5th STREET Corridor Study

JANUARY 2021

TECHNICAL MEMO

ALTERNATIVES ANALYSIS

VDOT Planning

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1.0 INTRODUCTION

The Virginia Department of Transportation (VDOT) is using the public engagement process and evaluation of present conditions and future plans to develop a series of feasible transportation options for an approximately two-mile section of 5th Street (Route 631) that runs through Charlottesville and Albemarle County. This memorandum documents the alternatives analysis process for the 5th Street study. It describes how VDOT identified, refined, and evaluated street and intersection options along 5th Street. The results of the alternatives analysis process will be used to inform the final study recommendations.

2.0 THE STUDY

The 5th Street Study seeks to identify and advance solutions that foster safe, comfortable travel for all roadway users, to arrive at a shared vision for the 5th Street corridor, and to better define how the corridor can evolve as development changes the street's character and travel demands along it.

VDOT conducted an Existing and Future No-build Conditions Analysis and Phase 1 Public Engagement Process prior to the alternatives analysis process. These initial efforts helped VDOT to identify corridor challenges and opportunities and refine the study goals and objectives.

2.1 Challenges and Opportunities

The existing conditions analysis and preliminary public engagement efforts revealed challenges and opportunities that helped VDOT identify street and intersection alternatives for the corridor.

Corridor challenges include:

- I-64 serves as a literal barrier on 5th Street and signifies the shift between the denser, more commercial northern half of the corridor and the more residential southern half of the corridor.
- Sidewalks and bike lanes are inconsistent and incomplete along 5th Street, and do not provide the level of safety or comfort necessary to foster walking and biking on the street.
- Angle crashes are the most common crash type on the corridor and resulted in a higher proportion of fatalities and injuries than other reported crash types.
- 5th Street is the major north-south connection between Charlottesville and Albemarle County south of I-64. The only other connecting street is Old Lynchburg Road. Solutions that consider network-level connections are urgently needed.
- The top four transportation problems survey participants observed along the study corridor included traffic congestion, location and quality of sidewalks, speeding, and location of pedestrian crossings.

Corridor opportunities include:

- Despite inconsistent, incomplete sidewalks and bicycle facilities and long wait times at less comfortable transit stops, several corridor CAT stops experienced high weekday boardings in 2018.
- Thirty-four percent of survey participants reported that they walk and/or bike on 5th Street.
- Nearly all (96%) corridor crashes over the past five years of available data occurred at intersections, and a majority of crashes occurred at signalized intersections (69%).
- With one notable exception (the intersection of 5th Street and 5th Street

Station Parkway), excessive delay at corridor intersections is limited to three corridor intersections during either the weekday AM or PM rush hour.

- The communities adjoining 5th Street have a higher percentage of households living below the poverty line than the Charlottesville Metropolitan Statistical Area (MSA), but a lower percentage of zero-car households than the Charlottesville MSA. This highlights an opportunity to provide increased multimodal options to households burdened by the combined cost of housing and transportation.

2.2 Goals and Objectives

VDOT, the stakeholder group, and the study team developed the study goals and objectives based on findings from the existing conditions analysis and refined the study goals and objectives based on community feedback from the preliminary public engagement process. These goals and objectives form the framework for measuring the effectiveness of any potential transportation alternatives. Evaluation criteria developed for the alternatives analysis process related back to each of the project goals and objectives.

Table 1 presents the project goals and objectives. Evaluation criteria for the alternatives analysis process are detailed in **5.0 Alternative Analysis.**

Table 1. Project Goals and Objectives

Goals	Objectives
Improve safety and comfort	Introduce safety features
	Manage vehicular speeds
	Provide continuous, consistent bicycle, pedestrian, and transit facilities
	Provide designated (e.g., signed, signalized) pedestrian crossing opportunities
	Provide separation between vehicular travel and bicycle/pedestrian travel
Manage congestion	Increase person throughput capacity
	Reduce travel time variability
	Make efficient use of right-of-way for all users
	Mitigate delay at corridor pinch-points (intersections)
Support economic development	Provide access to jobs for users with a range of abilities
	Provide mode choice in access to employment opportunities
	Beautify the corridor
Support environmental sustainability and community health	Provide bicycle facilities that connect to existing and future trails
	Provide ADA access corridor-wide
	Prioritize multimodal investments to and near mixed and low-income housing developments

3.0 ALTERNATIVE IDENTIFICATION

VDOT and the study team developed an initial group of street and intersection alternatives that would address issues identified during the Existing and Future No-Build Conditions Analysis and Phase 1 Public Engagement, be supported by stakeholders, and meet the study's goals and objectives.

3.1 Street Alternatives

The study team considered available right-of-way[1] (**Figure 1**), existing pedestrian and drainage facilities (**Figure 2**), and existing roadway volumes and speeds (**Figure 3**) when developing alternatives for walking and biking along 5th Street.

Existing right-of-way along most of the 5th Street corridor ranges between 100 and 180 feet. Two pinch points where existing right-of-way ranges between 80 and 99 feet include:

- Harris Road to 5th Street Station Parkway
- I-64 Eastbound Ramps to I-64 Westbound Ramps

The 5th Street corridor has intermittent pedestrian facilities and inconsistent drainage facilities. Corridor drainage consists of a mix of curb or ditch drainage. A limited section of the corridor between Pinehurst Court and Stagecoach Road has curb and gutter drainage.

Corridor speed limits range between 35 and 45 mph, and traffic volumes range between 3,000 and 28,000 vehicles per day. Based on the posted speeds and average daily traffic, it is best practice to provide a physically separated bicycle facility and wide, connected sidewalks along the full length of the study corridor.[2]

The study team developed four preliminary street alternatives along 5th Street that balance available right-of-way with the need to provide safe, comfortable, and consistent walking and biking facilities. Each option could be applied in sections of 5th Street with curb and gutter drainage and with shoulder and ditch drainage.

1. A 6-foot sidewalk on the north side of 5th Street with a 12-foot shared use path on the south side of 5th Street
2. A 6-foot sidewalk on both sides of 5th Street and a 6-foot at-grade, barrier-protected bicycle lane on both sides of 5th Street
3. An 8-foot sidewalk on both sides of 5th Street
4. No change to the north side of 5th Street and a 12-foot shared use path on the south side of 5th Street

Since available right-of-way is fixed at the I-64 bridge unless a new bridge is constructed, the study team developed a limited set of alternatives for the I-64 bridge:

1. An 8-foot sidewalk on the north side of the bridge
2. 5-foot sidewalks on both sides of the bridge

The stakeholders provided preliminary feedback on the street alternatives that the study team used to develop refined street alternatives detailed in **4.0 Alternative Refinement**.

[1] Publicly owned land running parallel to 5th Street. If a project can be built within existing right-of-way, it will generally cost less than a project that requires the purchase of private land that falls outside of the existing right-of-way.

[2] FHWA Bicycle Selection Guide (2019)

Figure 1. Available Right-of-Way

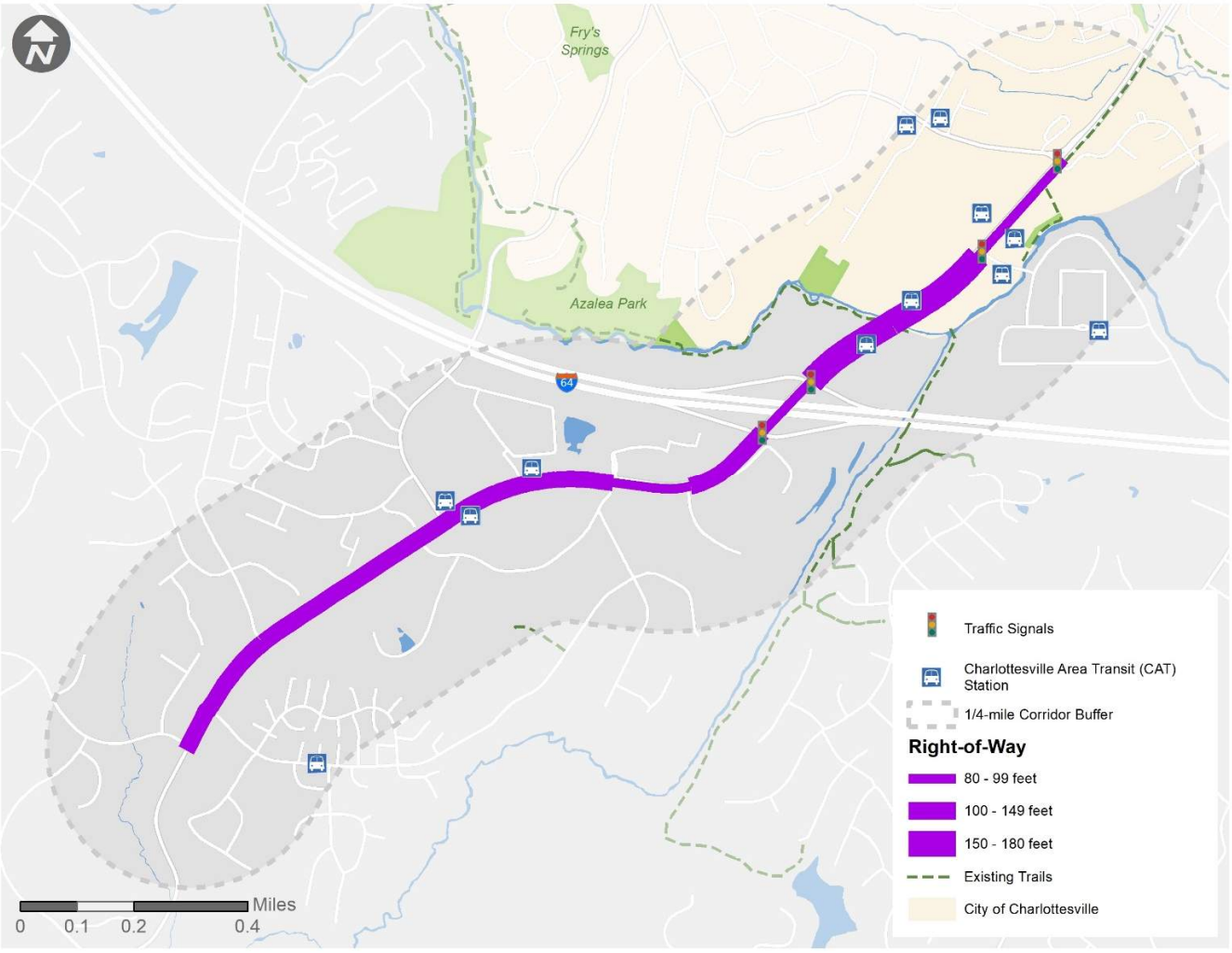


Figure 2. Existing Pedestrian and Drainage Facilities

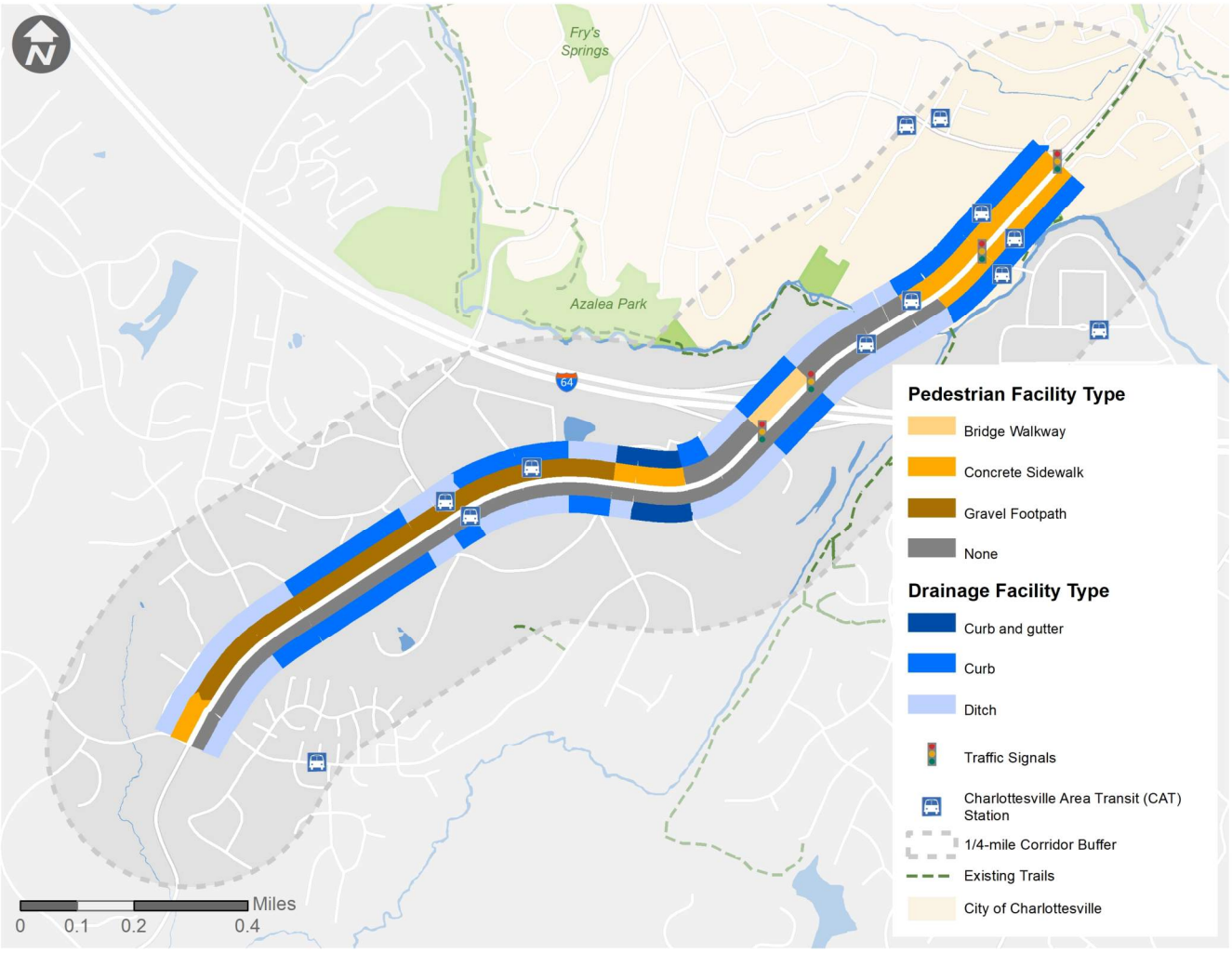
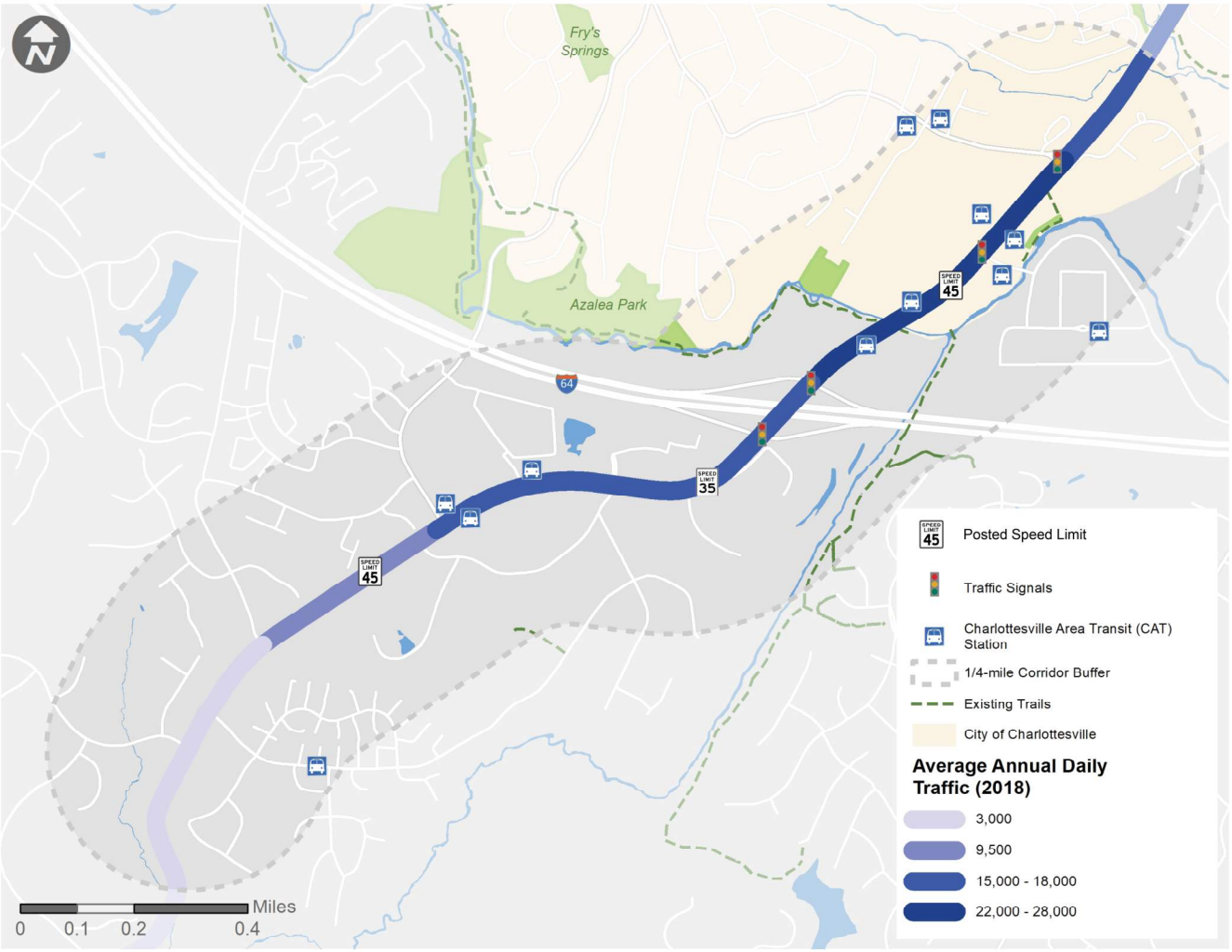


Figure 3. Existing Volumes and Speeds



3.2 Intersection Alternatives

The study team used the VDOT Junction Screening Tool (VJuST) to evaluate alternative intersection configurations at the I-64 interchange and four intersections along the study corridor.[3] The interchange and intersections were selected for evaluation based on their performance in the Future No Build Conditions Analysis, and included:

- 5th Street and Harris Road
- 5th Street and 5th Street Station Parkway
- 5th Street and Stagecoach Road
- 5th Street and Old Lynchburg Road

VJuST helped in the decision-making process by identifying intersection and interchange configurations that could reduce congestion and improve safety. The tool considers 29 different intersection configuration types, including nine interchanges, based on three analysis factors. The VJuST analysis factors include congestion, pedestrian, and safety.

Harris Road and 5th Street

The study team considered a conventional signal, median U-turn, partial median U-turn, restricted crossing U-turn, and roundabout at 5th Street and Harris Road. **Table 2** summarizes the results of the VJuST analysis.

The analysis results showed that the existing signal can effectively process vehicle volumes, while the other options would not reduce congestion. Most of the other options would be challenging to implement due to limited right-of-way, changes in topography on Harris Road, and the close proximity of a signalized intersection to the south (5th Street Station Parkway).

The study team recommended continuing with the existing signal and exploring geometric modifications to improve safety and reduce pedestrian crossing delay.

5th Street Station Parkway and 5th Street

The study team considered a conventional signal, median U-turn, partial median U-turn, restricted crossing U-turn, and roundabout at 5th Street and 5th Street Station Parkway. **Table 2** summarizes the results of the VJuST analysis.

The analysis results showed that while the existing signal cannot effectively process vehicle volumes, the other options would not substantially reduce congestion. All of the other options would be challenging to implement due to limited right-of-way, changes in topography on the intersection approaches, and the close proximity of signalized intersections to the north (Harris Road) and east (Wegmans Way).

The study team recommended continuing with a conventional signal and exploring alternative travel lane configurations for improved operations and safety.

I-64 Interchange and 5th Street

The study team considered a traditional diamond interchange, contraflow left interchange, displaced left turn interchange, diverging diamond interchange, double roundabout, Michigan urban diamond interchange, partial cloverleaf interchange, single point interchange, and single roundabout at the I-64 interchange. **Table 2** summarizes the results of the VJuST analysis.

[3] http://www.virginiadot.org/innovativeintersections/

The analysis results showed that three interchange options would reduce congestion compared to the existing interchange: a displaced left-turn interchange, a diverging diamond interchange, and a partial cloverleaf interchange. Like most of the other options, the partial cloverleaf interchange would be challenging to implement due to limited right-of-way and geometric constraints that prevent the construction of large footprint interchanges at this location.

While the diverging diamond interchange would not be subject to the same substantial right-of-way and geometric constraints, the project would still be challenging to implement due to high costs.

The study team recommended continuing with the current interchange configuration and exploring cross-sectional and signal timing options for improved operations and safety in the near-term. The analysis also highlighted two interchange options as potential long-term alternatives: the displaced left turn interchange and diverging diamond interchange.

Stagecoach Road and 5th Street

The study team considered two-way stop control, a median U-turn, a partial median U-turn, a restricted crossing U-turn, and a roundabout at 5th Street and Stagecoach Road. A signalized intersection was not considered because signal warrants are not projected to be met at the intersection. **Table 2** summarizes the results of the VJuST analysis.

The analysis results showed that the existing two-way stop control cannot effectively process vehicle volumes, while the other options would reduce congestion. The median U-turn and partial median U-turn options would be challenging to implement due to limited right-of-way and vertical and horizontal curves on the intersection approaches. These two options would also not address visibility concerns at the intersection.

The study team recommended further analyzing the restricted crossing U-turn and roundabout alternatives. Both alternatives offer operational, safety, and pedestrian improvements.

Old Lynchburg Road and 5th Street

The study team considered two-way stop control, a conventional signal, median U-turn, partial median U-turn, restricted crossing U-turn, and roundabout at 5th Street and Old Lynchburg Road. **Table 2** summarizes the results of the VJuST analysis.

The analysis results showed that the existing two-way stop control cannot effectively process vehicle volumes, while the other options would reduce congestion. The median U-turn and partial median U-turn options would be challenging to implement due to limited right-of-way. These two options would also not address visibility concerns at the intersection. The roundabout and restricted crossing U-Turn options would offer more safety benefits than a conventional signal.

The study team recommended further analyzing the restricted crossing U-turn and roundabout alternatives. Both alternatives offer operational, safety, and pedestrian improvements.

Table 2. 5th Street and Harris Road VJuST Results

Intersection Type[1]	Congestion Maximum Volume/Capacity (AM or PM)	Pedestrian Accommodation Compared to Existing Traffic Control Device	Safety Weighted Conflict Points Compared to Existing Traffic Control Device	Feasibility Substantial Right-of-Way Impacts Likely
5th Street and Harris Road				
Conventional Signal	0.79			
Median U-Turn	0.98	+	+	Yes
Partial Median U-Turn	0.86	+	+	Yes
Restricted Crossing U-Turn	0.71		+	Yes
Roundabout	0.88		++	No
5th Street and 5th Street Station Parkway				
Conventional Signal	1.90			
Median U-Turn	1.38	+	+	Yes
Partial Median U-Turn	1.36	+	+	Yes
Restricted Crossing U-Turn	1.14		+	Yes
Roundabout	3.64		++	Yes
5th Street and I-64 Interchange				
Traditional Diamond	1.25			
Contraflow Left	1.25		-	Yes
Displaced Left Turn	0.90	-		Yes
Diverging Diamond	0.90	-	+	No
Double Roundabout	2.92	+	+	Yes
Michigan Urban Diamond	1.85	+	+	No
Partial Cloverleaf	0.83		+	Yes
Single Point	1.01	-	-	Yes
Single Roundabout	1.76	+	++	Yes
5th Street and Stagecoach Road				
Two-Way Stop Control	2.22			
Median U-Turn	0.78	+	+	Yes
Partial Median U-Turn	0.74	+	+	Yes
Restricted Crossing U-Turn	0.63	+	+	No
Roundabout	0.62	+	++	No
5th Street and Old Lynchburg Road				
Two-Way Stop Control	2.55			
Conventional Signal	0.52	+		No
Median U-Turn	0.70	+	+	Yes
Partial Median U-Turn	0.32	+	+	Yes
Restricted Crossing U-Turn	0.50	+	+	No
Roundabout	0.60	+	++	No

Existing traffic control device – no score assigned

[1]More information about the intersections analyzed by the study team can be found on VDOT's Innovative Intersections and Interchanges dashboard: http://www.virginiadot.org/innovativeintersections/

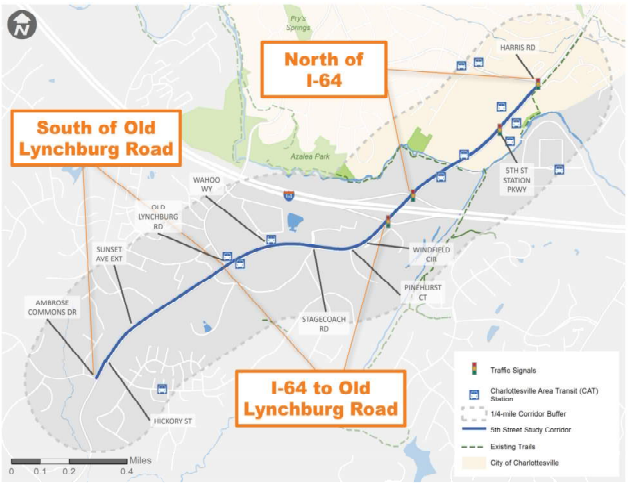
4.0 ALTERNATIVE REFINEMENT

VDOT and the study team developed a refined group of street and intersection alternatives based on stakeholder feedback. As part of the alternative refinement process, the study team developed cross-sections, conceptual plan-view drawings, and planning-level cost-estimates. The study team also solicited community feedback on the refined alternatives through a second phase of public engagement, which is documented in the Phase 2 Public Engagement Technical Memorandum.

4.1 Street Alternatives

The study team divided the 5th Street corridor into three sections can based on changes in the corridor transportation and land use context. The sections are 5th Street north of I-64, 5th Street from I-64 to Old Lynchburg Road, and 5th Street south of Old Lynchburg Road (**Figure 4**). The following sections detail the different street alternatives for each section of the corridor.

Figure 4. 5th Street Corridor Sections



Along 5th Street North of I-64

Today, Sidewalks and bike lanes end south of 5th Street Station Parkway. The incomplete bicycle and pedestrian network is disconnected from trails, employment, and transit, discouraging bicycle and pedestrian use. Existing sidewalk and bike lanes do not include a buffer separating non-motorized users and motorists, further reducing comfort for non-motorized users.

The study team developed four refined alternatives to provide consistent, continuous walking and biking facilities along 5th Street north of I-64:

- **Sidewalk (Both Sides):** Add an 8-foot sidewalk to both sides of 5th Street.
- **Shared Use Path (One Side):** Add a 12-foot shared-use path to the east side of 5th Street.
- **Sidewalk and Separated Bicycle Facility (Both Sides):** Add a 6-foot sidewalk and a 6-foot separated bicycle facility to both sides of 5th Street.
- **Sidewalk and Shared Use Path:** Add a 6-foot sidewalk to the west side of 5th Street and a 12-foot shared-use path to the east side of 5th Street.

Following the Phase 2 Public Engagement, the stakeholders recommended adding a fifth alternative:

- **Sidewalk and Shared Use Path with Separated Bicycle Facilities:** Add a 6-foot sidewalk to the west side of 5th Street, a 12-foot shared-use path to the east side of 5th Street, and a 6-foot separated bicycle facility to both sides of 5th Street.

The transportation alternatives developed for 5th Street north of I-64 are illustrated in **Figure 5**. The planning-level cost estimate spreadsheets can be found in **Attachment A**.

Sidewalk (Both Sides)

This alternative would implement 8-foot sidewalks on both sides of 5th Street. Bicyclists and pedestrians would share the sidewalks. A landscape buffer would be provided between non-motorized users and motorists. This alternative would have moderate right-of-way and drainage impacts due to the increase in paved area on both sides of the road. It would cost approximately $6,100,000.

Shared Use Path (One Side)

This alternative would implement a shared use path on the east side of 5th Street. Bicyclists and pedestrians would share the path. A landscape buffer would be provided between non-motorized users and motorists. This alternative would have moderate right-of-way and drainage impacts on the east side of the road. This alternative would cost approximately $5,400,000.

Sidewalk & Separated Bicycle Facility (Both Sides)

This alternative would implement a 6-foot buffered bike lane on both sides of 5th Street. This is one of two alternatives that fully separate bicyclists, pedestrians, and motorists. A landscape buffer would be provided between pedestrians and motorists. This alternative would have substantial right-of-way and drainage impacts due to the increase in paved area on both sides of the road. This alternative would cost approximately $8,100,000.

Sidewalk & Shared Use Path

This alternative would implement a 6-foot sidewalk on the west side of 5th Street and a shared use path on the east side of 5th Street. Bicyclists and pedestrians would share the sidewalk and the shared use path. A landscape buffer would be provided between non-motorized users and motorists. This alternative would have substantial right-of-way and drainage impacts due to the increase in paved area on both sides of the road. This alternative would cost approximately $6,400,000.

Sidewalk & Shared Use Path with Separated Bicycle Facilities

This alternative would implement a 6-foot sidewalk on the west side of 5th Street, a shared use path on the east side of 5th Street, and separated bicycle facilities on both sides of 5th Street. This is one of two alternatives that fully separate bicyclists, pedestrians, and motorists. A landscape buffer would be provided between pedestrians and motorists. This alternative would have substantial right-of-way and drainage impacts due to the increase in paved area on both sides of the road. This alternative would cost approximately $13,000,000.

Figure 5. Along 5th Street North of I-64 – Cross-Section Alternatives

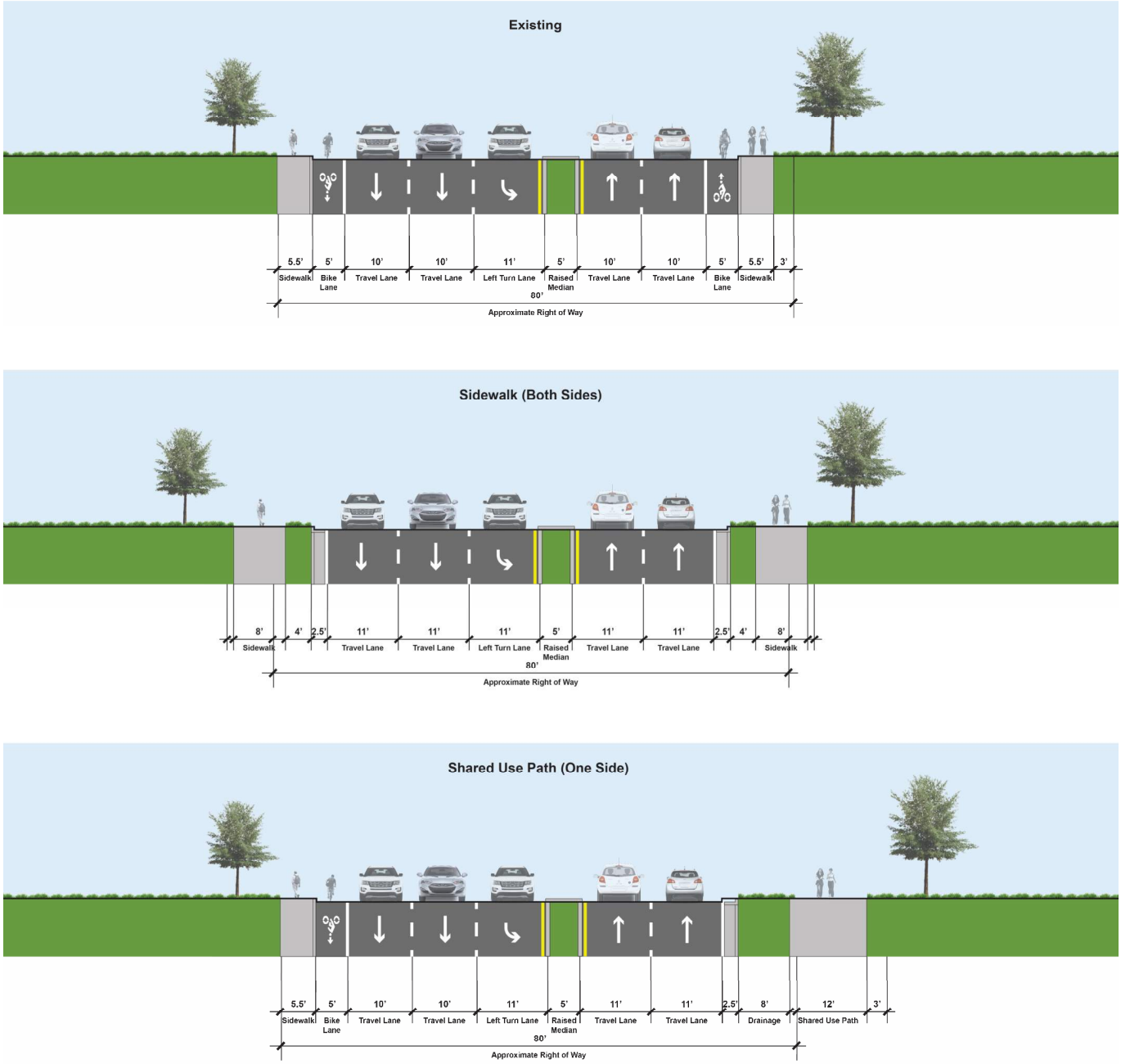
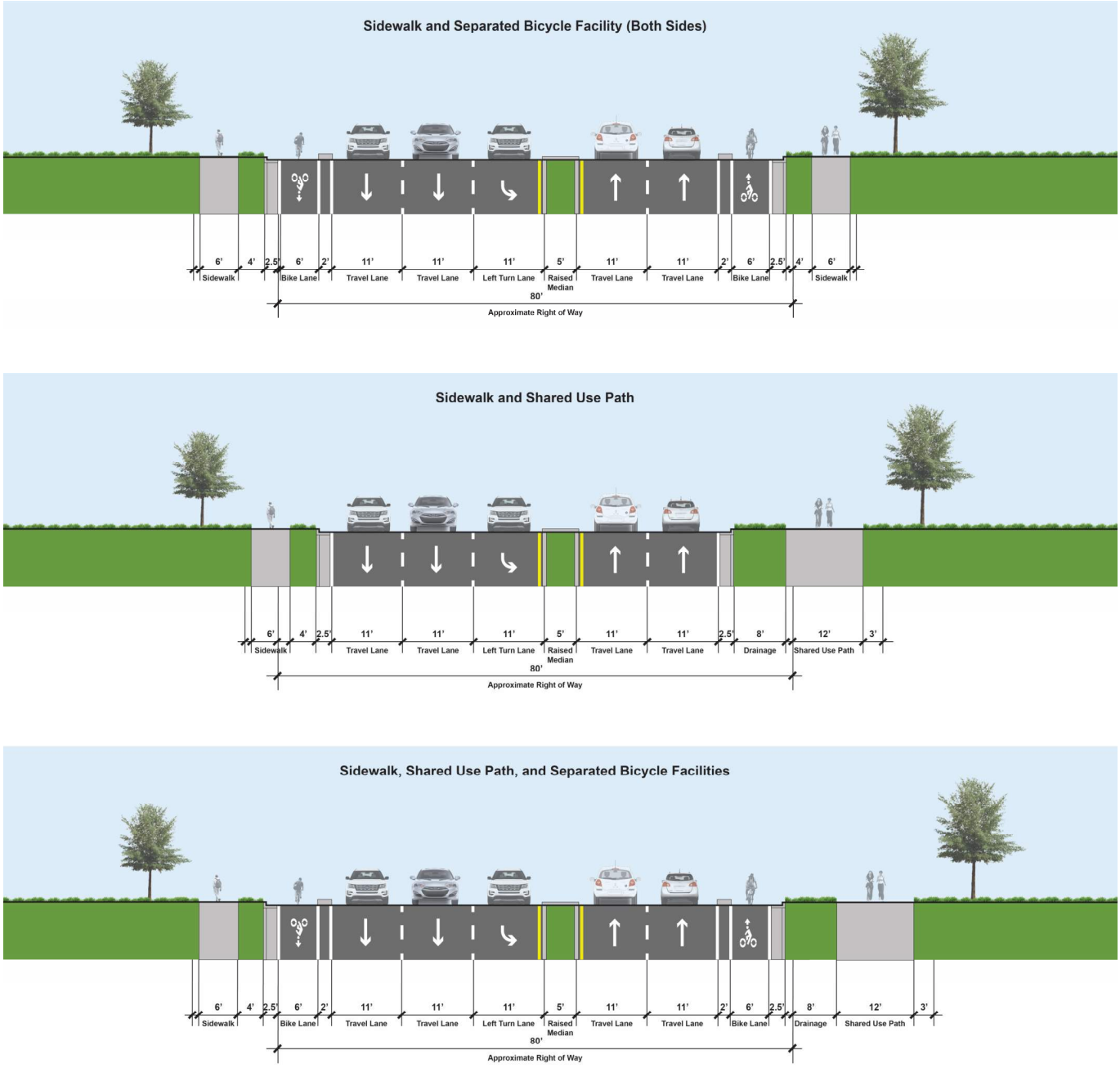


Figure 5. Along 5th Street North of I-64 – Cross-Section Alternatives (continued)



Along 5th Street South of I-64 to Old Lynchburg Road

Today, 5th Street south of I-64 has no designated pedestrian crossings, and bicycle and pedestrian facilities are missing from the south side of 5th Street. The existing pedestrian facility on the north side of 5th Street is a mix of paved and gravel paths that are not ADA accessible. The only buffer between the pedestrian facility and the roadway is a guardrail.

The study team developed four refined alternatives to provide consistent, continuous walking and biking facilities along 5th Street south of I-64 to Old Lynchburg Road:

- **Sidewalk (Both Sides):** Add an 8-foot sidewalk to both sides of 5th Street.
- **Shared Use Path (One Side):** Add a 12-foot shared-use path to the west side of 5th Street.
- **Sidewalk and Separated Bicycle Facility (Both Sides):** Add a 6-foot sidewalk and a 6-foot separated bicycle facility to both sides of 5th Street.
- **Sidewalk and Shared Use Path:** Add a 6-foot sidewalk to the east side of 5th Street and a 12-foot shared-use path to the west side of 5th Street.

The transportation alternatives developed for 5th Street south of I-64 to Old Lynchburg Road are illustrated in **Figure 6**. The planning-level cost estimate spreadsheets can be found in **Attachment A**.

Sidewalk (Both Sides)

This alternative would implement 8-foot sidewalks on both sides of 5th Street. Bicyclists and pedestrians would share the sidewalks. A landscape buffer would be provided between non-motorized users and motorists. This alternative would have moderate right-of-way and drainage impacts due to the increase in paved area on both sides of the road. This alternative would cost approximately $5,600,000.

Shared Use Path (One Side)

This alternative would implement a shared use path on the west side of 5th Street. Bicyclists and pedestrians would share the path. A landscape buffer would be provided between non-motorized users and motorists. This alternative would have substantial right-of-way and drainage impacts on the west side of the road. This alternative would cost approximately $8,200,000.

Sidewalk & Separated Bicycle Facility (Both Sides)

This alternative would implement a 6-foot buffered bike lane on both sides of 5th Street. This is the only alternative that fully separates bicyclists, pedestrians, and motorists. A landscape buffer would be provided between pedestrians and motorists. This alternative would have substantial right-of-way and drainage impacts due to the increase in paved area on both sides of the road. This alternative would cost approximately $9,200,000.

Sidewalk & Shared Use Path

This alternative would implement a 6-foot sidewalk on the east side of 5th Street and a shared use path on the west side of 5th Street. Bicyclists and pedestrians would share the sidewalk and the shared use path. This alternative would have substantial right-of-way and drainage impacts due to the increase in paved area on both sides of the road. This alternative would cost approximately $8,700,000.

Figure 6. Along 5th Street South of I-64 to Old Lynchburg Road – Cross Section Alternatives

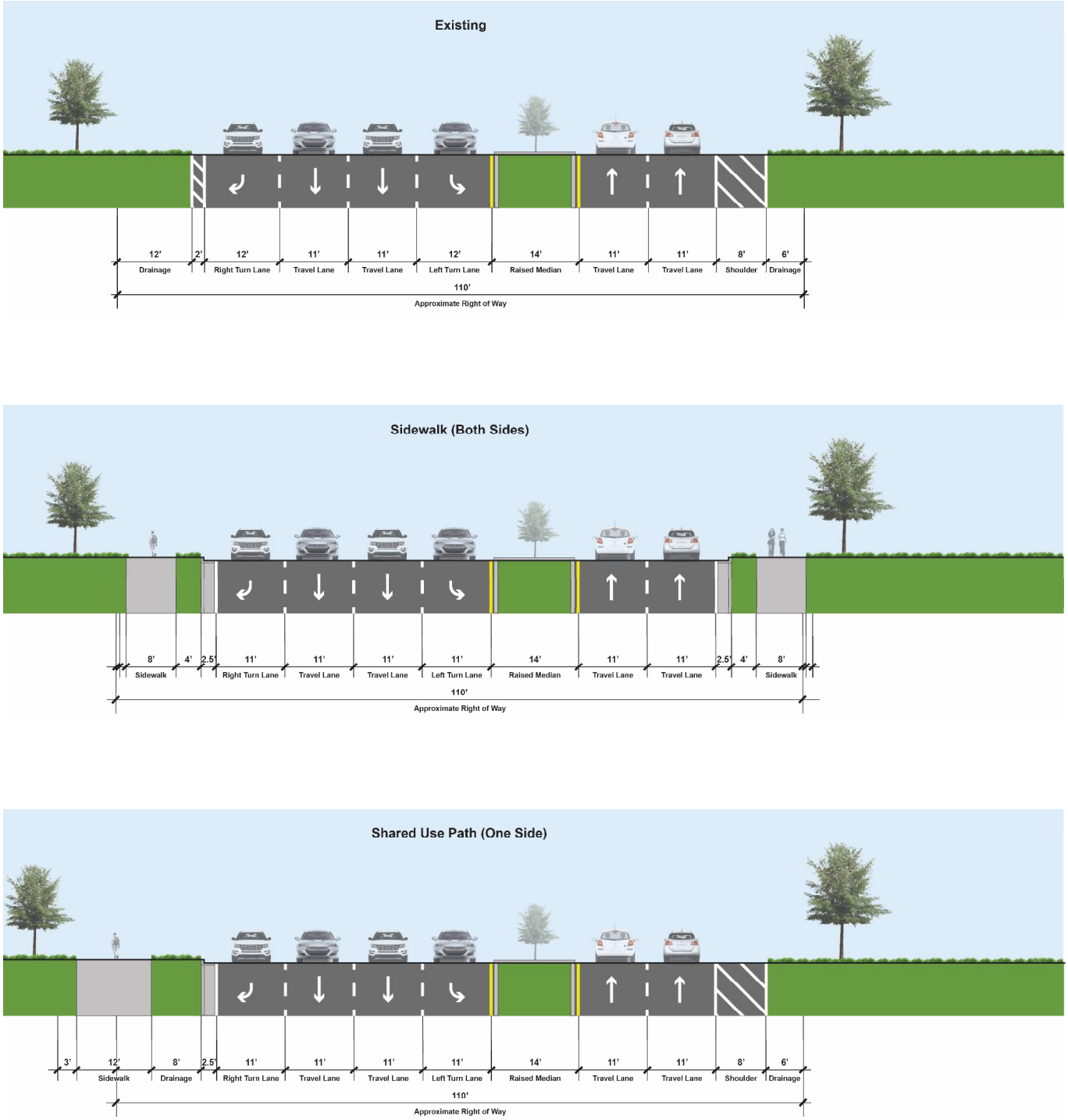
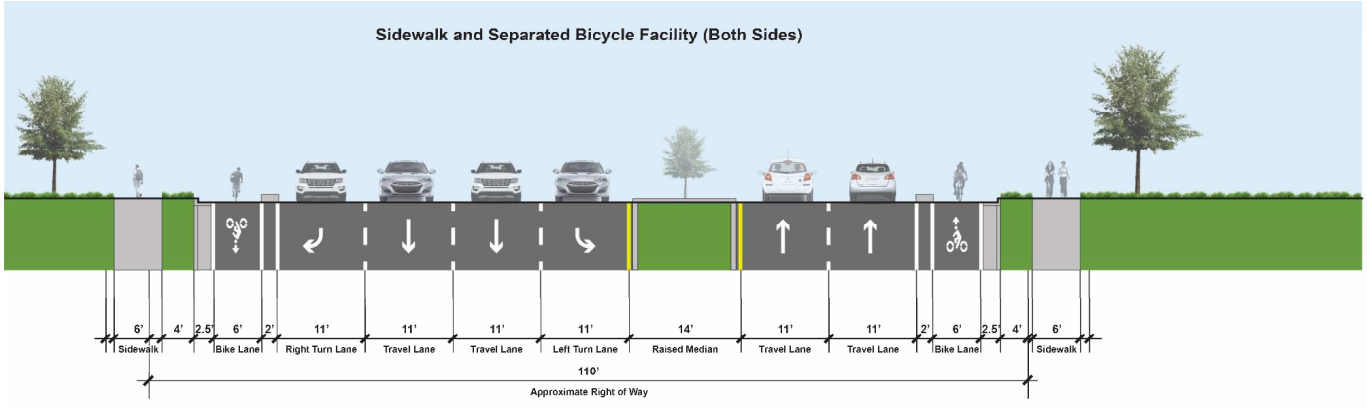
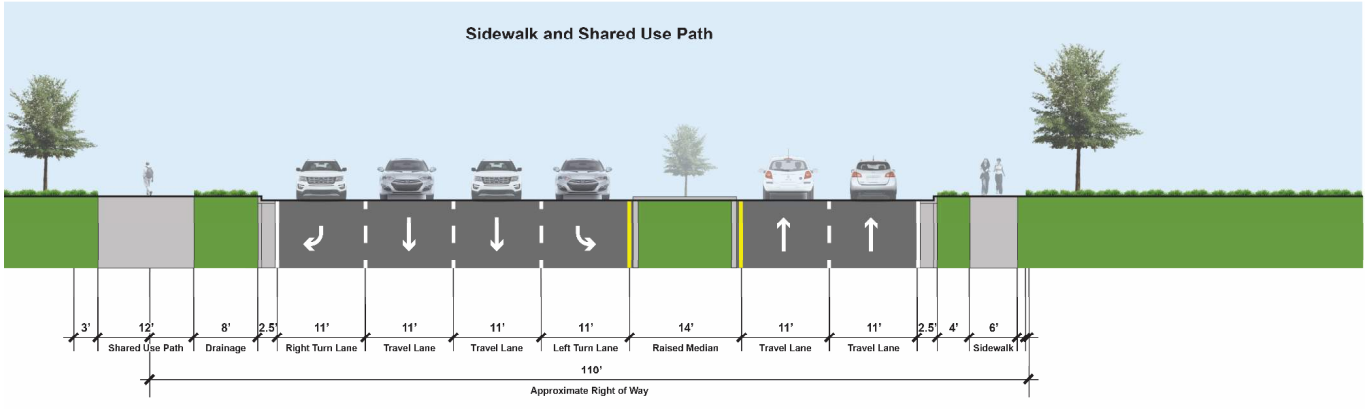


Figure 6. Along 5th Street South of I-64 to Old Lynchburg Road – Cross Section Alternatives (continued)





Along 5th Street South of Old Lynchburg Road

Walking and biking conditions along 5th Street south of I-64 to Old Lynchburg Road match conditions south of Old Lynchburg Road to Ambrose Commons Drive. The study team recommended the same four refined alternatives to provide consistent, continuous walking and biking facilities along 5th Street south of Old Lynchburg Road:

- **Sidewalk (Both Sides):** Add an 8-foot sidewalk to both sides of 5th Street.
- **Shared Use Path (One Side):** Add a 12-foot shared-use path to the west side of 5th Street.
- **Sidewalk and Separated Bicycle Facility (Both Sides):** Add a 6-foot sidewalk and a 6-foot separated bicycle facility to both sides of 5th Street.
- **Sidewalk and Shared Use Path:** Add a 6-foot sidewalk to the east side of 5th Street and a 12-foot shared-use path to the west side of 5th Street.

Following the Phase 2 Public Engagement, VDOT and the study team recommended adding a fifth alternative:

- **Road diet**: Reallocate the outside travel lane on both sides of 5th Street to non-motorized uses.

The first four alternatives developed for 5th Street south of Old Lynchburg Road are illustrated in the previous section in **Figure 6**. The road diet alternative is illustrated in **Figure 7**. The planning-level cost estimate spreadsheets can be found in **Attachment A**.

Sidewalk (Both Sides)

This alternative would implement 8-foot sidewalks on both sides of 5th Street. It would cost approximately $7,800,000.

Shared Use Path (One Side)

This alternative would implement a shared use path on the west side of 5th Street. It would cost approximately $8,300,000.

Sidewalk & Separated Bicycle Facility (Both Sides)

This alternative would implement a 6-foot buffered bike lane on both sides of 5th Street. It would cost approximately $10,200,000.

Sidewalk & Shared Use Path

This alternative would implement a 6-foot sidewalk on the east side of 5th Street and a shared use path on the west side of 5th Street. It would cost approximately $8,900,000.

Road Diet

This option would reallocate the outside travel lane on both sides of 5th Street to non-motorized uses. With the reallocation of a travel lane, all four alternative cross-sections described above could be implemented south of Old Lynchburg Road for a lower cost and with the added benefit of calming motor vehicle traffic. With a road diet, the most expensive alternative cross-section (Sidewalk and Separated Bicycle Facility) would cost approximately $6,200,000.

Supporting Analysis

A supporting analysis for the road diet option included a review of existing and future daily traffic on 5th Street and an intersection-specific operations analysis.

Table 3 compares existing and projected future daily traffic for 5th Street south of Old Lynchburg

Road. The Federal Highway Administration advises that roadways with daily traffic equal to or less than 20,000 vehicles per day may be good candidates for a road diet.

Table 3 Existing and Projected Average Annual Daily Traffic South of Old Lynchburg Road[1]

	Year	Average Annual Daily Traffic
Existing Daily Traffic	2018	6,600
Future Daily Traffic	2040	11,500

[1]Estimated using traffic counts and projections documented in the Existing and Future No-build Conditions Analysis.

The study team used the future operations analysis from the Existing and Future No-build Conditions Analysis to compare how study intersections would function under traffic and geometric conditions associated with the road diet.

Four intersections were included in the supporting analysis:

- Ambrose Commons Drive
- Hickory Street
- Sunset Avenue Extended
- Old Lynchburg Road

Intersection-specific peak hours were used for the analysis. AM peak hours were observed between 7:15 AM and 8:30 AM. PM peak hours were observed between 4:45 PM and 6:15 p.m.

Traffic operations analyses were performed at the analysis intersections in accordance with the *Highway Capacity Manual (HCM)*, Sixth Edition using SYNCHRO 10. **Table 4**, **Figure 8**, and **Figure 9** compare the weekday AM and PM peak hour operational analysis results for the analysis intersections under the future no-build traffic conditions and future build (i.e., road diet) traffic conditions. The road diet traffic conditions for the intersection of 5th Street and Old Lynchburg Road include three different intersection alternatives:

- Two-way stop control

KEY TERMS>>

- **Operations Analysis:** An evaluation of how a roadway or set of roadways function under existing and/or anticipated traffic and geometric conditions.
- **Peak Hour:** The time of day when demand for a transportation facility is highest and the ease with which vehicles can move through the transportation facility is most limited. Weekdays typically have two peak hours (AM and PM), while weekends have a single peak hour.
- **Delay:** The amount of time it takes vehicles to pass through an intersection (reported in seconds)
- **Level of Service (LOS):** A performance metric communicating quality of intersection service. For vehicles, LOS D indicates acceptable quality in urban conditions, while LOS scores of E-F indicate poor quality.
- **Volume to capacity (v/c) ratio:** A ratio comparing the number of vehicles traveling through an intersection at a given point in time to the maximum capacity of the intersection. A v/c score of 1 or higher means that an intersection is at or above capacity. A v/c score below 1 means that an intersection is below capacity.
- **95th percentile queue length:** The worst-case queue length (number of vehicles waiting in a lane) during a given time period. These queues have only a 5 percent probability of being exceeded.

- Roundabout
- Restricted Crossing U-Turn

The full analysis for the future no-build conditions can be found in **Attachment B**, and the full analysis for the future build (road diet) conditions can be found in **Attachment C**.

AM Conditions Comparison

- The intersections of 5th Street/Ambrose Commons Drive and 5th Street/Hickory Street perform acceptably without and with the road diet during the AM peak hour.

- The intersection of 5th Street/Sunset Avenue Extended would have movements operating at level of service (LOS) F and over capacity with and without the road diet during the AM peak hour. If the road diet is implemented in conjunction with a roundabout at 5th Street and Old Lynchburg Road, it is possible that more motorists will use Old Lynchburg Road to access 5th Street instead of Sunset Avenue Extended. Reduced demand at Sunset Avenue Extended would improve intersection operations.
- The intersection of 5th Street/Old Lynchburg Road would have movements operating at LOS F and over capacity without the road diet during the AM peak hour. The study team tested the road diet with three different intersection designs:
    - The intersection of 5th Street/Old Lynchburg Road would have movements operating at LOS F and over capacity with the road diet and **two-way stop control**.
    - The intersection of 5th Street/Old Lynchburg Road would perform acceptably with the road diet and a **roundabout**.
    - The intersection of 5th Street/Old Lynchburg Road would have movements operating at LOS F and over capacity with the road diet and a **restricted crossing U-Turn**.

PM Conditions Comparison

- The intersections of 5th Street/Ambrose Commons Drive and 5th Street/Hickory Street perform acceptably without and with the road diet during the PM peak hour.
- The intersection of 5th Street/Sunset Avenue Extended would have movements operating at LOS E with and without the road diet during the PM peak hour. If the road diet is implemented in conjunction with a roundabout at 5th Street and Old Lynchburg Road, it is possible that more motorists will use Old Lynchburg Road to access 5th Street instead of Sunset Avenue Extended. Reduced demand at Sunset Avenue Extended would improve intersection operations.
- The intersection of 5th Street/Old Lynchburg Road would have movements operating at LOS F and over capacity without the road diet during the PM peak hour. The study team tested the road diet with three different intersection designs:
    - The intersection of 5th Street/Old Lynchburg Road would have movements operating at LOS F and over capacity with the road diet and **two-way stop control**.
    - The intersection of 5th Street/Old Lynchburg Road would perform acceptably with the road diet and a **roundabout**.
    - The intersection of 5th Street/Old Lynchburg Road would have movements operating at LOS F with the road diet and a **restricted crossing U-Turn**.

Figure 7. Along 5th Street South Old Lynchburg Road – Road Diet Cross Section Alternative

Table 4 Future No-Build and Future Road Diet Operational Analysis Comparison

Intersection	Alternative	Peak hour	Worst-performing movement	Delay (sec) and level of service[2]	v/c[2]	95th percentile queues (vehicles)[3]
5th Street/Ambrose Commons Drive	**Future No-Build**	AM Peak	Ambrose Commons Drive (EB)	11.6 (B)	0.17	1
		PM Peak	Ambrose Commons Drive (EB)	10.9 (B)	0.08	1
	Future Road Diet	AM Peak	Ambrose Commons Drive (EB)	11.6 (B)	0.17	1
		PM Peak	Ambrose Commons Drive (EB)	10.9 (B)	0.08	1
5th Street/Hickory Street	**Future No-Build**	AM Peak	Hickory Street (WB)	18.5 (C)	0.58	4
		PM Peak	5th Street (SB)	8.4 (A)	0.25	1
	Future Road Diet	AM Peak	Hickory Street (WB)	18.5 (C)	0.58	4
		PM Peak	5th Street (SB)	8.4 (A)	0.25	1
5th Street/Sunset Avenue Extended	**Future No-Build**	AM Peak	Sunset Avenue Extended (EB)	104.9 (F)	1.10	17
		PM Peak	Sunset Avenue Extended (EB)	36.1 (E)	0.71	6
	Future Road Diet	AM Peak	Sunset Avenue Extended (EB)	280.2 (F)	1.52	27
		PM Peak	Sunset Avenue Extended (EB)	49.5 (E)	0.80	7
5th Street/ Old Lynchburg Road	**Future No-Build**	AM Peak	Old Lynchburg Road (EB)	461.9 (F)	1.86	22
		PM Peak	Old Lynchburg Road (EB)	254.4 (F)	1.40	16
	Future Road Diet – Two-way Stop Control	AM Peak	Old Lynchburg Road (EB)	$2,350.0 (F)	5.90	33
		PM Peak	Old Lynchburg Road (EB)	$353.7 (F)	1.62	19
	Future Road Diet - Roundabout	AM Peak	Old Lynchburg Road (EB)	12.4 (B)	0.39	5
		PM Peak	Old Lynchburg Road (EB)	25.2 (D)	0.67	13
	Future Road Diet – Restricted Crossing U-Turn	AM Peak	5th Street (Western U-Turn)	105.8 (F)	1.03	11
		PM Peak	Old Lynchburg Road (EB)	54.8 (F)	0.89	9

[1] Average intersection delay, LOS reported only for signalized intersections

[2] Reported delay, LOS, v/c, and 95th percentile queues represent the worst-performing metric at each intersection

[3] 95th percentile queues rounded up to the nearest whole number

Figure 8. Future No-Build Conditions Operational Analysis

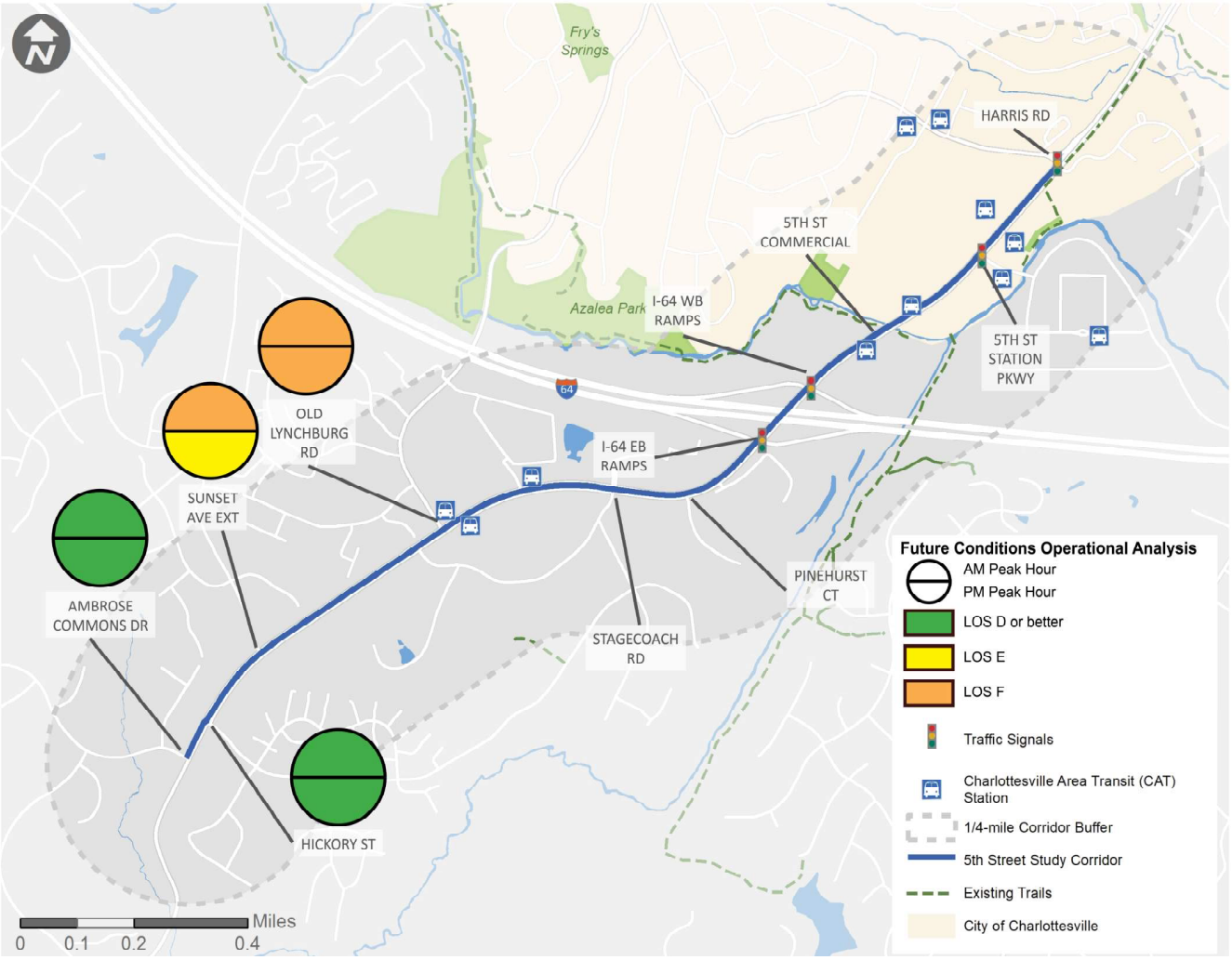
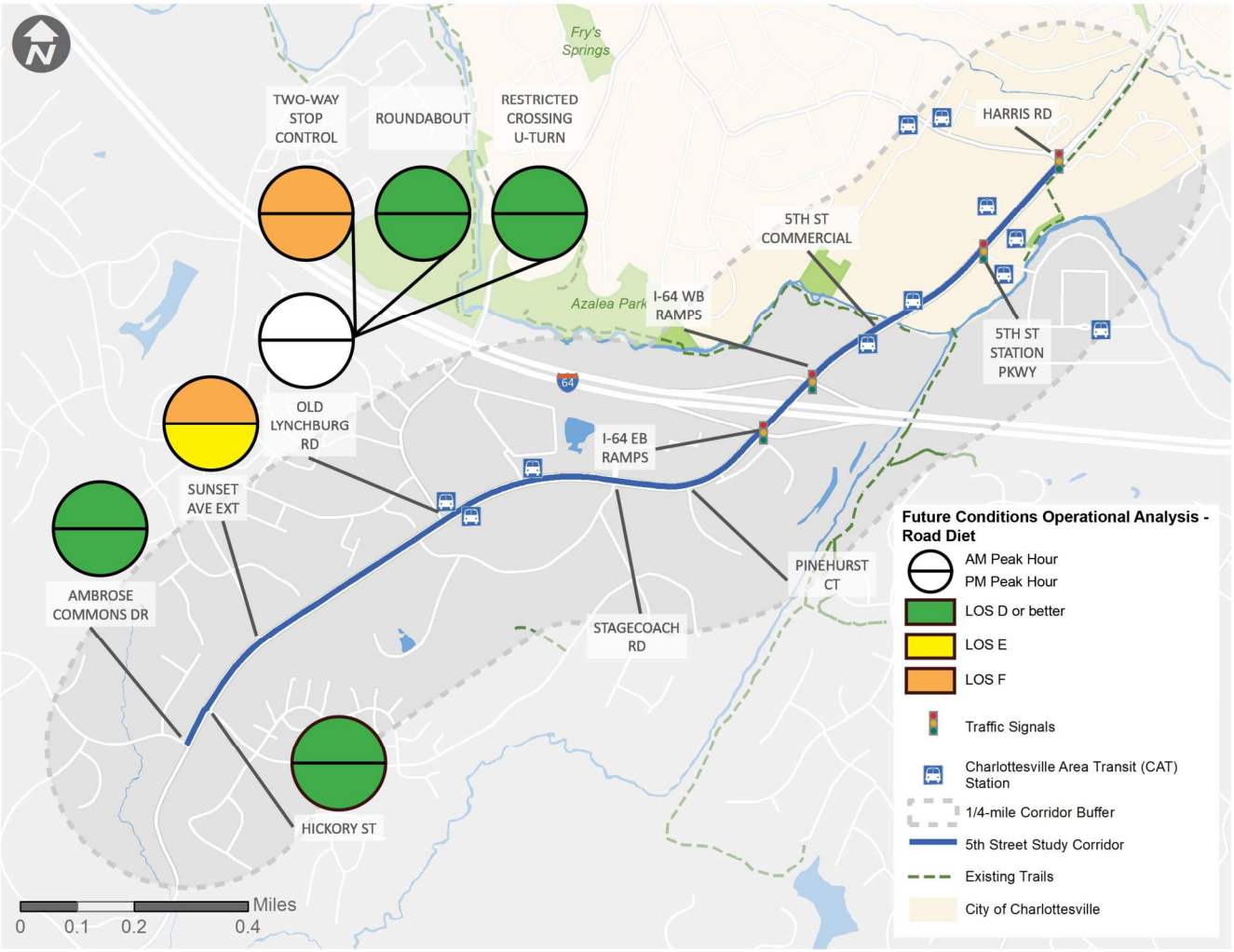


Figure 9. Future Build (Road Diet) Conditions Operational Analysis



4.2 Intersection Alternatives

The study team used the results of the VJuST screening to refine and compare intersection alternatives for the I-64 interchange and four intersections. The intersections included:

- 5th Street and Harris Road
- 5th Street and 5th Street Station Parkway
- 5th Street and Stagecoach Road
- 5th Street and Old Lynchburg Road

The following sections detail the different intersection alternatives for each intersection and the I-64 interchange.

Harris Road and 5th Street

Today, the intersection of Harris Road and 5th Street presents safety challenges for people driving, walking, biking, and waiting for the bus. The intersection has a higher proportion of angle and rear-end crashes than the corridor-wide average. Pedestrians experience delay at crossings and discomfort at the southbound channelized right-turn lane onto Harris Road. Existing bike lanes at the intersection are likely to be used by only the most experienced cyclists.

The study team developed one alternative for the intersection of 5th Street and Harris Road consistent with recommendations from the 5th-Ridge-McIntire Multimodal Corridor Study.

Intersection Modification

This alternative would close the channelized southbound right-turn lane to calm traffic and make it easier for cyclists and pedestrians to cross the road. It would replace the traffic signal equipment and making signal timing modifications for improved operations. The alternative would build on recommended street alternatives by continuing separated bicycle facilities through the intersection.

The alternative improves safety and comfort by reducing speeds, while maintaining travel times for cars and buses and reducing pedestrian delay at crossings. It would also improve ADA-accessible crossings for non-motorized users. This alternative can be accomplished within the existing public right-of-way. It reduces drainage impacts by increasing available space for landscaping. This alternative would cost approximately $1,500,000.

The transportation alternative developed for Harris Road and 5th Street is illustrated in **Figure 10**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Operational Analysis

The study team used the future operations analysis from the Existing and Future No-build Conditions Analysis to compare how the intersection of Harris Road and 5th Street would perform with and without the intersection modification alternative. **Table 5** compares the weekday AM and PM peak hour operational analysis results for the two alternatives. The full analysis for the future no-build alternative and intersection modification alternative can be found in **Attachment D**.

Under future no-build conditions, the intersection of 5th Street and Harris Road is projected to operate under capacity and at LOS C.

Under the intersection modification alternative, the intersection of 5th Street and Harris Road would continue to perform acceptably during both the AM and PM peak hour.

Figure 10. Intersection Modification, 5th Street and Harris Road

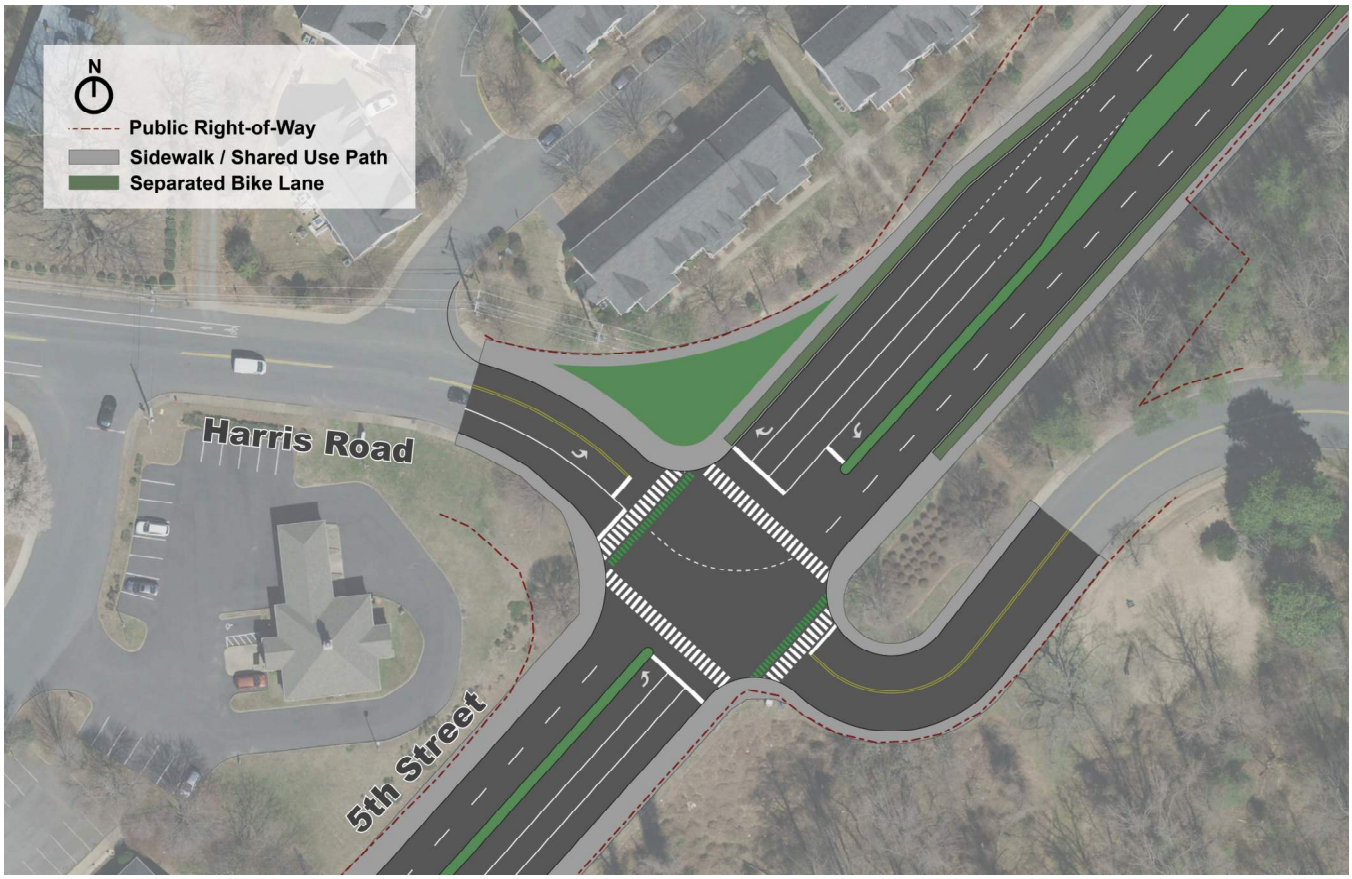


Table 5. Future No-Build and Intersection Alternative Operational Analysis Comparison, 5th Street and Harris Road

Intersection	Alternative	Peak hour	Intersection delay (sec) and level of service[1]	Worst-performing movement			
				Movement	Delay (sec) and level of service[2]	v/c[2]	95th percentile queues (vehicles)[3]
5th Street/ Harris Road (signalized)	No Build	AM Peak	28.7 (C)	Harris Road (WB)	43.1 (D)	0.72	9
		PM Peak	26.7 (C)	Harris Road (EBTH/R)	41.4 (D)	0.85	16
	Intersection Modification	AM Peak	36.9 (D)	5th Street (NBTR)	42.0 (D)	0.94	41
		PM Peak	30.8 (C)	5th Street (SBT)	30.4 (C)	0.91	37

[1] Average intersection delay, LOS reported only for signalized intersections and roundabouts

[2] Reported delay, LOS, v/c, and 95th percentile queues represent the worst-performing metric at each intersection

[3] 95th percentile queues rounded up to the nearest whole number

5th Street Station Parkway and 5th Street

The intersection of 5th Street Station Parkway and 5th Street presents safety challenges for all intersection users and congestion challenges related to turning vehicles and long queues. The intersection experienced more crashes and more injury crashes than any other intersection on the 5th Street corridor. Over the past five years, one crash involving a pedestrian and one involving a bicyclist occurred at the intersection. The intersection is a key corridor bottleneck today, and experiences high levels of delay during the weekday AM and PM rush hours. Pedestrians experience long crossing delays at intersection crosswalks, and bike lanes at the intersection are likely to be used by only the most experienced bicyclists.

The study team developed two alternatives for the intersection of 5th Street and 5th Street Station Parkway.

Expand Intersection

Most of the congestion challenges at this intersection relate to motorists traveling to and from 5th Street Station shopping center. This alternative improves travel times for cars and buses by expanding the size of the intersection to add turning lanes into and out of 5th Street Station Parkway. Reducing queues and delays may reduce motor vehicle crashes. The safety tradeoff associated with this change is increased crossing distances and exposure for pedestrians. This alternative will improve existing ADA-accessible crossings for non-motorized users and maintain non-motorized connections to employment and to transit. This alternative cannot be accomplished within the existing public right-of-way and increases drainage impacts by expanding the paved surface of the roadway. This alternative would cost approximately $2,900,000.

This transportation alternative is illustrated in **Figure 11**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Left Turn Restrictions

This alternative would improve times for cars and buses by restricting left-turn access into and out of Willoughby Square Shopping Center from 5th Street and 5th Street Station Parkway. Motorists who want to access Willoughby Square Shopping Center from the south can do so through a new median opening north of 5th Street Station Parkway. Motorists, who wish to exit the shopping center and travel north on 5th Street can do so via the Harris Road intersection. This alternative would improve existing ADA-accessible crossings for non-motorized users and maintain non-motorized connections to employment and transit. This alternative would impact the west side of 5th Street due to widening for the added lane and would slightly increase drainage impacts by opening the median north of 5th Street Station Parkway. This alternative would cost approximately $2,800,000.

This transportation alternative is illustrated in **Figure 12**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Operational Analysis

The study team used the future operations analysis from the Existing and Future No-build Conditions Analysis to compare how the intersection of 5th Street Station Parkway and 5th Street would perform with and without the expanded intersection and left-turn restrictions alternatives. **Table 6** compares the weekday AM and PM peak hour operational analysis results for the alternatives. The full analysis for the 5th Street Station Parkway alternatives can be found in **Attachment E**.

Under future no-build conditions, the intersection of 5th Street and 5th Street Station Parkway has movements operating at LOS F and over capacity during both the AM and PM peak hour. The overall intersection operates at LOS E during the AM peak hour and LOS F during the PM peak hour.

Under the expand intersection alternative, the intersection of 5th Street and 5th Street Station Parkway would perform acceptably during both the AM and PM peak hour. The intersection would have movements operating at LOS E and near capacity.

Under the left-turn restrictions alternative, the intersection of 5th Street and 5th Street Station Parkway would perform acceptably during both the AM and PM peak hour. The intersection would have movements operating at LOS D.

Figure 11. Expand Intersection, 5th Street and 5th Street Station Parkway

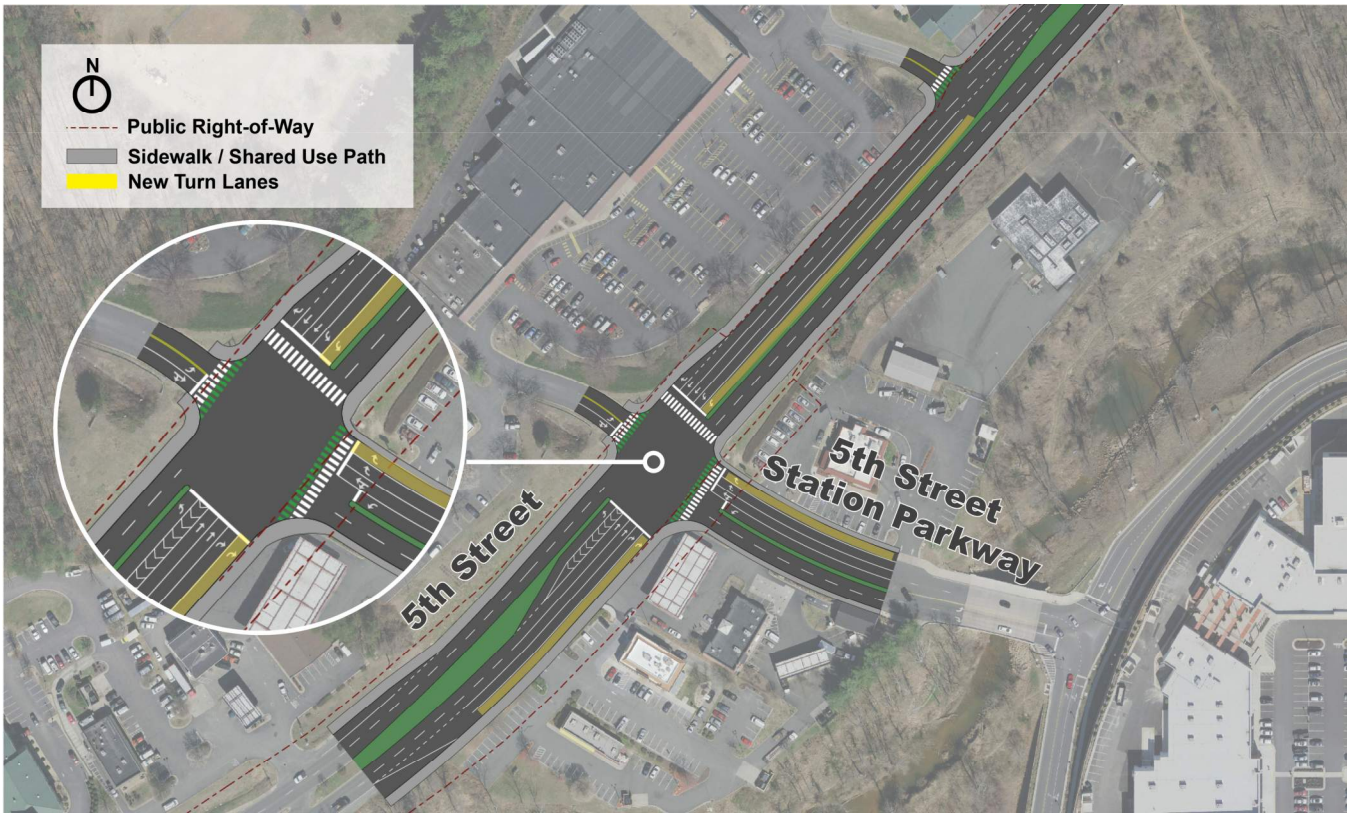


Figure 12. Left-turn Restrictions, 5th Street and 5th Street Station Parkway

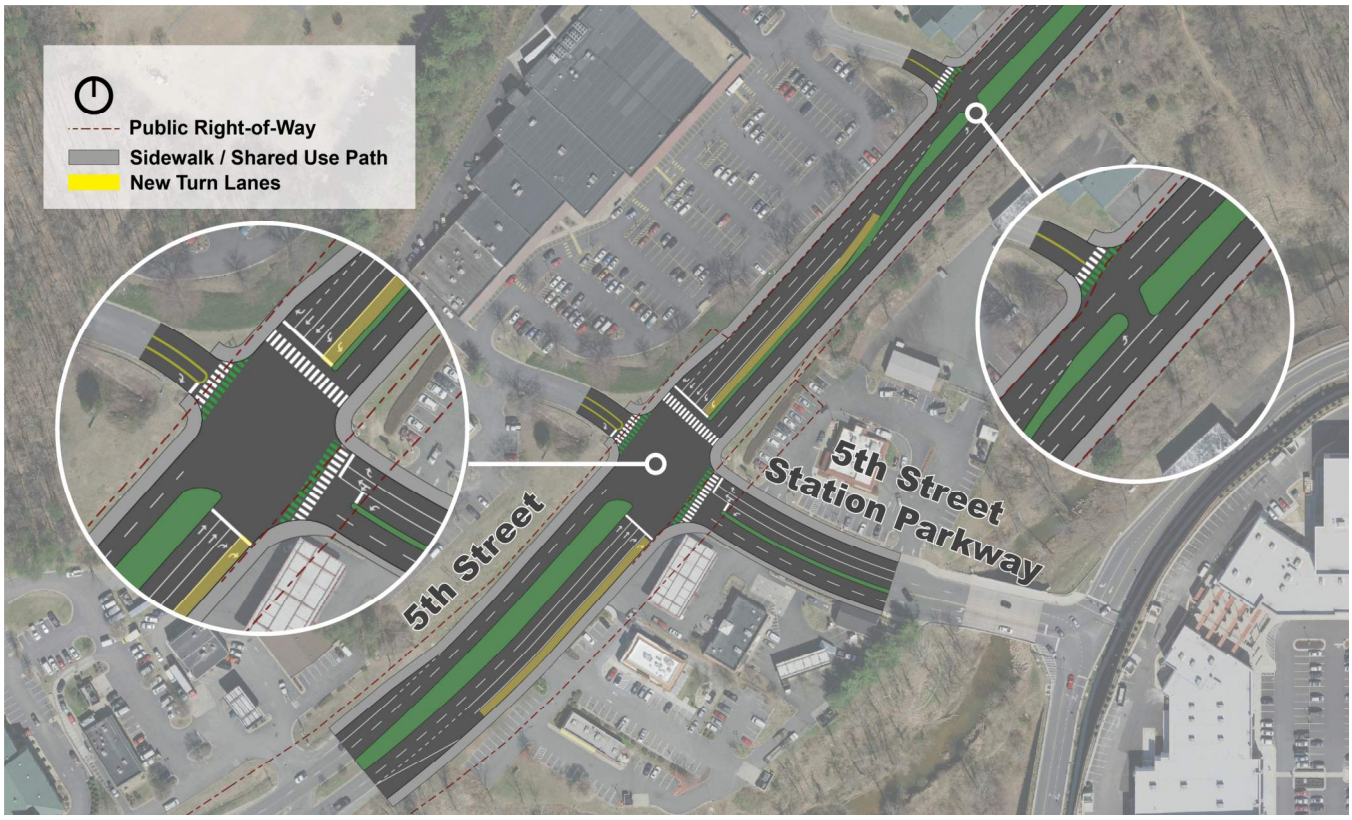


Table 6. Future No-Build and Intersection Alternative Operational Analysis Comparison, 5th Street and 5th Street Station Parkway

Intersection	Alternative	Peak hour	Intersection delay (sec) and level of service[1]	Worst-performing movement			
				Movement	Delay (sec) and level of service[2]	v/c[2]	95th percentile queues (vehicles)[3]
5th Street/ 5th Street Station Parkway (signalized)	No Build	AM Peak	79.5 (E)	5th Street (SBL)	262.7 (F)	1.49	26
		PM Peak	193.7 (F)	5th Street (SBL)	440.6 (F)	1.90	64
	Expand Intersection	AM Peak	34.3 (C)	5th Street Station Parkway (WBL)	61.2 (E)	0.80	17
		PM Peak	53.5 (D)	5th Street (SBL)	76.8 (E)	0.99	10
	Left-Turn Restrictions	AM Peak	17.9 (B)	5th Street (SBL)	45.9 (D)	0.58	4
		PM Peak	25.3 (C)	5th Street (SBL)	52.7 (D)	0.93	12

[1] Average intersection delay, LOS reported only for signalized intersections and roundabouts

[2] Reported delay, LOS, v/c, and 95th percentile queues represent the worst-performing metric at each intersection

[3] 95th percentile queues rounded up to the nearest whole number

I-64 Interchange and 5th Street

Safety challenges related to heavy vehicle demand occur at both signalized ramp intersections on 5th Street at the I-64 interchange. Long vehicle queues and high volumes of vehicles turning on and off of the I-64 interchange ramps contribute to rear-end and angle crashes, respectively. This section also faces congestion challenges at the 5th Street and the I-64 eastbound ramp. Neither of the traffic signals at the interchange have pedestrian accommodations, and a narrow concrete walkway on the bridge is the only option for bicyclists and pedestrians traveling on the bridge. With these limited facilities, bicyclists and pedestrians have trouble safely and comfortably crossing over I-64.

The study team developed near- and long-term alternatives for the I-64 interchange.

Near-Term Alternative

The near-term alternative would focus on adding crosswalks at intersections and wider sidewalks on both sides of the bridge to improve non-motorized users' safety and comfort. If paired with bicycle and pedestrian facilities north and south of I-64, this alternative would increase multimodal connections to employment and transit. This alternative would cost approximately $2,600,000.

This transportation alternative is illustrated in **Figure 13**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Long-Term Alternative

The long-term alternative is a project development and environmental study to vet and select a preferred interchange improvement.

The preliminary VJuST analysis suggests that a diverging diamond interchange (DDI) may be a viable alternative. A DDI is a grade-separated interchange design where the major road, 5th Street, crosses to the other side of the roadway between freeway ramps. This design reduces vehicle conflict points and separates vehicle travel form bicycle and pedestrian travel. This design would improve travel times for cars and buses and add ADA-accessible crossings for bicyclist and pedestrians. This alternative would also have substantial right-of-way and drainage impacts. If selected through the project development and environmental study, this alternative would cost approximately $9,400,000.

Key elements of a diverging diamond interchange and example of a constructed DDI at I-64 and US 15 (James Madison Highway) are illustrated in **Figure 14**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Operational Analysis

The study team used the future operations analysis from the Existing and Future No-build Conditions Analysis to compare how the I-64 interchange would perform with and without the near-term alternative. The operational impacts of the long-term alternative would be determined through the Project Development and Environment study. **Table 7** compares the weekday AM and PM peak hour operational analysis results for the future no-build and near-term alternatives. The full analysis for the future no-build alternative and near-term alternative can be found in **Attachment F**.

Under future no-build conditions and the near-term alternative, the eastbound and westbound ramps at the I-64 interchange have movements operating at LOS F and over capacity during both the AM and PM peak hour. Both signals operate at LOS E or F during the AM and PM peak hour.

The addition of crosswalks to allow north-south travel on both sides of 5th Street will not substantially change intersection operations and travel times for cars and buses.

Figure 13. Near-Term Alternative, 5th Street and I-64 Interchange

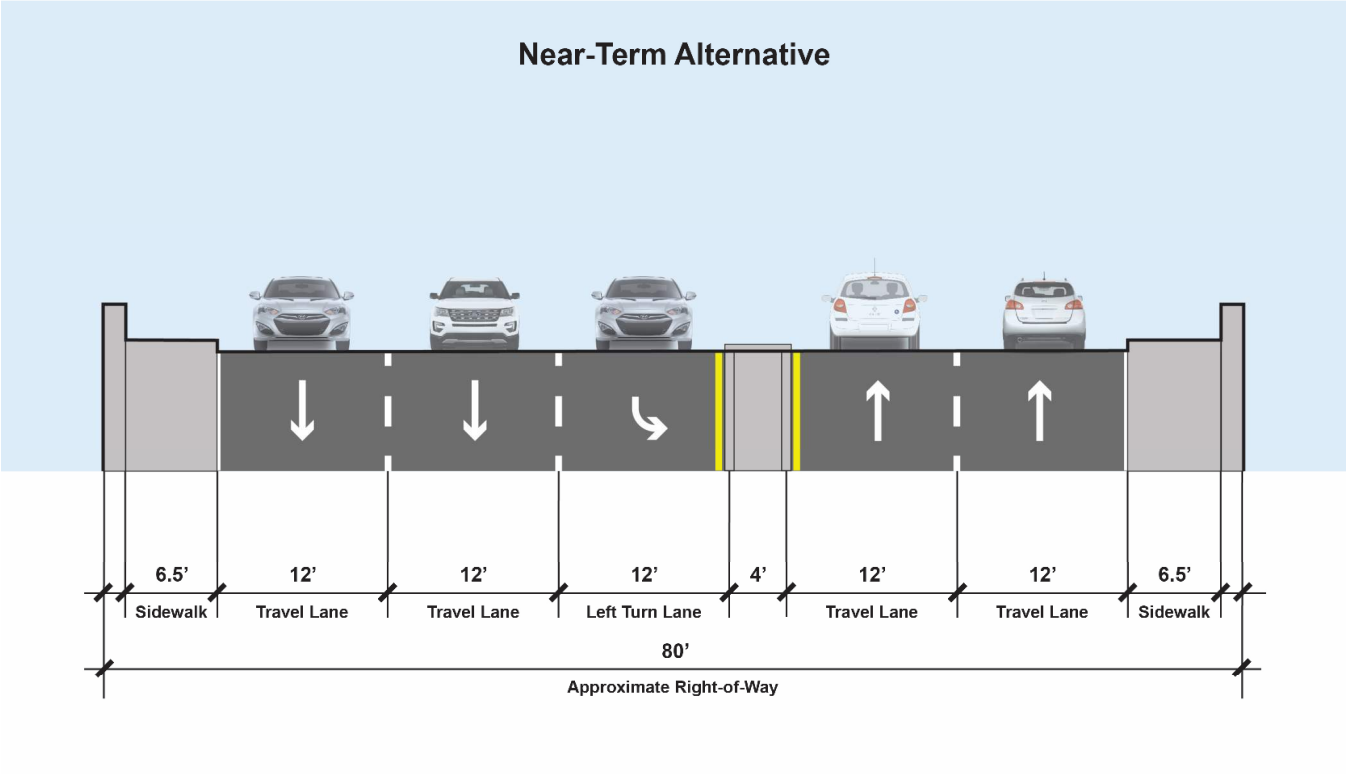
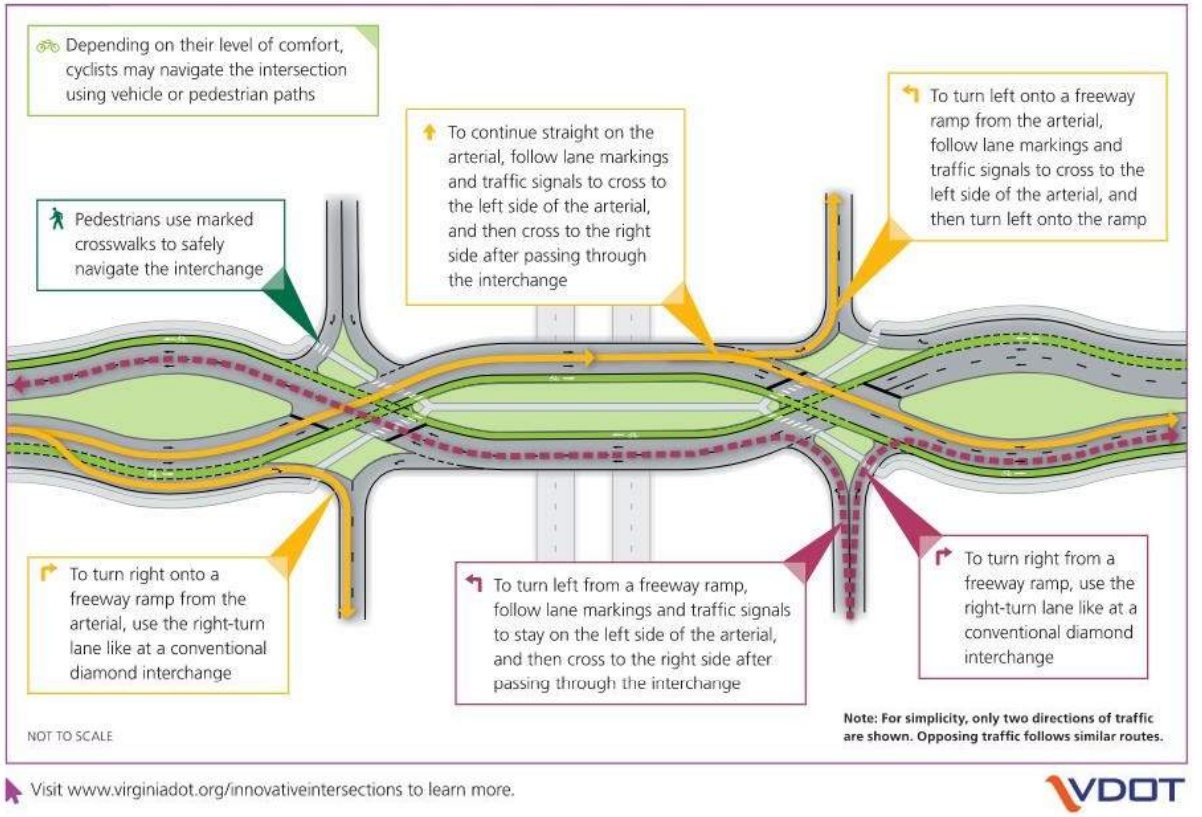


Figure 14. Long-Term Alternative, 5th Street and I-64 Interchange



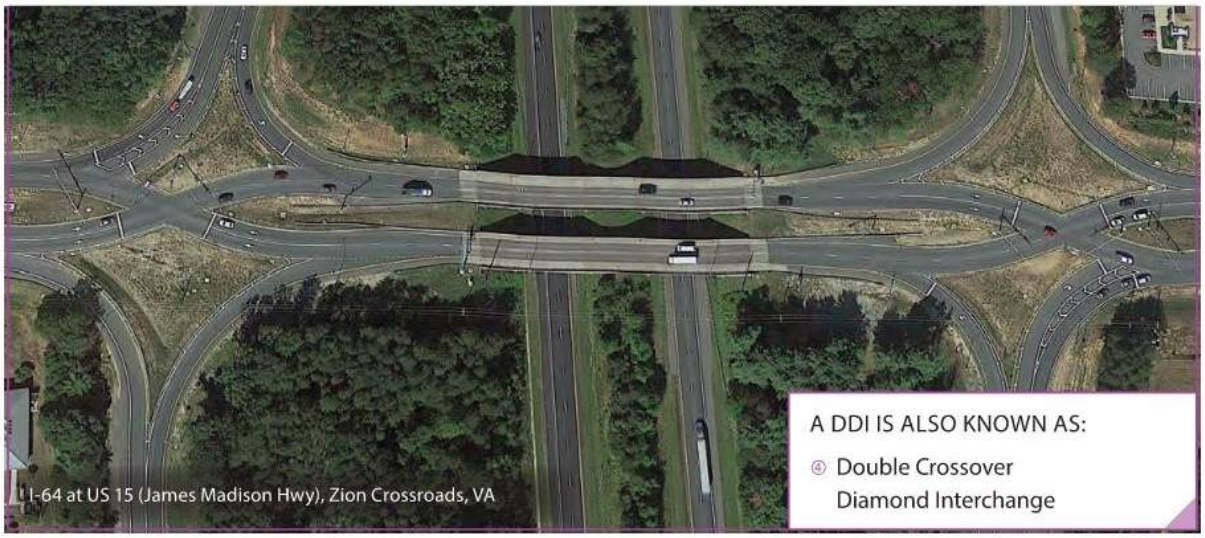


Table 7. Future No-Build and Intersection Alternative Operational Analysis Comparison, 5th Street and I-64 Interchange

Intersection	Alternative	Peak hour	Intersection delay (sec) and level of service[1]	Worst-performing movement			
				Movement	Delay (sec) and level of service[2]	v/c[2]	95th percentile queues (vehicles)[3]
5th Street / I-64 Eastbound Ramps (signalized)	No Build	AM Peak	100.1 (F)	5th Street (SBL)	154.0 (F)	1.26	18
		PM Peak	80.2 (F)	5th Street (SBL)	162.1 (F)	1.30	30
	Near-Term Alternative	AM Peak	100.8 (F)	5th Street (SBL)	161.1 (F)	1.26	19
		PM Peak	83.6 (F)	5th Street (SBL)	209.8 (F)	1.41	35
5th Street / I-64 Westbound Ramps (signalized)	No Build	AM Peak	80.2 (F)	5th Street (SBR)	247.8 (F)	1.43	54
		PM Peak	60.8 (E)	I-64 WB Off-Ramp (SBR)	162.3 (F)	1.24	33
	Near-Term Alternative	AM Peak	74.6 (E)	I-64 WB Off-Ramp (SBR)	248.3 (F)	1.45	54
		PM Peak	61.5 (E)	I-64 WB Off-Ramp (SBR)	162.3 (F)	1.24	33

[1] Average intersection delay, LOS reported only for signalized intersections and roundabouts

[2] Reported delay, LOS, v/c, and 95th percentile queues represent the worst-performing metric at each intersection

[3] 95th percentile queues rounded up to the nearest whole number

Stagecoach Road and 5th Street

The unsignalized intersection of Stagecoach Road and 5th Street experiences safety challenges and delay related to turning vehicles. The Albemarle County Police Department directs traffic at this intersection during the weekday AM rush hour so families can turn onto Stagecoach Road from 5th Street to drop off their children at the Covenant School. A new development on the north leg of the intersection will increase intersection delay and turning conflicts.

Roundabout

This alternative replaces the unsignalized intersection with a roundabout. Roundabouts improve safety by calming traffic, reducing vehicle conflict points, and adding ADA-accessible pedestrian crossing opportunities. This alternative would slightly improve travel times and connect multimodal facilities to employment and transit opportunities. The roundabout would minor right-of-way impacts and reduced drainage impacts by increasing available space for landscaping. This alternative would cost approximately $3,500,000.

This transportation alternative is illustrated in **Figure 15**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Restricted Crossing U-Turn

This alternative replaces the unsignalized intersection with an unsignalized Restricted Crossing U-Turn (RCUT). RCUTs are intersection designs where all side street movements begin with a right turn. Side street left turn and through vehicles turn right and make a U-turn at a dedicated downstream median opening to complete the desired movement. This alternative would improve safety by reducing vehicle conflict points and adding ADA-accessible pedestrian crossing opportunities. This alternative would also slightly improve travel times for cars and buses on 5th Street, while slightly increasing travel times for vehicles turning left onto 5th Street. It would connect multimodal facilities to employment and transit opportunities. The RCUT would have moderate right-of-way and drainage impacts by constructing the U-turn crossovers (i.e., loons) east and west of Stagecoach Road. This alternative would cost approximately $3,600,000.

This transportation alternative is illustrated in **Figure 16**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Operational Analysis

The study team used the future operations analysis from the Existing and Future No-build Conditions Analysis to compare how the intersection of 5th Street and Stagecoach Road perform with and without the roundabout and RCUT alternatives. **Table 8** compares the operational analysis results for the alternatives. The full analysis can be found in **Attachment G**.

Under future no-build conditions, the intersection of 5th Street and Stagecoach Road has movements operating at LOS F but well under capacity during both the AM and PM peak hour. This is because the small number of vehicles on Stagecoach Road or Afton Pond Court have to wait a long period of time to find a safe gap in busier traffic on 5th Street.

Under the roundabout alternative, the intersection of 5th Street and Stagecoach Road would perform acceptably during both the AM and PM peak hour. The intersection would have movements operating at or below LOS D and under capacity. The full roundabout would operate at LOS A and under capacity during the AM and PM peak hour.

Under the RCUT alternative, the intersection of 5th Street and Stagecoach Road would perform acceptably during both the AM and PM peak hour. The intersection would have movements operating at or below LOS D and under capacity.

Figure 15. Roundabout, 5th Street and Stagecoach Road

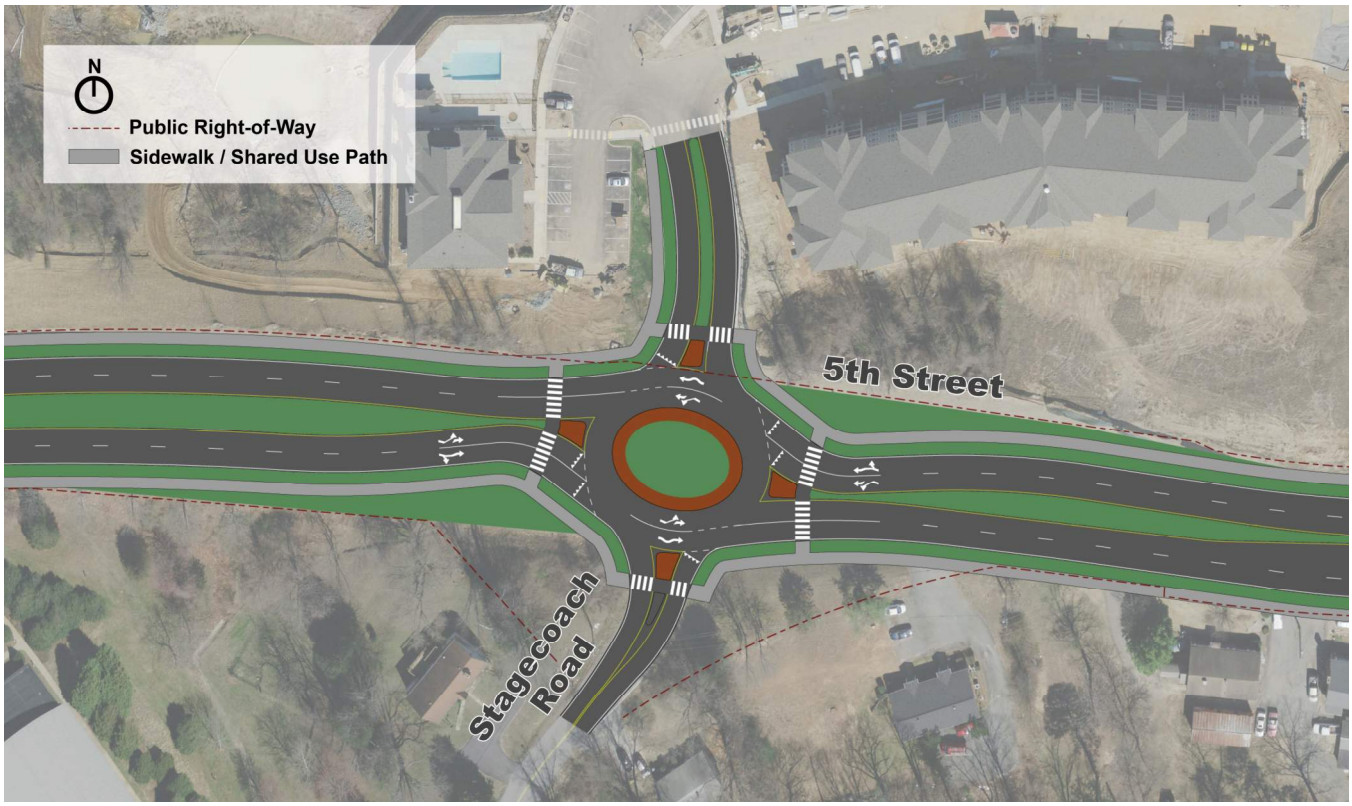


Figure 16. Restricted Crossing U-turn (RCUT), 5th Street and Stagecoach Road

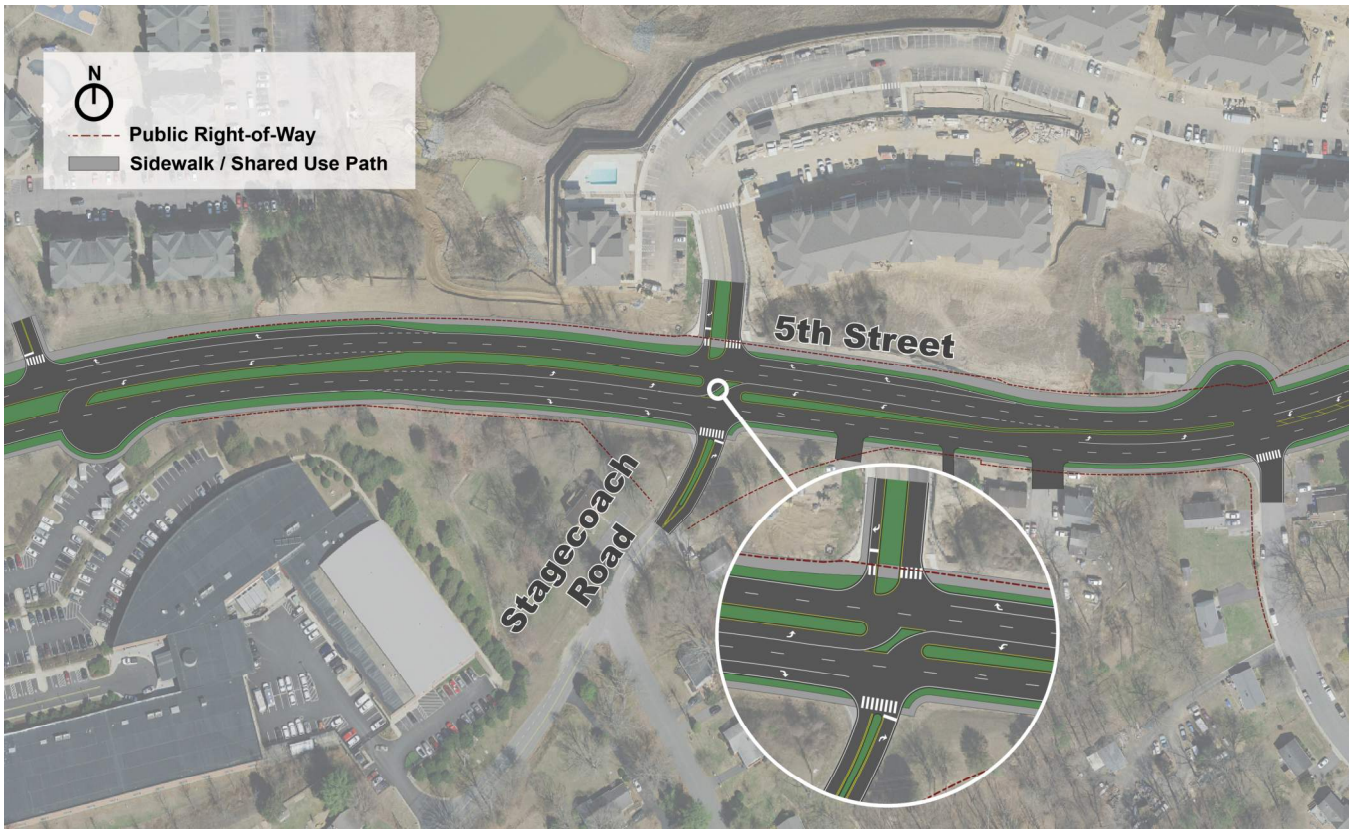


Table 8. Future No-Build and Intersection Alternative Operational Analysis Comparison, 5th Street and Stagecoach Road

Intersection	Alternative	Peak hour	Intersection delay (sec) and level of service[1]	Worst-performing movement			
				Movement	Delay (sec) and level of service[2]	v/c[2]	95th percentile queues (vehicles)[3]
5th Street/ Stagecoach Road	No Build	AM Peak		Stagecoach Road (WBL/TH)	69.4 (F)	0.07	1
		PM Peak		Stagecoach Road (EBL/TH)	62.4 (F)	0.23	1
	Roundabout	AM Peak	6.7 (A)	Stagecoach Road (WB)	15.6 (C)	0.62	7
		PM Peak	4.8 (A)	Afton Pond Court (EB)	14.0 (B)	0.04	1
	Restricted Crossing U-Turn	AM Peak	-	Stagecoach Road (WB)	25.9 (D)	0.64	5
		PM Peak	-	Stagecoach Road (WB)	13.6 (B)	0.29	2

[1] Average intersection delay, LOS reported only for signalized intersections and roundabouts

[2] Reported delay, LOS, v/c, and 95th percentile queues represent the worst-performing metric at each intersection

[3]95th percentile queues rounded up to the nearest whole number

Old Lynchburg Road and 5th Street

The unsignalized intersection of Old Lynchburg Road and 5th Street experiences safety challenges and delays due to turning vehicles. Old Lynchburg Road and 5th Street had the highest number of crashes at an unsignalized intersection on the corridor. Angle crashes make up a higher proportion of crashes at Old Lynchburg Road compared to the corridor-wide average. If current land use growth trends continue and no changes are made to the intersection aside from routine maintenance, it may experience high motor vehicle delay during the weekday AM and PM rush hours in 2040.

Roundabout

This option replaces the unsignalized intersection with a roundabout. Roundabouts improve safety by calming traffic, reducing vehicle conflict points, and adding ADA-accessible pedestrian crossing opportunities. This option would slightly improve travel times and connect multimodal facilities to employment and transit opportunities. The roundabout would have some right-of-way impacts but would reduce drainage by increasing available space for landscaping. This option would cost approximately $5,200,000.

This transportation alternative is illustrated in **Figure 17**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Restricted Crossing U-Turn

This option replaces the unsignalized intersection with an unsignalized Restricted Crossing U-Turn (RCUT). This option would improve safety by reducing vehicle conflict points and adding ADA-accessible pedestrian crossing opportunities. This option would also slightly improve travel times for cars and buses on 5th Street, while slightly increasing travel times for vehicles turning left onto 5th Street. It would connect multimodal facilities to employment and transit opportunities. The RCUT would have minor right-of-way and drainage impacts by opening the median east and west of Old Lynchburg Road. This option would cost approximately $2,700,000.

This transportation alternative is illustrated in **Figure 18**. The planning-level cost estimate spreadsheet can be found in **Attachment A**.

Operational Analysis

The study team used the future operations analysis from the Existing and Future No-build Conditions Analysis to compare how the intersection of 5th Street and Old Lynchburg Road perform with and without the roundabout and RCUT alternatives. **Table 9** compares the weekday AM and PM peak hour operational analysis results for the alternatives. The full analysis for the intersection of 5th Street and Old Lynchburg Road can be found in **Attachment H**.

Under future no-build conditions, the intersection of 5th Street and Old Lynchburg Road has movements operating at LOS F during both the AM and PM peak hour.

Under the roundabout alternative, the intersection of 5th Street and Old Lynchburg Road would perform acceptably during both the AM and PM peak hour. The intersection would have movements operating at or below LOS D and under capacity. The roundabout would operate at LOS A and under capacity during the AM and PM peak hour.

Under the RCUT alternative, the intersection of 5th Street and Old Lynchburg Road would perform acceptably during both the AM and PM peak hour. The intersection would have movements operating at or below LOS D and under capacity.

Figure 17. Roundabout, 5th Street and Old Lynchburg Road

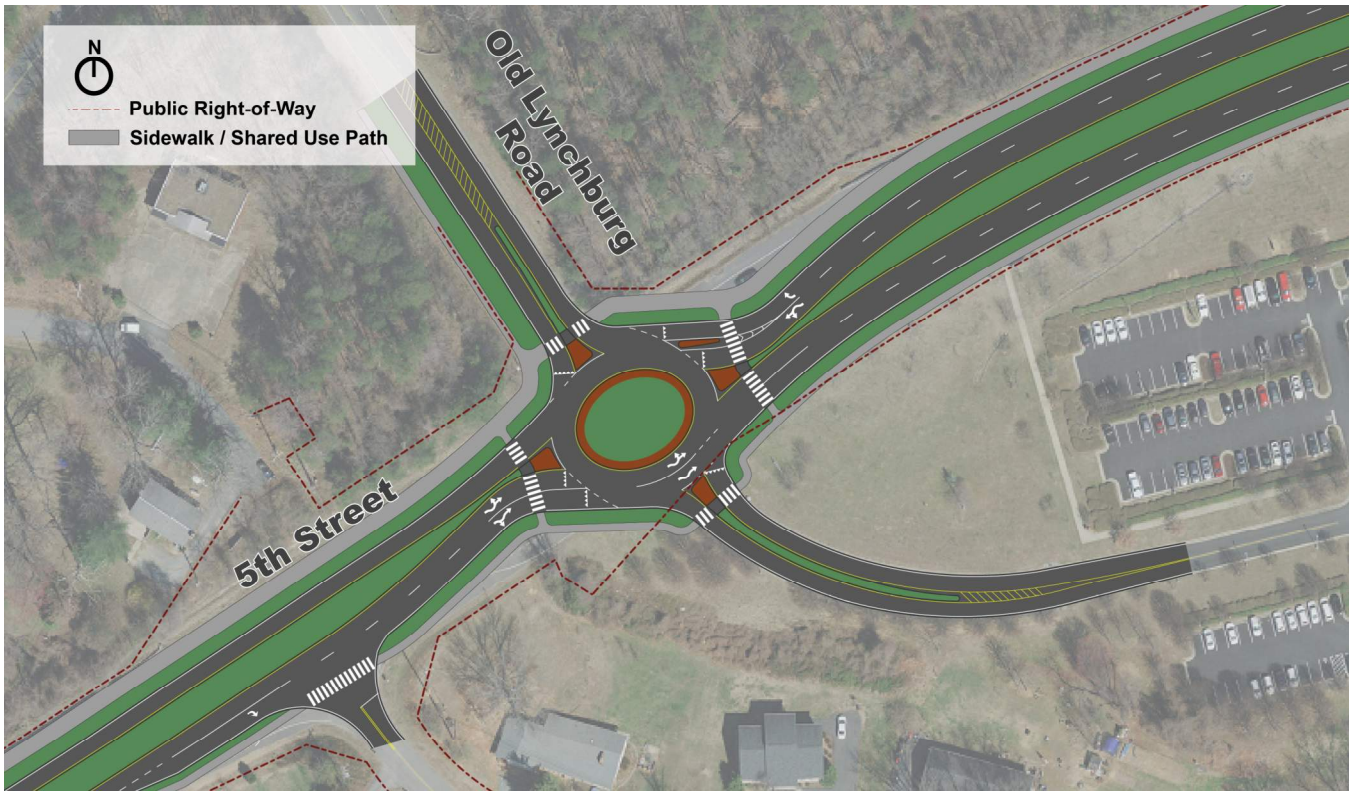


Figure 18. Restricted Crossing U-turn (RCUT), 5th Street and Stagecoach Road

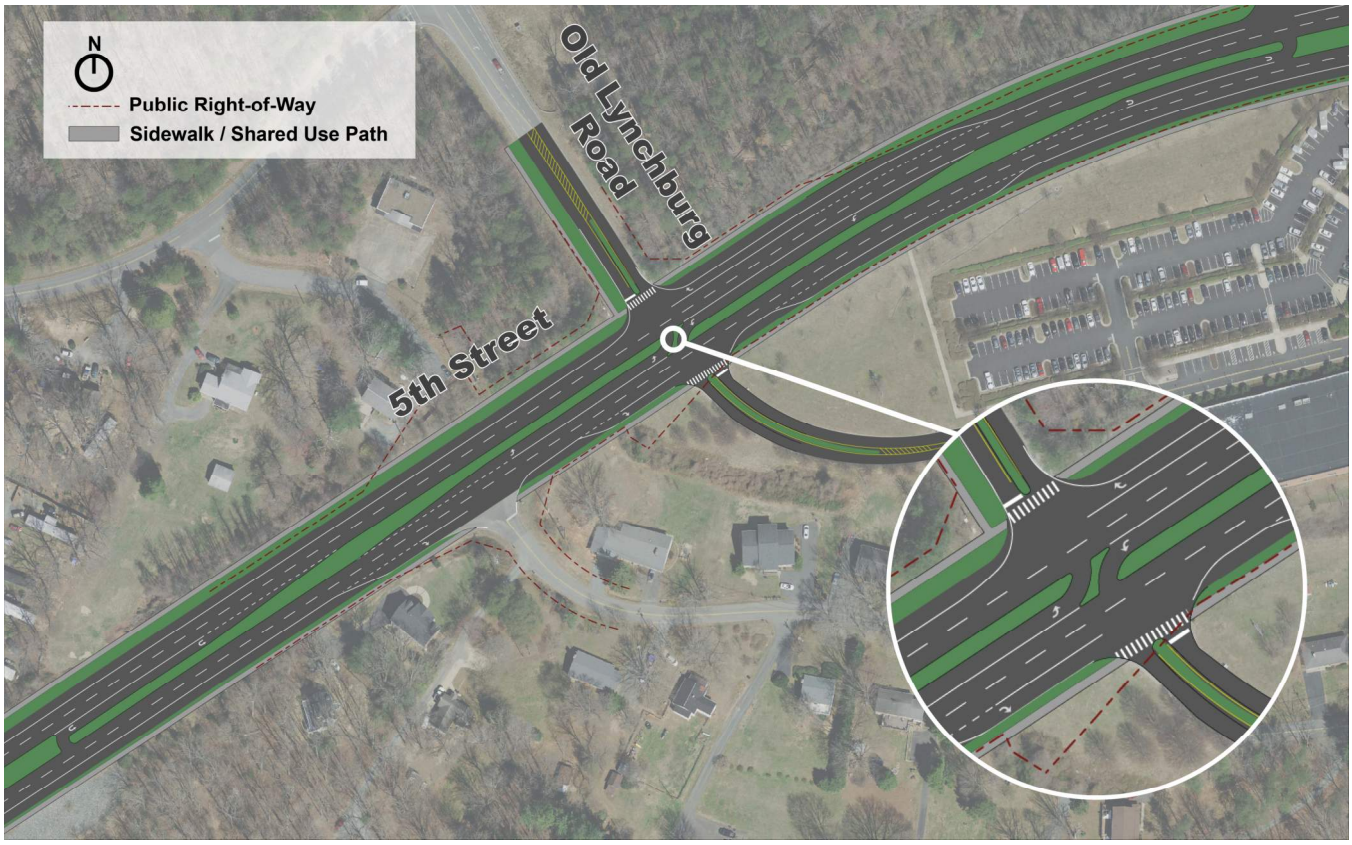


Table 9. Future No-Build and Intersection Alternative Operational Analysis Comparison, 5th Street and Old Lynchburg Road

Intersection	Alternative	Peak hour	Intersection delay (sec) and level of service[1]	Worst-performing movement			
				Movement	Delay (sec) and level of service[2]	v/c[2]	95th percentile queues (vehicles)[3]
5th Street/ Old Lynchburg Road	No Build	AM Peak		Old Lynchburg Road (EB)	473.5 (F)	1.89	22
		PM Peak		Old Lynchburg Road (EB)	254.4 (F)	1.40	16
	Roundabout	AM Peak	8.3 (A)	Old Lynchburg Road (EB)	12.4 (B)	0.39	3
		PM Peak	8.4 (A)	Old Lynchburg Road (EB)	25.2 (D)	0.67	8
	Restricted Crossing U-Turn	AM Peak	-	Old Lynchburg Road (EBL/TH)	32.0 (D)	0.54	4
		PM Peak	-	Old Lynchburg Road (EBL/TH)	32.0 (D)	0.57	4

[1] Average intersection delay, LOS reported only for signalized intersections and roundabouts

[2] Reported delay, LOS, v/c, and 95th percentile queues represent the worst-performing metric at each intersection

[3] 95th percentile queues rounded up to the nearest whole number

5.0 ALTERNATIVE ANALYSIS

VDOT and the study team evaluated the refined group of street and intersection alternatives. The study team aimed to develop an alternative analysis process that was objective, iterative, and rooted in the project goals and objectives. Given the length of the study corridor, the team acknowledged the potential that the final recommendations could be a combination of multiple alternatives.

Screening Criteria

The assessment of how each street and intersection alternative performed related to each of the study goals was conducted at the objectives level. The study goals and objectives are summarized in **Table 1**. VDOT and the study team developed qualitative and quantitative screening criteria related to the study objectives. The stakeholder group provided feedback on the screening criteria during the second stakeholder group meeting in April 2020.

Table 10 presents the criteria along with explanations of how the criteria would be assessed. The rightmost three columns describe what is assumed to constitute "worse," "moderate," and "better" performance.

Table 10. Screening Criteria

Goals	Criteria	Reported as	Worse	Moderate	Better
Improve safety and comfort	Number of elements with high crash modification factors (CMFs)	Percent increase in CMFs per street segment	The total number of CMFs along the segment is relatively low	The total number of CMFs along the segment is relatively moderate/average	The total number of CMFs along the segment is relatively high
	Potential to incorporate access management as part of alternative	Low/Medium/High	The potential to incorporate access management as part of the alternative is relatively low	The potential to incorporate access management as part of the alternative is relatively moderate/average	The potential to incorporate access management as part of the alternative is relatively high
	Potential to influence driver compliance with posted speed	Low/Medium/High	The potential to influence driver compliance with posted speeds is relatively low	The potential to influence driver compliance with posted speeds is relatively moderate/average	The potential to influence driver compliance with posted speeds is relatively high
	Length of consistent, continuous bicycle and pedestrian facilities	Feet	Feet of consistent, continuous bicycle and pedestrian facilities along the segment is relatively low	Feet of consistent, continuous bicycle and pedestrian facilities along the segment is relatively moderate/average	Feet of consistent, continuous bicycle and pedestrian facilities along the segment is relatively high
	Number of ADA accessible transit stops	Number	The number of ADA accessible transit stops in the vicinity of the segment is relatively low	The number of ADA accessible transit stops in the vicinity of the segment is relatively moderate/average	The number of ADA accessible transit stops in the vicinity of the segment is relatively high
	Number of designated (e.g., signed, signalized) pedestrian crossing opportunities connecting to corridor generators	Number	The number of designated pedestrian crossing opportunities connecting to corridor generators along the segment is relatively low	The number of designated pedestrian crossing opportunities connecting to corridor generators along the segment is relatively moderate/average	The number of designated pedestrian crossing opportunities connecting to corridor generators along the segment is relatively high
	Pedestrian crossing distance curb to curb	Feet	The pedestrian crossing distance curb to curb along the segment is relatively high	The pedestrian crossing distance curb to curb along the segment is relatively moderate/average	The pedestrian crossing distance curb to curb along the segment is relatively low
	Width of buffer between back of pedestrian/bicycle facility and edge of vehicular travel lane	Feet	The width of the buffer between the back of the multimodal facility and edge of vehicular travel lane is relatively low	The width of the buffer between the back of the multimodal facility and edge of vehicular travel lane is relatively moderate/average	The width of the buffer between the back of the multimodal facility and edge of vehicular travel lane is relatively high
Manage congestion	Potential to increase daily transit ridership	Low/Medium/High	The potential to increase daily transit ridership is relatively low	The potential to increase daily transit ridership is relatively moderate/average	The potential to increase daily transit ridership is relatively high
	Travel times for trips	Build year level of service	Travel times for trips are relatively high	Travel times for trips are relatively moderate/average	Travel times for trips are relatively low
	Physical improvements that promote consistent transit run times	Build year level of service	The number of physical improvements that promote consistent transit run times at the intersection is relatively low	The number of physical improvements that promote consistent transit run times at the intersection is relatively moderate/average	The number of physical improvements that promote consistent transit run times at the intersection is relatively high
	Potential to increase bicycle and pedestrian activity on the corridor	Acres	The total area of the intersection walkshed is relatively low	The total area of the intersection walkshed is relatively moderate/average	The total area of the intersection walkshed is relatively high

Goals	Criteria	Reported as	Worse	Moderate	Better
	Potential to impact intersection delay at intersections that will be congested in the future no-build condition	Build year level of service	The potential to impact intersection delay at the intersection is relatively low	The potential to impact intersection delay at the intersection is relatively moderate/average	The potential to impact intersection delay at the intersection is relatively high
Support economic development	Population accessible by connected bike and pedestrian facilities	Number per street segment / intersection	The overall population living within walking and biking distance of the segment is relatively low	The overall population living within walking and biking distance of the segment is relatively moderate/average	The overall population living within walking and biking distance of the segment is relatively high
	Jobs accessible by connected bike and pedestrian facilities	Number per street segment/ intersection	The total number of jobs located within walking and biking distance of the segment is relatively low	The total number of jobs located within walking and biking distance of the segment is relatively moderate/average	The total number of jobs located within walking and biking distance of the segment is relatively high
	Transit stops accessible by connected bike and pedestrian facilities	Number per street segment / intersection	The total number of transit stations located within walking and biking distance of the segment is relatively low	The total number of transit stations located within walking and biking distance of the segment is relatively moderate/average	The total number of transit stations located within walking and biking distance of the segment is relatively high
	Potential to increase landscaping	Square feet per street segment Low/Medium/High for intersection	The potential to increase landscaping with the segment design is relatively low	The potential to increase landscaping with the segment design is relatively moderate/average	The potential to increase landscaping with the segment design is relatively high
	Potential to increase lighting	Low/Medium/High	The potential to increase lighting with the segment design is relatively low	The potential to increase lighting with the segment design is relatively moderate/average	The potential to increase lighting with the segment design is relatively high
	Potential to improve signage/wayfinding	Low/Medium/High	The potential to improve signage and wayfinding with the segment design is relatively low	The potential to improve signage and wayfinding with the segment design is relatively moderate/average	The potential to improve signage and wayfinding with the segment design is relatively high
Support environmental sustainability and community health	Feet of separated bicycle facilities that connect to existing and future trails	Feet	The total feet of **separated** bicycle facilities that connect to existing and future trails is relatively low	The total feet of **separated** bicycle facilities that connect to existing and future trails is relatively moderate/average	The total feet of **separated** bicycle facilities that connect to existing and future trails is relatively high
	Increase in ADA-accessible transit facilities	Number along street segment	The increase in ADA-accessible facilities along the segment is relatively low	The increase in ADA-accessible facilities along the segment is relatively moderate/average	The increase in ADA-accessible facilities along the segment is relatively high
	Mixed and low-income neighborhoods accessible by interconnected bike, pedestrian, and transit facilities	Number per street segment	The mixed- and low-income population living within walking and biking distance of the segment is relatively low	The mixed- and moderate/average-income population living within walking and biking distance of the segment is relatively moderate/average	The mixed- and high-income population living within walking and biking distance of the segment is relatively high
	Likelihood that general population will use the multimodal facility to bike	Low/Medium/High	The likelihood that the general population will use the multimodal facility to bike is relatively low	The likelihood that the general population will use the multimodal facility to bike is relatively moderate/average	The likelihood that the general population will use the multimodal facility to bike is relatively high

Screening Results

VDOT and the study team used color-coded tables to aid in synthesizing the evaluation results. Darker green colors represented better performance on the various criteria, while lighter green colors reflected worse performance. Grey cells indicate criteria that were not applicable to the street alternatives analysis.

To the extent possible, the assessments of low, medium, or high performance were based on data from the existing conditions analysis and empirical research of the street and intersection alternatives.

Street Alternatives Analysis

The screening criteria previously discussed were applied to the street alternatives proposed for 5th Street north of I-64, for 5th Street at the I-64 Interchange, and for 5th Street south of I-64. The section south of I-64 was divided into two sections: I-64 Interchange to Old Lynchburg Road and Old Lynchburg Road to Ambrose Commons Road to better analyze the road diet alternatives. The results of the evaluation are presented in **Table 11** (street segments north of I-64 and the I-64 Interchange) and **Table 12** (street segments south of I-64).

A visual review suggests that, discounting project cost, the most effective street alternatives for 5th Street would be:

- Sidewalk and shared use path with separated bicycle facilities for 5th Street north of the I-64 Interchange;
- Both the short-term (sidewalk and crossings) and long-term (diverging diamond interchange) alternatives for 5th Street at the I-64 Interchange;
- Sidewalk and separated bicycle facilities for 5th Street from the I-64 Interchange to Old Lynchburg Road; and,
- Road Diet with sidewalk and separated bicycle facilities for 5th Street from Old Lynchburg Road to Ambrose Commons Drive.

Table 11. North of I-64 Street Segment Alternatives Screening

Street Segment Alternatives Screening		Harris Road to I-64						I-64 Interchange		
Goals	**Criteria**	**No Build**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**Sidewalk & Shared Use Path & Bike Lane**	**No Build**	**Sidewalk**	**Diverging Diamond**
Improve safety and comfort	Number of elements with high crash modification factors (CMFs) (Percent increase in CMFs per segment)	100%	138%	125%	125%	125%	138%	100%	233%	167%
	Potential to incorporate access management as part of alternative (Low/Medium/High)	Low	Medium	Medium	Medium	Medium	Medium	Low	Low	Low
	Potential to influence driver compliance with posted speeds (Low/Medium/High)	Low	Medium	Low	Medium	Medium	Medium	Low	Low	Low
	Feet of consistent, continuous bicycle and pedestrian facilities	1,100	6,400	6,400	6,400	3,200	6,400	700	1,400	1,400
	Number of ADA accessible transit stops	0	5	5	5	5	5	0	2	2
	Number of designated (e.g., signed, signalized) pedestrian crossing opportunities connecting to corridor generators									
	Pedestrian crossing distance curb to curb (Feet)	85	75	90	75	75	90	70	65	40
	Width of buffer between back of pedestrian/bicycle facility and edge of vehicular travel lane (Feet)	0	4	14.5	4	8	14.5	3	0	8
Manage congestion	Potential to increase daily transit ridership (Low/Medium/High)	Low	High	High	Medium	Medium	High	Low	Medium	Medium
	Travel times for vehicular trips									
	Physical improvements that promote consistent transit run times									

Street Segment Alternatives Screening		Harris Road to I-64						I-64 Interchange		
Goals	**Criteria**	**No Build**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**Sidewalk & Shared Use Path & Bike Lane**	**No Build**	**Sidewalk**	**Diverging Diamond**
	Potential to increase bicycle and pedestrian activity on the corridor (Acres)	85	125	125	125	125	125	0	55	55
	Potential to impact intersection delay at intersections that will be congested in the future no-build condition									
Support economic development	Population accessible by connected bike and pedestrian facilities (Number of people per segment)	590	845	845	845	845	845	0	390	390
	Jobs accessible by connected bike and pedestrian facilities (Number of jobs per segment)	230	230	230	230	230	230	0	45	45
	Transit stops accessible by connected bike and pedestrian facilities (Number per segment)	3	4	4	4	4	4	0	2	2
	Potential to increase landscaping (Square feet)	11,400	53,400	91,100	40,800	38,700	91,100	4,200	0	11,200
	Potential to increase lighting									
	Potential to improve signage/wayfinding (Low/Medium/High)	Low	High	High	High	High	High	Low	Medium	Medium
Support environmental sustainability and community health	Feet of separated bicycle facilities that connect to existing and future trails	0	3,200	6,400	0	3,200	6,400	0	0	700
	Increase in ADA-accessible facilities (Number per segment)	0	5	5	5	5	5	0	2	2
	Mixed and low-income population accessible by interconnected bike, pedestrian, and transit facilities (Number of households per segment)	100	160	160	160	160	160	0	110	110
	Likelihood that general population will use the multimodal facility to bike (Low/Medium/High)	Low	Medium	High	Low	Medium	High	Low	Low	Medium

Table 12. South of I-64 Street Segment Alternatives Screening

Street Segment Alternatives Screening		I-64 to Old Lynchburg Road					Old Lynchburg Road to Ambrose Commons Drive					
Goals	**Criteria**	**No Change**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**No Build**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**Road Diet with Sidewalk & Bike Lane**
Improve safety and comfort	Number of elements with high crash modification factors (CMFs) (Percent increase in CMFs per segment)	100%	200%	167%	167%	167%	100%	300%	200%	200%	200%	200%
	Potential to incorporate access management as part of alternative (Low/Medium/High)	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
	Potential to influence driver compliance with posted speeds (Low/Medium/High)	Low	Medium	Low	Medium	Medium	Low	Medium	Low	Medium	Medium	High
	Feet of consistent, continuous bicycle and pedestrian facilities	0	6,400	6,400	6,400	3,200	0	6,400	6,400	6,400	3,200	6,400
	Number of ADA accessible transit stops	0	3	3	3	3	0	3	3	3	3	3
	Number of designated (e.g., signed, signalized) pedestrian crossing opportunities connecting to corridor generators											
	Pedestrian crossing distance curb to curb (Feet)	90	80	80	80	80	90	80	95	80	80	75
	Width of buffer between back of pedestrian/bicycle facility and edge of vehicular travel lane (Feet)	0	4	14.5	4	8	0	4	14.5	4	8	14.5
Manage congestion	Potential to increase daily transit ridership (Low/Medium/High)	Low	High	High	Medium	Medium	Low	High	High	Medium	Medium	High
	Travel times for vehicular trips											
	Physical improvements that promote consistent transit run times											

Street Segment Alternatives Screening		I-64 to Old Lynchburg Road					Old Lynchburg Road to Ambrose Commons Drive					
Goals	**Criteria**	**No Change**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**No Build**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**Road Diet with Sidewalk & Bike Lane**
	Potential to increase bicycle and pedestrian activity on the corridor (Acres)	0	130	130	130	130	0	200	200	200	200	200
	Potential to impact intersection delay at intersections that will be congested in the future no-build condition											
Support economic development	Population accessible by connected bike and pedestrian facilities (Number of people per segment)	0	860	860	860	860	0	2,025	2,025	2,023	2,023	2,023
	Jobs accessible by connected bike and pedestrian facilities (Number of jobs per segment)	0	395	395	395	395	0	305	305	305	305	305
	Transit stops accessible by connected bike and pedestrian facilities (Number per segment)	0	2	2	2	2	0	2	2	2	2	2
	Potential to increase landscaping (Square feet)	4,100	53,800	91,800	41,100	33,200	3,600	54,700	93,400	41,900	33,800	93,400
	Potential to increase lighting											
	Potential to improve signage/wayfinding (Low/Medium/High)	Low	High	High	High	High	Low	High	High	High	High	High
Support environmental sustainability and community health	Feet of separated bicycle facilities that connect to existing and future trails	0	3,200	6,400	0	3,200	0	3,200	6,400	0	3,200	6,400
	Increase in ADA-accessible facilities (Number per segment)	0	3	3	3	3	0	3	3	3	3	3
	Mixed and low-income population accessible by interconnected bike, pedestrian, and transit facilities (Number of households per segment)	0	260	260	260	260	0	375	375	375	375	375

Street Segment Alternatives Screening		I-64 to Old Lynchburg Road					Old Lynchburg Road to Ambrose Commons Drive					
Goals	**Criteria**	**No Change**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**No Build**	**Sidewalk & Shared Use Path**	**Sidewalk & Bike Lane**	**Sidewalk**	**Shared Use Path**	**Road Diet with Sidewalk & Bike Lane**
	Likelihood that general population will use the multimodal facility to bike (Low/Medium/High)	**Low**	**Medium**	**High**	**Low**	**Medium**	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**

Intersection Alternatives Analysis

The screening criteria previously discussed were applied to the intersection alternatives proposed for the intersections of 5th Street and Harris Road, 5th Street Station Parkway, the I-64 Interchange, Stagecoach Road, and Old Lynchburg Road. The results of the evaluation are presented in **Table 13** and **Table 14**.

A visual review suggests that, discounting project cost, the most effective intersection alternatives for 5th Street would be:

- Intersection modification for 5th Street and Harris Road;
- Intersection modification with left-turn restrictions for 5th Street and 5th Street Station Parkway;
- Both the short-term (sidewalk and crossings) and long-term (diverging diamond) alternatives for 5th Street at the I-64 Interchange;
- Roundabout for 5th Street and Stagecoach Road;
- Roundabout for 5th Street and Old Lynchburg Road.

As can be seen in **Table 13**, no single alternative for the intersection of 5th Street and 5th Street Station Parkway achieves "better" performance across all criteria. This does not mean that these alternatives should not be considered. There are inherent trade-offs to be made in the eventual selection of a preferred alternative. Better performance on a certain criterium may ultimately matter more than worse performance on another one.

Table 13. North of I-64 Intersection Alternatives Screening

Intersection Alternatives Screening		Harris Road		5th Street Station Parkway			I-64 Interchange Ramps		
Goals	**Criteria**	**No Build**	**Intersection Modification**	**No Build**	**Expand Intersection**	**Restricted Left Turns**	**No Build**	**Intersection Modification**	**Diverging Diamond Interchange**
Improve safety and comfort	Number of elements with high crash modification factors (CMFs) (Percent increase in CMFs per segment)	6	7	7	7	8	3	6	5
	Potential to incorporate access management as part of alternative								
	Potential to influence driver compliance with posted speeds (Low/Medium/High)	Low	Medium	Low	Low	Low	Low	Low	Low
	Feet of consistent, continuous bicycle and pedestrian facilities								
	Number of ADA accessible transit stops								
	Number of designated (e.g., signed, signalized) pedestrian crossing opportunities connecting to corridor generators	4	4	4	4	4	0	6	6
	Pedestrian crossing distance curb to curb (Feet)	85	79	64	91	91	100	100	40
	Width of buffer between back of pedestrian/bicycle facility and edge of vehicular travel lane								
Manage congestion	Potential to increase daily transit ridership								
	Travel times for trips (Build year level of service)	LOS C	LOS D	LOS F	LOS D	LOS C	LOS F	LOS F	
	Physical improvements that promote consistent transit run times (Build year level of service)	LOS C	LOS D	LOS F	LOS D	LOS C	LOS F	LOS F	
	Potential to increase bicycle and pedestrian activity on the corridor (Acres)	81	85	28	59	59	0	56	56
	Potential to impact intersection delay at intersections that will be congested in the future no-build condition (Build year level of service)	LOS C	LOS D	LOS F	LOS D	LOS C	LOS F	LOS F	

Intersection Alternatives Screening		Harris Road		5th Street Station Parkway			I-64 Interchange Ramps		
Goals	**Criteria**	**No Build**	**Intersection Modification**	**No Build**	**Expand Intersection**	**Restricted Left Turns**	**No Build**	**Intersection Modification**	**Diverging Diamond Interchange**
Support economic development	Population accessible by connected bike and pedestrian facilities (Number or people per intersection)	626	626	211	425	425	0	391	391
	Jobs accessible by connected bike and pedestrian facilities (Number of jobs per intersection)	231	231	116	188	188	0	44	44
	Transit stops accessible by connected bike and pedestrian facilities	2	2	1	3	3	0	2	2
	Potential to increase landscaping (Low/Medium/High)	Medium	Medium	Low	Low	Low	Low	Low	Medium
	Potential to increase lighting (Low/Medium/High)	Medium	Medium	Low	Medium	Medium	Low	Low	High
	Potential to improve signage/wayfinding								
Environmental sustainability and community health	Feet of separated bicycle facilities that connect to existing and future trails								
	Increase in ADA-accessible facilities								
	Mixed and low-income population accessible by interconnected bike, pedestrian, and transit facilities (Number of households per intersection)	98	109	43	100	100	0	111	111

Table 14. South of I-64 Intersection Alternatives Screening

Intersection Alternatives Screening		Stagecoach Road/Afton Pond Court			Old Lynchburg Road		
Goals	**Criteria**	**No Build**	**Roundabout**	**Restricted Crossing U-Turn**	**No Build**	**Roundabout**	**Restricted Crossing U-Turn**
Improve safety and comfort	Number of elements with high crash modification factors (CMFs) (Percent increase in CMFs per segment)	2	4	4	2	4	4
	Potential to incorporate access management as part of alternative						
	Potential to influence driver compliance with posted speeds (Low/Medium/High)	Low	Medium	Low	Low	Medium	Low
	Feet of consistent, continuous bicycle and pedestrian facilities						
	Number of ADA accessible transit stops						
	Number of designated (e.g., signed, signalized) pedestrian crossing opportunities connecting to corridor generators	1	4	2	1	4	2
	Pedestrian crossing distance curb to curb (Feet)	83	32	48	105	35	58
	Width of buffer between back of pedestrian/bicycle facility and edge of vehicular travel lane						
Manage congestion	Potential to increase daily transit ridership						
	Travel times for trips (Build year level of service)	LOS F	LOS C	LOS D	LOS F	LOS D	LOS D
	Physical improvements that promote consistent transit run times (Build year level of service)	LOS F	LOS C	LOS D	LOS F	LOS D	LOS D
	Potential to increase bicycle and pedestrian activity on the corridor (Acres)	0	94	94	0	116	116

Intersection Alternatives Screening		Stagecoach Road/Afton Pond Court			Old Lynchburg Road		
Goals	**Criteria**	**No Build**	**Roundabout**	**Restricted Crossing U-Turn**	**No Build**	**Roundabout**	**Restricted Crossing U-Turn**
	Potential to impact intersection delay at intersections that will be congested in the future no-build condition (Build year level of service)	**LOS F**	**LOS C**	**LOS D**	**LOS F**	**LOS D**	**LOS D**
Support economic development	Population accessible by connected bike and pedestrian facilities (Number or people per intersection)	**0**	**583**	**583**	**0**	**869**	**869**
	Jobs accessible by connected bike and pedestrian facilities (Number of jobs per intersection)	**0**	**206**	**206**	**0**	**192**	**192**
	Transit stops accessible by connected bike and pedestrian facilities	**0**	**1**	**1**	**0**	**2**	**2**
	Potential to increase landscaping (Low/Medium/High)	**Low**	**Medium**	**Low**	**Low**	**Medium**	**Low**
	Potential to increase lighting (Low/Medium/High)	**Low**	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**
	Potential to improve signage/wayfinding						
Environmental sustainability and community health	Feet of separated bicycle facilities that connect to existing and future trails						
	Increase in ADA-accessible facilities						
	Mixed and low-income population accessible by interconnected bike, pedestrian, and transit facilities (Number of households per intersection)	**0**	**176**	**176**	**0**	**253**	**253**

6.0 CONCLUSION AND NEXT STEPS

The alternatives analysis for the 5th Street Corridor Study was based on the study's goals and objectives. The process identified and refined a selection of street and intersection alternatives for the 5th Street corridor. These alternatives were assessed against 23 criteria to develop a list of appropriate alternatives for the corridor.

Study **street alternatives** that could meet the goals and objectives of the 5th Street Study are listed below. Discounting project cost, the most effective street alternatives are shown in bold.

- 5th Street North of the I-64 Interchange
  - Sidewalk
  - Shared use path
  - Sidewalk and bike lane
  - Sidewalk and shared use path
  - **Sidewalk, shared use path, and bike lane**
- I-64 Interchange
  - **Near-term sidewalks and crossings**
  - **Long-term interchange redesign**
- 5th Street South of the I-64 Interchange to Old Lynchburg Road
  - Sidewalk
  - Shared use path
  - **Sidewalk and bike lane**
  - Sidewalk and shared use path
- 5th Street South of Old Lynchburg Road to Ambrose Commons Drive
  - Sidewalk
  - Shared use path
  - Sidewalk and bike lane
  - Sidewalk and shared use path
  - **Road diet with sidewalk and bike lane**

A similar review of the **intersection alternatives** showed how they could meet the goals and objectives of the study. Discounting project cost, the most effective intersection alternatives are shown in bold.

- Harris Road and 5th Street
  - **Intersection modification**
- 5th Street Station Parkway and 5th Street
  - Expand intersection
  - **Left-turn restrictions**
- I-64 Interchange
  - **Near-term sidewalks and crossings**
  - **Long-term interchange redesign**
- Stagecoach Road and 5th Street
  - **Roundabout**
  - Restricted crossing U-turn
- Old Lynchburg Road and 5th Street
  - **Roundabout**
  - Restricted crossing U-turn

The exercise showed that alternatives that best advance the study goals and objectives and have the most community support are also the most expensive. VDOT and the stakeholder group will use the findings from the alternatives analysis, planning level cost estimates, and community feedback for each alternative to select final study recommendations.

Attachment A Planning Level Cost Estimates

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	Harris Road Southbound Right	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 230,102	5.00%	$241,607
Hydraulics	Culpeper Tool	$ 50,030	5.00%	$52,532
In-plan Utilities	Culpeper Tool	$ 10,705	5.00%	$11,240
Traffic	Culpeper Tool	$ 78,300	5.00%	$82,215
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 26,370	5.00%	$27,689
Survey	Culpeper Tool	$ 28,349	5.00%	$29,767
Environmental	Culpeper Tool	$ 40,000	5.00%	$42,000
Right of Way	Culpeper Tool	$ 14,907	5.00%	$15,652
Other	Culpeper Tool	$ 31,136	5.00%	$32,693
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 509,899	5.00%	$535,394
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$25,000	60.00%	$40,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$30,000	20.00%	$36,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$55,000	38.18%	$76,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$51,348	13.54%	$58,300
MOT	Culpeper Tool	$68,494	15.00%	$78,768
Roadway	Culpeper Tool	$76,026	15.00%	$87,430
Hydraulics	Culpeper Tool	$85,000	15.00%	$97,750
In-plan Utilities	Culpeper Tool	$20,000	15.00%	$23,000
Traffic	Culpeper Tool	$222,122	15.00%	$255,440
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$68,857	15.00%	$79,186
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$591,846	14.87%	$679,873
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$29,592	14.87%	$33,994
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$8,878	14.87%	$10,198
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$118,369	14.87%	$135,975
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$135,975
	Total CN Phase Estimate	$748,685	14.87%	$860,039
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$1,471,434

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	5th Street Station Widening	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 285,585	5.00%	$299,864
Hydraulics	Culpeper Tool	$ 84,955	5.00%	$89,202
In-plan Utilities	Culpeper Tool	$ 16,670	5.00%	$17,504
Traffic	Culpeper Tool	$ 85,800	5.00%	$90,090
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 32,540	5.00%	$34,167
Survey	Culpeper Tool	$ 49,225	5.00%	$51,686
Environmental	Culpeper Tool	$ 75,000	5.00%	$78,750
Right of Way	Culpeper Tool	$ 21,307	5.00%	$22,372
Other	Culpeper Tool	$ 38,714	5.00%	$40,649
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 689,795	5.00%	$724,285
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$125,000	60.00%	$200,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$60,000	20.00%	$72,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$185,000	47.03%	$272,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$101,560	10.57%	$112,294
MOT	Culpeper Tool	$113,718	15.00%	$130,775
Roadway	Culpeper Tool	$322,810	15.00%	$371,231
Hydraulics	Culpeper Tool	$340,000	15.00%	$391,000
In-plan Utilities	Culpeper Tool	$40,000	15.00%	$46,000
Traffic	Culpeper Tool	$290,994	15.00%	$334,643
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$75,285	15.00%	$86,578
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$1,284,367	14.65%	$1,472,522
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$64,218	14.65%	$73,626
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$19,266	14.65%	$22,088
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$256,873	14.65%	$294,504
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$294,504
	Total CN Phase Estimate	$1,624,724	14.65%	$1,862,740
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$2,859,025

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	5th Street Station Restricted Lefts	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 285,585	5.00%	$299,864
Hydraulics	Culpeper Tool	$ 84,955	5.00%	$89,202
In-plan Utilities	Culpeper Tool	$ 16,670	5.00%	$17,504
Traffic	Culpeper Tool	$ 85,800	5.00%	$90,090
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 32,540	5.00%	$34,167
Survey	Culpeper Tool	$ 36,708	5.00%	$38,544
Environmental	Culpeper Tool	$ 75,000	5.00%	$78,750
Right of Way	Culpeper Tool	$ 21,307	5.00%	$22,372
Other	Culpeper Tool	$ 38,714	5.00%	$40,649
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 677,279	5.00%	$711,143
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$125,000	60.00%	$200,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$60,000	20.00%	$72,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$185,000	47.03%	$272,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$97,997	10.41%	$108,197
MOT	Culpeper Tool	$109,442	15.00%	$125,858
Roadway	Culpeper Tool	$273,155	15.00%	$314,129
Hydraulics	Culpeper Tool	$340,000	15.00%	$391,000
In-plan Utilities	Culpeper Tool	$40,000	15.00%	$46,000
Traffic	Culpeper Tool	$286,962	15.00%	$330,006
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$74,367	15.00%	$85,522
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$1,221,923	14.63%	$1,400,712
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$61,096	14.63%	$70,036
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$18,329	14.63%	$21,011
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$244,385	14.63%	$280,142
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$280,142
	Total CN Phase Estimate	$1,545,733	14.63%	$1,771,900
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$2,755,043

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	I-64 Bridge Option 3	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 209,250	5.00%	$219,713
Hydraulics	Culpeper Tool	$ 39,121	5.00%	$41,077
In-plan Utilities	Culpeper Tool	$ -	0.00%	$0
Traffic	Culpeper Tool	$ 25,550	5.00%	$26,828
Structures/Bridges	Culpeper Tool	$ 300,000	5.00%	$315,000
Materials/Geotech	Culpeper Tool	$ -	0.00%	$0
Survey	Culpeper Tool	$ -	0.00%	$0
Environmental	Culpeper Tool	$ 40,000	5.00%	$42,000
Right of Way	Culpeper Tool	$ 21,307	5.00%	$22,372
Other	Culpeper Tool	$ 29,600	5.00%	$31,080
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 664,828	5.00%	$698,069
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$0	0.00%	$0
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$0	0.00%	$0
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$0	#DIV/0!	$0
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$103,945	10.67%	$115,036
MOT	Culpeper Tool	$120,165	15.00%	$138,189
Roadway	Culpeper Tool	$33,899	15.00%	$38,984
Hydraulics	Culpeper Tool	$20,000	15.00%	$23,000
In-plan Utilities	Culpeper Tool	$0	0.00%	$0
Traffic	Culpeper Tool	$8,160	15.00%	$9,384
Structures/Bridges	Culpeper Tool	$1,040,000	15.00%	$1,196,000
Earthwork/Geotech	Culpeper Tool	$0	0.00%	$0
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$1,326,169	14.66%	$1,520,594
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$66,308	14.66%	$76,030
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$19,893	14.66%	$22,809
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$265,234	14.66%	$304,119
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$304,119
	Total CN Phase Estimate	$1,677,603	14.66%	$1,923,551
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$2,621,621

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	DDI at I-64 (no bridge widening)	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 431,955	5.00%	$453,552
Hydraulics	Culpeper Tool	$ 142,818	5.00%	$149,959
In-plan Utilities	Culpeper Tool	$ 13,955	5.00%	$14,652
Traffic	Culpeper Tool	$ 222,500	5.00%	$233,625
Structures/Bridges	Culpeper Tool	$ 300,000	5.00%	$315,000
Materials/Geotech	Culpeper Tool	$ 40,940	5.00%	$42,987
Survey	Culpeper Tool	$ 72,753	5.00%	$76,391
Environmental	Culpeper Tool	$ 150,000	5.00%	$157,500
Right of Way	Culpeper Tool	$ 21,307	5.00%	$22,372
Other	Culpeper Tool	$ 47,532	5.00%	$49,908
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 1,443,759	5.00%	$1,515,947
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$500,000	60.00%	$800,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$150,000	20.00%	$180,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$650,000	50.77%	$980,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$300,576	13.50%	$341,162
MOT	Culpeper Tool	$352,350	15.00%	$405,202
Roadway	Culpeper Tool	$1,249,103	15.00%	$1,436,468
Hydraulics	Culpeper Tool	$270,000	15.00%	$310,500
In-plan Utilities	Culpeper Tool	$100,000	15.00%	$115,000
Traffic	Culpeper Tool	$858,283	15.00%	$987,025
Structures/Bridges	Culpeper Tool	$1,280,000	15.00%	$1,472,000
Earthwork/Geotech	Culpeper Tool	$362,591	15.00%	$416,979
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$4,772,902	14.91%	$5,484,337
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$238,645	14.91%	$274,217
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$71,594	14.91%	$82,265
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$954,580	14.91%	$1,096,867
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$1,096,867
	Total CN Phase Estimate	$6,037,721	14.91%	$6,937,686
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$9,433,633

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	Stagecoach Roundabout	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 340,045	5.00%	$357,048
Hydraulics	Culpeper Tool	$ 72,136	5.00%	$75,743
In-plan Utilities	Culpeper Tool	$ 14,114	5.00%	$14,819
Traffic	Culpeper Tool	$ 51,300	5.00%	$53,865
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 28,610	5.00%	$30,041
Survey	Culpeper Tool	$ 19,757	5.00%	$20,745
Environmental	Culpeper Tool	$ 75,000	5.00%	$78,750
Right of Way	Culpeper Tool	$ 22,400	5.00%	$23,520
Other	Culpeper Tool	$ 43,514	5.00%	$45,689
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 666,876	5.00%	$700,220
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$150,000	60.00%	$240,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$30,000	20.00%	$36,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$180,000	53.33%	$276,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$127,088	11.46%	$141,651
MOT	Culpeper Tool	$170,214	15.00%	$195,746
Roadway	Culpeper Tool	$657,034	15.00%	$755,590
Hydraulics	Culpeper Tool	$395,000	15.00%	$454,250
In-plan Utilities	Culpeper Tool	$20,000	15.00%	$23,000
Traffic	Culpeper Tool	$241,621	15.00%	$277,864
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$120,884	15.00%	$139,016
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$1,731,840	14.74%	$1,987,116
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$86,592	14.74%	$99,356
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$25,978	14.74%	$29,807
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$346,368	14.74%	$397,423
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$397,423
	Total CN Phase Estimate	$2,190,778	14.74%	$2,513,702
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$3,489,922

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	Stagecoach RCUT	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 388,625	5.00%	$408,056
Hydraulics	Culpeper Tool	$ 126,500	5.00%	$132,825
In-plan Utilities	Culpeper Tool	$ 18,500	5.00%	$19,425
Traffic	Culpeper Tool	$ 69,050	5.00%	$72,503
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 44,320	5.00%	$46,536
Survey	Culpeper Tool	$ 44,904	5.00%	$47,149
Environmental	Culpeper Tool	$ 40,000	5.00%	$42,000
Right of Way	Culpeper Tool	$ 34,107	5.00%	$35,812
Other	Culpeper Tool	$ 53,300	5.00%	$55,965
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 819,306	5.00%	$860,271
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$460,000	60.00%	$736,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$30,000	20.00%	$36,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$490,000	57.55%	$772,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$103,733	10.66%	$114,793
MOT	Culpeper Tool	$114,776	15.00%	$131,992
Roadway	Culpeper Tool	$486,892	15.00%	$559,926
Hydraulics	Culpeper Tool	$403,000	15.00%	$463,450
In-plan Utilities	Culpeper Tool	$20,000	15.00%	$23,000
Traffic	Culpeper Tool	$117,855	15.00%	$135,533
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$76,203	15.00%	$87,634
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$1,322,459	14.66%	$1,516,328
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$66,123	14.66%	$75,816
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$19,837	14.66%	$22,745
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$264,492	14.66%	$303,266
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$303,266
	Total CN Phase Estimate	$1,672,911	14.66%	$1,918,155
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$3,550,426

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	Old Lynchburg Rd Roundabout	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	8/13/20 - rev
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 329,705	5.00%	$346,190
Hydraulics	Culpeper Tool	$ 45,864	5.00%	$48,157
In-plan Utilities	Culpeper Tool	$ 13,261	5.00%	$13,924
Traffic	Culpeper Tool	$ 30,000	5.00%	$31,500
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 22,450	5.00%	$23,573
Survey	Culpeper Tool	$ 18,186	5.00%	$19,095
Environmental	Culpeper Tool	$ -	0.00%	$0
Right of Way	Culpeper Tool	$ 22,400	5.00%	$23,520
Other	Culpeper Tool	$ 36,261	5.00%	$38,074
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 518,127	5.00%	$544,033
PE Base Estimate Date (XX/XX/XXXX)		6/29/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$1,275,000	60.00%	$2,040,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$30,000	20.00%	$36,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$1,305,000	59.08%	$2,076,000
RW Base Estimate Date (XX/XX/XXXX)		6/29/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$131,168	11.57%	$146,343
MOT	Culpeper Tool	$177,176	15.00%	$203,752
Roadway	Culpeper Tool	$729,278	15.00%	$838,669
Hydraulics	Culpeper Tool	$410,000	15.00%	$471,500
In-plan Utilities	Culpeper Tool	$40,000	15.00%	$46,000
Traffic	Culpeper Tool	$233,012	15.00%	$267,964
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$82,725	15.00%	$95,134
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$1,803,359	14.75%	$2,069,362
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$90,168	14.75%	$103,468
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$3,600	15.00%	$4,140
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$27,050	14.75%	$31,040
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$360,672	14.75%	$413,872
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$413,872
	Total CN Phase Estimate	$2,284,849	14.75%	$2,621,884
CN Base Estimate Date (XX/XX/XXXX)		6/29/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$5,241,916

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	Old Lynchburg RCUT	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 388,625	5.00%	$408,056
Hydraulics	Culpeper Tool	$ 126,500	5.00%	$132,825
In-plan Utilities	Culpeper Tool	$ 18,500	5.00%	$19,425
Traffic	Culpeper Tool	$ 69,050	5.00%	$72,503
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 44,320	5.00%	$46,536
Survey	Culpeper Tool	$ 44,904	5.00%	$47,149
Environmental	Culpeper Tool	$ 40,000	5.00%	$42,000
Right of Way	Culpeper Tool	$ 34,107	5.00%	$35,812
Other	Culpeper Tool	$ 53,300	5.00%	$55,965
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 819,306	5.00%	$860,271
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$50,000	60.00%	$80,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$30,000	20.00%	$36,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$80,000	45.00%	$116,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$94,675	10.25%	$104,376
MOT	Culpeper Tool	$103,386	15.00%	$118,894
Roadway	Culpeper Tool	$517,389	15.00%	$594,997
Hydraulics	Culpeper Tool	$238,000	15.00%	$273,700
In-plan Utilities	Culpeper Tool	$20,000	15.00%	$23,000
Traffic	Culpeper Tool	$114,946	15.00%	$132,188
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$75,285	15.00%	$86,578
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$1,163,680	14.61%	$1,333,733
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$58,184	14.61%	$66,687
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$17,455	14.61%	$20,006
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$232,736	14.61%	$266,747
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$266,747
	Total CN Phase Estimate	$1,472,056	14.61%	$1,687,172
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$2,663,443

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	North of I-64 - 8 Foot Sidewalks	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 405,500	5.00%	$425,775
Hydraulics	Culpeper Tool	$ 99,909	5.00%	$104,905
In-plan Utilities	Culpeper Tool	$ 21,341	5.00%	$22,408
Traffic	Culpeper Tool	$ 35,550	5.00%	$37,328
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 20,907	5.00%	$21,952
Survey	Culpeper Tool	$ 94,287	5.00%	$99,001
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 34,107	5.00%	$35,812
Other	Culpeper Tool	$ 56,141	5.00%	$58,948
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 867,741	5.00%	$911,128
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$250,000	60.00%	$400,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$120,000	20.00%	$144,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$370,000	47.03%	$544,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$211,940	12.73%	$238,916
MOT	Culpeper Tool	$242,419	15.00%	$278,781
Roadway	Culpeper Tool	$689,776	15.00%	$793,242
Hydraulics	Culpeper Tool	$1,300,000	15.00%	$1,495,000
In-plan Utilities	Culpeper Tool	$80,000	15.00%	$92,000
Traffic	Culpeper Tool	$270,593	15.00%	$311,182
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$389,771	15.00%	$448,236
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,184,498	14.85%	$3,657,357
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$159,225	14.85%	$182,868
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$47,767	14.85%	$54,860
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$636,900	14.85%	$731,471
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$731,471
	Total CN Phase Estimate	$4,028,389	14.85%	$4,626,557
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$6,081,685

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	North of I-64 - SU Path (one side)	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 299,307	5.00%	$314,272
Hydraulics	Culpeper Tool	$ 99,909	5.00%	$104,905
In-plan Utilities	Culpeper Tool	$ 21,341	5.00%	$22,408
Traffic	Culpeper Tool	$ 35,550	5.00%	$37,328
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 20,907	5.00%	$21,952
Survey	Culpeper Tool	$ 73,973	5.00%	$77,672
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 34,107	5.00%	$35,812
Other	Culpeper Tool	$ 56,141	5.00%	$58,948
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 741,234	5.00%	$778,296
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$300,000	60.00%	$480,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$90,000	20.00%	$108,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$390,000	50.77%	$588,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$188,797	12.45%	$212,301
MOT	Culpeper Tool	$214,363	15.00%	$246,518
Roadway	Culpeper Tool	$402,191	15.00%	$462,520
Hydraulics	Culpeper Tool	$1,270,000	15.00%	$1,460,500
In-plan Utilities	Culpeper Tool	$60,000	15.00%	$69,000
Traffic	Culpeper Tool	$264,109	15.00%	$303,725
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$379,362	15.00%	$436,267
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$2,778,822	14.83%	$3,190,831
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$138,941	14.83%	$159,542
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$41,682	14.83%	$47,862
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$555,764	14.83%	$638,166
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$638,166
	Total CN Phase Estimate	$3,515,210	14.83%	$4,036,401
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$5,402,697

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	North of I-64 - Sidewalk + Sep Bike	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 428,256	5.00%	$449,668
Hydraulics	Culpeper Tool	$ 99,909	5.00%	$104,905
In-plan Utilities	Culpeper Tool	$ 21,341	5.00%	$22,408
Traffic	Culpeper Tool	$ 35,550	5.00%	$37,328
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 32,907	5.00%	$34,552
Survey	Culpeper Tool	$ 94,287	5.00%	$99,001
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 34,107	5.00%	$35,812
Other	Culpeper Tool	$ 56,141	5.00%	$58,948
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 902,497	5.00%	$947,622
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$500,000	60.00%	$800,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$360,000	20.00%	$432,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$860,000	43.26%	$1,232,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$263,880	13.18%	$298,647
MOT	Culpeper Tool	$306,688	15.00%	$352,691
Roadway	Culpeper Tool	$1,033,657	15.00%	$1,188,705
Hydraulics	Culpeper Tool	$1,380,000	15.00%	$1,587,000
In-plan Utilities	Culpeper Tool	$240,000	15.00%	$276,000
Traffic	Culpeper Tool	$313,208	15.00%	$360,189
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$557,525	15.00%	$641,154
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$4,094,958	14.88%	$4,704,387
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$204,748	14.88%	$235,219
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$61,424	14.88%	$70,566
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$818,992	14.88%	$940,877
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$940,877
	Total CN Phase Estimate	$5,180,122	14.88%	$5,951,049
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$8,130,671

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	North of I-64 - Sidewalk + SU Path	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 405,500	5.00%	$425,775
Hydraulics	Culpeper Tool	$ 99,909	5.00%	$104,905
In-plan Utilities	Culpeper Tool	$ 21,341	5.00%	$22,408
Traffic	Culpeper Tool	$ 35,550	5.00%	$37,328
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 20,907	5.00%	$21,952
Survey	Culpeper Tool	$ 94,287	5.00%	$99,001
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 34,107	5.00%	$35,812
Other	Culpeper Tool	$ 56,141	5.00%	$58,948
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 867,741	5.00%	$911,128
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$400,000	60.00%	$640,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$180,000	20.00%	$216,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$580,000	47.59%	$856,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$213,636	12.75%	$240,866
MOT	Culpeper Tool	$241,865	15.00%	$278,144
Roadway	Culpeper Tool	$618,494	15.00%	$711,268
Hydraulics	Culpeper Tool	$1,320,000	15.00%	$1,518,000
In-plan Utilities	Culpeper Tool	$120,000	15.00%	$138,000
Traffic	Culpeper Tool	$269,673	15.00%	$310,124
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$430,561	15.00%	$495,146
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,214,229	14.85%	$3,691,548
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$160,711	14.85%	$184,577
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$48,213	14.85%	$55,373
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$642,846	14.85%	$738,310
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$738,310
	Total CN Phase Estimate	$4,065,999	14.85%	$4,669,808
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$6,436,936

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	North of I-64 - SW + SBL + SUP	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 428,256	5.00%	$449,668
Hydraulics	Culpeper Tool	$ 99,909	5.00%	$104,905
In-plan Utilities	Culpeper Tool	$ 21,341	5.00%	$22,408
Traffic	Culpeper Tool	$ 35,550	5.00%	$37,328
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 32,907	5.00%	$34,552
Survey	Culpeper Tool	$ 94,287	5.00%	$99,001
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 34,107	5.00%	$35,812
Other	Culpeper Tool	$ 56,141	5.00%	$58,948
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 902,497	5.00%	$947,622
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$2,500,000	60.00%	$4,000,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$1,000,000	20.00%	$1,200,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$3,500,000	48.57%	$5,200,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$298,975	13.39%	$339,007
MOT	Culpeper Tool	$342,707	15.00%	$394,113
Roadway	Culpeper Tool	$1,238,621	15.00%	$1,424,414
Hydraulics	Culpeper Tool	$1,630,000	15.00%	$1,874,500
In-plan Utilities	Culpeper Tool	$240,000	15.00%	$276,000
Traffic	Culpeper Tool	$322,036	15.00%	$370,341
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$637,802	15.00%	$733,472
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$4,710,141	14.90%	$5,411,847
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$235,507	14.90%	$270,592
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$70,652	14.90%	$81,178
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$942,028	14.90%	$1,082,369
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$1,082,369
	Total CN Phase Estimate	$5,958,328	14.90%	$6,845,986
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$12,993,608

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	I-64 to Old Lynchburg - Sidewalks	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 428,000	5.00%	$449,400
Hydraulics	Culpeper Tool	$ 108,455	5.00%	$113,877
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 20,533	5.00%	$21,560
Survey	Culpeper Tool	$ 103,233	5.00%	$108,395
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 927,569	5.00%	$973,947
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$650,000	60.00%	$1,040,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$60,000	20.00%	$72,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$710,000	56.62%	$1,112,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$166,139	12.29%	$186,560
MOT	Culpeper Tool	$189,443	15.00%	$217,859
Roadway	Culpeper Tool	$686,885	15.00%	$789,918
Hydraulics	Culpeper Tool	$560,000	15.00%	$644,000
In-plan Utilities	Culpeper Tool	$40,000	15.00%	$46,000
Traffic	Culpeper Tool	$278,001	15.00%	$319,701
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$495,906	15.00%	$570,292
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$2,416,374	14.81%	$2,774,330
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$120,819	14.81%	$138,716
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$36,246	14.81%	$41,615
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$483,275	14.81%	$554,866
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$554,866
	Total CN Phase Estimate	$3,056,713	14.81%	$3,509,527
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$5,595,474

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	I-64 to Old Lynchburg - SUP (one side)	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 315,841	5.00%	$331,633
Hydraulics	Culpeper Tool	$ 138,682	5.00%	$145,616
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 20,533	5.00%	$21,560
Survey	Culpeper Tool	$ 81,045	5.00%	$85,098
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 823,449	5.00%	$864,622
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$1,750,000	60.00%	$2,800,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$60,000	20.00%	$72,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$1,810,000	58.67%	$2,872,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$226,982	13.02%	$256,529
MOT	Culpeper Tool	$263,199	15.00%	$302,679
Roadway	Culpeper Tool	$426,863	15.00%	$490,893
Hydraulics	Culpeper Tool	$1,025,000	15.00%	$1,178,750
In-plan Utilities	Culpeper Tool	$40,000	15.00%	$46,000
Traffic	Culpeper Tool	$296,078	15.00%	$340,490
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$1,204,754	15.00%	$1,385,467
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,482,876	14.87%	$4,000,808
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$174,144	14.87%	$200,040
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$52,243	14.87%	$60,012
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$696,575	14.87%	$800,162
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$800,162
	Total CN Phase Estimate	$4,405,838	14.87%	$5,061,022
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$8,797,643

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	I-64 to Old Lynchburg - SW + SBL	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 452,034	5.00%	$474,636
Hydraulics	Culpeper Tool	$ 138,682	5.00%	$145,616
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 59,850	5.00%	$62,843
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 34,033	5.00%	$35,735
Survey	Culpeper Tool	$ 103,233	5.00%	$108,395
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 1,012,830	5.00%	$1,063,472
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$2,000,000	60.00%	$3,200,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$60,000	20.00%	$72,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$2,060,000	58.83%	$3,272,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$219,839	12.95%	$248,314
MOT	Culpeper Tool	$256,628	15.00%	$295,122
Roadway	Culpeper Tool	$870,676	15.00%	$1,001,277
Hydraulics	Culpeper Tool	$1,015,000	15.00%	$1,167,250
In-plan Utilities	Culpeper Tool	$40,000	15.00%	$46,000
Traffic	Culpeper Tool	$326,968	15.00%	$376,013
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$628,557	15.00%	$722,841
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,357,667	14.87%	$3,856,817
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$167,883	14.87%	$192,841
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$50,365	14.87%	$57,852
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$671,533	14.87%	$771,363
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$771,363
	Total CN Phase Estimate	$4,247,449	14.87%	$4,878,873
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$9,214,345

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	I-64 to Old Lynchburg - SW + SUP	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 428,000	5.00%	$449,400
Hydraulics	Culpeper Tool	$ 138,682	5.00%	$145,616
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 20,533	5.00%	$21,560
Survey	Culpeper Tool	$ 103,233	5.00%	$108,395
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 957,796	5.00%	$1,005,686
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$1,800,000	60.00%	$2,880,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$60,000	20.00%	$72,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$1,860,000	58.71%	$2,952,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$214,811	12.91%	$242,533
MOT	Culpeper Tool	$245,835	15.00%	$282,711
Roadway	Culpeper Tool	$638,609	15.00%	$734,401
Hydraulics	Culpeper Tool	$1,065,000	15.00%	$1,224,750
In-plan Utilities	Culpeper Tool	$40,000	15.00%	$46,000
Traffic	Culpeper Tool	$291,822	15.00%	$335,596
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$773,467	15.00%	$889,487
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,269,545	14.86%	$3,755,477
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$163,477	14.86%	$187,774
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$49,043	14.86%	$56,332
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$653,909	14.86%	$751,095
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$751,095
	Total CN Phase Estimate	$4,135,974	14.86%	$4,750,678
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$8,708,364

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	S. of Old Lynchburg - Sidewalks	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 428,000	5.00%	$449,400
Hydraulics	Culpeper Tool	$ 108,455	5.00%	$113,877
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 20,533	5.00%	$21,560
Survey	Culpeper Tool	$ 103,233	5.00%	$108,395
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 927,569	5.00%	$973,947
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$1,075,000	60.00%	$1,720,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$90,000	20.00%	$108,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$1,165,000	56.91%	$1,828,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$222,717	12.98%	$251,624
MOT	Culpeper Tool	$255,419	15.00%	$293,731
Roadway	Culpeper Tool	$842,292	15.00%	$968,635
Hydraulics	Culpeper Tool	$1,125,000	15.00%	$1,293,750
In-plan Utilities	Culpeper Tool	$60,000	15.00%	$69,000
Traffic	Culpeper Tool	$328,093	15.00%	$377,307
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$574,601	15.00%	$660,791
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,408,121	14.87%	$3,914,839
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$170,406	14.87%	$195,742
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$51,122	14.87%	$58,723
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$681,624	14.87%	$782,968
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$782,968
	Total CN Phase Estimate	$4,311,273	14.87%	$4,952,271
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$7,754,218

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	S. of Old Lynchburg - SUP one side	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 303,023	5.00%	$318,174
Hydraulics	Culpeper Tool	$ 130,682	5.00%	$137,216
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 34,033	5.00%	$35,735
Survey	Culpeper Tool	$ 91,743	5.00%	$96,331
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 826,829	5.00%	$868,170
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$1,600,000	60.00%	$2,560,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$90,000	20.00%	$108,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$1,690,000	57.87%	$2,668,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$216,277	12.92%	$244,219
MOT	Culpeper Tool	$250,223	15.00%	$287,756
Roadway	Culpeper Tool	$482,247	15.00%	$554,584
Hydraulics	Culpeper Tool	$1,150,000	15.00%	$1,322,500
In-plan Utilities	Culpeper Tool	$60,000	15.00%	$69,000
Traffic	Culpeper Tool	$326,819	15.00%	$375,842
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$809,676	15.00%	$931,128
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,295,243	14.86%	$3,785,029
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$164,762	14.86%	$189,251
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$49,429	14.86%	$56,775
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$659,049	14.86%	$757,006
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$757,006
	Total CN Phase Estimate	$4,168,482	14.86%	$4,788,062
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$8,324,232

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	S. of Old Lynchburg - Sidewalks + SBL	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 452,034	5.00%	$474,636
Hydraulics	Culpeper Tool	$ 150,682	5.00%	$158,216
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 34,033	5.00%	$35,735
Survey	Culpeper Tool	$ 103,233	5.00%	$108,395
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 1,007,330	5.00%	$1,057,697
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$1,700,000	60.00%	$2,720,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$90,000	20.00%	$108,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$1,790,000	57.99%	$2,828,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$277,153	13.38%	$314,226
MOT	Culpeper Tool	$324,018	15.00%	$372,621
Roadway	Culpeper Tool	$1,411,821	15.00%	$1,623,594
Hydraulics	Culpeper Tool	$1,190,000	15.00%	$1,368,500
In-plan Utilities	Culpeper Tool	$60,000	15.00%	$69,000
Traffic	Culpeper Tool	$369,906	15.00%	$425,392
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$729,426	15.00%	$838,840
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$4,362,325	14.90%	$5,012,174
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$218,116	14.90%	$250,609
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$65,435	14.90%	$75,183
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$872,465	14.90%	$1,002,435
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$1,002,435
	Total CN Phase Estimate	$5,518,341	14.90%	$6,340,400
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$10,226,096

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	S. of Old Lynchburg - Sidewalks + SUP	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 428,000	5.00%	$449,400
Hydraulics	Culpeper Tool	$ 138,682	5.00%	$145,616
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 34,033	5.00%	$35,735
Survey	Culpeper Tool	$ 103,233	5.00%	$108,395
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 971,296	5.00%	$1,019,861
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$1,600,000	60.00%	$2,560,000
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$90,000	20.00%	$108,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$1,690,000	57.87%	$2,668,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$233,462	13.07%	$263,982
MOT	Culpeper Tool	$265,834	15.00%	$305,710
Roadway	Culpeper Tool	$820,779	15.00%	$943,896
Hydraulics	Culpeper Tool	$1,180,000	15.00%	$1,357,000
In-plan Utilities	Culpeper Tool	$60,000	15.00%	$69,000
Traffic	Culpeper Tool	$330,646	15.00%	$380,243
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$705,753	15.00%	$811,616
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,596,475	14.87%	$4,131,446
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$179,824	14.87%	$206,572
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$53,947	14.87%	$61,972
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$719,295	14.87%	$826,289
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$826,289
	Total CN Phase Estimate	$4,549,541	14.87%	$5,226,279
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$8,914,140

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	S. of Old Lynchburg - Lane Realloc. SW + SBL	Project UPC:	N/A
Prepared By:	Josh Hurst - Kittelson	Milestone	Creation/Pre Scope
Reviewed By:	0	Date:	9/15/2020
County/City/Town:	City of Charlottesville (104)	Tier Level	1

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	Source	Base ($)	Contingency (%)	Total
Roadway	Culpeper Tool	$ 428,000	5.00%	$449,400
Hydraulics	Culpeper Tool	$ 138,682	5.00%	$145,616
In-plan Utilities	Culpeper Tool	$ 23,045	5.00%	$24,198
Traffic	Culpeper Tool	$ 42,350	5.00%	$44,468
Structures/Bridges	Culpeper Tool	$ -	0.00%	$0
Materials/Geotech	Culpeper Tool	$ 34,033	5.00%	$35,735
Survey	Culpeper Tool	$ 87,779	5.00%	$92,168
Environmental	Culpeper Tool	$ 100,000	5.00%	$105,000
Right of Way	Culpeper Tool	$ 40,507	5.00%	$42,532
Other	Culpeper Tool	$ 61,445	5.00%	$64,518
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	$ 955,842	5.00%	$1,003,634
PE Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
PE Phase Dates (XX/XX/XXXX)	Start Date	7/1/2025	End Date	4/1/2026

Right-of-Way & Utilities Phase [6]

Discipline	Source	Base ($)	Contingency (%)	Total
Right-of-Way Acquisition	Pre-Scoping Plans	$0	0.00%	$0
Out-of-Plan Utilities (power, cable, gas, etc.)	Pre-Scoping Plans	$90,000	20.00%	$108,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$90,000	20.00%	$108,000
RW Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
RW Phase Dates (XX/XX/XXXX)	Start Date	4/1/2026	End Date	1/1/2027

Construction Phase [7]

Discipline	Source	Base ($)	Contingency (%)	Total
Mobilization/Constr. Survey	Culpeper Tool	$226,325	13.01%	$255,773
MOT	Culpeper Tool	$262,402	15.00%	$301,763
Roadway	Culpeper Tool	$1,089,675	15.00%	$1,253,127
Hydraulics	Culpeper Tool	$1,065,000	15.00%	$1,224,750
In-plan Utilities	Culpeper Tool	$60,000	15.00%	$69,000
Traffic	Culpeper Tool	$359,804	15.00%	$413,775
Structures/Bridges	Culpeper Tool	$0	0.00%	$0
Earthwork/Geotech	Culpeper Tool	$408,152	15.00%	$469,375
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	$3,471,358	14.87%	$3,987,562
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$173,568	14.87%	$199,378
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$0	0.00%	$0
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$52,070	14.87%	$59,813
Construction Engineering (Inspection)	Environmental Inspection ($)	$0	0.00%	$0
	VDOT or Locality ($)	$694,272	14.87%	$797,512
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$797,512
	Total CN Phase Estimate	$4,391,268	14.87%	$5,044,266
CN Base Estimate Date (XX/XX/XXXX)		9/15/2020	0	0
CN Phase Start Date (XX/XX/XXXX)		1/1/2027		
CN Phase End Date (XX/XX/XXXX)		9/1/2027		
Total Project Cost Estimate				$6,155,900

Attachment B Future No-Build Conditions

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	0	1	242	50	25
Future Vol, veh/h	100	0	1	242	50	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	270
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	0	0	1	5	11
Mvmt Flow	114	0	1	275	57	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	334	57	85	0	-	0
Stage 1	57	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.41	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	663	1015	1524	-	-	-
Stage 1	968	-	-	-	-	-
Stage 2	772	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	662	1015	1524	-	-	-
Mov Cap-2 Maneuver	662	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	772	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1524	-	662	-	-
HCM Lane V/C Ratio	0.001	-	0.172	-	-
HCM Control Delay (s)	7.4	0	11.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection	
Int Delay, s/veh	8.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	305	346	6	158	68
Future Vol, veh/h	8	305	346	6	158	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	275	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	5	1	50	8	8
Mvmt Flow	9	355	402	7	184	79

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	814	406	0	0	409	0
Stage 1	406	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Critical Hdwy	6.6	6.275	-	-	4.22	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3475	-	-	2.276	-
Pot Cap-1 Maneuver	335	636	-	-	1111	-
Stage 1	677	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	279	636	-	-	1111	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	646	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.5	0	6.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	624	1111	-
HCM Lane V/C Ratio	-	-	0.583	0.165	-
HCM Control Delay (s)	-	-	18.5	8.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	3.8	0.6	-

Intersection	
Int Delay, s/veh	32

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	388	0	16	0	0	0	34	583	0	18	216	85
Future Vol, veh/h	388	0	16	0	0	0	34	583	0	18	216	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	220	-	-	225	-	325
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	0	0	0	0	0	8	2	0	0	9	9
Mvmt Flow	446	0	18	0	0	0	39	670	0	21	248	98

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	703	1038	124	914	1136	335	346	0	0	670	0	0
Stage 1	290	290	-	748	748	-	-	-	-	-	-	-
Stage 2	413	748	-	166	388	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.5	6.9	7.5	6.5	6.9	4.26	-	-	4.1	-	-
Critical Hdwy Stg 1	6.54	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4	3.3	3.5	4	3.3	2.28	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 324	233	910	231	204	667	1168	-	-	930	-	-
Stage 1	694	676	-	375	423	-	-	-	-	-	-	-
Stage 2	587	423	-	825	612	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 310	220	910	217	193	667	1168	-	-	930	-	-
Mov Cap-2 Maneuver	~ 413	312	-	303	300	-	-	-	-	-	-	-
Stage 1	671	660	-	363	409	-	-	-	-	-	-	-
Stage 2	567	409	-	790	598	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	104.9	0	0.5	0.5
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1168	-	-	422	-	930	-	-
HCM Lane V/C Ratio	0.033	-	-	1.1	-	0.022	-	-
HCM Control Delay (s)	8.2	-	-	104.9	0	9	-	-
HCM Lane LOS	A	-	-	F	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	16.1	-	0.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	64

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	261	3	37	0	0	11	126	900	12	118	288	195
Future Vol, veh/h	261	3	37	0	0	11	126	900	12	118	288	195
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	225	-	-	180	260	-	100	270	-	375
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	0	0	0	0	0	7	2	0	0	8	4
Mvmt Flow	278	3	39	0	0	12	134	957	13	126	306	207

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1305	1796	153	1632	1990	479	513	0	0	970	0	0
Stage 1	558	558	-	1225	1225	-	-	-	-	-	-	-
Stage 2	747	1238	-	407	765	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.5	6.9	7.5	6.5	6.9	4.24	-	-	4.1	-	-
Critical Hdwy Stg 1	6.54	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4	3.3	3.5	4	3.3	2.27	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 118	81	872	68	61	538	1014	-	-	719	-	-
Stage 1	482	515	-	193	254	-	-	-	-	-	-	-
Stage 2	371	250	-	597	415	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 90	58	872	49	44	538	1014	-	-	719	-	-
Mov Cap-2 Maneuver	~ 152	81	-	121	118	-	-	-	-	-	-	-
Stage 1	418	425	-	168	220	-	-	-	-	-	-	-
Stage 2	315	217	-	467	342	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 406.3	11.8	1.1	2.2
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1014	-	-	151	872	-	538	719	-	-
HCM Lane V/C Ratio	0.132	-	-	1.86	0.045	-	0.022	0.175	-	-
HCM Control Delay (s)	9.1	-	-	$ 461.9	9.3	0	11.8	11.1	-	-
HCM Lane LOS	A	-	-	F	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.5	-	-	21.2	0.1	-	0.1	0.6	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	0	0	100	206	79
Future Vol, veh/h	45	0	0	100	206	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	270
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	51	0	0	112	231	89

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	343	231	320	0	-	0
Stage 1	231	-	-	-	-	-
Stage 2	112	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	657	813	1251	-	-	-
Stage 1	812	-	-	-	-	-
Stage 2	918	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	657	813	1251	-	-	-
Mov Cap-2 Maneuver	657	-	-	-	-	-
Stage 1	812	-	-	-	-	-
Stage 2	918	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1251	-	657	-	-
HCM Lane V/C Ratio	-	-	0.077	-	-
HCM Control Delay (s)	0	-	10.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	4.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	293	139	7	323	276
Future Vol, veh/h	11	293	139	7	323	276
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	275	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	2	0	0	3	0
Mvmt Flow	12	322	153	8	355	303

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1019	157	0	0	161	0
Stage 1	157	-	-	-	-	-
Stage 2	862	-	-	-	-	-
Critical Hdwy	6.6	6.23	-	-	4.145	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.319	-	-	2.2285	-
Pot Cap-1 Maneuver	250	888	-	-	1410	-
Stage 1	876	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	187	888	-	-	1410	-
Mov Cap-2 Maneuver	~ -58	-	-	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	379	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	7	0	4.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	2167	1410	-
HCM Lane V/C Ratio	-	-	0.154	0.252	-
HCM Control Delay (s)	-	-	7	8.4	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.5	1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	189	0	43	0	0	0	31	406	0	4	558	267
Future Vol, veh/h	189	0	43	0	0	0	31	406	0	4	558	267
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	220	-	-	225	-	325
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	210	0	48	0	0	0	34	451	0	4	620	297

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	922	1147	310	837	1444	226	917	0	0	451	0	0
Stage 1	628	628	-	519	519	-	-	-	-	-	-	-
Stage 2	294	519	-	318	925	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	228	201	692	263	133	783	752	-	-	1120	-	-
Stage 1	442	479	-	513	536	-	-	-	-	-	-	-
Stage 2	695	536	-	673	351	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	220	191	692	236	126	783	752	-	-	1120	-	-
Mov Cap-2 Maneuver	327	312	-	351	231	-	-	-	-	-	-	-
Stage 1	422	477	-	490	512	-	-	-	-	-	-	-
Stage 2	664	512	-	624	350	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	36.1	0	0.7	0
HCM LOS	E	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	752	-	-	362	-	1120	-	-
HCM Lane V/C Ratio	0.046	-	-	0.712	-	0.004	-	-
HCM Control Delay (s)	10	-	-	36.1	0	8.2	-	-
HCM Lane LOS	B	-	-	E	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	5.3	-	0	-	-

Intersection	
Int Delay, s/veh	31.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	251	0	92	4	1	66	50	511	4	43	792	319
Future Vol, veh/h	251	0	92	4	1	66	50	511	4	43	792	319
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	225	-	-	180	260	-	100	270	-	375
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	5	1	0	0	0	0
Mvmt Flow	267	0	98	4	1	70	53	544	4	46	843	339

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1314	1589	422	1164	1924	272	1182	0	0	548	0	0
Stage 1	935	935	-	650	650	-	-	-	-	-	-	-
Stage 2	379	654	-	514	1274	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.2	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.25	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 118	109	586	152	68	732	570	-	-	1032	-	-
Stage 1	289	347	-	429	468	-	-	-	-	-	-	-
Stage 2	620	466	-	517	240	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 95	94	586	114	59	732	570	-	-	1032	-	-
Mov Cap-2 Maneuver	~ 191	204	-	222	135	-	-	-	-	-	-	-
Stage 1	~ 262	331	-	389	424	-	-	-	-	-	-	-
Stage 2	507	423	-	411	229	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	189.5	11.3	1.1	0.3
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	570	-	-	191	586	197	732	1032	-	-
HCM Lane V/C Ratio	0.093	-	-	1.398	0.167	0.027	0.096	0.044	-	-
HCM Control Delay (s)	12	-	-	254.4	12.4	23.8	10.4	8.7	-	-
HCM Lane LOS	B	-	-	F	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	15.8	0.6	0.1	0.3	0.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Attachment C Future Build Conditions – Road Diet

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	0	1	242	50	25
Future Vol, veh/h	100	0	1	242	50	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	270
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	0	0	1	5	11
Mvmt Flow	114	0	1	275	57	28

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	334	57	85	0	-	0
Stage 1	57	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.41	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	663	1015	1524	-	-	-
Stage 1	968	-	-	-	-	-
Stage 2	772	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	662	1015	1524	-	-	-
Mov Cap-2 Maneuver	662	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	772	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1524	-	662	-	-
HCM Lane V/C Ratio	0.001	-	0.172	-	-
HCM Control Delay (s)	7.4	0	11.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection	
Int Delay, s/veh	8.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	305	346	6	158	68
Future Vol, veh/h	8	305	346	6	158	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	275	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	5	1	50	8	8
Mvmt Flow	9	355	402	7	184	79

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	853	406	0	0	409	0
Stage 1	406	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Critical Hdwy	6.4	6.25	-	-	4.18	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.345	-	-	2.272	-
Pot Cap-1 Maneuver	332	638	-	-	1118	-
Stage 1	677	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	277	638	-	-	1118	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	649	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.5	0	6.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	625	1118	-
HCM Lane V/C Ratio	-	-	0.582	0.164	-
HCM Control Delay (s)	-	-	18.5	8.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	3.8	0.6	-

Intersection	
Int Delay, s/veh	84.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	388	0	16	0	0	0	34	583	0	18	216	85
Future Vol, veh/h	388	0	16	0	0	0	34	583	0	18	216	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	220	-	-	225	-	325
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	2	0	0	0	0	0	8	2	0	0	9	9
Mvmt Flow	446	0	18	0	0	0	39	670	0	21	248	98

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1038	1038	248	1096	1136	670	346	0	0	670	0	0
Stage 1	290	290	-	748	748	-	-	-	-	-	-	-
Stage 2	748	748	-	348	388	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.5	6.2	7.1	6.5	6.2	4.18	-	-	4.1	-	-
Critical Hdwy Stg 1	6.12	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4	3.3	3.5	4	3.3	2.272	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 209	233	796	193	204	460	1180	-	-	930	-	-
Stage 1	718	676	-	408	423	-	-	-	-	-	-	-
Stage 2	~ 404	423	-	672	612	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 200	220	796	181	193	460	1180	-	-	930	-	-
Mov Cap-2 Maneuver	~ 298	312	-	295	300	-	-	-	-	-	-	-
Stage 1	694	660	-	395	409	-	-	-	-	-	-	-
Stage 2	~ 391	409	-	642	598	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	280.2	0	0.4	0.5
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1180	-	-	306	-	930	-	-
HCM Lane V/C Ratio	0.033	-	-	1.518	-	0.022	-	-
HCM Control Delay (s)	8.2	-	-	280.2	0	9	-	-
HCM Lane LOS	A	-	-	F	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	26.4	-	0.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	319.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	261	3	37	0	0	11	126	900	12	118	288	195
Future Vol, veh/h	261	3	37	0	0	11	126	900	12	118	288	195
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	225	-	-	180	260	-	100	270	-	375
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	0	0	0	0	0	7	2	0	0	8	4
Mvmt Flow	278	3	39	0	0	12	134	957	13	126	306	207

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1796	1796	153	1632	1990	957	513	0	0	970	0	0
Stage 1	558	558	-	1225	1225	-	-	-	-	-	-	-
Stage 2	1238	1238	-	407	765	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.5	6.9	7.3	6.5	6.2	4.205	-	-	4.1	-	-
Critical Hdwy Stg 1	6.53	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4	3.3	3.5	4	3.3	2.2665	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 56	81	872	75	61	315	1021	-	-	719	-	-
Stage 1	482	515	-	221	254	-	-	-	-	-	-	-
Stage 2	~ 214	250	-	597	415	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 42	58	872	54	44	315	1021	-	-	719	-	-
Mov Cap-2 Maneuver	~ 48	81	-	134	118	-	-	-	-	-	-	-
Stage 1	419	425	-	192	221	-	-	-	-	-	-	-
Stage 2	~ 179	217	-	467	342	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, $	2062.3	16.9	1.1	2.2
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1021	-	-	48	872	-	315	719	-	-
HCM Lane V/C Ratio	0.131	-	-	5.851	0.045	-	0.037	0.175	-	-
HCM Control Delay (s)	9.1	-	-	$ 2350	9.3	0	16.9	11.1	-	-
HCM Lane LOS	A	-	-	F	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.5	-	-	32.4	0.1	-	0.1	0.6	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	0	0	100	206	79
Future Vol, veh/h	45	0	0	100	206	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	270
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	51	0	0	112	231	89

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	343	231	320	0	-	0
Stage 1	231	-	-	-	-	-
Stage 2	112	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	657	813	1251	-	-	-
Stage 1	812	-	-	-	-	-
Stage 2	918	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	657	813	1251	-	-	-
Mov Cap-2 Maneuver	657	-	-	-	-	-
Stage 1	812	-	-	-	-	-
Stage 2	918	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1251	-	657	-	-
HCM Lane V/C Ratio	-	-	0.077	-	-
HCM Control Delay (s)	0	-	10.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	4.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	293	139	7	323	276
Future Vol, veh/h	11	293	139	7	323	276
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	275	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	2	0	0	3	0
Mvmt Flow	12	322	153	8	355	303

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1170	157	0	0	161	0
Stage 1	157	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Critical Hdwy	6.4	6.22	-	-	4.13	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.318	-	-	2.227	-
Pot Cap-1 Maneuver	215	889	-	-	1412	-
Stage 1	876	-	-	-	-	-
Stage 2	354	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	161	889	-	-	1412	-
Mov Cap-2 Maneuver	~ -73	-	-	-	-	-
Stage 1	656	-	-	-	-	-
Stage 2	354	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	7.6	0	4.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1699	1412	-
HCM Lane V/C Ratio	-	-	0.197	0.251	-
HCM Control Delay (s)	-	-	7.6	8.4	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.7	1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	189	0	43	0	0	0	31	406	0	4	558	267
Future Vol, veh/h	189	0	43	0	0	0	31	406	0	4	558	267
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	220	-	-	225	-	325
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	210	0	48	0	0	0	34	451	0	4	620	297

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1147	1147	620	1320	1444	451	917	0	0	451	0	0
Stage 1	628	628	-	519	519	-	-	-	-	-	-	-
Stage 2	519	519	-	801	925	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 178	201	492	135	133	613	752	-	-	1120	-	-
Stage 1	474	479	-	544	536	-	-	-	-	-	-	-
Stage 2	544	536	-	381	351	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 171	191	492	117	126	613	752	-	-	1120	-	-
Mov Cap-2 Maneuver	298	312	-	226	231	-	-	-	-	-	-	-
Stage 1	453	477	-	520	512	-	-	-	-	-	-	-
Stage 2	519	512	-	343	350	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	49.5	0	0.7	0
HCM LOS	E	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	752	-	-	321	-	1120	-	-
HCM Lane V/C Ratio	0.046	-	-	0.803	-	0.004	-	-
HCM Control Delay (s)	10	-	-	49.5	0	8.2	-	-
HCM Lane LOS	B	-	-	E	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	6.6	-	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	43.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	251	0	92	4	1	66	50	511	4	43	792	319
Future Vol, veh/h	251	0	92	4	1	66	50	511	4	43	792	319
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	225	-	-	180	260	-	100	270	-	375
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	5	1	0	0	0	0
Mvmt Flow	267	0	98	4	1	70	53	544	4	46	843	339

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1623	1589	843	1804	1924	544	1182	0	0	548	0	0
Stage 1	935	935	-	650	650	-	-	-	-	-	-	-
Stage 2	688	654	-	1154	1274	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.15	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.245	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 83	109	367	62	68	543	580	-	-	1032	-	-
Stage 1	321	347	-	461	468	-	-	-	-	-	-	-
Stage 2	440	466	-	242	240	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 65	95	367	41	59	543	580	-	-	1032	-	-
Mov Cap-2 Maneuver	~ 165	204	-	95	135	-	-	-	-	-	-	-
Stage 1	292	331	-	419	425	-	-	-	-	-	-	-
Stage 2	347	424	-	170	229	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	263.7	14.7	1	0.3
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	580	-	-	165	367	101	543	1032	-	-
HCM Lane V/C Ratio	0.092	-	-	1.618	0.267	0.053	0.129	0.044	-	-
HCM Control Delay (s)	11.8	-	-	$ 353.7	18.3	42.6	12.6	8.7	-	-
HCM Lane LOS	B	-	-	F	C	E	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	18.2	1.1	0.2	0.4	0.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Attachment D Future Build Conditions – Harris Road

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	271	352	190	360	1423	27	657	262
v/c Ratio	0.82	0.51	0.90	0.73	0.77	0.15	0.56	0.38
Control Delay	49.5	5.9	66.6	32.5	35.6	14.0	28.8	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	5.9	66.6	32.5	35.6	14.0	28.8	5.6
Queue Length 50th (ft)	141	6	89	185	365	6	166	0
Queue Length 95th (ft)	217	61	#192	m151	m286	20	244	57
Internal Link Dist (ft)		920	920		1005		920	
Turn Bay Length (ft)	100			165		150		330
Base Capacity (vph)	406	773	255	537	1857	181	1178	691
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.46	0.75	0.67	0.77	0.15	0.56	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	241	13	300	92	28	50	320	1241	26	24	585	233
Future Volume (veh/h)	241	13	300	92	28	50	320	1241	26	24	585	233
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1737	1737	1826	1826	1826	1841	1870	1870	1544	1826	1841
Adj Flow Rate, veh/h	271	15	337	103	31	56	360	1394	29	27	657	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	11	11	5	5	5	4	2	2	24	5	4
Cap, veh/h	434	22	489	154	51	60	463	1486	31	149	1016	
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.16	0.42	0.42	0.04	0.29	0.00
Sat Flow, veh/h	1310	63	1419	269	148	174	1753	3560	74	1471	3469	1560
Grp Volume(v), veh/h	271	0	352	190	0	0	360	695	728	27	657	0
Grp Sat Flow(s),veh/h/ln	1310	0	1482	591	0	0	1753	1777	1857	1471	1735	1560
Q Serve(g_s), s	0.0	0.0	18.4	11.4	0.0	0.0	12.1	33.7	33.8	1.1	14.9	0.0
Cycle Q Clear(g_c), s	21.5	0.0	18.4	29.8	0.0	0.0	12.1	33.7	33.8	1.1	14.9	0.0
Prop In Lane	1.00		0.96	0.54		0.29	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	434	0	510	265	0	0	463	742	775	149	1016	
V/C Ratio(X)	0.62	0.00	0.69	0.72	0.00	0.00	0.78	0.94	0.94	0.18	0.65	
Avail Cap(c_a), veh/h	434	0	510	265	0	0	548	742	775	207	1016	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	0.09	0.09	0.09	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.4	0.0	25.4	34.2	0.0	0.0	18.4	25.1	25.1	23.6	27.8	0.0
Incr Delay (d2), s/veh	2.8	0.0	3.9	8.9	0.0	0.0	0.6	3.0	2.9	0.6	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	0.0	11.1	8.2	0.0	0.0	5.4	15.0	15.6	0.7	10.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.2	0.0	29.3	43.1	0.0	0.0	18.9	28.1	28.0	24.2	30.9	0.0
LnGrp LOS	C	A	C	D	A	A	B	C	C	C	C	
Approach Vol, veh/h		623			190			1783			684	A
Approach Delay, s/veh		29.2			43.1			26.2			30.7	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.4	43.6		37.0	20.6	32.4		37.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	34.0		31.0	19.0	22.0		31.0
Max Q Clear Time (g_c+I1), s	3.1	35.8		23.5	14.1	16.9		31.8
Green Ext Time (p_c), s	0.0	0.0		2.0	0.5	1.8		0.0

Intersection Summary	
HCM 6th Ctrl Delay	28.7
HCM 6th LOS	C

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	241	431	89	76	1026	57	1412	259
v/c Ratio	0.77	0.87	0.75	0.38	0.55	0.17	0.75	0.27
Control Delay	48.7	39.4	56.4	22.4	5.8	8.3	21.8	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.7	39.4	56.4	22.4	5.8	8.3	21.8	2.7
Queue Length 50th (ft)	123	141	26	14	52	12	358	0
Queue Length 95th (ft)	#210	#295	#106	m31	m85	26	456	39
Internal Link Dist (ft)		920	920		1005		920	
Turn Bay Length (ft)	100			165		150		330
Base Capacity (vph)	360	539	131	201	1852	338	1884	957
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.80	0.68	0.38	0.55	0.17	0.75	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	234	40	378	44	6	37	74	701	294	55	1370	251
Future Volume (veh/h)	234	40	378	44	6	37	74	701	294	55	1370	251
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1900	1900	1722	1885	1885	1900	1885	1870
Adj Flow Rate, veh/h	241	41	390	45	6	38	76	723	303	57	1412	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	0	0	0	0	0	12	1	1	0	1	2
Cap, veh/h	326	40	377	60	22	16	237	1194	500	446	1713	
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.13	0.97	0.97	0.06	0.48	0.00
Sat Flow, veh/h	1373	155	1477	0	86	64	1640	2460	1031	1810	3582	1585
Grp Volume(v), veh/h	241	0	431	89	0	0	76	526	500	57	1412	0
Grp Sat Flow(s),veh/h/ln	1373	0	1632	150	0	0	1640	1791	1700	1810	1791	1585
Q Serve(g_s), s	0.0	0.0	23.0	0.0	0.0	0.0	1.9	1.9	1.9	1.4	30.6	0.0
Cycle Q Clear(g_c), s	22.3	0.0	23.0	23.0	0.0	0.0	1.9	1.9	1.9	1.4	30.6	0.0
Prop In Lane	1.00		0.90	0.51		0.43	1.00		0.61	1.00		1.00
Lane Grp Cap(c), veh/h	326	0	417	99	0	0	237	869	825	446	1713	
V/C Ratio(X)	0.74	0.00	1.03	0.90	0.00	0.00	0.32	0.61	0.61	0.13	0.82	
Avail Cap(c_a), veh/h	326	0	417	99	0	0	256	869	825	480	1713	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	0.56	0.56	0.56	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.3	0.0	33.5	35.5	0.0	0.0	15.1	0.7	0.7	10.0	20.2	0.0
Incr Delay (d2), s/veh	8.6	0.0	52.9	60.5	0.0	0.0	0.4	1.8	1.9	0.1	4.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.8	0.0	21.7	6.5	0.0	0.0	1.1	1.3	1.2	0.9	17.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.8	0.0	86.4	96.1	0.0	0.0	15.6	2.5	2.6	10.1	24.9	0.0
LnGrp LOS	D	A	F	F	A	A	B	A	A	B	C	
Approach Vol, veh/h		672			89			1102			1469	A
Approach Delay, s/veh		70.4			96.1			3.4			24.3	
Approach LOS		E			F			A			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.3	49.7		29.0	12.0	49.0		29.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	42.0		23.0	7.0	42.0		23.0
Max Q Clear Time (g_c+I1), s	3.4	3.9		25.0	3.9	32.6		25.0
Green Ext Time (p_c), s	0.0	7.4		0.0	0.0	6.0		0.0

Intersection Summary	
HCM 6th Ctrl Delay	28.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	271	352	190	360	1423	27	657	262
v/c Ratio	0.82	0.51	0.90	0.73	0.77	0.15	0.56	0.38
Control Delay	49.5	5.9	66.6	21.4	24.3	14.0	28.8	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	5.9	66.6	21.4	24.3	14.0	28.8	5.6
Queue Length 50th (ft)	141	6	89	102	282	6	166	0
Queue Length 95th (ft)	217	61	#192	190	#601	20	244	57
Internal Link Dist (ft)		920	920		920		920	
Turn Bay Length (ft)	100			165		150		330
Base Capacity (vph)	406	773	255	537	1857	181	1178	691
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.46	0.75	0.67	0.77	0.15	0.56	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	241	13	300	92	28	50	320	1241	26	24	585	233
Future Volume (veh/h)	241	13	300	92	28	50	320	1241	26	24	585	233
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1737	1737	1826	1826	1826	1841	1870	1870	1544	1826	1841
Adj Flow Rate, veh/h	271	15	337	103	31	56	360	1394	29	27	657	262
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	11	11	5	5	5	4	2	2	24	5	4
Cap, veh/h	434	22	489	154	51	60	442	1486	31	149	1016	455
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.16	0.42	0.42	0.04	0.29	0.29
Sat Flow, veh/h	1310	63	1419	269	148	174	1753	3560	74	1471	3469	1555
Grp Volume(v), veh/h	271	0	352	190	0	0	360	695	728	27	657	262
Grp Sat Flow(s),veh/h/ln	1310	0	1482	591	0	0	1753	1777	1857	1471	1735	1555
Q Serve(g_s), s	0.0	0.0	18.4	11.4	0.0	0.0	12.1	33.7	33.8	1.1	14.9	12.9
Cycle Q Clear(g_c), s	21.5	0.0	18.4	29.8	0.0	0.0	12.1	33.7	33.8	1.1	14.9	12.9
Prop In Lane	1.00		0.96	0.54		0.29	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	434	0	510	265	0	0	442	742	775	149	1016	455
V/C Ratio(X)	0.62	0.00	0.69	0.72	0.00	0.00	0.82	0.94	0.94	0.18	0.65	0.58
Avail Cap(c_a), veh/h	434	0	510	265	0	0	526	742	775	207	1016	455
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.4	0.0	25.4	34.2	0.0	0.0	18.7	25.1	25.1	23.6	27.8	27.1
Incr Delay (d2), s/veh	2.8	0.0	3.9	8.9	0.0	0.0	8.2	20.9	20.5	0.6	3.2	5.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	0.0	11.1	8.2	0.0	0.0	9.1	23.6	24.4	0.7	10.2	8.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.2	0.0	29.3	43.1	0.0	0.0	26.9	46.0	45.6	24.2	30.9	32.3
LnGrp LOS	C	A	C	D	A	A	C	D	D	C	C	C
Approach Vol, veh/h		623			190			1783			946	
Approach Delay, s/veh		29.2			43.1			42.0			31.1	
Approach LOS		C			D			D			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.4	43.6		37.0	20.6	32.4		37.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	34.0		31.0	19.0	22.0		31.0
Max Q Clear Time (g_c+I1), s	3.1	35.8		23.5	14.1	16.9		31.8
Green Ext Time (p_c), s	0.0	0.0		2.0	0.5	2.3		0.0

Intersection Summary		
HCM 6th Ctrl Delay		36.9
HCM 6th LOS		D

Queues
11: 5th St & Harris Rd

10/29/2020

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	241	431	89	76	1026	57	1412	259
v/c Ratio	0.72	0.83	0.58	0.38	0.57	0.18	0.77	0.28
Control Delay	43.0	32.1	33.2	15.7	17.2	9.6	24.3	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	32.1	33.2	15.7	17.2	9.6	24.3	3.0
Queue Length 50th (ft)	124	136	24	16	200	12	356	0
Queue Length 95th (ft)	193	238	74	44	293	30	#546	43
Internal Link Dist (ft)		920	920		463		920	
Turn Bay Length (ft)	100			165		150		330
Base Capacity (vph)	422	608	182	201	1798	324	1829	936
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.71	0.49	0.38	0.57	0.18	0.77	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	234	40	378	44	6	37	74	701	294	55	1370	251
Future Volume (veh/h)	234	40	378	44	6	37	74	701	294	55	1370	251
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1900	1900	1900	1722	1885	1885	1900	1885	1870
Adj Flow Rate, veh/h	241	41	390	45	6	38	76	723	303	57	1412	259
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	1	0	0	0	0	0	12	1	1	0	1	2
Cap, veh/h	371	47	443	90	26	42	206	1085	454	303	1554	688
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.07	0.44	0.44	0.06	0.43	0.43
Sat Flow, veh/h	1373	155	1477	100	87	139	1640	2460	1031	1810	3582	1585
Grp Volume(v), veh/h	241	0	431	89	0	0	76	526	500	57	1412	259
Grp Sat Flow(s),veh/h/ln	1373	0	1632	326	0	0	1640	1791	1700	1810	1791	1585
Q Serve(g_s), s	0.0	0.0	22.6	3.7	0.0	0.0	2.2	20.9	21.0	1.5	33.2	10.0
Cycle Q Clear(g_c), s	21.2	0.0	22.6	26.3	0.0	0.0	2.2	20.9	21.0	1.5	33.2	10.0
Prop In Lane	1.00		0.90	0.51		0.43	1.00		0.61	1.00		1.00
Lane Grp Cap(c), veh/h	371	0	490	158	0	0	206	790	749	303	1554	688
V/C Ratio(X)	0.65	0.00	0.88	0.56	0.00	0.00	0.37	0.67	0.67	0.19	0.91	0.38
Avail Cap(c_a), veh/h	371	0	490	158	0	0	225	790	749	337	1554	688
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.5	0.0	30.0	32.4	0.0	0.0	19.6	19.9	19.9	14.5	23.8	17.2
Incr Delay (d2), s/veh	4.0	0.0	16.7	4.5	0.0	0.0	1.1	4.4	4.7	0.3	9.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.8	0.0	16.2	3.8	0.0	0.0	1.4	13.6	13.1	1.0	20.6	6.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.4	0.0	46.7	36.9	0.0	0.0	20.7	24.3	24.6	14.8	33.2	18.8
LnGrp LOS	C	A	D	D	A	A	C	C	C	B	C	B
Approach Vol, veh/h		672			89			1102			1728	
Approach Delay, s/veh		41.9			36.9			24.2			30.4	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.3	45.7		33.0	12.0	45.0		33.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	38.0		27.0	7.0	38.0		27.0
Max Q Clear Time (g_c+I1), s	3.5	23.0		24.6	4.2	35.2		28.3
Green Ext Time (p_c), s	0.0	5.5		0.9	0.0	2.3		0.0

Intersection Summary			
HCM 6th Ctrl Delay			30.8
HCM 6th LOS			C

Attachment E Future Build Conditions – 5th Street Station Parkway

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	14	56	295	291	321	66	1335	635	323	717	7
v/c Ratio	0.18	0.22	0.75	0.74	0.52	0.22	1.49	0.73	1.03	0.59	0.01
Control Delay	38.8	17.4	46.1	45.1	6.9	19.3	251.5	6.4	94.5	31.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	17.4	46.1	45.1	6.9	19.3	251.5	6.4	94.5	31.0	0.0
Queue Length 50th (ft)	7	9	152	150	0	21	~550	18	~233	116	0
Queue Length 95th (ft)	24	40	#326	#317	68	m29	m#623	m58	m#401	#234	m0
Internal Link Dist (ft)		920		920			1237			1005	
Turn Bay Length (ft)	90		275		250	95		350	520		60
Base Capacity (vph)	114	371	393	395	621	297	895	873	315	1215	666
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.15	0.75	0.74	0.52	0.22	1.49	0.73	1.03	0.59	0.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	16	36	533	6	295	61	1228	584	297	660	6
Future Volume (veh/h)	13	16	36	533	6	295	61	1228	584	297	660	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1411	1900	1900	1826	1900	1856	1900	1856	1856	1841	1856	1900
Adj Flow Rate, veh/h	14	17	39	584	0	321	66	1335	635	323	717	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	33	0	0	5	0	3	0	3	3	4	3	0
Cap, veh/h	123	47	108	696	0	314	413	1282	571	216	1335	609
Arrive On Green	0.09	0.09	0.09	0.20	0.00	0.20	0.02	0.12	0.12	0.16	0.76	0.76
Sat Flow, veh/h	1344	513	1176	3478	0	1572	1810	3526	1570	1753	3526	1608
Grp Volume(v), veh/h	14	0	56	584	0	321	66	1335	635	323	717	7
Grp Sat Flow(s),veh/h/ln	1344	0	1688	1739	0	1572	1810	1763	1570	1753	1763	1608
Q Serve(g_s), s	0.9	0.0	2.8	14.5	0.0	18.0	2.0	32.7	32.7	7.0	7.5	0.1
Cycle Q Clear(g_c), s	0.9	0.0	2.8	14.5	0.0	18.0	2.0	32.7	32.7	7.0	7.5	0.1
Prop In Lane	1.00		0.70	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	0	155	696	0	314	413	1282	571	216	1335	609
V/C Ratio(X)	0.11	0.00	0.36	0.84	0.00	1.02	0.16	1.04	1.11	1.49	0.54	0.01
Avail Cap(c_a), veh/h	269	0	338	696	0	314	440	1282	571	216	1335	609
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.81	0.81	0.81
Uniform Delay (d), s/veh	37.5	0.0	38.4	34.6	0.0	36.0	16.3	39.6	39.6	21.4	7.7	6.8
Incr Delay (d2), s/veh	0.4	0.0	1.4	9.0	0.0	56.1	0.2	36.5	72.1	240.6	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	0.0	2.2	11.2	0.0	17.4	1.4	30.1	35.6	25.9	3.7	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.9	0.0	39.8	43.6	0.0	92.1	16.5	76.1	111.7	262.1	9.0	6.8
LnGrp LOS	D	A	D	D	A	F	B	F	F	F	A	A
Approach Vol, veh/h		70			905			2036			1047	
Approach Delay, s/veh		39.4			60.8			85.3			87.0	
Approach LOS		D			E			F			F	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.0	38.7		14.3	11.7	40.1		24.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	23.0		18.0	7.0	23.0		18.0
Max Q Clear Time (g_c+I1), s	9.0	34.7		4.8	4.0	9.5		20.0
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	3.8		0.0

Intersection Summary	
HCM 6th Ctrl Delay	79.5
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	215	348	353	398	149	677	754	624	1327	13
v/c Ratio	0.26	0.62	0.78	0.78	0.55	0.66	0.90	0.81	2.07	1.45	0.02
Control Delay	42.3	22.9	46.1	46.3	6.7	34.2	50.3	12.0	513.9	241.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.3	22.9	46.1	46.3	6.7	34.2	50.3	12.0	513.9	241.7	0.1
Queue Length 50th (ft)	10	45	186	189	0	60	193	56	~534	~547	0
Queue Length 95th (ft)	30	107	#400	#405	77	m92	m#261	m114	m#733	#684	m0
Internal Link Dist (ft)		920		920			1237			1005	
Turn Bay Length (ft)	90		275		250	95		350	520		60
Base Capacity (vph)	107	444	447	451	718	225	754	929	301	913	548
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.48	0.78	0.78	0.55	0.66	0.90	0.81	2.07	1.45	0.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	57	151	649	31	386	145	657	731	605	1287	13
Future Volume (veh/h)	18	57	151	649	31	386	145	657	731	605	1287	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1678	1900	1900	1885	1900	1900	1900	1885	1870	1885	1885	1900
Adj Flow Rate, veh/h	19	59	156	692	0	398	149	677	754	624	1327	13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	15	0	0	1	0	0	0	1	2	1	1	0
Cap, veh/h	243	70	185	718	0	322	221	928	411	328	1087	489
Arrive On Green	0.15	0.15	0.15	0.20	0.00	0.20	0.03	0.09	0.09	0.04	0.10	0.10
Sat Flow, veh/h	1598	461	1219	3591	0	1610	1810	3582	1585	1795	3582	1610
Grp Volume(v), veh/h	19	0	215	692	0	398	149	677	754	624	1327	13
Grp Sat Flow(s),veh/h/ln	1598	0	1681	1795	0	1610	1810	1791	1585	1795	1791	1610
Q Serve(g_s), s	0.9	0.0	11.2	17.2	0.0	18.0	5.3	16.6	23.3	11.0	27.3	0.7
Cycle Q Clear(g_c), s	0.9	0.0	11.2	17.2	0.0	18.0	5.3	16.6	23.3	11.0	27.3	0.7
Prop In Lane	1.00		0.73	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	243	0	255	718	0	322	221	928	411	328	1087	489
V/C Ratio(X)	0.08	0.00	0.84	0.96	0.00	1.24	0.67	0.73	1.84	1.90	1.22	0.03
Avail Cap(c_a), veh/h	320	0	336	718	0	322	221	928	411	328	1087	489
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.58	0.58	0.58
Uniform Delay (d), s/veh	32.7	0.0	37.1	35.7	0.0	36.0	26.0	38.1	41.2	26.9	40.5	28.5
Incr Delay (d2), s/veh	0.1	0.0	13.7	24.8	0.0	130.1	7.9	5.0	385.6	413.7	104.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.7	0.0	9.3	14.9	0.0	28.3	4.9	13.3	84.6	63.3	40.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.9	0.0	50.8	60.5	0.0	166.1	33.8	43.1	426.7	440.6	144.8	28.6
LnGrp LOS	C	A	D	E	A	F	C	D	F	F	F	C
Approach Vol, veh/h		234			1090			1580			1964	
Approach Delay, s/veh		49.3			99.1			225.3			238.0	
Approach LOS		D			F			F			F	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	17.0	29.3		19.7	13.0	33.3		24.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	11.0	19.0		18.0	7.0	23.0		18.0
Max Q Clear Time (g_c+I1), s	13.0	25.3		13.2	7.3	29.3		20.0
Green Ext Time (p_c), s	0.0	0.0		0.5	0.0	0.0		0.0

Intersection Summary	
HCM 6th Ctrl Delay	193.7
HCM 6th LOS	F

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

Queues
10: 5th St & Food Lion/5th St Station Pkwy

10/28/2020

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	14	56	295	291	321	66	1335	635	323	717	7
v/c Ratio	0.23	0.25	0.80	0.79	0.27	0.19	0.95	0.43	0.89	0.47	0.01
Control Delay	51.5	21.7	58.8	57.4	3.8	15.8	47.1	2.8	49.7	25.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.5	21.7	58.8	57.4	3.8	15.8	47.1	2.8	49.7	25.5	0.0
Queue Length 50th (ft)	9	11	203	200	0	23	488	0	71	204	0
Queue Length 95th (ft)	29	46	#418	#411	35	47	#652	38	#163	263	0
Internal Link Dist (ft)		920		920			2857			462	
Turn Bay Length (ft)	90		275		250	95		350	520		60
Base Capacity (vph)	90	311	368	370	1174	342	1411	1490	363	1514	766
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.18	0.80	0.79	0.27	0.19	0.95	0.43	0.89	0.47	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	16	36	533	6	295	61	1228	584	297	660	6
Future Volume (veh/h)	13	16	36	533	6	295	61	1228	584	297	660	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1411	1900	1900	1826	1900	1856	1900	1856	1856	1841	1856	1900
Adj Flow Rate, veh/h	14	17	39	584	0	321	66	1335	635	323	717	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	33	0	0	5	0	3	0	3	3	4	3	0
Cap, veh/h	108	41	94	601	0	743	417	1640	1286	406	1670	762
Arrive On Green	0.08	0.08	0.08	0.17	0.00	0.17	0.06	0.47	0.47	0.06	0.47	0.47
Sat Flow, veh/h	1344	513	1176	3478	0	3145	1810	3526	2765	3401	3526	1608
Grp Volume(v), veh/h	14	0	56	584	0	321	66	1335	635	323	717	7
Grp Sat Flow(s),veh/h/ln	1344	0	1688	1739	0	1572	1810	1763	1382	1700	1763	1608
Q Serve(g_s), s	1.1	0.0	3.5	18.4	0.0	9.5	2.0	35.8	17.5	5.4	14.8	0.3
Cycle Q Clear(g_c), s	1.1	0.0	3.5	18.4	0.0	9.5	2.0	35.8	17.5	5.4	14.8	0.3
Prop In Lane	1.00		0.70	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	108	0	135	601	0	743	417	1640	1286	406	1670	762
V/C Ratio(X)	0.13	0.00	0.41	0.97	0.00	0.43	0.16	0.81	0.49	0.79	0.43	0.01
Avail Cap(c_a), veh/h	220	0	276	601	0	743	432	1640	1286	406	1670	762
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.0	0.0	48.1	45.2	0.0	35.7	14.1	25.3	20.4	24.0	19.1	15.3
Incr Delay (d2), s/veh	0.5	0.0	2.0	29.7	0.0	0.4	0.2	4.6	1.4	10.5	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.7	0.0	2.8	15.6	0.0	6.6	1.4	21.1	9.4	4.5	9.8	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.6	0.0	50.1	74.9	0.0	36.1	14.3	29.9	21.8	34.5	19.9	15.3
LnGrp LOS	D	A	D	E	A	D	B	C	C	C	B	B
Approach Vol, veh/h		70			905			2036			1047	
Approach Delay, s/veh		49.6			61.2			26.8			24.4	
Approach LOS		D			E			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.0	57.2		14.8	12.1	58.1		25.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	7.0	42.0		18.0	7.0	42.0		19.0
Max Q Clear Time (g_c+I1), s	7.4	37.8		5.5	4.0	16.8		20.4
Green Ext Time (p_c), s	0.0	3.4		0.2	0.0	4.7		0.0

Intersection Summary	
HCM 6th Ctrl Delay	34.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Queues

10: 5th St & Food Lion/5th St Station Pkwy

10/28/2020

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	215	348	353	398	149	677	754	624	1327	13
v/c Ratio	0.32	0.73	0.88	0.88	0.41	0.81	0.77	0.45	0.99	1.02	0.02
Control Delay	57.2	39.0	65.2	65.8	5.1	55.7	45.6	2.3	79.1	65.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.2	39.0	65.2	65.8	5.1	55.7	45.6	2.3	79.1	65.7	0.1
Queue Length 50th (ft)	13	77	249	253	0	58	234	10	228	~525	0
Queue Length 95th (ft)	37	156	#468	#473	43	#160	304	29	#347	#661	0
Internal Link Dist (ft)		920		920			1028			895	
Turn Bay Length (ft)	90		275		250	95		350	520		60
Base Capacity (vph)	77	347	397	400	970	183	877	1676	630	1299	682
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.62	0.88	0.88	0.41	0.81	0.77	0.45	0.99	1.02	0.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	57	151	649	31	386	145	657	731	605	1287	13
Future Volume (veh/h)	18	57	151	649	31	386	145	657	731	605	1287	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1678	1900	1900	1885	1900	1900	1900	1885	1870	1885	1885	1900
Adj Flow Rate, veh/h	19	59	156	692	0	398	149	677	754	624	1327	13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	15	0	0	1	0	0	0	1	2	1	1	0
Cap, veh/h	232	67	177	718	0	644	182	914	1270	633	1337	601
Arrive On Green	0.14	0.14	0.14	0.20	0.00	0.20	0.06	0.26	0.26	0.18	0.37	0.37
Sat Flow, veh/h	1598	461	1219	3591	0	3220	1810	3582	2790	3483	3582	1610
Grp Volume(v), veh/h	19	0	215	692	0	398	149	677	754	624	1327	13
Grp Sat Flow(s),veh/h/ln	1598	0	1681	1795	0	1610	1810	1791	1395	1742	1791	1610
Q Serve(g_s), s	1.1	0.0	13.8	21.0	0.0	12.4	6.7	19.1	22.2	19.6	40.6	0.6
Cycle Q Clear(g_c), s	1.1	0.0	13.8	21.0	0.0	12.4	6.7	19.1	22.2	19.6	40.6	0.6
Prop In Lane	1.00		0.73	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	232	0	243	718	0	644	182	914	1270	633	1337	601
V/C Ratio(X)	0.08	0.00	0.88	0.96	0.00	0.62	0.82	0.74	0.59	0.99	0.99	0.02
Avail Cap(c_a), veh/h	247	0	260	718	0	644	182	914	1270	633	1337	601
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.7	0.0	46.1	43.6	0.0	40.2	31.4	37.6	22.4	44.9	34.3	21.8
Incr Delay (d2), s/veh	0.2	0.0	26.9	24.8	0.0	1.8	24.2	5.4	2.1	31.9	22.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.8	0.0	12.1	17.3	0.0	8.7	7.2	13.5	15.5	16.4	28.2	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.9	0.0	73.1	68.4	0.0	42.0	55.6	43.0	24.4	76.8	57.2	21.8
LnGrp LOS	D	A	E	E	A	D	E	D	C	E	E	C
Approach Vol, veh/h		234			1090			1580			1964	
Approach Delay, s/veh		70.4			58.8			35.3			63.2	
Approach LOS		E			E			D			E	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	26.0	34.1		21.9	13.0	47.1		28.0
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s	20.0	27.0		17.0	7.0	40.0		22.0
Max Q Clear Time (g_c+I1), s	21.6	24.2		15.8	8.7	42.6		23.0
Green Ext Time (p_c), s	0.0	1.9		0.2	0.0	0.0		0.0

Intersection Summary	
HCM 6th Ctrl Delay	53.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Queues
10: 5th St & Food Lion/5th St Station Pkwy

10/28/2020

Lane Group	EBR	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	26	193	198	214	936	424	227	479	4
v/c Ratio	0.07	0.62	0.63	0.31	0.56	0.21	0.60	0.21	0.00
Control Delay	0.4	42.7	43.3	6.2	20.7	0.7	45.3	8.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.4	42.7	43.3	6.2	20.7	0.7	45.3	8.0	0.0
Queue Length 50th (ft)	0	102	105	13	199	0	63	52	0
Queue Length 95th (ft)	0	178	183	60	298	10	101	94	0
Internal Link Dist (ft)			920		1028			460	
Turn Bay Length (ft)		275		250		350	330		60
Base Capacity (vph)	356	346	347	685	1663	2100	393	2291	1068
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.56	0.57	0.31	0.56	0.20	0.58	0.21	0.00

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	25	375	4	208	0	908	411	220	465	4
Future Volume (veh/h)	0	0	25	375	4	208	0	908	411	220	465	4
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	0	0	1900	1885	1900	1900	0	1885	1870	1885	1885	1900
Adj Flow Rate, veh/h	0	0	26	390	0	214	0	936	424	227	479	4
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	0	0	1	0	0	0	1	2	1	1	0
Cap, veh/h	0	0	0	545	0	385	0	2009	1988	304	2560	1151
Arrive On Green	0.00	0.00	0.00	0.15	0.00	0.15	0.00	0.56	0.56	0.09	0.71	0.71
Sat Flow, veh/h		0		3591	0	1610	0	3676	2790	3483	3582	1610
Grp Volume(v), veh/h		0.0		390	0	214	0	936	424	227	479	4
Grp Sat Flow(s),veh/h/ln				1795	0	1610	0	1791	1395	1742	1791	1610
Q Serve(g_s), s				9.3	0.0	10.5	0.0	14.0	4.6	5.7	4.0	0.1
Cycle Q Clear(g_c), s				9.3	0.0	10.5	0.0	14.0	4.6	5.7	4.0	0.1
Prop In Lane				1.00		1.00	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				545	0	385	0	2009	1988	304	2560	1151
V/C Ratio(X)				0.72	0.00	0.56	0.00	0.47	0.21	0.75	0.19	0.00
Avail Cap(c_a), veh/h				718	0	463	0	2009	1988	387	2560	1151
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				36.3	0.0	30.0	0.0	11.7	4.4	40.1	4.2	3.7
Incr Delay (d2), s/veh				2.3	0.0	1.3	0.0	0.8	0.2	5.8	0.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				7.5	0.0	7.4	0.0	8.5	3.5	4.7	1.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				38.6	0.0	31.3	0.0	12.5	4.6	45.9	4.4	3.7
LnGrp LOS				D	A	C	A	B	A	D	A	A
Approach Vol, veh/h					604			1360			710	
Approach Delay, s/veh					36.0			10.1			17.7	
Approach LOS					D			B			B	

Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	13.9	56.5				70.3		19.7				
Change Period (Y+Rc), s	6.0	6.0				6.0		6.0				
Max Green Setting (Gmax), s	10.0	34.5				50.5		18.0				
Max Q Clear Time (g_c+I1), s	7.7	16.0				6.0		12.5				
Green Ext Time (p_c), s	0.2	7.6				3.2		1.2				

Intersection Summary	
HCM 6th Ctrl Delay	17.9
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Queues
10: 5th St & Food Lion/5th St Station Pkwy

10/28/2020

Lane Group	EBR	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	156	348	353	398	827	754	682	1327	13
v/c Ratio	0.59	0.92	0.93	0.44	0.89	0.48	0.93	0.69	0.01
Control Delay	14.2	66.7	67.6	8.2	45.4	4.6	56.5	17.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	66.7	67.6	8.2	45.4	4.6	56.5	17.7	0.0
Queue Length 50th (ft)	0	205	208	59	238	36	197	274	0
Queue Length 95th (ft)	43	#376	#381	126	#344	61	#303	350	0
Internal Link Dist (ft)			920		1028			460	
Turn Bay Length (ft)		275		250		350	330		60
Base Capacity (vph)	264	377	380	911	929	1563	731	1922	910
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.92	0.93	0.44	0.89	0.48	0.93	0.69	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	151	649	31	386	0	802	731	662	1287	13
Future Volume (veh/h)	0	0	151	649	31	386	0	802	731	662	1287	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	0	0	1900	1885	1900	1900	0	1885	1870	1885	1885	1900
Adj Flow Rate, veh/h	0	0	156	692	0	398	0	827	754	682	1327	13
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	0	0	1	0	0	0	1	2	1	1	0
Cap, veh/h	0	0	0	777	0	688	0	1334	1643	735	2329	1047
Arrive On Green	0.00	0.00	0.00	0.22	0.00	0.22	0.00	0.37	0.37	0.21	0.65	0.65
Sat Flow, veh/h		0		3591	0	1610	0	3676	2790	3483	3582	1610
Grp Volume(v), veh/h		0.0		692	0	398	0	827	754	682	1327	13
Grp Sat Flow(s),veh/h/ln				1795	0	1610	0	1791	1395	1742	1791	1610
Q Serve(g_s), s				16.8	0.0	16.9	0.0	17.0	13.7	17.3	18.5	0.3
Cycle Q Clear(g_c), s				16.8	0.0	16.9	0.0	17.0	13.7	17.3	18.5	0.3
Prop In Lane				1.00		1.00	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				777	0	688	0	1334	1643	735	2329	1047
V/C Ratio(X)				0.89	0.00	0.58	0.00	0.62	0.46	0.93	0.57	0.01
Avail Cap(c_a), veh/h				798	0	698	0	1334	1643	735	2329	1047
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh				34.2	0.0	19.6	0.0	23.0	10.4	34.8	8.7	5.5
Incr Delay (d2), s/veh				12.0	0.0	1.2	0.0	2.2	0.9	17.9	1.0	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				13.2	0.0	10.4	0.0	11.2	10.6	13.5	9.8	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				46.2	0.0	20.8	0.0	25.2	11.3	52.7	9.8	5.6
LnGrp LOS				D	A	C	A	C	B	D	A	A
Approach Vol, veh/h					1090			1581			2022	
Approach Delay, s/veh					36.9			18.6			24.2	
Approach LOS					D			B			C	

Timer - Assigned Phs	1	2				6		8				
Phs Duration (G+Y+Rc), s	25.0	39.5				64.5		25.5				
Change Period (Y+Rc), s	6.0	6.0				6.0		6.0				
Max Green Setting (Gmax), s	19.0	23.4				48.4		20.0				
Max Q Clear Time (g_c+I1), s	19.3	19.0				20.5		18.9				
Green Ext Time (p_c), s	0.0	3.1				10.7		0.6				

Intersection Summary	
HCM 6th Ctrl Delay	25.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Attachment F Future Build Conditions – I-64 Interchange

Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	663	368	1715	335	714
v/c Ratio	1.24	0.68	1.20	1.26	0.37
Control Delay	152.2	28.1	122.0	171.3	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	152.2	28.1	122.0	171.3	8.0
Queue Length 50th (ft)	~472	138	~621	~200	63
Queue Length 95th (ft)	#681	240	#760	m#314	m78
Internal Link Dist (ft)	920		748		587
Turn Bay Length (ft)		30		200	
Base Capacity (vph)	536	538	1432	266	1930
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.24	0.68	1.20	1.26	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	636	0	353	0	0	0	0	1244	402	322	685	0
Future Volume (veh/h)	636	0	353	0	0	0	0	1244	402	322	685	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1870				0	1870	1870	1841	1811	0
Adj Flow Rate, veh/h	662	0	368				0	1296	419	335	714	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	0	2				0	2	2	4	6	0
Cap, veh/h	543	0	476				0	1095	343	265	1950	0
Arrive On Green	0.30	0.00	0.30				0.00	0.41	0.41	0.21	1.00	0.00
Sat Flow, veh/h	1810	0	1585				0	2756	834	1753	3532	0
Grp Volume(v), veh/h	662	0	368				0	851	864	335	714	0
Grp Sat Flow(s),veh/h/ln	1810	0	1585				0	1777	1720	1753	1721	0
Q Serve(g_s), s	27.0	0.0	19.0				0.0	37.0	37.0	9.5	0.0	0.0
Cycle Q Clear(g_c), s	27.0	0.0	19.0				0.0	37.0	37.0	9.5	0.0	0.0
Prop In Lane	1.00		1.00				0.00		0.48	1.00		0.00
Lane Grp Cap(c), veh/h	543	0	476				0	730	707	265	1950	0
V/C Ratio(X)	1.22	0.00	0.77				0.00	1.16	1.22	1.26	0.37	0.00
Avail Cap(c_a), veh/h	543	0	476				0	730	707	265	1950	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.47	0.47	0.00
Uniform Delay (d), s/veh	31.5	0.0	28.7				0.0	26.5	26.5	21.5	0.0	0.0
Incr Delay (d2), s/veh	114.6	0.0	7.8				0.0	88.7	112.3	132.5	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	42.0	0.0	12.7				0.0	45.6	51.6	17.3	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	146.1	0.0	36.5				0.0	115.2	138.8	154.0	0.3	0.0
LnGrp LOS	F	A	D				A	F	F	F	A	A
Approach Vol, veh/h		1030						1715			1049	
Approach Delay, s/veh		107.0						127.1			49.4	
Approach LOS		F						F			D	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	14.0	43.0		33.0		57.0
Change Period (Y+Rc), s	4.5	6.0		6.0		6.0
Max Green Setting (Gmax), s	9.5	37.0		27.0		51.0
Max Q Clear Time (g_c+I1), s	11.5	39.0		29.0		2.0
Green Ext Time (p_c), s	0.0	0.0		0.0		5.1

Intersection Summary	
HCM 6th Ctrl Delay	100.1
HCM 6th LOS	F

Lane Group	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	292	629	537	1463	783	615
v/c Ratio	0.55	1.13	1.16	0.74	0.82	1.00
Control Delay	30.5	104.6	102.5	21.0	44.7	59.9
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	30.5	104.6	102.5	21.1	44.7	59.9
Queue Length 50th (ft)	137	~373	~326	354	254	271
Queue Length 95th (ft)	218	#583	m249	m294	#322	#331
Internal Link Dist (ft)	920			587	618	
Turn Bay Length (ft)		460	95			55
Base Capacity (vph)	531	558	464	1985	955	618
Starvation Cap Reductn	0	0	0	67	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	1.13	1.16	0.76	0.82	1.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	276	1	598	510	1390	0	0	744	584
Future Volume (veh/h)	0	0	0	276	1	598	510	1390	0	0	744	584
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1841	1900	1841	1885	1885	0	0	1826	1826
Adj Flow Rate, veh/h				291	1	629	537	1463	0	0	783	615
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				4	0	4	1	1	0	0	5	5
Cap, veh/h				561	2	485	481	1990	0	0	964	430
Arrive On Green				0.31	0.31	0.31	0.42	1.00	0.00	0.00	0.09	0.09
Sat Flow, veh/h				1804	6	1560	1795	3676	0	0	3561	1547
Grp Volume(v), veh/h				292	0	629	537	1463	0	0	783	615
Grp Sat Flow(s),veh/h/ln				1810	0	1560	1795	1791	0	0	1735	1547
Q Serve(g_s), s				11.9	0.0	28.0	19.0	0.0	0.0	0.0	19.9	25.0
Cycle Q Clear(g_c), s				11.9	0.0	28.0	19.0	0.0	0.0	0.0	19.9	25.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				563	0	485	481	1990	0	0	964	430
V/C Ratio(X)				0.52	0.00	1.30	1.12	0.74	0.00	0.00	0.81	1.43
Avail Cap(c_a), veh/h				563	0	485	481	1990	0	0	964	430
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	0.33	0.33
Upstream Filter(I)				1.00	0.00	1.00	0.09	0.09	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				25.5	0.0	31.0	14.6	0.0	0.0	0.0	38.6	40.9
Incr Delay (d2), s/veh				0.8	0.0	147.9	55.5	0.2	0.0	0.0	7.4	206.9
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				8.8	0.0	45.2	13.9	0.1	0.0	0.0	15.3	53.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				26.3	0.0	178.9	70.1	0.2	0.0	0.0	46.0	247.8
LnGrp LOS				C	A	F	F	A	A	A	D	F
Approach Vol, veh/h					921			2000			1398	
Approach Delay, s/veh					130.5			19.0			134.8	
Approach LOS					F			B			F	

Timer - Assigned Phs	2	5	6	8
Phs Duration (G+Y+Rc), s	56.0	25.0	31.0	34.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	19.0	25.0	28.0
Max Q Clear Time (g_c+I1), s	2.0	21.0	27.0	30.0
Green Ext Time (p_c), s	14.7	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	80.2
HCM 6th LOS	F

Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	687	455	1165	556	1061
v/c Ratio	1.20	0.78	1.09	1.29	0.55
Control Delay	137.2	33.0	86.3	172.3	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	137.2	33.0	86.3	172.3	17.7
Queue Length 50th (ft)	~480	188	~388	~372	205
Queue Length 95th (ft)	#691	#342	#519	m#522	272
Internal Link Dist (ft)	920		748		587
Turn Bay Length (ft)		30		200	
Base Capacity (vph)	571	582	1068	431	1945
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.20	0.78	1.09	1.29	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	645	1	428	0	0	0	0	858	237	523	997	0
Future Volume (veh/h)	645	1	428	0	0	0	0	858	237	523	997	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1885	1885	1870	1885	0
Adj Flow Rate, veh/h	686	1	455				0	913	252	556	1061	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0				0	1	1	2	1	0
Cap, veh/h	582	1	519				0	832	229	426	1950	0
Arrive On Green	0.32	0.32	0.32				0.00	0.30	0.30	0.39	1.00	0.00
Sat Flow, veh/h	1807	3	1610				0	2868	764	1781	3676	0
Grp Volume(v), veh/h	687	0	455				0	589	576	556	1061	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1791	1748	1781	1791	0
Q Serve(g_s), s	29.0	0.0	24.0				0.0	27.0	27.0	17.5	0.0	0.0
Cycle Q Clear(g_c), s	29.0	0.0	24.0				0.0	27.0	27.0	17.5	0.0	0.0
Prop In Lane	1.00		1.00				0.00		0.44	1.00		0.00
Lane Grp Cap(c), veh/h	583	0	519				0	537	524	426	1950	0
V/C Ratio(X)	1.18	0.00	0.88				0.00	1.10	1.10	1.30	0.54	0.00
Avail Cap(c_a), veh/h	583	0	519				0	537	524	426	1950	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.44	0.44	0.00
Uniform Delay (d), s/veh	30.5	0.0	28.8				0.0	31.5	31.5	17.7	0.0	0.0
Incr Delay (d2), s/veh	97.0	0.0	15.6				0.0	67.6	69.1	144.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	40.3	0.0	16.6				0.0	29.9	29.6	30.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	127.5	0.0	44.4				0.0	99.1	100.6	162.1	0.5	0.0
LnGrp LOS	F	A	D				A	F	F	F	A	A
Approach Vol, veh/h		1142						1165			1617	
Approach Delay, s/veh		94.4						99.9			56.0	
Approach LOS		F						F			E	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	22.0	33.0		35.0		55.0
Change Period (Y+Rc), s	4.5	6.0		6.0		6.0
Max Green Setting (Gmax), s	17.5	27.0		29.0		49.0
Max Q Clear Time (g_c+I1), s	19.5	29.0		31.0		2.0
Green Ext Time (p_c), s	0.0	0.0		0.0		8.7

Intersection Summary	
HCM 6th Ctrl Delay	80.2
HCM 6th LOS	F

Lane Group	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	311	465	296	1259	1326	915
v/c Ratio	0.75	1.01	0.98	0.56	0.84	1.03
Control Delay	44.8	73.1	44.6	10.2	22.7	42.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.8	73.1	44.6	10.2	22.7	42.0
Queue Length 50th (ft)	165	~217	150	182	277	~332
Queue Length 95th (ft)	#283	#418	m128	m160	m246	m262
Internal Link Dist (ft)	920			587	618	
Turn Bay Length (ft)		460	95			55
Base Capacity (vph)	416	460	302	2241	1588	885
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	1.01	0.98	0.56	0.84	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	295	0	442	281	1196	0	0	1260	869
Future Volume (veh/h)	0	0	0	295	0	442	281	1196	0	0	1260	869
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1885	1870	0	0	1885	1900
Adj Flow Rate, veh/h				311	0	465	296	1259	0	0	1326	915
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				0	0	0	1	2	0	0	1	0
Cap, veh/h				422	0	376	320	2251	0	0	1592	716
Arrive On Green				0.23	0.00	0.23	0.24	1.00	0.00	0.00	0.44	0.44
Sat Flow, veh/h				1810	0	1610	1795	3647	0	0	3676	1610
Grp Volume(v), veh/h				311	0	465	296	1259	0	0	1326	915
Grp Sat Flow(s),veh/h/ln				1810	0	1610	1795	1777	0	0	1791	1610
Q Serve(g_s), s				14.3	0.0	21.0	9.2	0.0	0.0	0.0	29.4	40.0
Cycle Q Clear(g_c), s				14.3	0.0	21.0	9.2	0.0	0.0	0.0	29.4	40.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				422	0	376	320	2251	0	0	1592	716
V/C Ratio(X)				0.74	0.00	1.24	0.93	0.56	0.00	0.00	0.83	1.28
Avail Cap(c_a), veh/h				422	0	376	320	2251	0	0	1592	716
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.09	0.09	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				31.9	0.0	34.5	18.9	0.0	0.0	0.0	22.1	25.0
Incr Delay (d2), s/veh				6.6	0.0	127.8	4.9	0.1	0.0	0.0	5.3	136.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				11.2	0.0	32.3	3.3	0.1	0.0	0.0	17.7	59.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				38.6	0.0	162.3	23.8	0.1	0.0	0.0	27.3	161.0
LnGrp LOS				D	A	F	C	A	A	A	C	F
Approach Vol, veh/h					776			1555			2241	
Approach Delay, s/veh					112.7			4.6			81.9	
Approach LOS					F			A			F	

Timer - Assigned Phs	2	5	6	8
Phs Duration (G+Y+Rc), s	63.0	17.0	46.0	27.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	57.0	11.0	40.0	21.0
Max Q Clear Time (g_c+I1), s	2.0	11.2	42.0	23.0
Green Ext Time (p_c), s	11.6	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	60.8
HCM 6th LOS	E

Queues
7: 5th St & EB Ramps

12/10/2020

Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	663	368	1715	335	714
v/c Ratio	1.24	0.68	1.20	1.26	0.37
Control Delay	152.2	28.1	122.0	172.8	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	152.2	28.1	122.0	172.8	8.7
Queue Length 50th (ft)	~472	138	~621	~200	75
Queue Length 95th (ft)	#681	240	#760	#373	92
Internal Link Dist (ft)	920		748		587
Turn Bay Length (ft)		30		200	
Base Capacity (vph)	536	538	1432	266	1930
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.24	0.68	1.20	1.26	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	636	0	353	0	0	0	0	1244	402	322	685	0
Future Volume (veh/h)	636	0	353	0	0	0	0	1244	402	322	685	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1870				0	1870	1870	1841	1811	0
Adj Flow Rate, veh/h	662	0	368				0	1296	419	335	714	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	0	2				0	2	2	4	6	0
Cap, veh/h	543	0	476				0	1095	343	265	1950	0
Arrive On Green	0.30	0.00	0.30				0.00	0.41	0.41	0.21	1.00	0.00
Sat Flow, veh/h	1810	0	1585				0	2756	834	1753	3532	0
Grp Volume(v), veh/h	662	0	368				0	851	864	335	714	0
Grp Sat Flow(s),veh/h/ln	1810	0	1585				0	1777	1720	1753	1721	0
Q Serve(g_s), s	27.0	0.0	19.0				0.0	37.0	37.0	9.5	0.0	0.0
Cycle Q Clear(g_c), s	27.0	0.0	19.0				0.0	37.0	37.0	9.5	0.0	0.0
Prop In Lane	1.00		1.00				0.00		0.48	1.00		0.00
Lane Grp Cap(c), veh/h	543	0	476				0	730	707	265	1950	0
V/C Ratio(X)	1.22	0.00	0.77				0.00	1.16	1.22	1.26	0.37	0.00
Avail Cap(c_a), veh/h	543	0	476				0	730	707	265	1950	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.75	0.75	0.00
Uniform Delay (d), s/veh	31.5	0.0	28.7				0.0	26.5	26.5	21.5	0.0	0.0
Incr Delay (d2), s/veh	114.6	0.0	7.8				0.0	88.7	112.3	139.5	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	42.0	0.0	12.7				0.0	45.6	51.6	19.0	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	146.1	0.0	36.5				0.0	115.2	138.8	161.1	0.4	0.0
LnGrp LOS	F	A	D				A	F	F	F	A	A
Approach Vol, veh/h		1030						1715			1049	
Approach Delay, s/veh		107.0						127.1			51.7	
Approach LOS		F						F			D	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	14.0	43.0		33.0		57.0
Change Period (Y+Rc), s	4.5	6.0		6.0		6.0
Max Green Setting (Gmax), s	9.5	37.0		27.0		51.0
Max Q Clear Time (g_c+I1), s	11.5	39.0		29.0		2.0
Green Ext Time (p_c), s	0.0	0.0		0.0		5.1

Intersection Summary	
HCM 6th Ctrl Delay	100.8
HCM 6th LOS	F

Lane Group	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	292	629	537	1463	783	615
v/c Ratio	0.62	1.23	1.22	0.70	0.62	0.81
Control Delay	34.9	147.6	126.0	15.4	32.2	28.6
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	34.9	147.6	126.0	15.6	32.2	28.6
Queue Length 50th (ft)	144	~401	~292	287	235	233
Queue Length 95th (ft)	230	#611	m#223	m238	297	#366
Internal Link Dist (ft)	920			587	618	
Turn Bay Length (ft)		460	95			55
Base Capacity (vph)	474	510	441	2104	1260	755
Starvation Cap Reductn	0	0	0	123	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	1.23	1.22	0.74	0.62	0.81

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	276	1	598	510	1390	0	0	744	584
Future Volume (veh/h)	0	0	0	276	1	598	510	1390	0	0	744	584
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1841	1900	1841	1885	1885	0	0	1826	1826
Adj Flow Rate, veh/h				291	1	629	537	1463	0	0	783	615
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				4	0	4	1	1	0	0	5	5
Cap, veh/h				501	2	433	424	2109	0	0	1272	567
Arrive On Green				0.28	0.28	0.28	0.31	1.00	0.00	0.00	0.25	0.25
Sat Flow, veh/h				1804	6	1560	1795	3676	0	0	3561	1547
Grp Volume(v), veh/h				292	0	629	537	1463	0	0	783	615
Grp Sat Flow(s),veh/h/ln				1810	0	1560	1795	1791	0	0	1735	1547
Q Serve(g_s), s				12.5	0.0	25.0	14.0	0.0	0.0	0.0	18.1	33.0
Cycle Q Clear(g_c), s				12.5	0.0	25.0	14.0	0.0	0.0	0.0	18.1	33.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				503	0	433	424	2109	0	0	1272	567
V/C Ratio(X)				0.58	0.00	1.45	1.27	0.69	0.00	0.00	0.62	1.08
Avail Cap(c_a), veh/h				503	0	433	424	2109	0	0	1272	567
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	0.67	0.67
Upstream Filter(I)				1.00	0.00	1.00	0.09	0.09	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				28.0	0.0	32.5	15.6	0.0	0.0	0.0	28.3	33.9
Incr Delay (d2), s/veh				1.7	0.0	215.8	121.9	0.2	0.0	0.0	2.2	62.5
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				9.4	0.0	54.0	22.4	0.1	0.0	0.0	12.6	31.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				29.7	0.0	248.3	137.5	0.2	0.0	0.0	30.5	96.5
LnGrp LOS				C	A	F	F	A	A	A	C	F
Approach Vol, veh/h					921			2000			1398	
Approach Delay, s/veh					179.0			37.0			59.5	
Approach LOS					F			D			E	

Timer - Assigned Phs	2		5	6		8
Phs Duration (G+Y+Rc), s	59.0		20.0	39.0		31.0
Change Period (Y+Rc), s	6.0		6.0	6.0		6.0
Max Green Setting (Gmax), s	53.0		14.0	33.0		25.0
Max Q Clear Time (g_c+I1), s	2.0		16.0	35.0		27.0
Green Ext Time (p_c), s	14.9		0.0	0.0		0.0

Intersection Summary	
HCM 6th Ctrl Delay	74.6
HCM 6th LOS	E

Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	687	455	1165	556	1061
v/c Ratio	1.34	0.86	0.90	1.50	0.51
Control Delay	195.8	41.6	36.6	261.4	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	195.8	41.6	36.6	261.4	13.9
Queue Length 50th (ft)	~515	199	313	~409	166
Queue Length 95th (ft)	#727	#372	#443	m#559	222
Internal Link Dist (ft)	920		748		587
Turn Bay Length (ft)		30		200	
Base Capacity (vph)	512	531	1299	371	2064
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.34	0.86	0.90	1.50	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	645	1	428	0	0	0	0	858	237	523	997	0
Future Volume (veh/h)	645	1	428	0	0	0	0	858	237	523	997	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1885	1885	1870	1885	0
Adj Flow Rate, veh/h	686	1	455				0	913	252	556	1061	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0				0	1	1	2	1	0
Cap, veh/h	522	1	465				0	1017	280	394	2070	0
Arrive On Green	0.29	0.29	0.29				0.00	0.37	0.37	0.32	1.00	0.00
Sat Flow, veh/h	1807	3	1610				0	2868	764	1781	3676	0
Grp Volume(v), veh/h	687	0	455				0	589	576	556	1061	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1791	1748	1781	1791	0
Q Serve(g_s), s	26.0	0.0	25.2				0.0	27.9	28.0	14.5	0.0	0.0
Cycle Q Clear(g_c), s	26.0	0.0	25.2				0.0	27.9	28.0	14.5	0.0	0.0
Prop In Lane	1.00		1.00				0.00		0.44	1.00		0.00
Lane Grp Cap(c), veh/h	523	0	465				0	657	641	394	2070	0
V/C Ratio(X)	1.31	0.00	0.98				0.00	0.90	0.90	1.41	0.51	0.00
Avail Cap(c_a), veh/h	523	0	465				0	657	641	394	2070	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.44	0.44	0.00
Uniform Delay (d), s/veh	32.0	0.0	31.7				0.0	26.9	26.9	17.4	0.0	0.0
Incr Delay (d2), s/veh	154.5	0.0	35.9				0.0	17.3	18.0	192.4	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	49.8	0.0	20.2				0.0	20.0	19.8	34.3	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	186.5	0.0	67.7				0.0	44.2	44.9	209.8	0.4	0.0
LnGrp LOS	F	A	E				A	D	D	F	A	A
Approach Vol, veh/h		1142						1165			1617	
Approach Delay, s/veh		139.2						44.5			72.4	
Approach LOS		F						D			E	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	19.0	39.0		32.0		58.0
Change Period (Y+Rc), s	4.5	6.0		6.0		6.0
Max Green Setting (Gmax), s	14.5	33.0		26.0		52.0
Max Q Clear Time (g_c+I1), s	16.5	30.0		28.0		2.0
Green Ext Time (p_c), s	0.0	1.9		0.0		8.8

Intersection Summary			
HCM 6th Ctrl Delay			83.6
HCM 6th LOS			F

Lane Group	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	311	465	296	1259	1326	915
v/c Ratio	0.75	1.01	0.98	0.56	0.84	1.03
Control Delay	44.8	73.1	42.0	9.7	22.7	42.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.8	73.1	42.0	9.7	22.7	42.0
Queue Length 50th (ft)	165	~217	150	190	277	~333
Queue Length 95th (ft)	#283	#418	m142	m193	m246	m262
Internal Link Dist (ft)	920			587	618	
Turn Bay Length (ft)		460	95			55
Base Capacity (vph)	416	460	302	2241	1588	885
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	1.01	0.98	0.56	0.84	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	295	0	442	281	1196	0	0	1260	869
Future Volume (veh/h)	0	0	0	295	0	442	281	1196	0	0	1260	869
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1885	1870	0	0	1885	1900
Adj Flow Rate, veh/h				311	0	465	296	1259	0	0	1326	915
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				0	0	0	1	2	0	0	1	0
Cap, veh/h				422	0	376	320	2251	0	0	1592	716
Arrive On Green				0.23	0.00	0.23	0.24	1.00	0.00	0.00	0.44	0.44
Sat Flow, veh/h				1810	0	1610	1795	3647	0	0	3676	1610
Grp Volume(v), veh/h				311	0	465	296	1259	0	0	1326	915
Grp Sat Flow(s),veh/h/ln				1810	0	1610	1795	1777	0	0	1791	1610
Q Serve(g_s), s				14.3	0.0	21.0	9.2	0.0	0.0	0.0	29.4	40.0
Cycle Q Clear(g_c), s				14.3	0.0	21.0	9.2	0.0	0.0	0.0	29.4	40.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				422	0	376	320	2251	0	0	1592	716
V/C Ratio(X)				0.74	0.00	1.24	0.93	0.56	0.00	0.00	0.83	1.28
Avail Cap(c_a), veh/h				422	0	376	320	2251	0	0	1592	716
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.32	0.32	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				31.9	0.0	34.5	18.9	0.0	0.0	0.0	22.1	25.0
Incr Delay (d2), s/veh				6.6	0.0	127.8	14.0	0.3	0.0	0.0	5.3	136.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln				11.2	0.0	32.3	5.0	0.2	0.0	0.0	17.7	59.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				38.6	0.0	162.3	32.9	0.3	0.0	0.0	27.3	161.0
LnGrp LOS				D	A	F	C	A	A	A	C	F
Approach Vol, veh/h					776			1555			2241	
Approach Delay, s/veh					112.7			6.5			81.9	
Approach LOS					F			A			F	

Timer - Assigned Phs	2	5	6	8
Phs Duration (G+Y+Rc), s	63.0	17.0	46.0	27.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	57.0	11.0	40.0	21.0
Max Q Clear Time (g_c+I1), s	2.0	11.2	42.0	23.0
Green Ext Time (p_c), s	11.6	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	61.5
HCM 6th LOS	E

Attachment G Future Build Conditions – Stagecoach Road

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	0	5	3	1	284	1	1161	24	343	557	9
Future Vol, veh/h	16	0	5	3	1	284	1	1161	24	343	557	9
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	75	250	-	340	250	-	250
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	25	0	0	3	0	2	6	4	6	14
Mvmt Flow	17	0	5	3	1	296	1	1209	25	357	580	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1902	2531	291	2215	2515	605	590	0	0	1234	0	0
Stage 1	1295	1295	-	1211	1211	-	-	-	-	-	-	-
Stage 2	607	1236	-	1004	1304	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	7.4	7.5	6.5	6.96	4.1	-	-	4.18	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.55	3.5	4	3.33	2.2	-	-	2.24	-	-
Pot Cap-1 Maneuver	43	28	641	25	29	438	995	-	-	549	-	-
Stage 1	175	235	-	197	257	-	-	-	-	-	-	-
Stage 2	455	250	-	263	232	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 7	10	640	12	10	438	994	-	-	549	-	-
Mov Cap-2 Maneuver	685	180	-	61	59	-	-	-	-	-	-	-
Stage 1	175	82	-	197	257	-	-	-	-	-	-	-
Stage 2	147	250	-	91	81	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	29.3	0	8.7
HCM LOS	B	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	994	-	-	685	640	60	438	549	-	-
HCM Lane V/C Ratio	0.001	-	-	0.024	0.008	0.069	0.675	0.651	-	-
HCM Control Delay (s)	8.6	-	-	10.4	10.7	69.4	28.7	23	-	-
HCM Lane LOS	A	-	-	B	B	F	D	C	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0.2	4.9	4.7	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	18	0	1	1	0	167	4	810	8	172	1139	24
Future Vol, veh/h	18	0	1	1	0	167	4	810	8	172	1139	24
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	75	250	-	340	250	-	250
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	1	0	0	0	1	1	0
Mvmt Flow	19	0	1	1	0	174	4	844	8	179	1186	25

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1975	2405	594	1803	2422	422	1212	0	0	852	0	0
Stage 1	1545	1545	-	852	852	-	-	-	-	-	-	-
Stage 2	430	860	-	951	1570	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.92	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.31	2.2	-	-	2.21	-	-
Pot Cap-1 Maneuver	38	34	453	51	33	583	583	-	-	789	-	-
Stage 1	122	178	-	325	379	-	-	-	-	-	-	-
Stage 2	579	376	-	283	173	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	22	26	453	42	25	583	582	-	-	789	-	-
Mov Cap-2 Maneuver	81	85	-	136	97	-	-	-	-	-	-	-
Stage 1	121	137	-	323	376	-	-	-	-	-	-	-
Stage 2	403	373	-	218	134	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	59.8	13.9	0.1	1.4
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	582	-	-	81	453	136	583	789	-	-
HCM Lane V/C Ratio	0.007	-	-	0.231	0.002	0.008	0.298	0.227	-	-
HCM Control Delay (s)	11.2	-	-	62.4	13	31.7	13.8	10.9	-	-
HCM Lane LOS	B	-	-	F	B	D	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0	0	1.2	0.9	-	-

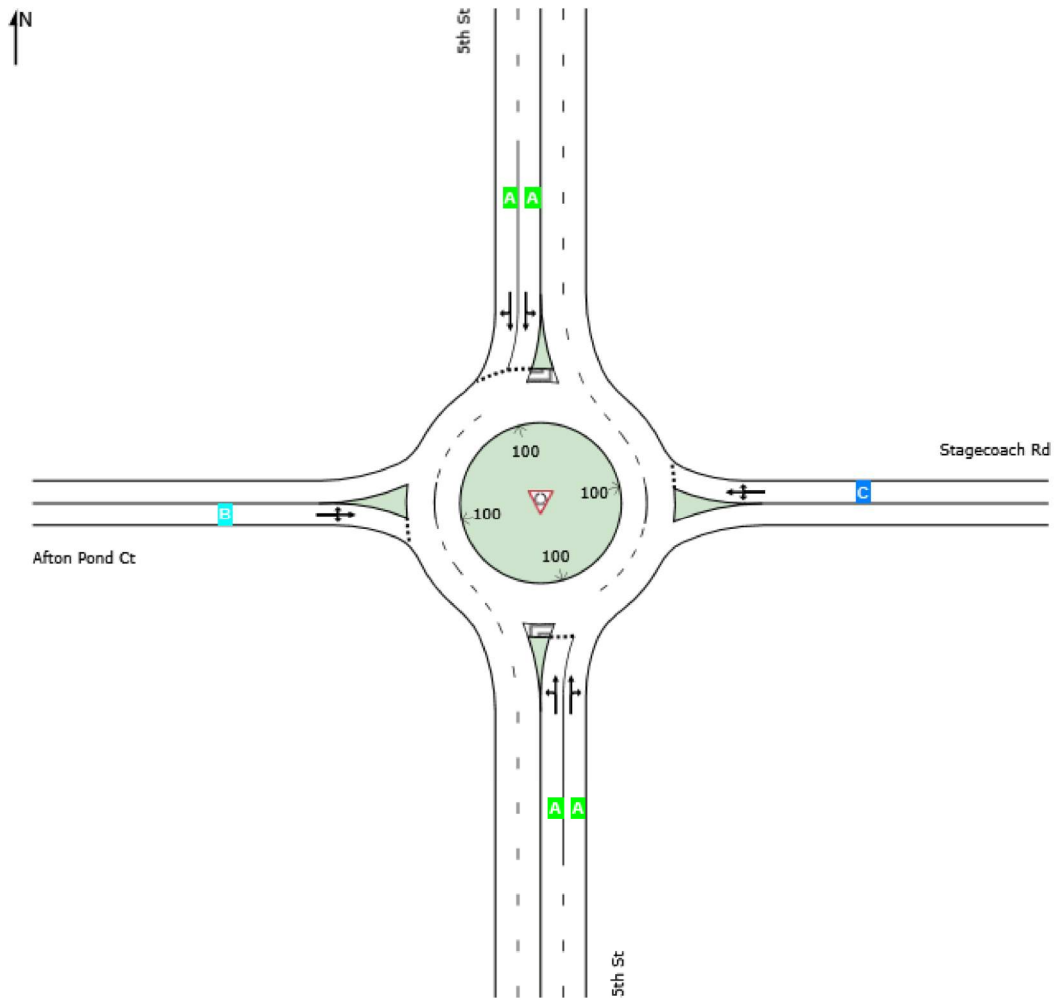
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [5th St and Stagecoach Rd]

2040 AM
Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	C	A	B	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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INPUT VOLUMES

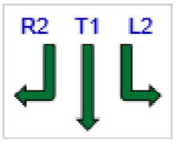
Vehicles and pedestrians per 60 minutes

Site: 101 [5th St and Stagecoach Rd]

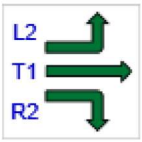
2040 AM
Site Category: (None)
Roundabout

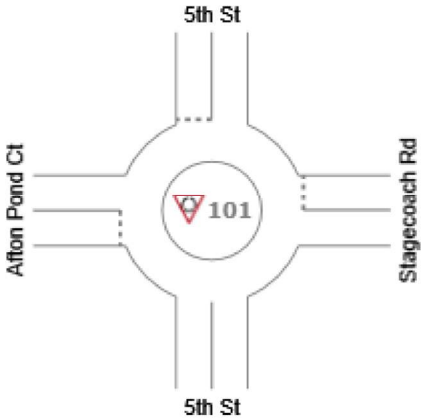
Volume Display Method: Total and %

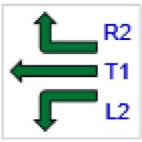
	R2	T1	L2
Tot	9	557	343
LV	86%	94%	96%
HV	14%	6%	4%



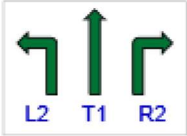
HV	LV	Tot	
0%	100%	16	L2
0%	100%	1	T1
25%	75%	5	R2







	Tot	LV	HV
R2	284	97%	3%
T1	1	100%	0%
L2	3	100%	0%



	L2	T1	R2
Tot	1	1161	24
LV	100%	98%	94%
HV	0%	2%	6%

	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 5th St	1186	1161	25
E: Stagecoach Rd	288	279	9
N: 5th St	909	861	48
W: Afton Pond Ct	22	21	1
Total	2405	2322	83

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LANE SUMMARY

Site: 101 [5th St and Stagecoach Rd]

2040 AM
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 5th St													
Lane 1	405	2.0	882	0.459	100	7.4	LOS A	3.1	77.5	Full	1600	0.0	0.0
Lane 2[d]	884	2.1	1924	0.459	100	3.9	LOS A	0.0	0.0	Full	1600	0.0	0.0
Approach	1289	2.1		0.459		5.0	LOS A	3.1	77.5				
East: Stagecoach Rd													
Lane 1[d]	313	3.0	502	0.624	100	15.6	LOS C	4.0	102.3	Full	1600	0.0	0.0
Approach	313	3.0		0.624		15.6	LOS C	4.0	102.3				
North: 5th St													
Lane 1	481	4.5	1378	0.349	100	8.5	LOS A	2.8	71.3	Full	1600	0.0	0.0
Lane 2[d]	507	6.2	1452	0.349	100	3.9	LOS A	2.8	72.8	Full	1600	0.0	0.0
Approach	988	5.3		0.349		6.1	LOS A	2.8	72.8				
West: Afton Pond Ct													
Lane 1[d]	24	5.7	589	0.041	100	12.2	LOS B	0.1	3.6	Full	1600	0.0	0.0
Approach	24	5.7		0.041		12.2	LOS B	0.1	3.6				
Intersection	2614	3.4		0.624		6.7	LOS A	4.0	102.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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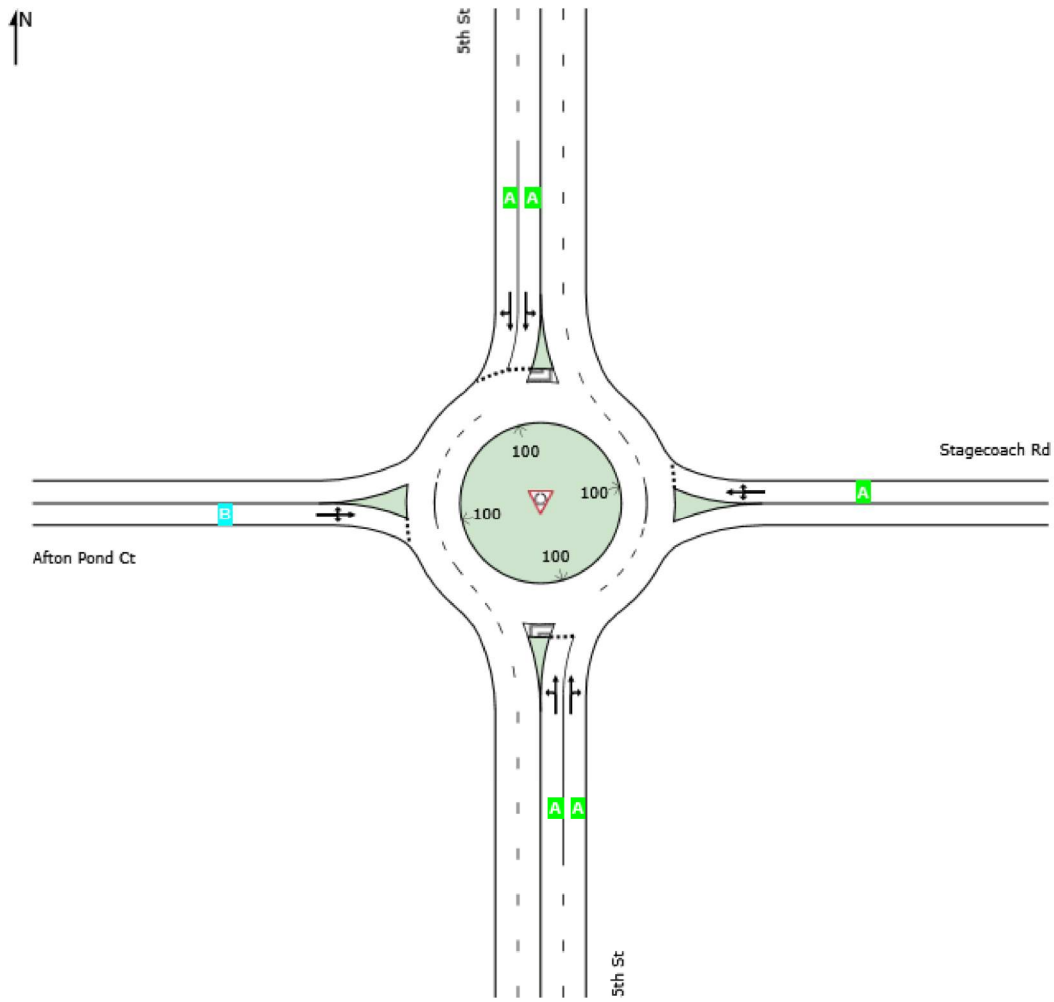
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [5th St and Stagecoach Rd]

2040 PM
Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	B	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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INPUT VOLUMES

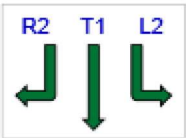
Vehicles and pedestrians per 60 minutes

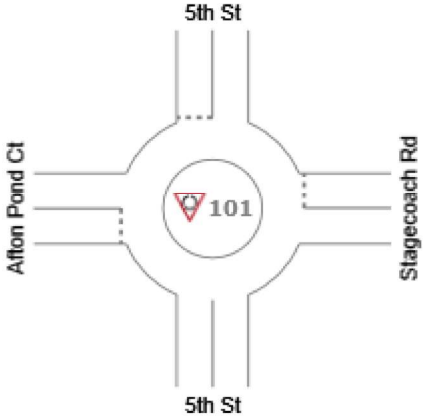
Site: 101 [5th St and Stagecoach Rd]

2040 PM
Site Category: (None)
Roundabout

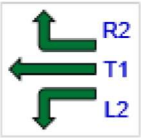
Volume Display Method: Total and %

	R2	T1	L2
Tot	24	1139	172
LV	100%	99%	99%
HV	0%	1%	1%

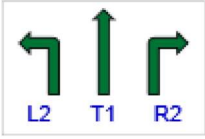




HV	LV	Tot	
0%	100%	18	L2
0%	100%	1	T1
0%	100%	1	R2



	Tot	LV	HV
R2	167	99%	1%
T1	1	100%	0%
L2	1	100%	0%



	L2	T1	R2
Tot	4	810	8
LV	100%	100%	100%
HV	0%	0%	0%

	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 5th St	822	822	0
E: Stagecoach Rd	169	167	2
N: 5th St	1335	1322	13
W: Afton Pond Ct	20	20	0
Total	2346	2331	15

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LANE SUMMARY

Site: 101 [5th St and Stagecoach Rd]

2040 PM
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 5th St													
Lane 1	324	0.0	1121	0.289	100	5.2	LOS A	1.7	42.9	Full	1600	0.0	0.0
Lane 2[d]	569	0.0	1970	0.289	100	3.8	LOS A	0.0	0.0	Full	1600	0.0	0.0
Approach	893	0.0		0.289		4.3	LOS A	1.7	42.9				
East: Stagecoach Rd													
Lane 1[d]	184	1.0	654	0.281	100	8.0	LOS A	1.2	29.2	Full	1600	0.0	0.0
Approach	184	1.0		0.281		8.0	LOS A	1.2	29.2				
North: 5th St													
Lane 1	700	1.0	1424	0.492	100	5.4	LOS A	4.3	108.8	Full	1600	0.0	0.0
Lane 2[d]	751	1.0	1527	0.492	100	3.9	LOS A	4.3	108.3	Full	1600	0.0	0.0
Approach	1451	1.0		0.492		4.6	LOS A	4.3	108.8				
West: Afton Pond Ct													
Lane 1[d]	22	0.0	559	0.039	100	14.0	LOS B	0.1	3.5	Full	1600	0.0	0.0
Approach	22	0.0		0.039		14.0	LOS B	0.1	3.5				
Intersection	2550	0.6		0.492		4.8	LOS A	4.3	108.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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Intersection	
Int Delay, s/veh	6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑		↱
Traffic Vol, veh/h	1177	24	343	571	0	288
Future Vol, veh/h	1177	24	343	571	0	288
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1177	24	343	571	0	288

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1201	0	-	589
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	577	-	0	452
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	577	-	-	452
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.5	25.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	452	-	-	577	-
HCM Lane V/C Ratio	0.637	-	-	0.594	-
HCM Control Delay (s)	25.9	-	-	20	-
HCM Lane LOS	D	-	-	C	-
HCM 95th %tile Q(veh)	4.3	-	-	3.9	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	1198	560	11	0	21
Future Vol, veh/h	1	1198	560	11	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	1198	560	11	0	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	571	0	-	0	-	280
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.32
Pot Cap-1 Maneuver	998	-	-	-	0	717
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	998	-	-	-	-	717
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	998	-	-	-	717
HCM Lane V/C Ratio	0.001	-	-	-	0.029
HCM Control Delay (s)	8.6	-	-	-	10.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	1186	0	0	16	0
Future Vol, veh/h	0	1186	0	0	16	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1186	0	0	16	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	593	-
Stage 1	-	-	0	-
Stage 2	-	-	593	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	437	0
Stage 1	0	-	-	0
Stage 2	0	-	515	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	437	-
Mov Cap-2 Maneuver	-	-	437	-
Stage 1	-	-	-	-
Stage 2	-	-	515	-

Approach	EB	SB
HCM Control Delay, s	0	13.6
HCM LOS		B

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	437
HCM Lane V/C Ratio	-	0.037
HCM Control Delay (s)	-	13.6
HCM Lane LOS	-	B
HCM 95th %tile Q(veh)	-	0.1

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
Lane Configurations		↑↑	↱						↰	
Traffic Vol, veh/h	0	1177	24	0	0	0	0	0	343	0
Future Vol, veh/h	0	1177	24	0	0	0	0	0	343	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	0	-	-	-	-	0	0	-
Veh in Median Storage, #	-	0	-	-	16983	-	0	-	16983	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1177	24	0	0	0	0	0	343	0

Major/Minor	Major1			Minor1	
Conflicting Flow All	-	0	0	-	589
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	452
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	452
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	25.9
HCM LOS		D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	452	-	-
HCM Lane V/C Ratio	0.637	-	-
HCM Control Delay (s)	25.9	-	-
HCM Lane LOS	D	-	-
HCM 95th %tile Q(veh)	4.3	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL	NER
Lane Configurations										
Traffic Vol, veh/h	0	0	0	0	560	11	0	0	1	0
Future Vol, veh/h	0	0	0	0	560	11	0	0	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	0	-	0	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	16965	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	560	11	0	0	1	0

Major/Minor	Major2		Minor2		
Conflicting Flow All	-	-	0	-	280
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	717
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	717
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	10.2
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	717
HCM Lane V/C Ratio	-	-	0.029
HCM Control Delay (s)	-	-	10.2
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↖	
Traffic Vol, veh/h	0	0	0	909	4	0
Future Vol, veh/h	0	0	0	909	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	909	4	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	455	-
Stage 1	-	-	0	-
Stage 2	-	-	455	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	534	0
Stage 1	0	-	-	0
Stage 2	0	-	606	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	534	-
Mov Cap-2 Maneuver	-	-	534	-
Stage 1	-	-	-	-
Stage 2	-	-	606	-

Approach	WB	NB
HCM Control Delay, s	0	11.8
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	534	-
HCM Lane V/C Ratio	0.007	-
HCM Control Delay (s)	11.8	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	829	8	172	1164	0	168
Future Vol, veh/h	829	8	172	1164	0	168
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	829	8	172	1164	0	168

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	837	0	-	415
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	793	-	0	586
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	793	-	-	586
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	13.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	586	-	-	793	-
HCM Lane V/C Ratio	0.287	-	-	0.217	-
HCM Control Delay (s)	13.6	-	-	10.8	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	1.2	-	-	0.8	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	837	1140	24	0	20
Future Vol, veh/h	4	837	1140	24	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	837	1140	24	0	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1164	0	-	0	-	570
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.32
Pot Cap-1 Maneuver	596	-	-	-	0	465
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	596	-	-	-	-	465
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	596	-	-	-	465
HCM Lane V/C Ratio	0.007	-	-	-	0.043
HCM Control Delay (s)	11.1	-	-	-	13.1
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	822	0	0	18	0
Future Vol, veh/h	0	822	0	0	18	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	822	0	0	18	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	411	-
Stage 1	-	-	0	-
Stage 2	-	-	411	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	569	0
Stage 1	0	-	-	0
Stage 2	0	-	638	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	569	-
Mov Cap-2 Maneuver	-	-	569	-
Stage 1	-	-	-	-
Stage 2	-	-	638	-

Approach	EB	SB
HCM Control Delay, s	0	11.5
HCM LOS		B

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	569
HCM Lane V/C Ratio	-	0.032
HCM Control Delay (s)	-	11.5
HCM Lane LOS	-	B
HCM 95th %tile Q(veh)	-	0.1

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	0	829	8	0	0	0	0	0	172	0
Future Vol, veh/h	0	829	8	0	0	0	0	0	172	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	0	-	-	-	-	0	0	-
Veh in Median Storage, #	-	0	-	-	16983	-	0	-	16983	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	829	8	0	0	0	0	0	172	0

Major/Minor	Major1			Minor1	
Conflicting Flow All	-	0	0	-	415
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	586
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	586
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	13.6
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	586	-	-
HCM Lane V/C Ratio	0.287	-	-
HCM Control Delay (s)	13.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.2	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL	NER
Lane Configurations					↑↑	↗			↖	
Traffic Vol, veh/h	0	0	0	0	1140	24	0	0	4	0
Future Vol, veh/h	0	0	0	0	1140	24	0	0	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	0	-	0	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	16965	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	1140	24	0	0	4	0

Major/Minor	Major2		Minor2		
Conflicting Flow All	-	-	0	-	570
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	465
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	465
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	13.1
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	465
HCM Lane V/C Ratio	-	-	0.043
HCM Control Delay (s)	-	-	13.1
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	1334	1	0
Future Vol, veh/h	0	0	0	1334	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	1334	1	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	667	-
Stage 1	-	-	0	-
Stage 2	-	-	667	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	392	0
Stage 1	0	-	-	0
Stage 2	0	-	472	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	392	-
Mov Cap-2 Maneuver	-	-	392	-
Stage 1	-	-	-	-
Stage 2	-	-	472	-

Approach	WB	NB
HCM Control Delay, s	0	14.2
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	392	-
HCM Lane V/C Ratio	0.003	-
HCM Control Delay (s)	14.2	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0	-

Attachment H Future Build Conditions – Old Lynchburg Road

Intersection	
Int Delay, s/veh	64

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	261	3	37	0	0	11	126	900	12	118	288	195
Future Vol, veh/h	261	3	37	0	0	11	126	900	12	118	288	195
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	225	-	-	180	260	-	100	270	-	375
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	0	0	0	0	0	7	2	0	0	8	4
Mvmt Flow	278	3	39	0	0	12	134	957	13	126	306	207

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1305	1796	153	1632	1990	479	513	0	0	970	0	0
Stage 1	558	558	-	1225	1225	-	-	-	-	-	-	-
Stage 2	747	1238	-	407	765	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.5	6.9	7.5	6.5	6.9	4.24	-	-	4.1	-	-
Critical Hdwy Stg 1	6.54	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4	3.3	3.5	4	3.3	2.27	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 118	81	872	68	61	538	1014	-	-	719	-	-
Stage 1	482	515	-	193	254	-	-	-	-	-	-	-
Stage 2	371	250	-	597	415	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 90	58	872	49	44	538	1014	-	-	719	-	-
Mov Cap-2 Maneuver	~ 152	81	-	121	118	-	-	-	-	-	-	-
Stage 1	418	425	-	168	220	-	-	-	-	-	-	-
Stage 2	315	217	-	467	342	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 406.3	11.8	1.1	2.2
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1014	-	-	151	872	-	538	719	-	-
HCM Lane V/C Ratio	0.132	-	-	1.86	0.045	-	0.022	0.175	-	-
HCM Control Delay (s)	9.1	-	-	$ 461.9	9.3	0	11.8	11.1	-	-
HCM Lane LOS	A	-	-	F	A	A	B	B	-	-
HCM 95th %tile Q(veh)	0.5	-	-	21.2	0.1	-	0.1	0.6	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	31.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	251	0	92	4	1	66	50	511	4	43	792	319
Future Vol, veh/h	251	0	92	4	1	66	50	511	4	43	792	319
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	225	-	-	180	260	-	100	270	-	375
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	5	1	0	0	0	0
Mvmt Flow	267	0	98	4	1	70	53	544	4	46	843	339

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1314	1589	422	1164	1924	272	1182	0	0	548	0	0
Stage 1	935	935	-	650	650	-	-	-	-	-	-	-
Stage 2	379	654	-	514	1274	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.9	4.2	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.25	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 118	109	586	152	68	732	570	-	-	1032	-	-
Stage 1	289	347	-	429	468	-	-	-	-	-	-	-
Stage 2	620	466	-	517	240	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 95	94	586	114	59	732	570	-	-	1032	-	-
Mov Cap-2 Maneuver	~ 191	204	-	222	135	-	-	-	-	-	-	-
Stage 1	~ 262	331	-	389	424	-	-	-	-	-	-	-
Stage 2	507	423	-	411	229	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	189.5	11.3	1.1	0.3
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	570	-	-	191	586	197	732	1032	-	-
HCM Lane V/C Ratio	0.093	-	-	1.398	0.167	0.027	0.096	0.044	-	-
HCM Control Delay (s)	12	-	-	254.4	12.4	23.8	10.4	8.7	-	-
HCM Lane LOS	B	-	-	F	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	15.8	0.6	0.1	0.3	0.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

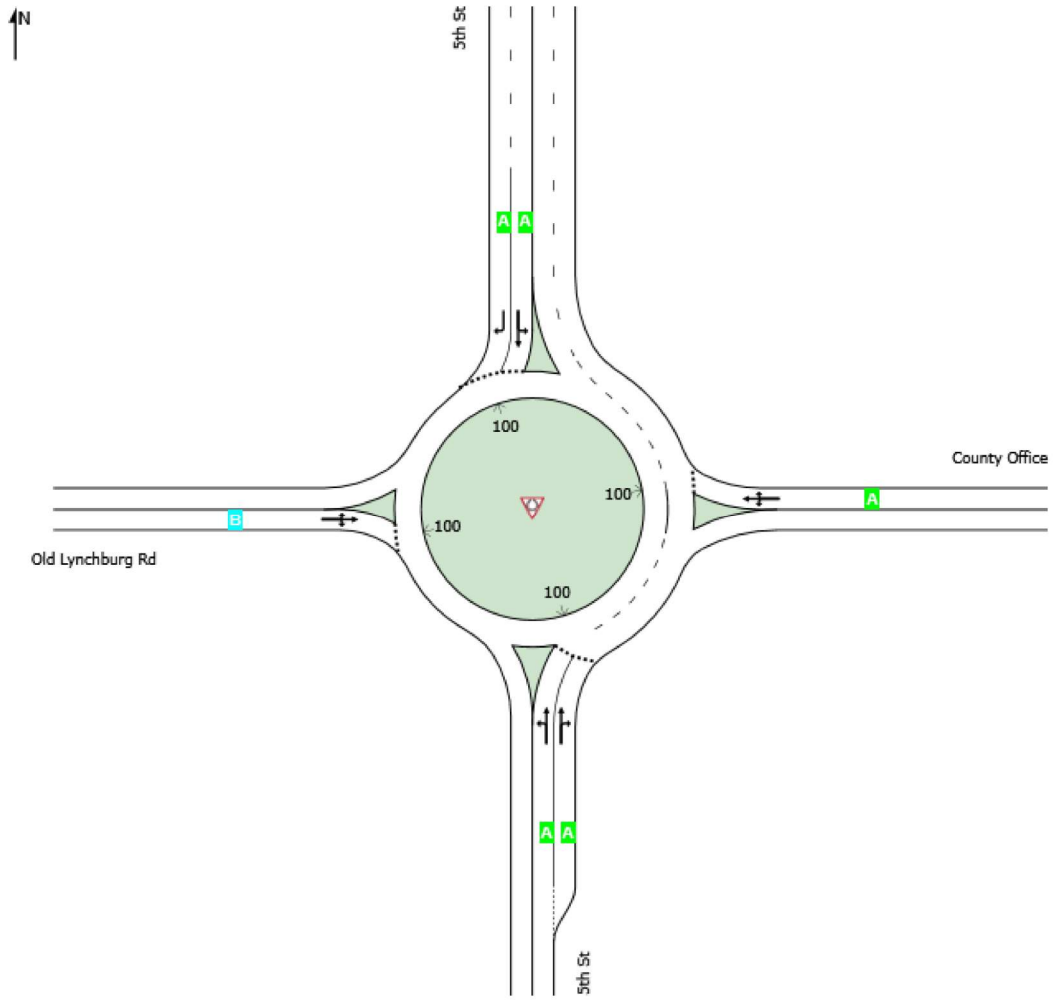
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [5th St and Old Lynchburg Rd]

2040 AM
Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	B	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

LANE SUMMARY

Site: 101 [5th St and Old Lynchburg Rd]

2040 AM
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 5th St													
Lane 1	517	3.3	916	0.565	100	9.7	LOS A	5.0	127.9	Full	1600	0.0	0.0
Lane 2[d]	611	2.0	1082	0.565	100	7.2	LOS A	5.1	128.8	Short	800	0.0	NA
Approach	1128	2.6		0.565		8.4	LOS A	5.1	128.8				
East: County Office													
Lane 1[d]	14	0.0	417	0.034	100	9.5	LOS A	0.1	3.6	Full	1600	0.0	0.0
Approach	14	0.0		0.034		9.5	LOS A	0.1	3.6				
North: 5th St													
Lane 1[d]	441	5.7	1267	0.348	100	6.4	LOS A	2.6	67.5	Full	1600	0.0	0.0
Lane 2	212	4.0	1033	0.205	100	5.1	LOS A	1.3	32.7	Full	1600	0.0	0.0
Approach	653	5.1		0.348		6.0	LOS A	2.6	67.5				
West: Old Lynchburg Rd													
Lane 1[d]	327	1.7	837	0.391	100	12.4	LOS B	2.6	65.4	Full	1600	0.0	0.0
Approach	327	1.7		0.391		12.4	LOS B	2.6	65.4				
Intersection	2123	3.2		0.565		8.3	LOS A	5.1	128.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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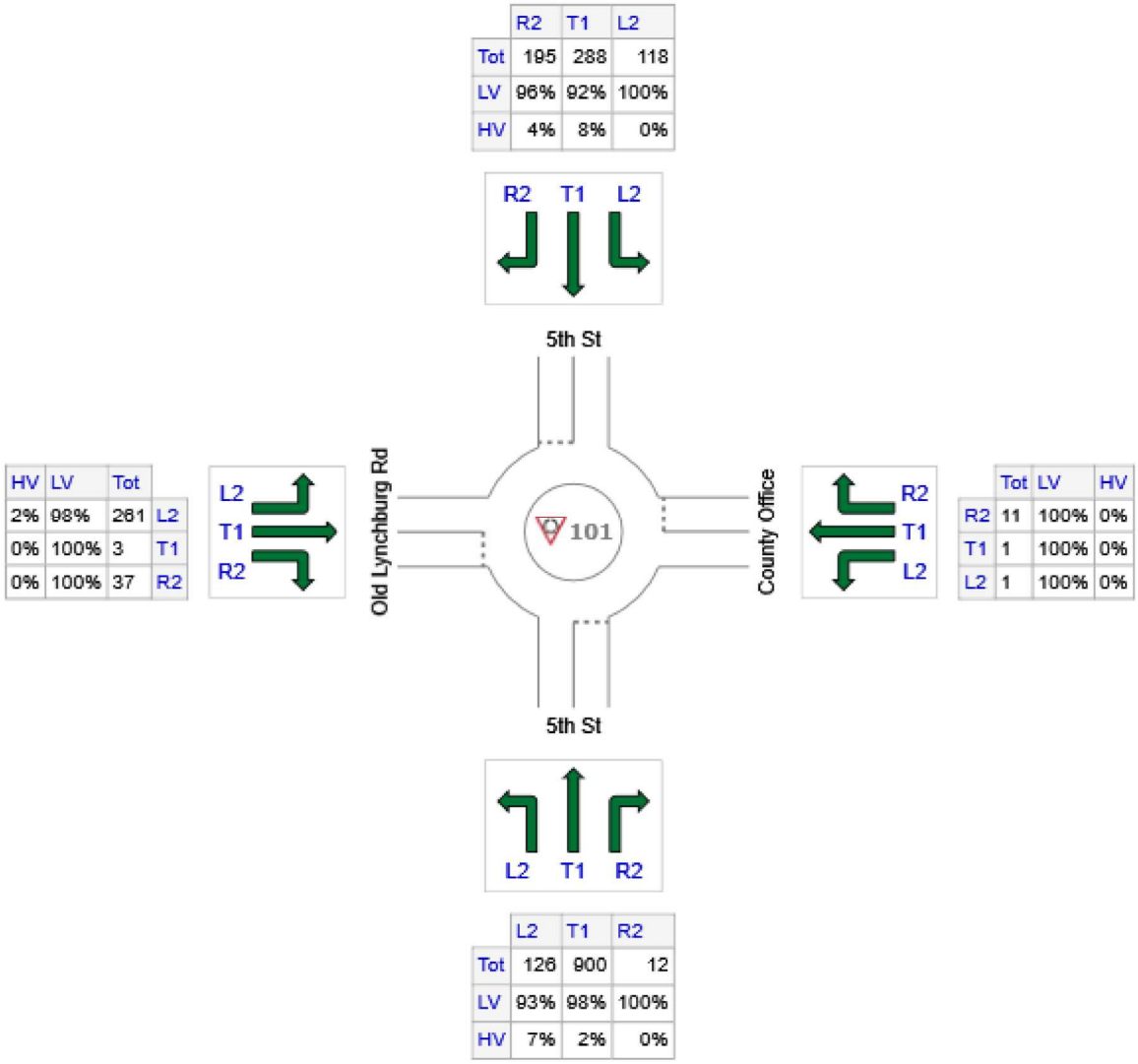
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [5th St and Old Lynchburg Rd]

2040 AM
Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 5th St	1038	1011	27
E: County Office	13	13	0
N: 5th St	601	570	31
W: Old Lynchburg Rd	301	296	5
Total	1953	1890	63

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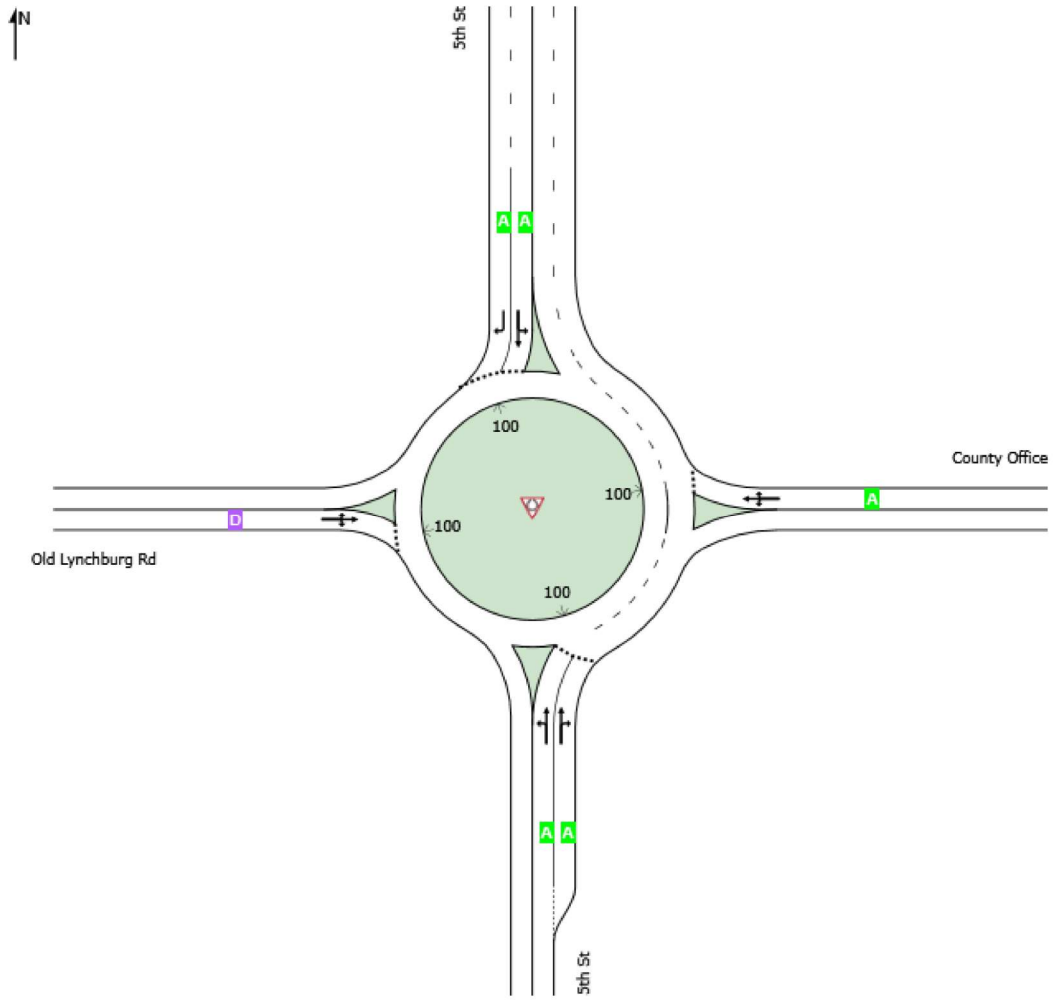
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 101 [5th St and Old Lynchburg Rd]

2040 AM
Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	D	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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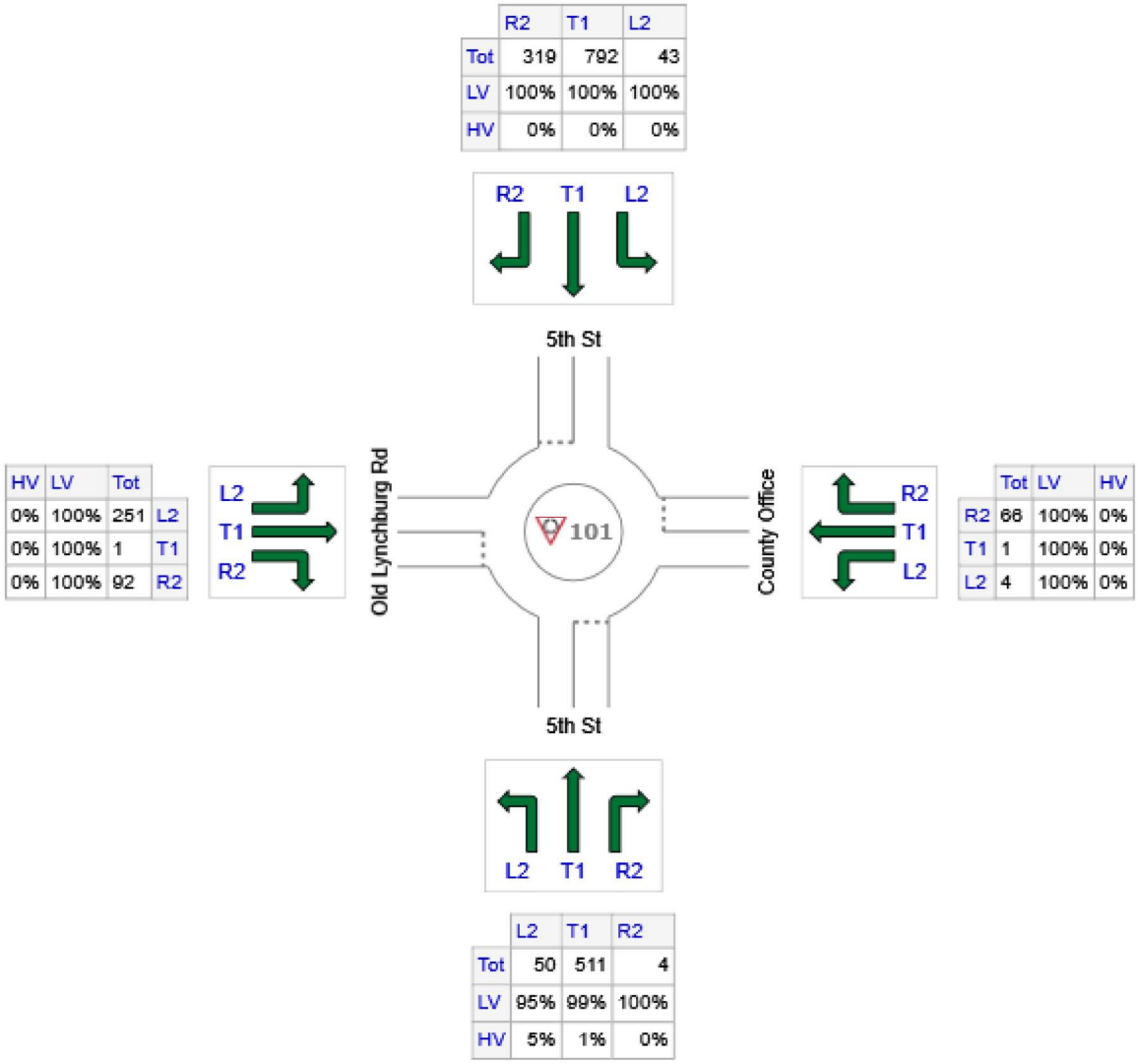
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 101 [5th St and Old Lynchburg Rd]

2040 AM
Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 5th St	565	557	8
E: County Office	71	71	0
N: 5th St	1154	1154	0
W: Old Lynchburg Rd	344	344	0
Total	2134	2126	8

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LANE SUMMARY

Site: 101 [5th St and Old Lynchburg Rd]

2040 AM
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 5th St													
Lane 1	286	1.8	1001	0.286	100	6.8	LOS A	1.9	48.9	Full	1600	0.0	0.0
Lane 2[d]	328	1.0	1149	0.286	100	5.4	LOS A	2.0	50.7	Short	800	0.0	NA
Approach	614	1.3		0.286		6.0	LOS A	2.0	50.7				
East: County Office													
Lane 1[d]	77	0.0	617	0.125	100	7.7	LOS A	0.5	12.8	Full	1600	0.0	0.0
Approach	77	0.0		0.125		7.7	LOS A	0.5	12.8				
North: 5th St													
Lane 1[d]	908	0.0	1463	0.620	100	4.6	LOS A	6.9	172.2	Full	1600	0.0	0.0
Lane 2	347	0.0	1121	0.309	100	4.5	LOS A	2.1	52.8	Full	1600	0.0	0.0
Approach	1254	0.0		0.620		4.6	LOS A	6.9	172.2				
West: Old Lynchburg Rd													
Lane 1[d]	374	0.0	556	0.673	100	25.2	LOS D	7.4	184.8	Full	1600	0.0	0.0
Approach	374	0.0		0.673		25.2	LOS D	7.4	184.8				
Intersection	2320	0.4		0.673		8.4	LOS A	7.4	184.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

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Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1161	12	118	483	0	11
Future Vol, veh/h	1161	12	118	483	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1161	12	118	483	0	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1173	0	-	581
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	591	-	0	457
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	591	-	-	457
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	13.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	457	-	-	591	-
HCM Lane V/C Ratio	0.024	-	-	0.2	-
HCM Control Delay (s)	13.1	-	-	12.6	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	126	1239	288	195	0	301
Future Vol, veh/h	126	1239	288	195	0	301
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	126	1239	288	195	0	301

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	483	0	-	0	-	144
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.32
Pot Cap-1 Maneuver	1076	-	-	-	0	877
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1076	-	-	-	-	877
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1076	-	-	-	877
HCM Lane V/C Ratio	0.117	-	-	-	0.343
HCM Control Delay (s)	8.8	-	-	-	11.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	1.5

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	1035	0	0	264	0
Future Vol, veh/h	0	1035	0	0	264	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1035	0	0	264	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	518	-
Stage 1	-	-	0	-
Stage 2	-	-	518	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	487	0
Stage 1	0	-	-	0
Stage 2	0	-	563	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	487	-
Mov Cap-2 Maneuver	-	-	487	-
Stage 1	-	-	-	-
Stage 2	-	-	563	-

Approach	EB	SB
HCM Control Delay, s	0	20.8
HCM LOS		C

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	487
HCM Lane V/C Ratio	-	0.542
HCM Control Delay (s)	-	20.8
HCM Lane LOS	-	C
HCM 95th %tile Q(veh)	-	3.2

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
Lane Configurations										
Traffic Vol, veh/h	0	1161	12	0	0	0	0	0	118	0
Future Vol, veh/h	0	1161	12	0	0	0	0	0	118	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	0	-	-	-	-	0	0	-
Veh in Median Storage, #	-	0	-	-	16983	-	0	-	16983	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1161	12	0	0	0	0	0	118	0

Major/Minor	Major1			Minor1	
Conflicting Flow All	-	0	0	-	581
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	457
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	457
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	13.1
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	457	-	-
HCM Lane V/C Ratio	0.024	-	-
HCM Control Delay (s)	13.1	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL	NER
Lane Configurations										
Traffic Vol, veh/h	0	0	0	0	288	195	0	0	126	0
Future Vol, veh/h	0	0	0	0	288	195	0	0	126	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	0	-	0	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	16965	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	288	195	0	0	126	0

Major/Minor	Major2		Minor2		
Conflicting Flow All	-	-	0	-	144
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	877
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	877
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	11.2
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	877
HCM Lane V/C Ratio	-	-	0.343
HCM Control Delay (s)	-	-	11.2
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	1.5

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	601	0	0
Future Vol, veh/h	0	0	0	601	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	601	0	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	301	-
Stage 1	-	-	0	-
Stage 2	-	-	301	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	666	0
Stage 1	0	-	-	0
Stage 2	0	-	725	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	666	-
Mov Cap-2 Maneuver	-	-	666	-
Stage 1	-	-	-	-
Stage 2	-	-	725	-

Approach	WB	NB
HCM Control Delay, s	0	0
HCM LOS		A

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	-	-
HCM Lane V/C Ratio	-	-
HCM Control Delay (s)	0	-
HCM Lane LOS	A	-
HCM 95th %tile Q(veh)	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	762	4	43	1117	0	71
Future Vol, veh/h	762	4	43	1117	0	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	762	4	43	1117	0	71

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	766	0	-	381
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	843	-	0	617
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	843	-	-	617
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	11.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	617	-	-	843	-
HCM Lane V/C Ratio	0.115	-	-	0.051	-
HCM Control Delay (s)	11.6	-	-	9.5	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	766	796	321	0	343
Future Vol, veh/h	50	766	796	321	0	343
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	50	766	796	321	0	343

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1117	0	-	0	-	398
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	-	-	3.32
Pot Cap-1 Maneuver	621	-	-	-	0	601
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	621	-	-	-	-	601
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	18.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	621	-	-	-	601
HCM Lane V/C Ratio	0.081	-	-	-	0.571
HCM Control Delay (s)	11.3	-	-	-	18.7
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	3.6

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑			↰	
Traffic Vol, veh/h	0	565	0	0	251	0
Future Vol, veh/h	0	565	0	0	251	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	16983	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	565	0	0	251	0

Major/Minor	Major1		Minor2	
Conflicting Flow All	-	0	283	-
Stage 1	-	-	0	-
Stage 2	-	-	283	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	684	0
Stage 1	0	-	-	0
Stage 2	0	-	740	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	684	-
Mov Cap-2 Maneuver	-	-	684	-
Stage 1	-	-	-	-
Stage 2	-	-	740	-

Approach	EB	SB
HCM Control Delay, s	0	13.3
HCM LOS		B

Minor Lane/Major Mvmt	EBT	SBLn1
Capacity (veh/h)	-	684
HCM Lane V/C Ratio	-	0.367
HCM Control Delay (s)	-	13.3
HCM Lane LOS	-	B
HCM 95th %tile Q(veh)	-	1.7

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
Lane Configurations		↑↑	↱						↰	
Traffic Vol, veh/h	0	762	4	0	0	0	0	0	43	0
Future Vol, veh/h	0	762	4	0	0	0	0	0	43	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	0	-	-	-	-	0	0	-
Veh in Median Storage, #	-	0	-	-	16983	-	0	-	16983	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	762	4	0	0	0	0	0	43	0

Major/Minor	Major1			Minor1	
Conflicting Flow All	-	0	0	-	381
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	617
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	617
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	NB
HCM Control Delay, s	0	11.6
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR
Capacity (veh/h)	617	-	-
HCM Lane V/C Ratio	0.115	-	-
HCM Control Delay (s)	11.6	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NEL	NER
Lane Configurations										
Traffic Vol, veh/h	0	0	0	0	796	321	0	0	50	0
Future Vol, veh/h	0	0	0	0	796	321	0	0	50	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	0	-	0	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	16965	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	796	321	0	0	50	0

Major/Minor	Major2		Minor2		
Conflicting Flow All	-	-	0	-	398
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	0	601
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %		-	-		
Mov Cap-1 Maneuver	-	-	-	-	601
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	WB	SB
HCM Control Delay, s	0	18.7
HCM LOS		C

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	601
HCM Lane V/C Ratio	-	-	0.571
HCM Control Delay (s)	-	-	18.7
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	3.6

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑↑	↰	
Traffic Vol, veh/h	0	0	0	1154	5	0
Future Vol, veh/h	0	0	0	1154	5	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	1154	5	0

Major/Minor	Major2		Minor1	
Conflicting Flow All	-	-	577	-
Stage 1	-	-	0	-
Stage 2	-	-	577	-
Critical Hdwy	-	-	6.84	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.84	-
Follow-up Hdwy	-	-	3.52	-
Pot Cap-1 Maneuver	0	-	447	0
Stage 1	0	-	-	0
Stage 2	0	-	525	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	-	-	447	-
Mov Cap-2 Maneuver	-	-	447	-
Stage 1	-	-	-	-
Stage 2	-	-	525	-

Approach	WB	NB
HCM Control Delay, s	0	13.1
HCM LOS		B

Minor Lane/Major Mvmt	NBLn1	WBT
Capacity (veh/h)	447	-
HCM Lane V/C Ratio	0.011	-
HCM Control Delay (s)	13.1	-
HCM Lane LOS	B	-
HCM 95th %tile Q(veh)	0	-

VDOT Planning