St. Albans

STP 044-1(2)

VT-104 & SASH / Exit 19 Intersection Scoping Study

July 2024

VERMONT AGENCY OF TRANSPORTATION

VCG

TOWN OF St. Albans VERMONT CHARTERED 1763

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1. INTRODUCTION & BACKGROUND

The town of St. Albans and surrounding communities in northwest Vermont are some of the fastest growing areas in the region. As the population, employment, and recreational opportunities have developed, so has traffic growth and congestion.

As a primary gateway to the area, the I-89 Exit 19 / St. Albans State Highway (SASH) & VT Route 104 intersection in the town of St. Albans has been identified by the Vermont Agency of Transportation (VTrans) and the Northwest Regional Planning Commission (NRPC) as an area with high traffic congestion and safety issues.

FIGURE 1. Project Area Map

The intersection has been studied for improvement for years, with minor improvements installed to maximize intersection capacity. In 2002, the NRPC prepared a Scoping Study to identify the most appropriate improvement alternative for the intersection. By 2003, traffic conditions had deteriorated such that VTrans installed a temporary traffic signal. In 2009, the southbound VT-104 approach was widened to provide additional storage capacity for the southbound left-turn movement. At the same time, the 2002 study was updated and the previous analysis and results were confirmed. As this most recent study reexamines the intersection, VTrans is preparing to construct a new westbound right-turn lane and signal changes to further maximize the efficiency of the existing signal.

Since 2002, a roundabout intersection has been selected as the preferred alternative to provide long-term safety and traffic capacity improvements at the intersection. However, the preferred alternative has not yet been implemented. Continued traffic growth, high crash rates, and development of the surrounding area necessitate a reassessment of the previous planning efforts to finally implement the long-term traffic solution at this intersection. To assist in developing such a plan, WCG has been engaged to refresh the previous Scoping Study efforts and reevaluate a preferred alternative.

With funding from VTrans, this Scoping Report follows the Project Definition Process Guidebook to update the previous scoping efforts for the development and selection of a preferred alternative with input from stakeholders, local and state officials, residents of the community, and regional partners.

2. EXISTING CONDITIONS

The VT-104 & SASH / Exit 19 intersection is a regionally important transportation node, providing a critical link between the communities in northwest Vermont to I-89. The intersection carries a high volume of passenger, freight, and transit traffic, and is on a primary access route to the Northwestern Medical Center hospital campus. The intersection is a gateway to both the town and city of St. Albans.

The high volume of traffic on the adjacent roadways form a transportation barrier for bicycle and pedestrian travel. The intersection is a natural crossing point for people walking and biking to cross the street. The nearby adjacent land use is a mix between commercial, retail, residential, and recreation, indicating a high demand (potentially unrealized) for walk and bike access through the intersection.

In addition to the existing land use, several large tracts of undeveloped land have potential for significant development, further increasing the vehicle, transit, bicycle and pedestrian travel demands through the intersection.

ROADWAY RESOURCES

Table 1 summarizes the roadway characteristics for each approach to the intersection.

Roadway Characteristic	Northbound VT-104	Southbound VT-104	Eastbound SASH	Westbound Exit 19
Design Speed	40 MPH	40 MPH	50 MPH	50 MPH
Functional Classification	urban major collector	urban major collector	urban principal arterial	urban principal arterial
Traffic Volume: 2023 AADT (vpd)	10,430	3,940	7,190	13,990
Traffic Volume: 2023 DHV (vph)	1,200	490	790	1,500
Clear Zone	16 feet	14 feet	16 feet	16 feet
Right of Way	99 feet (49.5 feet 200 feet south of intersection)	99 feet (49.5 feet 200 feet south of intersection)	200 feet	200 feet
Approach Lane Assignment and Width (feet)	S-L-TR-S 1-12-12-2	S-L-TR-S 1-10-12-2	S-L-TR-S 3-12-12-5	S-L-TR-S 2-13-14-2
Sight Distance	305 feet	305 feet	425 feet	425 feet

AADT = Estimated average annual daily traffic in vehicles per day
DHV = Estimated design hour volume in vehicles per hour
L = left turn lane, TR = shared through / right turn lane, S = paved shoulder

TABLE 1. Summary of roadway characteristics by approach to the study intersection

Design Speed

Posted speed limits in the immediate vicinity of this intersection are 50 mph on SASH and 40 mph on VT-104.

Functional Classification

The I-89 Exit 19 ramps and SASH are both limited-access urban principal arterials; VT-104 is an urban major collector.

Traffic Volumes

Approximately 2,250 vehicles currently (2025) travel through this intersection during the afternoon peak hour on a peak day. It is estimated that by the year 2045, approximately 2,700 vehicles will be traveling through the intersection during the afternoon peak hour with just normal background growth.

Horizontal and Vertical Alignment

Both the SASH and VT-104 are relatively level and straight in the vicinity of the intersection. The two roadways intersect at nearly 90-degrees. East of the intersection, the Exit 19 ramps have significant curvature. The ramps have been designed according to interstate highway standards to accommodate the free flowing, high-speed traffic expected on on- and off-ramps.

Clear Zone

The Vermont State Design Standards recommended clear zone for new construction and reconstruction projects on uncurbed urban principal arterials with volumes such as those on the SASH is 24 feet for fill slopes. Volumes on the VT-104 south of the intersection warrant a 14-foot clear zone on fill slopes. Volumes north of the intersection warrant a 16-foot clear zone.

Where necessary to avoid or minimize disturbance to historic, archaeological, scenic, natural or other resources, the clear zone can be reduced to 10 feet without a design exception. On curbed principal arterials and collector streets, a 1.5-foot horizontal offset to obstructions from the face of the curb should be provided. This dimension should be increased to three feet near turning radii at intersections.

Right of Way

Available right-of-way (ROW) information indicates that the SASH appears to have a 200-foot-wide ROW, and VT-104 has a 99-foot (six rod) wide right-of-way near the intersection. About 200 feet north and south of the intersection, the VT-104 ROW narrows to 49.5 feet in width (three rods).

The ROW of both SASH and VT-104 are owned and maintained by the State of Vermont (VTrans).

Roadway Width and Lane Assignment

All four approaches to the intersection include a dedicated left-turn lane plus a shared through/right-turn lane. SASH west of this intersection has two westbound departure lanes that merge into one lane west of the intersection. Eastbound, there are two departure lanes leading towards the Exit 19 on-ramps. Table 1 documents the existing lane and shoulder widths.

Vermont State Design Standards recommend 11-foot lanes and three-foot shoulders along VT-104, and 12-foot lanes and eight-foot shoulders along SASH. Because the SASH is classified as a limited access highway, bicycle traffic is not currently permitted along it. All bicycle traffic through this intersection must use VT-104, which has narrow (two feet or less) shoulders.

There are no dedicated pedestrian facilities adjacent to or through the intersection.

Utilities

Existing municipal water and sewer mains approach this intersection from the north and south on VT-104, but do not pass through it. Similarly, VT Gas serves the commercial properties surrounding the intersection but does not cross SASH or VT-104 in the vicinity of the project area.

There is an overhead high-voltage electrical transmission line owned by CVPS that crosses north-south approximately 500 feet east of the intersection. Other overhead electrical and communication service wires pass north-south on the west side of the intersection. Most utility poles are approximately 16 feet from the VT-104 edge of travel way, just outside of the clear zone.

Sight Distance

Available stopping sight distances on all four approaches to the intersection exceed AASHTO required distances of 305 feet for a posted speed limit of 40 mph on VT-104, and 425 feet for a posted speed of 50 mph on SASH.

ADJACENT LAND USE CONTEXT

WCG reviewed the existing and potential land uses adjacent to the study area. Figure 2 illustrates the adjacent St. Albans Town zoning districts, growth center overlay, and other significant land uses near the project area.

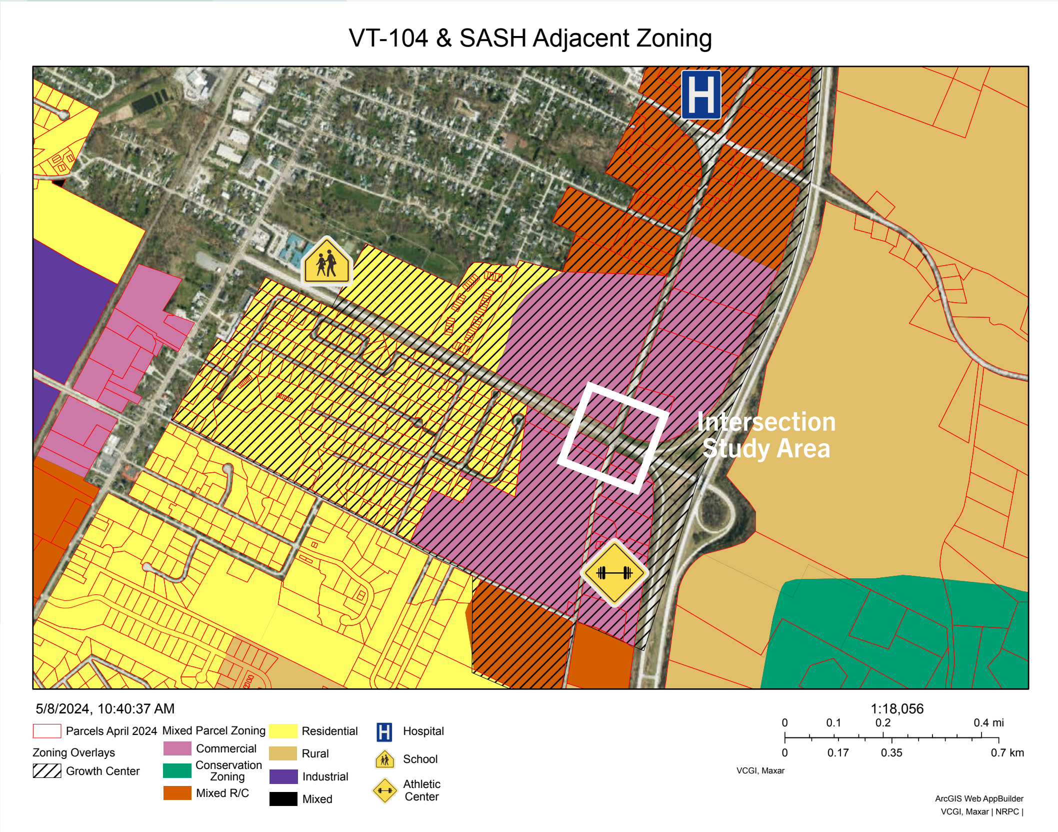


FIGURE 2. St Albans zoning map with significant land uses

Surrounding Land Use

In the immediate vicinity of the intersection, the existing land use consists primarily of commercial land uses on the northeast and southwest corners: gas stations with convenience stores, farm and garden supply retail, a hotel, the Collins Perley Sports & Fitness Center on the southwest corner, and undeveloped agricultural land on the northwest corner. All surrounding land proximate to the intersection is zoned as commercial with a Growth Center overlay in the town of St. Albans.

Further from the intersection, the Northwest Regional Medical Center is approximately ¾ mile north of the intersection, and the urban and suburban development of St. Albans lies generally west of the intersection. Development east of the intersection is limited by topography and access limitations due to I-89.

Projected Background Growth

The VTrans Redbook recommends a traffic growth rate of 8% over 20 years, or about 0.4% per year. This 8% growth estimate would represent a "standard growth" traffic volume scenario.

To estimate a "high growth" scenario, WCG reviewed observed traffic volumes from the historic catalog of turning movement counts at the intersection from 2008 through 2021. The observed annual change in peak hour traffic volume is presented in Table 2 by approach direction and the overall peak hour volume. Observed growth rates by direction and peak hour range from 0.3% per year along southbound VT-104 in the PM peak hour to 3.9% per year along northbound VT-104 in the AM peak hour. It should be noted that, since some of the existing approaches are operating at capacity, the peak hour volume processed during observation periods may not capture the peak hour demand.

With continued regional investment in transportation demand management strategies, improved walk-bike connections, and expected mixed-use development patterns, the background traffic growth rate is expected to moderate into the future. The recommended growth rate for analyses into the future is the average of the state standard growth rate and observed high growth rate.

	NB VT-104	SB VT-104	EB SASH	WB Exit 19	Overall
AM Peak Hour	3.9%	1.2%	2.2%	1.3%	2.0%
PM Peak Hour	3.2%	0.3%	2.2%	0.5%	1.2%
State Standard Growth Rate	0.4%	0.4%	0.4%	0.4%	0.4%
Projected High Growth Rate	3.0%	1.0%	2.0%	1.0%	--
Recommended Growth Rate	1.7%	0.7%	1.2%	0.7%	--

TABLE 2. Average annual change in traffic volume through study intersection, 2008 to 2021, and recommended growth rate

Development Opportunities

A significant amount of undeveloped land is located on the north side of the intersection within the Growth Center overlay district. While no development proposal currently exists, the project assumes this land may be developed into a dense multi-use residential and commercial district in the future.

Adjacent Transportation Infrastructure Projects

The Town of St. Albans has investigated two nearby path projects:

The **SASH Bike & Pedestrian Crossing Study** investigated opportunities to provide a protected bicycle and pedestrian crossing of the SASH along a convenient route between the St. Albans Town Ed. Center (SATEC) and the Collins Perley Sports & Fitness Center. The preferred alternative included a new crosswalk with pedestrian hybrid beacon at Thorpe Avenue approximately 1,500 feet west of the intersection.

The **St. Albans Health Path Scoping Study** is currently evaluating shared-use path alignment opportunities from the Collins Perley Sports & Fitness Center to the Hard'ack Recreation Area and Missisquoi Valley Rail Trail north of the intersection. The path is expected to follow the west side of VT-104, utilizing a protected bicycle and pedestrian crossing to be identified by this current VT-104 & SASH Scoping Study.

ENVIRONMENTAL RESOURCES

WCG reviewed the environmental resources adjacent to the study area. Figure 3 illustrates the Agency of Natural Resources (ANR) Natural Resources Atlas proximate to the study area intersection.

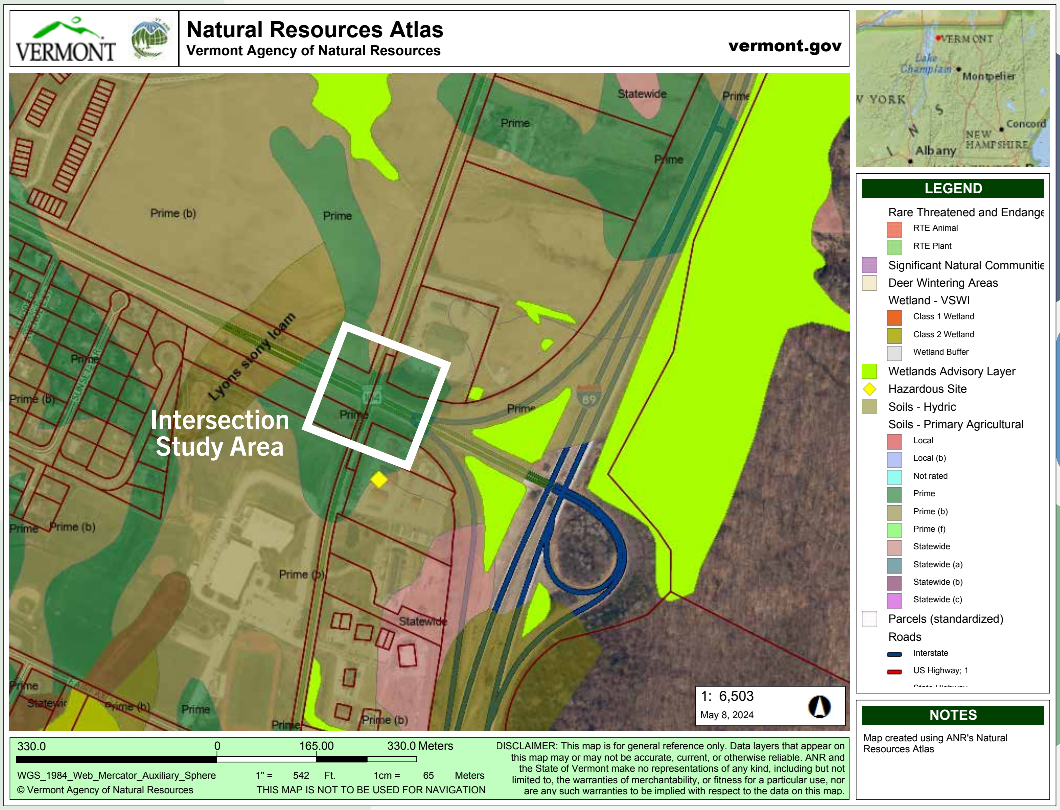


FIGURE 3. ANR Atlas Map

Stormwater Drainage

The intersection is located in the impaired Rugg Brook watershed. The roadway is uncurbed, and stormwater is collected in grass swales along both VT-104 and the SASH. Both VT-104 and SASH are graded to drain away from the intersection in all four directions.

Drainage from the southeast quadrant of this intersection crosses east to west under VT-104 through an 18-inch culvert located approximately 20 feet south of the intersection. Drainage from the northeast corner of the intersection crosses east to west under VT-104 through a 36-inch culvert in good condition located approximately 300 feet north of the intersection. This drainage continues southwest and crosses to the south side of the SASH through a 48-inch culvert in fair condition located approximately 550 feet west of the intersection.

Wetlands

The Agency of Natural Resources Atlas does not show any existing or proposed significant wetlands mapped in the immediate vicinity of this intersection. It does show, however, potential wetland hydric soils mapped on both sides of culvert crossing the SASH approximately 550 feet west of this intersection, and several Class III wetlands have been identified within the ramp areas of Exit 19.

Both the U.S. Army Corps of Engineers (COE) and the Vermont Agency of Natural Resources (ANR) have jurisdiction over wetlands. Improvements at this intersection would require a COE General Permit if greater than 3,000 square feet of wetlands under their jurisdiction are impacted. Wetlands typically under COE jurisdiction do not include roadside ditches, cultivated croplands or isolated wetlands not adjacent to streams, rivers and lakes. The ANR regulates significant (Class 1 & 2) wetlands and the 50-foot buffer zone which surrounds them. Any impact to a significant wetland requires a Conditional Use Determination from the ANR.

Significant Plant and Animal Species

The ANR Atlas does not show any rare, threatened or endangered species, or any significant natural communities in the immediate area of this intersection. Due to the time lapsed since issuing, the no impact letters issued by the Agency of Natural Resources Department of Fish and Wildlife and its Nongame and Natural Heritage Program for the 2002 Intersection Scoping Study may need to be reissued.

Land and Water Conservation Sites

The Vermont Land and Water Conservation Fund list of funded projects (1965-2015) does not include any projects in St. Albans that are located adjacent to or near this intersection.

Hazardous Materials Sites

The ANR Atlas indicates that the gas station and convenience store in the southeast quadrant of this intersection is a closed Vermont hazardous waste site with voluntary action completed and no further investigation required at this time.

Historic Sites and Structures

There are no identified historic sites or structures located in the proximity of this intersection.

Archaeological Sites

Much of the area immediately surrounding this intersection within the existing highway right-of-ways has been previously disturbed by roadway, drainage, and slope construction. As such, there is little, if any, remaining sensitivity for undisturbed prehistoric or historic cultural resources. Should future intersection improvements extend outside the existing right-of-ways, further archaeological examination may be required.

Agricultural Lands

To the extent that future improvements at this intersection remain within existing highway right-of-ways, there would not be any impacts on agricultural lands.

Surrounding parcels, particularly on the northerly side of this intersection, have been historically used for agricultural purposes and contain soil types having significant agricultural potential.

Drinking Water Sources

All nearby land uses are served by municipal water.

CRASH HISTORY

A high crash location (HCL) is a state-designated intersection or segment of roadway where the number of crashes that have occurred over five years exceeds a critical crash rate specific to the roadway volume and classification. The study area intersection of VT-104 & SASH is designated as an HCL intersection and sections of VT-104 north and south of the intersection have been classified as HCL segments using data from 2012 through 2016.

An initial crash review indicated that 50 crashes were reported at or within ¼ mile of the VT-104 & SASH / I-89 Exit 19 intersection from 2018 through 2022. Further investigation into the 50 records indicated that 20 of these crashes occurred on I-89 or the on- and off-ramps, in adjacent parking lots, or were coded incorrectly; these crashes were determined to be outside the influence of the intersection. Furthermore, 13 of the crash records included no additional details on crash type or direction, and two records were duplicate entries. After sorting through the 50 records, 15 crash records contained enough detail to map on a crash diagram, illustrated in Figure 4.

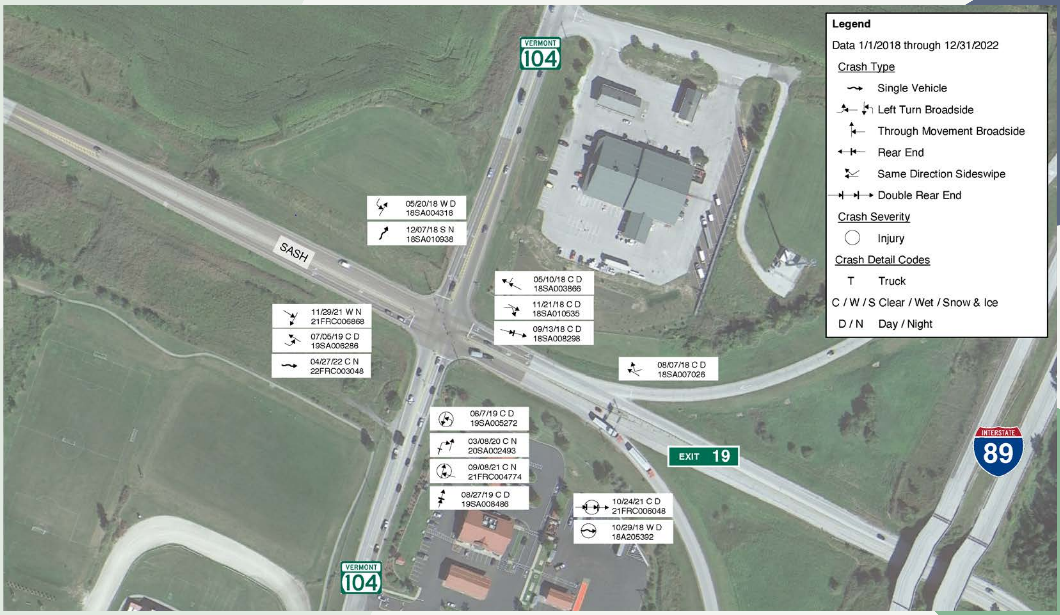


FIGURE 4. Crash diagram of reported crashes between 2018 through 2022

Of the 15 crashes:

- 4 resulted in injury
- 7 (47%, 2 injury) were turn-related broadside crashes
- 3 (20%, 1 injury) were rear end crashes
- 3 (20%, 1 injury) were single vehicle crashes
- 2 (13%) were sideswipe crashes
- 5 (33%, 1 injury) occurred at night
- 4 (27%, 1 injury) occurred with wet, snowy, or icy road conditions

Potential crash mitigation opportunities include:

- Reduced congestion and improved traffic operations may reduce broadside and rear end crashes.
- Many of the turn-related broadside crashes may be addressed with construction of roundabout intersection control.
- Improved lighting may reduce the occurrence of crashes at night.
- Improved advanced lane control signs and adequate weaving distances may reduce the occurrence of sideswipe crashes.

INTERSECTION CAPACITY & CONGESTION ANALYSIS

Intersection capacity analyses were performed at the existing study area intersection. Analyses evaluated average control delay, level of service (LOS), and volume to capacity (v/c) ratios consistent with methodologies documented in the Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis (HCM6).

Level of Service Definition

Level of service (LOS) is a qualitative measure describing the operating conditions as perceived by motorists driving in a traffic stream. LOS is calculated using the procedures outlined in the Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis (HCM6). In addition to traffic volumes, key inputs include the number of lanes at each intersection, traffic control type (signalized or unsignalized), and the traffic signal timing plans, if applicable.

The HCM6 defines six qualitative grades to describe the level of service at an intersection. Level-of-service is based on the average control delay per vehicle; average control delay is a function of a gap acceptance model. Table 3 shows the various LOS grades and descriptions for signalized intersections.

LOS	Characteristics	Signalized Intersection Average Control Delay (sec)
A	Little or no delay	≤ 10.0
B	Short delays	10.1-20.0
C	Average delays	20.1-35.0
D	Long delays	35.1-55.0
E	Very long delays	55.1-80.0
F	Extreme delays	> 80.0

TABLE 3. Level of service criteria for signalized intersections

The VTrans policy on level of service is:

- Overall LOS C should be maintained for state-maintained highways and other streets accessing the state's facilities.
- Reduced LOS may be acceptable on a case-by-case basis when considering, at minimum, current and future traffic volumes, delays, volume to capacity ratios, crash rates, and negative impacts resulting from improvements necessary to achieve LOS C.

- LOS D should be maintained for side roads with volumes exceeding 100 vehicles/hour for a single lane approach (150 vehicles/hour for a two-lane approach) at two-way stop-controlled intersections.

Volume to Capacity Ratio Definition

The volume to capacity ratio (v/c) represents the sufficiency of an approach leg to accommodate the vehicular demand. According to FHWA:

“As the v/c ratio approaches 1.0, traffic flow may become unstable, and delay and queuing conditions may occur. Once the demand exceeds the capacity (a v/c ratio greater than 1.0), traffic flow is unstable and excessive delay and queuing is expected.”

VTrans does not have a v/c policy. Typically, v/c is used as an alternative indicator of performance, with preferred values below 0.95.

Existing Conditions Capacity Analysis

Table 4 presents the intersection capacity analysis results for the existing intersection using the 2025 design hour volumes. The results of the capacity analysis confirm the previous analysis results: the existing condition is over capacity with excessive vehicle delay in both the AM and PM peak hours.

	No Build / Ex. Conditions - 2025 Scenarios					
Intersections	LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
	AM Peak Hour			**PM Peak Hour**		
VT-104 & SASH / I-89 Exit 19						
Overall	F	>100		F	88	
EB, along SASH	F	>100	1.07	D	53	0.88
WB, along I-89 Exit 19 Off Ramps	F	>100	1.20	F	>100	1.17
NB, along VT-104	F	90	1.02	F	94	1.01
SB, along VT-104	E	66	1.03	E	71	1.02

TABLE 4. Peak hour intersection capacity analysis results for the existing intersection in the 2025 scenarios

Picture Source: stalbanstown.com

3. PURPOSE & NEED

The Purpose and Need Statement for this project has not changed since first developed in 2002:

PURPOSE

The purpose of the Exit 19/SASH/VT-104 intersection project is to improve the safety of the intersection for vehicles, bicycles, and pedestrians while providing an adequate capacity for all users.

NEED

The intersection is considered deficient based on its poor levels of service and limited multi-modal capabilities.

Poor Level of Service - This intersection provides access to Interstate 89 at Exit 19. It serves two major travel routes: an east-west corridor linking Exit 19 with South Main Street (US Route 7) in the City of St. Albans. VT-104 is also a regional travel corridor linking Exit 19 and the St. Albans area with VT Routes 36 and 105 north and east of St. Albans, and with VT Routes 128 and 15 to the south and east in Fairfax. This intersection is also located in a regional and town-designated growth center district. Traffic volumes and conflicting turning movements are heavy during both morning and afternoon peak hours resulting in an overall level of service F for the intersection.

Limited Multi-Modal Capabilities - The intersection is not pedestrian- or bicyclist-friendly; the minimal shoulders on VT-104 do not provide sufficient space for bicyclists and pedestrians to safely travel outside of the travel way. Additionally, the SASH is a limited-access highway on which pedestrian and bicycle travel are prohibited. Ongoing residential and commercial development in the area of the intersection is resulting in increased bicycle and pedestrian travel in this immediate area.

Picture Source: Martin Sanchez - Unsplash.com

4. DESIGN OPTIONS

DESIGN CRITERIA

Heavy Vehicles / Design Vehicles

Given the intersection's location serving an interstate highway ramp facility and adjacent truck stop service facilities, the intersection should be designed to accommodate the largest truck-trailer combination: WB-67.

Pedestrian and Bicycle Travel

The Town of St. Albans has identified the SASH as a considerable barrier to bicycle and pedestrian travel in the area. The Collins-Perley Sports Complex on the southwest corner of the intersection has no direct, formal bicycle and pedestrian access to the school campuses to the north and west. The town is planning an off-road shared-use path from the Collins-Perley Complex south of the intersection to Hard'ack Park, north of the intersection along VT-104. There are no pedestrian crossing facilities across VT-104 or SASH at or near the intersection.

Controlled bicycle and pedestrian crossings have been identified as a priority across the northbound, eastbound, and southbound approaches. A controlled bicycle and pedestrian crossing across the westbound approach is desirable, but not critical; the preferred design should not preclude future controlled crossing opportunities.

Picture Source: Kevin Davidson - Unsplash.com

ALTERNATIVES

Consistent with the previous scoping efforts, three alternatives have been evaluated: do nothing / existing condition, expanded signal, or hybrid roundabout.

Do Nothing / Existing Condition

Figure 5 illustrates the Do Nothing / Existing Condition Alternative.

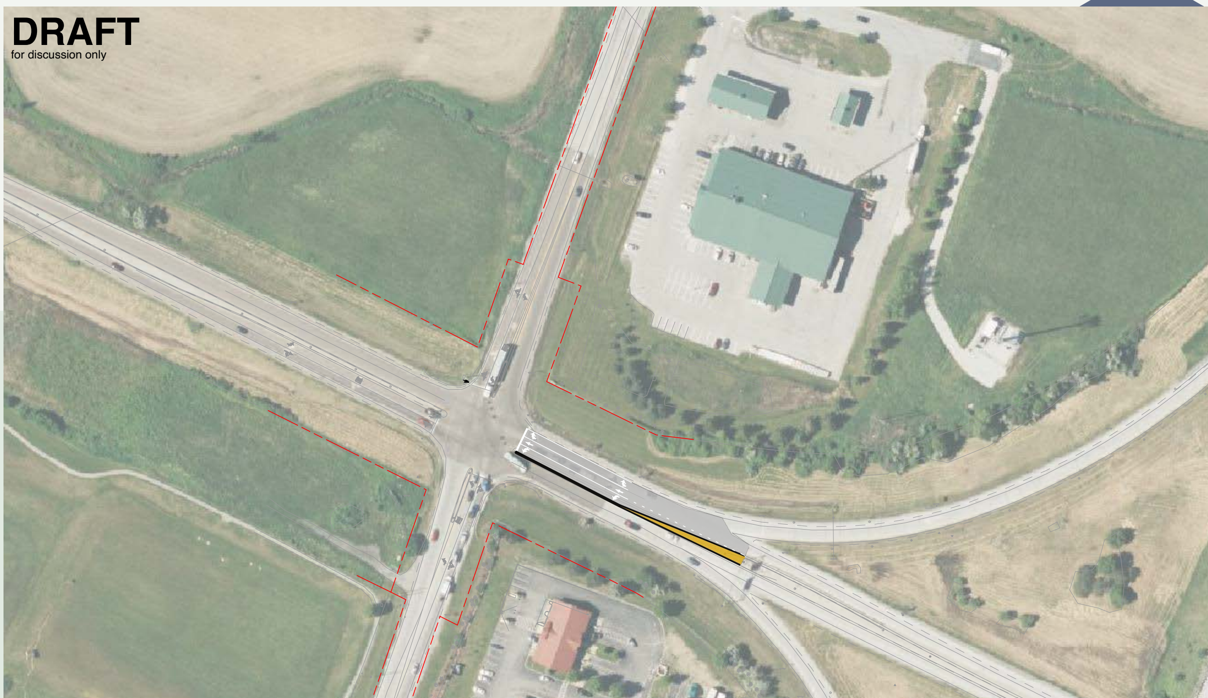


FIGURE 5. Do Nothing / Exisiting Condition

This alternative would retain the existing condition with no changes to intersection capacity. With continued background traffic growth and development of the adjacent parcels, future traffic congestion conditions and delays would continue to increase, and the existing crash patterns would be expected to continue.

Capacity analyses were performed for projected 2045 AM and PM peak hours, the results of which are shown in Table 5.

	No Build / Existing Conditions - 2045 Scenarios					
	LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
	AM Peak Hour			**PM Peak Hour**		
VT-104 & SASH / I-89 Exit 19						
Overall	F	>100		F	>100	
EB, along SASH	F	>100	1.25	F	>100	1.26
WB, along I-89 Exit 19 Off Ramps	F	>100	1.43	F	>100	1.46
NB, along VT-104	F	>100	1.23	F	>100	1.24
SB, along VT-104	F	>100	1.25	F	>100	1.35

TABLE 5. Peak hour intersection capacity analysis results for the do nothing alternative in the 2045 scenarios*

*Refer to Page 11 for definition of level of service (LOS), delay, and volume to capacity ratio (v/c)

Expanded Signal

Figure 6 illustrates the Expanded Signal Alternative.

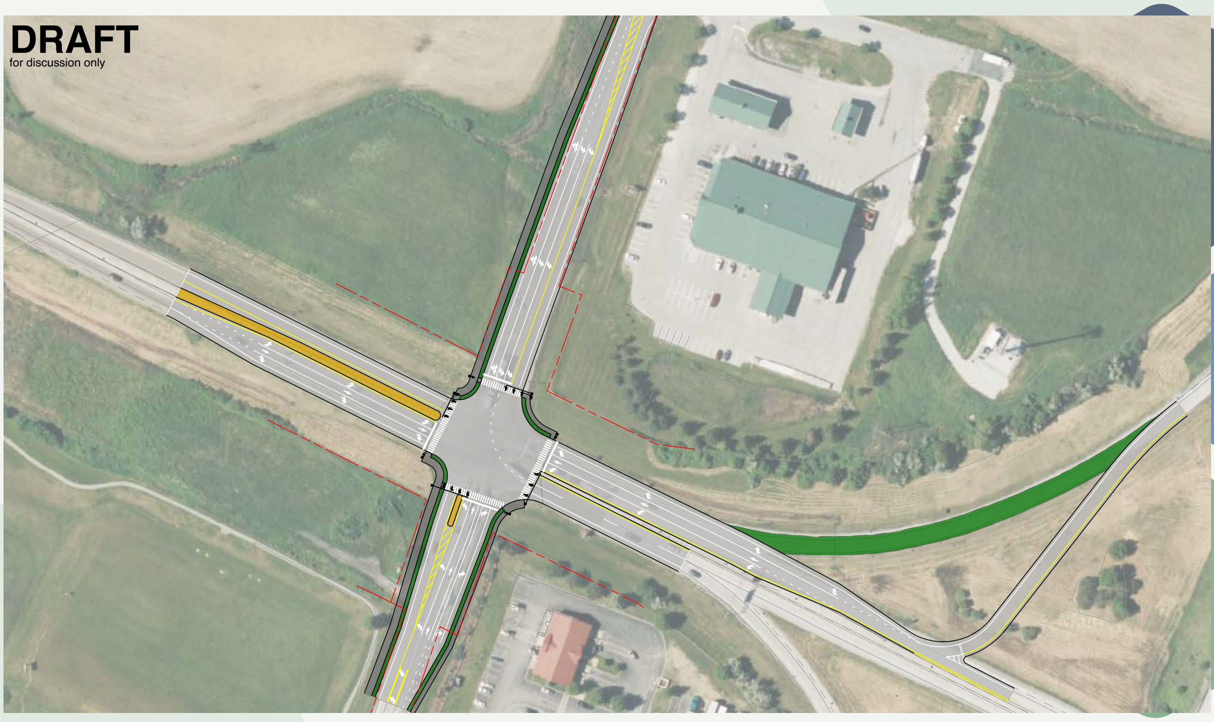


FIGURE 6. Expanded Signal

The Expanded Signal alternative includes an additional southbound left-turn lane, westbound right-turn lane, and a relocated southbound off ramp to provide additional storage capacity to accommodate the projected 2045 peak hour traffic volumes. The design speed of the expanded signal alternative is 40 MPH.

The signal timing plans were intended to include a leading pedestrian interval (LPI) phase. After a person walking pushes the button to cross the street, the pedestrian phase will be given a seven second head start to begin crossing while all traffic is stopped (and right turns on red are prohibited). After seven seconds, vehicle traffic will begin normal operations concurrent with the pedestrian crossing. LPI operations are shown to be the safest pedestrian signal phasing technique.

Table 6 presents the results of the capacity analysis for the expanded signal in the 2045 AM and PM peak hours.

	Expanded Signal - 2045 Scenarios					
	LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
	AM Peak Hour			**PM Peak Hour**		
VT-104 & SASH / I-89 Exit 19						
Overall	C	34		D	41	
EB, along SASH	D	35	0.80	C	33	0.77
WB, along I-89 Exit 19 Off Ramps	C	30	0.73	D	54	1.06
NB, along VT-104	C	29	0.72	C	31	0.70
SB, along VT-104	D	39	0.90	D	35	0.81

TABLE 6. Peak hour intersection capacity analysis results for the expanded signal alternative in the 2045 scenarios*

*Refer to Page 11 for definition of level of service (LOS), delay, and volume to capacity ratio (v/c)

Variation: Dual Southbound Exit 19 On-Ramp

As a variation that could be applied to both alternatives, the southbound Exit 19 on-ramp may be widened to two lanes. Traffic volumes indicate that the southbound on-ramp traffic demand is considerably higher than the northbound on-ramp. Providing two southbound on-ramp lanes would reduce the prepositioning behavior as vehicles queue in a preferred lane.

Roundabout

Figure 7 illustrates the Hybrid Roundabout Alternative.

FIGURE 7. Hybrid Roundabout

The Hybrid Roundabout alternative includes two entering lanes and one exiting lane from each approach direction to best balance traffic capacity demands and minimize pedestrian conflicts. There is one roundabout circulating lane across all approaches except the eastbound approach, with two roundabout circulating lanes. The design speed of the roundabout alternative is 20 MPH.

Table 7 presents the results of the capacity analysis for the expanded signal in the 2045 AM and PM peak hours.

	Hybrid Roundabout - 2045 Scenarios					
	LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
	AM Peak Hour			PM Peak Hour		
VT-104 & SASH / I-89 Exit 19						
Overall	C	24		C	18	
EB, along SASH	F	63	0.89	E	36	1.01
WB, along I-89 Exit 19 Off Ramps	A	8	0.70	B	15	0.38
NB, along VT-104	C	22	0.54	B	13	0.68
SB, along VT-104	B	11	0.48	B	11	0.62

TABLE 7. Peak hour intersection capacity analysis results for the hybrid roundabout alternative in the 2045 scenarios*

*Refer to Page 11 for definition of level of service (LOS), delay, and volume to capacity ratio (v/c)

Following discussion with the Town of St. Albans Selectboard, the design and right of way acquisition of the hybrid roundabout should allow for future implementation of two lane exits if future congestion becomes unacceptable.

5. ALTERNATIVES EVALUATION

TRAFFIC CAPACITY COMPARISON

There are two primary techniques to evaluate intersection traffic performance: deterministic models, such as the Highway Capacity Manual, and stochastic microsimulation software (such as SimTraffic or VISSIM).

The traffic capacity modeling methodology described by the Highway Capacity Manual (HCM), 6th Edition is the industry standard technique for evaluating intersection traffic performance. The methodology estimates average control delay using a deterministic model, indicating that the resulting delay estimates are calculated using equations that have been developed and calibrated to approximate actual conditions, and the result from the equation is the same value when the calculation is repeated. The HCM model is well suited to isolated intersections using standard intersection configurations.

Microsimulation software packages utilize a stochastic model to estimate average control delay by evaluating individual vehicle operating characteristics. A stochastic model includes elements of randomness, including vehicle arrivals and driver behavior, and as such, the model cannot be repeated. To account for unique situations that may occur in any one model result, a microsimulation model is typically run several times, and the resulting estimate of delay or queue length is averaged. Microsimulation is well suited for complex intersection geometries and congested locations with closely spaced intersections that may interact.

There is not one correct modeling technique—both deterministic and stochastic techniques are models used to approximate actual conditions, and both may be accurate in certain situations.

Picture Source: wikepedia.org

HCM (Deterministic) Model Comparison

Using the HCM model, the Do Nothing / Existing Condition Scenario is expected to continue to fail in the near future (2025) and planning year (2045). The signal is expected to operate at level of service (LOS) C in 2025, declining to LOS D in the planning year. The roundabout is expected to operate at LOS A in 2025, declining to LOS C in the planning year.

Intersections	No Build / Ex. Conditions			Signal Expansion			Hybrid Roundabout		
	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c
2025 Scenarios - AM Peak Hour									
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	24		A	9	
EB, along SASH	F	>100	1.07	C	25	0.69	C	16	0.63
WB, along I-89 Exit 19 Off Ramps	F	>100	1.20	C	23	0.68	A	6	0.29
NB, along VT-104	F	90	1.02	C	22	0.53	A	10	0.34
SB, along VT-104	E	66	1.03	C	25	0.77	A	8	0.43
2025 Scenarios - PM Peak Hour									
VT-104 & SASH / I-89 Exit 19									
Overall	F	88		C	25		A	9	
EB, along SASH	D	53	0.88	C	27	0.68	B	13	0.55
WB, along I-89 Exit 19 Off Ramps	F	>100	1.17	C	24	0.85	A	8	0.43
NB, along VT-104	F	94	1.01	C	23	0.53	A	8	0.28
SB, along VT-104	E	71	1.02	C	26	0.70	A	7	0.32
2045 Scenarios - AM Peak Hour									
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	34		C	24	
EB, along SASH	F	>100	1.25	D	35	0.80	F	63	0.89
WB, along I-89 Exit 19 Off Ramps	F	>100	1.43	C	30	0.73	A	8	0.70
NB, along VT-104	F	>100	1.23	C	29	0.72	C	22	0.54
SB, along VT-104	F	>100	1.25	D	39	0.90	B	11	0.48
2045 Scenarios - PM Peak Hour									
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		D	41		C	18	
EB, along SASH	F	>100	1.26	C	33	0.77	E	36	1.01
WB, along I-89 Exit 19 Off Ramps	F	>100	1.46	D	54	1.06	B	15	0.38
NB, along VT-104	F	>100	1.24	C	31	0.70	B	13	0.68
SB, along VT-104	F	>100	1.35	D	35	0.81	B	11	0.62

Delay is the average delay per vehicle in seconds; v/c is the volume to capacity ratio.

TABLE 8. Summary of peak hour intersection capacity analysis results for all alternatives using the HCM methodology in the 2025 and 2045 scenarios*

*Refer to Page 11 for definition of level of service (LOS), delay, and volume to capacity ratio (v/c)

The HCM model for a roundabout evaluates the approach volume by lane group compared to the circulating volume and number of lanes within the roundabout. As the roundabout geometry becomes more complex, the capacity of the roundabout decreases. To check the capacity, the approach volume by lane group was compared to the circulating volume capacity curves illustrated in HCM Exhibit 22-6. The result indicates that the volume on several approaches nears the capacity curves, warranting additional microsimulation modeling.

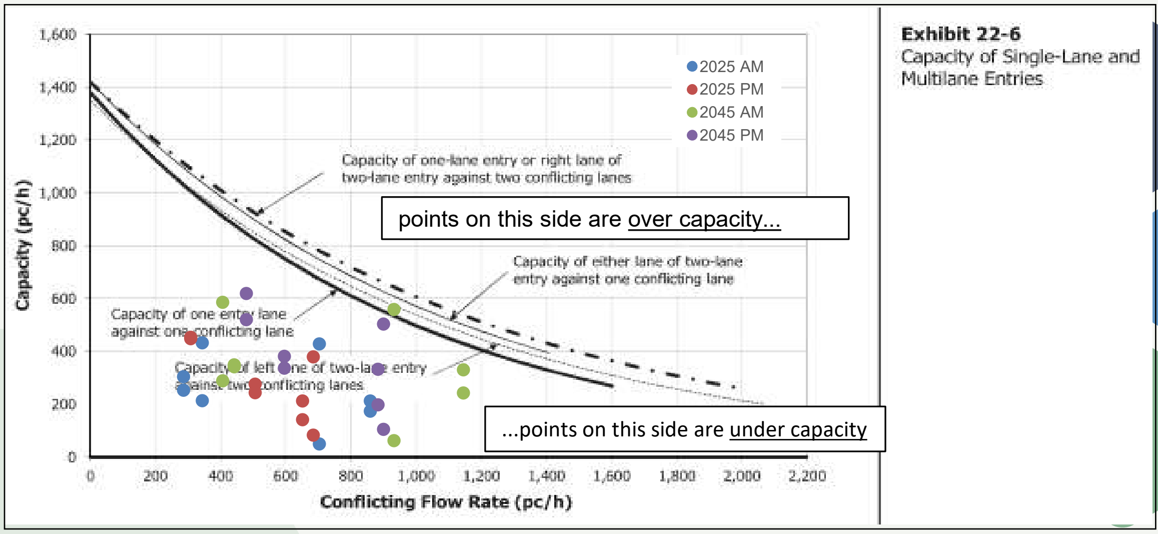


FIGURE 8. Projected roundabout entering and conflicting volumes plotted against HCM roundabout capacity curves

Microsimulation (Stochastic) Model Comparison

The same traffic volumes were used to develop a microsimulation model of the AM and PM peak hours, the 2025 build year, and 2045 planning year time horizons. Talbe 9 illustrates the estimated delay and queue length for each approach using SimTraffic microsimulation software. VISSIM, a more robust microsimulation modeling software, confirmed the general operational results.

Microsimulation Analysis Software	SimTraffic No Build / Ex. Conditions			SimTraffic Signal Expansion			SimTraffic Hybrid Roundabout		
Intersections	LOS	Delay	95th Q	LOS	Delay	95th Q	LOS	Delay	95th Q
2045 Scenarios with ODVs - AM Peak Hour									
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	29		F	>100	
EB, along SASH	F	>100	78	C	32	10	F	82	39
WB, along I-89 Exit 19 Off Ramps	F	>100	56	C	24	11	A	6	4
NB, along VT-104	F	>100	74	C	26	12	F	>100	77
SB, along VT-104	F	>100	68	C	32	14	F	>100	73
2045 Scenarios with ODVs - PM Peak Hour									
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	31		F	>100	
EB, along SASH	F	>100	76	C	29	9	F	>100	75
WB, along I-89 Exit 19 Off Ramps	F	>100	48	D	38	21	E	60	52
NB, along VT-104	F	>100	73	C	23	11	F	>100	55
SB, along VT-104	D	43	23	C	30	12	E	57	35

Delay is the average delay per vehicle in seconds.
95th Q is the longest queue by number of vehicles expected to occur in the peak hour for each approach direction.

Table 9. Summary of peak hour intersection capacity analysis results for all alternatives using SimTraffic microsimulation methodology in the 2045 scenarios*

*Refer to Page 11 for definition of level of service (LOS), delay, and volume to capacity ratio (v/c)

The microsimulation results confirm that the existing condition is expected to fail in the future. The signal will operate acceptably, but the roundabout may not operate as efficiently as modeled by the deterministic methodology.

For a more complete assessment of the operational performance throughout the day, the microsimulation evaluation was expanded to evaluate build scenario operations from 6 AM through 6 PM, presented in Figure 9.

2045 Planning Year - Above Average Traffic Growth with Dense Adjacent Land Use Development																												
Signal															Hybrid Roundabout													
Overall		SASH EB			Exit 19 WB			VT-104 NB			VT-104 SB			Hour	Overall		SASH EB			Exit 19 WB			VT-104 NB			VT-104 SB		
LOS	Delay	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q	Starting	LOS	Delay	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q
C	21	C	25	8	B	16	6	C	21	7	C	21	11	6 AM	B	11	A	9	6	A	4	3	B	17	8	B	13	11
C	32	D	41	10	C	30	11	C	31	12	C	30	14	7 AM	**F**	**>100**	**F**	**82**	**40**	A	6	5	**F**	**>100**	**78**	**F**	**>100**	**74**
C	26	C	32	10	C	23	10	C	26	13	C	25	12	8 AM	**F**	**83**	B	19	11	A	5	4	**F**	**>100**	**78**	D	47	26
C	20	C	26	7	B	17	8	B	20	9	C	21	10	9 AM	B	11	A	8	5	A	4	3	B	20	11	A	9	7
C	21	C	25	7	B	17	8	C	21	10	C	22	10	10 AM	A	8	A	6	4	A	5	4	B	15	9	A	6	6
C	21	C	27	8	B	17	8	C	21	10	C	21	11	11 AM	A	9	A	6	4	A	5	5	B	20	12	A	6	5
C	21	C	27	7	B	18	10	C	21	10	C	21	8	12 PM	A	8	A	6	4	A	8	8	B	11	7	A	6	4
B	19	C	23	7	B	15	7	B	20	9	B	20	7	1 PM	A	6	A	6	4	A	6	6	A	9	7	A	5	4
C	21	C	25	7	B	17	7	C	22	9	C	24	9	2 PM	A	9	B	16	8	A	7	6	A	10	6	A	7	6
C	30	C	35	11	C	28	14	C	28	11	C	32	11	3 PM	D	53	**F**	**92**	**41**	B	19	16	**F**	**>100**	**45**	C	28	19
C	33	D	39	9	C	32	22	C	29	11	C	32	12	4 PM	**F**	**>100**	**F**	**>100**	**76**	**E**	**60**	**52**	**F**	**>100**	**56**	**E**	**57**	**35**
C	27	C	34	10	C	24	10	C	26	11	C	27	11	5 PM	C	22	C	23	15	B	19	21	C	33	17	B	17	11
B	17	C	20	5	B	14	7	B	20	8	B	18	7	6 PM	A	6	A	7	5	A	5	4	A	7	5	A	6	4

LOS = Level of Service
Delay = Average control delay in seconds
Queue = 95th percentile queue in number of vehicles

FIGURE 9. Time-of-Day Microsimulation Evaluation using 2045 planning year traffic volumes with above average traffic growth rates and relatively dense adjacent land use development*

*Refer to Page 11 for definition of level of service (LOS), delay, and volume to capacity ratio (v/c)

The time-of-day microsimulation evaluation presented in Figure 9 indicates that the expanded signal is expected to operate with a consistent average control delay of 20-35 seconds throughout the day, while the roundabout is expected to operate with 6-11 seconds of average control delay outside of the peak hours. In the planning year time horizon with above average traffic growth projections and relatively dense land use development adjacent to the intersection, microsimulation modeling indicates that the overall intersection performance will decline into LOS F conditions in the peak hours.

Picture Source: Venit Views unsplash.com

EVALUATION MATRIX

Table 10 presents a comparison of the estimated benefits and impacts of the do nothing and two build alternatives.

	Existing Condition	Expanded Signal	Hybrid Roundabout	Option: 2-Lane SB On-Ramp
Purpose & Need				
Improves Safety for Pedestrians	poor	good	good	**n/a**
Improves Safety for Bicyclists	poor	good	good	n/a
Improves Safety for Motorists	poor	good	**best**	improved
Improves LOS	**worst**	good	good	improved
Meets Purpose & Need	No	Yes	Yes	n/a
Safety				
Expected Change in Crashes per 5 Years	0	-1	-6	0
Value of Crash Reduction over 20 Years	$0	$87,000	$1,222,000	$0
Order of Magnitude Estimated Costs	$0	$3,290,000	$3,730,000	$960,000
Benefit : Cost Ratio	0.00	0.03	0.33	0.00
Max. Uninterrupted Crosswalk Length (feet)	n/a	88	39	n/a
Total Crosswalk Length (feet)	n/a	300	250	n/a
Capacity Improvements				
Near Term	**worst**	good	**best**	improved
Long Term (Low Growth)	**worst**	good	**best**	improved
Long Term (High Growth)	**worst**	**best**	good	improved
Impacts				
Utility	-	Moderate	Minor	No Impact
Right of Way	-	Significant	Moderate	No Impact
Constructability Effort	-	Moderate	Significant	Minor
Community Character				
Aesthetics Improvements	-	Minor	Improved	Minor
Environmental Impacts				
Wetlands	-	Class III	Class III	Class III
Stormwater Pilot Project Sites	-	SB Off Ramp	SB Off Ramp	None
Significant Plant and Animal Species	-	None	None	None
Land & Water Conservation Fund Sites	-	None	None	None
Hazardous Materials Sites	-	None	None	None
Historic Sites and Structures	-	None	None	None
Archaeological Sites	-	None	None	None
Agricultural Lands	-	Minor	Minor	Minor
Drinking Water Sources	-	None	None	None

TABLE 10. Evaluation matrix comparing the impacts and improvements of each alternative

ALTERNATIVE SCORING

A draft score from 0 to 3 was assigned to each evaluation category for the alternatives based on a subjective initial assessment. A score of 0 indicates poor improvement in the category or high impacts to the evaluated resources; a score of 3 indicates a high degree of improvement in the category or no impacts to the evaluated resources. A higher score is one indication of a higher preference. Each category is equally weighted with a possible total score of 18.

Evaluation Category and Discussion	Do Nothing / No Build	Expanded Signal	Hybrid Roundabout
Purpose and Need The two build alternatives meet the purpose and need by improving safety for people traveling through the intersection by all modes and by improving the level of service. The no-build / existing condition does not achieve either objective.	0	3	3
Safety The no-build / existing condition is not expected to result in any reduction in crashes. The signalized alternative is expected to result in a slight reduction in the number of crashes, and the roundabout alternative is expected to reduce the number and severity of crashes. The roundabout alternative has the shortest total crosswalk length and the shortest maximum uninterrupted crossing distance, resulting in the least pedestrian exposure to vehicle conflict.	0	1	3
Capacity Improvement The no-build / existing condition is not expected to result in an increase in capacity or congestion improvement. The signalized alternative is expected to result in consistent acceptable level of service throughout the day, while the roundabout is expected to result in the least delay for most of the day with moderate to significant delays during the peak hour under high traffic growth projections.	0	2	2
Construction Impacts With no proposed construction, the no-build / existing condition is not expected to create any construction impacts. The signal requires expansion of the roadway at the intersection and lengthening of the turn lanes, resulting in right of way and utility impacts. The roundabout will likely require right of way at the intersection, but no widening outside of the intersection or extension of turn lanes; the roundabout is expected to create temporary impacts during construction.	3	1	2
Community Character The no-build / existing condition is expected to result in extensive delays and frustration from people traveling through the intersection with no improvement to bicycle and pedestrian mobility. Mobility and delays will be improved in both build scenarios, and the roundabout offers aesthetic opportunity (art/landscaping) in the central island.	0	2	3
Environmental Impacts With no proposed construction, the no-build / existing condition is not expected to create any environmental impacts, nor will there be any proposed improvement to stormwater collection and treatment that would be expected as a result of the build alternatives.	2	1	1
Total	**5**	**10**	**14**

TABLE 11. Draft alternative scoring matrix

6. STAKEHOLDER OUTREACH

STORY MAP

As the project has developed, an online Story Map (https://arcg.is/1r1C05) has been prepared and updated documenting the project background and development process. This online resource is open to the public and is an up-to-date reflection of the project status, analysis, and evaluation.

STAKEHOLDER MEETINGS

A stakeholder committee was convened at the beginning of this project. The stakeholders included representatives from the Agency of Transportation as the owner of the facility, staff from the town of St Albans and city of St Albans, and staff from the Northwest Regional Planning Commission. The full stakeholder committee convened for a kickoff meeting, an initial results meeting, and a revised analysis meeting.

In addition to the full group meetings, the individual groups making up the stakeholder committee were consulted in one-on-one meetings to ensure their priorities were captured and addressed as the alternatives were developed and analyzed.

PUBLIC MEETING

The St. Albans Town Educational Center (SATEC) hosted an Alternatives Presentation Meeting on May 15, 2024. In addition to project stakeholders, the meeting was attended by approximately 20 residents. The meeting was recorded by Northwest Access TV, and may be viewed at https://www.youtube.com/watch?v=6s78D_EVFow.

Notes and the presentation from the meeting is included in the Appendices.

PREFERRED ALTERNATIVE

The Stakeholder Committee has selected the Hybrid Roundabout as the preferred alternative for the following reasons:

- Safest alternative with fewer expected severe and injury crashes,
- Least pedestrian exposure / shortest crosswalk length,
- Best benefit to cost ratio,
- Best whole-day performance,
- Operates well into future under moderate growth / lower density adjacent development, and
- Least pedestrian delay.

The design and right of way acquisition of the hybrid roundabout should allow for future implementation of two lane exits if future congestion becomes unacceptable.

The selection of the roundabout as the preferred alternative is consistent with the 2002 and 2009 intersection scoping efforts at this intersection.

TOWN OF ST. ALBANS SELECTBOARD MEETING

The project development process and preferred alternative was presented at the July 15, 2024 Town of St. Albans Selectboard meeting. The Selectboard discussed the potential future capacity constraints of a single lane exit hybrid roundabout and requested that the intersection is designed to allow future upgrades to accommodate additional capacity, if needed. The Selectboard voted unanimously to pass a motion to affirm and support the preferred alternative.

APPENDICES

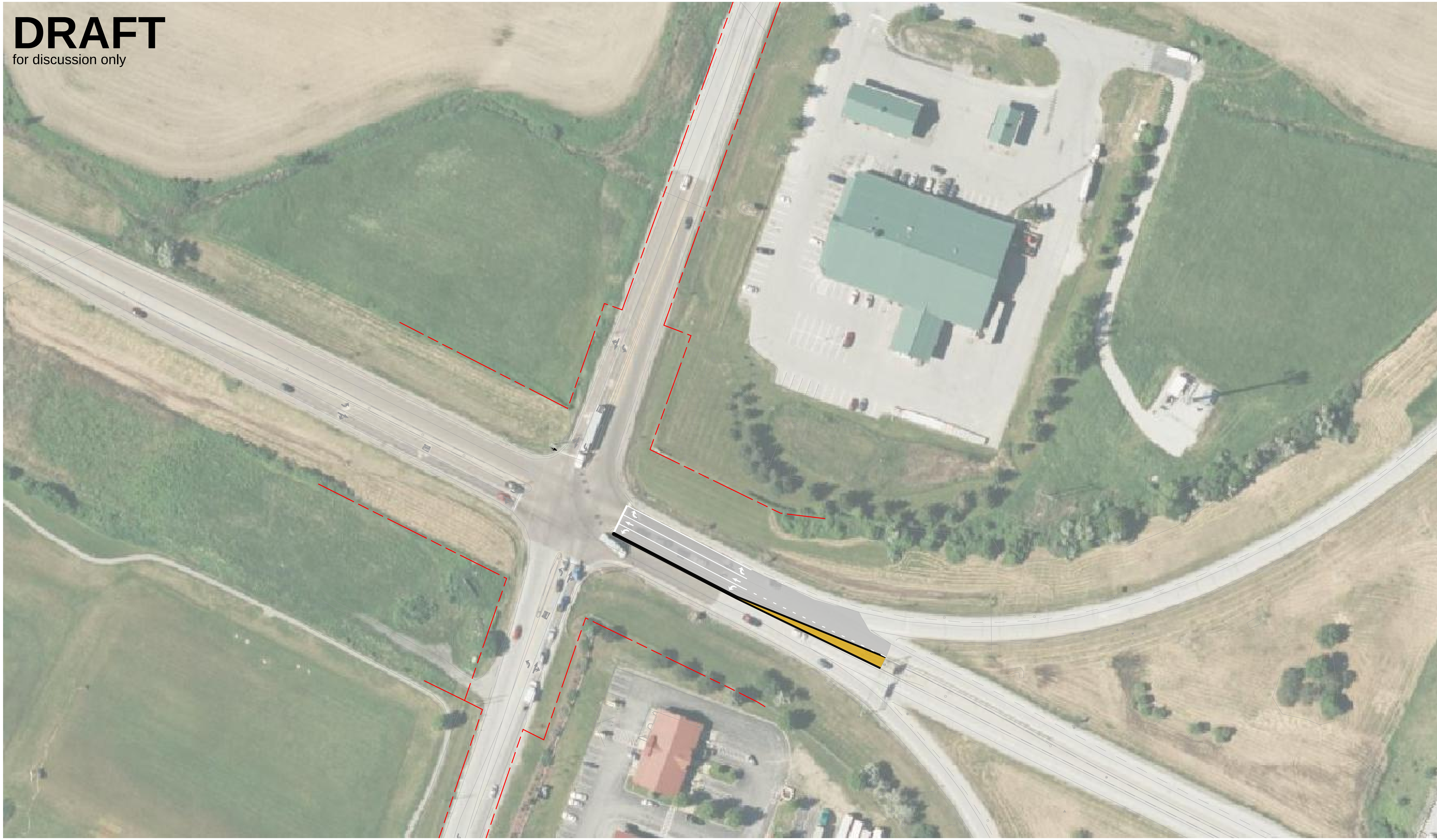
A. Conceptual Alternative Designs
B. Traffic Analysis Memorandum
C. Notes from Public Meeting
D. Notes from Selectboard Meeting

APPENDIX

APPENDIX

A

CONCEPTUAL ALTERNATIVE DESIGNS



WALL CONSULTANT GROUP

Alternative 1 - Do Nothing / Existing Condition

St Albans STP 044-1(2) - VT-104 & SASH Scoping Refresh

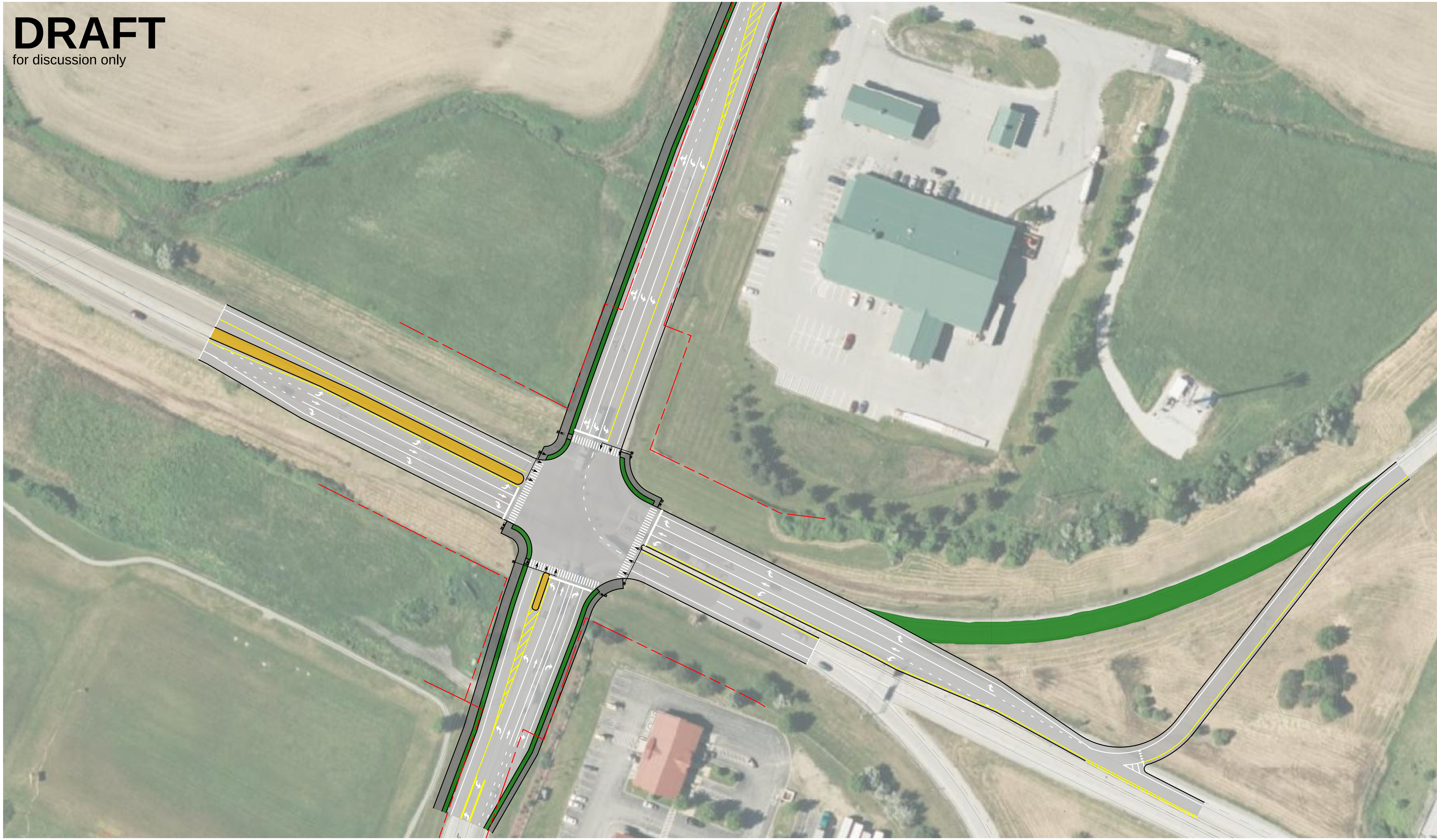
50 ft
Scale 1" = 50'

N

DATE: 05/10/2024

PROJECT: 22-226

Figure A1



WALL CONSULTANT GROUP

Alternative 2 - Signal Expansion

St Albans STP 044-1(2) - VT-104 & SASH Scoping Refresh

50 ft
Scale 1" = 50'

N

DATE: 05/10/2024

PROJECT: 22-226

Figure A2

WALL CONSULTANT GROUP

Alternative 3 - Hybrid Roundabout

St Albans STP 044-1(2) - VT-104 & SASH Scoping Refresh

50 ft
Scale 1" = 50'

DATE: 05/24/2024

PROJECT: 22-226

Figure A3

WALL CONSULTANT GROUP

Alternative 4 - Two Lane Southbound On Ramp

St Albans STP 044-1(2) - VT-104 & SASH Scoping Refresh

50 ft
Scale 1" = 50'

N

DATE: 05/10/2024

PROJECT: 22-226

Figure A4a

Alternative 4 - Two Lane Southbound On Ramp

St Albans STP 044-1(2) - VT-104 & SASH Scoping Refresh

50 ft
Scale 1" = 50'

N

DATE: 05/10/2024

PROJECT: 22-226

Figure A4b

APPENDIX

B

TRAFFIC ANALYSIS MEMORANDUM

Memo

Submitted To: Michael LaCroix, Vermont Agency of Transportation Project Manager

Submitted By: Corey Mack, PE, Consulting Transportation Engineer

Project Name: St Albans STP 044-1(2) – Traffic Analysis

Date: July 1, 2024

Wall Consultant Group, Inc. (WCG) has contracted with DuBois & King and the Vermont Agency of Transportation (VTrans) to provide transportation planning services for St Albans STP 044-1(2): VT-104 & St Albans State Highway (SASH) Intersection Scoping Refresh Study. This memo documents the existing and future traffic projections, analysis scenarios, design considerations, and resulting traffic modeling at the project intersection.

Summary of Transportation Modeling Analysis

As detailed in the traffic modeling section:

- The existing condition is over capacity and failing in AM and PM peak hours, in the 2025 current year and 2045 future year time horizons.
- Signal expansion would improve intersection operations in both the near term and long-term design horizons to acceptable levels. The resulting intersection would have consistent delays throughout the day.
- Roundabout alternatives appear to yield the least delay and the greatest performance improvement of all the alternatives in the 2025 year scenarios, and 2045 off-peak hour scenarios.
- If continued high growth is experienced in Franklin County and the adjacent undeveloped land builds in a dense pattern, microsimulation models indicate the long-term operations of a roundabout at this intersection may decline into excessive delay conditions during the peak hour; roundabout operations are expected remain acceptable for the 20 hours outside of the peak periods.

Background

The St Albans STP 044-1(2) project is a scoping project at the intersection of VT-104 & St Albans State Highway (SASH) / I-89 Exit 19 Ramps. The study is intended to refresh data and modernize conceptual designs associated with previous intersection improvement studies completed in 2002 and 2009. These previous studies analyzed the intersection and developed signalized and roundabout intersection control alternatives to accommodate existing and future traffic volumes. The current project seeks to update the traffic projections, crash data, and conceptual design impacts to validate previous preferred alternative selections.

Existing Traffic Volumes

A historical database of turning movement counts at the project intersection is available online through the MS2 traffic management data system. At the VT-104 & SASH intersection, 12-hour or longer turning movement counts are available in 2012, 2014, 2017, and two in 2021. All turning movement counts were conducted in June or August. WCG conducted an independent turning movement count in November 2022 to capture school traffic periods, however the evening peak hour recording was unable to be processed due to headlight glare.

An historic comparison of the AM peak hour and PM peak hour volumes by approach from the 2012, 2014, 2017, and two 2021 counts is provided in the Attachments.

All four approach legs to the intersection have relatively recent automatic traffic recorder counts. In addition, WCG collected traffic volumes, classification, and speed data along VT-104 north of SASH for one day in November 2022. The resulting average annual daily traffic (AADT) and design hour volume (DHV) for each approach are presented in Table 1. The locations presented for the counts in Table 1 are illustrated in Figure 2.

FIGURE 1: PROJECT LOCATION

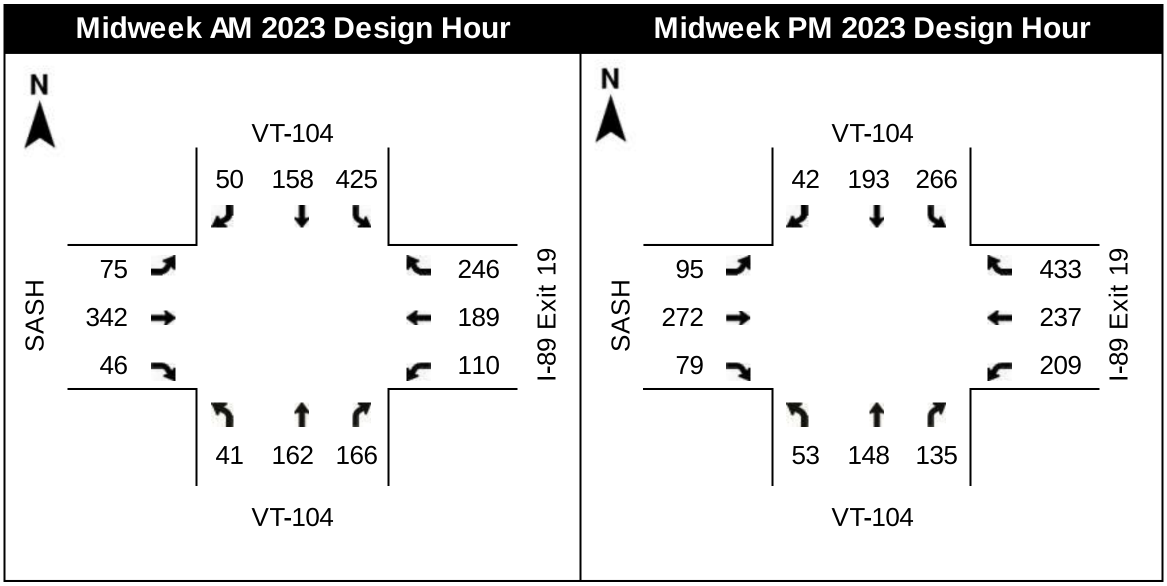
TABLE 1: ATR SUMMARY

Loc. ID	Location	Count Duration	Year	Est. AADT (vpd)	Highest Obs. Hour AM (vph)	Highest Obs. Hour PM (vph)	%D	Est. 2023 AADT (vpd)	Est. 2023 DHV (vph)
F198	VT-104 north of SASH (VTrans)	2 days	2018	11,284	1,020 (470 NB / 550 SB)	1,102 (618 NB / 484 SB)	56%	10,428	1,200
F198	VT-104 north of SASH (WCG)	1 day	2022	11,925	1,160 (495 NB / 665 SB)	1,204 (643 NB / 561 SB)	53%	11,985	1,300
F107	VT-104 south of SASH	2 days	2018	4,265	402 (257 NB / 145 SB)	478 (187 NB / 291 SB)	61%	3,941	484
F195	SASH west of VT-104	5 days	2017	7,185	814 (478 EB / 336 WB)	742 (438 EB / 304 WB)	59%	6,626	793
n/a	SASH east of VT-104		2021	13,992	1,430 (836 EB / 594 WB)	1,546 (633 EB / 913 WB)	59%	14,132	1,500
F231	Exit 19 NB Off Ramp B	2 days	2021	5,127	375	707	n/a	5,178	678
F232	Exit 19 NB On Ramp A	2 days	2021	1,778	161	220	n/a	1,796	250
F233	Exit 19 SB Off Ramp D	2 days	2021	2,023	219	206	n/a	2,043	288
F234	Exit 19 SB On Ramp C	2 days	2021	5,064	675	413	n/a	5,115	671

FIGURE 2: LOCATION OF AUTOMATIC TRAFFIC RECORDERS RELATIVE TO THE PROJECT SITE

To develop existing 2023 AM and PM peak hour design volumes, WCG averaged the two 2021 peak hour turning movement counts and adjusted the approach volumes to best match design hour volumes indicated in Table 1. The resulting 2023 design hour turning movement diagrams are illustrated in Figure 3 and documented in Attachment A.

FIGURE 3: ADJUSTED AM AND PM 2023 DESIGN HOUR VOLUMES



Schematic diagram - not to scale; values rounded to nearest whole number

Analysis Scenarios

To evaluate existing and future peak hour traffic demands, WCG modeled design year and future year (design year + 20) traffic volumes in the AM and PM peak hours.

- Design Year: 2025
- Future Year: 2045

Traffic Growth Projections

Annual / Background Growth

The VTrans Redbook recommends a traffic growth rate of 8% over 20 years, or about 0.4% per year. This 8% growth estimate would represent a “standard growth” traffic volume scenario.

To estimate a “high growth” scenario, WCG reviewed observed traffic volumes from the historic catalog of turning movement counts at the intersection from 2008 through 2021. The observed annual change in peak hour traffic volume is presented in Table 2 by approach direction and the overall peak hour volume. Observed growth rates by direction and peak hour range from 0.3% per year along southbound VT-104 in the PM peak hour to 3.9% per year along northbound VT-104 in the AM peak hour. It should be noted that, since some of the existing approaches are operating at capacity, the peak hour volume processed during observation periods may not capture the peak hour demand. The historic observed volumes and growth rate calculations are documented in Attachment B.

TABLE 2: AVERAGE ANNUAL CHANGE IN TRAFFIC VOLUME THROUGH STUDY INTERSECTION, 2008 TO 2021, AND RECOMMENDED GROWTH RATE

	NB VT-104	SB VT-104	EB SASH	WB Exit 19	Overall
AM Peak Hour	3.9%	1.2%	2.2%	1.3%	2.0%
PM Peak Hour	3.2%	0.3%	2.2%	0.5%	1.2%
State Standard Growth Rate	0.4%	0.4%	0.4%	0.4%	0.4%
Projected High Growth Rate	3.0%	1.0%	2.0%	1.0%	--
Recommended Growth Rate	1.7%	0.7%	1.2%	0.7%	--

The recommended growth rate indicated in Table 2 is the average of the standard growth rate and the observed historic growth rate.

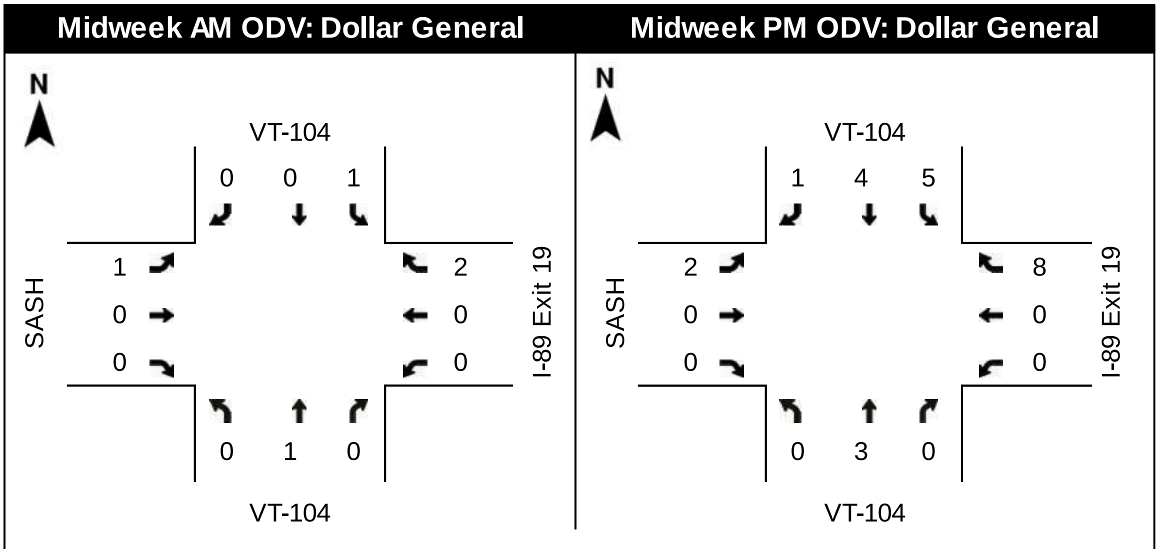
- Northbound VT-104: This is the lowest volume approach and has seen the highest growth rate. The rate is expected to continue to grow at the highest rate, however the rate is likely to decrease as the approach volume increases. ***Assume a 1.7% per year growth rate.***
- Southbound VT-104: This approach is operating at or near capacity. The hourly demand is expected to continue to grow. ***Assume a 0.7% per year growth rate.***
- Eastbound SASH: This approach is expected to continue to grow, particularly with consideration of the infrastructure investments and continued development in downtown St Albans. ***Assume a 1.2% per year growth rate.***
- Westbound Exit 19: This approach operates at or near capacity. The hourly demand is expected to continue to grow as it serves as the primary access to I-89 and points south. ***Assume a 0.7% per year growth rate.***

Other Development Volumes

Only one specific project has been identified near the project area: a Dollar General variety store on the northeast corner of the intersection, sharing driveway access with the existing Maplefields Gas Station / Convenience Store and Guys Farm and Yard garden center. However, there is significant greenfield development potential on approximately 270 additional acres north of the intersection, between SASH and VT-36. There are no significant developable parcels south of the intersection within a mile of the intersection.

- **Dollar General.** The proposed Dollar General did not prepare a traffic study. The proposed project permitting documentation indicated that the project would generate 52 trips in the PM peak hour, and 13 trips in the AM peak hour, with a pass-by rate of 17%. The associated primary trips were distributed to the study intersection proportionally based on existing traffic patterns. The proposed Dollar General is assumed to be occupied and operational by 2025.

FIGURE 4: DOLLAR GENERAL ODVS



Schematic diagram - not to scale; values rounded to nearest whole number

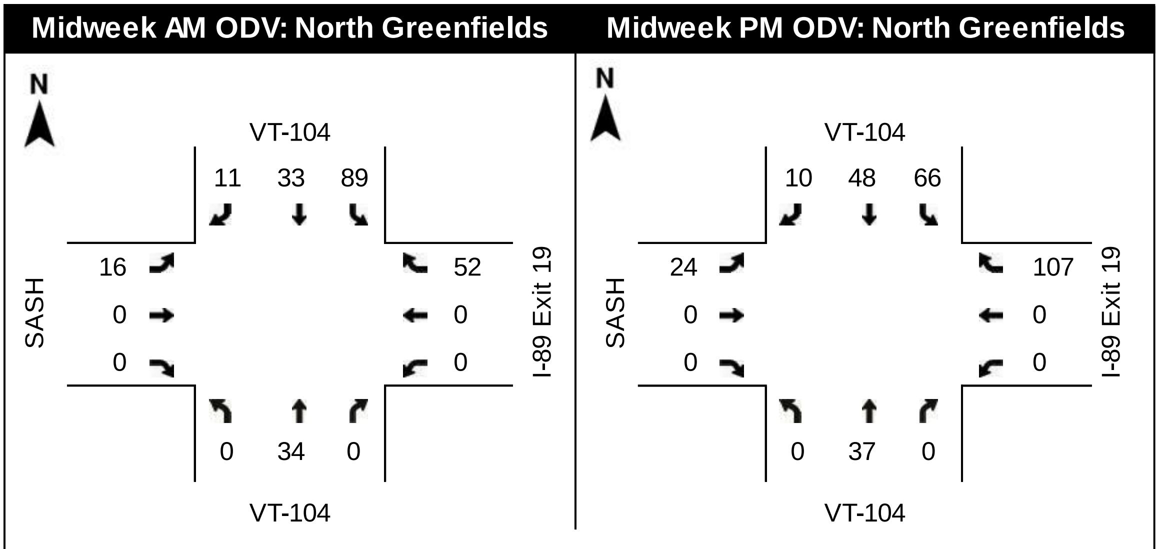
- **Northern Greenfield Development.** There are no known development proposals for the 102 acres of developable greenfield space between SASH / Exit 19 and VT-36. To estimate a potential traffic demand, WCG compiled permitting documentation from three mixed use residential and commercial developments in Chittenden County to estimate a per acre trip generation, including open space requirements:

TABLE 3: ESTIMATED TRIP GENERATION RATES FOR NEARBY MIXED USE DEVELOPMENTS

Development	Size (acres)	AM Trip Ends	AM Rate (trip ends / ac)	PM Trip Ends	PM Rate (trip ends / ac)
Eastview, South Burlington VT	102	514	5.0	733	7.1
Severance Corners, Colchester VT	36	264	7.3	313	8.7
South Village, South Burlington VT	227	315	1.4	305	1.3
		Average	4.6		5.7

Applying the average trip generation rate to the 102 acres results in an estimated 470 and 582 trip ends in the AM and PM peak hours, respectively. These trips were evenly divided between entering and exiting trips and distributed proportionally based on existing traffic patterns. Since there is no known development proposal, these trips will be added to the 2045 future year as a high-growth scenario.

FIGURE 5: NORTHERN GREENFIELD ODVS

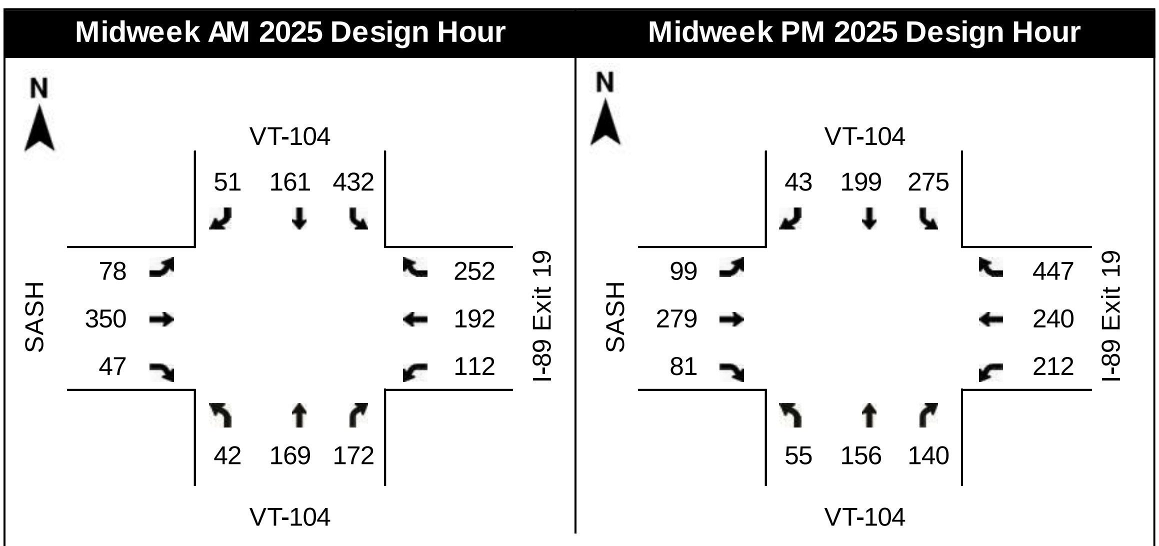


Schematic diagram - not to scale; values rounded to nearest whole number

Analysis Scenario Volumes

The following figures represent the predicted 2025 and 2045 design hour volumes for congestion and capacity analyses.

FIGURE 6: 2025 PROJECTED DESIGN HOUR TRAFFIC VOLUMES



Schematic diagram - not to scale; values rounded to nearest whole number

FIGURE 7: 2045 PROJECTED TRAFFIC VOLUMES – NO GREENFIELD DEVELOPMENT

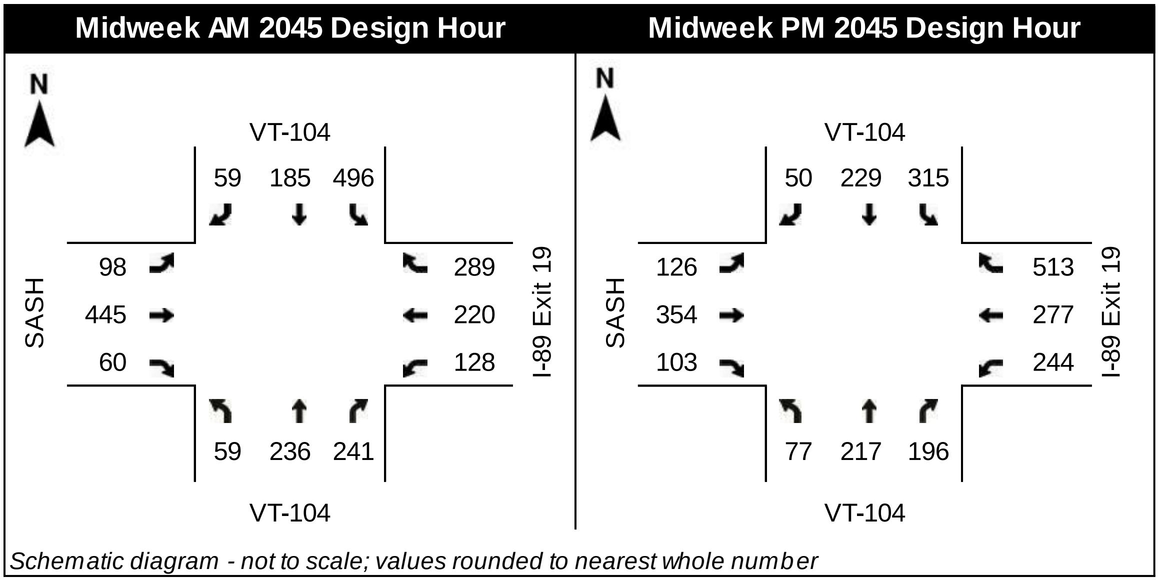
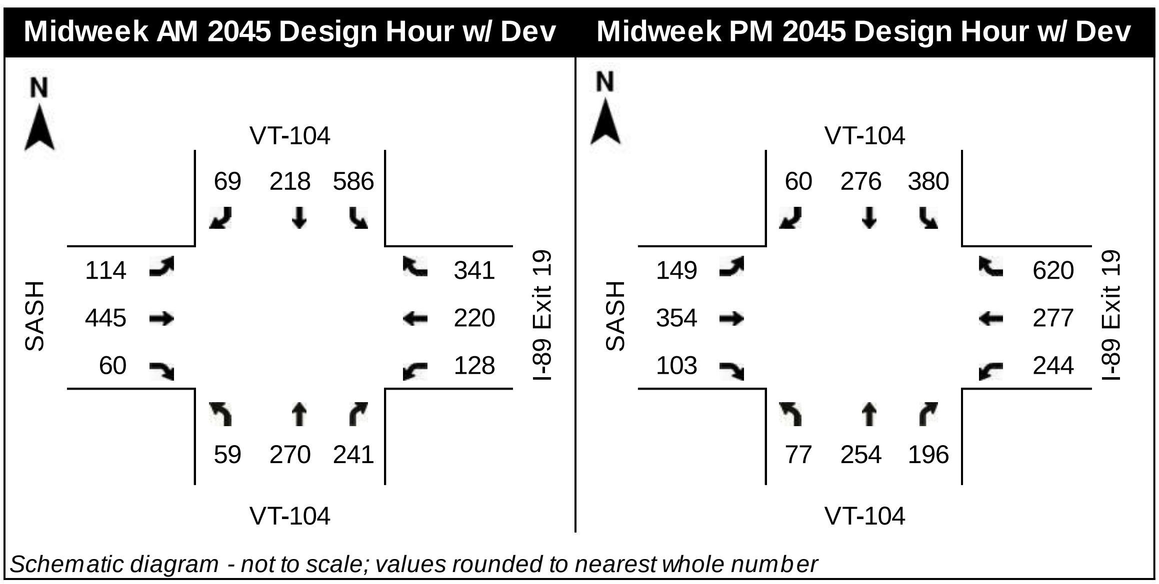


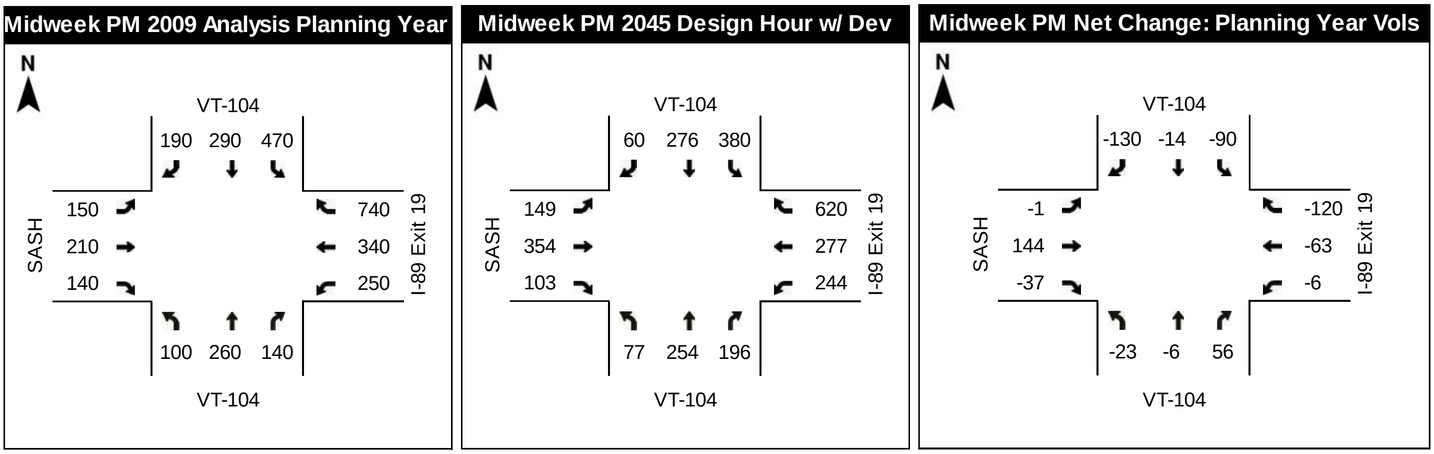
FIGURE 8: 2045 PROJECTED TRAFFIC VOLUME WITH NORTH GREENFIELD DEVELOPMENT



Comparison to Previous Analyses

The 2009 Traffic Analysis developed a traffic model using the PM peak hour and a 2030 planning year. A comparison of the +20 year planning year scenario volumes from the 2009 study, the current study, and the net change is presented in Figure 9.

FIGURE 9: COMPARISON OF PM PEAK HOUR PLANNING YEAR SCENARIO VOLUMES: 2009 STUDY (LEFT), CURRENT STUDY (CENTER), NET CHANGE (RIGHT)



Total Intersection Volume = 3280 vph   Total Intersection Volume = 2989 vph   Total Intersection Volume = -291 vph

As shown in Figure 9, the volumes on each approach have changed, and the overall intersection volume has decreased in the current study. Past analyses have typically overestimated traffic volume growth. The current growth projections are intended to more closely reflect the change in total traffic through the intersection.

Design Considerations

Heavy Vehicles / Design Vehicles

Given the intersection's location serving an interstate highway ramp facility and adjacent truck stop service facilities, the intersection should be designed to accommodate the largest truck-trailer combination: WB-67.

Pedestrian and Bicycle Travel

The Town of St Albans has identified the SASH as a considerable barrier to bicycle and pedestrian travel in the area.

- The Collins-Perley Sports Complex on the southwest corner of the intersection has no direct, formal bicycle and pedestrian access to the school campuses to the north and west.
- The Town is planning an off-road shared use path from the Collins-Perley Complex south of the intersection to Hard'ack Park, north of the intersection along VT-104.
- There are no pedestrian crossing facilities across VT-104 or SASH at or near the intersection.

Controlled bicycle and pedestrian crossings have been identified as a priority across the northbound, eastbound, and southbound approaches. A controlled bicycle and pedestrian crossing across the westbound approach is desirable, but not critical; the preferred design should not preclude future controlled crossing opportunities.

Transportation Modeling

WCG prepared traffic capacity models using Synchro HCM and SimTraffic microsimulation analysis software for all scenarios. VISSIM microsimulation was consulted for the more complex hybrid roundabout analyses in the 2045 planning year scenarios.

Five intersection geometry alternatives were modeled in the various volume scenarios:

- **No-Build / Existing Conditions.** This alternative models the existing intersection.
- **Signalized Intersection: Expansion.** The expanded signalized intersection is designed to serve the high-growth 2045 traffic demand.
- **Hybrid Roundabout with Single Lane Exits.** The hybrid roundabout alternative is similar to the 2009 preferred alternative with two lane entrances on each approach, but only one lane exits on all approaches.

Specific modeling values include:

- **Dual lane prepositioning.** For alternatives with two lanes from one approach feeding into the eastbound exit towards the I-89 on ramps, a lane utilization factor of 0.67 has been applied; this effectively raises the single lane vehicle demand by 50%. This is intended to address the prepositioning behavior of a driver's preference to be in the I-89 southbound on-ramp lane.
- **Percent Truck.** The percentage truck values used in the modeling was an average of the two observed percentage truck values by approach from the 2021 counts, applied to all approach volume movements.
- **Signal Timing Optimization.** All signal timing plans have been optimized in each of the signalized alternatives, including the no-build / existing conditions alternative. The build scenario is based on Dallas permitted and lagging protected left turn phasing.
- **Leading Pedestrian Interval.** The signal timing plans were intended to include a leading pedestrian interval (LPI) phase. After a person walking pushes the button to cross the street, the pedestrian phase will be given a 7 second head start to begin crossing while all traffic is stopped (and right turns on red are prohibited). After 7 seconds, vehicle traffic will begin normal operations concurrent with the pedestrian crossing. LPI operations are shown to be the safest pedestrian signal phasing technique.

Highway Capacity Manual Analysis Methodology

The resulting Synchro Software traffic capacity analysis using HCM 6th edition procedures are summarized in Table 4. As illustrated in the table:

- The existing condition is over capacity and failing in all scenarios and time horizons.
- The signal expansion has been designed to provide acceptable operations in both the near term and long-term design horizons.
- Roundabout alternatives appear to yield the least delay and the greatest overall performance improvement of all the alternatives. However, the EB SASH approach is expected to experience significant delay in the future year PM peak hour.

TABLE 4: TRAFFIC CAPACITY ANALYSIS RESULTS USING SYNCHRO 11 HCM 6TH EDITION ANALYSIS METHODOLOGIES

	No Build / Ex. Conditions			Signal Expansion			Hybrid Roundabout		
'sections	LOS	Delay	v/c	LOS	Delay	v/c	LOS	Delay	v/c
	2025 Scenarios - AM Peak Hour								
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	24		A	9	
EB, along SASH	F	>100	1.07	C	25	0.69	C	16	0.63
B, along I-89 Exit 19 Off Ramps	F	>100	1.20	C	23	0.68	A	6	0.29
NB, along VT-104	F	90	1.02	C	22	0.53	A	10	0.34
SB, along VT-104	E	66	1.03	C	25	0.77	A	8	0.43
	2025 Scenarios - PM Peak Hour								
VT-104 & SASH / I-89 Exit 19									
Overall	F	88		C	25		A	9	
EB, along SASH	D	53	0.88	C	27	0.68	B	13	0.55
B, along I-89 Exit 19 Off Ramps	F	>100	1.17	C	24	0.85	A	8	0.43
NB, along VT-104	F	94	1.01	C	23	0.53	A	8	0.28
SB, along VT-104	E	71	1.02	C	26	0.70	A	7	0.32
	2045 Scenarios - AM Peak Hour								
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	34		C	24	
EB, along SASH	F	>100	1.25	D	35	0.80	F	63	0.89
B, along I-89 Exit 19 Off Ramps	F	>100	1.43	C	30	0.73	A	8	0.70
NB, along VT-104	F	>100	1.23	C	29	0.72	C	22	0.54
SB, along VT-104	F	>100	1.25	D	39	0.90	B	11	0.48
	2045 Scenarios - PM Peak Hour								
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		D	41		C	18	
EB, along SASH	F	>100	1.26	C	33	0.77	E	36	1.01
B, along I-89 Exit 19 Off Ramps	F	>100	1.46	D	54	1.06	B	15	0.38
NB, along VT-104	F	>100	1.24	C	31	0.70	B	13	0.68
SB, along VT-104	F	>100	1.35	D	35	0.81	B	11	0.62

Delay is the average delay per vehicle in seconds; v/c is the volume to capacity ratio.

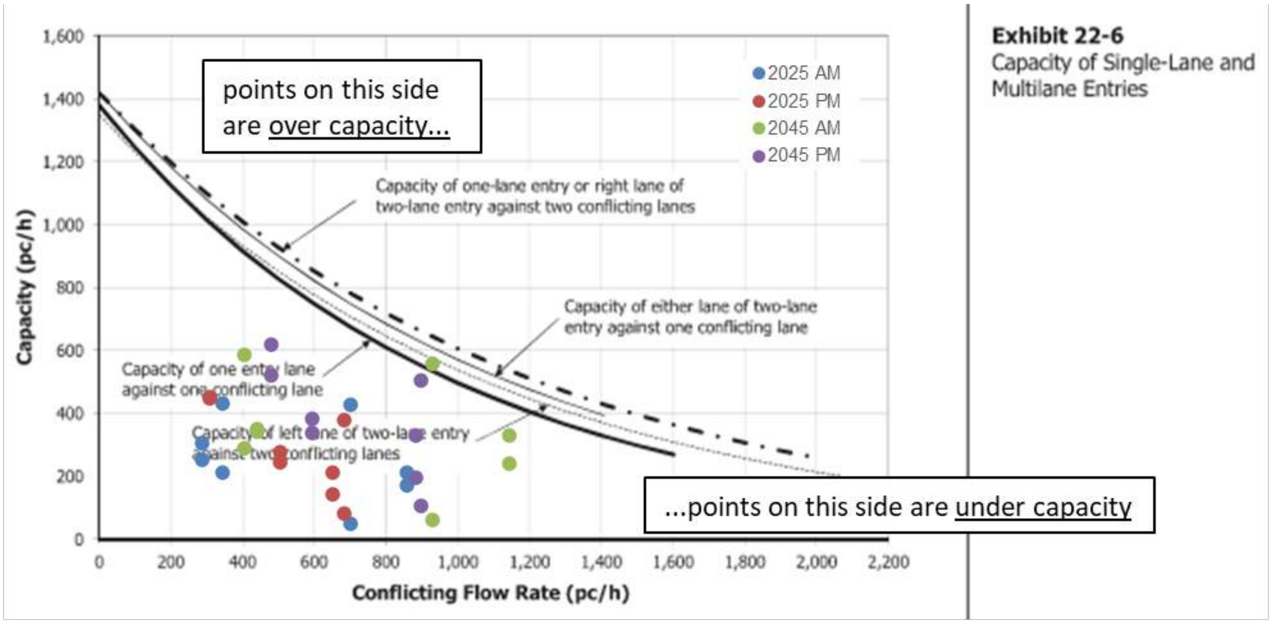
Roundabout Capacity Discussion

The HCM 6th Edition roundabout analysis relies on a combination of regression analysis and gap acceptance analytical analysis to evaluate the capacity of entering flow rates compared to the conflicting flow rates, accounting for heavy vehicles, conflicting pedestrians, and roundabout geometry. Figure 10 superimposes the estimated entering and conflicting design hour traffic volumes by approach (noted in Table 5) to the capacity curves illustrated in HCM Exhibit 22-6. As shown in the Figure, one approach direction nears or exceeds the capacity curves in the 2045 AM and PM peak hour scenarios. This indicates that further confirmatory analyses may be needed to verify the performance and queuing of the intersection.

TABLE 5: ESTIMATED ENTERING AND CONFLICTING FLOW RATES THROUGH THE PROPOSED VT-104 & SASH ROUNDABOUT BY APPROACH AND LANE

		Movement							
Scenario	**Flow Rate (vph)**	**EBLT**	**EBR**	**WBLT**	**WBR**	**NBLT**	**NBR**	**SBL**	**SBTR**
2025 AM	Entering	428	47	303	252	211	172	432	212
	Conflicting	704	704	289	289	860	860	346	346
2025 PM	Entering	378	81	452	447	211	140	275	242
	Conflicting	686	686	310	310	653	653	507	507
2045 AM	Entering	559	60	348	341	329	241	586	287
	Conflicting	932	932	444	444	1145	1145	408	408
2045 PM	Entering	503	103	520	620	331	196	380	336
	Conflicting	900	900	481	481	884	884	597	597

FIGURE 10: ESTIMATED ENTERING AND CONFLICTING FLOW RATES THROUGH THE PROPOSED VT-104 & SASH ROUNDABOUT, SUPERIMPOSED ON HCM 6TH EDITION EXHIBIT 22-6 ENTRY LANE CAPACITY



To provide confirmation of the capacity analysis and performance measures using the HCM methodology, WCG conducted additional microsimulation analysis of the alternatives to evaluate delay and queueing.

Microsimulation and Queuing

WCG prepared microsimulation models of the 2045 Hybrid Roundabout and Expanded Signal using SimTraffic software. Table 6 presents the resulting delay and queue lengths by approach.

TABLE 6: ESTIMATED LOS, DELAY, AND 95TH PERCENTILE QUEUES USING MICROSIMULATION MODELING SOFTWARE

Microsimulation Analysis Software	SimTraffic No Build / Ex. Conditions			SimTraffic Signal Expansion			SimTraffic Hybrid Roundabout		
Intersections	LOS	Delay	95th Q	LOS	Delay	95th Q	LOS	Delay	95th Q
	2045 Scenarios with ODVs - AM Peak Hour								
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	29		F	>100	
EB, along SASH	F	>100	78	C	32	10	F	82	39
WB, along I-89 Exit 19 Off Ramps	F	>100	56	C	24	11	A	6	4
NB, along VT-104	F	>100	74	C	26	12	F	>100	77
SB, along VT-104	F	>100	68	C	32	14	F	>100	73
	2045 Scenarios with ODVs - PM Peak Hour								
VT-104 & SASH / I-89 Exit 19									
Overall	F	>100		C	31		F	>100	
EB, along SASH	F	>100	76	C	29	9	F	>100	75
WB, along I-89 Exit 19 Off Ramps	F	>100	48	D	38	21	E	60	52
NB, along VT-104	F	>100	73	C	23	11	F	>100	55
SB, along VT-104	D	43	23	C	30	12	E	57	35

Delay is the average delay per vehicle in seconds.
95th Q is the longest queue by number of vehicles expected to occur in the peak hour for each approach direction.

As an additional confirmation, WCG also reviewed the Hybrid Roundabout using the VISSIM microsimulation software package in the 2045 scenarios with similar results.

The results from the microsimulation analyses confirm:

- The existing condition will continue to fail in the future year (2045) scenarios.
- The signal expansion will yield acceptable traffic operations in both the base year and future year scenarios.

Microsimulation models from both microsimulation software packages, SimTraffic and VISSIM, indicate that the roundabout alternative fails operationally in the future year scenarios with above-average background growth and relatively dense adjacent development. While the roundabout would be expected to perform very well in the immediate term and lower traffic growth future scenarios, if the current higher traffic growth pattern is sustained and the adjacent land use develops in a dense pattern, the long-term operations of a roundabout at this intersection may decline into failing conditions.

WCG performed a time-of-day operational analysis of the roundabout and signal alternatives in the 2045 scenario with ODVs, presented in Table 7. As indicated by the time-of-day operational analysis, the signal is expected to have consistent average delays of 20-30 seconds per vehicle throughout the day. The roundabout is expected to operate with 5-15 seconds of average delay per vehicle outside of the peak hours. During the AM and PM peak hours the average delay increases to over 100 seconds. The increased delay is concentrated on the most constrained approaches, based on the approach volume and / or conflicting circulatory volume.

TABLE 7: CAPACITY MODELING RESULTS FOR THE 2045 SCENARIO WITH ODVS FROM 6 AM THROUGH 6 PM FOR THE EXPANDED SIGNAL ALTERNATIVE (LEFT) AND HYBRID ROUNDABOUT (RIGHT)

Signal																Hybrid Roundabout												
Overall		SASH EB			Exit 19 WB			VT-104 NB			VT-104 SB			Hour	Overall		SASH EB			Exit 19 WB			VT-104 NB			VT-104 SB		
LOS	Delay	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q	Starting	LOS	Delay	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q	LOS	Delay	Q
C	21	C	25	8	B	16	6	C	21	7	C	21	11	6 AM	B	11	A	9	6	A	4	3	B	17	8	B	13	11
C	32	D	41	10	C	30	11	C	31	12	C	30	14	7 AM	**F**	**>100**	**F**	**82**	**40**	A	6	5	**F**	**>100**	**78**	**F**	**>100**	**74**
C	26	C	32	10	C	23	10	C	26	13	C	25	12	8 AM	**F**	**83**	B	19	11	A	5	4	**F**	**>100**	**78**	D	47	26
C	20	C	26	7	B	17	8	B	20	9	C	21	10	9 AM	B	11	A	8	5	A	4	3	B	20	11	A	9	7
C	21	C	25	7	B	17	8	C	21	10	C	22	10	10 AM	A	8	A	6	4	A	5	4	B	15	9	A	6	6
C	21	C	27	8	B	17	8	C	21	10	C	21	11	11 AM	A	9	A	6	4	A	5	5	B	20	12	A	6	5
C	21	C	27	7	B	18	10	C	21	10	C	21	8	12 PM	A	8	A	6	4	A	8	8	B	11	7	A	6	4
B	19	C	23	7	B	15	7	B	20	9	B	20	7	1 PM	A	6	A	6	4	A	6	6	A	9	7	A	5	4
C	21	C	25	7	B	17	7	C	22	9	C	24	9	2 PM	A	9	B	16	8	A	7	6	A	10	6	A	7	6
C	30	C	35	11	C	28	14	C	28	11	C	32	11	3 PM	D	53	**F**	**92**	**41**	B	19	16	**F**	**>100**	**45**	C	28	19
C	33	D	39	9	C	32	22	C	29	11	C	32	12	4 PM	**F**	**>100**	**F**	**>100**	**76**	**E**	**60**	**52**	**F**	**>100**	**56**	**E**	**57**	**35**
C	27	C	34	10	C	24	10	C	26	11	C	27	11	5 PM	C	22	C	23	15	B	19	21	C	33	17	B	17	11
B	17	C	20	5	B	14	7	B	20	8	B	18	7	6 PM	A	6	A	7	5	A	5	4	A	7	5	A	6	4

LOS: Level of Service   Delay: Average control delay in seconds   Q = 95th percentile queue in number of vehicles

Pedestrian and Bicycle Level of Service

Similar to vehicle capacity analysis, the Highway Capacity Manual has defined a methodology to evaluate level of service (LOS) for pedestrian and bicycle travel, which is a qualitative measure of perceived travel conditions. Pedestrian and Bicycle LOS is a function of traffic, pedestrian, and bicycle flow rates; geometric design, such as width of sidewalk, crosswalk, and / or presence of a dedicated bicycle lane; and signal timing parameters (if applicable).

Given the low volume of bicycle and pedestrian travel, LOS may not be an appropriate performance measure. Furthermore, LOS comparison would not be possible across alternatives. The HCM states “limited research has been performed in the United States on the operational impacts of vehicular traffic on pedestrians at roundabouts” and “no methodology specific to bicyclists has been developed to assess the performance of bicyclists at roundabouts.” More quantitative measures, such as pedestrian exposure and control type may be more appropriate to consider when selecting a preferred intersection alternative.

Crash Analysis

Initial crash review indicated that 50 crashes were reported at or within ¼ mile of the VT-104 & SASH / I-89 Exit 19 intersection from 2018 through 2022. Further investigation into the 50 records indicated a 20 of these crashes occurred on I-89 or the on- and off-ramps, in adjacent parking lots, or were coded incorrectly; these crashes were determined to be outside the influence of the intersection. Furthermore, 13 of the crash records included no additional details on crash type or direction, and 2 records were duplicate entries. After sorting through the 50 records, 15 crash records contained enough detail to map on a crash diagram, illustrated in Figure 11.

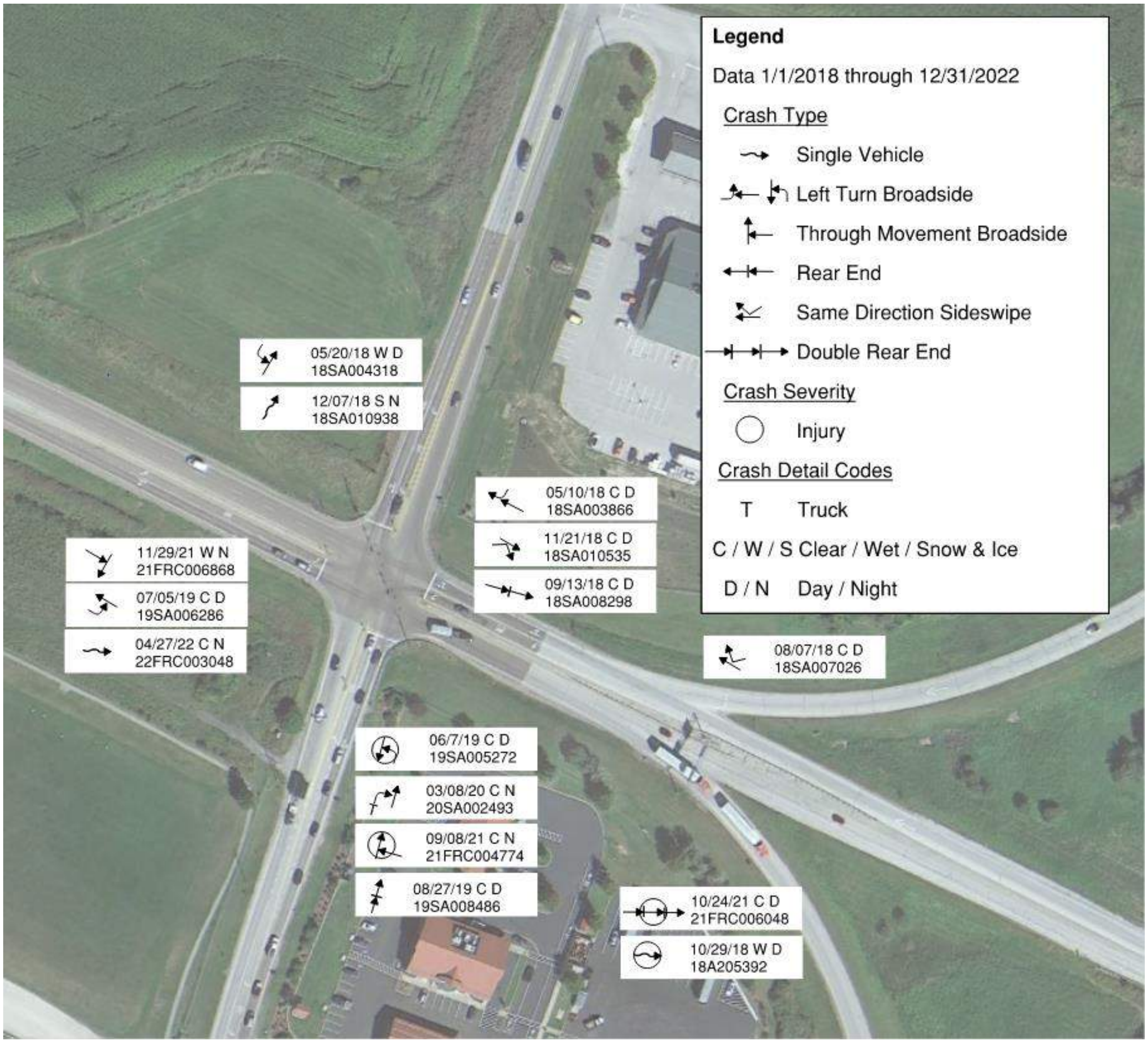
Of the 15 crashes:

- 4 resulted in injury
- 7 (47%, 2 injury) were turn related broadside crashes
- 3 (20%, 1 injury) were rear end crashes
- 3 (20%, 1 injury) were single vehicle crashes
- 2 (13%) were sideswipe crashes
- 5 (33%, 1 injury) occurred at night
- 4 (27%, 1 injury) occurred with wet, snowy, or icy road conditions

Potential crash mitigation opportunities include:

- Reduced congestion and improved traffic operations may reduce broadside and rear end crashes.
- Many of the turn-related broadside crashes may be addressed with construction of roundabout intersection control.
- Improved lighting may reduce the occurrence of crashes at night.
- Improved advanced lane control signs and adequate weaving distances may reduce the occurrence of sideswipe crashes.

FIGURE 11: CRASH DIAGRAM OF REPORTED CRASHES WITH DETAIL, 1 JANUARY 2018 THROUGH 31 DECEMBER 2022



Attachments

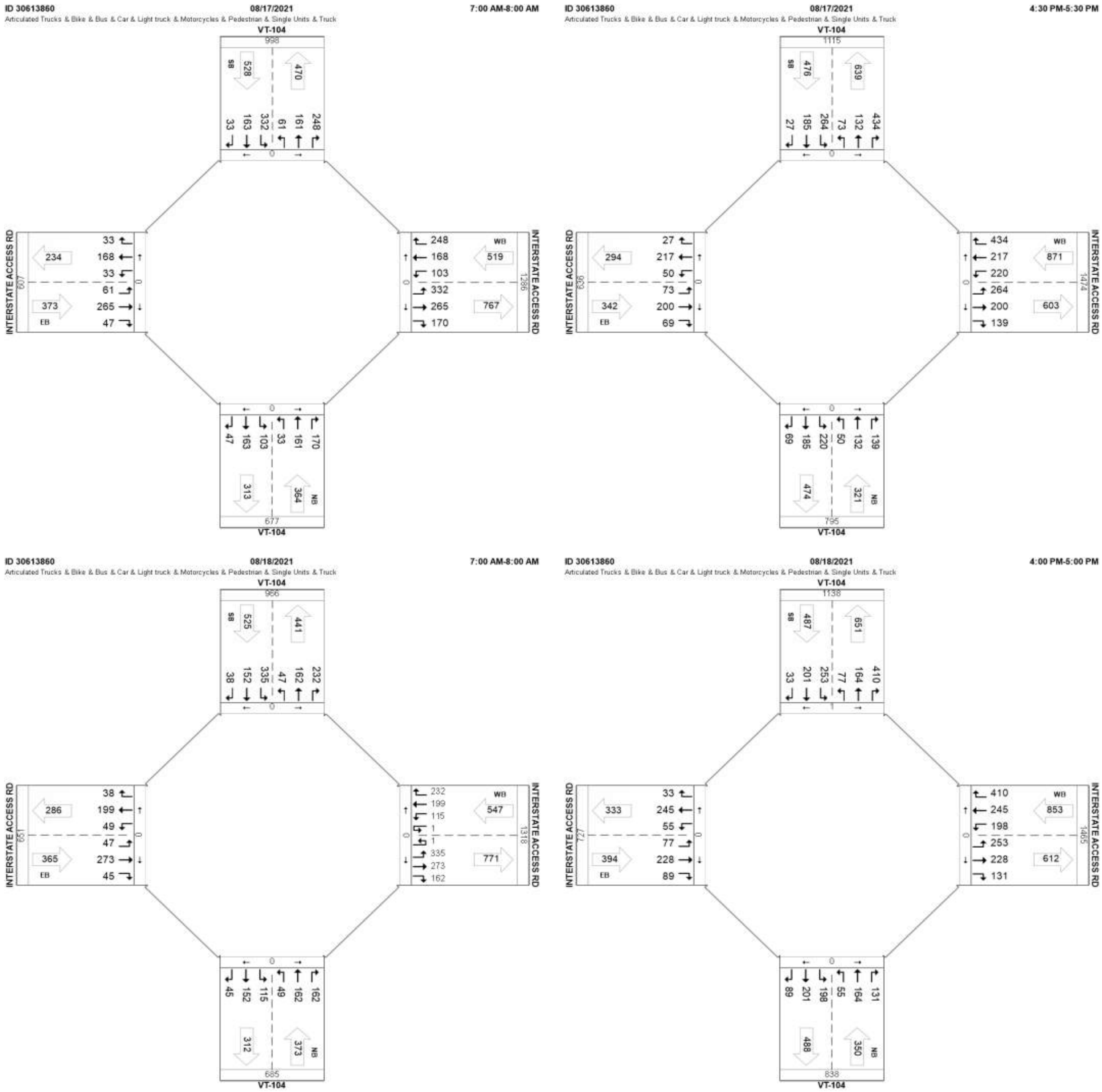
Attachment A – Design Hour Volume Calculations

Attachment B – Growth Projection Documentation

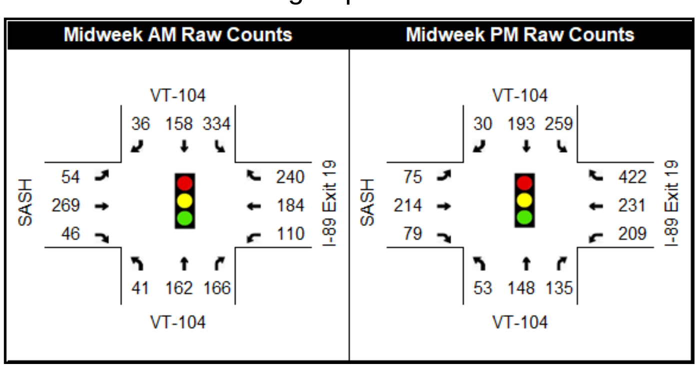
Attachment C – Synchro HCM Calculation Worksheets

Attachment D – SimTraffic Delay and Queuing Worksheets

Attachment E – Crash Diagram



Averaged peak hours:



WALL CONSULTANT GROUP

VT-104 & SASH 2023 Design Hour Volume

St. Albans STP 044-1(2)

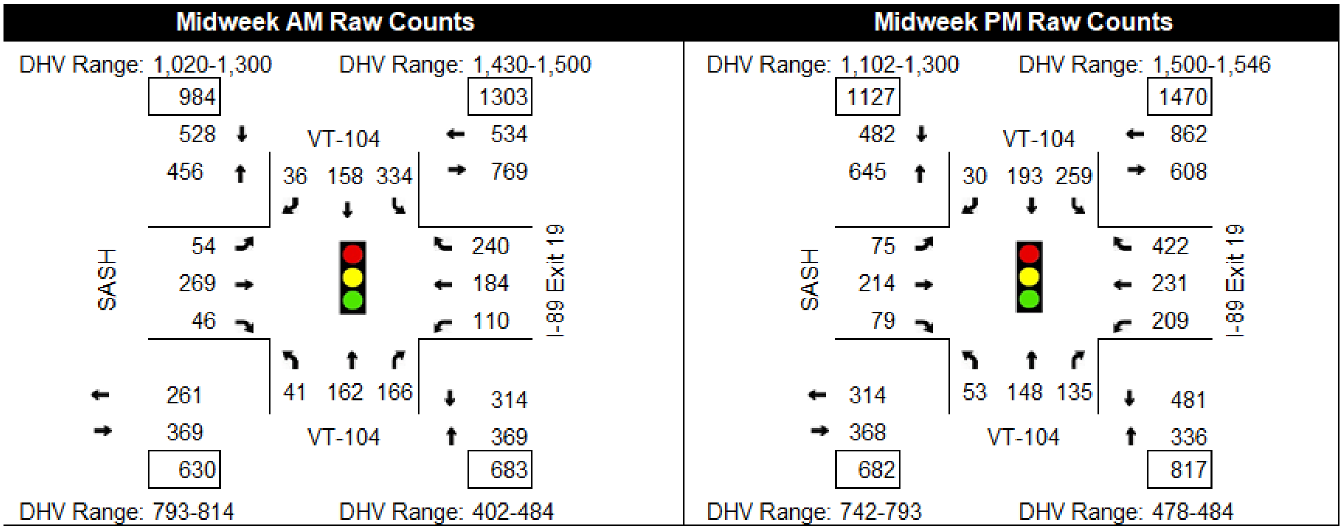
N

DATE: 03/13/2023

PROJECT: 22-226

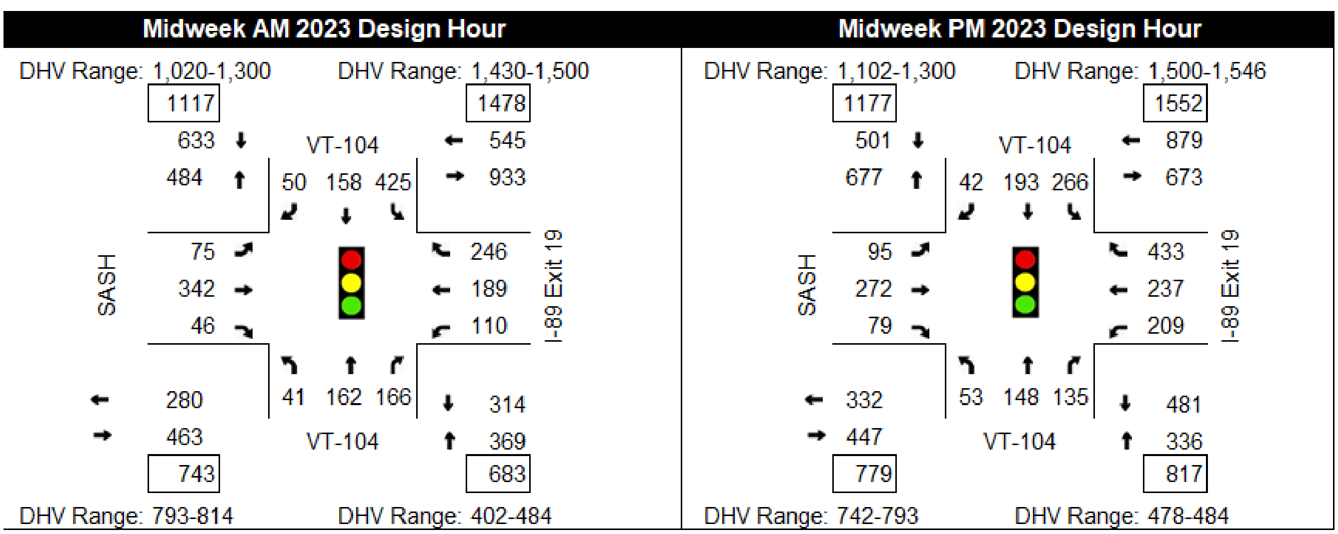
Figure A1

Averaged observed peak hours:



DHV Range from Traffic Analysis summary memo, Table 1. Range is determined by the highest observed hourly volume (in AM or PM period) from ATR counts and the predicted DHV based on the AADT and seasonal factor group (Redbook DHV Estimating Methods 3 and 2, respectively)

Adjusted peak hours:



Adjusted to fall reasonably within or near DHV ranges without significantly changing approach proportions

WALL CONSULTANT GROUP

VT-104 & SASH 2023 Design Hour Volume

St. Albans STP 044-1(2)

N

DATE: 03/13/2023

PROJECT: 22-226

Figure A2

AM

04/16/24 08:51 PM

Synchro Node		Raw Count Data	EB	WB	NB	SB		DHV & Annual Adjustments (1) to 2023	DHV & Annual Adjustments (2) to 2023	DHV & Annual Adjustments (3) to 2023	DHV & Annual Adjustments (4) to 2023
1	VT-104 & SASH / Exit 19	L	54	110	41	334					
	St Albans VT	T	269	184	162	158					
	08/18/21	R	46	240	166	36	1800				
	3rd Wednesday	Enter	369	534	369	528	1800				
		Exit	769	261	456	314	1800				
	averaged with:	% Trucks	6.5%	8.5%	4.5%	3.5%					
	VT-104 & SASH / Exit 19	Peds					PHF	1.39 *(From PM Peak)*	0.88 *(From PM Peak)*	1.27 *(From PM Peak)*	1.03 *(From PM Peak)*
	St Albans VT	Peak Hour									
	08/17/21										
	3rd Tuesday										

PM

04/16/24 08:51 PM

Synchro Node		Raw Count Data	EB	WB	NB	SB	
1	VT-104 & SASH / Exit 19	L	75	209	53	259	
	St Albans VT	T	214	231	148	193	
	08/18/21	R	79	422	135	30	2048
	3rd Wednesday	Enter	368	862	336	482	2048
		Exit	608	314	645	481	2048
	averaged with:	% Trucks	2.5%	3.0%	3.5%	3.5%	
	VT-104 & SASH / Exit 19	Peds					PHF
	St Albans VT	Peak Hour					0.92
	08/17/21						
	3rd Tuesday						

	DHV & Annual Adjustments (1) to 2023	DHV & Annual Adjustments (2) to 2023	DHV & Annual Adjustments (3) to 2023	DHV & Annual Adjustments (4) to 2023
Enter	SB Enter	NB Enter	EB Enter	WB Enter
Total DHV	1200	484	793	1500
Growth Rate	0.5%	0.5%	0.5%	0.5%
ATR Station	F198	F107	F195	n/a
DHV Year	2023	2023	2023	2023
Method				
Analysis Year	2023	2023	2023	2023
DHV	672	295	468	885
2023-2023 Growth	1.000	1.000	1.000	1.000
Corr. Count	482	336	368	862
DHV Adjustment	1.39	0.88	1.27	1.03
Total Adjustment	1.39	0.88	1.27	1.03

AM

04/16/24 08:51 PM

Synchro Node

1 VT-104 & SASH / Exit 19
St Albans VT
08/18/21
3rd Wednesday

averaged with:
VT-104 & SASH / Exit 19
St Albans VT
08/17/21
3rd Tuesday

DHV & Annual Adjustments (5) to

2023

1.00 *(From PM Peak)*

Apply Adjustments

1 = Apply Adjustment 1
2 = Apply Adjustment 2
3 = Apply Adjustment 3
4 = Apply Adjustment 4
5 = Apply Adjustment 5

	EB	WB	NB	SB
L	1	5	5	3
T	3	4	5	5
R	5	4	5	1

Adjusted Raw Counts

2023

	EB	WB	NB	SB	
L	75	110	41	425	
T	342	189	162	158	
R	46	246	166	50	2011
Enter	463	545	369	633	2011
Exit	933	280	484	314	2011

VT-104 North	1117	1200	
VT-104 South	683	484	OK - the count is further south than commerical
SASH West	743	793	
SASH East	1478	1500	

Balancing

2023

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

Balanced Adjusted Raw Counts

2023

	EB	WB	NB	SB	
L	75	110	41	425	
T	342	189	162	158	
R	46	246	166	50	2011
Enter	463	545	369	633	2011
Exit	933	280	484	314	2011

Grown Counts by Approach

2025

Rate:		Years	2	Factor
NB	1.7%			1.03
SB	0.7%			1.014
EB	1.2%			1.024
WB	0.7%			1.014

	EB	WB	NB	SB	
L	77	112	42	431	
T	350	192	168	160	
R	47	250	172	51	2051
Enter	475	553	382	642	2051
Exit	953	285	495	319	2051

ODVs

Dollar General

	Enter	Exit		
PM	9	4	13	
Pass-by	2	1		17%
Primary	7	3		

	EB	WB	NB	SB	
L	1			1	
T			1	0	
R		2		0	5
Enter	1	2	1	2	5
Exit	1	0	3	0	5

To / From VT-104

SB Enter	1.882	0.567	O'E
NB Exit	3.236	0.433	Severar
			Sc

PM

04/16/24 08:51 PM

Synchro Node

1 VT-104 & SASH / Exit 19
St Albans VT
08/18/21
3rd Wednesday

averaged with:
VT-104 & SASH / Exit 19
St Albans VT
08/17/21
3rd Tuesday

DHV & Annual Adjustments (5) to

2023

DHV Calculations			
		Growth Rate	0.5%
ATR Station		DHV Year	2023
Method		Analysis Year	2023
DHV		2023-2023 Growth	1.000
Corr. Count			
DHV Adjustment			
Total Adjustment	1.00		

Apply Adjustments

1 = Apply Adjustment 1
2 = Apply Adjustment 2
3 = Apply Adjustment 3
4 = Apply Adjustment 4
5 = Apply Adjustment 5

	EB	WB	NB	SB
L	3	5	5	4
T	3	4	5	5
R	5	4	5	1

Adjusted Raw Counts

2023

	EB	WB	NB	SB	
L	95	209	53	266	
T	272	237	148	193	
R	79	433	135	42	2163
Enter	447	879	336	501	2163
Exit	673	332	677	481	2163

VT-104 North	1177	1200	
VT-104 South	817	484	OK - the count is further south than commerical
SASH West	779	793	
SASH East	1552	1500	

Balancing

2023

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

Balanced Adjusted Raw Counts

2023

	EB	WB	NB	SB	
L	95	209	53	266	
T	272	237	148	193	
R	79	433	135	42	2163
Enter	447	879	336	501	2163
Exit	673	332	677	481	2163

Grown Counts by Approach

2025

Rate:		Years	2	Factor
NB	1.7%			1.03
SB	0.7%			1.014
EB	1.2%			1.024
WB	0.7%			1.014

	EB	WB	NB	SB	
L	98	212	55	270	
T	279	240	153	196	
R	81	439	140	42	2204
Enter	457	892	348	508	2204
Exit	688	338	690	489	2204

ODVs

Dollar General

	Enter	Exit		
PM	26	26	52	
Pass-by	4	4		17%
Primary	22	22		

	EB	WB	NB	SB	
L	2			5	
T			3	4	
R		8		1	22
Enter	2	8	3	9	22
Exit	5	1	12	4	22

To / From VT-104

SB Enter	9.148	0.424	O'E
NB Exit	12.43	0.576	Severar
			Sc

AM

04/16/24 08:51 PM

Synchro Node

1 VT-104 & SASH / Exit 19
St Albans VT
08/18/21
3rd Wednesday

averaged with:
VT-104 & SASH / Exit 19
St Albans VT
08/17/21
3rd Tuesday

ODVs

NW Corner

	Enter	Exit	
PM	235	235	470
Acres	Rate	Trips	
270	4.57	1234	

	EB	WB	NB	SB	
L	16			89	
T			34	33	
R		52		11	235
Enter	16	52	34	133	235
Exit	89	11	102	33	235

To / From VT-104
SB Enter 133.2
NB Exit 101.8

	Acres	AM	PM	Rate / acre AM	Rate / acre PM
rien Farms	103	514	733	4.99	7.117
ce Corners	36	264	313	7.333	8.694
uth Village	227	315	305	1.388	1.344
				4.57	5.718

No Build

2025

	EB	WB	NB	SB	
L	78	112	42	432	
T	350	192	169	161	
R	47	252	172	51	2056
Enter	475	555	383	644	2056
Exit	954	285	498	319	2056
Circ	704	289	860	346	

Trip Generation (Primary)

	Enter	Exit	
PM			0

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

Trip Generation (Pass by)

	Enter	Exit	
PM			0

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

Build

2025

	EB	WB	NB	SB	
L	78	112	42	432	
T	350	192	169	161	
R	47	252	172	51	2056
Enter	475	555	383	644	2056
Exit	954	285	498	319	2056

Grown Counts by Approach

2045

Med	Rate:		Years	20	Factor	Med	Low
1.7%	NB	3.0%			1.806	1.401	1.1
0.7%	SB	1.0%			1.22	1.15	1.1
1.2%	EB	2.0%			1.486	1.269	1.1
0.7%	WB	1.0%			1.22	1.15	1.1

	EB	WB	NB	SB	
L	98	128	59	495	
T	445	220	235	184	
R	60	287	241	59	2511
Enter	602	636	535	738	2511
Exit	1180	338	620	372	2511

Growth Rate Scenario - Change on Map
3

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

PM

04/16/24 08:51 PM

Synchro Node

1 VT-104 & SASH / Exit 19
St Albans VT
08/18/21
3rd Wednesday

averaged with:
VT-104 & SASH / Exit 19
St Albans VT
08/17/21
3rd Tuesday

ODVs

NW Corner

	Enter	Exit	
PM	291	291	582
Acres	Rate	Trips	
270	5.718	1544	

	EB	WB	NB	SB	
L	24			66	
T			37	48	
R		107		10	291
Enter	24	107	37	123	291
Exit	66	10	168	48	291

To / From VT-104
SB Enter 123.4
NB Exit 167.6

	Acres	AM	PM	Rate / acre AM	Rate / acre PM
rien Farms	103	514	733	4.99	7.117
ce Corners	36	264	313	7.333	8.694
uth Village	227	315	305	1.388	1.344
				4.57	5.718

No Build

2025

	EB	WB	NB	SB	
L	99	212	55	275	
T	279	240	156	199	
R	81	447	140	43	2226
Enter	459	900	350	517	2226
Exit	693	338	703	492	2226
Circ	686	310	653	507	

Trip Generation (Primary)

	Enter	Exit	
PM			0

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

Trip Generation (Pass by)

	Enter	Exit	
PM			0

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

Build

2025

	EB	WB	NB	SB	
L	99	212	55	275	
T	279	240	156	199	
R	81	447	140	43	2226
Enter	459	900	350	517	2226
Exit	693	338	703	492	2226

Grown Counts by Approach

2045

Med	Rate:	High	Years	20	Factor	Med	Low
1.7%	NB	3.0%			1.806	1.401	1.1
0.7%	SB	1.0%			1.22	1.15	1.1
1.2%	EB	2.0%			1.486	1.269	1.1
0.7%	WB	1.0%			1.22	1.15	1.1

	EB	WB	NB	SB	
L	124	244	77	310	
T	354	277	214	225	
R	103	505	196	49	2676
Enter	581	1025	487	584	2676
Exit	859	402	844	571	2676

Growth Rate Scenario - Change on Map
3

Adjusted Raw Counts

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

Balancing

	EB	WB	NB	SB	
L					
T					
R					0
Enter	0	0	0	0	0
Exit	0	0	0	0	0

AM

04/16/24 08:51 PM

Synchro Node

1 VT-104 & SASH / Exit 19
St Albans VT
08/18/21
3rd Wednesday

averaged with:
VT-104 & SASH / Exit 19
St Albans VT
08/17/21
3rd Tuesday

Balanced Adjusted Raw Counts — 2045

	EB	WB	NB	SB	
L	98	128	59	495	
T	445	220	235	184	
R	60	287	241	59	2511
Enter	602	636	535	738	2511
Exit	1180	338	620	372	2511

No Build — 2045

	EB	WB	NB	SB	
L	98	128	59	496	
T	445	220	236	185	
R	60	289	241	59	2516
Enter	603	637	536	740	2516
Exit	1182	338	623	373	2516

With NW Corner — 2045

	EB	WB	NB	SB	
L	114	128	59	586	
T	445	220	270	218	
R	60	341	241	69	2751
Enter	619	689	570	873	2751
Exit	1271	349	725	406	2751
Circ	932	444	1145	408	

PM

04/16/24 08:51 PM

Synchro Node

1 VT-104 & SASH / Exit 19
St Albans VT
08/18/21
3rd Wednesday

averaged with:
VT-104 & SASH / Exit 19
St Albans VT
08/17/21
3rd Tuesday

Balanced Adjusted Raw Counts — 2045

	EB	WB	NB	SB	
L	124	244	77	310	
T	354	277	214	225	
R	103	505	196	49	2676
Enter	581	1025	487	584	2676
Exit	859	402	844	571	2676

No Build — 2045

	EB	WB	NB	SB	
L	126	244	77	315	
T	354	277	217	229	
R	103	513	196	50	2698
Enter	582	1033	490	593	2698
Exit	864	403	856	575	2698
Circ	787	420	794	597	

With NW Corner — 2045

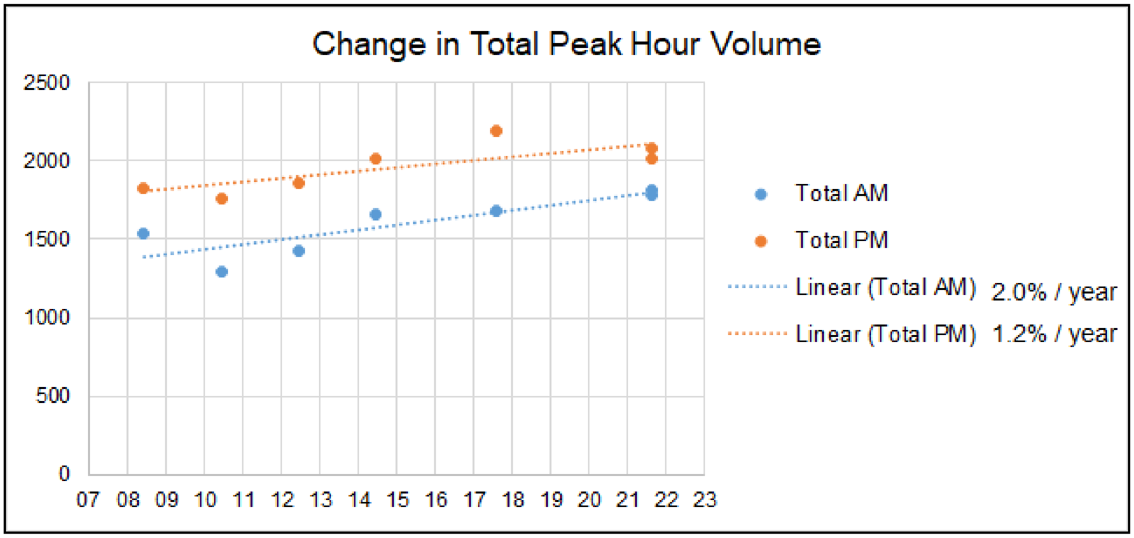
	EB	WB	NB	SB	
L	149	244	77	380	
T	354	277	254	276	
R	103	620	196	60	2989
Enter	606	1140	527	716	2989
Exit	930	413	1024	622	2989
Circ	900	481	884	597	

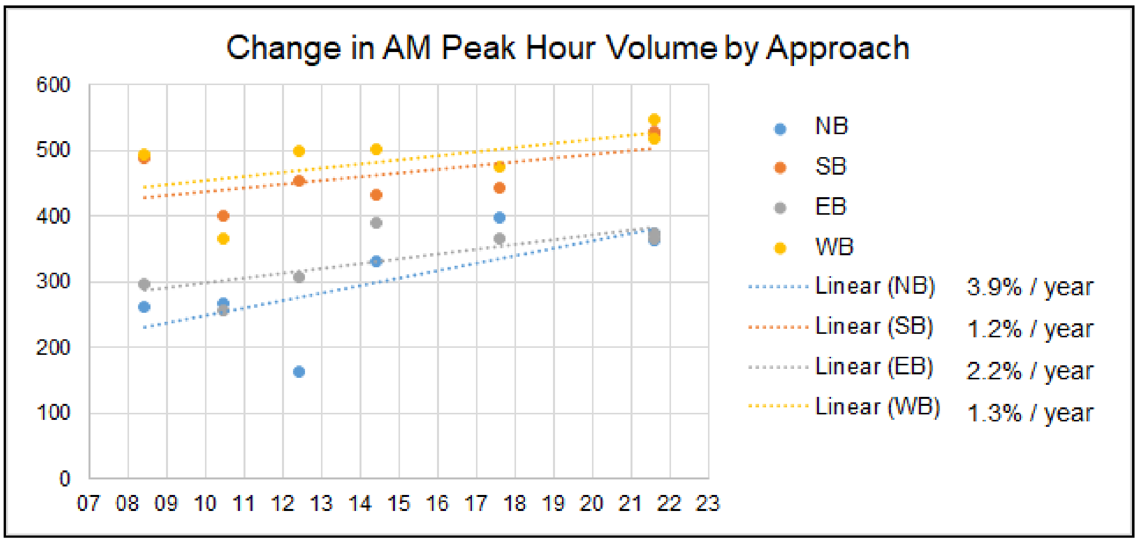
2009 Study — 2030 with ODVs

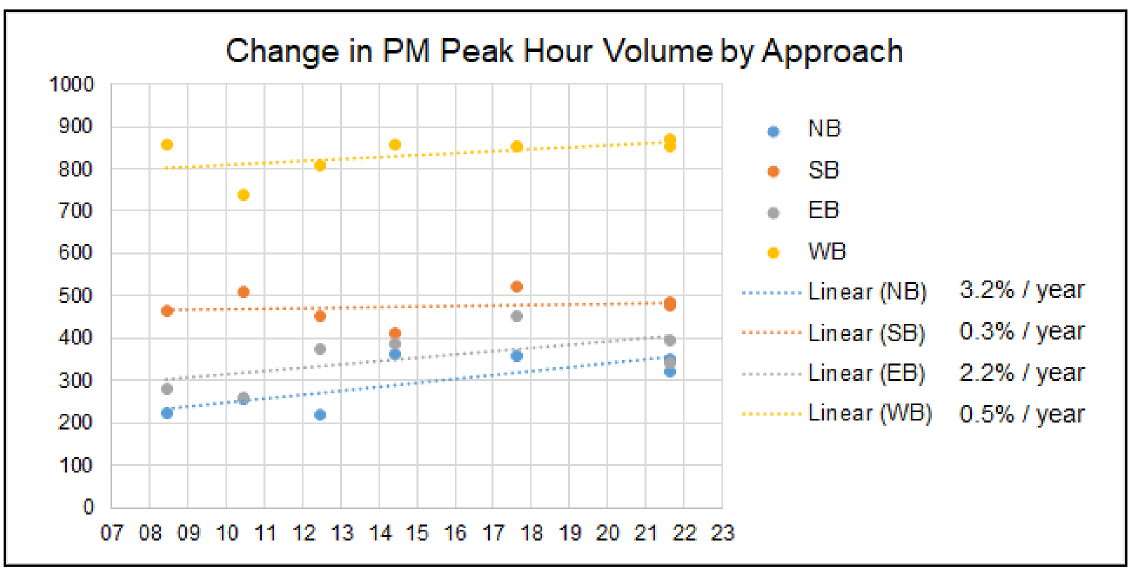
	EB	WB	NB	SB	
L	150	250	100	470	
T	210	340	260	290	
R	140	740	140	190	3280
Enter	500	1330	500	950	3280
Exit	820	630	1150	680	3280

Current Study vs 2009 Study — Planning Year

	EB	WB	NB	SB	
L	-1	-6	-23	-90	
T	144	-63	-6	-14	
R	-37	-120	56	-130	-291
Enter	106	-190	27	-234	-291
Exit	110	-217	-126	-58	-291







WALL CONSULTANT GROUP

VT-104 & SASH Historic Volume by Approach

St. Albans STP 044-1(2)

N

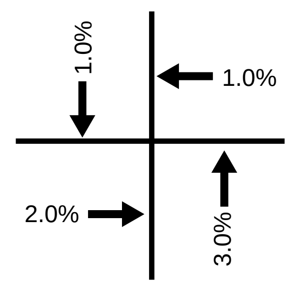
DATE: 03/13/2023

PROJECT: 22-226

Figure B1

	Approach Direction AM				Approach Direction PM				Total	
Date	NB	SB	EB	WB	NB	SB	EB	WB	AM	PM
6/19/2008	263	489	296	494	223	467	283	858	1542	1831
7/1/2010	266	401	257	367	255	509	260	739	1291	1763
6/21/2012	164	453	308	500	218	453	376	810	1425	1857
6/19/2014	330	433	390	502	363	410	389	856	1655	2018
8/17/2017	397	442	366	476	359	524	453	852	1681	2188
8/17/2021	364	528	373	519	321	476	342	871	1784	2010
8/18/2021	373	525	365	547	350	487	394	853	1810	2084
slope (m)	0.03	0.02	0.02	0.02	0.03	0.00	0.02	0.01	0.08	0.06
intercept (b)	-1007.12	-186.18	-489.16	-241.57	-761.48	331.56	-524.57	315.35	-1924.04	-639.14
6/19/2008	230.67	428.80	287.80	443.55	236.00	466.69	304.81	803.59	1390.82	1811.08
8/18/2021	380.89	503.43	382.09	526.69	357.05	483.08	405.46	862.84	1793.11	2108.43
Delta	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
g	3.9%	1.2%	2.2%	1.3%	3.2%	0.3%	2.2%	0.5%	1.9%	1.2%

Predicted Growth Rate by Approach: VT-104 & SASH



WALL CONSULTANT GROUP

VT-104 & SASH Historic Volume by Approach

St. Albans STP 044-1(2)

N

DATE: 03/13/2023

PROJECT: 22-226

Figure B2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	350	47	112	192	252	42	169	172	432	161	51
Future Volume (veh/h)	78	350	47	112	192	252	42	169	172	432	161	51
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	1796	1796	1796	1767	1767	1767	1826	1826	1826	1841	1841	1841
Adj Flow Rate, veh/h	78	350	47	112	192	252	42	169	172	432	161	51
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	7	7	7	9	9	9	5	5	5	4	4	4
Cap, veh/h	86	326	44	118	159	209	60	166	169	421	543	172
Arrive On Green	0.05	0.21	0.21	0.07	0.23	0.23	0.03	0.20	0.20	0.24	0.41	0.41
Sat Flow, veh/h	1711	1551	208	1682	693	910	1739	830	844	1753	1340	424
Grp Volume(v), veh/h	78	0	397	112	0	444	42	0	341	432	0	212
Grp Sat Flow(s),veh/h/ln	1711	0	1759	1682	0	1603	1739	0	1674	1753	0	1764
Q Serve(g_s), s	4.5	0.0	21.0	6.6	0.0	23.0	2.4	0.0	20.0	24.0	0.0	8.1
Cycle Q Clear(g_c), s	4.5	0.0	21.0	6.6	0.0	23.0	2.4	0.0	20.0	24.0	0.0	8.1
Prop In Lane	1.00		0.12	1.00		0.57	1.00		0.50	1.00		0.24
Lane Grp Cap(c), veh/h	86	0	369	118	0	369	60	0	335	421	0	716
V/C Ratio(X)	0.91	0.00	1.07	0.95	0.00	1.20	0.70	0.00	1.02	1.03	0.00	0.30
Avail Cap(c_a), veh/h	86	0	369	118	0	369	104	0	335	421	0	716
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	47.3	0.0	39.5	46.3	0.0	38.5	47.8	0.0	40.0	38.0	0.0	20.1
Incr Delay (d2), s/veh	67.5	0.0	68.2	66.9	0.0	115.0	5.4	0.0	54.0	50.9	0.0	0.2
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(50%),veh/ln	3.5	0.0	15.7	4.9	0.0	20.4	1.1	0.0	12.9	15.8	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.8	0.0	107.7	113.2	0.0	153.5	53.2	0.0	94.0	88.9	0.0	20.3
LnGrp LOS	F	A	F	F	A	F	D	A	F	F	A	C
Approach Vol, veh/h		475			556			383			644	
Approach Delay, s/veh		108.9			145.4			89.5			66.3	
Approach LOS		F			F			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.0	27.0	14.0	28.0	10.4	47.6	12.0	30.0
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	24.0	20.0	7.0	21.0	6.0	38.0	5.0	23.0
Max Q Clear Time (g_c+I1), s	26.0	22.0	8.6	23.0	4.4	10.1	6.5	25.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	101.8
HCM 6th LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	350	47	112	192	252	42	169	172	432	161	51
Future Volume (veh/h)	78	350	47	112	192	252	42	169	172	432	161	51
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	0.99		0.99	0.99		0.99
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	1796	1796	1796	1767	1767	1767	1826	1826	1826	1841	1841	1841
Adj Flow Rate, veh/h	78	350	47	112	192	252	42	169	172	432	161	51
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	7	7	7	9	9	9	5	5	5	4	4	4
Cap, veh/h	355	510	68	307	292	371	332	318	376	564	249	79
Arrive On Green	0.10	0.20	0.20	0.07	0.17	0.17	0.07	0.17	0.17	0.08	0.19	0.19
Sat Flow, veh/h	1711	2588	345	1682	1767	1479	1739	1826	1526	2349	1335	423
Grp Volume(v), veh/h	78	162	235	112	192	252	42	169	172	432	0	212
Grp Sat Flow(s),veh/h/ln	1711	1203	1730	1682	1767	1479	1739	1826	1526	1175	0	1758
Q Serve(g_s), s	0.0	7.4	7.5	0.0	6.0	4.1	0.0	5.0	1.4	0.9	0.0	6.6
Cycle Q Clear(g_c), s	0.0	7.4	7.5	0.0	6.0	4.1	0.0	5.0	1.4	0.9	0.0	6.6
Prop In Lane	1.00		0.20	1.00		1.00	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	355	237	341	307	292	371	332	318	376	564	0	328
V/C Ratio(X)	0.22	0.68	0.69	0.36	0.66	0.68	0.13	0.53	0.46	0.77	0.00	0.65
Avail Cap(c_a), veh/h	355	468	672	386	746	751	736	926	884	842	0	713
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.4	22.0	22.1	24.3	23.1	20.0	22.4	22.2	19.0	24.1	0.0	22.3
Incr Delay (d2), s/veh	0.1	3.4	2.5	0.3	2.5	2.2	0.1	1.4	0.9	1.1	0.0	2.1
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(50%),veh/ln	0.9	2.1	2.9	1.4	2.4	2.9	0.5	2.0	1.8	2.6	0.0	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.5	25.5	24.6	24.6	25.7	22.2	22.4	23.6	19.8	25.2	0.0	24.4
LnGrp LOS	C	C	C	C	C	C	C	C	B	C	A	C
Approach Vol, veh/h		475			556			383			644	
Approach Delay, s/veh		24.5			23.9			21.8			24.9	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	17.3	11.2	18.7	11.3	18.0	13.1	16.8
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	12.0	30.0	7.0	23.0	18.0	24.0	5.0	25.0
Max Q Clear Time (g_c+I1), s	2.9	7.0	2.0	9.5	2.0	8.6	2.0	8.0
Green Ext Time (p_c), s	0.8	1.2	0.1	1.4	0.0	0.7	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	24.0
HCM 6th LOS	C

Intersection								
Intersection Delay, s/veh	9.4							
Intersection LOS	A							

Approach	EB		WB		NB		SB	
Entry Lanes		2		2		2		2
Conflicting Circle Lanes		2		1		1		1
Adj Approach Flow, veh/h		475		556		383		644
Demand Flow Rate, veh/h		485		567		390		657
Vehicles Circulating, veh/h		719		295		878		353
Vehicles Exiting, veh/h		291		973		326		509
Ped Vol Crossing Leg, #/h		8		0		4		4
Ped Cap Adj		0.997		1.000		1.000		0.997
Approach Delay, s/veh		15.8		5.9		9.9		7.5
Approach LOS		C		A		A		A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	L	TR
Assumed Moves	LT	R	LT	R	LT	R	L	TR
RT Channelized								
Lane Util	0.901	0.099	0.547	0.453	0.551	0.449	0.671	0.329
Follow-Up Headway, s	2.667	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.544	4.544	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1420	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	437	48	310	257	215	175	441	216
Cap Entry Lane, veh/h	697	771	1086	1086	639	639	1030	1030
Entry HV Adj Factor	0.979	0.979	0.981	0.981	0.980	0.983	0.980	0.980
Flow Entry, veh/h	428	47	304	252	211	172	432	212
Cap Entry, veh/h	681	753	1065	1065	625	628	1006	1007
V/C Ratio	0.629	0.062	0.286	0.237	0.337	0.274	0.430	0.210
Control Delay, s/veh	17.0	5.4	6.2	5.6	10.3	9.3	8.4	5.6
LOS	C	A	A	A	B	A	A	A
95th %tile Queue, veh	4	0	1	1	1	1	2	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	279	81	212	240	447	55	156	140	275	199	43
Future Volume (veh/h)	99	279	81	212	240	447	55	156	140	275	199	43
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	1856	1856	1856	1856	1856	1856	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	99	279	81	212	240	447	55	156	140	275	199	43
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	4	4	4	4	4	4
Cap, veh/h	112	389	113	241	206	383	71	154	139	271	421	91
Arrive On Green	0.06	0.28	0.28	0.14	0.35	0.35	0.04	0.17	0.17	0.15	0.29	0.29
Sat Flow, veh/h	1767	1382	401	1767	580	1081	1753	894	802	1753	1467	317
Grp Volume(v), veh/h	99	0	360	212	0	687	55	0	296	275	0	242
Grp Sat Flow(s),veh/h/ln	1767	0	1783	1767	0	1661	1753	0	1696	1753	0	1784
Q Serve(g_s), s	6.1	0.0	20.0	12.9	0.0	39.0	3.4	0.0	19.0	17.0	0.0	12.3
Cycle Q Clear(g_c), s	6.1	0.0	20.0	12.9	0.0	39.0	3.4	0.0	19.0	17.0	0.0	12.3
Prop In Lane	1.00		0.22	1.00		0.65	1.00		0.47	1.00		0.18
Lane Grp Cap(c), veh/h	112	0	502	241	0	589	71	0	293	271	0	512
V/C Ratio(X)	0.88	0.00	0.72	0.88	0.00	1.17	0.78	0.00	1.01	1.02	0.00	0.47
Avail Cap(c_a), veh/h	112	0	502	273	0	589	143	0	293	271	0	512
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.1	0.0	35.6	46.6	0.0	35.5	52.3	0.0	45.5	46.5	0.0	32.3
Incr Delay (d2), s/veh	48.4	0.0	4.9	22.5	0.0	92.3	6.8	0.0	55.2	58.6	0.0	0.7
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(50%),veh/ln	4.2	0.0	9.1	7.1	0.0	30.0	1.6	0.0	12.2	11.6	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	99.5	0.0	40.4	69.1	0.0	127.8	59.1	0.0	100.7	105.1	0.0	33.0
LnGrp LOS	F	A	D	E	A	F	E	A	F	F	A	C
Approach Vol, veh/h		459			899			351			517	
Approach Delay, s/veh		53.1			114.0			94.2			71.3	
Approach LOS		D			F			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	26.0	22.0	38.0	11.4	38.6	14.0	46.0
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	17.0	19.0	17.0	29.0	9.0	27.0	7.0	39.0
Max Q Clear Time (g_c+I1), s	19.0	21.0	14.9	22.0	5.4	14.3	8.1	41.0
Green Ext Time (p_c), s	0.0	0.0	0.1	0.9	0.0	0.8	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	88.4
HCM 6th LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	279	81	212	240	447	55	156	140	275	199	43
Future Volume (veh/h)	99	279	81	212	240	447	55	156	140	275	199	43
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	0.99		0.99	0.99		0.99
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	1856	1856	1856	1856	1856	1856	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	99	279	81	212	240	447	55	156	140	275	199	43
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	4	4	4	4	4	4
Cap, veh/h	333	414	118	422	469	525	275	296	463	539	286	62
Arrive On Green	0.06	0.18	0.18	0.14	0.25	0.25	0.05	0.16	0.16	0.08	0.20	0.20
Sat Flow, veh/h	1767	2310	661	1767	1856	1560	1753	1841	1537	2349	1463	316
Grp Volume(v), veh/h	99	148	212	212	240	447	55	156	140	275	0	242
Grp Sat Flow(s),veh/h/ln	1767	1243	1728	1767	1856	1560	1753	1841	1537	1175	0	1779
Q Serve(g_s), s	0.0	7.1	7.3	0.2	7.1	11.6	0.0	5.0	0.0	0.0	0.0	8.1
Cycle Q Clear(g_c), s	0.0	7.1	7.3	0.2	7.1	11.6	0.0	5.0	0.0	0.0	0.0	8.1
Prop In Lane	1.00		0.38	1.00		1.00	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	333	223	310	422	469	525	275	296	463	539	0	348
V/C Ratio(X)	0.30	0.66	0.68	0.50	0.51	0.85	0.20	0.53	0.30	0.51	0.00	0.70
Avail Cap(c_a), veh/h	384	447	622	422	726	741	683	778	865	858	0	640
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.2	24.4	24.5	23.1	20.5	19.7	26.2	24.6	17.2	25.7	0.0	23.9
Incr Delay (d2), s/veh	0.2	3.4	2.7	0.4	0.9	6.7	0.1	1.4	0.4	0.3	0.0	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	2.1	2.9	2.6	2.8	3.9	0.7	2.1	1.4	1.8	0.0	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.4	27.8	27.2	23.5	21.4	26.4	26.3	26.0	17.6	26.0	0.0	26.4
LnGrp LOS	C	C	C	C	C	C	C	C	B	C	A	C
Approach Vol, veh/h		459			899			351			517	
Approach Delay, s/veh		26.6			24.4			22.7			26.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.3	17.3	15.8	18.5	10.1	19.5	11.1	23.1
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	14.0	27.0	8.0	23.0	18.0	23.0	6.0	25.0
Max Q Clear Time (g_c+I1), s	2.0	7.0	2.2	9.3	2.0	10.1	2.0	13.6
Green Ext Time (p_c), s	0.5	1.0	0.2	1.3	0.1	0.8	0.0	2.5

Intersection Summary	
HCM 6th Ctrl Delay	25.0
HCM 6th LOS	C

Intersection								
Intersection Delay, s/veh	8.8							
Intersection LOS	A							

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	1	1	1
Adj Approach Flow, veh/h	459	899	351	517
Demand Flow Rate, veh/h	469	917	358	528
Vehicles Circulating, veh/h	699	316	666	517
Vehicles Exiting, veh/h	345	709	502	716
Ped Vol Crossing Leg, #/h	8	0	4	4
Ped Cap Adj	0.997	1.000	0.998	0.998
Approach Delay, s/veh	12.5	8.2	7.5	7.4
Approach LOS	B	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	L	TR
Assumed Moves	LT	R	LT	R	LT	R	L	TR
RT Channelized								
Lane Util	0.823	0.177	0.503	0.497	0.601	0.399	0.532	0.468
Follow-Up Headway, s	2.667	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.544	4.544	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1420	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	386	83	461	456	215	143	281	247
Cap Entry Lane, veh/h	710	784	1065	1065	775	775	887	887
Entry HV Adj Factor	0.980	0.976	0.981	0.980	0.981	0.979	0.979	0.980
Flow Entry, veh/h	378	81	452	447	211	140	275	242
Cap Entry, veh/h	694	763	1045	1044	758	757	866	867
V/C Ratio	0.546	0.106	0.433	0.428	0.278	0.185	0.318	0.279
Control Delay, s/veh	14.0	5.8	8.2	8.1	8.0	6.8	7.7	7.1
LOS	B	A	A	A	A	A	A	A
95th %tile Queue, veh	3	0	2	2	1	1	1	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	445	60	128	220	341	59	270	241	586	218	69
Future Volume (veh/h)	114	445	60	128	220	341	59	270	241	586	218	69
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	1796	1796	1796	1767	1767	1767	1826	1826	1826	1841	1841	1841
Adj Flow Rate, veh/h	114	445	60	128	220	341	59	270	241	586	218	69
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	7	7	7	9	9	9	5	5	5	4	4	4
Cap, veh/h	91	372	50	101	154	239	75	219	196	467	630	199
Arrive On Green	0.05	0.24	0.24	0.06	0.25	0.25	0.04	0.25	0.25	0.27	0.47	0.47
Sat Flow, veh/h	1711	1550	209	1682	624	968	1739	889	794	1753	1340	424
Grp Volume(v), veh/h	114	0	505	128	0	561	59	0	511	586	0	287
Grp Sat Flow(s),veh/h/ln	1711	0	1759	1682	0	1592	1739	0	1683	1753	0	1764
Q Serve(g_s), s	8.0	0.0	36.0	9.0	0.0	37.0	5.0	0.0	37.0	40.0	0.0	15.4
Cycle Q Clear(g_c), s	8.0	0.0	36.0	9.0	0.0	37.0	5.0	0.0	37.0	40.0	0.0	15.4
Prop In Lane	1.00		0.12	1.00		0.61	1.00		0.47	1.00		0.24
Lane Grp Cap(c), veh/h	91	0	422	101	0	393	75	0	415	467	0	830
V/C Ratio(X)	1.25	0.00	1.20	1.27	0.00	1.43	0.79	0.00	1.23	1.25	0.00	0.35
Avail Cap(c_a), veh/h	91	0	422	101	0	393	116	0	415	467	0	830
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	71.0	0.0	57.0	70.5	0.0	56.5	71.1	0.0	56.5	55.0	0.0	25.1
Incr Delay (d2), s/veh	175.5	0.0	109.4	177.8	0.0	206.9	8.0	0.0	123.4	130.7	0.0	0.2
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(50%),veh/ln	7.9	0.0	28.6	8.8	0.0	37.2	2.4	0.0	29.7	34.3	0.0	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	246.5	0.0	166.4	248.3	0.0	263.4	79.1	0.0	179.9	185.7	0.0	25.4
LnGrp LOS	F	A	F	F	A	F	E	A	F	F	A	C
Approach Vol, veh/h		619			689			570			873	
Approach Delay, s/veh		181.1			260.6			169.4			133.0	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	47.0	44.0	16.0	43.0	13.5	77.5	15.0	44.0
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	40.0	37.0	9.0	36.0	10.0	67.0	8.0	37.0
Max Q Clear Time (g_c+I1), s	42.0	39.0	11.0	38.0	7.0	17.4	10.0	39.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	183.3
HCM 6th LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	114	445	60	128	220	341	59	270	241	586	218	69
Future Volume (veh/h)	114	445	60	128	220	341	59	270	241	586	218	69
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	0.99		0.99
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	1796	1796	1796	1767	1767	1767	1826	1826	1826	1841	1841	1841
Adj Flow Rate, veh/h	114	445	60	128	220	341	59	270	241	586	218	69
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	7	7	7	9	9	9	5	5	5	4	4	4
Cap, veh/h	313	557	75	235	300	499	431	375	406	649	277	88
Arrive On Green	0.11	0.22	0.22	0.06	0.17	0.17	0.16	0.21	0.21	0.17	0.21	0.21
Sat Flow, veh/h	1711	2586	347	1682	1767	1479	1739	1826	1529	2349	1336	423
Grp Volume(v), veh/h	114	206	299	128	220	341	59	270	241	586	0	287
Grp Sat Flow(s),veh/h/ln	1711	1203	1730	1682	1767	1479	1739	1826	1529	1175	0	1759
Q Serve(g_s), s	0.0	12.8	12.9	0.0	9.3	2.5	0.0	10.9	6.1	10.2	0.0	12.2
Cycle Q Clear(g_c), s	0.0	12.8	12.9	0.0	9.3	2.5	0.0	10.9	6.1	10.2	0.0	12.2
Prop In Lane	1.00		0.20	1.00		1.00	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	313	259	373	235	300	499	431	375	406	649	0	364
V/C Ratio(X)	0.36	0.79	0.80	0.55	0.73	0.68	0.14	0.72	0.59	0.90	0.00	0.79
Avail Cap(c_a), veh/h	313	366	525	262	537	697	543	578	576	766	0	534
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.9	29.3	29.4	34.3	31.1	22.6	25.7	29.3	25.3	29.2	0.0	29.7
Incr Delay (d2), s/veh	0.3	7.8	5.9	0.7	3.5	1.7	0.1	2.6	1.4	11.6	0.0	4.8
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(50%),veh/ln	1.9	4.0	5.6	2.3	4.0	5.2	0.9	4.7	3.8	5.9	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.1	37.2	35.3	35.0	34.6	24.3	25.8	31.9	26.7	40.7	0.0	34.5
LnGrp LOS	C	D	D	C	C	C	C	C	C	D	A	C
Approach Vol, veh/h		619			689			570			873	
Approach Delay, s/veh		35.2			29.6			29.1			38.7	
Approach LOS		D			C			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.1	23.2	11.7	24.0	19.9	23.4	15.3	20.4
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	17.0	25.0	6.0	24.0	18.0	24.0	6.0	24.0
Max Q Clear Time (g_c+I1), s	12.2	12.9	2.0	14.9	2.0	14.2	2.0	11.3
Green Ext Time (p_c), s	0.8	1.6	0.1	1.5	0.1	0.8	0.1	2.1

Intersection Summary	
HCM 6th Ctrl Delay	33.6
HCM 6th LOS	C

Intersection								
Intersection Delay, s/veh	24.2							
Intersection LOS	C							

Approach	EB		WB		NB		SB	
Entry Lanes		2		2		2		2
Conflicting Circle Lanes		2		1		1		1
Adj Approach Flow, veh/h		619		689		570		873
Demand Flow Rate, veh/h		631		703		581		890
Vehicles Circulating, veh/h		951		451		1168		415
Vehicles Exiting, veh/h		354		1298		414		739
Ped Vol Crossing Leg, #/h		8		0		4		4
Ped Cap Adj		1.000		1.000		1.000		0.997
Approach Delay, s/veh		63.0		8.1		22.0		10.8
Approach LOS		F		A		C		B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	L	TR
Assumed Moves	LT	R	LT	R	LT	R	L	TR
RT Channelized								
Lane Util	0.903	0.097	0.505	0.495	0.577	0.423	0.672	0.328
Follow-Up Headway, s	2.667	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.544	4.544	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1420	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	570	61	355	348	335	246	598	292
Cap Entry Lane, veh/h	563	633	942	942	491	491	973	973
Entry HV Adj Factor	0.981	0.984	0.979	0.980	0.981	0.980	0.980	0.982
Flow Entry, veh/h	559	60	348	341	329	241	586	287
Cap Entry, veh/h	552	622	922	923	481	481	951	953
V/C Ratio	1.013	0.096	0.377	0.369	0.683	0.502	0.616	0.301
Control Delay, s/veh	69.0	6.9	8.1	8.0	25.5	17.3	12.7	6.9
LOS	F	A	A	A	D	C	B	A
95th %tile Queue, veh	15	0	2	2	5	3	4	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	354	103	244	277	620	77	254	196	380	276	60
Future Volume (veh/h)	149	354	103	244	277	620	77	254	196	380	276	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	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	1856	1856	1856	1856	1856	1856	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	149	354	103	244	277	620	77	254	196	380	276	60
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	4	4	4	4	4	4
Cap, veh/h	118	405	118	259	190	426	96	206	159	280	467	102
Arrive On Green	0.07	0.29	0.29	0.15	0.37	0.37	0.05	0.21	0.21	0.16	0.32	0.32
Sat Flow, veh/h	1767	1379	401	1767	510	1141	1753	963	743	1753	1465	318
Grp Volume(v), veh/h	149	0	457	244	0	897	77	0	450	380	0	336
Grp Sat Flow(s),veh/h/ln	1767	0	1781	1767	0	1650	1753	0	1707	1753	0	1783
Q Serve(g_s), s	10.0	0.0	36.6	20.5	0.0	56.0	6.5	0.0	32.0	24.0	0.0	23.7
Cycle Q Clear(g_c), s	10.0	0.0	36.6	20.5	0.0	56.0	6.5	0.0	32.0	24.0	0.0	23.7
Prop In Lane	1.00		0.23	1.00		0.69	1.00		0.44	1.00		0.18
Lane Grp Cap(c), veh/h	118	0	522	259	0	616	96	0	364	280	0	569
V/C Ratio(X)	1.26	0.00	0.87	0.94	0.00	1.46	0.81	0.00	1.24	1.35	0.00	0.59
Avail Cap(c_a), veh/h	118	0	522	259	0	616	105	0	364	280	0	569
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	70.0	0.0	50.4	63.4	0.0	47.0	70.1	0.0	59.0	63.0	0.0	42.9
Incr Delay (d2), s/veh	170.2	0.0	15.2	39.7	0.0	214.1	29.6	0.0	127.6	181.2	0.0	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(50%),veh/ln	10.1	0.0	18.3	12.0	0.0	59.0	3.7	0.0	26.5	24.7	0.0	10.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	240.2	0.0	65.6	103.1	0.0	261.1	99.7	0.0	186.6	244.2	0.0	44.5
LnGrp LOS	F	A	E	F	A	F	F	A	F	F	A	D
Approach Vol, veh/h		606			1141			527			716	
Approach Delay, s/veh		108.5			227.3			173.9			150.5	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.0	39.0	29.0	51.0	15.2	54.8	17.0	63.0
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	24.0	32.0	22.0	44.0	9.0	47.0	10.0	56.0
Max Q Clear Time (g_c+I1), s	26.0	34.0	22.5	38.6	8.5	25.7	12.0	58.0
Green Ext Time (p_c), s	0.0	0.0	0.0	1.0	0.0	1.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	175.4
HCM 6th LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	354	103	244	277	620	77	254	196	380	276	60
Future Volume (veh/h)	149	354	103	244	277	620	77	254	196	380	276	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	0.99		0.99
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	1856	1856	1856	1856	1856	1856	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	149	354	103	244	277	620	77	254	196	380	276	60
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	4	4	4	4	4	4
Cap, veh/h	304	462	133	407	532	585	242	365	305	479	341	74
Arrive On Green	0.06	0.20	0.20	0.15	0.29	0.29	0.05	0.20	0.20	0.09	0.23	0.23
Sat Flow, veh/h	1767	2307	664	1767	1856	1562	1753	1841	1541	2349	1462	318
Grp Volume(v), veh/h	149	189	268	244	277	620	77	254	196	380	0	336
Grp Sat Flow(s),veh/h/ln	1767	1243	1728	1767	1856	1562	1753	1841	1541	1175	0	1780
Q Serve(g_s), s	0.0	11.0	11.3	3.2	9.6	22.0	0.0	9.8	9.0	2.8	0.0	13.7
Cycle Q Clear(g_c), s	0.0	11.0	11.3	3.2	9.6	22.0	0.0	9.8	9.0	2.8	0.0	13.7
Prop In Lane	1.00		0.38	1.00		1.00	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	304	249	346	407	532	585	242	365	305	479	0	415
V/C Ratio(X)	0.49	0.76	0.77	0.60	0.52	1.06	0.32	0.70	0.64	0.79	0.00	0.81
Avail Cap(c_a), veh/h	332	373	518	407	532	585	264	624	522	519	0	673
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.6	28.9	29.0	27.8	22.9	24.0	32.9	28.6	28.3	31.6	0.0	27.8
Incr Delay (d2), s/veh	0.5	4.9	4.1	1.7	0.9	53.8	0.3	2.4	2.3	6.8	0.0	3.8
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(50%),veh/ln	2.5	3.4	4.7	3.9	4.0	15.2	1.3	4.3	3.3	3.5	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.0	33.8	33.1	29.5	23.8	77.8	33.2	31.0	30.5	38.4	0.0	31.7
LnGrp LOS	C	C	C	C	C	F	C	C	C	D	A	C
Approach Vol, veh/h		606			1141			527			716	
Approach Delay, s/veh		32.6			54.3			31.1			35.2	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.7	22.2	18.4	22.4	11.0	24.9	11.8	29.0				
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0				
Max Green Setting (Gmax), s	8.0	26.0	5.0	23.0	5.0	29.0	6.0	22.0				
Max Q Clear Time (g_c+I1), s	4.8	11.8	5.2	13.3	2.0	15.7	2.0	24.0				
Green Ext Time (p_c), s	0.4	1.5	0.0	1.4	0.0	1.2	0.1	0.0				

Intersection Summary			
HCM 6th Ctrl Delay			41.3
HCM 6th LOS			D

Intersection	
Intersection Delay, s/veh	17.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	1	1	1
Adj Approach Flow, veh/h	606	1141	527	716
Demand Flow Rate, veh/h	618	1164	538	731
Vehicles Circulating, veh/h	919	490	901	611
Vehicles Exiting, veh/h	423	949	636	1043
Ped Vol Crossing Leg, #/h	8	0	4	4
Ped Cap Adj	1.000	1.000	1.000	0.998
Approach Delay, s/veh	35.6	14.5	13.4	10.5
Approach LOS	E	B	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	R	L	TR
Assumed Moves	LT	R	LT	R	LT	R	L	TR
RT Channelized								
Lane Util	0.830	0.170	0.457	0.543	0.628	0.372	0.531	0.469
Follow-Up Headway, s	2.667	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.544	4.544	4.544	4.544	4.544	4.544
A (Intercept)	1350	1420	1420	1420	1420	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4	9.101e-4
Entry Flow, veh/h	513	105	532	632	338	200	388	343
Cap Entry Lane, veh/h	580	650	909	909	625	625	814	814
Entry HV Adj Factor	0.980	0.981	0.980	0.981	0.979	0.980	0.979	0.981
Flow Entry, veh/h	503	103	521	620	331	196	380	336
Cap Entry, veh/h	568	638	891	892	612	613	796	797
V/C Ratio	0.885	0.162	0.585	0.695	0.540	0.320	0.477	0.422
Control Delay, s/veh	41.4	7.5	12.5	16.2	15.3	10.2	11.0	9.9
LOS	E	A	B	C	C	B	B	A
95th %tile Queue, veh	10	1	4	6	3	1	3	2

3: Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.1	0.6	0.3	0.7	1.7
Denied Del/Veh (s)	0.7	2.8	2.2	2.7	2.2
Total Delay (hr)	5.6	4.9	4.0	7.7	22.2
Total Del/Veh (s)	31.8	23.9	26.1	31.8	28.6

Total Network Performance

Denied Delay (hr)	1.7
Denied Del/Veh (s)	2.2
Total Delay (hr)	24.1
Total Del/Veh (s)	30.9

Intersection: 3:

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	R	L	T	R	L	L	TR
Maximum Queue (ft)	150	221	219	180	257	226	72	273	169	246	290	259
Average Queue (ft)	67	138	122	84	129	85	27	152	74	152	194	114
95th Queue (ft)	125	202	199	152	222	167	59	240	139	233	273	212
Link Distance (ft)		1214	1214		920			1158				1130
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	230			500		500	320		320	500	500	
Storage Blk Time (%)		0										
Queuing Penalty (veh)		0										

Network Summary

Network wide Queuing Penalty: 0

3: Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.9	0.3	465.3	366.6	212.7
Total Del/Veh (s)	81.7	5.8	381.1	221.5	147.9

Total Network Performance

Denied Del/Veh (s)	212.7
Total Del/Veh (s)	150.1

Intersection: 3:

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	LT	R	L	TR
Maximum Queue (ft)	865	410	119	71	1188	400	600	1159
Average Queue (ft)	426	183	40	27	977	322	584	1029
95th Queue (ft)	781	511	86	62	1546	568	670	1463
Link Distance (ft)	1185		905	905	1137			1108
Upstream Blk Time (%)					74			78
Queuing Penalty (veh)					0			0
Storage Bay Dist (ft)		230				300	400	
Storage Blk Time (%)	67				87		93	35
Queuing Penalty (veh)	40				210		267	205

Network Summary

Network wide Queuing Penalty: 723

3: Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.2	1.0	0.3	0.4	2.0
Denied Del/Veh (s)	0.9	3.3	2.2	2.3	2.4
Total Delay (hr)	5.0	12.1	3.4	5.7	26.1
Total Del/Veh (s)	28.5	37.6	22.9	29.6	31.3

Total Network Performance

Denied Delay (hr)	2.0
Denied Del/Veh (s)	2.4
Total Delay (hr)	28.1
Total Del/Veh (s)	33.4

Intersection: 3:

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	R	L	T	R	L	L	TR
Maximum Queue (ft)	155	199	174	326	357	501	107	245	116	211	245	286
Average Queue (ft)	81	110	93	177	138	220	42	127	54	82	139	137
95th Queue (ft)	139	172	159	304	268	425	85	212	93	180	208	234
Link Distance (ft)		1214	1214		920			1158				1130
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	230			500		500	320		320	500	500	
Storage Blk Time (%)		0			0	1						
Queuing Penalty (veh)		0			0	6						

Network Summary

Network wide Queuing Penalty: 7

3: Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	473.7	45.7	15.3	2.4	119.8
Total Del/Veh (s)	380.1	60.2	133.9	56.6	123.7

Total Network Performance

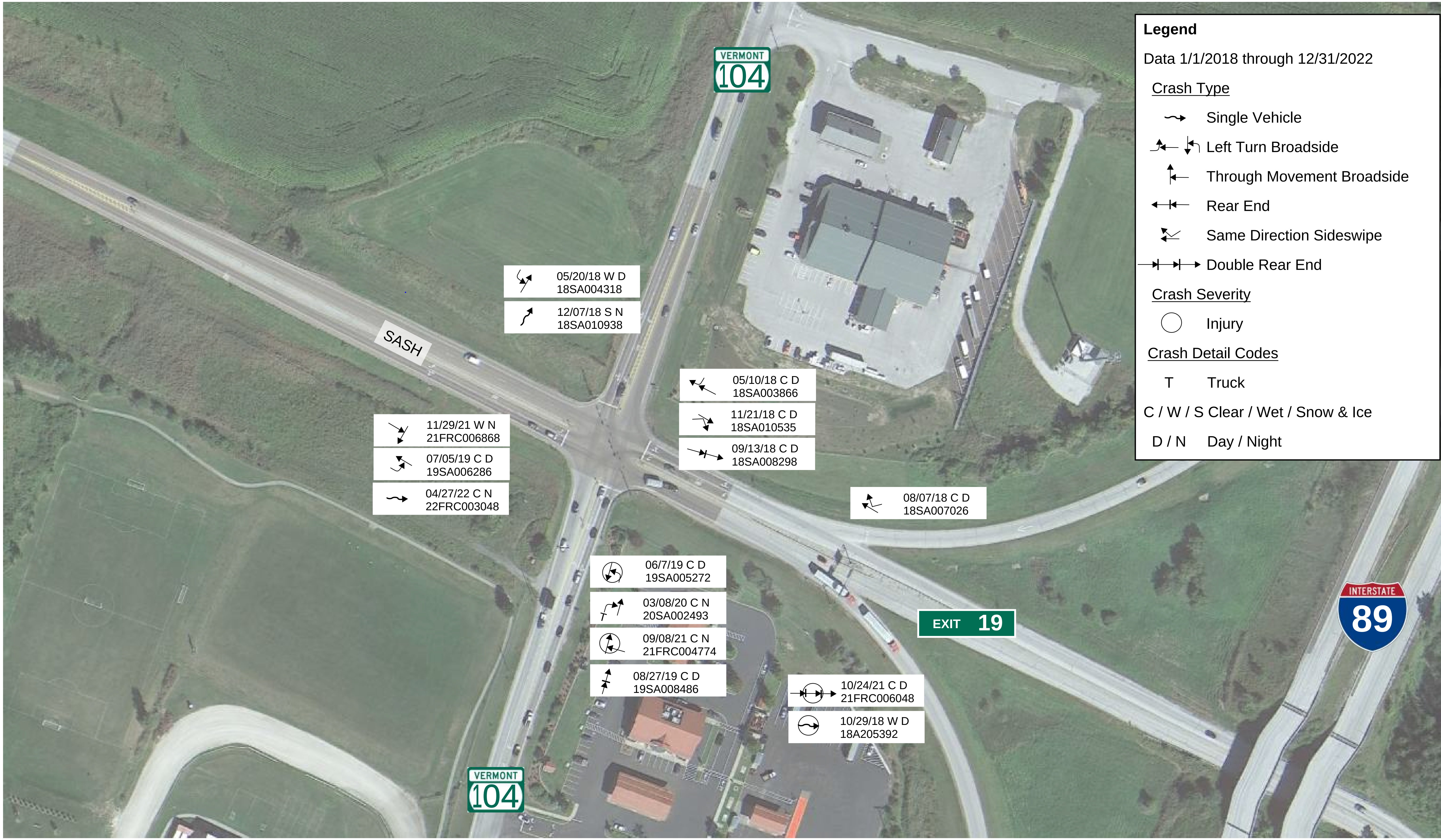
Denied Del/Veh (s)	119.8
Total Del/Veh (s)	126.1

Intersection: 3:

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	LT	R	L	TR
Maximum Queue (ft)	1228	410	721	384	994	400	442	686
Average Queue (ft)	1114	321	494	237	534	237	253	193
95th Queue (ft)	1501	599	1032	675	1108	545	564	695
Link Distance (ft)	1185		905		1137			1108
Upstream Blk Time (%)	84		23		14			0
Queuing Penalty (veh)	0		0		0			0
Storage Bay Dist (ft)		230		430		300	400	
Storage Blk Time (%)	98		38		65		22	6
Queuing Penalty (veh)	101		236		127		74	24

Network Summary

Network wide Queuing Penalty: 562



WALL CONSULTANT GROUP

Crash Diagram: 2018 through 2022

St. Albans STP 044-1(2) - VT-104 & SASH Scoping Refresh

N

DATE: 05/23/2023

PROJECT: 22-226

Figure E1

APPENDIX

C

NOTES FROM PUBLIC MEETING

Meeting Notes

St. Albans STP 044-1(2) - Alternative Presentation Meeting

Submitted By: Corey Mack, PE, PTOE, Consulting Transportation Engineer

Project Name: St. Albans STP 044-1(2) - Alternative Presentation Meeting

Date: 4 June 2024

The St. Albans Town Education Center (SATEC) hosted the Alternatives Presentation Meeting for the intersection scoping study at VT-104 & SASH / I-89 Exit 19 in St. Albans. The meeting took place on Wednesday, May 15 from 6:00 PM to 7:30 PM.

The meeting was recorded by Northwest Access Television and is available online: https://www.youtube.com/watch?v=6s78D_EVFow

ATTENDEES

In addition to staff and representatives from St. Albans Town, St. Albans City, Northwest Regional Planning Commission, Vermont Agency of Transportation, and the consultant team, there were 24 resident attendees signed in to the meeting. There were many attendees who chose not to sign in.

People who provided their email address were provided these notes, a link to the project Story Map with documentation, and were requested to provide additional feedback.

PRESENTATION

The meeting began shortly after 6:00 PM. The consultant transportation engineer and planner, Corey Mack, presented a number of slides documenting and summarizing the project development process, project background, existing conditions, identified issues, alternatives under consideration, transportation capacity and performance metrics, and evaluation comparison metrics.

The presentation slides can be found on the project Story Map: https://arcg.is/1r1C05

DISCUSSION SUMMARY

The community engaged in a discussion of the alternatives and priorities moving forward. Several comments are transcribed below:

Intersection Alternatives: Design, Operations, and Evaluation

- Several attendees requested that the upcoming paving project add a northbound right turn lane on VT-104 and signal timing updates.
- There was concern that a roundabout may provide more constant traffic flows with fewer gaps along VT-104 north and south of the intersection, making access from side streets and driveways more challenging; a traffic signal has more distinct and concentrated traffic movements (platoons) with larger gaps.
- There was discussion that the safest north-south pedestrian and bicycle crossing may be a bridge or tunnel / grade separated crossing of SASH.
- There is a potential pedestrian and bicycle demand across all legs of the intersection.
- There was concern about the Exit 19 SB Off-Ramp and how it currently intersects the westbound approach to the signalized intersection and inquiries as to how the same ramp would tie into the redesigned intersection.
- After the two I-89 off-ramps merge, there is limited distance on the westbound approach to weave: northbound off-ramp traffic heading north on VT-104 crossing the SB off-ramp traffic heading south on VT-104.
- The signalized intersection should consider free-right turn slip lanes, similar to US-7 & VT-207 near Exit 20. While free-right slip lanes may improve capacity, it would not improve bicycle and pedestrian access, increase travel speeds and crash severity, and right of way impacts.
- There was concern about the hybrid roundabout at this location being the first application of this type of intersection control in Vermont.
- If a roundabout is pursued, an educational component should be included to help introduce safe driving practices through a roundabout.
- Concerns were raised about pedestrian crossing of multilane entrance / exit legs of a roundabout.
- Concerns that the high percentage of truck traffic through the roundabout alternative may reduce roundabout capacity not captured / presented in the analysis.
- The roundabout alternative should include an option for bicycles to access the path / walkway from the roadway and avoid circulating within the roundabout.
- The timeline for implementation is years out – depending on right of way impacts from the selected preferred alternative, this could be 2-5+ years from construction.
- Funding sources are not yet set for construction. The cost will likely be split between federal and state funding sources, with no local funding requirement expected.

General Transportation System Discussion

- There was discussion that a new interchange / exit on I-89 at VT-105 / Sheldon St would reduce the traffic volume at the VT-104 & SASH / Exit 19 interchange, providing additional congestion relief.

- Currently, many vehicles including trucks seek shortcuts or alternate routes through smaller local roads to avoid the intersection. Improvements to the intersection would likely make traveling through the intersection more efficient and reduce the shortcutting behavior.
- Future development both north and south of the intersection along VT Route 104 needs to be carefully considered in the event that future traffic signals are installed at driveways / development access points.
- Pedestrian crossing infrastructure across VT-104 at other locations should be considered, particularly near Collins Perley and the Hotel / Wagon Wheel.

Key Takeaways

- Safety of pedestrians should be prioritized.
- The signal cycle length and timing should be evaluated after the summer paving project.
- A short-term solution to add a northbound right turn bypass lane could increase intersection capacity.

APPENDIX

D

NOTES FROM SELECTBOARD MEETING

Subject to Selectboard Approval

Town of St. Albans
Selectboard Meeting Minutes
Monday, July 15th, 2024
6:30 p.m.

On Monday, July 15th, 2024 at 6:30 p.m., the Town of St. Albans Selectboard met at Town Hall.

Officials and Staff: Chair Jonathan Giroux, Bryan DesLauriers, Town Manager Sean Adkins, Director of Operations Al Voegele, Director of Community Development Megan Sherlund, and Town Clerk Anna Bourdon. Absent were Jack Brigham and Vice Chair Jeff Sanders.

Staff Participation via Zoom: Brendan Deso and Executive Assistant Jenn Gray.
Public in Attendance: Beverly Mason (Tanglewood), Corey Mack (Wall Consultant Group - WCG), and Mike Lacroix (Vermont Agency of Transportation).
Public Participation via Zoom: Northwest Access TV and St. Albans Messenger Reporter Josh Ellerbrock.

Chair J. Giroux called the meeting to order at 6:32 p.m. The Pledge of Allegiance was recited.

General Warrant
MOTION: B. DesLauriers made a motion to approve the general fund warrant dated July 15th, 2024 in the amount of $341,523.94. Seconded by B. Deso. All in favor, none opposed, motion carried.

Payroll Warrant
MOTION: B. DesLauriers made a motion to approve the payroll warrants dated July 5th, 2024 in the amount of $37,780.01 and July 12th, 2024 in the amount of $32,644.05. Seconded by B. Deso. All in favor, none opposed, motion carried.

Federal ARPA Warrant
MOTION: B. DesLauriers made a motion to approve the Federal ARPA fund warrant dated July 15th, 2024 in the amount of $13,649.00. Seconded by B. Deso. All in favor, none opposed, motion carried.

Infrastructure Development Warrant
MOTION: B. DesLauriers made a motion to approve the Infrastructure Development warrant dated July 15th, in the amount of $74,837.67. Seconded by B. Deso. All in favor, none opposed, motion carried.

Stormwater Utility Warrant
MOTION: B. DesLauriers made a motion to approve the Stormwater Utility warrant in the amount of $1,474.30. Seconded by B. Deso. All in favor, none opposed, motion carried.

Industrial Park Warrant
MOTION: B. DesLauriers made a motion to approve the Industrial Park warrant dated July 15th, 2024 in the amount of $732.92. Seconded by B. Deso. All in favor, none opposed, motion carried.

Stone House Warrant
MOTION: B. DesLauriers made a motion to approve the Stone House warrant in the amount of $20,335.72. Seconded by B. Deso. All in favor, none opposed, motion carried.

Minutes
MOTION: B. DesLauriers made a motion to approve the Selectboard meeting minutes for Monday, July 1st, 2024 and the special Selectboard meeting minutes for Wednesday, July 3rd as presented. Seconded by B. Deso. All in favor, none opposed, motion carried.

Warrants & Mins. = 6 mins.

Public Comment
None.

Exit 19\SASH Intersection
Corey Mack, Transportation Engineer and Planner with Wall Consultant Group (WCG) and Mike LaCroix, Project Manager with Vermont Agency of Transportation (VTrans) came before the Board to provide an update on the Exit 19 intersection design and to obtain the Board's endorsement on the project. A presentation was provided for the audience showing the changes in design. The design presented was a hybrid roundabout intersection. Once the design is completed, it'll take about 4-6 years for completion.

MOTION: B. DesLauriers made a motion to affirm and support the St. Albans STP 044-1(2) Exit 19, SASH, and VT-104 Intersection Scoping Study refresh as presented. Seconded by B . Deso. All in favor, none opposed, motion carried.

Exit 19 = 28 mins.

Town Forest Fire Warden & Health Officer Appointments

MOTION: B. DesLauriers made a motion to appoint Harold R. Cross Jr. as the Town's Forest Fire Warden. Seconded by B. Deso. All in favor, none opposed, motion carried.

MOTION: B. DesLauriers made a motion to appoint Fire Chief Matt Mulheron as the Town's Health Officer effective August 1st, 2024 for a 2-year term expiring in 2026. Seconded by B. Deso. All in favor, none opposed, motion carried.

Appts. = 1 min.

Rotary Club of St. Albans Day Proclamation
S. Adkins explained the St. Albans Rotary Club is celebrating 100 years of service in St. Albans. With this, the Rotary Club would like to make a proclamation that September 22nd, 2024 will be "Rotary Club of St. Albans Day". B. DesLauriers read the proclamation to the audience.

MOTION: B. DesLauriers made a motion to declare September 22nd, 2024 "Rotary Club of St. Albans Day". Seconded by B. Deso. All in favor, none opposed, motion carried.

Rotary = 4 mins.

Town Manager's Report
Act 250 – Ocean State Job Lot
Informational only, no action required.

Act 250 = 1 min.

Other Business
None.

Schedule
The next regular Selectboard meetings are Monday, August 5th and Monday, August 19th at 6:30 p.m.

Schedule = 1 min.

Executive Session
MOTION: B. DesLauriers made a motion to go into executive session at 7:15 p.m. to discuss contractual and personnel matters where premature general public knowledge of the subject matter would place the Town (or person(s) involved) at a substantial disadvantage. It was further moved to enter into executive session to discuss contractual and personal matters under the provisions of Title 1, Section 313(a)(1) of Vermont Statutes and to invite in the Town Manager and Director of Operations.

No motions came out of executive session.

MOTION: B. Deso made a motion to come out of executive session at 8:02 p.m. Seconded by B. DesLauriers. All in favor, none opposed, motion carried.

Adjournment
MOTION: B. DesLauriers made a motion to adjourn the Selectboard meeting at 8:03 p.m. Seconded by B. Deso. All in favor, none opposed, motion carried.

Respectfully submitted,
Jennifer Gray, Executive Assistant