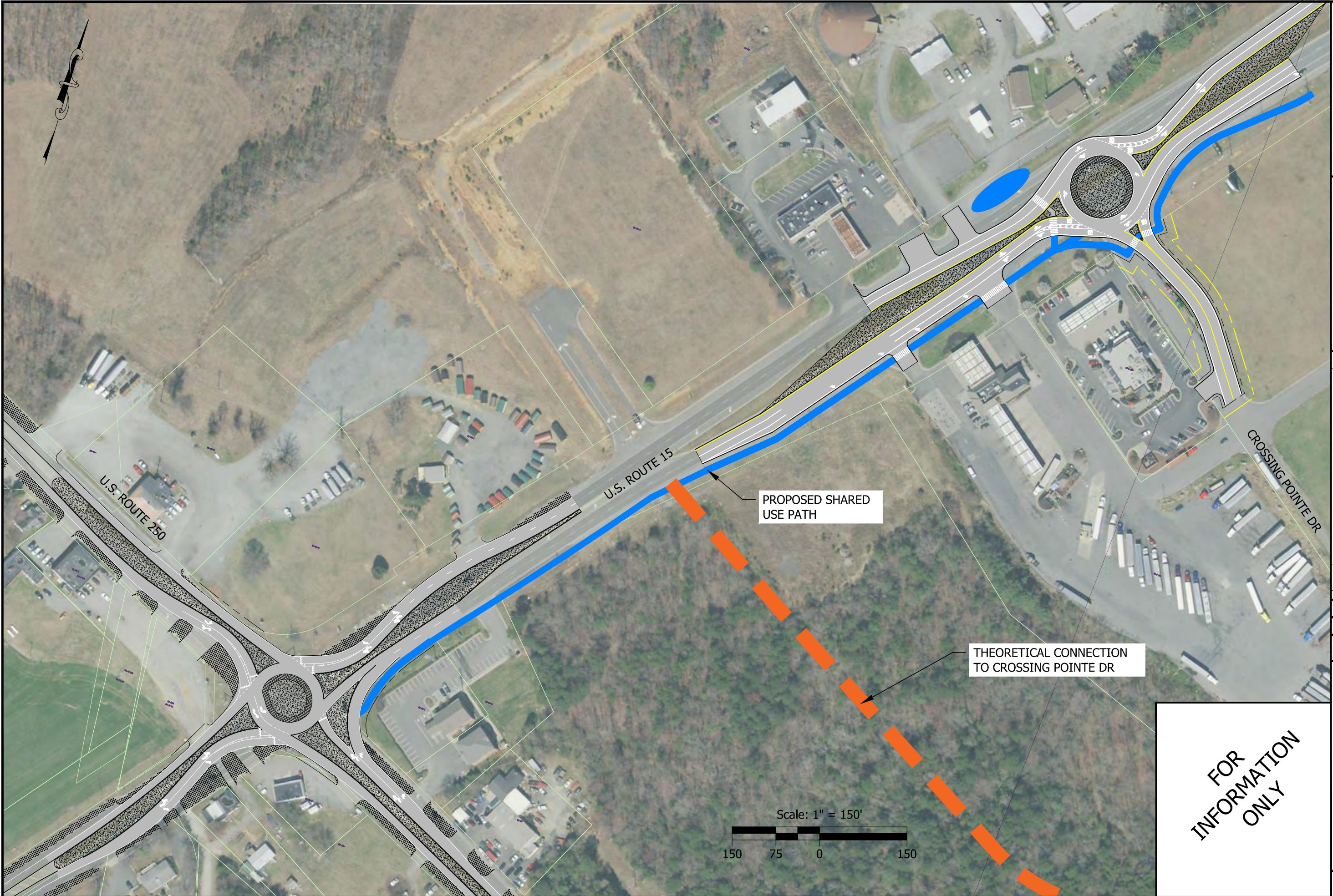
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 Zion Crossroads Small Area Study: Louisa/Fluvanna Counties
 US 15 and US 250 Roundabout
 SHEET NO. 32

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Zion Crossroads Small Area
 Study: Louisa/Fluvanna Counties
**CROSSING POINTE DR
 TO US 250**

SHEET NO. 33

US 15 and Starlite Park

NO-BUILD CONDITIONS

The southernmost intersection on US 15 identified in this study is at Starlite Park. This three-legged intersection currently provides access to commercial businesses on the west and a residential driveway on the east.

Operations

If no additional improvements were to be made, the Starlite Park in year 2040 is expected to operate at a LOS C in a.m. and p.m. peak hours and LOS B in the midday Saturday peak hour. Under these operational conditions, vehicles are expected to enter and exit US 15 with minimal operational delays.

Safety Performance

The study team also evaluated the crash history at the Starlite Park/US 15 intersection. During the five years of data analyzed, four crashes occurred with 250 feet of the intersection. This includes

two northbound rear-end crashes. In addition, there was one northbound fixed object/run-off-road crash that may have resulted from distracted driving. The fourth crash had a crash type of angle as the vehicle completed a left-turn from Starlite Park.

ALTERNATIVES ANALYSIS

The forecasted 2040 volumes at the Starlite Park were tested in the VDOT's VJuST tool, as shown in **Table 21**. **Table 22** summarizes the anticipated LOS of these improvements under 2040 conditions. Through this evaluation, it was determined that there would be very limited operational or safety improvements that would result from implementing an innovative intersection-form at this location. In addition, this intersection's 2040 forecasted volumes are not anticipated to meet any signal warrants.

Appendix B contains the Synchro operational worksheets for the existing conditions evaluated in greater detail.

Table 21 VJuST Results – US 15/Starlite Park

US 15 and Starlite Park					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.44	0.42	0.36
Continuous Green-T	EB	12*	0.43	0.42	0.35
Restricted Crossing U-Turn	NB-SB	20	0.45	0.43	0.36
Roundabout	N/A	8	0.51	0.48	0.41

Table 22 Level of Service of Potential Improvements - US 15/Starlite Park

Scenario	AM	PM	SAT
Existing	C	C	B
2040 No-Build	C	D	C
Northbound Left Turn Lane	C	C	C

RECOMMENDED ROADWAY IMPROVEMENTS

The study team does not recommend any roadway improvements at the US 15 and Starlite Park intersection due to the limited operational and safety benefits expected. However, state maintenance funds may be used to improve and maintain the pavement condition, particularly in the curb returns. Signage, such as “Side Road Intersection” (MUTCD 2-2L), can be used to warn drivers about the intersection.

US 250 and Route 631 (Troy Road)/Zion Station Court

NO-BUILD CONDITIONS

The easternmost intersection on US 250 identified in this study is at Route 631 (Troy Road)/Zion Station Court. This unsignalized four-legged intersection currently provides access to a school and commercial facilities on the north. To the south, Troy Road (631) connects US 250 and US 15 as a parallel route.

Fluvanna County has recently received VDOT funding to develop a roundabout at this intersection.

Operations

If no additional improvements were to be made, the US 250/Troy Road/Zion Station Court intersection is expected to operate at a LOS B in all three peak hours analyzed in design year 2040. Under these operational conditions, vehicles are expected to enter and exit US 250 with minimal operational delays.

Safety Performance

The study team also evaluated the crash history at the US 250/Troy Road/Zion Station Court

intersection. During the five years of data analyzed, six crashes occurred with 250 feet of the intersection. This included a fatality, one severe crash and four property damage only crashes. Although only six crashes occurred at this location during the evaluation period, the severity of crashes placed it among those with the highest EPDO scores in the study area.

Four of the six crashes were angle crashes that may have been attributed to drivers not yielding to the existing stop signs. The remaining two crashes involved crashes with deer.

ALTERNATIVES ANALYSIS

The forecasted 2040 volumes at the US 250/Troy Road/Zion Station Court intersection were tested in the VDOT's VJuST tool, as shown in **Table 23**. Given the impending construction of a roundabout at the intersection, the operations of a single-lane roundabout were evaluated further to determine the ability of the roundabout to serve this intersection in the 2040 design year. **Table 24** summarizes the anticipated LOS of these improvements under 2040 conditions, which illustrates a roundabout is anticipated to operate at LOS A during all analysis periods.

Table 23 VJuST Results – US 250/Route 631 (Troy Road)/Zion Station Court

US 250 and Troy Road (Route 631)/Zion Station Court					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.19	0.25	0.19
Continuous Green-T	N/A	12*	0.04	0.02	0.02
Median U-Turn	EB-WB	20	0.25	0.25	0.24
Partial Median U-Turn	EB-WB	28	0.20	0.24	0.20
Restricted Crossing U-Turn	EB-WB	20	0.21	0.25	0.20
Roundabout	N/A	8	0.21	0.27	0.20
Two-Way Stop Control	N/A	48	0.14	0.18	0.13

Table 24 Level of Service of Potential Improvements - US 250/Route 631 (Troy Road)/Zion Station Court

Scenario	AM	PM	SAT
Existing	B	B	B
2040 No-Build	B	B	B
Roundabout	A	A	A

RECOMMENDED ROADWAY IMPROVEMENTS

Given the County’s intent to construct a roundabout at this intersection, no additional improvements are recommended. The development of a roundabout is anticipated to address any operational and safety concerns that may arise by the 2040 design year.

US 250 and Route 689 (Hunters Branch Road)/Edgecomb Road

NO-BUILD CONDITIONS

The intersection between US 250 and Route 689 (Hunters Branch Road)/Edgecomb Road provides access to several commercial facilities. In addition, Edgecomb Road provides a connection to Route 615 (Zion Road) to the north.

Operations

If no additional improvements were to be made, the US 250/Hunters Branch Road/Edgecomb Road intersection is expected to operate at a LOS B during the weekday a.m., weekday p.m., and Saturday midday peak hours in the design year 2040. Under these operational conditions, vehicles are expected to enter and exit US 250 with minimal operational delays.

Safety Performance

The study team also evaluated the crash history at the US 250/Hunters Branch Road/Edgecomb

Road intersection. During the five years of data analyzed, no crashes occurred with 250 feet of the intersection.

ALTERNATIVES ANALYSIS

The forecasted 2040 volumes at the US 250/Hunters Branch Road/Edgecomb Road intersection were tested in the VDOT's VJuST tool, as shown in **Table 25**. **Table 26** summarizes the anticipated LOS of these improvements under 2040 conditions. Through this evaluation, it was determined that there would be very limited operational or safety improvements that would result from implementing an innovative intersection-form at this location. In addition, this intersection's 2040 forecasted volumes are not anticipated to meet any signal warrants.

Appendix B contains the Synchro operational worksheets for the existing conditions evaluated in greater detail.

Table 25 VJuST Results – US 250/Route 689 (Hunters Branch Road)/Edgecomb Road

Hunters Branch Road (Route 689)/Edgecomb Road					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.20	0.24	0.19
Median U-Turn	EB-WB	20	0.25	0.25	0.24
Partial Displaced Left Turn	EB-WB	44	0.20	0.24	0.18
Partial Median U-Turn	EB-WB	28	0.24	0.25	0.20
Restricted Crossing U-Turn	EB-WB	20	0.23	0.25	0.20
Roundabout	N/A	8	0.26	0.26	0.20
Two-Way Stop Control	N/A	48	0.14	0.19	0.13

Table 26 Level of Service of Potential Improvements - US 250/Route 689 (Hunters Branch Road)/Edgecomb Road

Scenario	AM	PM	SAT
Existing	B	B	B
2040 No-Build	B	B	B

RECOMMENDED ROADWAY IMPROVEMENTS

The study team does not recommend any roadway improvements at the US 250/Hunters Branch Road/Edgecomb Road intersection due to the limited operational and safety benefits expected. However, this intersection may benefit from local roadway maintenance ensuring that sight triangles are not blocked by trees and other landscaping.

US 250 and Better Living Drive

NO-BUILD CONDITIONS

US 250's intersection with Better Living Drive primarily serves commercial land uses in the Zion Crossroads area. This three-legged intersection currently also provides a local connection to Route 631 (Troy Road) to the south.

Operations

If no additional improvements were to be made, the Better Living Drive in year 2040 is expected to operate at a LOS B in a.m. and p.m. peak hours and LOS A in the Saturday midday peak hour. Under these operational conditions, vehicles are expected to enter and exit US 250 with minimal operational delays.

Safety Performance

The study team also evaluated the crash history at the US 250/Better Living Drive intersection.

During the five years of data analyzed, no crashes occurred with 250 feet of the intersection.

ALTERNATIVES ANALYSIS

The forecasted 2040 volumes at the US 250/Better Living Drive intersection were tested in the VDOT's VJuST tool, as shown in **Table 27**.

Table 28 summarizes the anticipated LOS of these improvements under 2040 conditions.

Through this evaluation, it was determined that there would be very limited operational or safety improvements that would result from implementing an innovative intersection-form at this location. In addition, this intersection's 2040 forecasted volumes are not anticipated to meet any signal warrants.

Appendix B contains the Synchro operational worksheets for the existing conditions evaluated in greater detail.

Table 27 VJuST Results – US 250/Better Living Drive

Better Living Drive					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.20	0.18	0.15
Continuous Green-T	NB	12*	0.19	0.18	0.15
Median U-Turn	EB-WB	20	0.26	0.21	0.19
Partial Median U-Turn	EB-WB	28	0.25	0.21	0.19
Quadrant Roadway, N-E	N/A	40	0.22	0.20	0.17
Quadrant Roadway, S-W	N/A	40	0.25	0.21	0.19
Restricted Crossing U-Turn	EB-WB	20	0.23	0.19	0.17
Roundabout	N/A	8	0.26	0.32	0.22
Two-Way Stop Control	N/A	48	0.16	0.12	0.14

Table 28 Level of Service of Potential Improvements - US 250/ Better Living Drive

Scenario	AM	PM	SAT
Existing	B	B	A
2040 No-Build	B	B	A

RECOMMENDED ROADWAY IMPROVEMENTS

The study team does not recommend any roadway improvements at the US 250/Better Living Drive intersection due to the limited operational and safety benefits expected. However, this intersection may benefit from local roadway maintenance ensuring that sight triangles are not blocked by trees and other landscaping.

Future consideration should be given to the realignment of Zion Road to the north to create a fourth leg to the intersection, as shown in **Figure 19**. This realignment would help reduce the risk for future crashes, particularly rear-end crashes, which are more typical at offset T-intersections relative to a conventional four-leg intersection.

US 250 and Route 615 (Zion Road)

NO-BUILD CONDITIONS

Zion Road is an important connection that connects US 250 at two locations west of US 15. The connection just east of the US 15/US 250 intersection is a three-legged intersection that has dense vegetation along the northside of the roadway. This intersection is influenced by the US 15/US 250 intersection as it is within 1000 feet of this nearby critical intersection.

Operations

If no additional improvements were to be made, the Route 615 (Zion Road) is expected to operate at a LOS B during the weekday a.m., weekday p.m., and Saturday midday peak hours under year 2040 traffic conditions. Under these operational conditions, vehicles are expected to enter and exit US 250 with minimal operational delays.

Safety Performance

The study team also evaluated the crash history at the US 250/Zion Road intersection. During the

five years of data analyzed, three crashes occurred with 250 feet of the intersection. This includes two angle crashes between southbound and westbound vehicles. The third crash was a head-on crash between southbound and northbound vehicles.

ALTERNATIVES ANALYSIS

The forecasted 2040 volumes at the US 250/Zion Road intersection were tested in the VDOT's VJuST tool, as shown in **Table 29**. **Table 30** summarizes the anticipated LOS of these improvements under 2040 conditions. Through this evaluation, it was determined that there would be very limited operational or safety improvements that would result from implementing an innovative intersection-form at this location. In addition, this intersection's 2040 forecasted volumes are not anticipated to meet any signal warrants.

Appendix B contains the Synchro operational worksheets for the existing conditions evaluated in greater detail.

Table 29 VJuST Results – US 250/Route 615 (Zion Road)

Zion Road					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.30	0.20	0.24
Continuous Green-T	SB	12*	0.19	0.28	0.19
Median U-Turn	EB-WB	20	0.31	0.24	0.25
Partial Displaced Left Turn	EB-WB	44	0.30	0.20	0.24
Partial Median U-Turn	EB-WB	28	0.30	0.24	0.24
Restricted Crossing U-Turn	EB-WB	20	0.31	0.24	0.25
Roundabout	N/A	8	0.29	0.35	0.25
Two-Way Stop Control	N/A	48	0.20	0.14	0.19

Table 30 Level of Service of Potential Improvements - US 250/Route 615 (Zion Road)

Scenario	AM	PM	SAT
Existing	B	B	B
2040 No-Build	B	B	B

RECOMMENDED ROADWAY IMPROVEMENTS

The study team does not recommend any roadway improvements at the US 250/Zion Road intersection due to the limited operational and safety benefits expected. However, this intersection may benefit from local roadway maintenance ensuring that sight triangles are not blocked by trees and other landscaping. In addition, the study team during the field visit identified that the existing striping was worn and could be updated.

Future consideration should be given to the realignment of Zion Road to create a fourth leg intersection with US 250 and Better Living Drive, as shown in **Figure 19**. This realignment would help reduce the risk for future crashes,

particularly rear-end crashes, which are more typical at offset T-intersections relative to a conventional four-leg intersection.

US 250 and Zion Park Road

NO-BUILD CONDITIONS

US 250's intersection with Zion Park Road is just east of the US 15/US 250 intersection. This intersection primarily serves commercial land uses that often have materials abutting the roadway. A mix of vehicles, including heavy vehicles, use this study intersection.

Operations

If no additional improvements were to be made, the Zion Park Road is expected to operate at a LOS C in weekday a.m., weekday p.m., and Saturday midday peak hours. Under these operational conditions, vehicles are expected to enter and exit US 250 with minimal operational delays.

Safety Performance

The study team also evaluated the crash history at the US 250/Zion Park Road intersection. During the five years of data analyzed, two crashes occurred with 250 feet of the intersection. One

crash occurred as westbound rear-end and the other occurred as a collision with a deer.

ALTERNATIVES ANALYSIS

The forecasted 2040 volumes at the US 250/Zion Park Road intersection were tested in the VDOT's VJuST tool, as shown in **Table 31**. **Table 32** summarizes the anticipated LOS of these improvements under 2040 conditions. The study team also evaluated if a westbound left turn lane would improve the operational delay for westbound vehicles turning left onto Zion Park Road. Through this evaluation, it was determined that there would be very limited operational or safety improvements that would result from implementing an innovative intersection-form at this location. In addition, this intersection's 2040 forecasted volumes are not anticipated to meet any signal warrants.

Appendix B contains the Synchro operational worksheets for the existing conditions evaluated in greater detail.

Table 31 VJuST Results – US 250/Zion Park Road

Zion Park Road					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A		0.42	0.38	0.26
Continuous Green-T	NB		0.39	0.38	0.26
Median U-Turn	EB-WB		0.47	0.40	0.30
Partial Displaced Left Turn	EB-WB		0.42	0.38	0.26
Partial Median U-Turn	EB-WB		0.43	0.38	0.27
Restricted Crossing U-Turn	EB-WB		0.43	0.40	0.27
Two-Way Stop Control	N/A		0.30	0.27	0.21

Table 32 Level of Service of Potential Improvements - US 250/Zion Park Road

Scenario	AM	PM	SAT
Existing	B	B	B
2040 No-Build	C	C	C
Westbound Left Turn Lane	C	C	C

RECOMMENDED ROADWAY IMPROVEMENTS

The study team does not recommend any roadway improvements at the US 250/Zion Park Road intersection due to the limited operational and safety benefits expected. However, this intersection may benefit from local roadway maintenance ensuring that sight triangles are not blocked by trees, landscaping, or commercial materials.

US 250 and Poindexter Road

NO-BUILD CONDITIONS

The easternmost intersection on US 250 is at Poindexter Road and US 250. Poindexter Road is expected to provide access to a new asphalt plant by year 2040. In addition, it is expected to connect to the Crossing Pointe development via a proposed roadway.

OPERATIONS

By 2040, the US 250/Poindexter Road intersection is expected to operate with minimal operational delay. It is forecasted to operate at LOS C in the a.m. peak hour and LOS B in the p.m. and Saturday midday peak hours.

SAFETY PERFORMANCE

Like the previous intersections, the study team evaluated the crash history at the US 250/Poindexter Road intersection. During the five years of data analyzed, three crashes occurred. Two of the three crashes were attributed to vehicles turning left onto Poindexter Road (one rear-end crash and one angle crash). The third crash resulted as a vehicle ran off the road to avoid an animal collision.

“Narrow roads, no shoulders or turn lanes.” – anonymous about US 250.

ALTERNATIVES ANALYSIS

As shown in **Table 33**, the study team used VJuST to evaluate innovative improvements at this intersection. Although many of these innovative configurations were shown to have yielded operational improvements, the study team

identified a few low-cost modifications to enhance the planned improvements for this area.

This includes a dedicated westbound right turn lane. Although this improvement is not anticipated to improve operations at the US 250/Poindexter Road intersection through a Synchro evaluation, it is expected to reduce the potential crashes as traffic volumes, including heavy vehicle volumes, are anticipated to grow by 2040. The Synchro results are shown in **Table 34** and the operational worksheets for this alternative can be found in **Appendix B**.

The dedicated westbound right turn lane was presented at the second public meeting. Most respondents had a favorable opinion of this alternative. Some respondents accredited their favorable opinion due to the simple and inexpensive nature of this improvement. Others also recommended that a left-turn lane be improved.

RECOMMENDED ROADWAY IMPROVEMENTS

As a result of the alternatives analysis and feedback from the public and Stakeholder Group, the implementation of a westbound right-turn lane is recommended. As shown in **Figure 34**, the proposed design would be considered have a low-cost and quick installation. It is anticipated to have minor reductions of delays at Poindexter Road. However, minor right-of-way acquisition would be required. A full-sized plan sheet of this improvement can be found in **Appendix C**. **Table 35** summarizes the alternatives analysis results and planning-level estimates of probable cost for the options at US 250/Poindexter intersection.

Appendix D contains a more detailed breakdown of the cost estimates.

Table 33 VJuST Results – US 250/Poindexter Road

Poindexter Road					
Type	Direction	Weighted Total Conflict Points	AM Peak V/C	PM Peak V/C	SAT Peak V/C
Conventional	N/A	48	0.36	0.28	0.24
Median U-Turn	EB-WB	20	0.37	0.37	0.29
Partial Displaced Left Turn	EB-WB	44	0.36	0.27	0.24
Partial Median U-Turn	EB-WB	28	0.36	0.36	0.27
Restricted Crossing U-Turn	EB-WB	20	0.37	0.33	0.24
Roundabout	N/A	8	0.35	0.37	0.27
Two-Way Stop Control	N/A	48	0.25	0.23	0.17

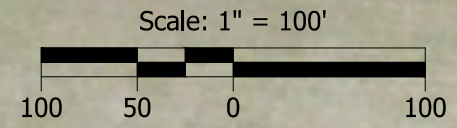
Table 34 Level of Service of Potential Improvements - US 250 and Poindexter Road

Scenario	AM	PM	SAT
Existing	B	B	B
2040 No-Build	C	B	B
Westbound Right Turn Lane	C	B	B

Table 35 Evaluation of Alternatives at US 250/Poindexter Road

	Improve Safety and Comfort	Manage Congestion	Manage Access	Provide Transit Options	Order of Magnitude of Costs
No-Build	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★☆☆☆☆	N/A
Right-Turn Lane	★★★★☆	★★★★☆	★★★★☆	★☆☆☆☆	\$1,321,000

EXISTING INTERSECTION



FOR
INFORMATION
ONLY



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#	DATE	REVISION	APP'D

Submission Date:
08/15/2022
 Drawn: EGB Designed: EGB Checked: KJH
 PROJECT NO.
21605.034

Zion Crossroads Small Area
 Study: Louisa County
 Poindexter Road
 Right-Turn Lanes

SHEET NO.
34

PRIORITY RECOMMENDATIONS

This study concluded with a package of recommendations that can be advanced with varying implementation timeframes. Although all alternatives presented to the public are viable, the study team proposes that some intersections are prioritized. The team rated these intersections by their potential for operational and safety improvements. Ratings described in the VDOT's Smart Scale application were used as a guide to this process.

Figure 35 shows each location by priority.

PRIORITY 1

The locations identified as “Priority 1” represent the greatest opportunity to achieve the project’s goals of improving safety, alleviating congestion, improving multimodal connections, and providing opportunities for transit. The forecast operations at the US 15/Spring Creek Parkway/Camp Creek Parkway illustrate the existing signalized intersection is not anticipated to be able to accommodate future growth (forecast to operate over capacity and/or at LOS F). With no opportunities to expand the existing intersection further, implementing the bowtie or hybrid alternatives will improve capacity and help improve the efficiency of the surrounding roadway network in a safer manner. To implement either alternative, the Stakeholder Group may need to implement improvements at individual intersections independently over time. However, there is cost efficiency in implementing either concept all at one time. The most appropriate path towards implementation will depend on the timing of various developments and availability of funding.

The study team also identified the proposed roundabout concept at US 15/US 250 as “Priority 1” given the existing crash frequency and severity

at this intersection. Implementing the proposed concept is anticipated to immediately help alleviate the potential for some of the higher severity crashes occurring at this intersection.

PRIORITY 2

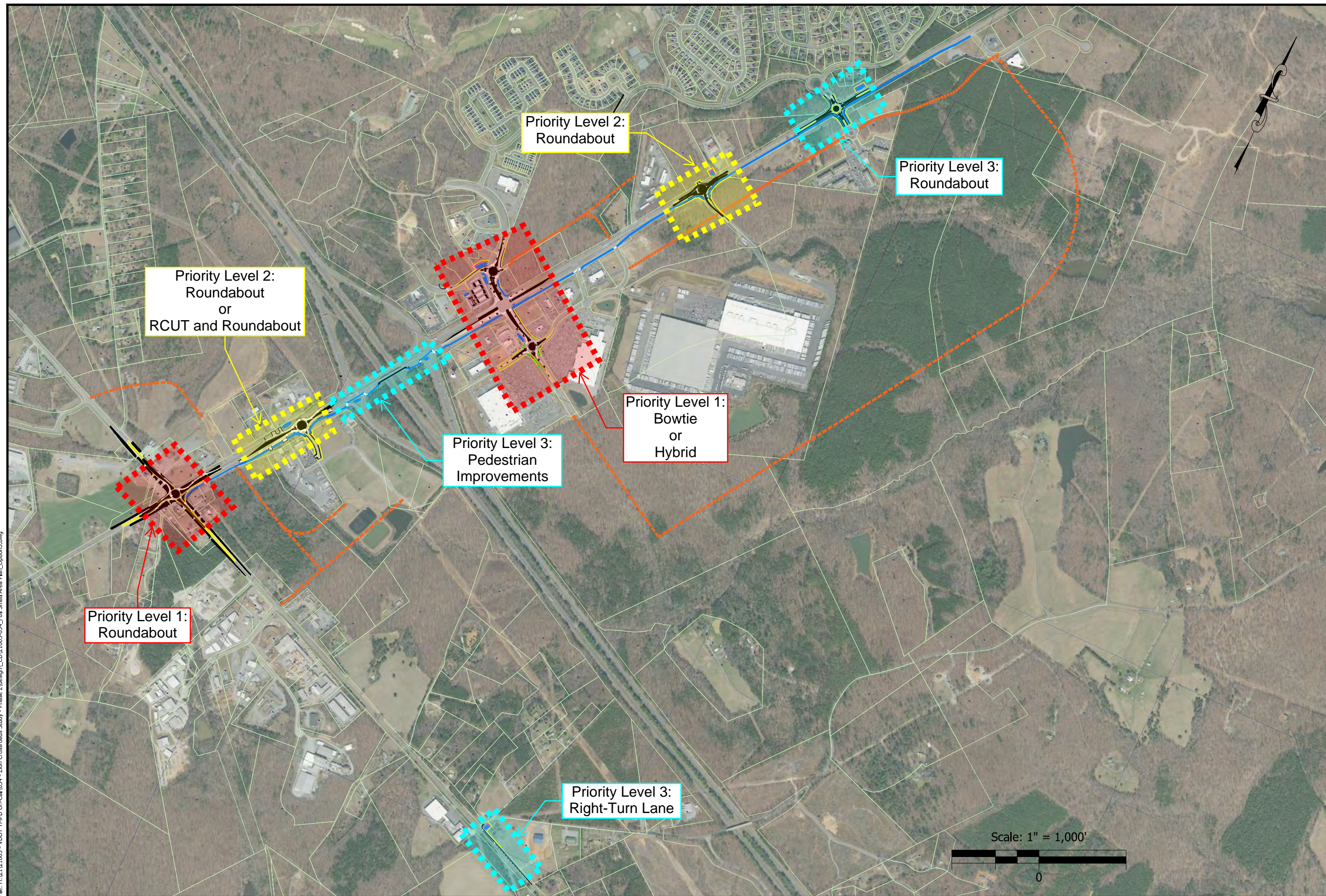
The locations identified as “Priority 2” are opportunities to address both safety and operational concerns anticipated by the 2040 design year. The US 15/Liberty Trail intersection is forecast to operate at LOS F, which will make it more difficult for heavy vehicles to safely exit the existing distribution center along Liberty Trail. Implementing the recommended improvements will provide easier access into and out of Liberty Trail, while also helping to maintain safer vehicular speeds along US 15.

The US 15/Crossing Pointe Drive intersection is forecast to operate at LOS F after build-out of the Crossing Pointe development. The study team encourages the local authorities to work with developers to have the recommended improvements, including the additional internal roadway connections, installed during the construction of the development.

PRIORITY 3

The locations identified as the lowest priority, or “Priority 3,” are the US 15/Sommerfield Drive, US 15/I-64 DDI, and US 250/Poindexter Road intersections. All three intersections are anticipated to operate below capacity with their current configuration through year 2040. The alternatives provided at these locations were primarily driven out of safety concerns. The study team encourages the local authorities, where applicable, to work with developers to have these installed during the construction of planned

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#	DATE	REVISION	APP'D

Submission Date: 08/15/2022
Drawn: AJB Designed: AJB Checked: KJH
PROJECT NO. 21605.034

Zion Crossroads Small Area Study
Corridor Improvement Prioritization

IMPLEMENTING RECOMMENDATIONS IN ZION CROSSROADS

The Zion Crossroads Small Area Study concluded with an evaluation of potential funding approaches and next steps.

Funding Sources

VDOT and the Zion Crossroads Small Area Study Stakeholder Group can pursue a variety of funding sources to realize the recommendations identified by this study.

SMART SCALE FUNDING

VDOT's [SMART SCALE program](#) scores and allocates funding to projects submitted by regional and local entities. TJPDC, Fluvanna County and Louisa County can work with VDOT to select and submit projects for SMART SCALE funding. Projects that improve the Corridors of Statewide Significance enhance the Regional Transportation Network, compliment an Urban Development Area, and address safety concerns are a top priority for funding.

TRANSPORTATION ALTERNATIVES FUNDING

VDOT administers Federal Transportation Alternatives (TA) funding for non-motorized transportation projects. Fluvanna County and Louisa County can submit projects for TA funding.

QUESTIONS THIS SECTION ANSWERS:

- What funding sources can be used to advance the study recommendations?
- Which agency partners will be involved in advancing each study recommendation?

KEY TAKEAWAYS FROM THIS SECTION:

- A mix of state and local funding sources can be used to fund the study recommendations.
- Agency partners who will be involved in submitting funding applications for study recommendations include VDOT, TJPDC, Fluvanna County, and Louisa County.
- Agency partners who can incorporate study recommendations into their funding programs and budgets include TJPDC, Fluvanna County and Louisa County.

LOCAL FUNDING APPROACHES

Regional and local agencies can incorporate study recommendations into their funding programs and budgets. TJPDC's Transportation Improvement Program and Fluvanna and Louisa County's Capital Improvement Programs are local funding programs that could incorporate study recommendations.

Fluvanna County, Louisa County and TJPDC can also work with private developers to incorporate some study recommendations into new development projects along US 15 and US 250 in Zion Crossroads.

BE A CHAMPION FOR ZION CROSSROADS!

The Zion Crossroads Small Area Study serves an important role in Fluvanna and Louisa Counties and its surrounding area. Major growth along this corridor is expected through several residential and commercial developments.

Through the Zion Crossroads Small Area Study recommendations, VDOT and its partners can advance the study's goals and achieve a safer, more livable, and complete street for Zion Crossroads' residents and workers.

Moving from vision to reality can be challenging. As community leaders, transportation professionals, or citizens of Fluvanna and Louisa Counties, we can all take steps to make these projects happen.

HOW YOU CAN HELP

- Executives/community leaders
 - Secure funds for preliminary engineering.
 - Support ongoing recommendations.
 - Contribute to short term recommendations.
- Agency staff
 - Incorporate study recommendations into your work.
 - Engage the community as you begin refining, designing, and implementing the short- and long-term recommendations.

QUESTION THIS SECTION ANSWERS:

- What specific actions can community leaders, agency staff, and citizens take to advance the recommendations of the Zion Crossroads Small Area Study?

KEY TAKEAWAYS FROM THIS SECTION:

- Realizing the recommendations of the Zion Crossroads Small Area Study will require support from all members of the Zion Crossroads Community, including community leaders, transportation professionals, and citizens.
- You can share the information in this section with others to explain how the Zion Crossroads Small Area Study recommendations meet its vision and goals.

- Citizens
 - Tell your elected officials that you want Zion Crossroads to become a complete street.
 - Follow VDOT at <https://www.virginiadot.org/projects/culpeper/zion-crossroads-study.asp> for updates.

WHAT CAN THE **ZION CROSSROADS SMALL AREA STUDY'S** RECOMMENDATIONS ACHIEVE?



Improve access management along the corridor by looking at consolidating access points or restrict particular movements



Improve safety



Improve efficiency by studying traffic operations at the 19 intersections and look at innovative intersection strategies or other upgrades



Increase opportunities for equitable access to all modes of travel

Appendix A.
Existing & No-Build Conditions
Report



Appendix B.
Operational Worksheets for
Alternatives



Appendix C.
Recommended Improvements



Appendix D.
Cost Estimates for
Recommended Improvements





Business Summary

Zion Crossroads Study Area
Area: 6.68 square miles

Appendix E

Prepared by Esri

Data for all businesses in area

Total Businesses:			159	
Total Employees:			1,812	
Total Residential Population:			1,823	
Employee/Residential Population Ratio (per 100 Residents)			99	
by SIC Codes	Businesses		Employees	
	Number	Percent	Number	Percent
Agriculture & Mining	6	3.8%	19	1.0%
Construction	15	9.4%	101	5.6%
Manufacturing	5	3.1%	98	5.4%
Transportation	3	1.9%	13	0.7%
Communication	1	0.6%	8	0.4%
Utility	2	1.3%	23	1.3%
Wholesale Trade	7	4.4%	90	5.0%
Retail Trade Summary	39	24.5%	777	42.9%
Home Improvement	2	1.3%	104	5.7%
General Merchandise Stores	1	0.6%	275	15.2%
Food Stores	8	5.0%	81	4.5%
Auto Dealers, Gas Stations, Auto Aftermarket	5	3.1%	40	2.2%
Apparel & Accessory Stores	0	0.0%	2	0.1%
Furniture & Home Furnishings	3	1.9%	11	0.6%
Eating & Drinking Places	13	8.2%	246	13.6%
Miscellaneous Retail	6	3.8%	16	0.9%
Finance, Insurance, Real Estate Summary	10	6.3%	38	2.1%
Banks, Savings & Lending Institutions	4	2.5%	14	0.8%
Securities Brokers	1	0.6%	1	0.1%
Insurance Carriers & Agents	1	0.6%	4	0.2%
Real Estate, Holding, Other Investment Offices	5	3.1%	19	1.0%
Services Summary	59	37.1%	538	29.7%
Hotels & Lodging	2	1.3%	33	1.8%
Automotive Services	9	5.7%	35	1.9%
Motion Pictures & Amusements	6	3.8%	141	7.8%
Health Services	12	7.5%	108	6.0%
Legal Services	1	0.6%	6	0.3%
Education Institutions & Libraries	2	1.3%	61	3.4%
Other Services	27	17.0%	154	8.5%
Government	6	3.8%	106	5.8%
Unclassified Establishments	5	3.1%	0	0.0%
Totals	159	100.0%	1,812	100.0%

Source: Copyright 2021 Data Axle, Inc. All rights reserved. Esri Total Residential Population forecasts for 2021.

Date Note: Data on the Business Summary report is calculated using **Esri's Data allocation method** which uses census block groups to allocate business summary data to custom areas.

June 15, 2022



Business Summary

Zion Crossroads Study Area
Area: 6.68 square miles

Prepared by Esri

by NAICS Codes	Businesses		Employees	
	Number	Percent	Number	Percent
Agriculture, Forestry, Fishing & Hunting	0	0.0%	0	0.0%
Mining	0	0.0%	0	0.0%
Utilities	0	0.0%	4	0.2%
Construction	16	10.1%	108	6.0%
Manufacturing	8	5.0%	109	6.0%
Wholesale Trade	6	3.8%	88	4.9%
Retail Trade	24	15.1%	513	28.3%
Motor Vehicle & Parts Dealers	3	1.9%	27	1.5%
Furniture & Home Furnishings Stores	1	0.6%	7	0.4%
Electronics & Appliance Stores	0	0.0%	0	0.0%
Bldg Material & Garden Equipment & Supplies Dealers	2	1.3%	104	5.7%
Food & Beverage Stores	6	3.8%	63	3.5%
Health & Personal Care Stores	2	1.3%	13	0.7%
Gasoline Stations	2	1.3%	14	0.8%
Clothing & Clothing Accessories Stores	0	0.0%	2	0.1%
Sport Goods, Hobby, Book, & Music Stores	2	1.3%	5	0.3%
General Merchandise Stores	1	0.6%	275	15.2%
Miscellaneous Store Retailers	1	0.6%	2	0.1%
Nonstore Retailers	3	1.9%	0	0.0%
Transportation & Warehousing	3	1.9%	11	0.6%
Information	3	1.9%	22	1.2%
Finance & Insurance	6	3.8%	19	1.0%
Central Bank/Credit Intermediation & Related Activities	4	2.5%	14	0.8%
Securities, Commodity Contracts & Other Financial	1	0.6%	1	0.1%
Insurance Carriers & Related Activities; Funds, Trusts &	1	0.6%	4	0.2%
Real Estate, Rental & Leasing	8	5.0%	18	1.0%
Professional, Scientific & Tech Services	11	6.9%	79	4.4%
Legal Services	1	0.6%	6	0.3%
Management of Companies & Enterprises	0	0.0%	0	0.0%
Administrative & Support & Waste Management & Remediation	8	5.0%	31	1.7%
Educational Services	2	1.3%	155	8.6%
Health Care & Social Assistance	13	8.2%	117	6.5%
Arts, Entertainment & Recreation	4	2.5%	57	3.1%
Accommodation & Food Services	16	10.1%	291	16.1%
Accommodation	2	1.3%	33	1.8%
Food Services & Drinking Places	14	8.8%	258	14.2%
Other Services (except Public Administration)	20	12.6%	83	4.6%
Automotive Repair & Maintenance	7	4.4%	30	1.7%
Public Administration	6	3.8%	107	5.9%
Unclassified Establishments	5	3.1%	0	0.0%
Total	159	100.0%	1,812	100.0%

Source: Copyright 2021 Data Axle, Inc. All rights reserved. Esri Total Residential Population forecasts for 2021.

Date Note: Data on the Business Summary report is calculated using **Esri's Data allocation method** which uses census block groups to allocate business summary data to custom areas.

June 15, 2022



Retail Demand Outlook

Zion Crossroads Study Area
Area: 6.68 square miles

Appendix F

Prepared by Esri

Top Tapestry Segments	Percent	Demographic Summary	2021	2026
Green Acres (6A)	99.0%	Population	1,823	2,025
The Great Outdoors (6C)	1.0%	Households	710	788
	0.0%	Families	541	598
	0.0%	Median Age	43.2	45.0
	0.0%	Median Household Income	\$85,863	\$89,566
		2021	2026	Projected
		Consumer Spending	Forecasted Demand	Spending Growth
Apparel and Services		\$1,492,343	\$1,770,360	\$278,017
Men's		\$276,920	\$328,510	\$51,590
Women's		\$537,476	\$637,610	\$100,134
Children's		\$214,799	\$254,810	\$40,011
Footwear		\$348,369	\$413,268	\$64,899
Watches & Jewelry		\$92,056	\$109,204	\$17,148
Apparel Products and Services (1)		\$36,799	\$43,655	\$6,856
Computer				
Computers and Hardware for Home Use		\$111,849	\$132,692	\$20,843
Portable Memory		\$3,219	\$3,819	\$600
Computer Software		\$6,370	\$7,557	\$1,187
Computer Accessories		\$13,375	\$15,866	\$2,491
Entertainment & Recreation		\$2,368,479	\$2,809,766	\$441,287
Fees and Admissions		\$563,345	\$668,293	\$104,948
Membership Fees for Clubs (2)		\$190,797	\$226,340	\$35,543
Fees for Participant Sports, excl. Trips		\$89,191	\$105,807	\$16,616
Tickets to Theatre/Operas/Concerts		\$62,577	\$74,235	\$11,658
Tickets to Movies		\$37,598	\$44,603	\$7,005
Tickets to Parks or Museums		\$23,766	\$28,195	\$4,429
Admission to Sporting Events, excl. Trips		\$54,155	\$64,242	\$10,087
Fees for Recreational Lessons		\$104,592	\$124,080	\$19,488
Dating Services		\$668	\$793	\$125
TV/Video/Audio		\$836,689	\$992,575	\$155,886
Cable and Satellite Television Services		\$579,546	\$687,529	\$107,983
Televisions		\$79,108	\$93,844	\$14,736
Satellite Dishes		\$1,135	\$1,346	\$211
VCRs, Video Cameras, and DVD Players		\$3,674	\$4,358	\$684
Miscellaneous Video Equipment		\$11,890	\$14,104	\$2,214
Video Cassettes and DVDs		\$5,349	\$6,346	\$997
Video Game Hardware/Accessories		\$18,786	\$22,286	\$3,500
Video Game Software		\$10,361	\$12,291	\$1,930
Rental/Streaming/Downloaded Video		\$49,029	\$58,163	\$9,134
Installation of Televisions		\$470	\$558	\$88
Audio (3)		\$75,670	\$89,768	\$14,098
Rental and Repair of TV/Radio/Sound Equipment		\$1,671	\$1,982	\$311
Pets		\$533,835	\$633,314	\$99,479
Toys/Games/Crafts/Hobbies (4)		\$83,246	\$98,754	\$15,508
Recreational Vehicles and Fees (5)		\$94,361	\$111,938	\$17,577
Sports/Recreation/Exercise Equipment (6)		\$127,849	\$151,673	\$23,824
Photo Equipment and Supplies (7)		\$33,083	\$39,246	\$6,163
Reading (8)		\$76,318	\$90,539	\$14,221
Catered Affairs (9)		\$19,887	\$23,593	\$3,706
Food		\$6,423,672	\$7,620,538	\$1,196,866
Food at Home		\$3,791,920	\$4,498,454	\$706,534
Bakery and Cereal Products		\$488,923	\$580,023	\$91,100
Meats, Poultry, Fish, and Eggs		\$820,363	\$973,209	\$152,846
Dairy Products		\$382,262	\$453,493	\$71,231
Fruits and Vegetables		\$729,182	\$865,054	\$135,872
Snacks and Other Food at Home (10)		\$1,371,190	\$1,626,674	\$255,484
Food Away from Home		\$2,631,752	\$3,122,084	\$490,332
Alcoholic Beverages		\$465,835	\$552,624	\$86,789

Data Note: The Consumer Spending data is household-based and represents the amount spent for a product or service by all households in an area. Detail may not sum to totals due to rounding. This report is not a comprehensive list of all consumer spending variables therefore the variables in each section may not sum to totals.

Source: Esri forecasts for 2021 and 2026; Consumer Spending data are derived from the 2018 and 2019 Consumer Expenditure Surveys, Bureau of Labor Statistics.



Retail Demand Outlook

Zion Crossroads Study Area
Area: 6.68 square miles

Prepared by Esri

	2021 Consumer Spending	2026 Forecasted Demand	Projected Spending Growth
Financial			
Value of Stocks/Bonds/Mutual Funds	\$22,262,412	\$26,409,858	\$4,147,446
Value of Retirement Plans	\$87,871,822	\$104,240,401	\$16,368,579
Value of Other Financial Assets	\$6,727,586	\$7,981,192	\$1,253,606
Vehicle Loan Amount excluding Interest	\$2,024,411	\$2,401,554	\$377,143
Value of Credit Card Debt	\$2,075,727	\$2,462,449	\$386,722
Health			
Nonprescription Drugs	\$112,507	\$133,470	\$20,963
Prescription Drugs	\$252,825	\$299,930	\$47,105
Eyeglasses and Contact Lenses	\$74,091	\$87,894	\$13,803
Home			
Mortgage Payment and Basics (11)	\$8,708,420	\$10,330,862	\$1,622,442
Maintenance and Remodeling Services	\$2,289,781	\$2,716,482	\$426,701
Maintenance and Remodeling Materials (12)	\$481,626	\$571,381	\$89,755
Utilities, Fuel, and Public Services	\$3,522,854	\$4,179,247	\$656,393
Household Furnishings and Equipment			
Household Textiles (13)	\$70,720	\$83,896	\$13,176
Furniture	\$464,362	\$550,867	\$86,505
Rugs	\$24,277	\$28,799	\$4,522
Major Appliances (14)	\$290,598	\$344,739	\$54,141
Housewares (15)	\$63,377	\$75,186	\$11,809
Small Appliances	\$36,298	\$43,063	\$6,765
Luggage	\$11,503	\$13,646	\$2,143
Telephones and Accessories	\$80,534	\$95,532	\$14,998
Household Operations			
Child Care	\$384,903	\$456,596	\$71,693
Lawn and Garden (16)	\$399,730	\$474,211	\$74,481
Moving/Storage/Freight Express	\$43,036	\$51,059	\$8,023
Housekeeping Supplies (17)	\$554,550	\$657,872	\$103,322
Insurance			
Owners and Renters Insurance	\$500,563	\$593,819	\$93,256
Vehicle Insurance	\$1,268,203	\$1,504,499	\$236,296
Life/Other Insurance	\$486,401	\$577,013	\$90,612
Health Insurance	\$3,086,535	\$3,661,606	\$575,071
Personal Care Products (18)	\$347,137	\$411,812	\$64,675
School Books and Supplies (19)	\$87,600	\$103,922	\$16,322
Smoking Products	\$255,693	\$303,338	\$47,645
Transportation			
Payments on Vehicles excluding Leases	\$1,895,246	\$2,248,334	\$353,088
Gasoline and Motor Oil	\$1,645,619	\$1,952,258	\$306,639
Vehicle Maintenance and Repairs	\$796,146	\$944,492	\$148,346
Travel			
Airline Fares	\$454,007	\$538,606	\$84,599
Lodging on Trips	\$553,126	\$656,175	\$103,049
Auto/Truck Rental on Trips	\$39,126	\$46,417	\$7,291
Food and Drink on Trips	\$444,261	\$527,036	\$82,775

Data Note: The Consumer Spending data is household-based and represents the amount spent for a product or service by all households in an area. Detail may not sum to totals due to rounding. This report is not a comprehensive list of all consumer spending variables therefore the variables in each section may not sum to totals.

Source: Esri forecasts for 2021 and 2026; Consumer Spending data are derived from the 2018 and 2019 Consumer Expenditure Surveys, Bureau of Labor Statistics.

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- (1) Apparel Products and Services** includes shoe repair and other shoe services, apparel laundry and dry cleaning, alteration, repair and tailoring of apparel, clothing rental and storage, and watch and jewelry repair.
- (2) Membership Fees for Clubs** includes membership fees for social, recreational, and health clubs.
- (3) Audio** includes satellite radio service, radios, stereos, sound components, equipment and accessories, digital audio players, records, CDs, audio tapes, streaming/downloaded audio, musical instruments and accessories, and rental and repair of musical instruments.
- (4) Toys and Games** includes toys, games, arts and crafts, tricycles, playground equipment, arcade games, online entertainment and games, and stamp and coin collecting.
- (5) Recreational Vehicles & Fees** includes docking and landing fees for boats and planes, payments on boats, trailers, campers and RVs, rental of boats, trailers, campers and RVs, and camp fees.
- (6) Sports/Recreation/Exercise Equipment** includes exercise equipment and gear, game tables, bicycles, camping equipment, hunting and fishing equipment, winter sports equipment, water sports equipment, other sports equipment, and rental/repair of sports/recreation/exercise equipment.
- (7) Photo Equipment and Supplies** includes film, film processing, photographic equipment, rental and repair of photo equipment, and photographer fees.
- (8) Reading** includes digital book readers, books, magazine and newspaper subscriptions, and single copies of magazines and newspapers.
- (9) Catered Affairs** includes expenses associated with live entertainment and rental of party supplies.
- (10) Snacks and Other Food at Home** includes candy, chewing gum, sugar, artificial sweeteners, jam, jelly, preserves, margarine, fats and oils, salad dressing, nondairy cream and milk, peanut butter, frozen prepared food, potato chips and other snacks, nuts, salt, spices, seasonings, olives, pickles, relishes, sauces, gravy, other condiments, soup, prepared salad, prepared dessert, baby food, miscellaneous prepared food, and nonalcoholic beverages.
- (11) Mortgage Payment and Basics** includes mortgage interest, mortgage principal, property taxes, homeowners insurance, and ground rent on owned dwellings.
- (12) Maintenance and Remodeling Materials** includes supplies/tools/equipment for painting and wallpapering, plumbing supplies and equipment, electrical/heating/AC supplies, materials for roofing/gutters, materials for plaster/panel/siding, materials for patio/fence/brick work, landscaping materials, and insulation materials for owned homes.
- (13) Household Textiles** includes bathroom linens, bedroom linens, kitchen linens, dining room linens, other linens, curtains, draperies, slipcovers and decorative pillows.
- (14) Major Appliances** includes dishwashers, disposals, refrigerators, freezers, washers, dryers, stoves, ovens, microwaves, window air conditioners, electric floor cleaning equipment, sewing machines, and miscellaneous appliances.
- (15) Housewares** includes flatware, dishes, cups glasses, serving pieces, nonelectric cookware, and tableware.
- (16) Lawn and Garden** includes lawn and garden supplies, equipment and care service, indoor plants, fresh flowers, and repair/rental of lawn and garden equipment.
- (17) Housekeeping Supplies** includes soaps and laundry detergents, cleaning products, toilet tissue, paper towels, napkins, paper/plastic/foil products, stationery, giftwrap supplies, postage, and delivery services.
- (18) Personal Care Products** includes hair care products, nonelectric articles for hair, wigs, hairpieces, oral hygiene products, shaving needs, perfume, cosmetics, skincare, bath products, nail products, deodorant, feminine hygiene products, adult diapers, other miscellaneous care products and personal care appliances.
- (19) School Books and Supplies** includes school books and supplies for college, elementary school, high school, vocational/technical school, preschool and other schools.

Data Note: The Consumer Spending data is household-based and represents the amount spent for a product or service by all households in an area. Detail may not sum to totals due to rounding. This report is not a comprehensive list of all consumer spending variables therefore the variables in each section may not sum to totals.

Source: Esri forecasts for 2021 and 2026; Consumer Spending data are derived from the 2018 and 2019 Consumer Expenditure Surveys, Bureau of Labor Statistics.



Retail MarketPlace Profile

Zion Crossroads Study Area
Area: 6.68 square miles

Appendix G

Prepared by Esri

Summary Demographics

2021 Population	1,823
2021 Households	710
2021 Median Disposable Income	\$65,440
2021 Per Capita Income	\$36,008

NOTE: This database is in mature status. While the data are presented in current year geography, all supply- and demand-related estimates remain vintage 2017.

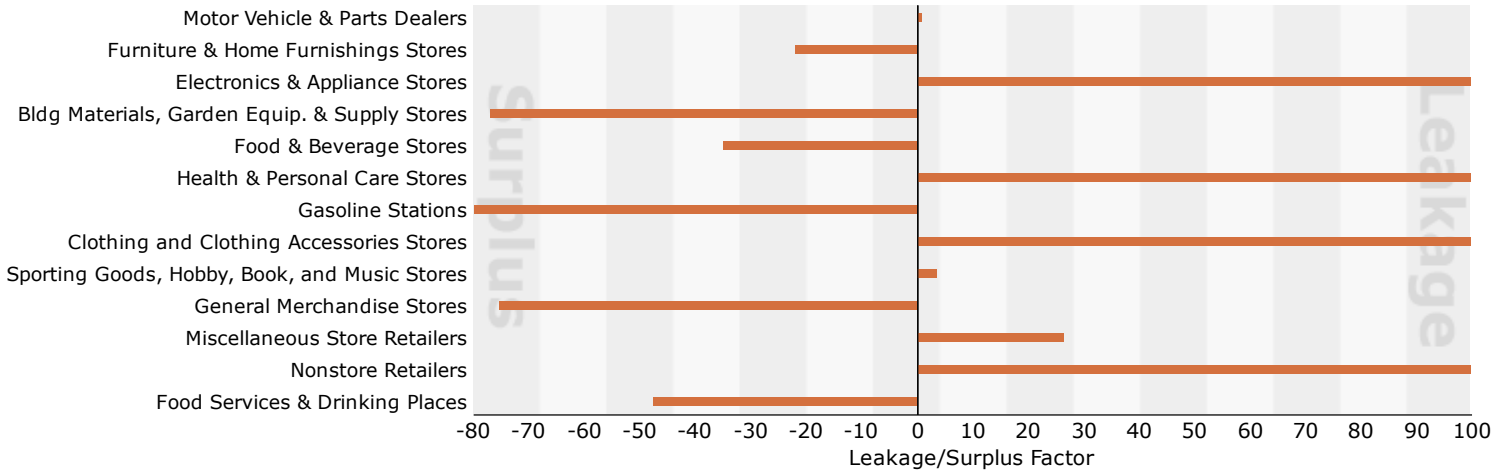
2017 Industry Summary	NAICS	Demand (Retail Potential)	Supply (Retail Sales)	Retail Gap	Leakage/Surplus Factor	Number of Businesses
Total Retail Trade and Food & Drink	44-45,722	\$25,876,208	\$87,198,770	-\$61,322,562	-54.2	31
Total Retail Trade	44-45	\$23,391,707	\$80,164,880	-\$56,773,173	-54.8	21
Total Food & Drink	722	\$2,484,501	\$7,033,890	-\$4,549,389	-47.8	10
2017 Industry Group	NAICS	Demand (Retail Potential)	Supply (Retail Sales)	Retail Gap	Leakage/Surplus Factor	Number of Businesses
Motor Vehicle & Parts Dealers	441	\$4,996,776	\$4,886,025	\$110,751	1.1	3
Automobile Dealers	4411	\$4,077,580	\$0	\$4,077,580	100.0	0
Other Motor Vehicle Dealers	4412	\$521,929	\$0	\$521,929	100.0	0
Auto Parts, Accessories & Tire Stores	4413	\$397,267	\$2,317,648	-\$1,920,381	-70.7	3
Furniture & Home Furnishings Stores	442	\$889,155	\$1,394,168	-\$505,013	-22.1	2
Furniture Stores	4421	\$486,534	\$0	\$486,534	100.0	0
Home Furnishings Stores	4422	\$402,621	\$1,394,168	-\$991,547	-55.2	2
Electronics & Appliance Stores	443	\$743,004	\$0	\$743,004	100.0	0
Bldg Materials, Garden Equip. & Supply Stores	444	\$1,671,539	\$12,820,781	-\$11,149,242	-76.9	3
Bldg Material & Supplies Dealers	4441	\$1,544,690	\$12,820,781	-\$11,276,091	-78.5	3
Lawn & Garden Equip & Supply Stores	4442	\$126,849	\$0	\$126,849	100.0	0
Food & Beverage Stores	445	\$4,094,504	\$8,507,859	-\$4,413,355	-35.0	3
Grocery Stores	4451	\$3,792,051	\$8,455,065	-\$4,663,014	-38.1	3
Specialty Food Stores	4452	\$118,957	\$0	\$118,957	100.0	0
Beer, Wine & Liquor Stores	4453	\$183,497	\$0	\$183,497	100.0	0
Health & Personal Care Stores	446,4461	\$1,429,072	\$0	\$1,429,072	100.0	0
Gasoline Stations	447,4471	\$2,284,539	\$20,597,914	-\$18,313,375	-80.0	3
Clothing & Clothing Accessories Stores	448	\$1,152,312	\$0	\$1,152,312	100.0	0
Clothing Stores	4481	\$778,433	\$0	\$778,433	100.0	0
Shoe Stores	4482	\$163,595	\$0	\$163,595	100.0	0
Jewelry, Luggage & Leather Goods Stores	4483	\$210,284	\$0	\$210,284	100.0	0
Sporting Goods, Hobby, Book & Music Stores	451	\$634,898	\$588,929	\$45,969	3.8	3
Sporting Goods/Hobby/Musical Instr Stores	4511	\$540,432	\$588,929	-\$48,497	-4.3	3
Book, Periodical & Music Stores	4512	\$94,465	\$0	\$94,465	100.0	0
General Merchandise Stores	452	\$4,176,900	\$29,911,237	-\$25,734,337	-75.5	2
Department Stores Excluding Leased Depts.	4521	\$2,895,208	\$28,634,331	-\$25,739,123	-81.6	1
Other General Merchandise Stores	4529	\$1,281,692	\$1,276,907	\$4,785	0.2	1
Miscellaneous Store Retailers	453	\$869,834	\$504,967	\$364,867	26.5	3
Florists	4531	\$46,071	\$0	\$46,071	100.0	0
Office Supplies, Stationery & Gift Stores	4532	\$214,956	\$0	\$214,956	100.0	0
Used Merchandise Stores	4533	\$102,884	\$303,011	-\$200,127	-49.3	1
Other Miscellaneous Store Retailers	4539	\$505,924	\$201,955	\$303,969	42.9	1
Nonstore Retailers	454	\$449,175	\$0	\$449,175	100.0	0
Electronic Shopping & Mail-Order Houses	4541	\$281,026	\$0	\$281,026	100.0	0
Vending Machine Operators	4542	\$20,314	\$0	\$20,314	100.0	0
Direct Selling Establishments	4543	\$147,834	\$0	\$147,834	100.0	0
Food Services & Drinking Places	722	\$2,484,501	\$7,033,890	-\$4,549,389	-47.8	10
Special Food Services	7223	\$36,877	\$0	\$36,877	100.0	0
Drinking Places - Alcoholic Beverages	7224	\$31,925	\$0	\$31,925	100.0	0
Restaurants/Other Eating Places	7225	\$2,415,699	\$7,033,890	-\$4,618,191	-48.9	10

Data Note: Supply (retail sales) estimates sales to consumers by establishments. Sales to businesses are excluded. Demand (retail potential) estimates the expected amount spent by consumers at retail establishments. Supply and demand estimates are in current dollars. The Leakage/Surplus Factor presents a snapshot of retail opportunity. This is a measure of the relationship between supply and demand that ranges from +100 (total leakage) to -100 (total surplus). A positive value represents 'leakage' of retail opportunity outside the trade area. A negative value represents a surplus of retail sales, a market where customers are drawn in from outside the trade area. The Retail Gap represents the difference between Retail Potential and Retail Sales. Esri uses the North American Industry Classification System (NAICS) to classify businesses by their primary type of economic activity. Retail establishments are classified into 27 industry groups in the Retail Trade sector, as well as four industry groups within the Food Services & Drinking Establishments subsector. For more information on the Retail MarketPlace data, please click the link below to view the Methodology Statement.

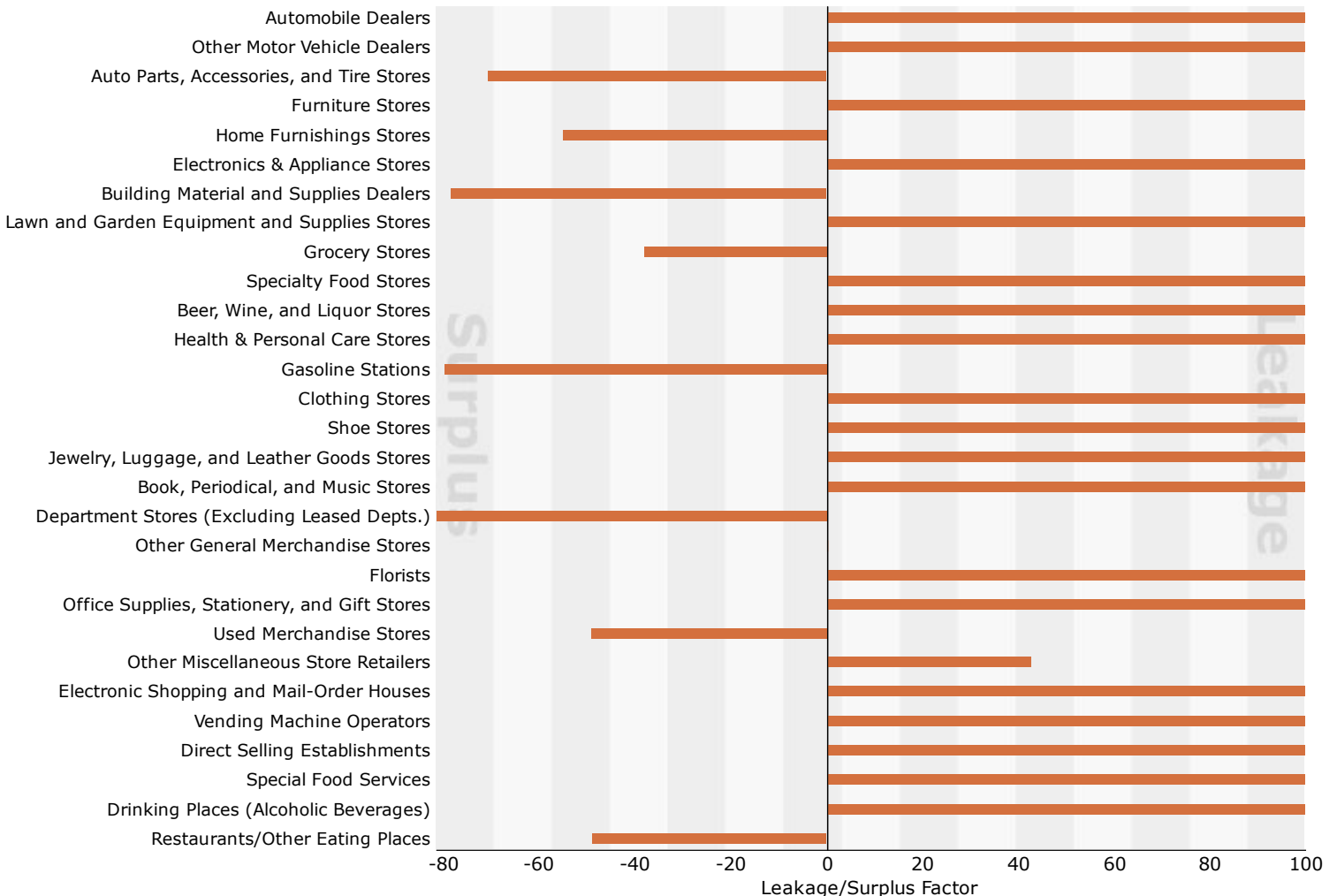
<http://www.esri.com/library/whitepapers/pdfs/esri-data-retail-marketplace.pdf>

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2017 Leakage/Surplus Factor by Industry Subsector



2017 Leakage/Surplus Factor by Industry Group



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