

Exhibit B

TADI - Right Turn Island

ABBREVIATED TRAFFIC IMPACT ANALYSIS FOR:

KWIK TRIP & THREE LEAF PARTNERS DEVELOPMENTS

VILLAGE OF HARTLAND, WISCONSIN

DATE SUBMITTED: MARCH 30, 2023



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“I certify that this Traffic Impact Analysis has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering.”

**KWIK TRIP & THREE LEAF PARTNERS DEVELOPMENT
ABBREVIATED TIA
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CHAPTER I – INTRODUCTION & EXECUTIVE SUMMARY

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

Kwik Trip, Inc. and Three Leaf Partners are proposing to develop vacant land parcels along West Capitol Drive, near STH 83 in the Village of Hartland, Waukesha County, Wisconsin. Kwik Trip, Inc. is proposing to construct a Kwik Trip on approximately 5.4 acres between STH 83, Capitol Drive, and Vettelson Road. Three Leaf Partners is proposing to construct a 400 to 450-unit multi-family development (“Hartland Quarry Apartments”) on about 45.4 acres east of Capitol Drive directly opposite the Kwik Trip site. Access to both sites will be at Capitol Drive.

This Abbreviated traffic impact analysis (TIA) report follows the WisDOT *Statewide TIA Guidelines*. The TIA evaluates the expected weekday AM and PM peak hour operating conditions with base year 2023 background traffic, plus the additional traffic volumes expected from the buildout of both the Kwik Trip gas station/convenience store and Hartland Quarry Apartments developments.

PART B – EXECUTIVE SUMMARY

The executive summary includes a description of the study area, a description of the proposed developments and conclusions based on the findings of the TIA.

B1. Study Area

The study intersections include:

- Capitol Drive & STH 83
- Capitol Drive & Palmer Drive/Proposed Kwik Trip North Driveway
- Capitol Drive & Proposed Kwik Trip South Driveway
- Capitol Drive & Vettelson Road/Proposed Apartments Driveway

Turning movement traffic counts were collected at the existing study intersections in March 2022 and March 2023. The peak hour turning movement counts were balanced between intersections and used as the Year 2023 Background traffic volumes evaluated in this study.

B2. Proposed Development

The proposed Kwik Trip development includes a convenience store, car wash, and 22 fueling positions (20 for autos and two for heavy trucks). Two access driveways to Capitol Drive are proposed for the Kwik Trip, one full-access driveway across from Palmer Road and one full-access driveway approximately 425 feet to the southeast. Based on national trip data, the Kwik Trip generates 4,640 driveway trips on a typical weekday, with 335 driveway trips in the weekday AM peak hour and 335 driveway trips in the weekday PM peak hour.

The proposed Hartland Quarry Apartments development includes 450 total units on site. One driveway to Capitol Drive is currently proposed for the site. Based on national trip data, the Hartland Quarry Apartments development generates 2,960 driveway trips on a typical weekday, with 160 driveway trips in the weekday AM peak hour and 215 driveway trips in the weekday PM peak hour.

B3. Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM) 6th Edition. Intersection operation is defined by “Level of Service”. Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS ‘A’, to very poor, represented by LOS

‘F’. For the purposes of this study, LOS D or better was used to define desirable peak hour operating conditions.

Improvements are for jurisdictional consideration and are not legally binding. The Village of Hartland reserves the right to determine alternative solutions.

The recommendations listed in this report are shown on [Exhibit 1-1](#).

Background Traffic Recommendations

The following are recommended to address background traffic (no development) conditions at the study intersections. These recommendations are estimated to be the responsibility of the Village of Hartland:

- Per the Village of Hartland, provide a sidewalk along the north side of Capitol Drive from STH 83 to across Palmer Drive.
- The Village has indicated that westbound traffic on Capitol Drive “cut the corner” when turning onto Vettelson Drive. Historical crashes have not identified any crash pattern due to this movement. It is recommended that the Village explore options to mitigate this issue by constructing a right-turn island, moving stop bars, etc. Sight distance and vehicle turning radii need to be considered in design features prior to construction.

Build Traffic Recommendations (Kwik Trip)

Capitol Drive & Kwik Trip North Driveway

- Clear and level the land in the southeast corner of the STH 83/Capitol Drive intersection to provide adequate sight distance for full-access turning movements into and out of the driveway.
- Install a “No Trucks” sign at the Kwik Trip north driveway exit to Capitol Drive.
- Although not warranted based on traffic volumes, provide a right-turn lane on Capitol Drive to separate the slower-moving right-turn from through traffic traveling eastbound around the curve on Capitol Drive.

Capitol Drive & Kwik Trip South Driveway

- Clear trees on the Hartland Quarry Apartments site to provide 510 feet of visibility to the right of the Kwik Trip south driveway.
- Construct the driveway with a single entrance and exit lane and stop sign control on the approach to Capitol Drive. Two-way stop control results in low delays and queues at all intersection movements during the peak hours. Roundabout control provides the same, but results in considerable additional cost and right-of-way to implement this alternative. Therefore, it is not a recommended option in this study.
- Per the Village requirements, provide a pedestrian crossing that connects between the Kwik Trip site and a future sidewalk along the north side of Capitol Drive.

Build Traffic Recommendations (Hartland Quarry Apartments)

General

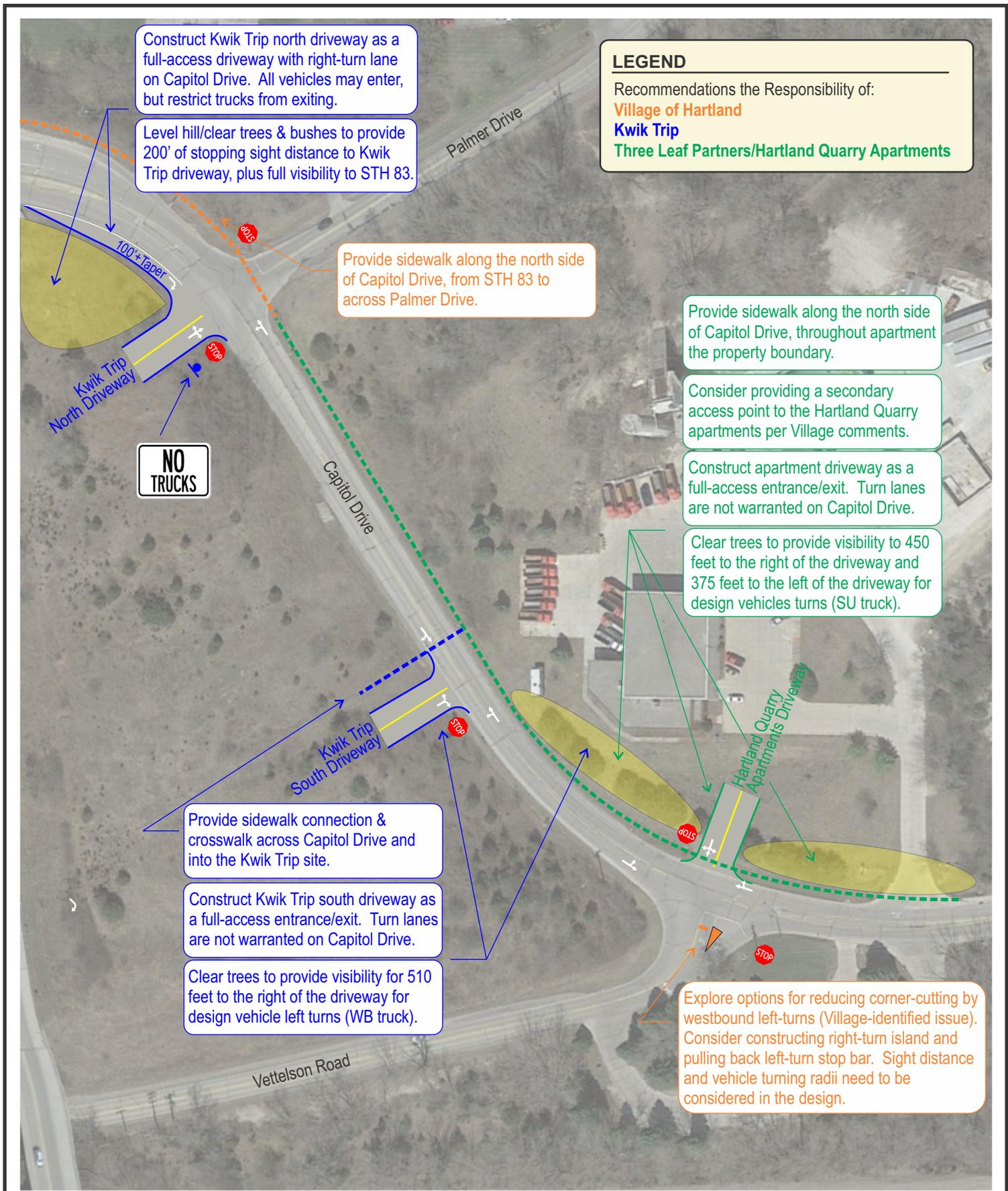
- Per the Village of Hartland, provide a sidewalk along the north side of Capitol Drive throughout the limits of the Hartland Quarry Apartments property.

Capitol Drive & Hartland Quarry Apartments Driveway

- Clear trees on the Hartland Quarry Apartments site to provide 375 feet of visibility to the left of the Kwik Trip south driveway and 450 feet of visibility to the right of the Kwik Trip south driveway.
- Construct the driveway with a single entrance and exit lane and stop sign control on the approach to Capitol Drive. Align the driveway across from Vettelson Drive. Two-way stop control results in low delays and queues at all intersection movements during the peak hours. Roundabout control provides the same, but results in considerable additional cost and right-of-way to implement this alternative. Therefore, it is not a recommended option in this study.

B4. Conclusion

The modifications listed above are expected to accommodate traffic through full buildout of the proposed Kwik Trip and Hartland Quarry Apartments development.



Construct Kwik Trip north driveway as a full-access driveway with right-turn lane on Capitol Drive. All vehicles may enter, but restrict trucks from exiting.

Level hill/clear trees & bushes to provide 200' of stopping sight distance to Kwik Trip driveway, plus full visibility to STH 83.

Provide sidewalk along the north side of Capitol Drive, from STH 83 to across Palmer Drive.

Provide sidewalk along the north side of Capitol Drive, throughout apartment the property boundary.

Consider providing a secondary access point to the Hartland Quarry apartments per Village comments.

Construct apartment driveway as a full-access entrance/exit. Turn lanes are not warranted on Capitol Drive.

Clear trees to provide visibility to 450 feet to the right of the driveway and 375 feet to the left of the driveway for design vehicles turns (SU truck).

Provide sidewalk connection & crosswalk across Capitol Drive and into the Kwik Trip site.

Construct Kwik Trip south driveway as a full-access entrance/exit. Turn lanes are not warranted on Capitol Drive.

Clear trees to provide visibility for 510 feet to the right of the driveway for design vehicle left turns (WB truck).

Explore options for reducing corner-cutting by westbound left-turns (Village-identified issue). Consider constructing right-turn island and pulling back left-turn stop bar. Sight distance and vehicle turning radii need to be considered in the design.

LEGEND

Recommendations the Responsibility of:

- Village of Hartland
- Kwik Trip
- Three Leaf Partners/Hartland Quarry Apartments

CHAPTER II – PROPOSED DEVELOPMENT

PART A – ON-SITE DEVELOPMENTS

A street map illustrating the location of the proposed development site with respect to the existing surrounding roadway system is shown on [Exhibit 2-1](#).

Kwik Trip, Inc. Development – Kwik Trip #1283

The conceptual site plan for the Kwik Trip #1283 is on [Exhibit 2-2](#). The Kwik Trip is proposed to include a convenience store, car wash, 20 fueling positions for automobiles and light trucks, and two fueling positions for larger trucks and busses. Access to the site is proposed at two locations – one at Capitol Drive, directly across from Palmer Drive and one at Capitol Drive, approximately 425 feet southeast of Palmer Drive. Based on sight distance studies (see Chapter V, Part E), both Kwik Trip driveways can operate with full-access turning movements if the sight obstructions are cleared (hill, bushes and trees north of the Kwik Trip north driveway and existing treeline on the Three Leaf Partners site).

Three Leaf Partners Development – Hartland Quarry Apartments

The conceptual site plan for the Hartland Quarry Apartments is on [Exhibit 2-3](#). The plan for the site shows approximately 448 multi-family units in 19 buildings with two-three stories each. Access to the site is proposed at one location to Capitol Drive, directly across from Vettelson Road. It is noted that the Village of Hartland is requesting that the site be modified to accommodate an additional access point (for emergency vehicles).

Buildout Scenarios

The Kwik Trip and Hartland Quarry Apartments are evaluated in this study for the following development scenarios, which reflect the likely staging/time-frame for development of each site:

- Scenario 1: Kwik Trip only
- Scenario 2: Kwik Trip plus 400 multi-family residential units
- Scenario 3: Kwik Trip plus 450 multi-family residential units

PART B – STUDY AREA

B1. Influence Area

The development sites are located on Capitol Drive near the STH 16 interchange with STH 83. It is expected that the majority of new development trips will travel to/from the north towards the interchange area. A large portion of new trips are also expected to travel to/from the south towards the I-94 interchange with STH 83, which is located approximately 3 ½ miles to the south of the site.

B2. Area of Significant Traffic Impact

The study intersections evaluated in this TIA include:

- Capitol Drive & STH 83
- Capitol Drive & Palmer Drive/Proposed Kwik Trip North Driveway
- Capitol Drive & Proposed Kwik Trip South Driveway
- Capitol Drive & Vettelson Road/Proposed Apartments Driveway

The Capitol Drive intersection with STH 83 operates with traffic signal control. All other study intersections operate with stop sign control on the minor street approaches.

PART C – OFF-SITE LAND USE AND DEVELOPMENT

No off-site developments were included in this study.

PART D – SITE ACCESSIBILITY

D1. Study Area Roadways

STH 83 is a two-lane undivided north/south Principal Arterial with a 35-mph speed limit within the study area. The 2018 Wisconsin Department of Transportation (WisDOT) annual average daily traffic (AADT) volume on STH 83 was 17,700 vehicles per day (vpd) north of Capitol Drive and 15,800 vpd south of Capitol Drive.

Capitol Drive is a two-lane undivided Minor Arterial with a 25-mph speed limit. Although Capitol Drive runs northwest/southeast in the immediate study area, Capitol Drive is generally an east/west roadway (and therefore is defined as such throughout this report). Capitol Drive has a 2015 WisDOT AADT of 3,400 north of Palmer Drive and a 2018 WisDOT AADT of 3,200 vpd south of Palmer Drive.

Vettelson Road is a two-lane undivided east/west Minor Arterial with a 25-mph speed limit within the study area. Vettelson Road has a 2015 WisDOT AADT of 1,300 vpd just west of Capitol Drive.

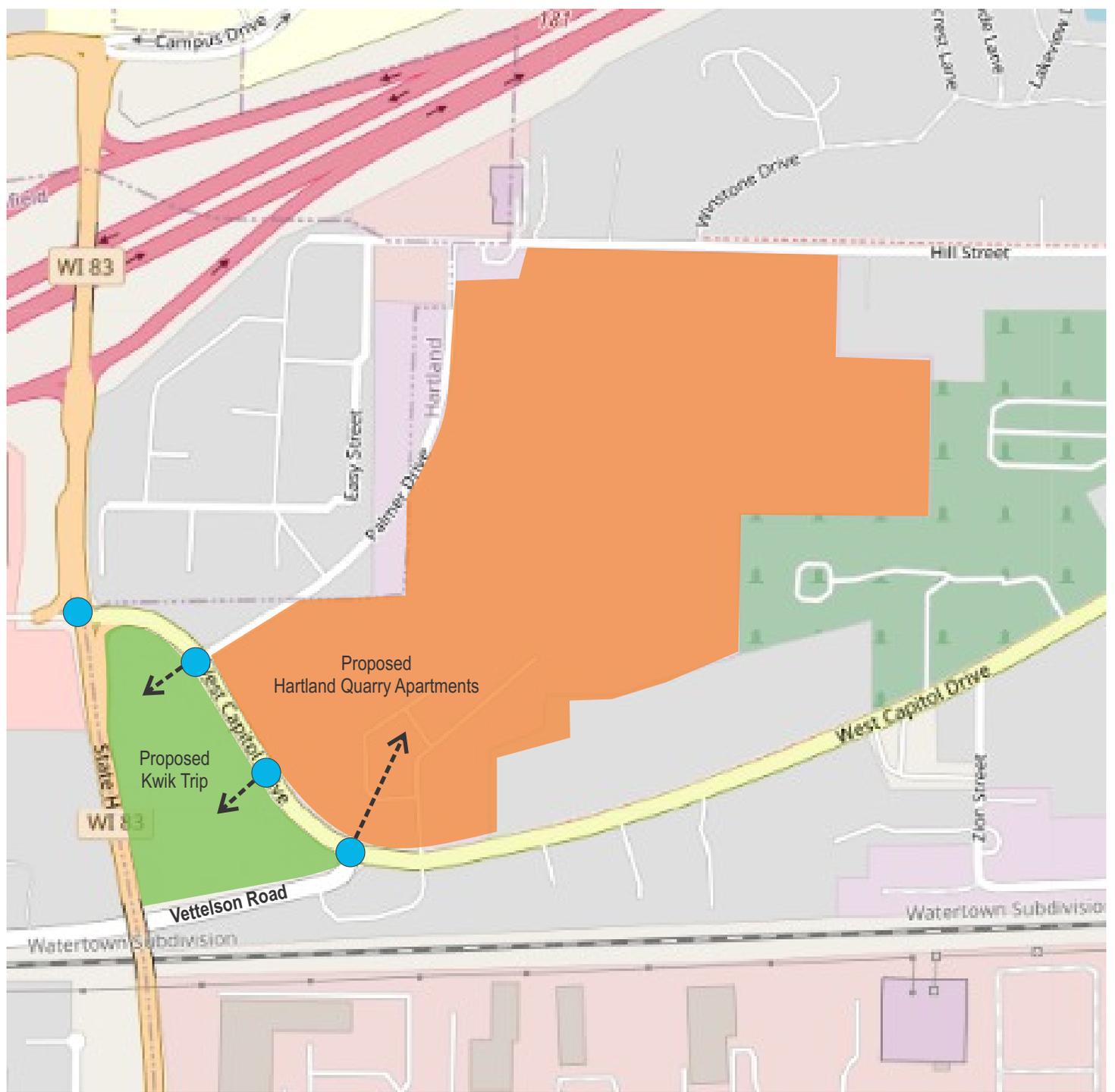
Palmer Drive is a two-lane undivided east/west Collector roadway with a 25-mph speed limit. Palmer Drive primarily provides access for residential developments along the south side of STH 16.

D2. Pedestrian & Bicycle Accommodations

The development site is located in an area without sidewalks or multi-use trails along the study segments of STH 83, Palmer Drive or Vettelson Road. With the exception of a sidewalk on the north side of Capitol Drive, west of STH 83, there are no sidewalks or multi-use trails along Capitol Drive.

D3. Transit Accommodations

No regularly scheduled public transit service or park-and-ride lots were identified within the study area.



LEGEND

	Kwik Trip Site		Hartland Quarry Apartments Site
	Proposed Access		Study Intersection



HARTLAND QUARRY APARTMENTS CONCEPTUAL SITE PLAN

Kwik Trip & Three Leaf Developments Abbreviated TIA - Hartland, WI



JLA
ARCHITECTS

HARTLAND QUARRY APARTMENTS
RENDERED MASTERPLAN

FEBRUARY 6, 2023



1"=200' @ 11x17



CHAPTER III – ANALYSIS OF EXISTING CONDITIONS

PART A – PHYSICAL CHARACTERISTICS

A transportation detail showing the existing lane configurations, traffic controls, posted speed limits, and approximate intersection spacing is included in [Exhibit 3-1](#).

PART B – TRAFFIC VOLUMES

B1. Traffic Counts

WisDOT provided a March 2022 traffic count at the STH 83/Capitol Drive intersection for this study. The WisDOT count was collected from 6:00 a.m. to 7:00 p.m.

TADI collected weekday turning movement traffic counts at the other study intersections in March 2023. The Capitol Drive/Vettelson Road intersection was counted from 6:00 a.m. to 7:00 p.m. (for warrant studies), and the Capitol Drive/Palmer Drive intersection was collected from 6:00-9:00 a.m. and from 3:00-6:00 p.m. All traffic count data collected for this study is in [Appendix A](#).

B2. Peak Hour Time Periods

Based on the traffic count data collected, the weekday peak hours were determined to occur during the following times:

- Weekday morning (AM) peak hour: 7:00-8:00 a.m.
- Weekday afternoon (PM) peak hour: 4:30-5:30 p.m.

The turning movement traffic counts were compiled for the peak hours and are shown as the Year 2023 Background Traffic Volumes on [Exhibit 3-2](#). The intersection peak hour factors and heavy vehicle percentages for each intersection approach were compiled for these peak hours and are shown in a table in [Appendix A](#).

PART C – CAPACITY LEVEL OF SERVICE

C1. Level of Service Definitions

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM), 6th Edition. Intersection operation is defined by “Level of Service”. Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS ‘A’, to very poor, represented by LOS ‘F’. For the purpose of this study, LOS D or better was used to define desirable peak hour operating conditions. Descriptions of the various levels of service are in [Table 2](#):

Table 2. LOS Descriptions

LOS	Signalized Intersections Control Delay/Vehicle (sec/veh)	Unsignalized Intersections Avg. Control Delay (sec/veh)	Relative Delay
A	≤10	≤10	Short Delays
	Free-flow traffic operations at average travel speeds. Vehicles completely unimpeded in ability to maneuver. Minimal delay at signalized intersections		
B	> 10 - 20	> 10 - 15	
	Reasonably unimpeded traffic operations at average travel speeds. Vehicle maneuverability slightly restricted. Low traffic delays.		
C	> 20 - 35	> 15 - 25	Moderate Delays
	Stable traffic operations. Lane changes becoming more restricted. Travel speeds reduced to half of average free flow travel speeds. Longer		
D	> 35 - 55	> 25 - 35	
	Small increases in traffic flow can cause increased delays. Delays likely attributable to increased traffic, reduced signal progression, and adverse		
E	> 55 - 80	> 35 - 50	Long Delays
	Significant delays. Travel speeds reduced to one-third of average free flow travel speed.		
F	> 80	> 50	
	Extremely low speeds. Intersection congestion. Long delays. Extensive traffic queues at intersections.		

Source: Highway Capacity Manual, Transportation Research Board, Washington, D.C., 2010

C2. Year 2023 Background Traffic Operations – Existing Transportation System

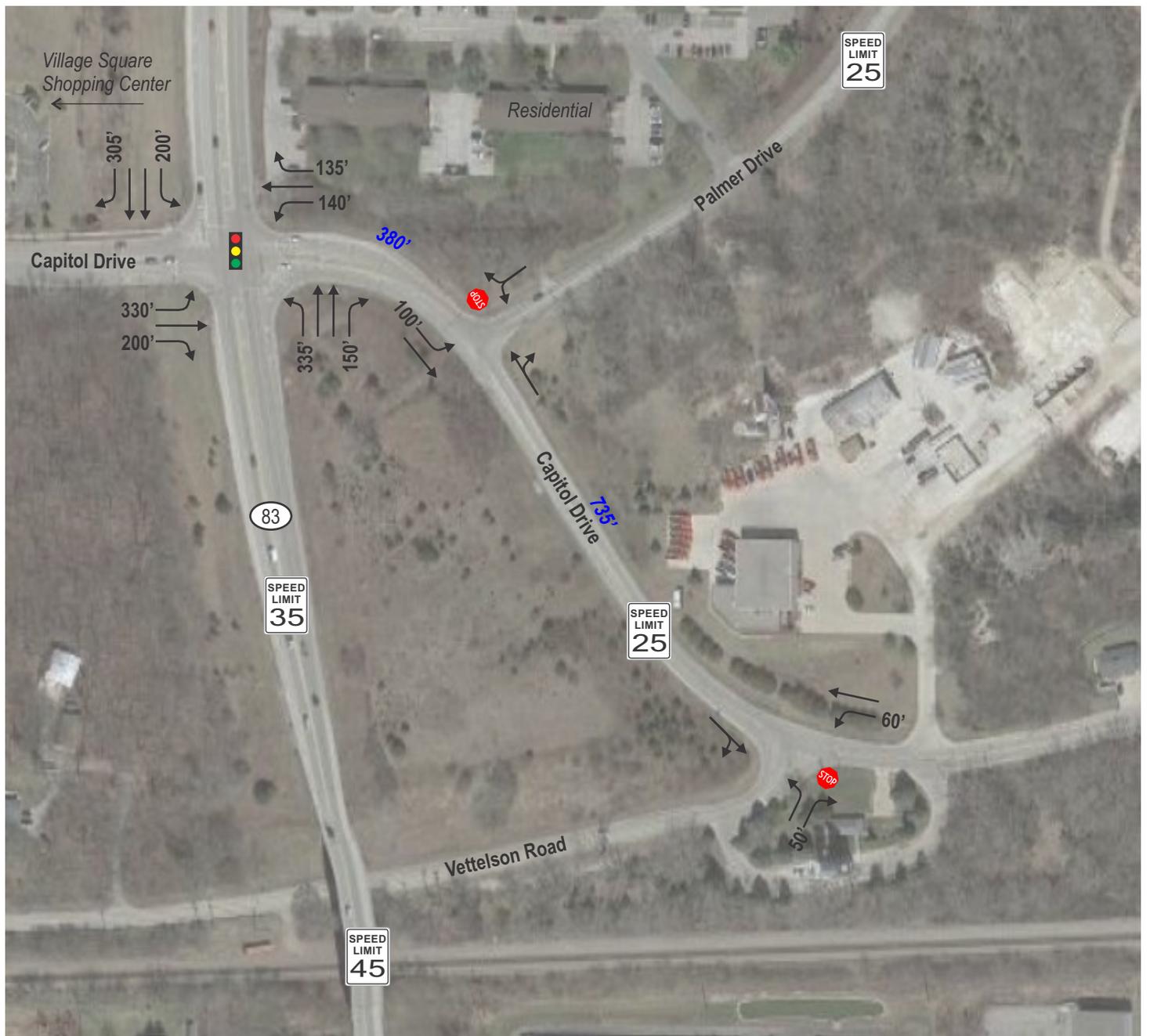
The 2023 Background traffic analysis was conducted using the existing intersection geometrics, peak hour factors, heavy vehicle percentages, saturation flow calculations and traffic control. [Exhibit 3-3](#) shows the Year 2023 Background traffic peak hour operating conditions at the study intersections. The tables show the peak hour LOS per lane group and corresponding delay (in seconds per vehicle), volume-to-capacity (v/c) ratio, and 95th percentile queue. The analysis worksheets for the Year 2023 Background traffic condition are in [Appendix B](#).

With the 2023 Background traffic volumes, the Synchro analysis shows that all traffic movements at the study intersections operate acceptably at LOS D or better during the weekday AM and PM peak hours.

PART D – SOURCES OF DATA

The following sources of data were obtained for use in conducting this traffic study:

- AADT Counts – WisDOT online TCMMap
- Turning movement traffic counts – TADI & WisDOT
- Existing field geometrics – TADI & Google Earth
- Traffic signal phasing/timing ([Appendix A](#)) – WisDOT
- Saturation flow calculations ([Appendix A](#)) – TADI

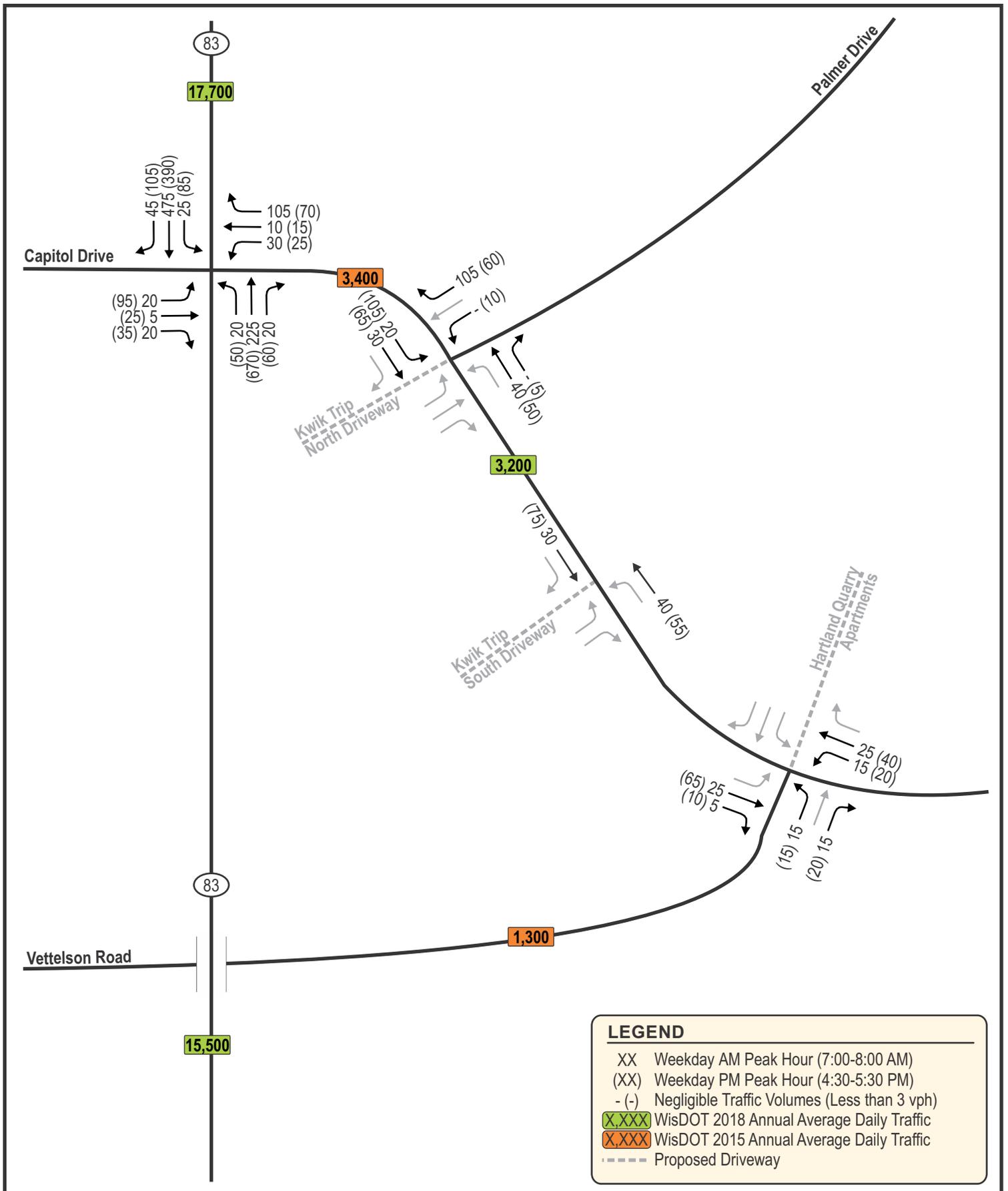


LEGEND

- Stop Sign
- Traffic Signal Control
- XX' Turn Bay Storage Length (In Feet)
- Lane Configuration
- XX' Distance Between Intersections and Driveways



**EXHIBIT 3-1
EXISTING TRANSPORTATION SYSTEM**



NOT TO SCALE

**EXHIBIT 3-2
 YEAR 2023 BACKGROUND TRAFFIC VOLUMES**

**Year 2023 Background Traffic Peak Hour Operating Conditions
Existing Transportation System**

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											I/S LOS & Delay	
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓		↙
Node 100: Capitol Drive (E/W) & STH 83 (N/S) <i>Traffic Signal Control</i>	AM	Lanes->	1	1	1	1	1	1	1	2	1	1	2	1	
		LOS	D	D	D	D	D	D	A	A	A	A	A	A	B
		Delay	37	35	36	37	35	38	4	5	5	4	6	4	10
		v/c	0.13	0.03	0.10	0.17	0.06	0.49	0.05	0.13	0.02	0.04	0.27	0.04	
	Queue	30'	15'	25'	40'	20'	75'	10'	45'	10'	10'	90'	15'		
	PM	LOS	D	D	D	D	D	D	A	A	A	A	A	A	B
		Delay	39	36	36	37	35	36	4	7	5	4	6	5	11
		v/c	0.45	0.12	0.13	0.12	0.08	0.26	0.07	0.30	0.04	0.15	0.18	0.07	
		Queue	100'	35'	35'	35'	25'	55'	20'	140'	25'	25'	75'	35'	
	Node 200: Capitol Drive (E/W) & Palmer Drive (N/S) <i>Stop Sign Control (SB)</i>	AM	Lanes->	1	1	-	-	1	-	-	-	-	1	-	
LOS			A	*	-	-	*	-	-	-	-	A	-	A	
Delay			7	*	-	-	*	-	-	-	-	9	-	5	
v/c			0.02	*	-	-	*	-	-	-	-	0.13	-		
Queue		0'	*	-	-	*	-	-	-	-	10'	-			
PM		LOS	A	*	-	-	*	-	-	-	-	A	-	A	
		Delay	7	*	-	-	*	-	-	-	-	9	-	4	
		v/c	0.08	*	-	-	*	-	-	-	-	0.09	-		
		Queue	5'	*	-	-	*	-	-	-	-	10'	-		
Node 400: Capitol Drive (E/W) & Vettelson Road (N/S) <i>Stop Sign Control (NB)</i>		AM	Lanes->	-	1	1	1	-	1	-	1	-	-	-	
	LOS		-	*	A	*	-	A	-	A	-	-	-	A	
	Delay		-	*	7	*	-	9	-	8	-	-	-	4	
	v/c		-	*	0.01	*	-	0.02	-	0.02	-	-	-		
	Queue	-	*	0'	*	-	5'	-	5'	-	-	-			
	PM	LOS	-	*	A	*	-	A	-	A	-	-	-	A	
		Delay	-	*	7	*	-	9	-	8	-	-	-	2	
		v/c	-	*	0.02	*	-	0.02	-	0.03	-	-	-		
		Queue	-	*	0'	*	-	5'	-	5'	-	-	-		

CHAPTER IV – FORECASTED TRAFFIC

PART A – BACKGROUND TRAFFIC FORECASTING

The Abbreviated TIA for the proposed development site evaluated base year 2023 traffic conditions. Therefore, no traffic forecasting was prepared for this TIA.

PART B – ON-SITE DEVELOPMENT TRAFFIC FORECASTING

B1. Trip Generation

Per WisDOT guidelines, the trip generation for Kwik Trip development is from the October 20, 2022, *WisDOT Specific Trip Generation Rates – Convenience Store/Gas Station Land Use* document. The traffic volumes generated by the Hartland Quarry Apartments development were calculated based on trip rates and/or fitted curve equations (FCE) published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition*.

The development trip generation and distribution tables are shown on [Exhibit 4-3](#). Based on WisDOT equations, the Kwik Trip development generates 2,090 new and 2,550 pass-by trips on a typical weekday, with 155 new and 180 pass-by trips in the AM peak hour and 155 new and 180 pass-by trips in the PM peak hour.

Pass-by trips occur when a motorist already on the roadway system stops at a development prior to continuing on their intended route. This study evaluates direct pass-by trips along Capitol Drive (e.g., a motorist on westbound Capitol Drive makes a stop at the Kwik Trip prior to continuing westbound on Capitol Drive). This study also evaluates diverted pass-by trips for traffic along STH 83 and Palmer Drive (e.g., traffic on these routes redirects onto Capitol Drive to make a stop at Kwik Trip prior to traveling back to their original route). For this study, 55% of the Kwik Trip trips were estimated to be direct or diverted pass-by trips.

Based on ITE equations, initial buildout (400 units) of the Hartland Quarry Apartments generates 2,640 trips on a typical weekday, with 145 new trips in the AM peak hour and 195 new trips in the PM peak hour. By full buildout (450 units), the Hartland Quarry Apartments generates 2,960 trips on a typical weekday, with 160 new trips in the AM peak hour and 215 new trips in the PM peak hour.

B2. Mode Split

For this study, the effect of organized carpools, van pools, buses, bicycles, and pedestrians were considered insignificant factors on traffic volumes in the area, and therefore, the effects of these alternative modes of travel were not included in this project.

B3. Trip Distribution

The new and pass-by trip distributions for the Kwik Trip and Hartland Quarry Apartments developments are listed below and shown on [Exhibit 7](#). The Kwik Trip trip distributions were based upon the existing traffic patterns at the study intersections, with adjustment made for more local traffic to/from the east on Capitol Drive (few nearby gas stations for local traffic). Since residential developments primarily exist along Palmer Drive, no trips to/from the Hartland Quarry Apartments were assigned along that route.

Kwik Trip – Trip Distribution (New Trips)

- 5% to/from the west on Capitol Drive
- 15% to/from the east on Capitol Drive
- 45% to/from the north on STH 83
- 25% to/from the south on STH 83

- 5% to/from the north on Palmer Drive
- 5% to/from the west on Vettelson Road

Kwik Trip – Trip Distribution (Pass-by Trips)

- 25% AM and 50% PM northbound on STH 83 (diverted pass-by)
- 55% AM and 30% PM southbound on STH 83 (diverted pass-by)
- 5% AM and 5% PM eastbound on Capitol Drive
- 5% AM and 5% PM westbound on Capitol Drive
- 10% AM and 5% PM southbound on Palmer Drive (diverted pass-by)
- 0% AM and 5% PM northbound on Palmer Drive (diverted pass-by)

Hartland Quarry Apartments – Trip Distribution (New Trips)

- 5% to/from the west on Capitol Drive
- 20% to/from the east on Capitol Drive
- 45% to/from the north on STH 83
- 25% to/from the south on STH 83
- 0% to/from the north on Palmer Drive
- 5% to/from the west on Vettelson Road

B4. Trip Assignment

The on-site development trips were assigned to the study intersections based on their respective trip distribution percentages estimated for this study. The traffic assignments are shown on the following exhibits:

- [Exhibit 4-5A](#): Kwik Trip – New Trips
- [Exhibit 4-5B](#): Kwik Trip – Pass-by Trips
- [Exhibit 4-5C](#): Kwik Trip – Driveway Trips
- [Exhibit 4-6](#): Hartland Quarry Apartments Initial Buildout – New Trips
- [Exhibit 4-7](#): Hartland Quarry Apartments Full Buildout – New Trips

PART C – BUILD TRAFFIC

The Year 2023 Build traffic volumes were generated by adding the on-site development driveway trips for each Access Option to the Year 2023 Background traffic volumes from [Exhibit 3-2B](#). The Year 2023 Build traffic volumes are shown on the following exhibits:

- [Exhibit 4-11](#): Year 2023 Build Traffic Volumes – Initial Buildout: Kwik Trip Only
- [Exhibit 4-12](#): Year 2023 Build Traffic Volumes – Interim Buildout: Kwik Trip + 400 Apartment Units
- [Exhibit 4-13](#): Year 2023 Build Traffic Volumes – Full Buildout: Kwik Trip + 450 Apartment Units

Kwik Trip - Trip Generation¹ & Trip Distribution

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak			PM Peak			
				In	Out	Total	In	Out	Total	
Super Convenience Market/Gas Station (Store Category 3, Pop >300k)	WisDOT	22 Fuel Positions	4,640 FCE	170 (51%)	165 (49%)	335 FCE	170 (50%)	165 (50%)	335 FCE	
Total Driveway Trips			4,640	170	165	335	170	165	335	
Wkday: AM (PM) Pass-by Trips			WisDOT	55%: 55% (55%)	-2,550	-90	-90	-180	-90	-180
Total New Trips			2,090	80	75	155	80	75	155	

¹ ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 11th Edition.

TRIP DISTRIBUTION (New Trips)

W. on Capitol Drive	5%	5	5	5	5
E. on Capitol Drive	15%	10	10	10	10
N. on STH 83	45%	35	30	35	30
S. on STH 83	25%	20	20	20	20
N. on Palmer Drive	5%	5	5	5	5
W. on Vettelson Road	5%	5	5	5	5
100%		80	75	80	75

TRIP DISTRIBUTION (Pass-by Trips)

NB STH 83 (Diverted PB)	25% (50%)	20	20	45	45
SB STH 83 (Diverted PB)	55% (30%)	50	50	25	25
EB Capitol Drive	5% (5%)	5	5	5	5
WB Capitol Drive	5% (5%)	5	5	5	5
SB Palmer (Diverted PB)	10% (5%)	10	10	5	5
NB Palmer (Diverted PB)	0% (5%)	0	0	5	5
AM (PM)		90	90	90	90

Hartland Quarry Apartments (Initial Buildout) Trip Generation¹ & Trip Distribution

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak			PM Peak		
				In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) (Not Close to Rail Transit)	220	400 Units	2,640 FCE	35 (24%)	110 (76%)	145 FCE	125 (63%)	70 (37%)	195 FCE
Total New Trips			2,640	35	110	145	125	70	195

¹ ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 11th Edition.

TRIP DISTRIBUTION (New Trips)

W. on Capitol Drive	5%	0	5	10	5
E. on Capitol Drive	20%	10	20	25	15
N. on STH 83	45%	15	50	55	30
S. on STH 83	25%	10	30	30	15
N. on Palmer Drive	0%	0	0	0	0
W. on Vettelson Road	5%	0	5	5	5
100%		35	110	125	70

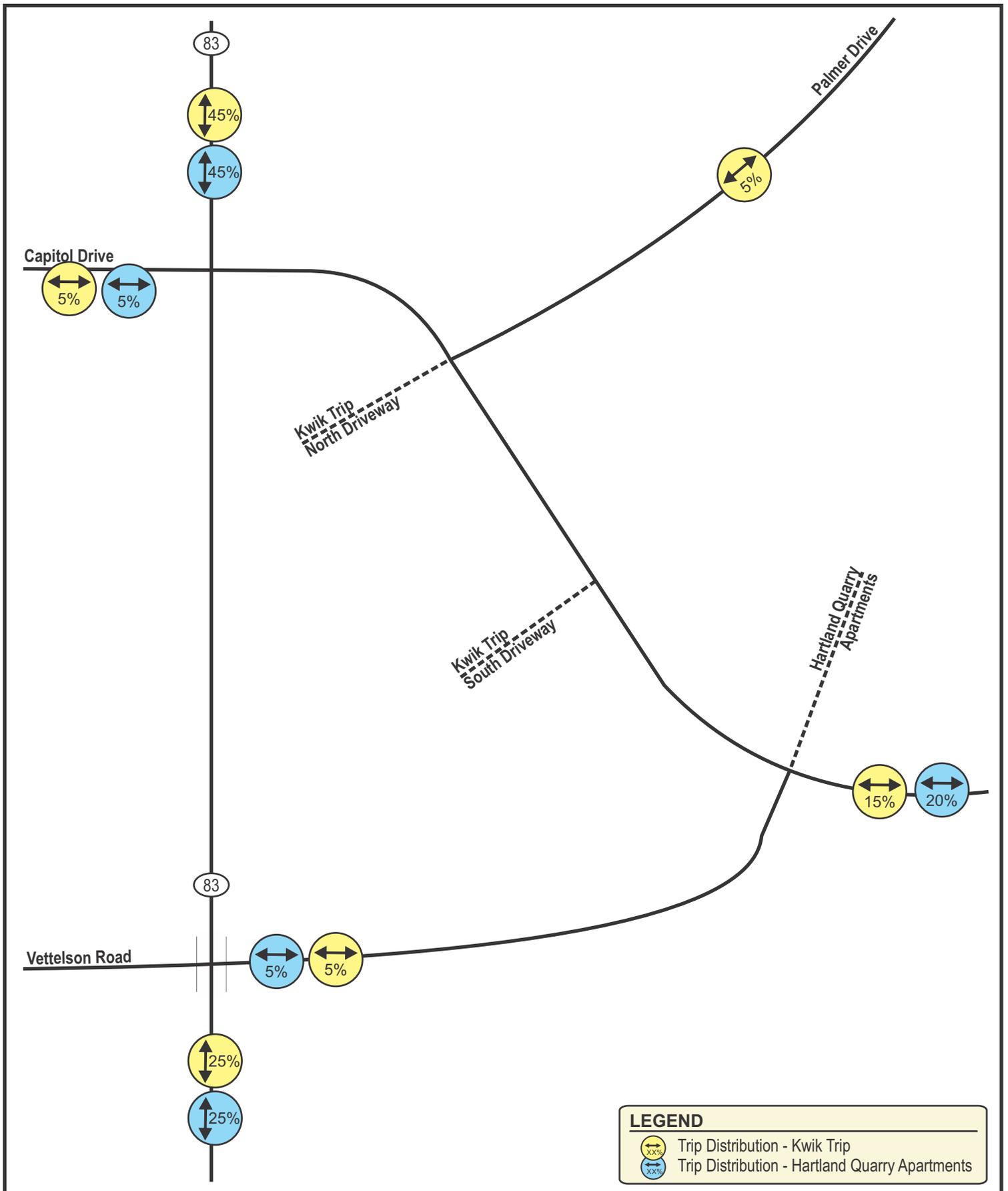
Hartland Quarry Apartments Full Buildout) Trip Generation¹ & Trip Distribution

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak			PM Peak		
				In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) (Not Close to Rail Transit)	220	450 Units	2,960 FCE	40 (24%)	120 (76%)	160 FCE	135 (63%)	80 (37%)	215 FCE
Total New Trips			2,960	40	120	160	135	80	215

¹ ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 11th Edition.

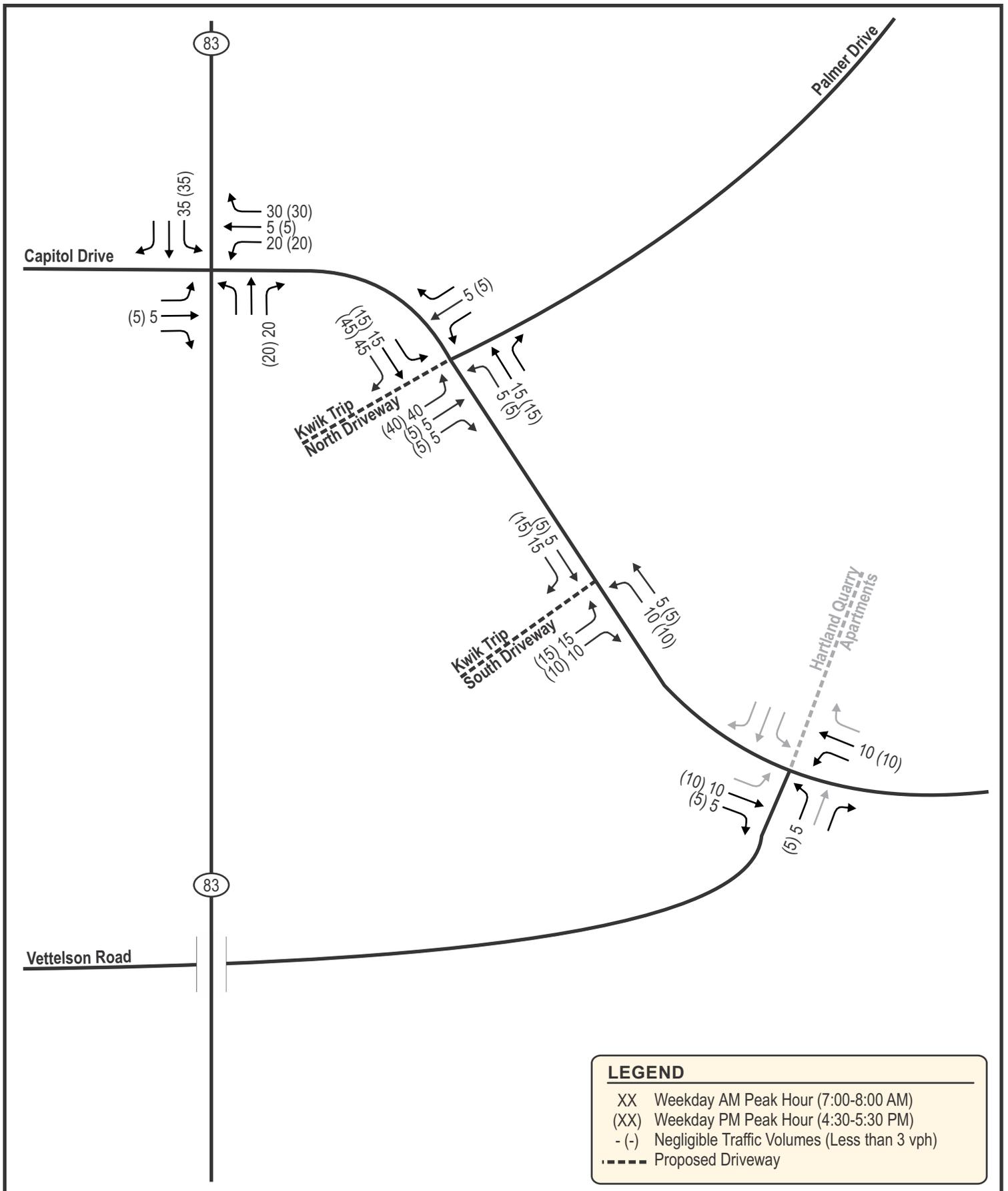
TRIP DISTRIBUTION (New Trips)

W. on Capitol Drive	5%	0	5	10	5
E. on Capitol Drive	20%	10	25	25	15
N. on STH 83	45%	20	55	60	35
S. on STH 83	25%	10	30	35	20
N. on Palmer Drive	0%	0	0	0	0
W. on Vettelson Road	5%	0	5	5	5
100%		40	120	135	80



LEGEND

- Trip Distribution - Kwik Trip
- Trip Distribution - Hartland Quarry Apartments

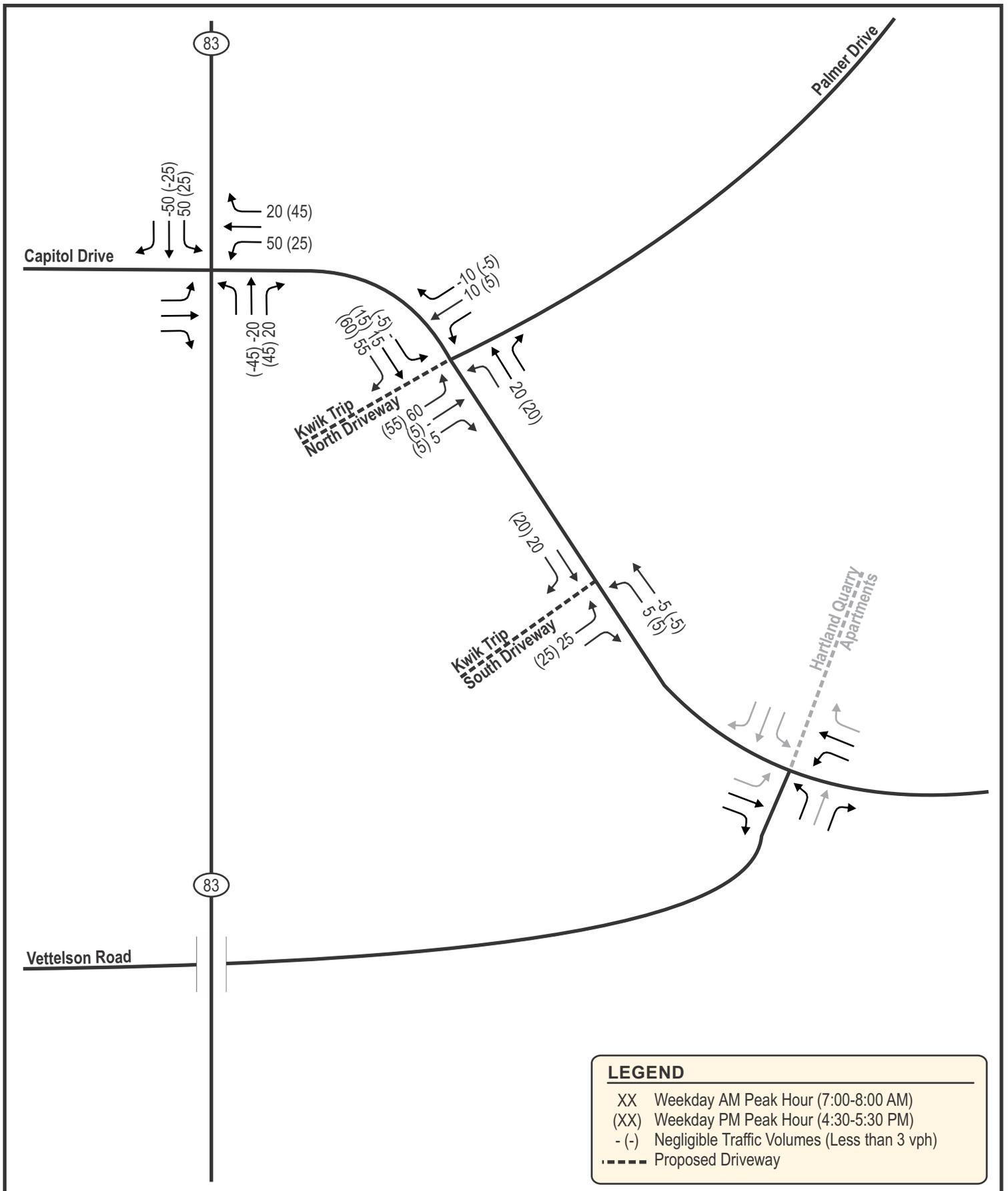


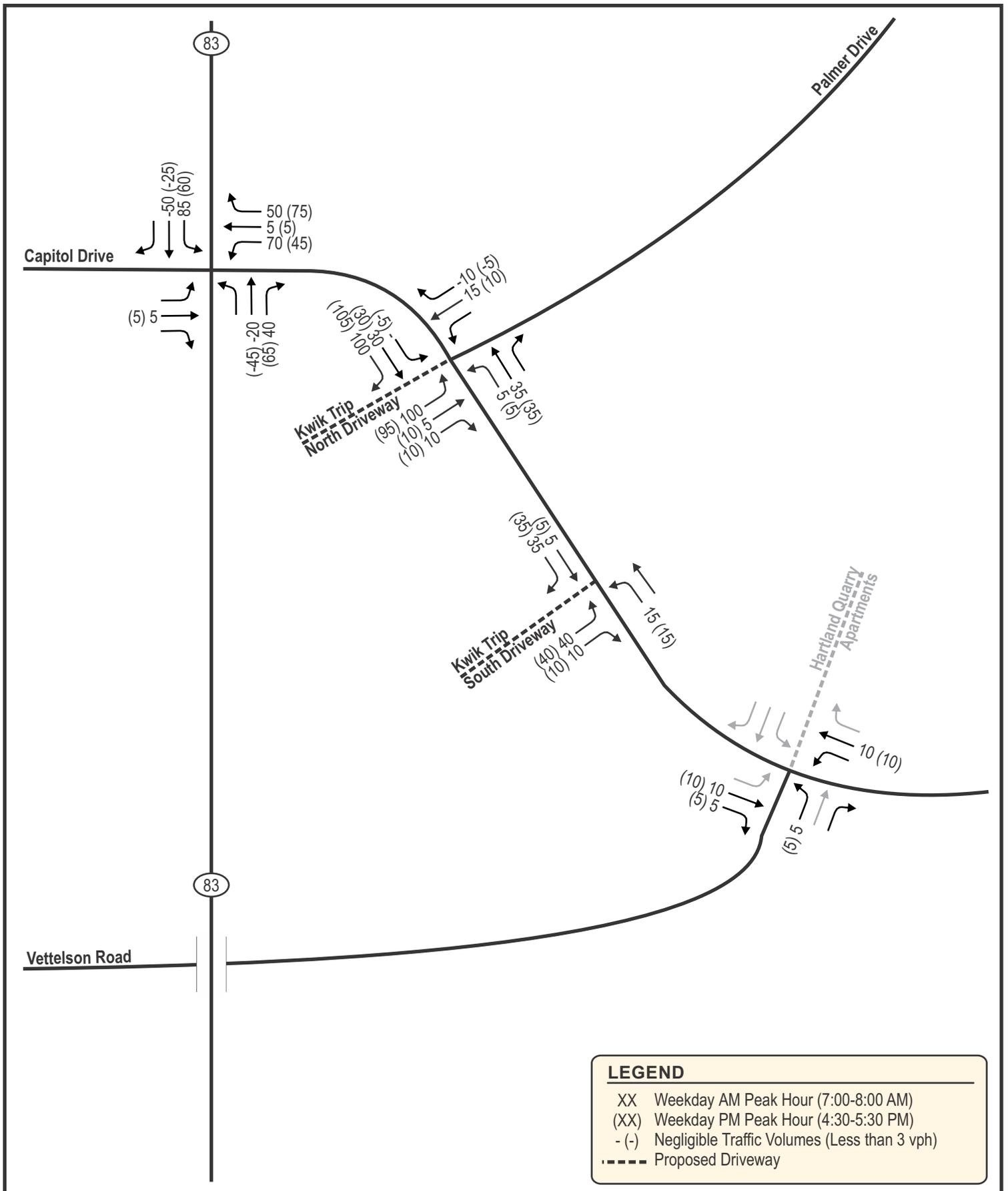
LEGEND

- XX Weekday AM Peak Hour (7:00-8:00 AM)
- (XX) Weekday PM Peak Hour (4:30-5:30 PM)
- (-) Negligible Traffic Volumes (Less than 3 vph)
- - - Proposed Driveway

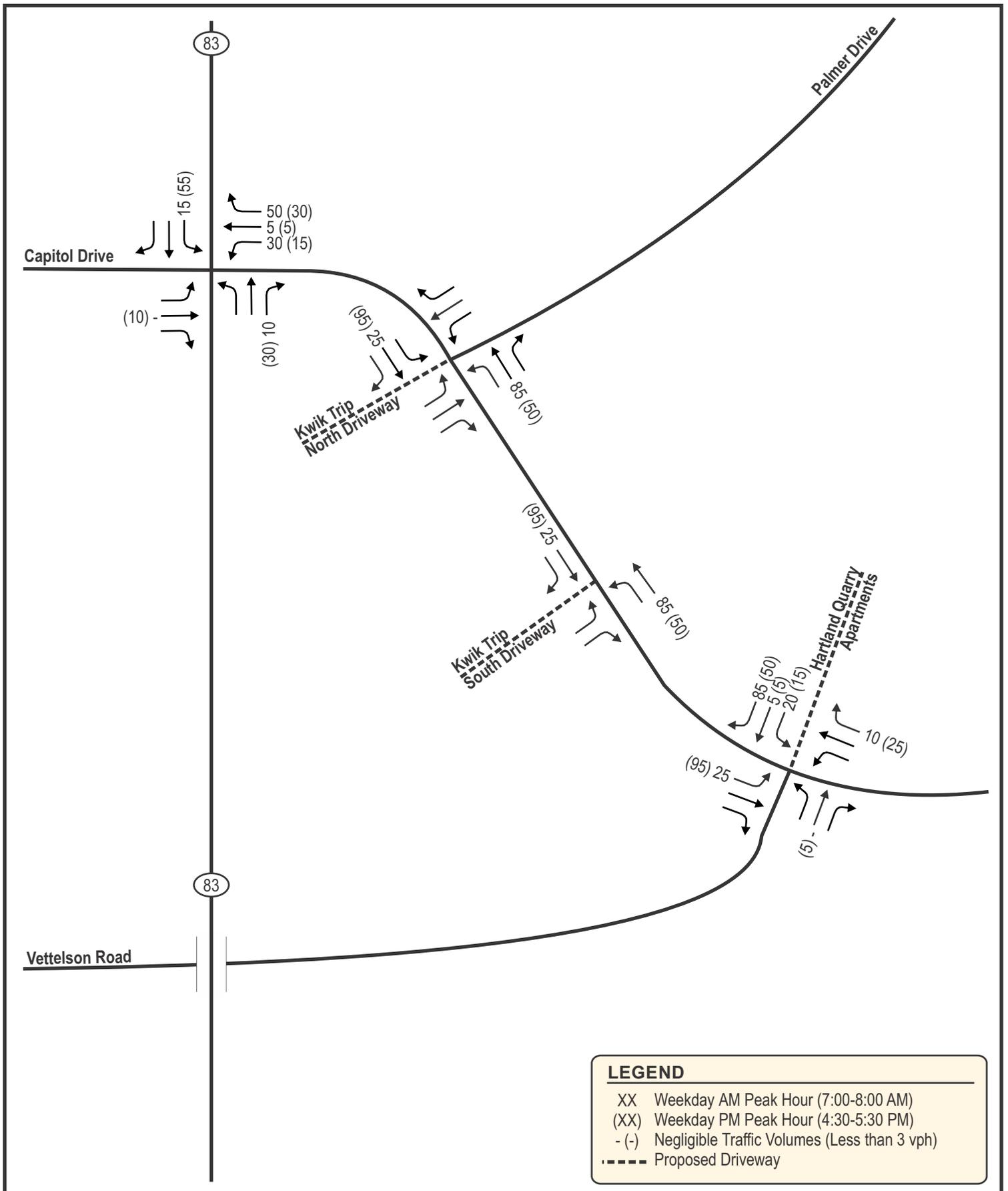


**EXHIBIT 4-5A
KWIK TRIP - NEW TRIPS**





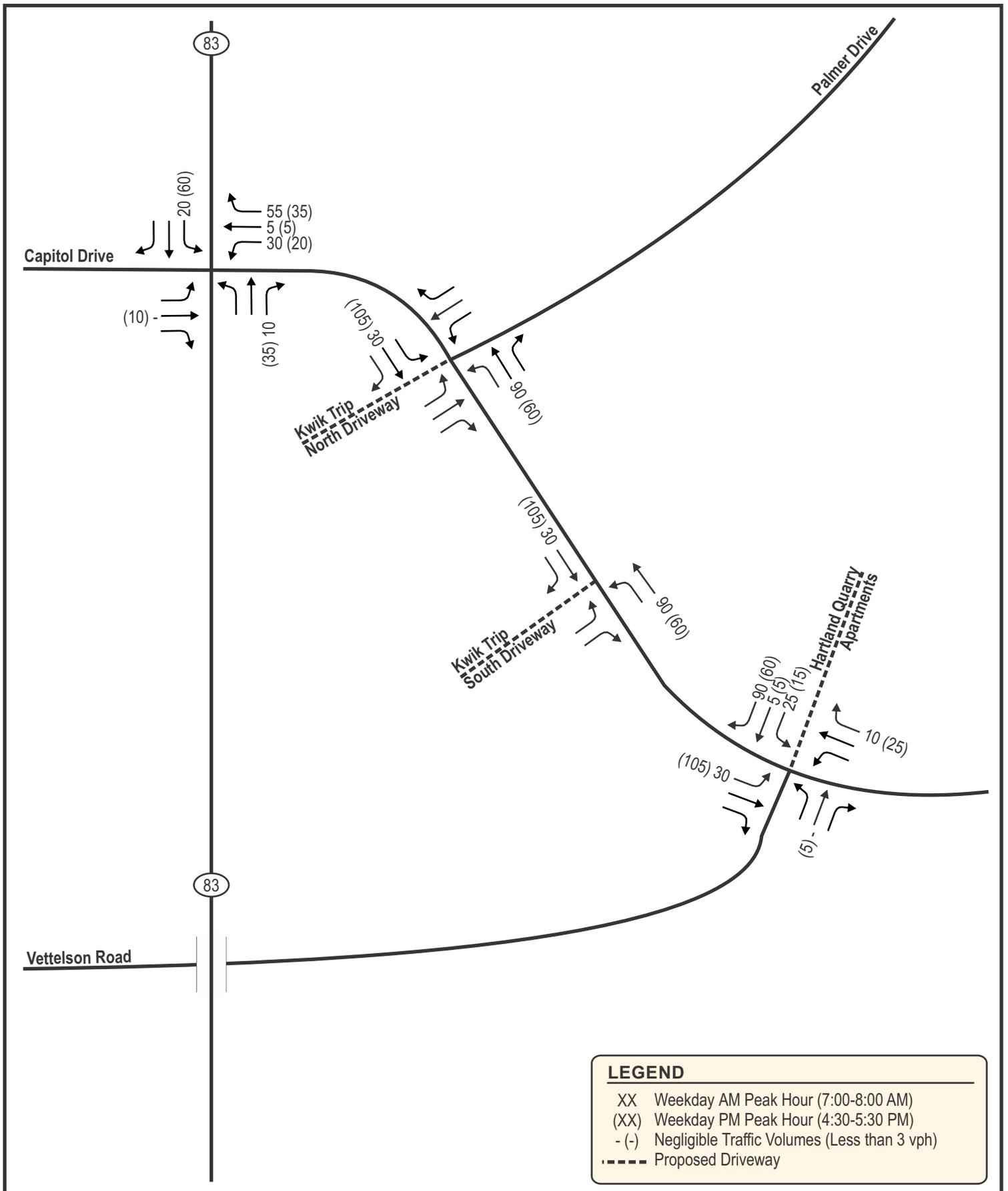
**EXHIBIT 4-5C
KWIK TRIP - DRIVEWAY TRIPS**



LEGEND	
XX	Weekday AM Peak Hour (7:00-8:00 AM)
(XX)	Weekday PM Peak Hour (4:30-5:30 PM)
- (-)	Negligible Traffic Volumes (Less than 3 vph)
- - - -	Proposed Driveway



**EXHIBIT 4-6
HARTLAND QUARRY APARTMENTS NEW TRIPS
400 UNITS**



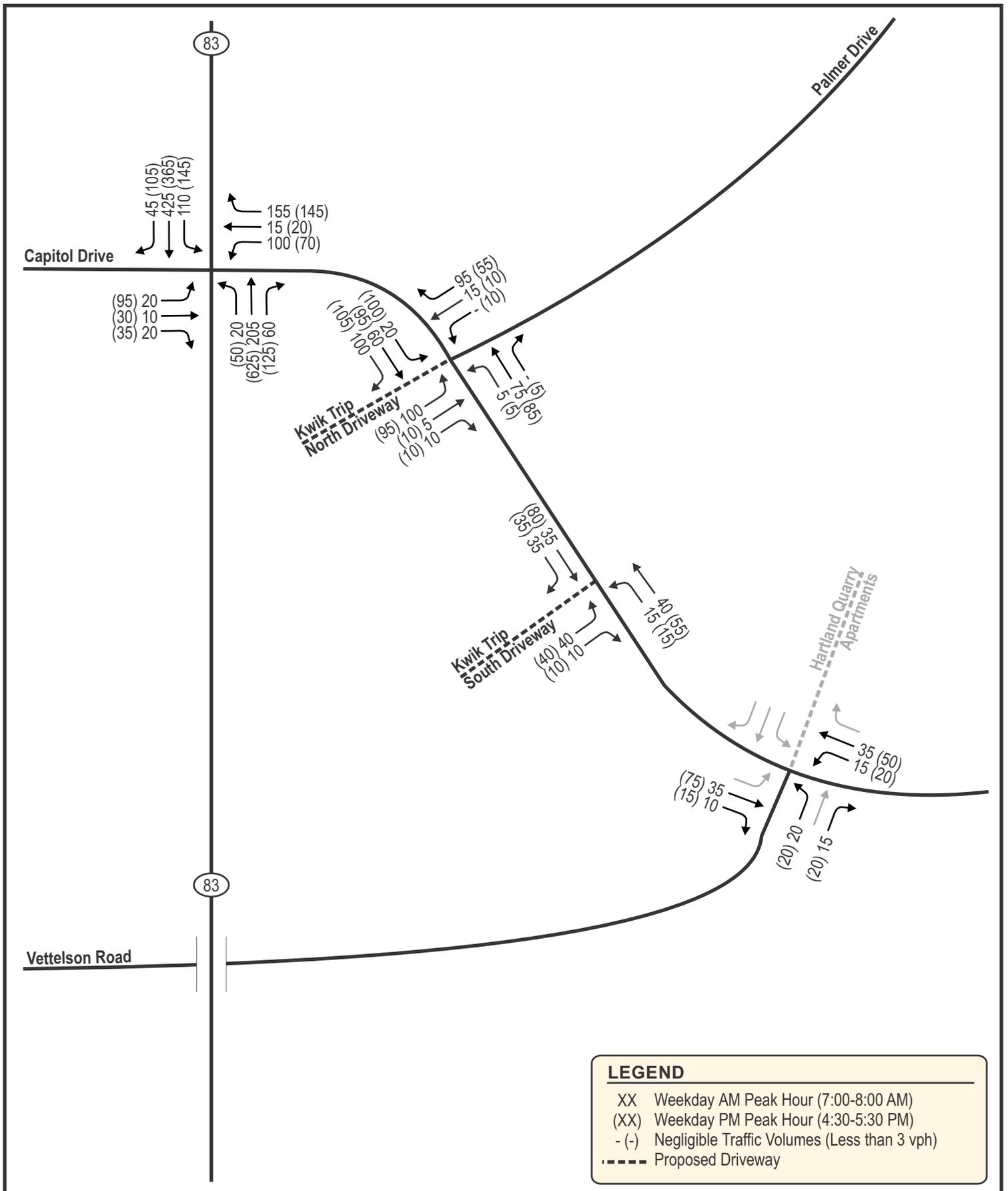
LEGEND

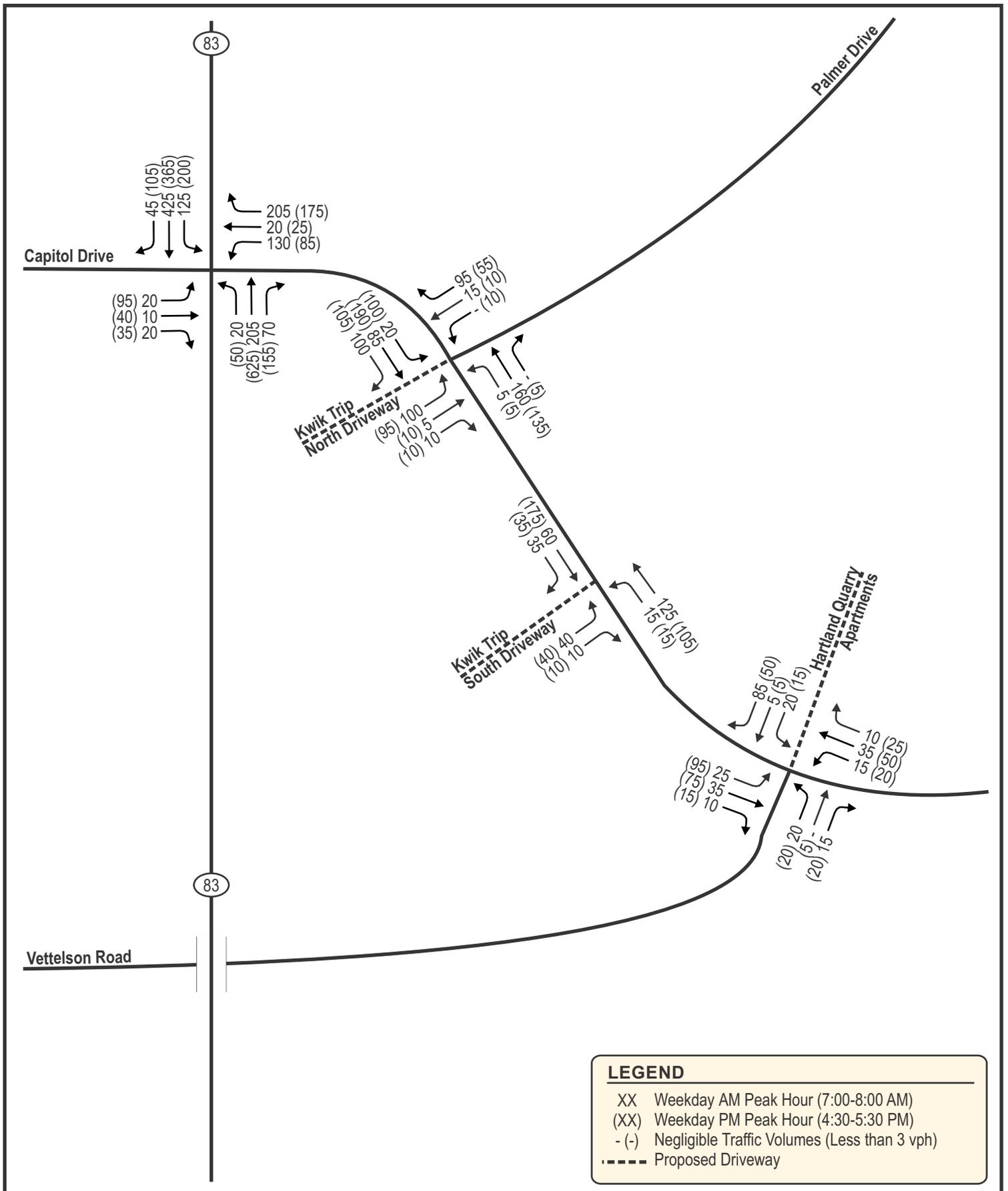
- XX Weekday AM Peak Hour (7:00-8:00 AM)
- (XX) Weekday PM Peak Hour (4:30-5:30 PM)
- (-) Negligible Traffic Volumes (Less than 3 vph)
- - - Proposed Driveway

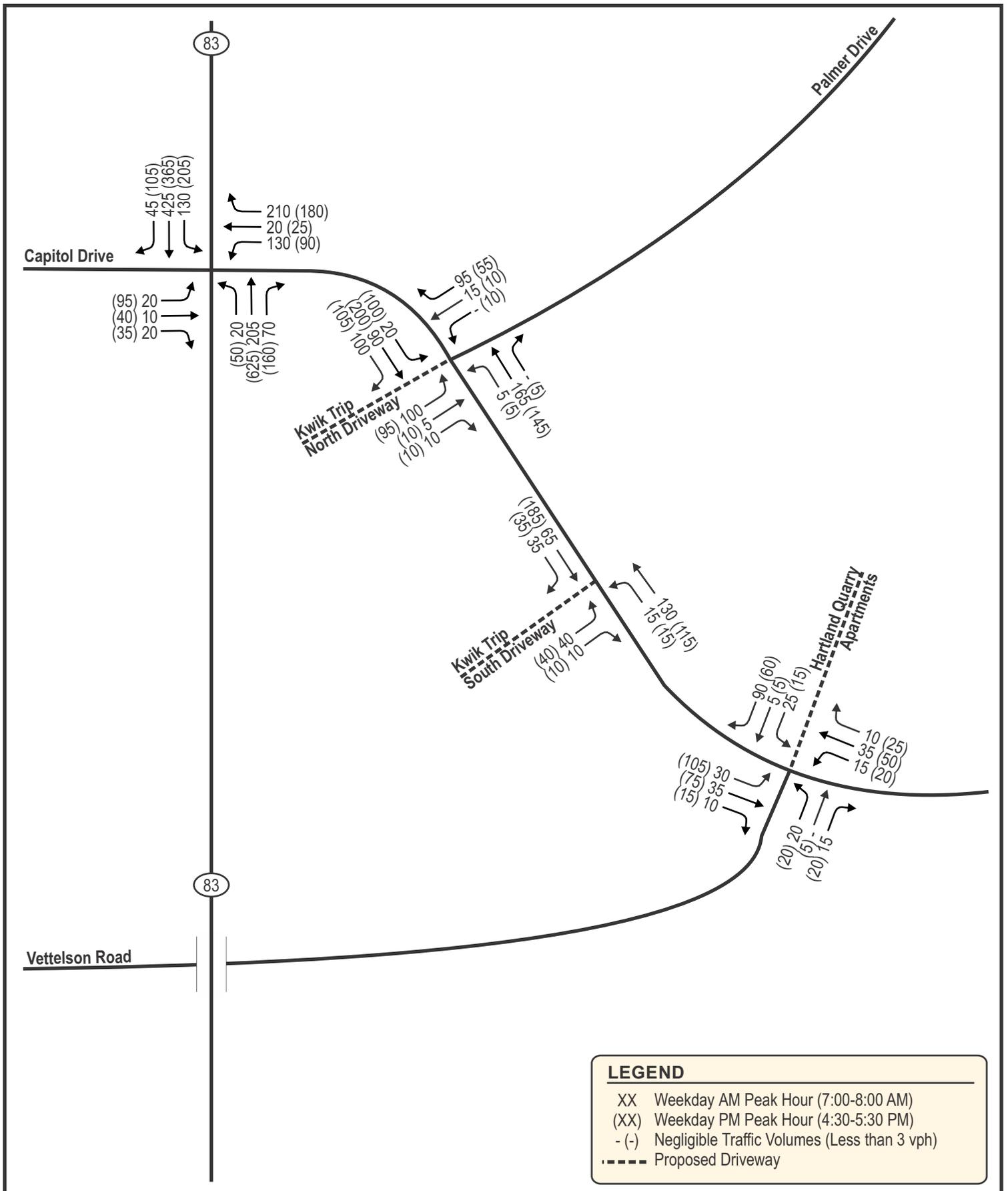


**EXHIBIT 4-7
HARTLAND QUARRY APARTMENTS NEW TRIPS
450 UNITS**

Kwik Trip & Three Leaf Developments Abbreviated TIA - Hartland, WI







LEGEND

- XX Weekday AM Peak Hour (7:00-8:00 AM)
- (XX) Weekday PM Peak Hour (4:30-5:30 PM)
- (-) Negligible Traffic Volumes (Less than 3 vph)
- - - Proposed Driveway



EXHIBIT 4-13

YEAR 2023 BUILD TRAFFIC VOLUMES

FULL BUILDOUT: KWIK TRIP + 450 APARTMENT UNITS

Kwik Trip & Three Leaf Developments Abbreviated TIA - Hartland, WI

CHAPTER V – TRAFFIC AND IMPROVEMENT ANALYSIS

PART A – SITE ACCESS

Two access drives are proposed for the Kwik Trip development. Based on intersection sight distance analyses ([Chapter V, Part E](#)), there is not enough visibility to the left of the driveway to allow for safe right-out or left-in movements. There is enough visibility to the right of the driveway for right-out movements, but the limited visibility to the left (due to the curve, hill, trees, and bushes) may make this movement unsafe (as drivers would need to look in both directions before turning). For full-access turning movements, at the Kwik Trip north driveway, it is recommended that the hill, trees, and bushes in the southeast corner of the STH 83/Capitol Drive intersection be cleared and leveled. Since the STH 83 intersection is close to the Kwik Trip north driveway, and may not provide adequate sight distance for truck exits, it is recommended that this driveway be signed “No Trucks” at the exit.

If the tree line along Three Leaf Partners development property fronting Capitol Drive is removed, then there is enough visibility for full-access turning movements to and from the proposed Kwik Trip south driveway and the Hartland Quarry Apartments driveway.

The proposed traffic volumes do not warrant exclusive left or right-turn lanes for any of the proposed development driveways to Capitol Drive, as the operating speeds and background traffic are relatively low. A separate right-turn lane is recommended at the Kwik Trip north driveway, however, to provide better separation of through and turning traffic around the curve on Capitol Drive. The results of the left-turn and right-turn warrant analyses are in [Appendix A](#).

PART B – CAPACITY/LEVEL OF SERVICE ANALYSIS

The Year 2023 Build traffic volumes were evaluated with the same geometrics and traffic control at the existing study intersections as the Year 2023 Background traffic volumes. All proposed driveways were evaluated with full-access turning movements and stop sign control on the driveway approaches. The Kwik Trip north driveway was evaluated with a separate eastbound right-turn lane on Capitol Drive. To satisfy the Village of Hartland’s interest, roundabout control was evaluated at the Capitol Drive intersections with the Kwik Trip south driveway and Vettelson Road/Hartland Quarry Apartments driveway with the Year 2023 Full Build traffic volumes.

The peak hour operating conditions for each Year 2023 Build condition are shown on the following exhibits. The analysis worksheets for all three volume scenarios are in [Appendix C](#).

- [Exhibit 5-3](#): Year 2023 Build Traffic Capacity/LOS Analysis – Initial Buildout: Kwik Trip Only
- [Exhibit 5-4](#): Year 2023 Build Traffic Capacity/LOS Analysis – Interim Buildout: Kwik Trip + 400 Apartment Units
- [Exhibit 5-5](#): Year 2023 Build Traffic Capacity/LOS Analysis – Full Buildout: Kwik Trip + 450 Apartment Units

Based on the analysis, all traffic movements at the study intersections operate acceptably at LOS D or better during the peak hours through full buildout of the proposed Kwik Trip and Hartland Quarry Apartments developments. Relatively low increases in delays and queues are expected through each buildout phase. With stop sign control, the Capitol Drive intersections with the Kwik Trip south driveway and Vettelson Road/Hartland Quarry Apartments driveway operate at LOS B or better during the peak hours. With roundabout control (single lane roundabout, single-lane approaches), all movements at these intersections operate at LOS A during the peak hours. Although roundabout control results in low delays and queues at these intersections, they are

considerably more costly to construct and maintain, and require a greater amount of right-of-way than stop sign control. Therefore, roundabout control is not recommended as a traffic control option in this study.

PART C – QUEUEING ANALYSIS

The 95th percentile queues for each lane group are shown on the LOS tables for each traffic volume scenario. Based on this analysis, no turn lane extensions are recommended at the study intersections.

PART D – PEDESTRIAN, BICYCLE AND MULTI-USE TRAIL CONSIDERATIONS

There are no pedestrian or bicycle facilities in the study area. The Village of Hartland has indicated that they would like the existing sidewalk on the north side of Capitol Drive to be extended westward to connect with STH 83. They would also like pedestrian connectivity between the Kwik Trip site and a future sidewalk along the north side of Capitol Drive.

To satisfy the Village’s interests, it is recommended that Three Leaf Partners extend the sidewalk on the north side of Capitol Drive westward through the limits of the property. It is recommended that the Village of Hartland continue the sidewalk westward across Palmer Drive to STH 83. It is recommended that Kwik Trip provide pedestrian connection between the Kwik Trip site and the future sidewalk on Capitol Drive. The pedestrian connection is recommended at the proposed Kwik Trip south driveway.

PART E – SPEED CONSIDERATIONS/SIGHT DISTANCE

A sight distance evaluation was completed for the proposed Kwik Trip driveways and Hartland Quarry Apartment driveway to Capitol Drive. Driveways should be designed for intersection sight distance (ISD) in accordance with the latest edition of the American Association of State Highway Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* and on sight distance requirements in the WisDOT *Facilities Development Manual* (FDM). With truck fueling positions proposed for the Kwik Trip site, a WB truck was selected as the design vehicle for the ISD evaluations at the Kwik Trip driveways. A single-unit (SU) truck was selected as the design vehicle for the Hartland Quarry Apartments driveway.

The ISD for the proposed driveways were calculated using the design speed (30 mph) and the cross-section widths (through and turn lanes present at each location) on Capitol Drive. The ISD calculation worksheets are in [Appendix A](#).

E1. Capitol Drive & Kwik Trip North Driveway ISD Evaluation

The ISD for the Kwik Trip north driveway is shown on [Exhibit 5-27A](#). As shown, the curve and hill, bushes, and trees on Capitol Drive, just north of the Kwik Trip driveway blocks visibility for traffic making a right-turn exit out of the driveway. The blocked area would need to be leveled and cleared to achieve the required visibility for passenger cars to make this movement (there would not be enough visibility for right-turn exits for WB trucks).

Due to the curve, the stopping sight distance (SSD) for right-turn inbound movements was evaluated. Only minor clearing of the elevation and bushes would be needed to achieve the 200 feet of SSD required for right-turn inbound movements.

Recommendation: level and clear the land in the southeast corner of the STH 83/Capitol Drive intersection for full-access turning movements at the Kwik Trip north driveway. Install “No Trucks” sign at the Kwik Trip north driveway exit.

E2. Capitol Drive & Kwik Trip South Driveway ISD Evaluation

The ISD for the Kwik Trip south driveway is shown on [Exhibit 5-27B](#). At this location, there is enough visibility for traffic to make a right-turn exit out of the driveway (looking left). The tree line along Capitol Drive on the Hartland Quarry Apartments site blocks visibility for left turn exits (looking right) from the driveway. These trees would need to be removed for full access turning movements out of the driveway.

Recommendation: remove the tree line on the Hartland Quarry Apartments site for full-access turning movements at the Kwik Trip south driveway.

E2. Capitol Drive & Hartland Quarry Apartments ISD Evaluation

The ISD for the Hartland Quarry Apartments driveway is shown on [Exhibit 5-27C](#). Due to the tree line around the curve along Capitol Drive, there is not enough visibility for traffic to make right-turn or left-turn exits out of the driveway (looking left). These trees would need to be removed for full access turning movements out of the driveway.

Recommendation: remove the tree line on the Hartland Quarry Apartments site for full-access turning movements at the Hartland Quarry Apartments driveway.

PART F – TRAFFIC CONTROL NEEDS

The Capitol Drive intersection with STH 83 operates with traffic signal control that is coordinated with adjacent signals along STH 83. No changes to the traffic control or signal timing are recommended in this study.

The remaining study intersections on Capitol Drive operate with stop sign control on the minor street/proposed driveway approaches. No changes to this traffic control are recommended in this study.

PART G – SIGNAL & AWSC WARRANT ANALYSES

Traffic signal warrant and all-way stop control warrants were evaluated at the Capitol Drive intersection with Vettelson Road/Hartland Quarry Apartments driveway to determine if alternative traffic control would be needed at these intersections. With Year 2023 Full Build traffic volumes and two-way stop control, the intersection operates at LOS B or better during the peak hours. The traffic signal and all-way stop control warrant analysis worksheets are in [Appendix A](#).

G1. Traffic Signal Warrant

Traffic signal warrant studies are based on traffic volume warrants from the 2009 *Manual on Uniform Traffic Control Devices* (MUTCD). Chapter 4C of the MUTCD outlines the standards for determining the need for traffic signals at a particular location. Warrant 1, Eight-Hour Vehicular Volume, Warrant 2, Four-Hour Vehicular Volume, and Warrant 3, Peak-Hour Volume was evaluated in this study.

MUTCD Warrants 1, 2, and 3 were compared to hourly traffic volumes that include the existing hourly traffic volume counts plus additional hourly traffic expected from the proposed development (using ITE hourly distribution percentages for each different land use on site). The following parameters form the basis of the signal warrant analysis:

- Capitol Drive identified as the major street, Vettelson Road and the Hartland Quarry Apartments driveway identified as the minor street.
- Mainline speed limit of 25 mph (<40 mph); Warrant volume thresholds at 100%
- Separate northbound right-turn lane; 0% minor street right-turn volumes

With these parameters, none of the MUTCD signal warrants are expected to be met. All traffic volumes would need to increase more than 200% to meet signal warrant volume thresholds.

G2. All-Way Stop Control Warrant

The all-way stop control warrants were also evaluated based on the procedures in the MUTCD. All-way stop control warrants are not met at the Capitol Drive intersection with Vettelson Road/Hartland Quarry Apartments driveway with the Year 2023 Full Build traffic volumes. Volumes would need to increase by up to 100 vehicles on the mainline and 100 vehicles on the minor streets for at least eight hours of the day in order to meet all-way stop control warrants.

**Initial Buildout (Kwik Trip Only) Traffic Peak Hour Operating Conditions
Existing Transportation System + New Driveway Approaches**

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											I/S LOS & Delay	
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓		↙
Node 100: Capitol Drive (E/W) & STH 83 (N/S) <i>Traffic Signal Control</i>	<i>Lanes-></i>														
	AM	LOS	D	C	D	D	D	D	A	A	A	A	A	A	B
		Delay	36	34	35	39	35	38	5	6	6	4	6	5	13
		v/c	0.12	0.06	0.09	0.55	0.09	0.65	0.05	0.13	0.05	0.18	0.25	0.04	
		Queue	30'	20'	20'	100'	25'	95'	10'	50'	25'	35'	95'	20'	
	PM	LOS	D	D	D	D	D	D	A	A	A	A	A	A	B
		Delay	40	36	36	39	36	38	4	7	6	4	6	5	12
		v/c	0.48	0.15	0.13	0.35	0.10	0.54	0.07	0.29	0.08	0.26	0.17	0.07	
		Queue	100'	40'	35'	80'	30'	95'	20'	135'	40'	40'	70'	35'	
	Node 200: Capitol Drive (E/W) & Palmer Drive/Kwik Trip Driveway (N/S) <i>Stop Sign Control (NB/SB)</i>	<i>Lanes-></i>													
AM		LOS	A	*	*	A			B		A				A
		Delay	7	*	*	7			13		9				5
		v/c	0.02	*	*	0.00			0.24		0.15				
		Queue	5'	*	*	0'			25'		15'				
PM		LOS	A	*	*	A			C		B				A
		Delay	7	*	*	7			15		10				5
		v/c	0.08	*	*	0.00			0.28		0.12				
		Queue	5'	*	*	0'			30'		10'				
Node 300: Capitol Drive (E/W) & Kwik Trip Driveway (N/S) <i>Stop Sign Control (NB)</i>		<i>Lanes-></i>													
	AM	LOS	-	*	A	-			A		-				A
		Delay	-	*	7	-			9		-				3
		v/c	-	*	0.01	-			0.07		-				
		Queue	-	*	0'	-			5'		-				
	PM	LOS	-	*	A	-			A		-				A
		Delay	-	*	7	-			9		-				2
		v/c	-	*	0.01	-			0.07		-				
		Queue	-	*	0'	-			5'		-				
	Node 400: Capitol Drive (E/W) & Vettelson Road(N/S) <i>Stop Sign Control (NB)</i>	<i>Lanes-></i>													
AM		LOS	-	*	A	*	-		A	-	A	-	-	-	A
		Delay	-	*	7	*	-		9	-	8	-	-	-	3
		v/c	-	*	0.01	*	-		0.03	-	0.02	-	-	-	
		Queue	-	*	0'	*	-		5'	-	5'	-	-	-	
PM		LOS	-	*	A	*	-		A	-	A	-	-	-	A
		Delay	-	*	7	*	-		9	-	8	-	-	-	2
		v/c	-	*	0.02	*	-		0.03	-	0.03	-	-	-	
		Queue	-	*	0'	*	-		5'	-	5'	-	-	-	

**Interim Buildout (Kwik Trip + 400 MF Units) Traffic Peak Hour Operating Conditions
Existing Transportation System + New Driveway Approaches**

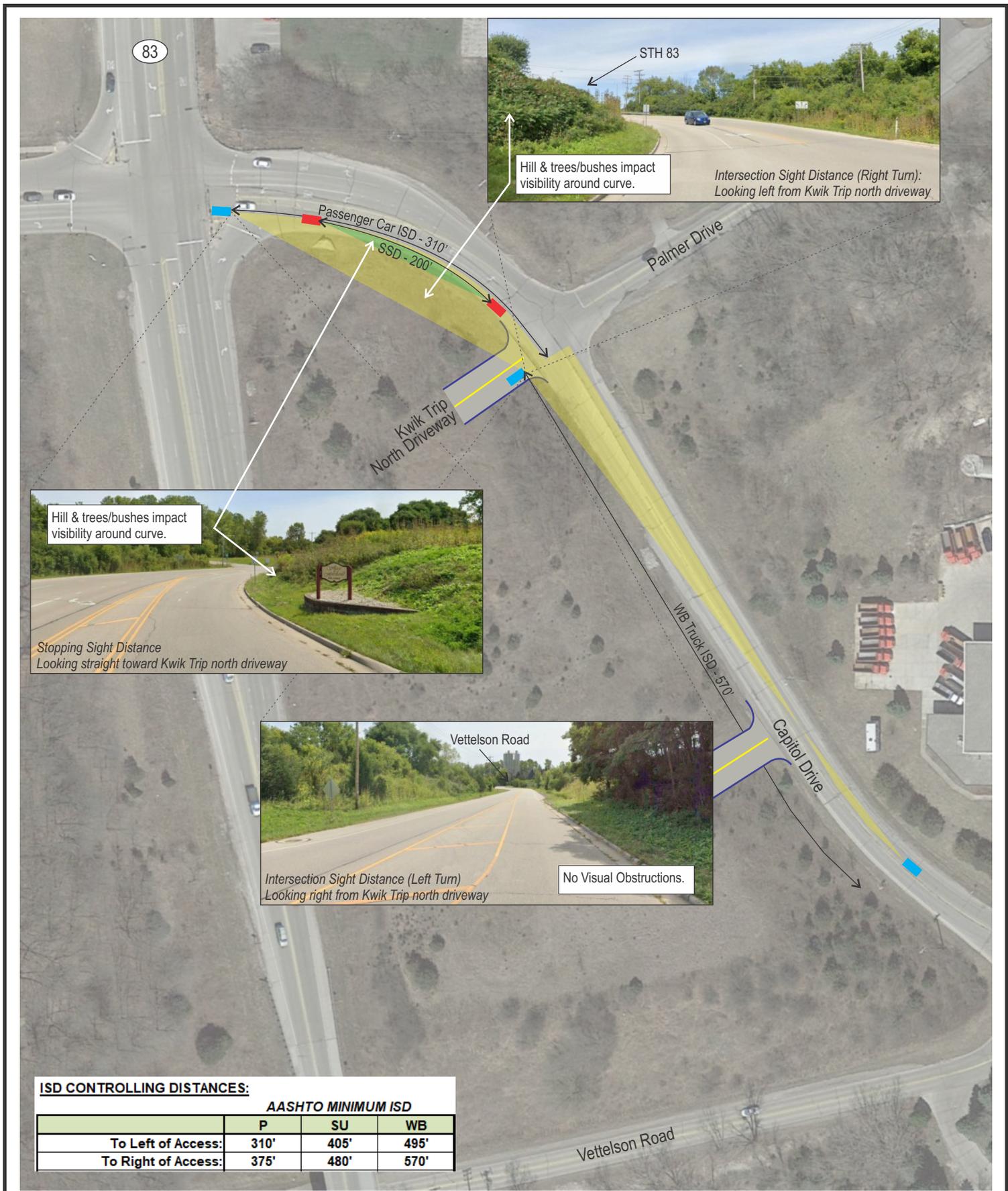
Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach											I/S LOS & Delay	
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓		↙
Node 100: Capitol Drive (E/W) & STH 83 (N/S) <i>Traffic Signal Control</i>	<i>Lanes-></i>														
	AM	LOS	C	C	C	D	C	D	A	A	A	A	A	A	B
		Delay	34	32	32	38	32	37	6	8	7	5	7	6	15
		v/c	0.11	0.05	0.07	0.61	0.09	0.70	0.05	0.14	0.07	0.22	0.26	0.04	
		Queue	30'	15'	20'	125'	30'	120'	10'	55'	30'	45'	95'	20'	
	PM	LOS	D	D	D	D	D	D	A	A	A	A	A	A	B
		Delay	40	36	36	40	35	39	4	7	6	5	6	5	13
		v/c	0.48	0.20	0.13	0.43	0.12	0.63	0.07	0.29	0.10	0.36	0.17	0.07	
		Queue	100'	50'	35'	90'	35'	110'	20'	145'	55'	55'	75'	35'	
	Node 200: Capitol Drive (E/W) & Palmer Drive/Kwik Trip Driveway (N/S) <i>Stop Sign Control (NB/SB)</i>	<i>Lanes-></i>													
AM		LOS	A	*	*	A			C		B				A
		Delay	7	*	*	7			15		10				5
		v/c	0.02	*	*	0.01			0.30		0.18				
		Queue	5'	*	*	0'			30'		15'				
PM		LOS	A	*	*	A			C		B				A
		Delay	7	*	*	7			20		11				5
		v/c	0.08	*	*	0.01			0.36		0.14				
		Queue	10'	*	*	0'			40'		15'				
Node 300: Capitol Drive (E/W) & Kwik Trip Driveway (N/S) <i>Stop Sign Control (NB)</i>		<i>Lanes-></i>													
	AM	LOS	-	*		A			B						A
		Delay	-	*		7			10						2
		v/c	-	*		0.01			0.08						
		Queue	-	*		0'			10'						
	PM	LOS	-	*		A			B						A
		Delay	-	*		7			11						1
		v/c	-	*		0.01			0.08						
		Queue	-	*		0'			10'						
	Node 400: Capitol Drive (E/W) & Vettelson Road/Hartland Quarry Driveway (N/S) <i>Stop Sign Control (NB/SB)</i>	<i>Lanes-></i>													
AM		LOS	A			A	*		B	A	A				A
		Delay	7			7	*		11	8	9				6
		v/c	0.02			0.01	*		0.05	0.02	0.16				
		Queue	5'			0'	*		5'	5'	15'				
PM		LOS	A			A	*		B	A	B				A
		Delay	7			7	*		14	8	10				5
		v/c	0.08			0.02	*		0.07	0.03	0.11				
		Queue	10'			0'	*		5'	5'	10'				

**Full Buildout (Kwik Trip + 450 MF Units) Traffic Peak Hour Operating Conditions
Existing Transportation System + New Driveway Approaches**

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay	
			Eastbound			Westbound			Northbound			Southbound				
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙		
Node 100: Capitol Drive (E/W) & STH 83 (N/S) <i>Traffic Signal Control</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1	1	1	1	15
		LOS	C	C	C	D	C	D	A	A	A	A	A	A		
		Delay	34	32	32	38	32	37	6	8	7	5	7	6		
		v/c	0.11	0.05	0.07	0.61	0.09	0.72	0.05	0.14	0.07	0.22	0.26	0.04		
	Queue	30'	15'	20'	125'	30'	120'	10'	55'	30'	45'	95'	20'			
	PM	LOS	D	D	D	D	D	D	A	A	A	A	A	A	13	
		Delay	40	36	35	40	35	39	4	7	6	5	6	5		
		v/c	0.48	0.20	0.13	0.46	0.12	0.65	0.07	0.29	0.10	0.37	0.17	0.07		
		Queue	100'	50'	35'	95'	35'	115'	20'	145'	55'	60'	75'	35'		
	Node 200: Capitol Drive (E/W) & Palmer Drive/Kwik Trip Driveway (N/S) <i>Stop Sign Control (NB/SB)</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1	1	1	5
LOS			A	*	*	A	*	*	C	*	*	B	*	*		
Delay			7	*	*	7	*	*	16	*	*	10	*	*		
v/c			0.02	*	*	0.01	*	*	0.31	*	*	0.18	*	*		
Queue		5'	*	*	0'	*	*	35'	*	*	20'	*	*			
PM		LOS	A	*	*	A	*	*	C	*	*	B	*	*	5	
		Delay	7	*	*	7	*	*	21	*	*	12	*	*		
		v/c	0.08	*	*	0.01	*	*	0.37	*	*	0.14	*	*		
		Queue	10'	*	*	0'	*	*	45'	*	*	15'	*	*		
Node 300: Capitol Drive (E/W) & Kwik Trip Driveway (N/S) <i>Stop Sign Control (NB)</i>		AM	Lanes->	-	1	1	1	-	1	1	1	-	-	-	-	2
	LOS		-	*	*	A	*	*	B	*	*	-	-	-		
	Delay		-	*	*	7	*	*	10	*	*	-	-	-		
	v/c		-	*	*	0.01	*	*	0.08	*	*	-	-	-		
	Queue	-	*	*	0'	*	*	10'	*	*	-	-	-			
	PM	LOS	-	*	*	A	*	*	B	*	*	-	-	-	1	
		Delay	-	*	*	7	*	*	11	*	*	-	-	-		
		v/c	-	*	*	0.01	*	*	0.09	*	*	-	-	-		
		Queue	-	*	*	0'	*	*	10'	*	*	-	-	-		
	Node 400: Capitol Drive (E/W) & Vettelson Road/Hartland Quarry Driveway (N/S) <i>Stop Sign Control (NB/SB)</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1	1	1	6
LOS			A	A	A	A	*	*	B	A	A	A	A	A		
Delay			7	7	7	7	*	*	11	8	8	9	9	9		
v/c			0.02	0.01	0.01	0.01	*	*	0.05	0.02	0.02	0.18	0.18	0.18		
Queue		5'	0'	0'	0'	*	*	5'	5'	5'	15'	15'	15'			
PM		LOS	A	A	A	A	*	*	B	A	A	B	B	B	5	
		Delay	7	7	7	7	*	*	14	8	8	10	10	10		
		v/c	0.09	0.02	0.02	0.02	*	*	0.07	0.03	0.03	0.13	0.13	0.13		
		Queue	10'	0'	0'	0'	*	*	5'	5'	5'	10'	10'	10'		

**Full Buildout (Kwik Trip + 450 MF Units) Traffic Peak Hour Operating Conditions
Roundabout Options**

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙	
Node 300: Capitol Drive (E/W) & Kwik Trip Driveway (N/S) <i>Roundabout Control</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1	1	1	3
		LOS	A	A	A	A	A	A	A	A	A	A	A	A	
		Delay	3	3	3	3	4	4	3	3	3	-	-	-	
		v/c	0.10	0.10	0.10	0.10	0.14	0.14	0.05	0.05	0.05	-	-	-	
	Queue	10'	10'	10'	10'	15'	15'	5'	5'	5'	-	-	-		
	PM	LOS	A	A	A	A	A	A	A	A	A	-	-	-	4
		Delay	4	4	4	4	3	3	3	3	3	-	-	-	
		v/c	0.19	0.19	0.19	0.19	0.11	0.11	0.05	0.05	0.05	-	-	-	
		Queue	20'	20'	20'	20'	10'	10'	5'	5'	5'	-	-	-	
	Node 400: Capitol Drive (E/W) & Vettelson Road/Hartland Quarry Driveway (N/S) <i>Roundabout Control</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1	1	1
LOS			A	A	A	A	A	A	A	A	A	A	A	A	
Delay			3	3	3	3	3	3	3	3	3	4	4	4	
v/c			0.09	0.09	0.09	0.09	0.07	0.07	0.04	0.04	0.04	0.13	0.13	0.13	
Queue		10'	10'	10'	10'	5'	5'	5'	5'	5'	10'	10'	10'		
PM		LOS	A	A	A	A	A	A	A	A	A	A	A	A	4
		Delay	4	4	4	4	3	3	3	3	3	3	3	3	
		v/c	0.19	0.19	0.19	0.19	0.10	0.10	0.05	0.05	0.05	0.08	0.08	0.08	
		Queue	20'	20'	20'	20'	10'	10'	5'	5'	5'	10'	10'	10'	



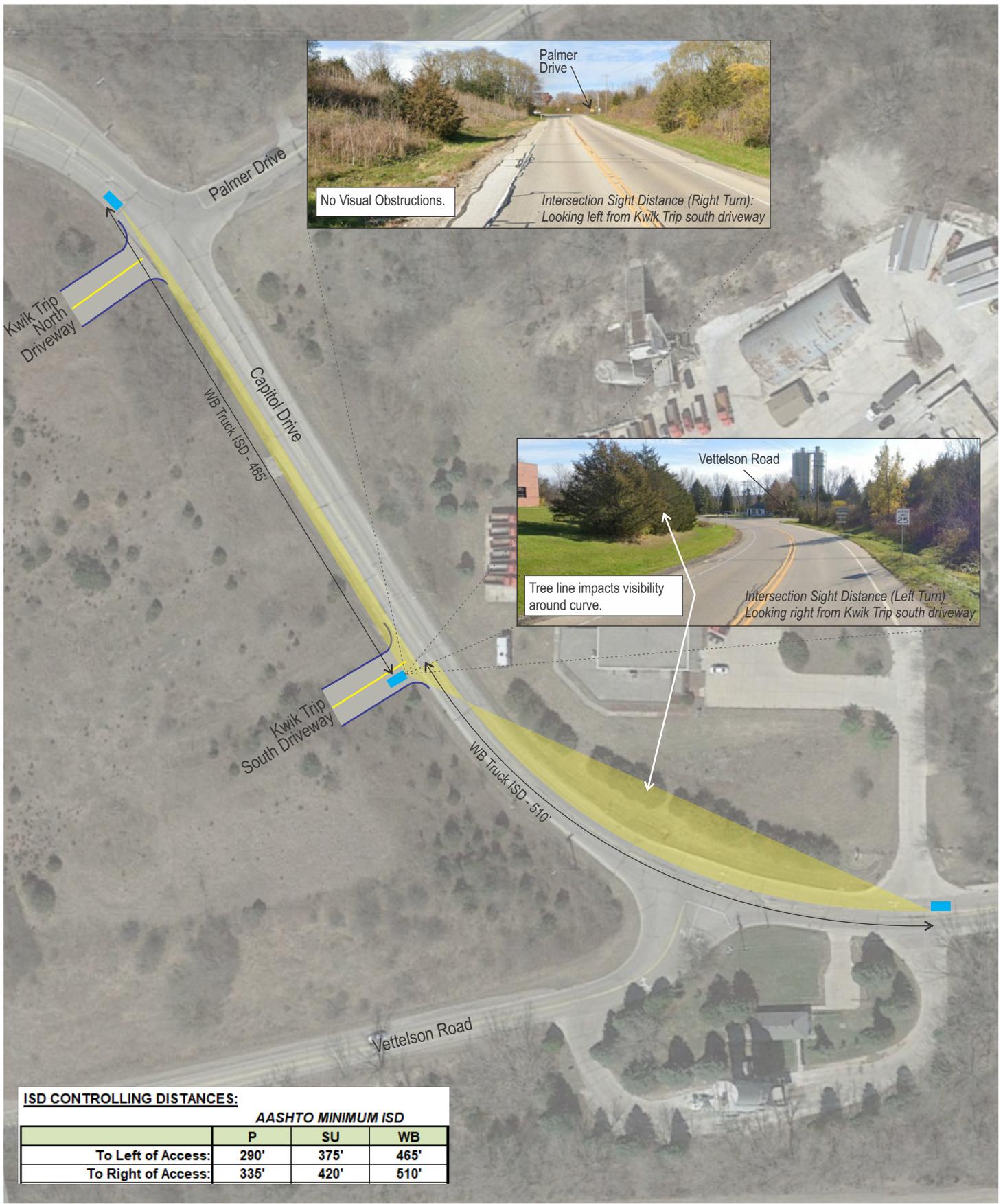
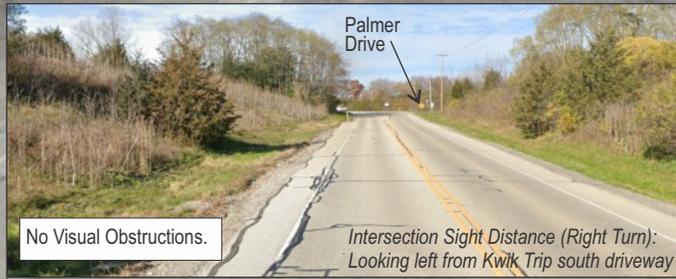
ISD CONTROLLING DISTANCES:

	AASHTO MINIMUM ISD		
	P	SU	WB
To Left of Access:	310'	405'	495'
To Right of Access:	375'	480'	570'



**EXHIBIT 5-27A
INTERSECTION & STOPPING SIGHT DISTANCE
KWIK TRIP NORTH DRIVEWAY AT CAPITOL DR./PALMER DR.**

Kwik Trip & Three Leaf Developments Abbreviated TIA - Hartland, WI



ISD CONTROLLING DISTANCES:

	AASHTO MINIMUM ISD		
	P	SU	WB
To Left of Access:	290'	375'	465'
To Right of Access:	335'	420'	510'



ISD CONTROLLING DISTANCES:

	AASHTO MINIMUM ISD		
	P	SU	40%
To Left of Access:	290'	375'	465'
To Right of Access:	355'	450'	540'



**EXHIBIT 5-27C
INTERSECTION SIGHT DISTANCE
APARTMENTS DRIVEWAY AT CAPITOL DR./VETTELSON RD.**

Kwik Trip & Three Leaf Developments Abbreviated TIA - Hartland, WI

CHAPTER VI – RECOMMENDATIONS AND CONCLUSION

PART A – RECOMMENDATIONS

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM) 6th Edition. Intersection operation is defined by “Level of Service”. Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS ‘A’, to very poor, represented by LOS ‘F’. For the purposes of this study, LOS D or better was used to define desirable peak hour operating conditions.

Improvements are for jurisdictional consideration and are not legally binding. The Village of Hartland reserves the right to determine alternative solutions.

A1. Background Traffic Recommendations

The following are recommended to address background traffic (no development) conditions at the study intersections. These recommendations are estimated to be the responsibility of the Village of Hartland:

- Per the Village of Hartland, provide a sidewalk along the north side of Capitol Drive from STH 83 to across Palmer Drive.
- The Village has indicated that westbound traffic on Capitol Drive “cut the corner” when turning onto Vettelson Drive. Historical crashes have not identified any crash pattern due to this movement. It is recommended that the Village explore options to mitigate this issue by constructing a right-turn island, moving stop bars, etc. Sight distance and vehicle turning radii need to be considered in design features prior to construction.

A2. Build Traffic Recommendations (Kwik Trip)

Capitol Drive & Kwik Trip North Driveway

- Clear and level the land in the southeast corner of the STH 83/Capitol Drive intersection to provide adequate sight distance for full-access turning movements into and out of the driveway.
- Install a “No Trucks” sign at the Kwik Trip north driveway exit to Capitol Drive.
- Although not warranted based on traffic volumes, provide a right-turn lane on Capitol Drive to separate the slower-moving right-turn from through traffic traveling eastbound around the curve on Capitol Drive.

Capitol Drive & Kwik Trip South Driveway

- Clear trees on the Hartland Quarry Apartments site to provide 510 feet of visibility to the right of the Kwik Trip south driveway.
- Construct the driveway with a single entrance and exit lane and stop sign control on the approach to Capitol Drive. Two-way stop control results in low delays and queues at all intersection movements during the peak hours. Roundabout control provides the same, but results in considerable additional cost and right-of-way to implement this alternative. Therefore, it is not a recommended option in this study.
- Per the Village requirements, provide a pedestrian crossing that connects between the Kwik Trip site and a future sidewalk along the north side of Capitol Drive.

A3. Build Traffic Recommendations (Hartland Quarry Apartments)

General

- Per the Village of Hartland, provide a sidewalk along the north side of Capitol Drive throughout the limits of the Hartland Quarry Apartments property.

Capitol Drive & Hartland Quarry Apartments Driveway

- Clear trees on the Hartland Quarry Apartments site to provide 375 feet of visibility to the left of the Kwik Trip south driveway and 450 feet of visibility to the right of the Kwik Trip south driveway.
- Construct the driveway with a single entrance and exit lane and stop sign control on the approach to Capitol Drive. Align the driveway across from Vettelson Drive. Two-way stop control results in low delays and queues at all intersection movements during the peak hours. Roundabout control provides the same, but results in considerable additional cost and right-of-way to implement this alternative. Therefore, it is not a recommended option in this study.

PART B – CONCLUSION

The modifications listed above are expected to accommodate traffic through full buildout of the proposed Kwik Trip and Hartland Quarry Apartments development.

APPENDIX A

Traffic Counts/Calculation Worksheets

**Intersection Traffic Counts
PHF and Percent Heavy Vehicles
Signal Timings
Saturation Flow Rate Calculations
Left and Right-Turn Lane Warrants Worksheets
Signals and All-Way Stop Control Warrants
Intersection Sight Distance Calculations**

**3047-HartlandKwik Trip
Peak Hour Calculations**

Weekday AM Peak Hour

Time	Capital Vettleson 3/23/2022	Capital Palmer 3/23/2022	Capital STH 83 3/23/2022	Sums
6:00 AM	13	27	98	
6:15 AM	17	21	126	
6:30 AM	26	39	144	
6:45 AM	19	38	218	786
7:00 AM	32	36	181	897
7:15 AM	17	47	226	1023
7:30 AM	25	49	258	1146
7:45 AM	37	58	334	1300
8:00 AM	6	40	185	1282
8:15 AM	21	39	225	1277
8:30 AM	20	37	224	1226
8:45 AM	30	42	233	1102

Weekday PM Peak Hour

Time	Capital Vettleson 3/21/2022	Capital Palmer 3/21/2022	Capital STH 83 3/21/2022	Sums
3:00 PM	35	60	313	
3:15 PM	28	75	356	
3:30 PM	43	66	406	
3:45 PM	29	54	351	1816
4:00 PM	45	71	386	1910
4:15 PM	50	64	341	1906
4:30 PM	50	66	421	1928
4:45 PM	29	65	410	1998
5:00 PM	49	75	427	2047
5:15 PM	39	79	373	2083
5:30 PM	31	72	325	1974
5:45 PM	41	60	292	1863

Intersection Traffic Volume Report

Count Basics		Version 2013.J4.1		Page 1 of 13	
Start Date:	Monday, March 21, 2022	Weekday	Schools in Session		
Total Number of Hours Counted:	6	Non-Holiday	No Special Events		

Base Information, Observed (6) Hour and Estimated (24) Hour Volume Summaries

Intersection of: **STH 83 and Capitol Drive**

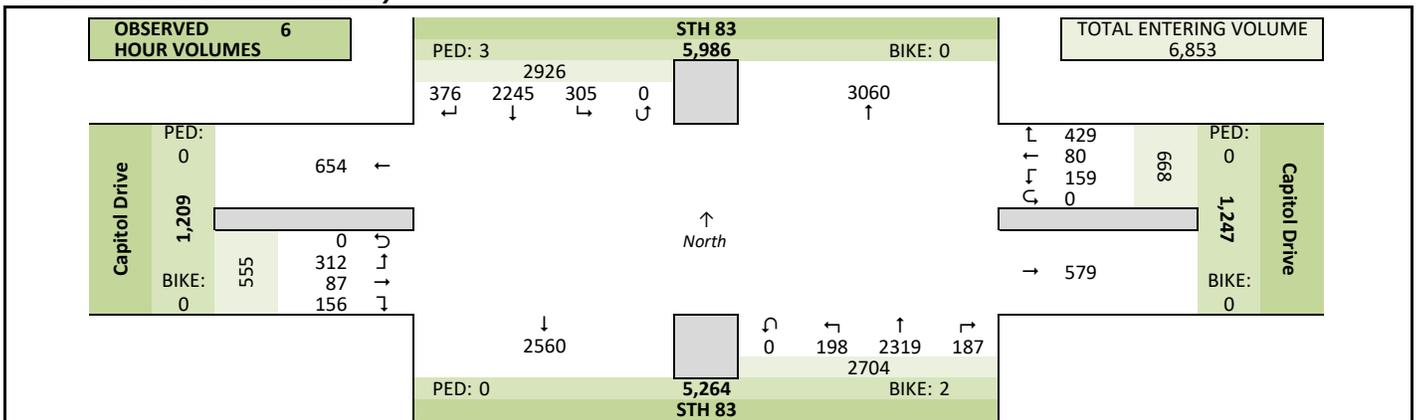
Site Information

Municipality	Village of Hartland		
County	Waukesha	WisDOT Region	SE
Traffic Control	Traffic Signal		
Roadway Names	North Direction ↑		
North Leg	STH 83		
East Leg	Capitol Drive		
South Leg	STH 83		
West Leg	Capitol Drive		
Special Considerations			
Schools	In Session		
Holidays	None		
Special Events	None		
Special Pedestrians Observed			
Pre-school children	None		
Elementary school age children	None		
Visually impaired (white cane/helper dog)	None		
Elderly/disabled (except wheelchairs)	None		
Wheelchairs/electric scooters	None		
Other (describe)	None		

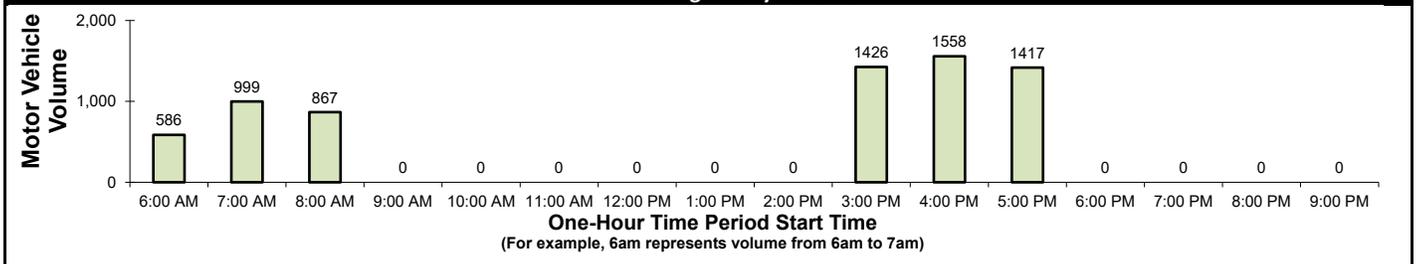
Count Information

Hrs Counted:	6:00 AM-9:00 AM and 3:00 PM-6:00 PM		
1st Day of Count	Monday, March 21, 2022		Weather
AM Peak Period	Wednesday, March 23, 2022		Clear & Dry
Midday Peak Period	Wednesday, March 23, 2022		Clear & Dry
PM Peak Period	Monday, March 21, 2022		Clear & Dry
Calculated Peak Hours			
AM	7:15-8:15am	MD	PM 4:30-5:30pm
Peak Hours Selected for Analysis			
AM	7:00-8:00am	MD	PM 4:30-5:30pm
Daily/Seasonal Adjustment Group	(2) Urban Arterials & Collectors		
Count Expansion Group	(2) Urban Arterials & Collectors		
Daily/Seasonal Adjustment Factor	0.983	Count Expansion Factor	2.284
Company Name	TADI, Inc		Manual Adj. 1.000
Observers	AM Peak Period	Amy Scheuerlein	
	Midday Peak Period	None	
	PM Peak Period	Wendy Picard	
Comments	2019 DOT Seasonal Factors		

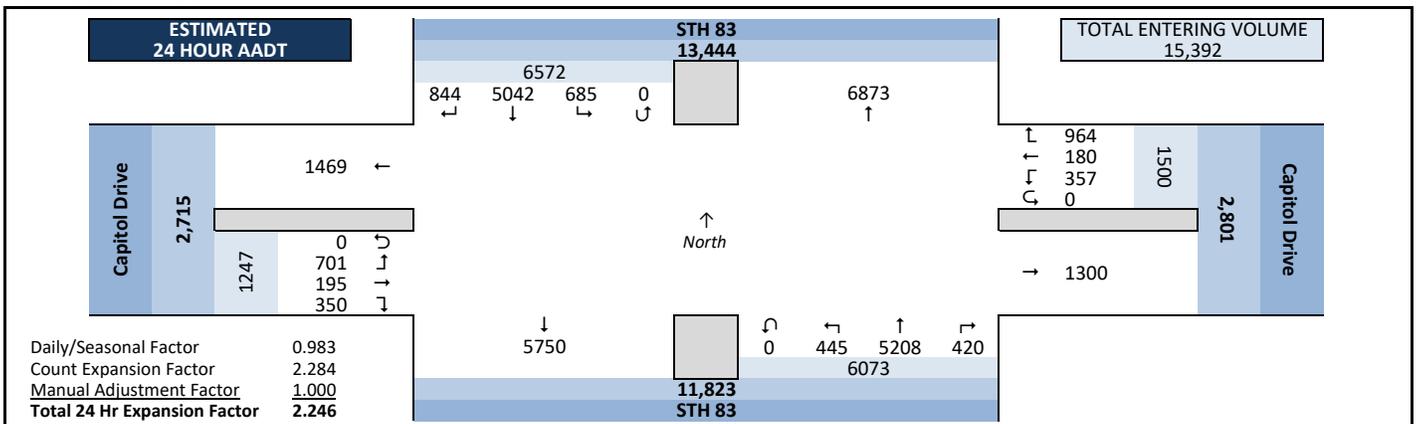
Observed 6 Hour Volume Summary



Total Entering Hourly Volume



Estimated 24 Hour AADT



Intersection Traffic Volume Report

15-Minute Motor Vehicle Data

STH 83 and Capitol Drive



15-Minute Motor Vehicle Data

15-Minute Time Period	From North					From East					From South					From West					15-Min Totals	Hourly Sum	PHF
	STH 83					Capitol Drive					STH 83					Capitol Drive							
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total			
6:00 AM	4	31	5	0	40	13	0	3	0	16	3	35	0	0	38	0	0	4	0	4	98	586	0.67
6:15 AM	5	60	4	0	69	8	0	8	0	16	1	30	4	0	35	2	0	4	0	6	126	669	0.77
6:30 AM	10	55	6	0	71	22	0	7	0	29	2	35	4	0	41	1	2	0	0	3	144	769	0.85
6:45 AM	11	121	6	0	138	20	3	6	0	29	2	35	8	0	45	2	0	4	0	6	218	883	0.86
7:00 AM	12	78	5	0	95	28	2	2	0	32	0	42	4	0	46	3	0	5	0	8	181	999	0.75
7:15 AM	4	101	3	0	108	24	3	10	0	37	6	64	1	0	71	4	2	4	0	10	226	1003	0.75
7:30 AM	12	133	4	0	149	30	2	6	0	38	6	48	4	0	58	8	1	4	0	13	258	1002	0.75
7:45 AM	17	162	12	0	191	23	4	11	0	38	6	73	12	0	91	4	2	8	0	14	334	968	0.72
8:00 AM	9	66	3	0	78	21	1	6	0	28	5	52	3	0	60	10	0	9	0	19	185	867	0.93
8:15 AM	2	116	4	0	122	23	1	8	0	32	3	59	1	0	63	4	1	3	0	8	225		
8:30 AM	13	102	2	0	117	18	1	5	0	24	6	57	9	0	72	4	1	6	0	11	224		
8:45 AM	12	106	8	0	126	19	1	6	0	26	6	59	5	0	70	3	1	7	0	11	233		
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3:00 PM	21	78	20	0	119	10	5	6	0	21	11	126	11	0	148	9	5	11	0	25	313	1426	0.88
3:15 PM	17	97	14	0	128	17	4	14	0	35	13	115	15	0	143	13	9	28	0	50	356	1499	0.92
3:30 PM	19	101	22	0	142	13	6	5	0	24	13	180	15	0	208	10	6	16	0	32	406	1484	0.91
3:45 PM	21	113	15	0	149	15	5	3	0	23	8	130	8	0	146	3	6	24	0	33	351	1499	0.89
4:00 PM	20	96	16	0	132	17	7	10	0	34	8	165	12	0	185	13	6	16	0	35	386	1558	0.93
4:15 PM	31	90	21	0	142	9	7	8	0	24	7	121	13	0	141	8	8	18	0	34	341	1599	0.94
4:30 PM	30	88	15	0	133	20	5	6	0	31	13	195	15	0	223	12	7	15	0	34	421	1631	0.95
4:45 PM	27	114	20	0	161	11	4	6	0	21	11	155	12	0	178	12	10	28	0	50	410	1535	0.90
5:00 PM	22	94	25	0	141	23	2	7	0	32	14	194	13	0	221	7	6	20	0	33	427	1417	0.83
5:15 PM	26	95	26	0	147	16	6	7	0	29	20	126	11	0	157	6	1	33	0	40	373		
5:30 PM	17	67	28	0	112	11	8	5	0	24	14	129	6	0	149	6	7	27	0	40	325		
5:45 PM	14	81	21	0	116	18	3	4	0	25	9	94	12	0	115	12	6	18	0	36	292		
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Totals	376	2245	305	0	2926	429	80	159	0	668	187	2319	198	0	2704	156	87	312	0	555	6853		

Peak Hour All Vehicle Volume Summary

Hourly Time Period	From North					From East					From South					From West					Total Hourly Volume	PHF
	STH 83					Capitol Drive					STH 83					Capitol Drive						
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total		
AM 7:00 AM	45	474	24	0	543	105	11	29	0	145	18	227	21	0	266	19	5	21	0	45	999	0.75
MD 12:00 PM	0	0	0	0	0	0	0															

Intersection Traffic Volume Report

Count Basics			Page 9 of 13
Start Date:	Monday, March 21, 2022	Weekday	Schools in Session
Total Number of Hours Counted:	6	Non-Holiday	No Special Events

15-Minute Heavy Vehicle Data

STH 83 and Capitol Drive



15-Minute Heavy Vehicle Data

15-Minute Time Period	From North					From East					From South					From West					15-Min Totals	Hourly Sum					
	STH 83					Capitol Drive					STH 83					Capitol Drive											
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total							
6:00 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	50	
6:15 AM	1	4	0	0	5	0	0	0	0	0	0	0	7	0	0	0	7	1	0	0	1	0	0	2	14	41	
6:30 AM	0	2	1	0	3	1	0	0	0	0	1	0	6	0	0	6	0	0	0	0	0	0	0	0	10	43	
6:45 AM	0	5	0	0	5	1	0	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	0	0	10	48	
7:00 AM	0	2	0	0	2	1	0	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	0	0	7	58	
7:15 AM	1	7	0	0	8	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	0	0	0	0	16	67	
7:30 AM	0	8	0	0	8	1	0	0	0	0	1	2	3	0	0	5	0	1	0	0	0	0	1	15	67		
7:45 AM	0	10	0	0	10	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	20	67	
8:00 AM	0	0	0	0	0	0	0	0	2	0	2	3	11	0	0	14	0	0	0	0	0	0	0	0	16	69	
8:15 AM	0	5	0	0	5	3	0	1	0	0	4	1	5	1	0	7	0	0	0	0	0	0	0	0	16	69	
8:30 AM	0	7	0	0	7	0	0	0	0	0	0	0	7	0	0	7	0	0	1	0	0	1	0	1	15	67	
8:45 AM	0	10	0	0	10	1	0	0	0	0	1	1	10	0	0	11	0	0	0	0	0	0	0	0	22	67	
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69
3:00 PM	0	11	0	0	11	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	17	64
3:15 PM	0	11	1	0	12	0	0	0	0	0	0	0	4	2	0	6	0	0	1	0	0	1	0	1	19	62	
3:30 PM	0	8	2	0	10	2	0	0	0	0	2	0	1	0	0	1	0	1	0	0	0	1	0	1	14	57	
3:45 PM	0	6	1	0	7	1	0	0	0	0	1	0	6	0	0	6	0	0	0	0	0	0	0	0	0	14	48
4:00 PM	0	7	0	0	7	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	0	15	47
4:15 PM	0	9	2	0	11	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	14	39
4:30 PM	0	2	0	0	2	0	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	5	29
4:45 PM	0	5	3	0	8	1	0	0	0	0	1	0	4	0	0	4	0	0	0	0	0	0	0	0	0	13	29
5:00 PM	1	1	2	0	4	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	7	20
5:15 PM	0	2	0	0	2	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	4	20
5:30 PM	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	5	20	
5:45 PM	0	0	0	0	0	1	0	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	0	0	0	4	20
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Totals	3	125	13	0	141	15	1	4	0	20	8	129	3	0	140	1	2	4	0	7	308						

Intersection Traffic Volume Report

15-Minute Motor Vehicle Data

Palmer Drive and Capitol Drive



15-Minute Motor Vehicle Data

15-Minute Time Period	From North					From East					From South					From West					15-Min Totals	Hourly Sum	PHF	
	Palmer Drive					Capitol Drive					Capitol Drive					Capitol Drive								
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total				
6:00 AM	11	0	1	0	12	1	6	0	0	7	0	0	0	0	0	0	7	1	0	0	8	27	125	0.80
6:15 AM	12	0	0	0	12	0	4	0	0	4	0	0	0	0	0	0	4	1	0	0	5	21	134	0.86
6:30 AM	24	0	0	0	24	0	5	0	0	5	0	0	0	0	0	0	8	2	0	0	10	39	160	0.85
6:45 AM	18	0	0	0	18	1	11	0	0	12	0	0	0	0	0	0	5	3	0	0	8	38	170	0.87
7:00 AM	24	0	0	0	24	0	8	0	0	8	0	0	0	0	0	0	3	1	0	0	4	36	190	0.82
7:15 AM	26	0	0	0	26	0	10	0	0	10	0	0	0	0	0	0	6	5	0	0	11	47	194	0.84
7:30 AM	30	0	0	0	30	0	8	0	0	8	0	0	0	0	0	0	7	4	0	0	11	49	186	0.80
7:45 AM	23	0	2	0	25	0	14	0	0	14	0	0	0	0	0	0	8	11	0	0	19	58	174	0.75
8:00 AM	18	0	1	0	19	1	11	0	0	12	0	0	0	0	0	0	7	2	0	0	9	40	158	0.94
8:15 AM	18	0	0	0	18	0	13	0	0	13	0	0	0	0	0	0	5	3	0	0	8	39		
8:30 AM	16	0	1	0	17	0	11	0	0	11	0	0	0	0	0	0	5	4	0	0	9	37		
8:45 AM	15	0	2	0	17	0	10	0	0	10	0	0	0	0	0	0	11	4	0	0	15	42		
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3:00 PM	10	0	2	0	12	1	11	0	0	12	0	0	0	0	0	0	19	17	0	0	36	60	255	0.85
3:15 PM	20	0	1	0	21	3	15	0	0	18	0	0	0	0	0	0	13	23	0	0	36	75	266	0.89
3:30 PM	14	0	0	0	14	2	10	0	0	12	0	0	0	0	0	0	13	27	0	0	40	66	255	0.90
3:45 PM	11	0	0	0	11	3	11	0	0	14	0	0	0	0	0	0	17	12	0	0	29	54	255	0.90
4:00 PM	17	0	3	0	20	2	17	0	0	19	0	0	0	0	0	0	23	9	0	0	32	71	266	0.94
4:15 PM	10	0	2	0	12	3	12	0	0	15	0	0	0	0	0	0	23	14	0	0	37	64	270	0.90
4:30 PM	21	0	0	0	21	1	10	0	0	11	0	0	0	0	0	0	10	24	0	0	34	66	285	0.90
4:45 PM	12	0	3	0	15	1	9	0	0	10	0	0	0	0	0	0	18	22	0	0	40	65	291	0.92
5:00 PM	16	0	1	0	17	2	12	0	0	14	0	0	0	0	0	0	13	31	0	0	44	75	286	0.91
5:15 PM	11	0	4	0	15	2	13	0	0	15	0	0	0	0	0	0	20	29	0	0	49	79		
5:30 PM	16	0	1	0	17	1	4	0	0	5	0	0	0	0	0	0	19	31	0	0	50	72		
5:45 PM	8	0	1	0	9	4	14	0	0	18	0	0	0	0	0	0	9	24	0	0	33	60		
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9:30 PM	0	0	0																					

Intersection Traffic Volume Report

Count Basics			Page 9 of 13
Start Date:	Monday, March 21, 2022	Weekday	Schools in Session
Total Number of Hours Counted:	6	Non-Holiday	No Special Events

15-Minute Heavy Vehicle Data

Palmer Drive and Capitol Drive



15-Minute Heavy Vehicle Data

15-Minute Time Period	From North					From East					From South					From West					15-Min Totals	Hourly Sum		
	Palmer Drive					Capitol Drive					Capitol Drive					Capitol Drive								
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total				
6:00 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
6:30 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	2	4
6:45 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	6
7:00 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	5
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
7:30 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	4	12
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
8:00 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3	0	4	10
8:15 AM	2	0	0	0	2	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	4	4
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	2	0
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	11
3:30 PM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	6	12
3:45 PM	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	3	7
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	8
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	2	10
4:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10
4:45 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	4	10
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	3	7
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	2	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0
5:45 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	0	0	0	5	1	12	0	0	13	0	0	0	0	0	0	22	5	0	27	45			

Peak Hour Heavy Vehicle Volume Summary

Hourly Time Period	From North					From East					From South					From West					Total Hourly Volume		
	Palmer Drive					Capitol Drive					Capitol Drive					Capitol Drive							
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total			
AM 7:00 AM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	5
MD 12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM 4:30 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	7	1	0	8	0	10

Intersection Traffic Volume Report

Count Basics		Version 2013.14.1		Page 1 of 13	
Start Date:	Monday, March 21, 2022	Weekday	Schools in Session		
Total Number of Hours Counted:	13	Non-Holiday	No Special Events		

Base Information, Observed (13) Hour and Estimated (24) Hour Volume Summaries

Intersection of: **Vettelson Road and Capitol Drive**

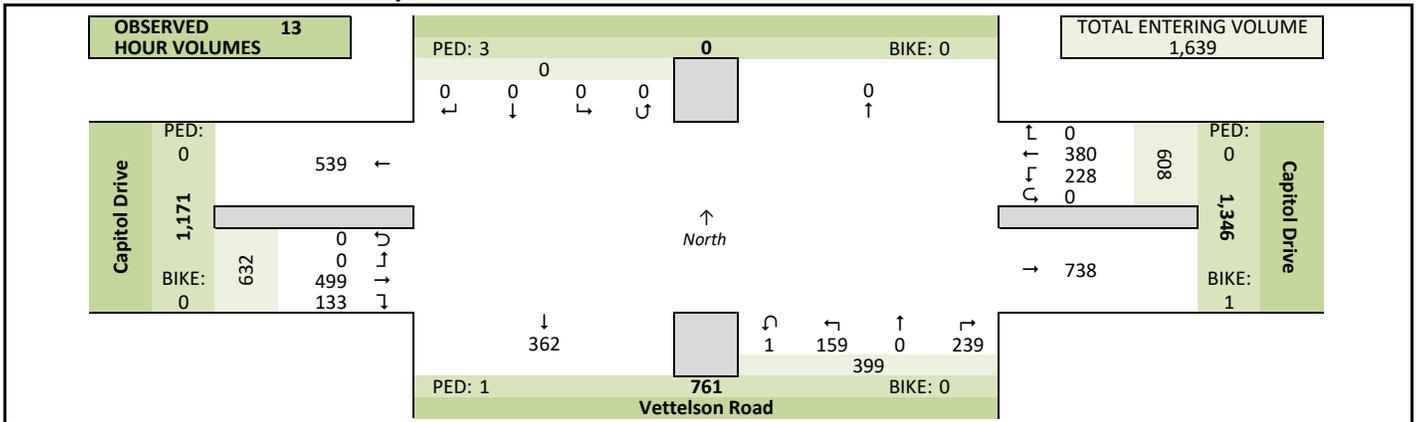
Site Information

Municipality	Village of Hartland		
County	Waukesha	WisDOT Region	SE
Traffic Control	Partial Stop Control		
Roadway Names	North Direction ↑		
North Leg			
East Leg	Capitol Drive		
South Leg	Vettelson Road		
West Leg	Capitol Drive		
Special Considerations			
Schools	In Session		
Holidays	None		
Special Events	None		
Special Pedestrians Observed			
Pre-school children	None		
Elementary school age children	None		
Visually impaired (white cane/helper dog)	None		
Elderly/disabled (except wheelchairs)	None		
Wheelchairs/electric scooters	None		
Other (describe)	None		

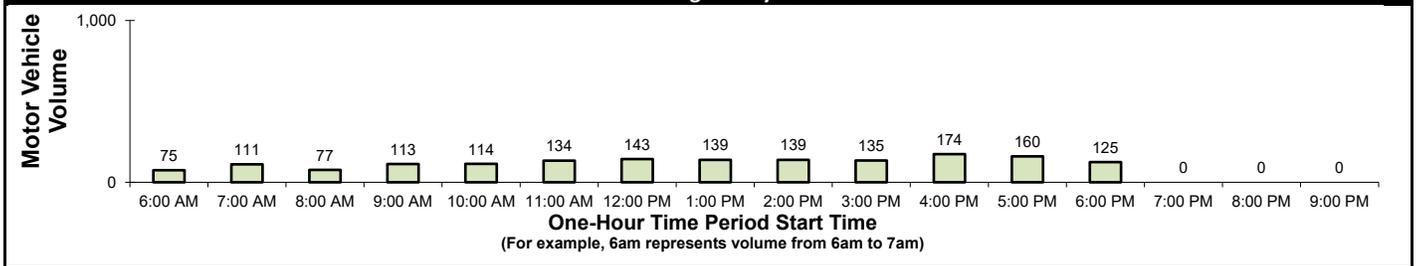
Count Information

Hrs Counted:	6:00 AM-7:00 PM		
1st Day of Count	Monday, March 21, 2022	Weather	
AM Peak Period	Wednesday, March 23, 2022	Clear & Dry	
Midday Peak Period	Wednesday, March 23, 2022	Clear & Dry	
PM Peak Period	Monday, March 21, 2022	Clear & Dry	
Calculated Peak Hours			
AM	8:45-9:45am	MD	11:30-12:30am
PM	4:15-5:15pm		
Peak Hours Selected for Analysis			
AM	7:00-8:00am	MD	11:30-12:30am
PM	4:30-5:30pm		
Daily/Seasonal Adjustment Group	(2) Urban Arterials & Collectors		
Count Expansion Group	(2) Urban Arterials & Collectors		
Daily/Seasonal Adjustment Factor	0.983	Count Expansion Factor	1.178
Company Name	TADI, Inc	Manual Adj.	1.000
Observers	AM Peak Period	Amy Scheuerlein	
	Midday Peak Period	None	
	PM Peak Period	Wendy Picard	
Comments	2019 DOT Seasonal Factors		

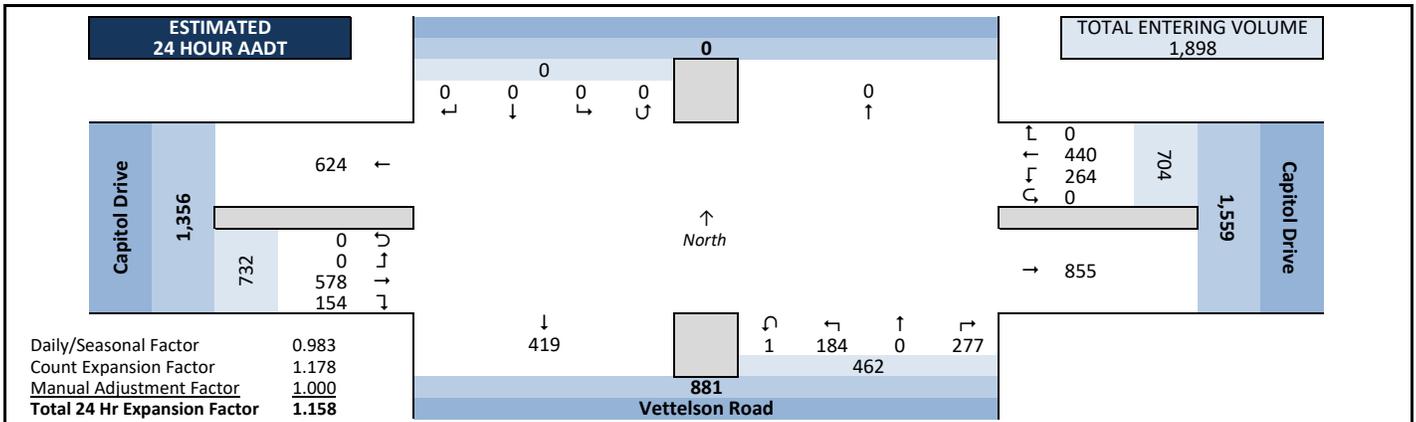
Observed 13 Hour Volume Summary



Total Entering Hourly Volume



Estimated 24 Hour AADT



Intersection Traffic Volume Report

15-Minute Motor Vehicle Data

Vettelson Road and Capitol Drive



15-Minute Motor Vehicle Data

15-Minute Time Period	From North					From East					From South					From West					15-Min Totals	Hourly Sum	PHF	
	Capitol Drive					Vettelson Road					Capitol Drive													
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total				
6:00 AM	0	0	0	0	0	0	5	1	0	6	1	0	0	0	2	0	5	0	0	5	13	75	0.72	
6:15 AM	0	0	0	0	0	0	5	0	0	5	5	0	3	0	8	1	3	0	0	4	17	94	0.73	
6:30 AM	0	0	0	0	0	0	11	1	0	12	5	0	3	0	8	1	5	0	0	6	26	94	0.73	
6:45 AM	0	0	0	0	0	0	6	2	0	8	0	0	4	0	4	1	6	0	0	7	19	93	0.73	
7:00 AM	0	0	0	0	0	0	11	2	0	13	3	0	6	0	9	0	10	0	0	10	32	111	0.75	
7:15 AM	0	0	0	0	0	0	2	3	0	5	1	0	5	0	6	1	5	0	0	6	17	85	0.57	
7:30 AM	0	0	0	0	0	0	8	4	0	12	3	0	2	0	5	2	6	0	0	8	25	89	0.60	
7:45 AM	0	0	0	0	0	0	8	5	0	13	7	0	3	0	10	3	11	0	0	14	37	84	0.57	
8:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	2	0	2	1	2	0	0	3	6	77	0.64	
8:15 AM	0	0	0	0	0	0	6	3	0	9	3	0	3	0	6	0	6	0	0	6	21	96	0.80	
8:30 AM	0	0	0	0	0	0	2	1	0	3	4	0	3	0	7	3	7	0	0	10	20	102	0.85	
8:45 AM	0	0	0	0	0	0	4	4	0	8	4	0	4	1	9	2	11	0	0	13	30	116	0.85	
9:00 AM	0	0	0	0	0	0	5	6	0	11	4	0	4	0	8	1	5	0	0	6	25	113	0.83	
9:15 AM	0	0	0	0	0	0	5	4	0	9	4	0	3	0	7	2	9	0	0	11	27	112	0.82	
9:30 AM	0	0	0	0	0	0	8	2	0	10	5	0	7	0	12	2	10	0	0	12	34	118	0.87	
9:45 AM	0	0	0	0	0	0	4	7	0	11	5	0	1	0	6	4	6	0	0	10	27	107	0.81	
10:00 AM	0	0	0	0	0	0	8	6	0	14	2	0	3	0	5	1	4	0	0	5	24	114	0.84	
10:15 AM	0	0	0	0	0	0	7	4	0	11	4	0	4	0	8	1	13	0	0	14	33	120	0.88	
10:30 AM	0	0	0	0	0	0	7	4	0	11	3	0	3	0	6	0	6	0	0	6	23	114	0.84	
10:45 AM	0	0	0	0	0	0	8	3	0	11	14	0	2	0	16	1	6	0	0	7	34	129	0.85	
11:00 AM	0	0	0	0	0	0	7	5	0	12	4	0	3	0	7	4	7	0	0	11	30	134	0.86	
11:15 AM	0	0	0	0	0	0	6	2	0	8	2	0	5	0	7	3	9	0	0	12	27	144	0.90	
11:30 AM	0	0	0	0	0	0	7	3	0	10	12	0	5	0	17	2	9	0	0	11	38	155	0.97	
11:45 AM	0	0	0	0	0	0	8	4	0	12	9	0	3	0	12	3	12	0	0	15	39	144	0.90	
12:00 PM	0	0	0	0	0	0	8	8	0	16	6	0	4	0	10	4	10	0	0	14	40	143	0.89	
12:15 PM	0	0	0	0	0	0	7	7	0	14	3	0	4	0	7	2	15	0	0	17	38	133	0.88	
12:30 PM	0	0	0	0	0	0	7	6	0	13	2	0	3	0	5	1	8	0	0	9	27	128	0.84	
12:45 PM	0	0	0	0	0	0	15	6	0	21	4	0	3	0	7	2	8	0	0	10	38	138	0.91	
1:00 PM	0	0	0	0	0	0	2	9	0	11	5	0	4	0	9	5	5	0	0	10	30	139	0.89	
1:15 PM	0	0	0	0	0	0	8	8	0	16	5	0	1	0	6	4	7	0	0	11	33	143	0.92	
1:30 PM	0	0	0	0	0	0	4	6	0	10	9	0	2	0	11	4	12	0	0	16	37	152	0.90	
1:45 PM	0	0	0	0	0	0	13	4	0	17	4	0	0	0	4	4	14	0	0	18	39	148	0.88	
2:00 PM	0	0	0	0	0	0	4	9	0	13	5	0	3	0	8	6	7	0	0	13	34	139	0.83	
2:15 PM	0	0	0	0	0	0	7	5	0	12	3	0	4	0	7	4	19	0	0	23	42	140	0.83	
2:30 PM	0	0	0	0	0	0	9	6	0	15	5	0	2	0	7	4	7	0	0	11	33	126	0.90	
2:45 PM	0	0	0	0	0	0	6	4	0	10	5	0	1	0	6	6	8	0	0	14	30	136	0.79	
3:00 PM	0	0	0	0	0	0	15	2	0	17	4	0	2	0	6	0	12	0	0	12	35	135	0.78	
3:15 PM	0	0	0	0	0	0	4	2	0	6	8	0	1	0	9	0	13	0	0	13	28	145	0.81	
3:30 PM	0	0	0	0	0	0	12	6	0	18	4	0	2	0	6	1	18	0	0	19	43	167	0.84	
3:45 PM	0	0	0	0	0	0	7	4	0	11	6	0	4	0	10	2	6	0	0	8	29	174	0.87	
4:00 PM	0	0	0	0	0	0	10	6	0	16	5	0	3	0	8	3	18	0	0	21	45	174	0.87	
4:15 PM	0	0	0	0	0	0	11	6	0	17	5	0	8	0	13	5	15	0	0	20	50	178	0.89	
4:30 PM	0	0	0	0	0	0	11	6	0	17	4	0	4	0	8	3	22	0	0	25	50	167	0.84	
4:45 PM	0	0	0	0	0	0	10	4	0	14	2	0	2	0	4	1	10	0	0	11	29	148	0.76	
5:00 PM	0	0	0	0	0	0	12	7	0	19	8	0	5	0	13	3	14	0	0	17	49	160	0.82	
5:15 PM	0	0	0	0	0	0	12	2	0	14	5	0	4	0	9	3	13	0	0	16	39	148	0.90	
5:30 PM	0	0	0	0	0	0	6	2	0	8	3	0	2	0	5	4	14	0	0	18	31	144	0.88	
5:45 PM	0	0	0	0	0	0	10	4	0	14	6	0	1	0	7	4	16	0	0	20	41	140	0.85	
6:00 PM	0	0	0	0	0	0	5	5	0	10	4	0	2	0	6	7	14	0	0	21	37	125	0.84	
6:15 PM	0	0	0	0	0	0	8	6	0	14	6	0	5	0	11	4	6	0	0	10	35			
6:30 PM	0	0	0	0	0	0	5	5	0	10	4	0	0	0	4	4	9	0	0	13	27			
6:45 PM	0	0	0	0	0	0	4	6	0	10	5	0	1	0	6	4	6	0	0	10	26			
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Totals								380	228	0	608	239	0	159	1	399	133	499	0	0	632	1639		

Peak Hour All Vehicle Volume Summary

Hourly Time Period	From North					From East					From South					From West					Total Hourly Volume	PHF
	Capitol Drive					Vettelson Road					Capitol Drive											
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total		
AM 7:00 AM	0	0	0	0	0	0	29	14	0	43	14	0	16	0	30	6	32	0	0	38	111	0.75
MD 11:30 AM	0	0	0	0	0	0	30	22	0	52	30	0	16	0	46	11	46	0	0	57	155	0.97
PM 4:30 PM	0	0	0	0	0	0	45	19	0	64	19	0	15	0	34	10	59	0	0	69	167	0.84

Intersection Traffic Volume Report

15-Minute Heavy Vehicle Data

Vettelson Road and Capitol Drive



15-Minute Heavy Vehicle Data

15-Minute Time Period	From North					From East					From South					From West					15-Min Totals	Hourly Sum			
						Capitol Drive					Vettelson Road					Capitol Drive									
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total					
6:00 AM	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3	10	
6:15 AM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	10
6:30 AM	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	12
6:45 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	2	10
7:00 AM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	0	0	1	3	9
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	1	0	0	0	0	1	4	6
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	4
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	4
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	12
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	13
8:45 AM	0	0	0	0	0	0	0	1	0	0	1	2	0	1	0	3	0	0	0	0	0	0	0	4	16
9:00 AM	0	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	0	1	0	0	0	0	1	5	12
9:15 AM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	0	0	1	3	8
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	0	0	0	3	4	8
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	6
10:15 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	0	0	2	3	5
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	3
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	5
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	9
11:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	1	0	0	0	0	1	3	11
11:45 AM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	2	0	0	0	0	3	4	8
12:00 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	4
12:15 PM	0	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0	3	5
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	2	4
1:15 PM	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1:45 PM	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	7
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	2	8
2:30 PM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	0	0	2	4	8
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	7
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	8
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	8
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	7
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	2	5
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2	4
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	2
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	2
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	0	0	0	0	0	0	20	5	0	25	8	0	9	0	17	5	37	0	0	0	0	42	84	

Peak Hour Heavy Vehicle Volume Summary

Hourly Time Period	From North					From East					From South					From West					Total Hourly Volume		
						Capitol Drive					Vettelson Road					Capitol Drive							
	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total			
AM 7:00 AM	0	0	0	0	0	0	0	2	0	0	2	0	0	3	0	3	1	3	0	0	0	4	9
MD 11:30 AM	0	0	0	0	0	0	0	2	2	0	4	2	0	1	0	3	1	3	0	0	0	4	11
PM 4:30 PM	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	0	4	4

Hartland Kwik Trip TIA
Heavy Vehicle Percentages, Peak Hour Factors

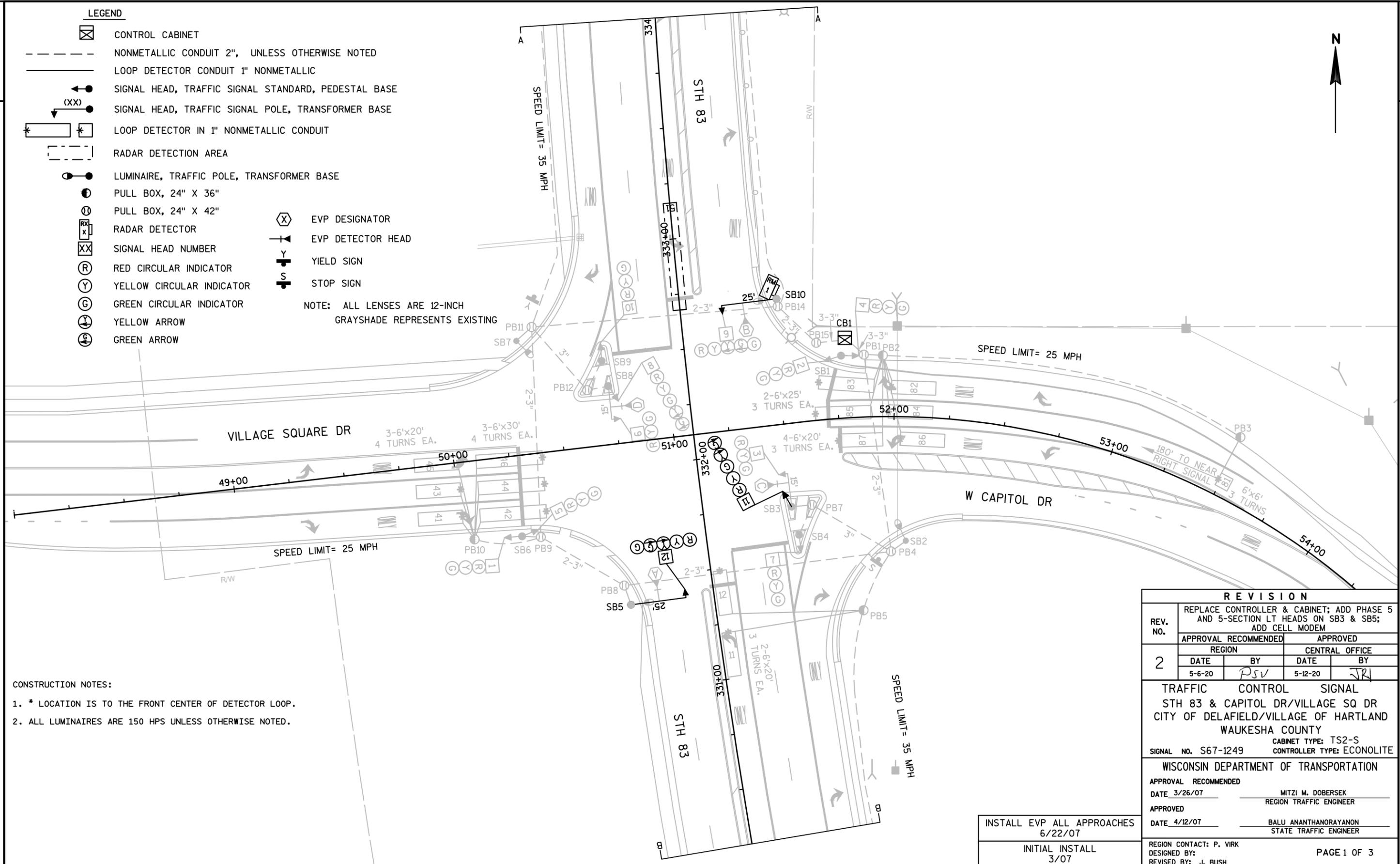
Intersection	Traffic Control	Peak Hour	Heavy Vehicle Percentage				PHF
			EB	WB	NB	SB	
#100 Capitol Drive (E/W) & STH 83 (N/S)	Traffic Signal	AM	2%	1%	10%	5%	0.75
		PM	1%	2%	1%	3%	0.95
#200 Capitol Drive (E/W) & Palmer Drive (N/S)	Stop Sign	AM	7%	5%	2%	2%	0.82
		PM	5%	2%	2%	2%	0.90
#300 Capitol Drive (E/W) & South Site Driveway (N/S)	Stop Sign	AM	7%	5%	2%		0.82
		PM	5%	2%	2%		0.90
#400 Capitol Drive (E/W) & Vettelson Road (N/S)	Stop Sign	AM	11%	5%	10%	2%	0.75
		PM	6%	1%	1%	2%	0.83

1% HV Coded in Synchro for all HV% calculated to be 0%
2% HV Coded in Synchro for all future intersection approaches.
#300 PHF & HV estimated from adjacent intersection #200.

LEGEND

- CONTROL CABINET
- NONMETALLIC CONDUIT 2", UNLESS OTHERWISE NOTED
- LOOP DETECTOR CONDUIT 1" NONMETALLIC
- SIGNAL HEAD, TRAFFIC SIGNAL STANDARD, PEDESTAL BASE
- SIGNAL HEAD, TRAFFIC SIGNAL POLE, TRANSFORMER BASE
- LOOP DETECTOR IN 1" NONMETALLIC CONDUIT
- RADAR DETECTION AREA
- LUMINAIRE, TRAFFIC POLE, TRANSFORMER BASE
- PULL BOX, 24" X 36"
- PULL BOX, 24" X 42"
- RADAR DETECTOR
- SIGNAL HEAD NUMBER
- RED CIRCULAR INDICATOR
- YELLOW CIRCULAR INDICATOR
- GREEN CIRCULAR INDICATOR
- YELLOW ARROW
- GREEN ARROW
- EVP DESIGNATOR
- EVP DETECTOR HEAD
- YIELD SIGN
- STOP SIGN

NOTE: ALL LENSES ARE 12-INCH
GRAYSHADE REPRESENTS EXISTING



CONSTRUCTION NOTES:

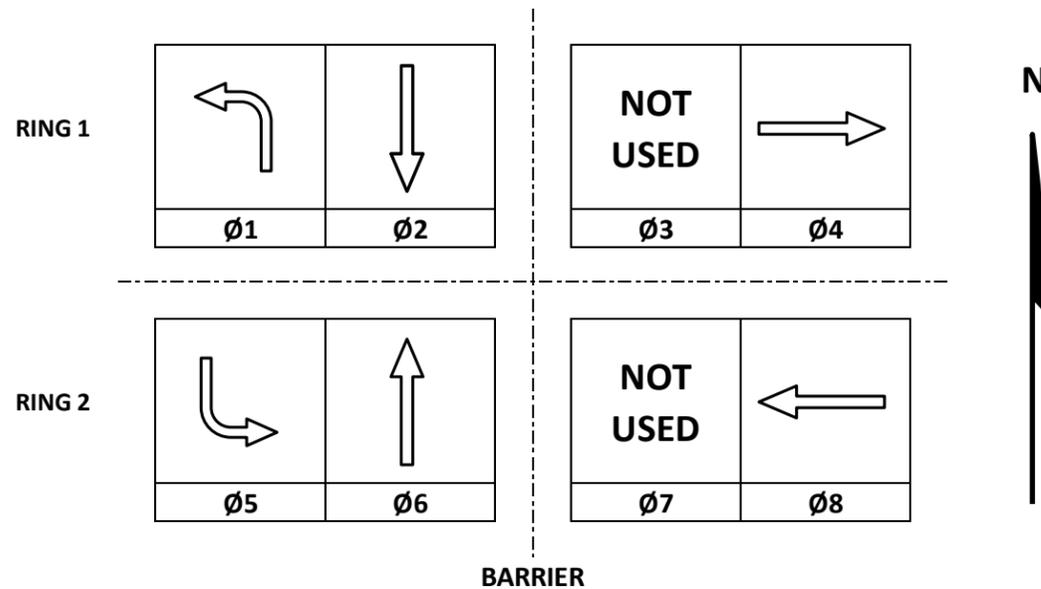
1. * LOCATION IS TO THE FRONT CENTER OF DETECTOR LOOP.
2. ALL LUMINAIRES ARE 150 HPS UNLESS OTHERWISE NOTED.

INSTALL EVP ALL APPROACHES
6/22/07

INITIAL INSTALL
3/07

REVISION			
REV. NO.	REPLACE CONTROLLER & CABINET; ADD PHASE 5 AND 5-SECTION LT HEADS ON SB3 & SB5; ADD CELL MODEM		
2	APPROVAL RECOMMENDED	APPROVED	
	REGION	CENTRAL OFFICE	
	DATE	BY	DATE BY
	5-6-20	PSV	5-12-20 JR
TRAFFIC CONTROL SIGNAL STH 83 & CAPITOL DR/VILLAGE SQ DR CITY OF DELAFIELD/VILLAGE OF HARTLAND WAUKESHA COUNTY			
SIGNAL NO. S67-1249		CABINET TYPE: TS2-S CONTROLLER TYPE: ECONOLITE	
WISCONSIN DEPARTMENT OF TRANSPORTATION			
APPROVAL RECOMMENDED		MITZI M. DOBERSEK REGION TRAFFIC ENGINEER	
DATE 3/26/07			
APPROVED		BALU ANANTHANORAYANON STATE TRAFFIC ENGINEER	
DATE 4/12/07			
REGION CONTACT: P. VIRK		PAGE 1 OF 3	
DESIGNED BY:			
REVISED BY: J. BUSH			

	HEAD NUMBERS	FLASH
Ø1	8,9	-
Ø2	10,11,12	R
Ø3		
Ø4	1,2,3	R
Ø5	11,12	-
Ø6	7,8,9	R
Ø7		
Ø8	4,5,6	R
Ø2P		
Ø4P		
Ø6P		
Ø8P		
OLE		
OLF		
OLG		
OLH		



CONTROLLER LOGIC

PHASE NUMBER	PHASE LOCKING	DUAL ENTRY W / Ø	PHASE RECALL	PHASE ACTIVE
1		6		X
2	X	6	MIN	X
3				
4		8		X
5		2		X
6	X	2	MIN	X
7				
8		4		X

EMERGENCY VEHICLE PREEMPTION SEQUENCE

EMERGENCY VEHICLE PREEMPTOR	A	B	C	D
MOVEMENT	← →	← →	↓ ↑	↓ ↑
PHASE	2+6	6+2	4+8	8+4

AFTER PREEMPTION SEQUENCE 2+6 OR 6+2, CONTROLLER SHALL RETURN TO PHASES 2+6.
 AFTER PREEMPTION SEQUENCE 4+8 OR 8+4, CONTROLLER SHALL RETURN TO PHASES 4+8.

DETECTOR LOGIC

DETECTOR INPUT	3	1	7	5	11	9	15	13
PLAN LOOP DETECTOR*(S)	11	21	42	44	46	81	83	85
CALLED PHASE	1	2	4	4	4	8	8	8
CALL OPTION	X	X	X	X	X		X	X
DELAY TIME			X		X		X	
EXTENTION OPTION	X	X	X	X	X	X	X	X
EXTEND TIME						X		
USE ADDED INITIAL		X						
CROSS SWITCH PHASE								

DETECTOR INPUT	19	17					33	
PLAN LOOP DETECTOR*(S)	87						51	
CALLED PHASE	8						5	
CALL OPTION	X						X	
DELAY TIME	X							
EXTENTION OPTION	X						X	
EXTEND TIME								
USE ADDED INITIAL								
CROSS SWITCH PHASE								

DETECTOR INPUT	4	2	8	6	12	10	16	14
PLAN LOOP DETECTOR*(S)	12	41	43	45	61	82	84	86
CALLED PHASE	1	4	4	4	6	8	8	8
CALL OPTION	X	X	X	X	X	X	X	X
DELAY TIME	X	X				X		
EXTENTION OPTION	X	X	X	X	X	X	X	X
EXTEND TIME								
USE ADDED INITIAL					X			
CROSS SWITCH PHASE								

DETECTOR INPUT	20	18					34	
PLAN LOOP DETECTOR*(S)								
CALLED PHASE								
CALL OPTION								
DELAY TIME								
EXTENTION OPTION								
EXTEND TIME								
USE ADDED INITIAL								
CROSS SWITCH PHASE								

TYPE OF INTERCONNECT/COMMUNICATION	
NONE	
CLOSED LOOP	
TWISTED PAIR	
FIBER OPTIC*	
FIBER OPTIC (ETHERNET)	
RADIO	
CELL MODEM	X

TYPE OF COORDINATION	
NONE	
TBC	X
TRAFFIC RESPONSIVE	
ADAPTIVE	
*LOCATION OF MASTER CONTROLLER NO:	S-
SIGNAL SYSTEM NO:	SS- 67-0091

TYPE OF LIGHTING	
BY OTHER AGENCY	
IN TRAFFIC CABINET	X
IN SEPARATE DOT LIGHTING CABINET	

TYPE OF PRE-EMPT	
NONE	
RAILROAD	
EMERGENCY VEHICLE	X
GTT	
TOMAR	X
HARDWIRE	
OTHER	
CONFIRMATION LIGHTS	
LIFT BRIDGE	
QUEUE DETECTION	

STH 83 & CAPITOL DR./VILLAGE SQ. DR CITY OF DELAFIELD/VILLAGE OF HARTLAND WAUKESHA COUNTY	
SIGNAL NO: S67-1249	CABINET TYPE: TS2-S
CONTROLLER TYPE: ECONOLITE	
DATE: MAY -2020	PAGE NUMBER: 3 OF 3

Timing Cover Sheet for Signal: S1249 HWY: 83 and Capitol Dr

Date: 2/15/2022 Changes Made By: P. Virk
 Signal No: S1249 Highway: 83
 County: WAU Local Hwy:
 Controller: ECONOLITE Location: Capitol Dr
 School: None Ped:

Pre-emption

Preemption: Type: Phases:
 None Recorded

Coordination

System No: SS0091 Cell Modem IP Address: 172.22.248.36
 Coordination Type: Time-Based Comments:
 Comm Type: Cell Modem

	Length	Split 1	Split 2	Split 3	Split 4
Cycle 1=	90 sec	6:30am - 9:00am M-F	3:00pm - 6:30pm M-F		
Cycle 2=	75 sec	9:00am - 3:00pm M-F 6:30pm - 9:00pm M-F 9:00am - 9:00pm S-S			
Cycle 3=					
Cycle 4=					

Cabinet Type: TS2 **Part of a Local System:** No Local Contact:
 Battery Backup Phone Number:

Turn Operations

Phases with

FYA TOD Phase Omit
 5 Section Head Dynamic FYA
 Lead/Lag Split Phase

Overlaps

Overlap A = Phases:
 Overlap B = Phases:
 Overlap C = Phases:
 Overlap D = Phases:

Detector Timing

Dilemma Zone: No Bike Detection Detection Type(s): Loop, Radar

Detector Number	11	12	41	42	45	46	81	82	83	86	87			
Stretch							3.75							
Right Turn Delay			8	8				8	8					
Left Turn Delay	2	2			2	2				2	2			

Unique Features



MOV

S 67-1249_TS1 - STH 83 & Capitol Dr - Econolite Type - Cobalt

Controller Timing Plan (MM) 2-1

Plan 1 - ""

Phase	1	2	3	4	5	6	7	8	9	10	11
Direction	N-L	S-T	N	E-T	S-L	N-T	N	W-T	N	N	N
Min Green	6	12	0	10	6	12	0	10	0	0	0
Bk Min Green	0	0	0	0	0	0	0	0	0	0	0
CS Min Green	0	0	0	0	0	0	0	0	0	0	0
Delay Green	0	0	0	0	0	0	0	0	0	0	0
Walk	0	0	0	0	0	0	0	0	0	0	0
Walk2	0	0	0	0	0	0	0	0	0	0	0
Walk Max	0	0	0	0	0	0	0	0	0	0	0
Ped Clear	0	0	0	0	0	0	0	0	0	0	0
Ped Clear 2	0	0	0	0	0	0	0	0	0	0	0
Ped Clear Max	0	0	0	0	0	0	0	0	0	0	0
Ped CO	0	0	0	0	0	0	0	0	0	0	0
Vehicle Ext	1.5	4.9	3.0	1.5	1.5	4.9	0.0	1.5	0.0	0.0	0.0
Vehicle Ext 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max1	30	45	0	30	30	45	0	30	0	0	0
Max2	0	0	0	0	0	0	0	0	0	0	0
Max3	0	0	0	0	0	0	0	0	0	0	0
DYM Max	0	0	0	0	0	0	0	0	0	0	0
Dym Step	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.5	3.6	0.0	3.3	3.5	3.6	0.0	3.3	0.0	0.0	0.0
Red Clear	1.0	2.0	0.0	3.0	1.0	2.0	0.0	3.0	0.0	0.0	0.0
Red Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red Revert	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Act B4	0	0	0	0	0	0	0	0	0	0	0
Sec/Act	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0
Max Int	6	12	0	10	6	12	0	10	0	0	0
Time B4	30	12	0	30	30	12	0	30	0	0	0
Cars Wt	0	0	0	0	0	0	0	0	0	0	0
STPTDuc	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TTReduc	0	33	0	0	0	33	0	0	0	0	0
Min Gap	1.5	2.0	0.0	1.5	1.5	2.0	0.0	1.5	0.0	0.0	0.0

Date: **March 25, 2023**

BASE SATURATION FLOW RATE CALCULATIONS

Intersection Name
STH 83 & Capitol Drive

Exit Ramp:	No
Speed Limit:	35

Urbanized Area/Cluster Population
1,376,476

Sat. Flow Rate (pc/h/ln)			
1900		1891	1891



**Consider using 1900 pc/h/ln*

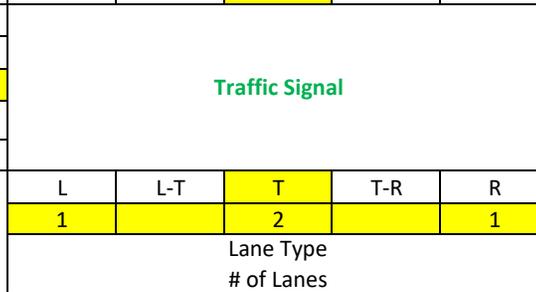
# of Lanes				
Lane Type				
1		2		1
R	T-R	T	L-T	L

Exit Ramp:
No
Speed Limit:
25

Sat. Flow (pc/h/ln)	1797	*
	1797	*
	1900	

**Consider using 1900 pc/h/ln*

# of Lanes	Lane Type	1	L
			L-T
		1	T
			T-R
		1	R



R	1	Lane Type	# of Lanes
T-R			
T	1		
L-T			
L	1		

1900	Sat. Flow (pc/h/ln)
1797	
1797	

**Consider using 1900 pc/h/ln*

Exit Ramp:
No
Speed Limit:
25

<i>*Consider using 1900 pc/h/ln</i>			
1891		1891	1900
Sat. Flow Rate (pc/h/ln)			

Speed Limit:	35
Exit Ramp:	No



Bureau of Traffic Operations
Last Updated: **4/7/2022**

OPERATIONAL WARRANTS FOR LEFT-TURN LANES AT INTERSECTIONS ON TWO-LANE HIGHWAYS

Project: 3047 Hartland Kwik Trip & Three Leaf Partners Developments
 Scenario: 2023 Traffic - Full Buildout
 Analyst: TADI - TSC
 Date: 3/30/2023

Location	Operating Speed (mph)	Opposing Volume (veh/hr)	Advancing Volume (veh/hr)	Left-Turn Volume (veh/hr)	Calculated Left-Turn Percentage**	Advancing Volume Threshold* (veh/hr)	Is Advancing Volume Threshold Met?	By How Much?
KT North Driveway - WB LT (AM)	40	190	170	5	5.0%	571	NO	short 401 veh/hr
KT North Driveway - WB LT (PM)	40	305	155	5	5.0%	571	NO	short 416 veh/hr
KT South Driveway - WB LT (AM)	40	100	145	15	10.3%	518	NO	short 373 veh/hr
KT South Driveway - WB LT (PM)	40	220	130	15	11.5%	502	NO	short 372 veh/hr
MF Driveway - EB LT (AM)	40	45	75	30	40.0%	290	NO	short 215 veh/hr
MF Driveway - EB LT (PM)	40	75	195	105	40.0%	290	NO	short 95 veh/hr

* Advanced volume threshold based on exponential trendlines fit to the data in WisDOT FDM 11-25 Table 5.1. As a result, thresholds may differ slightly from data provided in Table 5.1.

** Calculated left-turn percentage must be between 5 and 40 percent to provide threshold.

Notes

Operating speed is posted speed limit plus 5-mph.
 Opposing volume = Opposing Through and Right
 Advancing Volume = Advancing Left, Through, and Right

Note: Capitol Drive speed limit is posted at 25 mph (operating speed of 30 mph) and some intersections have left-turn percentages below 5% or above 40%. These values (shown in red) were adjusted to yield calculation results in this study.

Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
Variable	Value	
Major-road speed, mph:	30	
Major-road volume (one direction), veh/h:	405	
Right-turn volume, veh/h:	105	

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	1523
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	

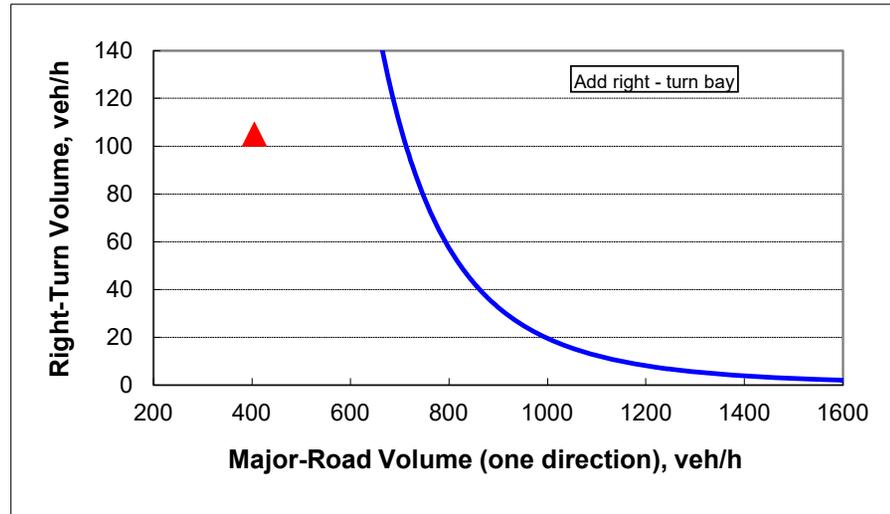


Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	30
Major-road volume (one direction), veh/h:	220
Right-turn volume, veh/h:	35

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	28825
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	

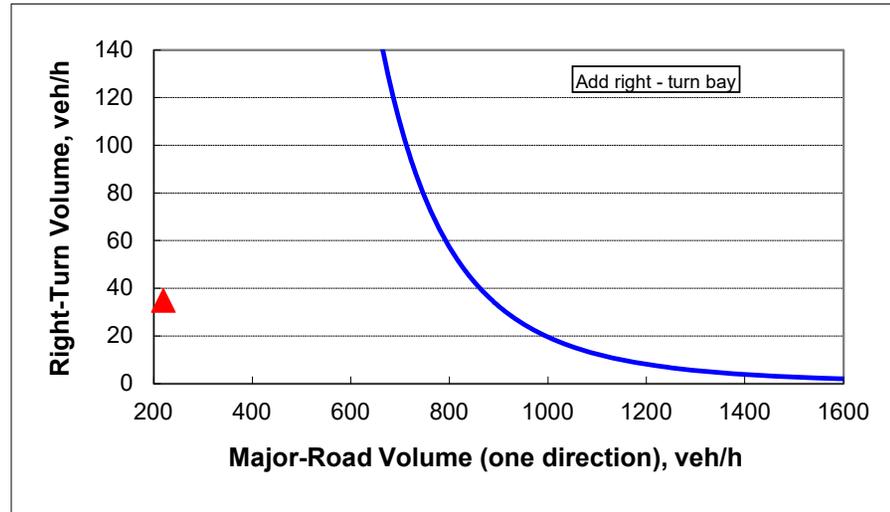


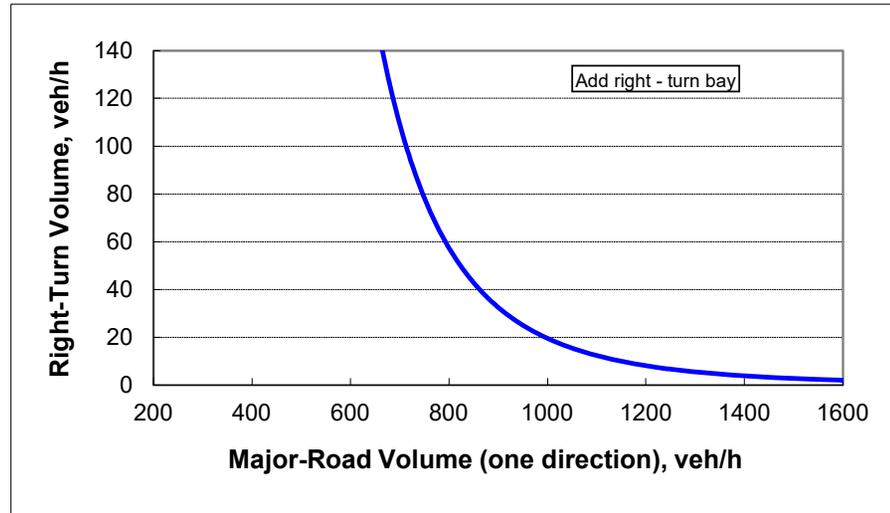
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
Variable	Value	
Major-road speed, mph:	30	
Major-road volume (one direction), veh/h:	95	
Right-turn volume, veh/h:	25	

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	1649182
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Wisconsin Department of Transportation Traffic Signal Warrant Summary Worksheet

100%

The Worksheet(s) attached are provided as an attachment to the Engineering Investigation Study for:

Intersection: Capitol Drive & Vettleson Road/Apartments Driveway
County: Waukesha County
Village: Hartland, WI

Major Street: Capitol Drive
Critical Approach Speed: 25 mph
Lanes: 1 lane

Minor Street: Vettleson Road
Critical Approach Speed: 25 mph
Lanes: 1 lane

% Right Turns Included	In built-up area of isolated community of < 10,000 population? No
From North (SB) 0%	Total number of approaches at intersection? 4 or more
From East (WB) 100%	If it is a "T" intersection, inflate minor threshold to 150%? No
From South (NB) 100%	Manually set volume level?
From West (EB) 100%	

Analysis based on PROJECTED volume data.

Forecast Year	Within 5 Years of Construction?	Time (HH:MM)			
		From	AM / PM	To	AM / PM
Full Build Traffic		6:00	AM	7:00	PM

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	No
Condition A: Minimum Vehicular Volume	No
Condition B: Interruption of Continuous Traffic	No
Condition C: Combination: 80% of A and B	No
Warrant 2: Four-Hour Volume	No
Warrant 3: Peak Hour Volume	No
Warrant 4: Pedestrian Volume	N/A
Criterion A: Four-Hour	
Criterion B: Peak-Hour	
Warrant 5: School Crossing	N/A
Warrant 6: Coordinated Signal System	N/A
Warrant 7: Crash Experience	N/A
Warrant 8: Roadway Network	N/A
Warrant 9: Intersection Near a Grade Crossing	N/A

Warrant Analysis Conducted By:

Name: Tammi Czewski
Agency: TADI
Date: 3/24/2023

Warrant 1: Eight - Hour Vehicular Volume

100%

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	500	400
Minor Rd. Req	150	120
Number of Hours	0	0

Satisfied? No

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	750	600
Minor Rd. Req	75	60
Number of Hours	0	0

Satisfied? No

Condition C: Combination of A & B at 80%		
---	--	--

Satisfied? No

6:00 AM		Enter Start Time (Military Time) (HH:MM)			Total
Time Period	From	To	Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	
1	6:00	7:00	113	25	138
2	7:00	8:00	171	40	211
3	8:00	9:00	151	31	182
4	9:00	10:00	159	38	197
5	10:00	11:00	150	40	190
6	11:00	12:00	184	49	233
7	12:00	13:00	215	35	250
8	13:00	14:00	203	36	239
9	14:00	15:00	230	35	265
10	15:00	16:00	248	40	288
11	16:00	17:00	328	44	372
12	17:00	18:00	341	46	387
13	18:00	19:00	280	37	317
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume

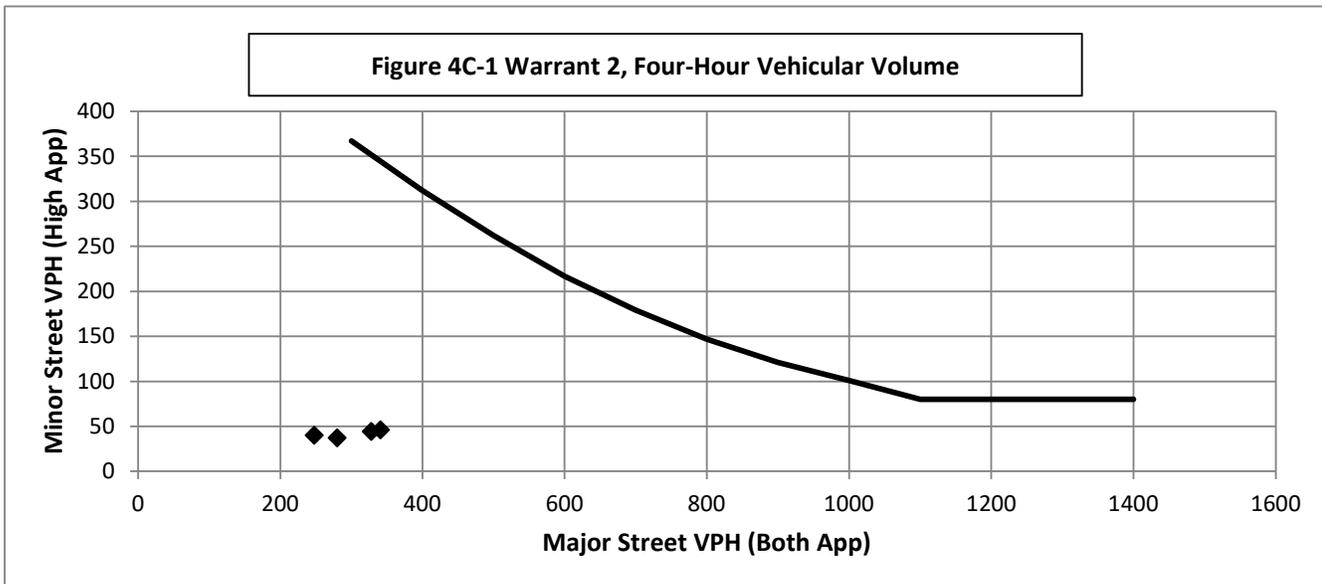
100%

Hour Start	17:00	16:00	18:00	15:00
Major Road Vol.	341	328	280	248
Minor Road Vol.	46	44	37	40

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:



Warrant 3: Peak Hour Volume

100%

Warrant Evaluated? Yes

Warrant Satisfied? No

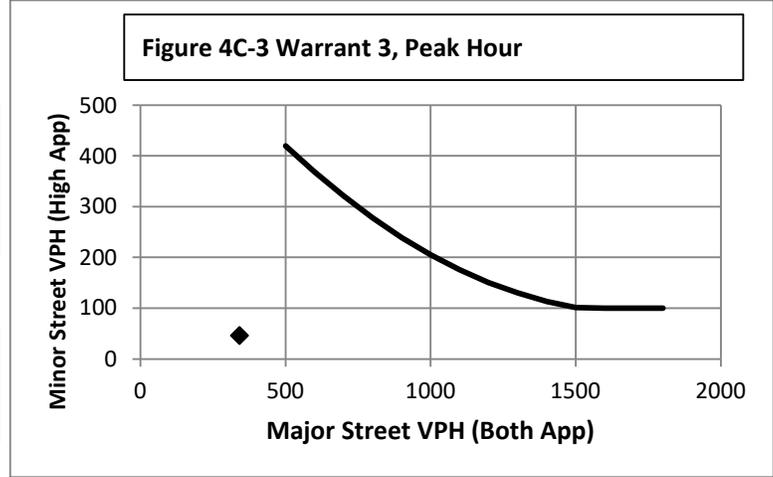
Manually Set To:

Condition justifying use of warrant:

Criteria		Met?
Delay on Minor Approach	4	No
Volume on Minor Approach	100	
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
17:00	341	46



Crite
1
2
3

Crite
1
2
3

Warrant 4: Pedestrian Volume

100%

Warrant Evaluated?

Warrant Satisfied? N/A

Manually Set To:

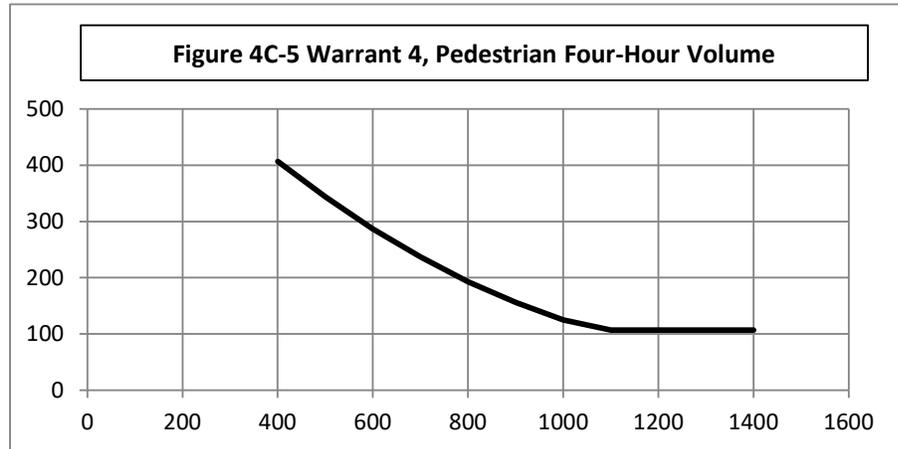
Criterion A: Four Hour

Hour (Start)	Pedestrian Volume	Major Road Vol.
		0
		0
		0
		0

Manually Set Major Rd Vol?

Avg. walk speed less than 3.5 ft/s?

Criterion A Satisfied?

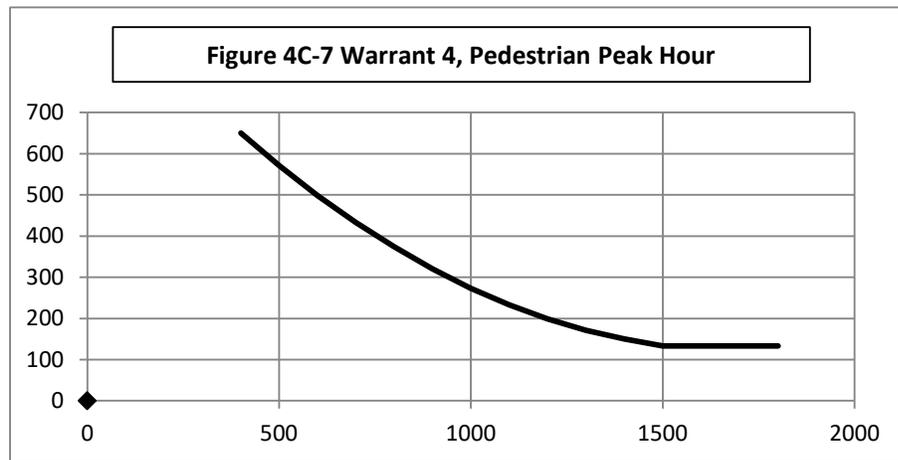


Crite
1
2
3

Criterion B: Peak Hour

Peak Hour	Pedestrian Vol.	Major Road Vol.
0:00	0	0

Criterion B Satisfied?



Crite
1
2
Char
1
2
3

Warrant 5: School Crossing

100%

Warrant Evaluated?

Warrant Satisfied? N/A

Manually Set To:

Criteria

Fulfilled?

There are a MINIMUM of 20 school children during the highest crossing hour.	
There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	
The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	

Warrant 6: Coordinated Signal System

100%

Warrant Evaluated?

Warrant Satisfied? N/A

Manually Set To:

Criteria

Fulfilled?

Signal spacing > 1000 ft	
On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	
On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	

Warrant 7: Crash Experience

100%

Warrant Evaluated?

Warrant Satisfied? N/A

Manually Set To:

Criteria

Met?

Fulfilled?

Adequate trial of other remedial measures has failed to reduce crash frequency.		
Measures Tried:		
Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period.	# of crashes per 12 months	
Warrant 1, Condition A (80%)	No	Yes
Warrant 1, Condition B (80%)	No	
Warrant 4, Criterion A (80%)	No	
Warrant 4, Criterion B (80%)	Yes	

Warrant 8: Roadway Network

100%

Warrant Evaluated?

Warrant Satisfied? N/A

Manually Set To:

Criteria

Met?

Fulfilled?

Total entering volume of at least 1,000 veh/h during typical weekday peak hour		387	No	No
Five-year projected volumes that satisfy one or more of Warrants 1, 2, or 3.			No	
Total entering vol. of at least 1,000 veh/h for each of any 5 hrs of non-normal business day (Sat. or Sun.)				
Hour				
Volume				

Characteristics of Major Routes - Select yes if all intersecting routes have characteristic

Fulfilled?

Part of the road or highway system that serves as the principal roadway network for through traffic flow	
Rural or suburban highway outside of, entering, or traversing a city	
Appears as a major route on an official plan	

Warrant 9: Intersection Near a Grade Crossing

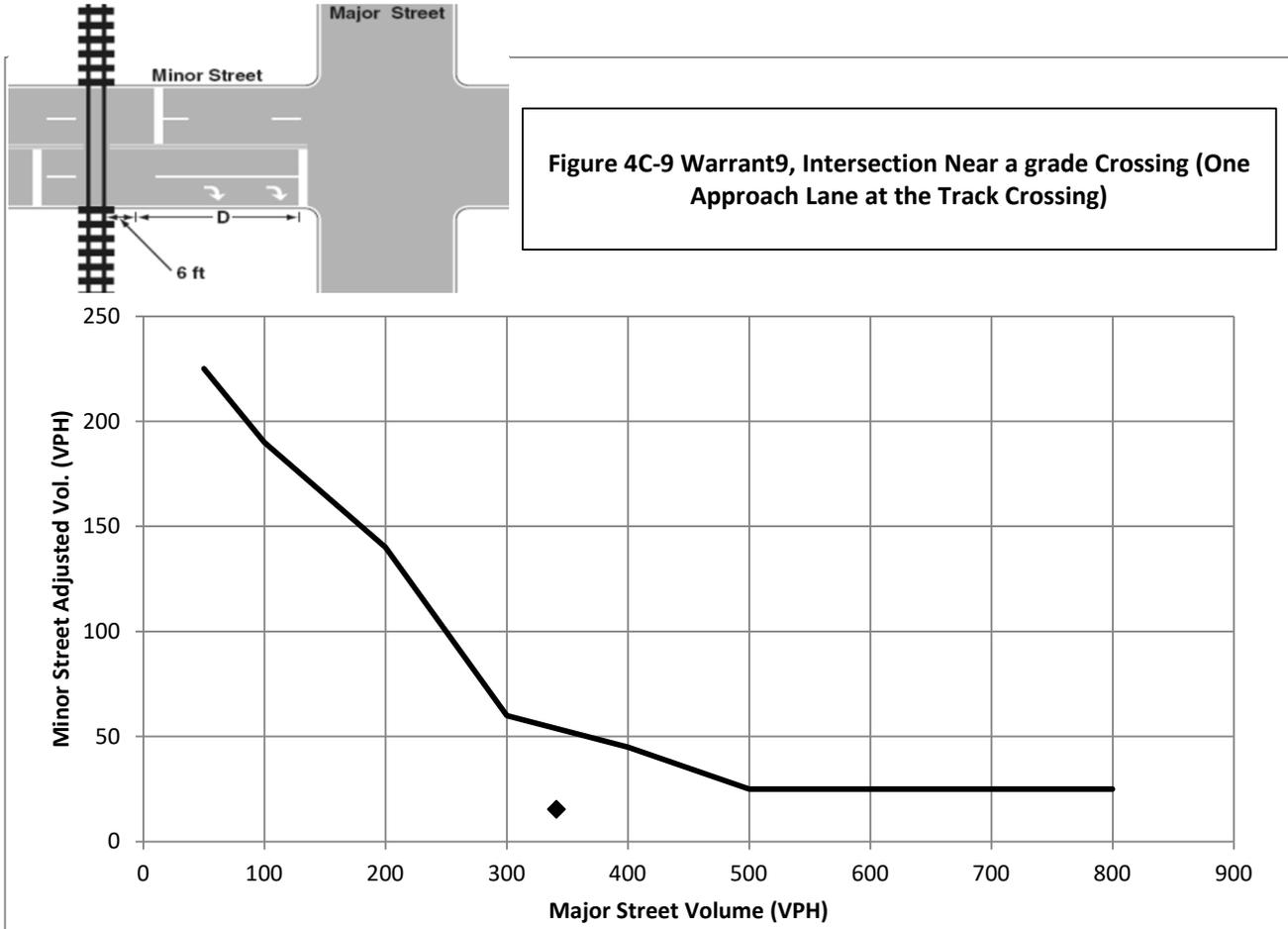
100%

Warrant Evaluated?

Warrant Satisfied? N/A

Manually Set To:

Adjustment Factors			Manually Set Peak Hour?				
Rail Traffic per Day	% High Occupancy Buses on Minor Road	% Tractor-Trailer Trucks on Minor Road	D	Peak Hour	Major Road Vol.	Minor Road Vol.	Adjusted Minor Vol.
1	0	0% to 2.5%	660	17:00	341	46	15.41



Conclusions/Comments:

Updated: 12/6/2017

Hourly Volume Data																						
One Hour Time Period	Start Time	From North (SB)					From East (WB)					From South (NB)					From West (EB)					Total Vehicle Volume
		Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	Right	Thru	Left	U-Tn	Total	
AM	6:00	77	5	20	0	102	4	34	4	0	42	11	1	13	0	25	10	46	15	0	71	240
	7:00	120	8	32	0	160	6	38	14	0	58	14	2	19	0	35	17	73	23	0	113	366
	8:00	94	6	25	0	125	9	22	9	0	40	11	2	15	1	29	15	61	35	0	111	305
	9:00	54	4	14	0	72	8	31	19	0	58	18	2	18	0	38	16	53	32	0	101	269
MD	10:00	53	4	14	0	71	7	38	17	0	62	23	2	15	0	40	10	51	27	0	88	261
	11:00	53	4	14	0	71	11	37	14	0	62	27	3	19	0	49	19	60	43	0	122	304
	12:00	46	3	12	0	61	13	47	27	0	87	15	3	17	0	35	15	63	50	0	128	311
	13:00	50	3	13	0	66	12	37	27	0	76	23	3	10	0	36	23	60	44	0	127	305
PM	14:00	54	4	14	0	72	17	35	24	0	76	18	4	13	0	35	27	65	62	0	154	337
	15:00	59	4	16	0	79	21	49	14	0	84	22	5	13	0	40	11	76	77	0	164	367
	16:00	62	4	17	0	83	30	52	22	0	104	16	8	20	0	44	19	92	113	0	224	455
	17:00	84	6	22	0	112	34	51	15	0	100	22	8	16	0	46	24	90	127	0	241	499
	18:00	74	5	20	0	99	29	30	22	0	81	19	7	11	0	37	27	64	108	0	199	416
	19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	20:00																					0
21:00																					0	
Totals		880	60	233	0	1173	201	501	228	0	930	239	50	199	1	489	233	854	756	0	1843	4435

Note: Copy volume data and paste into cells using paste special -> values

Note: U-Turns are counted as Left Turns in the Volume Totals

Please Select the Major Road:

Major Road Left Turn as Minor Approach?

% Right Turns Included (Default 0%)

From North (SB)	0%
From East (WB)	100%
From South (NB)	100%
From West (EB)	100%

Major Road Volume Totals: East/West				
Right	Thru	Left	T+LT	Total
14	80	19	99	113
23	111	37	148	171
24	83	44	127	151
24	84	51	135	159
17	89	44	133	150
30	97	57	154	184
28	110	77	187	215
35	97	71	168	203
44	100	86	186	230
32	125	91	216	248
49	144	135	279	328
58	141	142	283	341
56	94	130	224	280
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
434	1355	984	2339	2773

Minor Road Highest Volume: North/South				
Right	Thru	Left	T+LT	Total
11	1	13	14	25
0	8	32	40	40
0	6	25	31	31
18	2	18	20	38
23	2	15	17	40
27	3	19	22	49
15	3	17	20	35
23	3	10	13	36
18	4	13	17	35
22	5	13	18	40
16	8	20	28	44
22	8	16	24	46
19	7	11	18	37
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
214	60	222	282	496

ASWC Warrant Criteria

MUTCD **No**

WisDOT **No**

MUTCD

Met? Criteria

- No** A. Is a signal justified? **No**
- No** B. # of crashes in a 12 month period that can be corrected by multi-way stop control: **0**
- No** C. Minimum Volumes
1. Major road approach volume (total of both) at least 300 vph for min 8 hours?
 2. Combined ped, bike, and veh volume on minor approach (total of both) at least 200 units per hour for the same 8 hours as criteria C-1?
 3. If the 85th percentile speed on the major road exceeds 40 mph, may use 70% of the values in C-1 and C-2
- Major Street 85th percentile mph: **30**

Time Period	From	To	Major Road: Both App.	Minor Road: Both App. (VPH)	C-1	C-2	Both Met?	D (80%)		Both Met?
1	6:00	7:00	113	127	No	No	No	No	No	No
2	7:00	8:00	171	195	No	No	No	No	Yes	No
3	8:00	9:00	151	154	No	No	No	No	No	No
4	9:00	10:00	159	110	No	No	No	No	No	No
5	10:00	11:00	150	111	No	No	No	No	No	No
6	11:00	12:00	184	120	No	No	No	No	No	No
7	12:00	13:00	215	96	No	No	No	No	No	No
8	13:00	14:00	203	102	No	No	No	No	No	No
9	14:00	15:00	230	107	No	No	No	No	No	No
10	15:00	16:00	248	119	No	No	No	Yes	No	No
11	16:00	17:00	328	127	Yes	No	No	Yes	No	No
12	17:00	18:00	341	158	Yes	No	No	Yes	No	No
13	18:00	19:00	280	136	No	No	No	Yes	No	No
14	19:00	20:00								
15	20:00	21:00								
16	21:00	22:00								

- No** D. Use when previous criteria have not been met:
If 80% minimum values of Criteria B, C-1, and C-2 (C-3 excluded) are satisfied, warrant is met.

WisDOT

Met? Criteria

1 Functional Highway Classification

Approach	Classification
1: (SB)	
2: (WB)	
3: (NB)	
4: (EB)	

2 Average Daily Traffic

Approach	AADT
Minor 1	
Minor 2	
Major 1	
Major 2	

- No** **3 Crash History**
of crashes in a 12 month period that can be corrected by multi-way stop control: **0**
Expected to significantly reduce the overall severity of future crashes?

4 Alternatives

Refer to TGM 13-26-5 Section D.

5 Mobility Impact

Will the high-volume "through" street experience significant delays for the benefit of reducing delays for a low-volume side street?

6 Right Turn Inclusion

Refer to WisDOT TSDM 2-3-2

ISD CALCULATIONS (TWSC)

Performed by: TADI - TSC Date: 3/24/2023
 Intersection: Capitol Drive & Palmer Drive/Kwik Trip North Driveway
 Community: Hartland, WI

Mainline Name: Capitol Drive
 Sidestreet Name: Palmer Drive / Kwik Trip North Driveway

Left-In Allowed?	Yes	P-vehicle Design Length:	19.0	feet (P = 19.0. Overwrite if other design veh)
Left-Out Allowed?	Yes	SU-vehicle Design Length:	39.5	feet (SU-40 = 39.5. Overwrite if other design veh)
Right-In Allowed?	Yes	WB-vehicle Design Length:	73.5	feet (WB-67 = 73.5. Overwrite if other design veh)
Right-Out Allowed?	Yes			
Through-Out Allowed?	Yes			
Design Speed from Left:	30	mph		
Design Speed from Right:	30	mph		
Median Width:	12	feet		
Minor Street Approach Grade:	0.0%	If a minor street vehicle approaches the major street at greater than 3%, enter grade.		
Number of Near Side Right & Bike:	1.00	equivalent 12-ft lanes. Include tapers, auxiliary lanes, parking lanes, and bicycle accommodations.		
Number of Near Side Thru:	1.00	equivalent 12-ft lanes.		
Number of Far Side Thru:	1.00	equivalent 12-ft lanes.		
Number of Far Side Right & Bike:	0.00	equivalent 12-ft lanes. Include tapers, auxiliary lanes, parking lanes, and bicycle accommodations.		
AASHTO or WisDOT:	AASHTO			

Design Vehicles:	P	SU	WB	(place an "X")
	x	x	x	

ISD CASE B1: Left Turn from Minor Street or Median (driver looking right)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	7.50	9.50	11.50	10.00	12.00	13.00
Additional Time Gap 1, sec:	1.00	1.40	1.40	1.00	1.40	1.40
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	8.50	10.90	12.90	11.00	13.40	14.40
Case B1 ISD, feet:	374.0	479.6	567.6	484.0	589.6	633.6
Rounded Case B1 ISD, feet:	375	480	570	485	590	635

ISD CASE B2: Right Turn from Minor Street (driver looking left)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	8.00	10.00	12.00
Additional Time Gap 1, sec:	0.50	0.70	0.70	0.50	0.70	0.70
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	7.00	9.20	11.20	8.50	10.70	12.70
Case B2 ISD, feet:	308.0	404.8	492.8	374.0	470.8	558.8
Rounded Case B2 ISD, feet:	310	405	495	375	475	560

ISD CASE B3a: Crossing from Minor Street Traffic from Left (driver looking left)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Case B3a ISD, feet:	286.0	374.0	462.0	308.0	440.0	572.0
Rounded Case B3a ISD, feet:	290	375	465	310	445	575

ISD CASE B3b: Crossing from Minor Street or Median (driver looking right)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Additional Time Gap 1, sec:	1.00	1.40	1.40	1.00	1.40	1.40
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	7.50	9.90	11.90	8.00	11.40	14.40
Case B3b ISD, feet:	330.0	435.6	523.6	352.0	501.6	633.6
Rounded Case B3b ISD, feet:	335	440	525	355	505	635

ISD CASE F: Left from Major to Minor (driver looking to left of access towards oncoming traffic)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	5.50	6.50	7.50	8.00	8.00	8.00
Additional Time Gap 1, sec:	0.50	0.70	0.70	0.50	0.70	0.70
Additional Time Gap 2, sec:	N/A	N/A	N/A	N/A	N/A	N/A
Total Time Gap, sec:	6.00	7.20	8.20	8.50	8.70	8.70
Case F ISD, feet:	264.0	316.8	360.8	374.0	382.8	382.8
Rounded Case F ISD, feet:	265	320	365	375	385	385

ISD CONTROLLING DISTANCES:

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
To Left of Access:	310'	405'	495'	375'	475'	575'
To Right of Access:	375'	480'	570'	485'	590'	635'
Left-Turn from Mainline:	265'	320'	365'	375'	385'	385'

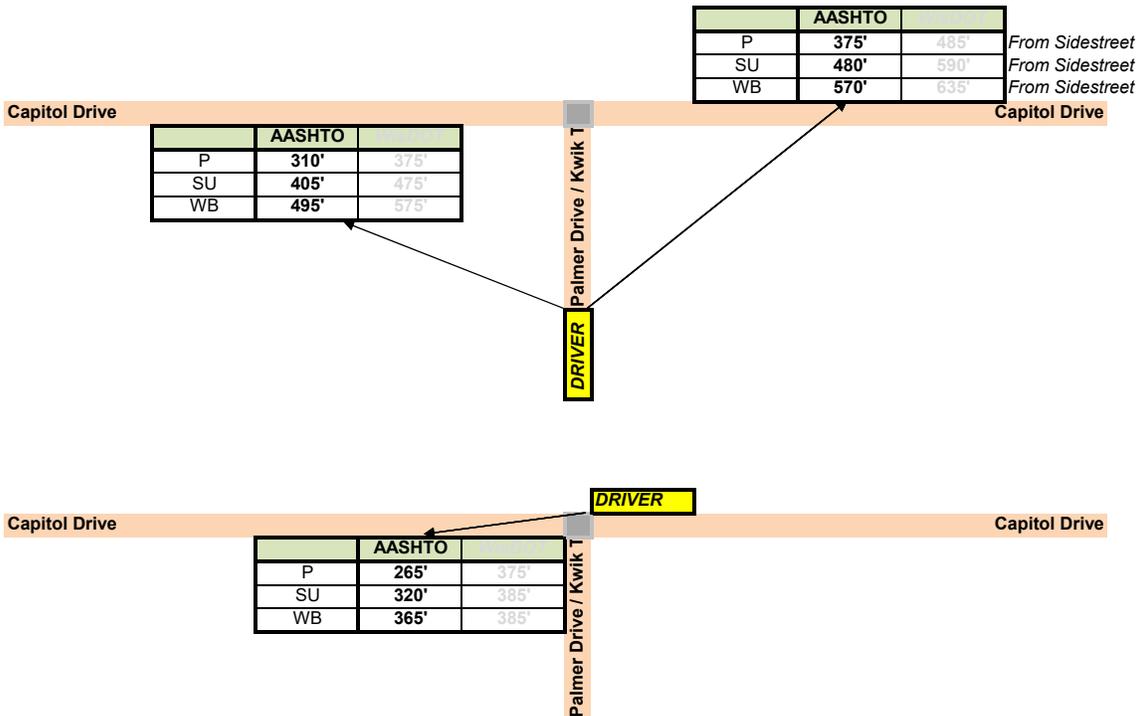
ISD CALCULATIONS (TWSC)

Performed by: TADI - TSC _____ Date: 3/24/2023
 Intersection: Capitol Drive & Palmer Drive/Kwik Trip North Driveway
 Community: Hartland, WI



Eye Height (start of Arrows): 3.5-ft for P, 7.6-ft for SU & WB
 Object Height (head of Arrows): 3.5-ft
 Eye Location: 14.5-ft from edge of traveled way

Special Instructions



SSD CALCULATIONS

	EB	WB	NB	SB	
Design Speed:	30	30			
Deceleration (ft/s ²):	11.2	11.2	11.2	11.2	Default rate is 11.2 ft/s ² per AASHTO GDHS
Estimated Grade (%):	0.0%	0.0%	0.0%	0.0%	Positive is uphill, negative is downhill
Brake Reaction Time (s):	2.5	2.5	2.5	2.5	Default rate is 2.5s per AASHTO GDHS
Brake Reaction (ft):	110.0	110.0	0.0	0.0	
Braking Distance (ft):	86.3	86.3	0.0	0.0	
Calculated SSD (ft):	196.3	196.3	0.0	0.0	
Rounded SSD (ft):	200	200	0	0	

Eye Height (upstream of object to be seen): 3.5-ft
 Object Height (downstream of motorist): 2.0-ft

Special Instructions

ISD CALCULATIONS (TWSC)

Performed by: TADI - TSC Date: 3/24/2023
 Intersection: Capitol Drive & Kwik Trip South Driveway
 Community: Hartland, WI

Mainline Name: Capitol Drive
 Sidestreet Name: Kwik Trip South Driveway

Left-In Allowed?	Yes	P-vehicle Design Length:	19.0	feet (P = 19.0. Overwrite if other design veh)	
Left-Out Allowed?	Yes	SU-vehicle Design Length:	39.5	feet (SU-40 = 39.5. Overwrite if other design veh)	
Right-In Allowed?	Yes	WB-vehicle Design Length:	73.5	feet (WB-67 = 73.5. Overwrite if other design veh)	
Right-Out Allowed?	Yes				
Through-Out Allowed?	No				
Design Speed from Left:	30	Design Vehicles:	P	SU	WB
Design Speed from Right:	30		x	x	x
Median Width:	0		(place an "X")		
Minor Street Approach Grade:	0.0%				
Number of Near Side Right & Bike:	0.00				
Number of Near Side Thru:	1.00				
Number of Far Side Thru:	1.00				
Number of Far Side Right & Bike:	0.00				
AASHTO or WisDOT:	AASHTO				

ISD CASE B1: Left Turn from Minor Street or Median (driver looking right)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	7.50	9.50	11.50	10.00	12.00	13.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	7.50	9.50	11.50	10.00	12.00	13.00
Case B1 ISD, feet:	330.0	418.0	506.0	440.0	528.0	572.0
Rounded Case B1 ISD, feet:	335	420	510	445	530	575

ISD CASE B2: Right Turn from Minor Street (driver looking left)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	8.00	10.00	12.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	6.50	8.50	10.50	8.00	10.00	12.00
Case B2 ISD, feet:	286.0	374.0	462.0	352.0	440.0	528.0
Rounded Case B2 ISD, feet:	290	375	465	355	445	530

ISD CASE B3a: Crossing from Minor Street Traffic from Left (driver looking left)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Case B3a ISD, feet:	286.0	374.0	462.0	308.0	440.0	572.0
Rounded Case B3a ISD, feet:	290	375	465	310	445	575

ISD CASE B3b: Crossing from Minor Street or Median (driver looking right)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Additional Time Gap 1, sec:	-6.50	-8.50	-10.50	-7.00	-10.00	-13.00
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Case B3b ISD, feet:	0.0	0.0	0.0	0.0	0.0	0.0
Rounded Case B3b ISD, feet:	0	0	0	0	0	0

ISD CASE F: Left from Major to Minor (driver looking to left of access towards oncoming traffic)

AASHTO MINIMUM ISD				WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	5.50	6.50	7.50	8.00	8.00	8.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	N/A	N/A	N/A	N/A	N/A	N/A
Total Time Gap, sec:	5.50	6.50	7.50	8.00	8.00	8.00
Case F ISD, feet:	242.0	286.0	330.0	352.0	352.0	352.0
Rounded Case F ISD, feet:	245	290	335	355	355	355

ISD CONTROLLING DISTANCES:

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
To Left of Access:	290'	375'	465'	355'	445'	575'
To Right of Access:	335'	420'	510'	445'	530'	575'
Left-Turn from Mainline:	245'	290'	335'	355'	355'	355'

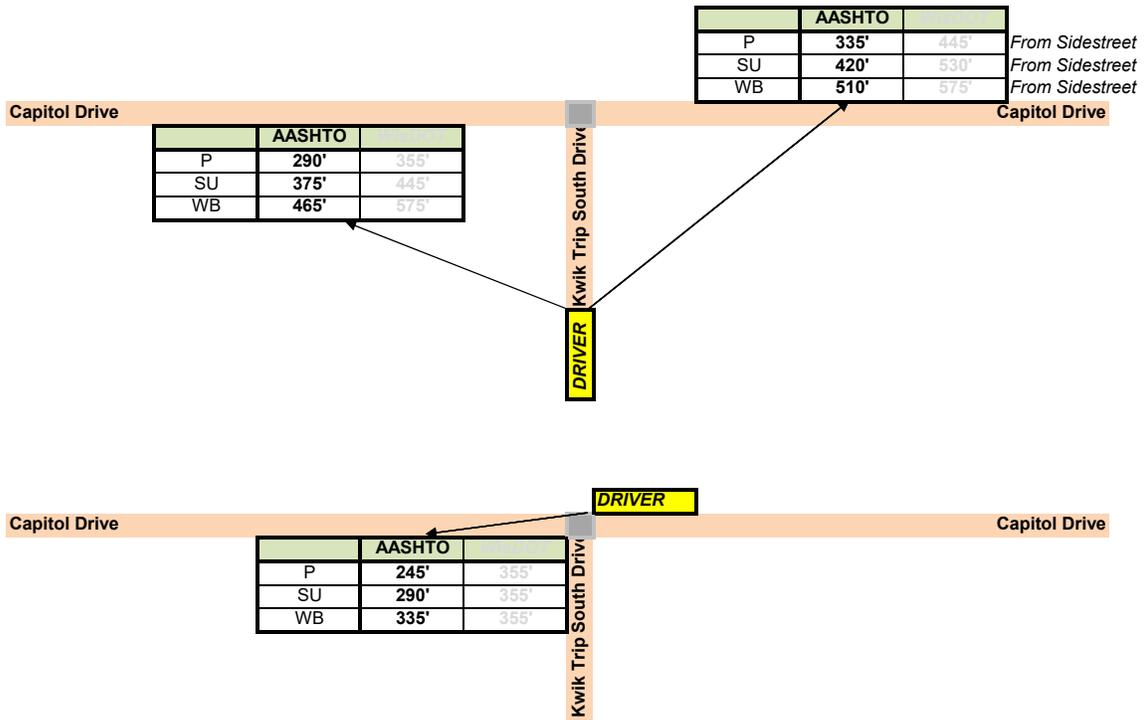
ISD CALCULATIONS (TWSC)

Performed by: TADI - TSC _____ Date: 3/24/2023
 Intersection: Capitol Drive & Kwik Trip South Driveway
 Community: Hartland, WI



Eye Height (start of Arrows): 3.5-ft for P, 7.6-ft for SU & WB
 Object Height (head of Arrows): 3.5-ft
 Eye Location: 14.5-ft from edge of traveled way

Special Instructions



SSD CALCULATIONS

	EB	WB	NB	SB	
Design Speed:	30	30			
Deceleration (ft/s ²):	11.2	11.2	11.2	11.2	Default rate is 11.2 ft/s ² per AASHTO GDHS
Estimated Grade (%):	0.0%	0.0%	0.0%	0.0%	Positive is uphill, negative is downhill
Brake Reaction Time (s):	2.5	2.5	2.5	2.5	Default rate is 2.5s per AASHTO GDHS
Brake Reaction (ft):	110.0	110.0	0.0	0.0	
Braking Distance (ft):	86.3	86.3	0.0	0.0	
Calculated SSD (ft):	196.3	196.3	0.0	0.0	
Rounded SSD (ft):	200	200	0	0	

Eye Height (upstream of object to be seen): 3.5-ft
 Object Height (downstream of motorist): 2.0-ft

Special Instructions



ISD CALCULATIONS (TWSC)

Performed by: TADI - TSC Date: 3/24/2023
 Intersection: Capitol Drive & Vettelson Rd./Hartland Quarry Apts Dwy
 Community: Hartland, WI

Mainline Name: Capitol Drive
 Sidestreet Name: Vettelson Road/Hartland Quarry Apts Driveway

Left-In Allowed?	Yes	P-vehicle Design Length:	19.0	feet (P = 19.0. Overwrite if other design veh)	
Left-Out Allowed?	Yes	SU-vehicle Design Length:	39.5	feet (SU-40 = 39.5. Overwrite if other design veh)	
Right-In Allowed?	Yes	WB-vehicle Design Length:	73.5	feet (WB-67 = 73.5. Overwrite if other design veh)	
Right-Out Allowed?	Yes				
Through-Out Allowed?	Yes				
Design Speed from Left:	30	Design Vehicles:	P	SU	WB
Design Speed from Right:	30		x	x	(place an "X")
Median Width:	12				
Minor Street Approach Grade:	0.0%				
Number of Near Side Right & Bike:	0.00				
Number of Near Side Thru:	1.00				
Number of Far Side Thru:	1.00				
Number of Far Side Right & Bike:	0.00				
AASHTO or WisDOT:	AASHTO				

ISD CASE B1: Left Turn from Minor Street or Median (driver looking right)

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	7.50	9.50	11.50	10.00	12.00	13.00
Additional Time Gap 1, sec:	0.50	0.70	0.70	0.50	0.70	0.70
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	8.00	10.20	12.20	10.50	12.70	13.70
Case B1 ISD, feet:	352.0	448.8	536.8	462.0	558.8	602.8
Rounded Case B1 ISD, feet:	355	450	540	465	560	605

ISD CASE B2: Right Turn from Minor Street (driver looking left)

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	8.00	10.00	12.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	6.50	8.50	10.50	8.00	10.00	12.00
Case B2 ISD, feet:	286.0	374.0	462.0	352.0	440.0	528.0
Rounded Case B2 ISD, feet:	290	375	465	355	445	530

ISD CASE B3a: Crossing from Minor Street Traffic from Left (driver looking left)

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Case B3a ISD, feet:	286.0	374.0	462.0	308.0	440.0	572.0
Rounded Case B3a ISD, feet:	290	375	465	310	445	575

ISD CASE B3b: Crossing from Minor Street or Median (driver looking right)

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	6.50	8.50	10.50	7.00	10.00	13.00
Additional Time Gap 1, sec:	0.50	0.70	0.70	0.50	0.70	0.70
Additional Time Gap 2, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Total Time Gap, sec:	7.00	9.20	11.20	7.50	10.70	13.70
Case B3b ISD, feet:	308.0	404.8	492.8	330.0	470.8	602.8
Rounded Case B3b ISD, feet:	310	405	495	335	475	605

ISD CASE F: Left from Major to Minor (driver looking to left of access towards oncoming traffic)

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
Base Time Gap, sec:	5.50	6.50	7.50	8.00	8.00	8.00
Additional Time Gap 1, sec:	0.00	0.00	0.00	0.00	0.00	0.00
Additional Time Gap 2, sec:	N/A	N/A	N/A	N/A	N/A	N/A
Total Time Gap, sec:	5.50	6.50	7.50	8.00	8.00	8.00
Case F ISD, feet:	242.0	286.0	330.0	352.0	352.0	352.0
Rounded Case F ISD, feet:	245	290	335	355	355	355

ISD CONTROLLING DISTANCES:

	AASHTO MINIMUM ISD			WISDOT UPPER MINIMUM ISD		
	P	SU	WB	P	SU	WB
To Left of Access:	290'	375'	465'	355'	445'	575'
To Right of Access:	355'	450'	540'	465'	560'	605'
Left-Turn from Mainline:	245'	290'	335'	355'	355'	355'

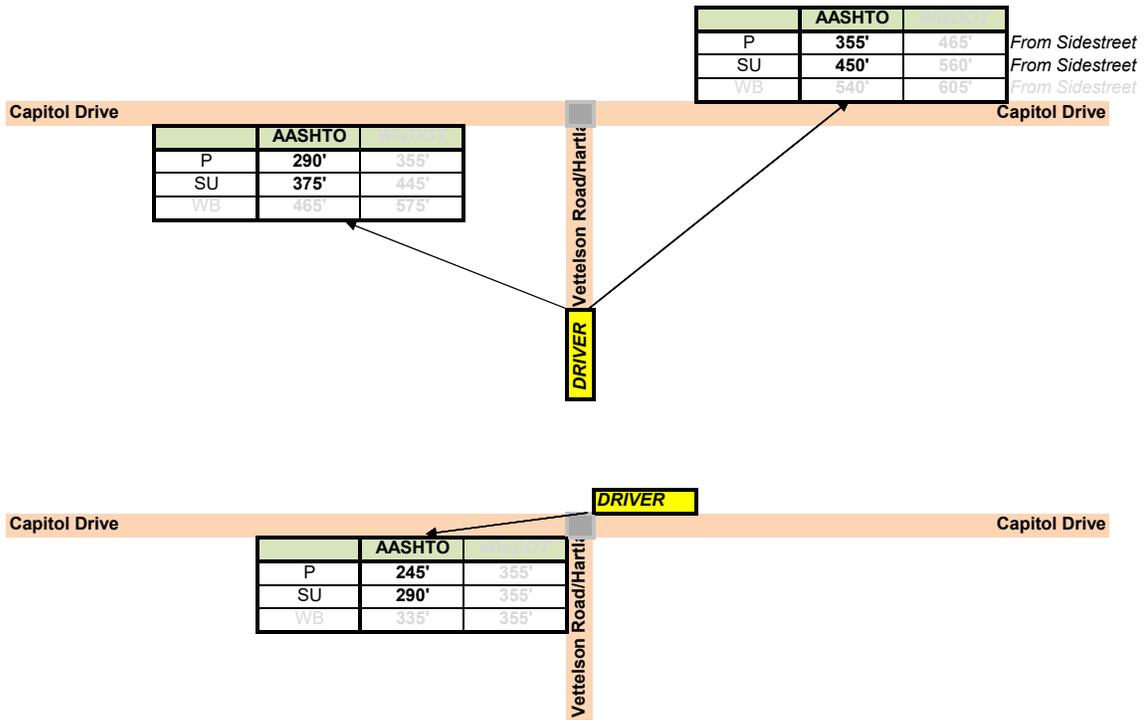
ISD CALCULATIONS (TWSC)

Performed by: TADI - TSC Date: 3/24/2023
 Intersection: Capitol Drive & Vettelson Rd./Hartland Quarry Apts Dw
 Community: Hartland, WI



Eye Height (start of Arrows): 3.5-ft for P, 7.6-ft for SU & WB
 Object Height (head of Arrows): 3.5-ft
 Eye Location: 14.5-ft from edge of traveled way

Special Instructions



SSD CALCULATIONS

	EB	WB	NB	SB	
Design Speed:	30	30			
Deceleration (ft/s ²):	11.2	11.2	11.2	11.2	Default rate is 11.2 ft/s ² per AASHTO GDHS
Estimated Grade (%):	0.0%	0.0%	0.0%	0.0%	Positive is uphill, negative is downhill
Brake Reaction Time (s):	2.5	2.5	2.5	2.5	Default rate is 2.5s per AASHTO GDHS
Brake Reaction (ft):	110.0	110.0	0.0	0.0	
Braking Distance (ft):	86.3	86.3	0.0	0.0	
Calculated SSD (ft):	196.3	196.3	0.0	0.0	
Rounded SSD (ft):	200	200	0	0	

Eye Height (upstream of object to be seen): 3.5-ft
 Object Height (downstream of motorist): 2.0-ft

Special Instructions



APPENDIX B

Year 2023 Background Traffic Operational Analysis

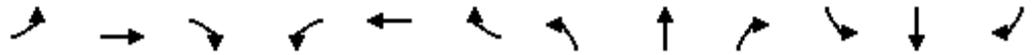
Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Existing
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	5	20	30	10	105	20	225	20	25	475	45
Future Volume (vph)	20	5	20	30	10	105	20	225	20	25	475	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	10%	10%	10%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	7	17	40	13	87	27	300	17	33	633	37
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Existing
AM Peak Hour

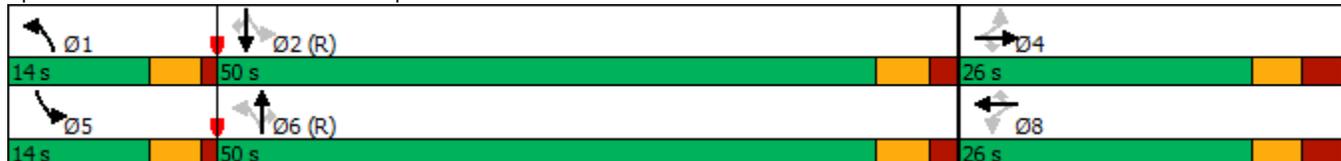


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.16	0.03	0.09	0.24	0.06	0.46	0.04	0.13	0.02	0.04	0.25	0.03
Control Delay	37.5	34.6	35.8	39.2	35.1	44.9	3.1	5.8	6.5	3.0	5.6	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.5	34.6	35.8	39.2	35.1	44.9	3.1	5.8	6.5	3.0	5.6	5.8
Queue Length 50th (ft)	14	4	9	21	7	47	3	32	3	4	45	4
Queue Length 95th (ft)	31	13	23	42	19	74	8	43	10	9	90	16
Internal Link Dist (ft)	359				294				547		553	
Turn Bay Length (ft)	330		200	105		135	335		150	200		305
Base Capacity (vph)	305	407	346	310	411	350	660	2387	1067	875	2580	1154
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.02	0.05	0.13	0.03	0.25	0.04	0.13	0.02	0.04	0.25	0.03

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
100: STH 83 & Capitol Drive

2023 Existing
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	5	20	30	10	105	20	225	20	25	475	45
Future Volume (veh/h)	20	5	20	30	10	105	20	225	20	25	475	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1752	1752	1752	1826	1826	1826
Adj Flow Rate, veh/h	27	7	17	40	13	87	27	300	17	33	633	37
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	1	1	1	10	10	10	5	5	5
Cap, veh/h	215	206	175	229	208	176	567	2231	995	806	2341	1044
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.03	0.67	0.67	0.04	0.67	0.67
Sat Flow, veh/h	1295	1870	1585	1398	1885	1598	1668	3328	1485	1739	3469	1547
Grp Volume(v), veh/h	27	7	17	40	13	87	27	300	17	33	633	37
Grp Sat Flow(s),veh/h/ln	1295	1870	1585	1398	1885	1598	1668	1664	1485	1739	1735	1547
Q Serve(g_s), s	1.7	0.3	0.9	2.4	0.6	4.6	0.4	2.9	0.3	0.5	6.5	0.7
Cycle Q Clear(g_c), s	2.3	0.3	0.9	2.7	0.6	4.6	0.4	2.9	0.3	0.5	6.5	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	215	206	175	229	208	176	567	2231	995	806	2341	1044
V/C Ratio(X)	0.13	0.03	0.10	0.17	0.06	0.49	0.05	0.13	0.02	0.04	0.27	0.04
Avail Cap(c_a), veh/h	355	409	347	381	413	350	689	2231	995	925	2341	1044
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	1.00	1.00
Uniform Delay (d), s/veh	36.9	35.8	36.0	37.0	35.9	37.7	4.3	5.4	5.0	4.0	5.8	4.9
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.1	0.0	0.8	0.0	0.1	0.0	0.0	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.1	0.3	0.8	0.3	1.8	0.1	0.9	0.1	0.1	2.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	35.8	36.1	37.1	35.9	38.5	4.3	5.5	5.0	4.0	6.1	4.9
LnGrp LOS	D	D	D	D	D	D	A	A	A	A	A	A
Approach Vol, veh/h		51			140			344			703	
Approach Delay, s/veh		36.5			37.8			5.4			5.9	
Approach LOS		D			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.4	66.3		16.2	7.9	65.9		16.2				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.4	8.5		4.3	2.5	4.9		6.6				
Green Ext Time (p_c), s	0.0	9.2		0.0	0.0	4.0		0.1				

Intersection Summary

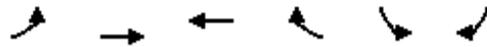
HCM 6th Ctrl Delay	10.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
200: Capitol Drive & Palmer Drive

2023 Existing
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	30	40	1	1	105
Future Volume (vph)	20	30	40	1	1	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	100				100	
Link Speed (mph)		25	25		25	
Link Distance (ft)		374	284		419	
Travel Time (s)		10.2	7.7		11.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	7%	5%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	24	37	50	0	129	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	5.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	30	40	1	1	105
Future Vol, veh/h	20	30	40	1	1	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	7	5	5	2	2
Mvmt Flow	24	37	49	1	1	128

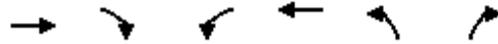
Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	50	0	-	0	135 50
Stage 1	-	-	-	-	50 -
Stage 2	-	-	-	-	85 -
Critical Hdwy	4.17	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.263	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1525	-	-	-	859 1018
Stage 1	-	-	-	-	972 -
Stage 2	-	-	-	-	938 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1525	-	-	-	845 1018
Mov Cap-2 Maneuver	-	-	-	-	845 -
Stage 1	-	-	-	-	956 -
Stage 2	-	-	-	-	938 -

Approach	EB	WB	SB
HCM Control Delay, s	3	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1525	-	-	-	1016
HCM Lane V/C Ratio	0.016	-	-	-	0.127
HCM Control Delay (s)	7.4	-	-	-	9.1
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Lanes, Volumes, Timings
400: Vettelson Road & Capitol Drive

2023 Existing
AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	25	5	15	25	15	15
Future Volume (vph)	25	5	15	25	15	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	50
Storage Lanes		0	0		1	1
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	477			924	458	
Travel Time (s)	13.0			25.2	12.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	5%	5%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	40	0	0	53	20	20
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	3.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	25	5	15	25	15	15
Future Vol, veh/h	25	5	15	25	15	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	11	11	5	5	10	10
Mvmt Flow	33	7	20	33	20	20

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	40	0	110 37
Stage 1	-	-	-	-	37 -
Stage 2	-	-	-	-	73 -
Critical Hdwy	-	-	4.15	-	6.5 6.3
Critical Hdwy Stg 1	-	-	-	-	5.5 -
Critical Hdwy Stg 2	-	-	-	-	5.5 -
Follow-up Hdwy	-	-	2.245	-	3.59 3.39
Pot Cap-1 Maneuver	-	-	1550	-	868 1013
Stage 1	-	-	-	-	965 -
Stage 2	-	-	-	-	930 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1550	-	857 1013
Mov Cap-2 Maneuver	-	-	-	-	857 -
Stage 1	-	-	-	-	965 -
Stage 2	-	-	-	-	918 -

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	857	1013	-	-	1550	-
HCM Lane V/C Ratio	0.023	0.02	-	-	0.013	-
HCM Control Delay (s)	9.3	8.6	-	-	7.4	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-

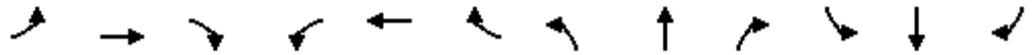
Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Existing
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	25	35	25	15	70	50	670	60	85	390	105
Future Volume (vph)	95	25	35	25	15	70	50	670	60	85	390	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	26	23	26	16	46	53	705	39	89	411	69
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Existing
PM Peak Hour

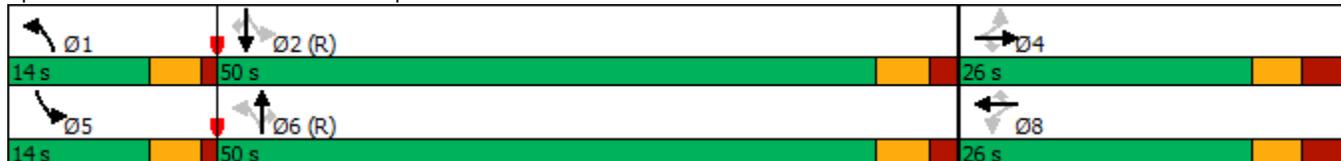


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.55	0.11	0.11	0.15	0.07	0.23	0.07	0.28	0.04	0.15	0.16	0.06
Control Delay	48.2	34.4	34.7	35.6	33.7	37.0	3.6	7.8	7.5	4.0	6.5	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.2	34.4	34.7	35.6	33.7	37.0	3.6	7.8	7.5	4.0	6.5	7.1
Queue Length 50th (ft)	55	14	12	14	8	24	6	85	7	10	45	13
Queue Length 95th (ft)	101	35	33	36	26	54	18	139	23	26	77	34
Internal Link Dist (ft)	359				294				547		553	
Turn Bay Length (ft)	330		200	105		135	335		150	200		305
Base Capacity (vph)	307	411	350	301	407	346	833	2474	1107	632	2513	1124
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.06	0.07	0.09	0.04	0.13	0.06	0.28	0.04	0.14	0.16	0.06

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
 100: STH 83 & Capitol Drive

2023 Existing
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	25	35	25	15	70	50	670	60	85	390	105
Future Volume (veh/h)	95	25	35	25	15	70	50	670	60	85	390	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	100	26	23	26	16	46	53	705	39	89	411	69
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	3	3	3
Cap, veh/h	219	209	177	213	207	176	733	2319	1034	584	2320	1035
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.05	0.65	0.65	0.06	0.66	0.66
Sat Flow, veh/h	1351	1885	1598	1356	1870	1585	1795	3582	1598	1767	3526	1572
Grp Volume(v), veh/h	100	26	23	26	16	46	53	705	39	89	411	69
Grp Sat Flow(s),veh/h/ln	1351	1885	1598	1356	1870	1585	1795	1791	1598	1767	1763	1572
Q Serve(g_s), s	6.5	1.1	1.2	1.6	0.7	2.4	0.8	7.8	0.8	1.4	4.1	1.4
Cycle Q Clear(g_c), s	7.1	1.1	1.2	2.7	0.7	2.4	0.8	7.8	0.8	1.4	4.1	1.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	209	177	213	207	176	733	2319	1034	584	2320	1035
V/C Ratio(X)	0.46	0.12	0.13	0.12	0.08	0.26	0.07	0.30	0.04	0.15	0.18	0.07
Avail Cap(c_a), veh/h	365	413	350	360	409	347	835	2319	1034	665	2320	1035
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	1.00	1.00
Uniform Delay (d), s/veh	39.1	36.1	36.1	37.3	35.9	36.6	4.3	7.0	5.7	4.5	6.0	5.5
Incr Delay (d2), s/veh	0.5	0.1	0.1	0.1	0.1	0.3	0.0	0.3	0.1	0.0	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.5	0.5	0.5	0.3	0.9	0.2	2.6	0.2	0.4	1.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.6	36.2	36.2	37.4	35.9	36.9	4.3	7.3	5.8	4.5	6.1	5.6
LnGrp LOS	D	D	D	D	D	D	A	A	A	A	A	A
Approach Vol, veh/h		149			88			797			569	
Approach Delay, s/veh		38.5			36.9			7.0			5.8	
Approach LOS		D			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	64.8		16.3	9.9	63.9		16.3				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.8	6.1		9.1	3.4	9.8		4.7				
Green Ext Time (p_c), s	0.0	6.0		0.1	0.0	10.3		0.1				

Intersection Summary

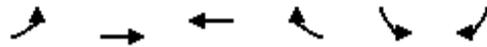
HCM 6th Ctrl Delay	11.2
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
 200: Capitol Drive & Palmer Drive

2023 Existing
 PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	105	65	50	5	10	60
Future Volume (vph)	105	65	50	5	10	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	100				100	
Link Speed (mph)		25	25		25	
Link Distance (ft)		374	284		419	
Travel Time (s)		10.2	7.7		11.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	117	72	62	0	78	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	4.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	105	65	50	5	10	60
Future Vol, veh/h	105	65	50	5	10	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	5	2	2	2	2
Mvmt Flow	117	72	56	6	11	67

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	62	0	-	0	365 59
Stage 1	-	-	-	-	59 -
Stage 2	-	-	-	-	306 -
Critical Hdwy	4.15	-	-	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.245	-	-	-	3.518 3.318
Pot Cap-1 Maneuver	1522	-	-	-	635 1007
Stage 1	-	-	-	-	964 -
Stage 2	-	-	-	-	747 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1522	-	-	-	586 1007
Mov Cap-2 Maneuver	-	-	-	-	586 -
Stage 1	-	-	-	-	890 -
Stage 2	-	-	-	-	747 -

Approach	EB	WB	SB
HCM Control Delay, s	4.7	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1522	-	-	-	913
HCM Lane V/C Ratio	0.077	-	-	-	0.085
HCM Control Delay (s)	7.6	-	-	-	9.3
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Lanes, Volumes, Timings
 400: Vettelson Road & Capitol Drive

2023 Existing
 PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	65	10	20	40	15	20
Future Volume (vph)	65	10	20	40	15	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	50
Storage Lanes		0	0		1	1
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	477			924	458	
Travel Time (s)	13.0			25.2	12.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	90	0	0	72	18	24
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection						
Int Delay, s/veh	2.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	65	10	20	40	15	20
Future Vol, veh/h	65	10	20	40	15	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	6	6	1	1	1	1
Mvmt Flow	78	12	24	48	18	24

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	90	0	180
Stage 1	-	-	-	-	84
Stage 2	-	-	-	-	96
Critical Hdwy	-	-	4.11	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	-	-	2.209	-	3.509
Pot Cap-1 Maneuver	-	-	1512	-	812
Stage 1	-	-	-	-	942
Stage 2	-	-	-	-	930
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1512	-	799
Mov Cap-2 Maneuver	-	-	-	-	799
Stage 1	-	-	-	-	942
Stage 2	-	-	-	-	915

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	799	978	-	-	1512	-
HCM Lane V/C Ratio	0.023	0.025	-	-	0.016	-
HCM Control Delay (s)	9.6	8.8	-	-	7.4	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-

APPENDIX C

Year 2023 Build Traffic Operational Analysis

Initial Buildout – Kwik Trip Only

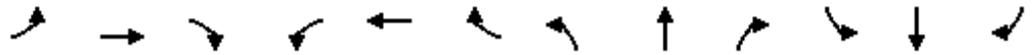
Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Initial Build (Kwik Trip Only)
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	10	20	100	15	155	20	205	60	110	425	45
Future Volume (vph)	20	10	20	100	15	155	20	205	60	110	425	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	10%	10%	10%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	13	17	133	20	128	27	273	50	147	567	37
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Initial Build (Kwik Trip Only)
AM Peak Hour

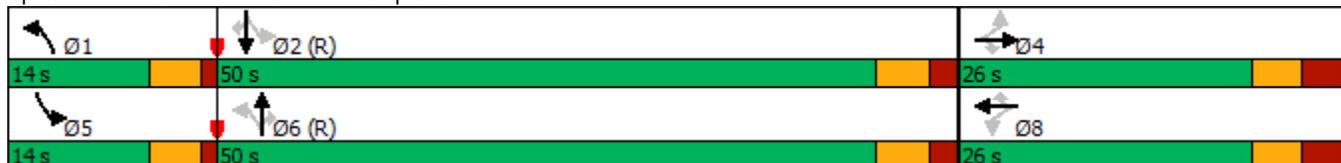


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.13	0.05	0.07	0.65	0.07	0.55	0.05	0.14	0.06	0.19	0.24	0.04
Control Delay	33.2	31.1	31.8	50.7	31.7	44.2	4.5	9.0	9.3	4.6	7.3	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	31.1	31.8	50.7	31.7	44.2	4.5	9.0	9.3	4.6	7.3	7.5
Queue Length 50th (ft)	14	7	9	73	10	69	3	31	10	19	45	5
Queue Length 95th (ft)	29	18	21	100	23	95	10	51	26	37	94	19
Internal Link Dist (ft)	359				294		547				553	
Turn Bay Length (ft)	330		200	105		135	335		150	200		305
Base Capacity (vph)	303	407	346	308	411	350	634	1958	875	791	2322	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.03	0.05	0.43	0.05	0.37	0.04	0.14	0.06	0.19	0.24	0.04

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
 100: STH 83 & Capitol Drive

2023 Initial Build (Kwik Trip Only)
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	10	20	100	15	155	20	205	60	110	425	45
Future Volume (veh/h)	20	10	20	100	15	155	20	205	60	110	425	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1752	1752	1752	1826	1826	1826
Adj Flow Rate, veh/h	27	13	17	133	20	128	27	273	50	147	567	37
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	1	1	1	10	10	10	5	5	5
Cap, veh/h	222	232	197	244	234	198	589	2092	933	807	2293	1023
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.03	0.63	0.63	0.06	0.66	0.66
Sat Flow, veh/h	1240	1870	1585	1391	1885	1598	1668	3328	1485	1739	3469	1547
Grp Volume(v), veh/h	27	13	17	133	20	128	27	273	50	147	567	37
Grp Sat Flow(s),veh/h/ln	1240	1870	1585	1391	1885	1598	1668	1664	1485	1739	1735	1547
Q Serve(g_s), s	1.8	0.6	0.9	8.4	0.8	6.9	0.5	3.0	1.2	2.5	6.0	0.7
Cycle Q Clear(g_c), s	2.6	0.6	0.9	8.9	0.8	6.9	0.5	3.0	1.2	2.5	6.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	222	232	197	244	234	198	589	2092	933	807	2293	1023
V/C Ratio(X)	0.12	0.06	0.09	0.54	0.09	0.65	0.05	0.13	0.05	0.18	0.25	0.04
Avail Cap(c_a), veh/h	340	409	347	376	413	350	710	2092	933	878	2293	1023
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	1.00	1.00
Uniform Delay (d), s/veh	36.1	34.8	34.9	38.7	34.9	37.5	5.3	6.8	6.4	4.6	6.2	5.3
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.7	0.1	1.3	0.0	0.1	0.1	0.0	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.3	0.3	2.9	0.4	2.7	0.1	1.0	0.3	0.7	1.9	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.1	34.8	35.0	39.4	34.9	38.8	5.3	6.9	6.5	4.6	6.4	5.4
LnGrp LOS	D	C	C	D	C	D	A	A	A	A	A	A
Approach Vol, veh/h		57			281			350			751	
Approach Delay, s/veh		35.5			38.8			6.7			6.0	
Approach LOS		D			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.4	65.1		17.5	10.3	62.2		17.5				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.5	8.0		4.6	4.5	5.0		10.9				
Green Ext Time (p_c), s	0.0	8.2		0.0	0.1	3.9		0.2				
Intersection Summary												
HCM 6th Ctrl Delay				13.8								
HCM 6th LOS				B								
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

Lanes, Volumes, Timings
 200: Kwik Trip N. Dwy/Palmer Drive & Capitol Drive

2023 Initial Build (Kwik Trip Only)
 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	60	100	5	75	1	100	5	10	1	15	95
Future Volume (vph)	20	60	100	5	75	1	100	5	10	1	15	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		100	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		374			284			219			419	
Travel Time (s)		10.2			7.7			6.0			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	73	122	0	98	0	0	140	0	0	135	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		60	60		9	15		60	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection												
Int Delay, s/veh	5.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗		↕			↕			↕	
Traffic Vol, veh/h	20	60	100	5	75	1	100	5	10	1	15	95
Future Vol, veh/h	20	60	100	5	75	1	100	5	10	1	15	95
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	100	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	7	7	7	5	5	5	2	2	2	2	2	2
Mvmt Flow	24	73	122	6	91	1	122	6	12	1	18	116

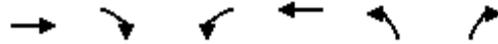
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	92	0	0	195	0	0	292	225	73	295	347	92
Stage 1	-	-	-	-	-	-	121	121	-	104	104	-
Stage 2	-	-	-	-	-	-	171	104	-	191	243	-
Critical Hdwy	4.17	-	-	4.15	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.263	-	-	2.245	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1472	-	-	1360	-	-	660	674	989	657	576	965
Stage 1	-	-	-	-	-	-	883	796	-	902	809	-
Stage 2	-	-	-	-	-	-	831	809	-	811	705	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1472	-	-	1360	-	-	557	660	989	634	564	965
Mov Cap-2 Maneuver	-	-	-	-	-	-	557	660	-	634	564	-
Stage 1	-	-	-	-	-	-	869	783	-	888	805	-
Stage 2	-	-	-	-	-	-	711	805	-	782	694	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.8			0.5			13.1			9.9		
HCM LOS							B			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	583	1472	-	-	1360	-	-	877
HCM Lane V/C Ratio	0.241	0.017	-	-	0.004	-	-	0.154
HCM Control Delay (s)	13.1	7.5	-	-	7.7	0	-	9.9
HCM Lane LOS	B	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0	-	-	0.5

Lanes, Volumes, Timings
 300: Kwik Trip S. Dwy & Capitol Drive

2023 Initial Build (Kwik Trip Only)
 AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	35	35	15	40	40	10
Future Volume (vph)	35	35	15	40	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	284			477	220	
Travel Time (s)	7.7			13.0	6.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	7%	5%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	0	0	67	61	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		60	60		60	60
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection						
Int Delay, s/veh	3.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	35	35	15	40	40	10
Future Vol, veh/h	35	35	15	40	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	7	5	5	2	2
Mvmt Flow	43	43	18	49	49	12

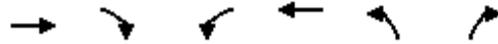
Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	86	0	150 65
Stage 1	-	-	-	-	65 -
Stage 2	-	-	-	-	85 -
Critical Hdwy	-	-	4.15	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.245	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1492	-	842 999
Stage 1	-	-	-	-	958 -
Stage 2	-	-	-	-	938 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1492	-	832 999
Mov Cap-2 Maneuver	-	-	-	-	832 -
Stage 1	-	-	-	-	958 -
Stage 2	-	-	-	-	927 -

Approach	EB	WB	NB
HCM Control Delay, s	0	2	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	861	-	-	1492	-
HCM Lane V/C Ratio	0.071	-	-	0.012	-
HCM Control Delay (s)	9.5	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lanes, Volumes, Timings
 400: Vettelson Road & Capitol Drive

2023 Initial Build (Kwik Trip Only)
 AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	35	10	15	35	20	15
Future Volume (vph)	35	10	15	35	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	50
Storage Lanes		0	0		1	1
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	477			924	458	
Travel Time (s)	13.0			25.2	12.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	5%	5%	10%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	0	0	67	27	20
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection						
Int Delay, s/veh	3.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	35	10	15	35	20	15
Future Vol, veh/h	35	10	15	35	20	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	11	11	5	5	10	10
Mvmt Flow	47	13	20	47	27	20

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	60	0	141
Stage 1	-	-	-	-	54
Stage 2	-	-	-	-	87
Critical Hdwy	-	-	4.15	-	6.5
Critical Hdwy Stg 1	-	-	-	-	5.5
Critical Hdwy Stg 2	-	-	-	-	5.5
Follow-up Hdwy	-	-	2.245	-	3.59
Pot Cap-1 Maneuver	-	-	1525	-	833
Stage 1	-	-	-	-	948
Stage 2	-	-	-	-	917
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1525	-	822
Mov Cap-2 Maneuver	-	-	-	-	822
Stage 1	-	-	-	-	948
Stage 2	-	-	-	-	905

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	822	991	-	-	1525	-
HCM Lane V/C Ratio	0.032	0.02	-	-	0.013	-
HCM Control Delay (s)	9.5	8.7	-	-	7.4	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-

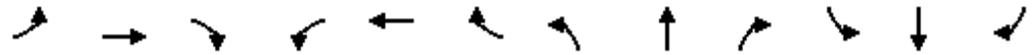
Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Initial Build (Kwik Trip Only)
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	30	35	70	20	145	50	625	125	145	365	105
Future Volume (vph)	95	30	35	70	20	145	50	625	125	145	365	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	32	23	74	21	95	53	658	82	153	384	69
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Initial Build (Kwik Trip Only)
PM Peak Hour

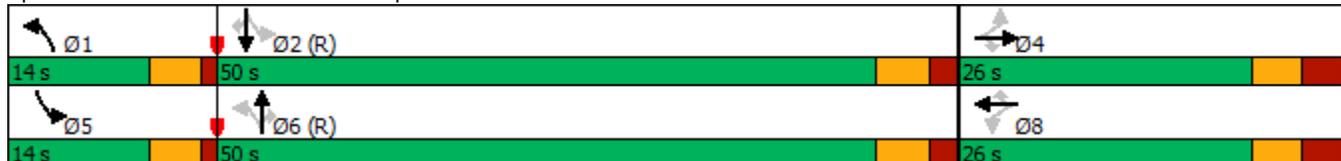


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.55	0.13	0.11	0.42	0.09	0.47	0.07	0.28	0.08	0.26	0.15	0.06
Control Delay	48.3	34.9	34.7	42.9	34.0	43.5	3.7	8.3	8.0	4.4	6.4	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	34.9	34.7	42.9	34.0	43.5	3.7	8.3	8.0	4.4	6.4	7.1
Queue Length 50th (ft)	55	17	12	40	11	52	6	78	16	18	42	13
Queue Length 95th (ft)	101	41	33	78	31	94	18	136	42	42	72	34
Internal Link Dist (ft)	359						294		547		553	
Turn Bay Length (ft)	330		200	105		135	335		150	200		305
Base Capacity (vph)	306	411	350	300	407	346	842	2326	1040	641	2513	1124
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.08	0.07	0.25	0.05	0.27	0.06	0.28	0.08	0.24	0.15	0.06

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
 100: STH 83 & Capitol Drive

2023 Initial Build (Kwik Trip Only)
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	30	35	70	20	145	50	625	125	145	365	105
Future Volume (veh/h)	95	30	35	70	20	145	50	625	125	145	365	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	100	32	23	74	21	95	53	658	82	153	384	69
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	3	3	3
Cap, veh/h	210	209	177	209	208	176	750	2298	1025	595	2319	1034
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.05	0.64	0.64	0.07	0.66	0.66
Sat Flow, veh/h	1286	1885	1598	1349	1870	1585	1795	3582	1598	1767	3526	1572
Grp Volume(v), veh/h	100	32	23	74	21	95	53	658	82	153	384	69
Grp Sat Flow(s),veh/h/ln	1286	1885	1598	1349	1870	1585	1795	1791	1598	1767	1763	1572
Q Serve(g_s), s	6.8	1.4	1.2	4.7	0.9	5.1	0.8	7.3	1.7	2.5	3.8	1.4
Cycle Q Clear(g_c), s	7.7	1.4	1.2	6.1	0.9	5.1	0.8	7.3	1.7	2.5	3.8	1.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	210	209	177	209	208	176	750	2298	1025	595	2319	1034
V/C Ratio(X)	0.48	0.15	0.13	0.35	0.10	0.54	0.07	0.29	0.08	0.26	0.17	0.07
Avail Cap(c_a), veh/h	349	413	350	355	409	347	852	2298	1025	666	2319	1034
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	1.00	1.00
Uniform Delay (d), s/veh	39.4	36.2	36.1	38.9	36.0	37.8	4.5	7.1	6.1	4.6	5.9	5.5
Incr Delay (d2), s/veh	0.6	0.1	0.1	0.4	0.1	1.0	0.0	0.3	0.2	0.1	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.6	0.5	1.6	0.4	2.0	0.3	2.5	0.5	0.7	1.2	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.1	36.3	36.2	39.3	36.0	38.8	4.5	7.4	6.2	4.7	6.1	5.6
LnGrp LOS	D	D	D	D	D	D	A	A	A	A	A	A
Approach Vol, veh/h		155			190			793			606	
Approach Delay, s/veh		38.7			38.7			7.1			5.7	
Approach LOS		D			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	64.8		16.3	10.4	63.3		16.3				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.8	5.8		9.7	4.5	9.3		8.1				
Green Ext Time (p_c), s	0.0	5.6		0.1	0.1	10.0		0.2				

Intersection Summary

HCM 6th Ctrl Delay	12.8
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
 200: Kwik Trip N. Dwy/Palmer Drive & Capitol Drive

2023 Initial Build (Kwik Trip Only)
 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	95	105	5	85	5	95	10	10	10	10	55
Future Volume (vph)	100	95	105	5	85	5	95	10	10	10	10	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		100	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		374			284			219			419	
Travel Time (s)		10.2			7.7			6.0			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	106	117	0	106	0	0	128	0	0	83	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗		↕			↕			↕	
Traffic Vol, veh/h	100	95	105	5	85	5	95	10	10	10	10	55
Future Vol, veh/h	100	95	105	5	85	5	95	10	10	10	10	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	100	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	5	5	5	2	2	2	2	2	2	2	2	2
Mvmt Flow	111	106	117	6	94	6	106	11	11	11	11	61

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	100	0	0	223	0	0	473	440	106	507	554	97
Stage 1	-	-	-	-	-	-	328	328	-	109	109	-
Stage 2	-	-	-	-	-	-	145	112	-	398	445	-
Critical Hdwy	4.15	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.245	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1474	-	-	1346	-	-	501	511	948	476	440	959
Stage 1	-	-	-	-	-	-	685	647	-	896	805	-
Stage 2	-	-	-	-	-	-	858	803	-	628	575	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1474	-	-	1346	-	-	431	470	948	434	405	959
Mov Cap-2 Maneuver	-	-	-	-	-	-	431	470	-	434	405	-
Stage 1	-	-	-	-	-	-	634	598	-	829	801	-
Stage 2	-	-	-	-	-	-	788	799	-	563	532	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	2.5			0.4			15.9			10.7		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	456	1474	-	-	1346	-	-	714
HCM Lane V/C Ratio	0.28	0.075	-	-	0.004	-	-	0.117
HCM Control Delay (s)	15.9	7.6	-	-	7.7	0	-	10.7
HCM Lane LOS	C	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.1	0.2	-	-	0	-	-	0.4

Lanes, Volumes, Timings
 300: Kwik Trip S. Dwy & Capitol Drive

2023 Initial Build (Kwik Trip Only)
 PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	80	35	15	55	40	10
Future Volume (vph)	80	35	15	55	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	284			477	220	
Travel Time (s)	7.7			13.0	6.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	128	0	0	78	55	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection						
Int Delay, s/veh	2.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	80	35	15	55	40	10
Future Vol, veh/h	80	35	15	55	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	5	2	2	2	2
Mvmt Flow	89	39	17	61	44	11

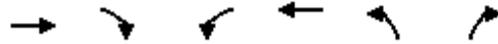
Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	128	0	204
Stage 1	-	-	-	-	109
Stage 2	-	-	-	-	95
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1458	-	784
Stage 1	-	-	-	-	916
Stage 2	-	-	-	-	929
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1458	-	775
Mov Cap-2 Maneuver	-	-	-	-	775
Stage 1	-	-	-	-	916
Stage 2	-	-	-	-	918

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	804	-	-	1458	-
HCM Lane V/C Ratio	0.069	-	-	0.011	-
HCM Control Delay (s)	9.8	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lanes, Volumes, Timings
400: Vettelson Road & Capitol Drive

2023 Initial Build (Kwik Trip Only)
PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	75	15	20	50	20	20
Future Volume (vph)	75	15	20	50	20	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	50
Storage Lanes		0	0		1	1
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	477			924	458	
Travel Time (s)	13.0			25.2	12.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	108	0	0	84	24	24
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	2.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	75	15	20	50	20	20
Future Vol, veh/h	75	15	20	50	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	6	6	1	1	1	1
Mvmt Flow	90	18	24	60	24	24

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	108	0	207
Stage 1	-	-	-	-	99
Stage 2	-	-	-	-	108
Critical Hdwy	-	-	4.11	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	-	-	2.209	-	3.509
Pot Cap-1 Maneuver	-	-	1489	-	784
Stage 1	-	-	-	-	927
Stage 2	-	-	-	-	919
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1489	-	771
Mov Cap-2 Maneuver	-	-	-	-	771
Stage 1	-	-	-	-	927
Stage 2	-	-	-	-	903

Approach	EB	WB	NB
HCM Control Delay, s	0	2.1	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	771	960	-	-	1489	-
HCM Lane V/C Ratio	0.031	0.025	-	-	0.016	-
HCM Control Delay (s)	9.8	8.8	-	-	7.5	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-

APPENDIX C

Year 2023 Build Traffic Operational Analysis

Interim Buildout – Kwik Trip + 400 Apartment Units

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Interim Build (Kwik Trip + 400 MF Units)

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	10	20	130	20	205	20	205	70	125	425	45
Future Volume (vph)	20	10	20	130	20	205	20	205	70	125	425	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	10%	10%	10%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	13	17	173	27	169	27	273	58	167	567	37
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Interim Build (Kwik Trip + 400 MF Units)

AM Peak Hour

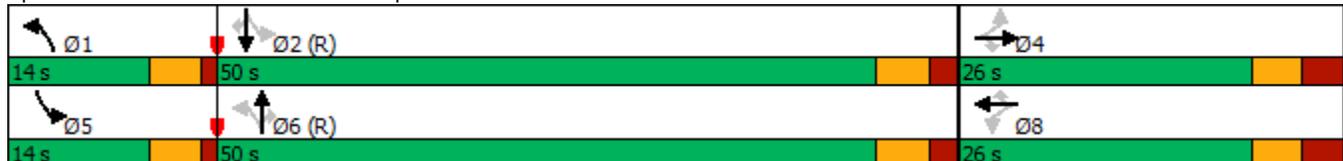


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.12	0.04	0.07	0.74	0.09	0.64	0.05	0.15	0.07	0.22	0.25	0.04
Control Delay	31.1	29.4	29.9	54.5	30.4	45.8	5.2	10.2	10.6	5.5	8.1	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	29.4	29.9	54.5	30.4	45.8	5.2	10.2	10.6	5.5	8.1	8.3
Queue Length 50th (ft)	13	6	8	95	13	91	4	34	13	25	51	6
Queue Length 95th (ft)	28	17	21	125	28	119	11	53	31	44	97	20
Internal Link Dist (ft)	359		294				547			553		
Turn Bay Length (ft)	330	200		105	135		335	150		200	305	
Base Capacity (vph)	301	407	346	308	411	350	616	1878	840	769	2254	1008
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.03	0.05	0.56	0.07	0.48	0.04	0.15	0.07	0.22	0.25	0.04

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
 100: STH 83 & Capitol Drive

2023 Interim Build (Kwik Trip + 400 MF Units)

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	10	20	130	20	205	20	205	70	125	425	45
Future Volume (veh/h)	20	10	20	130	20	205	20	205	70	125	425	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1752	1752	1752	1826	1826	1826
Adj Flow Rate, veh/h	27	13	17	173	27	169	27	273	58	167	567	37
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	1	1	1	10	10	10	5	5	5
Cap, veh/h	246	285	242	284	287	244	563	1996	890	772	2195	979
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.03	0.60	0.60	0.07	0.63	0.63
Sat Flow, veh/h	1187	1870	1585	1391	1885	1598	1668	3328	1485	1739	3469	1547
Grp Volume(v), veh/h	27	13	17	173	27	169	27	273	58	167	567	37
Grp Sat Flow(s),veh/h/ln	1187	1870	1585	1391	1885	1598	1668	1664	1485	1739	1735	1547
Q Serve(g_s), s	1.8	0.5	0.8	10.9	1.1	9.0	0.5	3.2	1.5	3.2	6.5	0.8
Cycle Q Clear(g_c), s	2.9	0.5	0.8	11.4	1.1	9.0	0.5	3.2	1.5	3.2	6.5	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	246	285	242	284	287	244	563	1996	890	772	2195	979
V/C Ratio(X)	0.11	0.05	0.07	0.61	0.09	0.69	0.05	0.14	0.07	0.22	0.26	0.04
Avail Cap(c_a), veh/h	325	409	347	376	413	350	685	1996	890	841	2195	979
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	1.00	1.00
Uniform Delay (d), s/veh	34.0	32.6	32.7	37.4	32.8	36.2	6.3	7.9	7.5	5.5	7.3	6.2
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.8	0.1	1.3	0.0	0.1	0.1	0.1	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.2	0.3	3.8	0.5	3.6	0.2	1.1	0.5	0.9	2.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.1	32.6	32.7	38.2	32.8	37.5	6.3	8.0	7.6	5.5	7.5	6.3
LnGrp LOS	C	C	C	D	C	D	A	A	A	A	A	A
Approach Vol, veh/h		57			369			358			771	
Approach Delay, s/veh		33.4			37.5			7.8			7.1	
Approach LOS		C			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.4	62.5		20.0	10.4	59.6		20.0				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.5	8.5		4.9	5.2	5.2		13.4				
Green Ext Time (p_c), s	0.0	8.1		0.0	0.1	3.9		0.3				

Intersection Summary

HCM 6th Ctrl Delay	15.4
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings

2023 Interim Build (Kwik Trip + 400 MF Units)

200: Kwik Trip N. Dwy/Palmer Drive & Capitol Drive

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	85	100	5	160	1	100	5	10	1	15	95
Future Volume (vph)	20	85	100	5	160	1	100	5	10	1	15	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		100	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		374			284			219			419	
Travel Time (s)		10.2			7.7			6.0			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	104	122	0	202	0	0	140	0	0	135	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		60	60		9	60		60	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection												
Int Delay, s/veh	5.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗		↕			↕			↕	
Traffic Vol, veh/h	20	85	100	5	160	1	100	5	10	1	15	95
Future Vol, veh/h	20	85	100	5	160	1	100	5	10	1	15	95
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	100	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	7	7	7	5	5	5	2	2	2	2	2	2
Mvmt Flow	24	104	122	6	195	1	122	6	12	1	18	116

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	196	0	0	226	0	0	427	360	104	430	482	196
Stage 1	-	-	-	-	-	-	152	152	-	208	208	-
Stage 2	-	-	-	-	-	-	275	208	-	222	274	-
Critical Hdwy	4.17	-	-	4.15	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.263	-	-	2.245	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1347	-	-	1325	-	-	538	567	951	535	484	845
Stage 1	-	-	-	-	-	-	850	772	-	794	730	-
Stage 2	-	-	-	-	-	-	731	730	-	780	683	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1347	-	-	1325	-	-	443	554	951	515	473	845
Mov Cap-2 Maneuver	-	-	-	-	-	-	443	554	-	515	473	-
Stage 1	-	-	-	-	-	-	835	758	-	780	726	-
Stage 2	-	-	-	-	-	-	612	726	-	750	671	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.8			0.2			15.9			10.8		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	469	1347	-	-	1325	-	-	760
HCM Lane V/C Ratio	0.299	0.018	-	-	0.005	-	-	0.178
HCM Control Delay (s)	15.9	7.7	-	-	7.7	0	-	10.8
HCM Lane LOS	C	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.2	0.1	-	-	0	-	-	0.6

Lanes, Volumes, Timings
 300: Kwik Trip S. Dwy & Capitol Drive

2023 Interim Build (Kwik Trip + 400 MF Units)

AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	60	35	15	125	40	10
Future Volume (vph)	60	35	15	125	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	284			477	220	
Travel Time (s)	7.7			13.0	6.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	7%	5%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	116	0	0	170	61	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		60	60		60	60
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	2.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	60	35	15	125	40	10
Future Vol, veh/h	60	35	15	125	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	7	5	5	2	2
Mvmt Flow	73	43	18	152	49	12

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	116	0	283 95
Stage 1	-	-	-	-	95 -
Stage 2	-	-	-	-	188 -
Critical Hdwy	-	-	4.15	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.245	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1454	-	707 962
Stage 1	-	-	-	-	929 -
Stage 2	-	-	-	-	844 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1454	-	697 962
Mov Cap-2 Maneuver	-	-	-	-	697 -
Stage 1	-	-	-	-	929 -
Stage 2	-	-	-	-	832 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	738	-	-	1454	-
HCM Lane V/C Ratio	0.083	-	-	0.013	-
HCM Control Delay (s)	10.3	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings

2023 Interim Build (Kwik Trip + 400 MF Units)

400: Vettelson Road/Hartland Quarry Driveway & Capitol Drive

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	35	10	15	35	10	20	1	15	20	5	85
Future Volume (vph)	25	35	10	15	35	10	20	1	15	20	5	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		477			924			458			371	
Travel Time (s)		13.0			25.2			12.5			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	5%	5%	5%	10%	10%	10%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	93	0	0	80	0	0	28	20	0	147	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	60		9	15		60	15		9	60		60
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection

Int Delay, s/veh 6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↕		↕	
Traffic Vol, veh/h	25	35	10	15	35	10	20	1	15	20	5	85
Future Vol, veh/h	25	35	10	15	35	10	20	1	15	20	5	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	11	11	11	5	5	5	10	10	10	2	2	2
Mvmt Flow	33	47	13	20	47	13	27	1	20	27	7	113

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	60	0	0	60
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.21	-	-	4.15
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.299	-	-	2.245
Pot Cap-1 Maneuver	1488	-	-	1525
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	1488	-	-	1525
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.7	1.8	10.4	9.7
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	571	991	1488	-	-	1525	-	-	914
HCM Lane V/C Ratio	0.049	0.02	0.022	-	-	0.013	-	-	0.16
HCM Control Delay (s)	11.6	8.7	7.5	0	-	7.4	0	-	9.7
HCM Lane LOS	B	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0.1	0.1	-	-	0	-	-	0.6

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

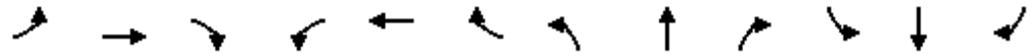
2023 Interim Build (Kwik Trip + 400 MF Units)
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	40	35	85	25	175	50	625	155	200	365	105
Future Volume (vph)	95	40	35	85	25	175	50	625	155	200	365	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	42	23	89	26	114	53	658	101	211	384	69
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Interim Build (Kwik Trip + 400 MF Units)

PM Peak Hour

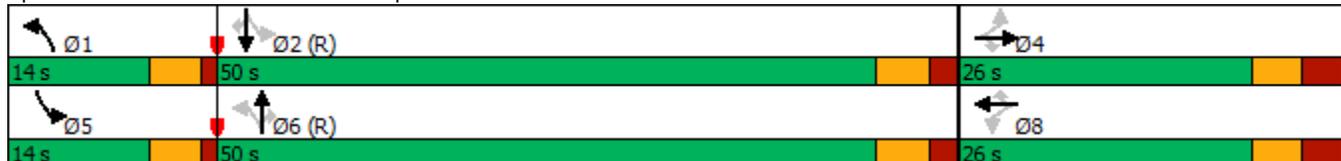


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.56	0.17	0.11	0.51	0.11	0.56	0.07	0.30	0.10	0.37	0.16	0.07
Control Delay	48.3	35.5	34.6	46.2	34.4	47.0	3.9	9.6	8.8	5.4	6.8	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	35.5	34.6	46.2	34.4	47.0	3.9	9.6	8.8	5.4	6.8	7.2
Queue Length 50th (ft)	55	22	12	49	14	63	6	82	21	25	42	13
Queue Length 95th (ft)	101	49	33	91	35	111	18	143	53	57	73	34
Internal Link Dist (ft)	359				294				547		553	
Turn Bay Length (ft)	330		200	105		135	335		150	200		305
Base Capacity (vph)	304	411	350	297	407	346	797	2163	968	606	2340	1046
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.10	0.07	0.30	0.06	0.33	0.07	0.30	0.10	0.35	0.16	0.07

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
100: STH 83 & Capitol Drive

2023 Interim Build (Kwik Trip + 400 MF Units)

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	40	35	85	25	175	50	625	155	200	365	105
Future Volume (veh/h)	95	40	35	85	25	175	50	625	155	200	365	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	100	42	23	89	26	114	53	658	101	211	384	69
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	3	3	3
Cap, veh/h	208	215	182	205	213	181	747	2283	1018	587	2309	1030
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.05	0.64	0.64	0.07	0.65	0.65
Sat Flow, veh/h	1259	1885	1598	1337	1870	1585	1795	3582	1598	1767	3526	1572
Grp Volume(v), veh/h	100	42	23	89	26	114	53	658	101	211	384	69
Grp Sat Flow(s),veh/h/ln	1259	1885	1598	1337	1870	1585	1795	1791	1598	1767	1763	1572
Q Serve(g_s), s	7.0	1.8	1.2	5.8	1.1	6.2	0.9	7.3	2.2	3.6	3.8	1.4
Cycle Q Clear(g_c), s	8.1	1.8	1.2	7.6	1.1	6.2	0.9	7.3	2.2	3.6	3.8	1.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	208	215	182	205	213	181	747	2283	1018	587	2309	1030
V/C Ratio(X)	0.48	0.20	0.13	0.43	0.12	0.63	0.07	0.29	0.10	0.36	0.17	0.07
Avail Cap(c_a), veh/h	340	413	350	346	409	347	849	2283	1018	656	2309	1030
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	1.00	1.00
Uniform Delay (d), s/veh	39.5	36.1	35.8	39.6	35.8	38.1	4.6	7.2	6.3	4.9	6.0	5.6
Incr Delay (d2), s/veh	0.6	0.2	0.1	0.5	0.1	1.3	0.0	0.3	0.2	0.1	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.8	0.5	1.9	0.5	2.5	0.3	2.5	0.7	1.0	1.2	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.1	36.3	36.0	40.1	35.9	39.4	4.6	7.6	6.5	5.1	6.2	5.7
LnGrp LOS	D	D	D	D	D	D	A	A	A	A	A	A
Approach Vol, veh/h		165			229			812			664	
Approach Delay, s/veh		38.6			39.3			7.2			5.8	
Approach LOS		D			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	64.5		16.6	10.5	63.0		16.6				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.9	5.8		10.1	5.6	9.3		9.6				
Green Ext Time (p_c), s	0.0	5.6		0.2	0.1	10.2		0.2				

Intersection Summary

HCM 6th Ctrl Delay	13.4
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings

2023 Interim Build (Kwik Trip + 400 MF Units)

200: Kwik Trip N. Dwy/Palmer Drive & Capitol Drive

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	190	105	5	135	5	95	10	10	10	10	55
Future Volume (vph)	100	190	105	5	135	5	95	10	10	10	10	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		100	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		374			284			219			419	
Travel Time (s)		10.2			7.7			6.0			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	211	117	0	162	0	0	128	0	0	83	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗		↕			↕			↕	
Traffic Vol, veh/h	100	190	105	5	135	5	95	10	10	10	10	55
Future Vol, veh/h	100	190	105	5	135	5	95	10	10	10	10	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	100	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	5	5	5	2	2	2	2	2	2	2	2	2
Mvmt Flow	111	211	117	6	150	6	106	11	11	11	11	61

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	156	0	0	328	0	0	634	601	211	668	715	153
Stage 1	-	-	-	-	-	-	433	433	-	165	165	-
Stage 2	-	-	-	-	-	-	201	168	-	503	550	-
Critical Hdwy	4.15	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.245	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1406	-	-	1232	-	-	392	414	829	372	356	893
Stage 1	-	-	-	-	-	-	601	582	-	837	762	-
Stage 2	-	-	-	-	-	-	801	759	-	551	516	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1406	-	-	1232	-	-	333	379	829	336	326	893
Mov Cap-2 Maneuver	-	-	-	-	-	-	333	379	-	336	326	-
Stage 1	-	-	-	-	-	-	554	536	-	771	758	-
Stage 2	-	-	-	-	-	-	732	755	-	490	475	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	2			0.3			20.7			11.8		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	355	1406	-	-	1232	-	-	615
HCM Lane V/C Ratio	0.36	0.079	-	-	0.005	-	-	0.136
HCM Control Delay (s)	20.7	7.8	-	-	7.9	0	-	11.8
HCM Lane LOS	C	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.6	0.3	-	-	0	-	-	0.5

Lanes, Volumes, Timings
 300: Kwik Trip S. Dwy & Capitol Drive

2023 Interim Build (Kwik Trip + 400 MF Units)
 PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	175	35	15	105	40	10
Future Volume (vph)	175	35	15	105	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	284			477	220	
Travel Time (s)	7.7			13.0	6.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	233	0	0	134	55	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	1.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	175	35	15	105	40	10
Future Vol, veh/h	175	35	15	105	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	5	2	2	2	2
Mvmt Flow	194	39	17	117	44	11

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	233	0	365 214
Stage 1	-	-	-	-	214 -
Stage 2	-	-	-	-	151 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1335	-	635 826
Stage 1	-	-	-	-	822 -
Stage 2	-	-	-	-	877 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1335	-	626 826
Mov Cap-2 Maneuver	-	-	-	-	626 -
Stage 1	-	-	-	-	822 -
Stage 2	-	-	-	-	865 -

Approach	EB	WB	NB
HCM Control Delay, s	0	1	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	658	-	-	1335	-
HCM Lane V/C Ratio	0.084	-	-	0.012	-
HCM Control Delay (s)	11	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings

2023 Interim Build (Kwik Trip + 400 MF Units)

400: Vettelson Road/Hartland Quarry Driveway & Capitol Drive

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	75	15	20	50	25	20	5	20	15	5	50
Future Volume (vph)	95	75	15	20	50	25	20	5	20	15	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		477			924			458			371	
Travel Time (s)		13.0			25.2			12.5			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	222	0	0	114	0	0	30	24	0	84	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection												
Int Delay, s/veh	5.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↕		↕	
Traffic Vol, veh/h	95	75	15	20	50	25	20	5	20	15	5	50
Future Vol, veh/h	95	75	15	20	50	25	20	5	20	15	5	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	6	6	6	1	1	1	1	1	1	2	2	2
Mvmt Flow	114	90	18	24	60	30	24	6	24	18	6	60

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	90	0	0	108	0	0	483	465	99	465	459	75
Stage 1	-	-	-	-	-	-	327	327	-	123	123	-
Stage 2	-	-	-	-	-	-	156	138	-	342	336	-
Critical Hdwy	4.16	-	-	4.11	-	-	7.11	6.51	6.21	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.12	5.52	-
Follow-up Hdwy	2.254	-	-	2.209	-	-	3.509	4.009	3.309	3.518	4.018	3.318
Pot Cap-1 Maneuver	1480	-	-	1489	-	-	496	496	960	508	499	986
Stage 1	-	-	-	-	-	-	688	650	-	881	794	-
Stage 2	-	-	-	-	-	-	849	784	-	673	642	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1480	-	-	1489	-	-	427	447	960	454	450	986
Mov Cap-2 Maneuver	-	-	-	-	-	-	427	447	-	454	450	-
Stage 1	-	-	-	-	-	-	632	597	-	809	781	-
Stage 2	-	-	-	-	-	-	778	771	-	596	589	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	3.9			1.6			11.7			10.5		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	431	960	1480	-	-	1489	-	-	738
HCM Lane V/C Ratio	0.07	0.025	0.077	-	-	0.016	-	-	0.114
HCM Control Delay (s)	14	8.8	7.6	0	-	7.5	0	-	10.5
HCM Lane LOS	B	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0.1	0.3	-	-	0	-	-	0.4

APPENDIX C

Year 2023 Build Traffic Operational Analysis

Full Buildout – Kwik Trip + 450 Apartment Units

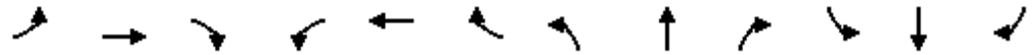
Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	10	20	130	20	210	20	205	70	130	425	45
Future Volume (vph)	20	10	20	130	20	210	20	205	70	130	425	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	10%	10%	10%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	13	17	173	27	174	27	273	58	173	567	37
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)
AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.12	0.04	0.07	0.74	0.09	0.66	0.05	0.15	0.07	0.23	0.25	0.04
Control Delay	31.1	29.4	29.9	54.5	30.4	46.8	5.2	10.2	10.7	5.5	8.1	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	29.4	29.9	54.5	30.4	46.8	5.2	10.2	10.7	5.5	8.1	8.3
Queue Length 50th (ft)	13	6	8	95	13	94	4	34	14	26	51	6
Queue Length 95th (ft)	28	17	21	125	28	122	11	53	31	46	97	20
Internal Link Dist (ft)	359				294				547		553	
Turn Bay Length (ft)	330		200	105		135	335		150	200		305
Base Capacity (vph)	301	407	346	308	411	350	615	1875	839	769	2254	1008
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.03	0.05	0.56	0.07	0.50	0.04	0.15	0.07	0.22	0.25	0.04

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
 100: STH 83 & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	10	20	130	20	210	20	205	70	130	425	45
Future Volume (veh/h)	20	10	20	130	20	210	20	205	70	130	425	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1752	1752	1752	1826	1826	1826
Adj Flow Rate, veh/h	27	13	17	173	27	174	27	273	58	173	567	37
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	1	1	1	10	10	10	5	5	5
Cap, veh/h	246	285	242	284	287	244	563	1995	890	772	2195	979
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.03	0.60	0.60	0.07	0.63	0.63
Sat Flow, veh/h	1181	1870	1585	1391	1885	1598	1668	3328	1485	1739	3469	1547
Grp Volume(v), veh/h	27	13	17	173	27	174	27	273	58	173	567	37
Grp Sat Flow(s),veh/h/ln	1181	1870	1585	1391	1885	1598	1668	1664	1485	1739	1735	1547
Q Serve(g_s), s	1.8	0.5	0.8	10.9	1.1	9.3	0.5	3.2	1.5	3.3	6.5	0.8
Cycle Q Clear(g_c), s	2.9	0.5	0.8	11.4	1.1	9.3	0.5	3.2	1.5	3.3	6.5	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	246	285	242	284	287	244	563	1995	890	772	2195	979
V/C Ratio(X)	0.11	0.05	0.07	0.61	0.09	0.71	0.05	0.14	0.07	0.22	0.26	0.04
Avail Cap(c_a), veh/h	324	409	347	376	413	350	685	1995	890	841	2195	979
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	1.00	1.00
Uniform Delay (d), s/veh	34.0	32.5	32.7	37.4	32.8	36.3	6.3	7.9	7.5	5.5	7.3	6.2
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.8	0.1	1.5	0.0	0.1	0.1	0.1	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.2	0.3	3.8	0.5	3.7	0.2	1.1	0.5	1.0	2.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.1	32.6	32.7	38.2	32.8	37.7	6.3	8.0	7.7	5.6	7.5	6.3
LnGrp LOS	C	C	C	D	C	D	A	A	A	A	A	A
Approach Vol, veh/h		57			374			358			777	
Approach Delay, s/veh		33.3			37.6			7.8			7.0	
Approach LOS		C			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.4	62.5		20.0	10.4	59.6		20.0				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.5	8.5		4.9	5.3	5.2		13.4				
Green Ext Time (p_c), s	0.0	8.1		0.0	0.1	3.9		0.3				

Intersection Summary

HCM 6th Ctrl Delay	15.5
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
 200: Kwik Trip N. Dwy/Palmer Drive & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	90	100	5	165	1	100	5	10	1	15	95
Future Volume (vph)	20	90	100	5	165	1	100	5	10	1	15	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		100	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		374			284			219			419	
Travel Time (s)		10.2			7.7			6.0			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	7%	7%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	110	122	0	208	0	0	140	0	0	135	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		60	60		9	15		60	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection												
Int Delay, s/veh	5.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗		↕			↕			↕	
Traffic Vol, veh/h	20	90	100	5	165	1	100	5	10	1	15	95
Future Vol, veh/h	20	90	100	5	165	1	100	5	10	1	15	95
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	100	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	7	7	7	5	5	5	2	2	2	2	2	2
Mvmt Flow	24	110	122	6	201	1	122	6	12	1	18	116

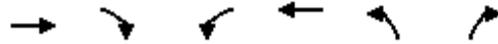
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	202	0	0	232	0	0	439	372	110	442	494	202
Stage 1	-	-	-	-	-	-	158	158	-	214	214	-
Stage 2	-	-	-	-	-	-	281	214	-	228	280	-
Critical Hdwy	4.17	-	-	4.15	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.263	-	-	2.245	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1341	-	-	1318	-	-	528	558	943	526	476	839
Stage 1	-	-	-	-	-	-	844	767	-	788	725	-
Stage 2	-	-	-	-	-	-	726	725	-	775	679	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1341	-	-	1318	-	-	434	545	943	506	465	839
Mov Cap-2 Maneuver	-	-	-	-	-	-	434	545	-	506	465	-
Stage 1	-	-	-	-	-	-	829	753	-	774	721	-
Stage 2	-	-	-	-	-	-	607	721	-	745	667	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			0.2			16.2			10.8		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	460	1341	-	-	1318	-	-	753
HCM Lane V/C Ratio	0.305	0.018	-	-	0.005	-	-	0.18
HCM Control Delay (s)	16.2	7.7	-	-	7.7	0	-	10.8
HCM Lane LOS	C	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.3	0.1	-	-	0	-	-	0.7

Lanes, Volumes, Timings
 300: Kwik Trip S. Dwy & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)
 AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	65	35	15	130	40	10
Future Volume (vph)	65	35	15	130	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	284			477	220	
Travel Time (s)	7.7			13.0	6.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	7%	5%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	122	0	0	177	61	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		60	60		60	60
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	2.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	65	35	15	130	40	10
Future Vol, veh/h	65	35	15	130	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	7	7	5	5	2	2
Mvmt Flow	79	43	18	159	49	12

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	122	0	296
Stage 1	-	-	-	-	101
Stage 2	-	-	-	-	195
Critical Hdwy	-	-	4.15	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.245	-	3.518
Pot Cap-1 Maneuver	-	-	1447	-	695
Stage 1	-	-	-	-	923
Stage 2	-	-	-	-	838
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1447	-	685
Mov Cap-2 Maneuver	-	-	-	-	685
Stage 1	-	-	-	-	923
Stage 2	-	-	-	-	826

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	726	-	-	1447	-
HCM Lane V/C Ratio	0.084	-	-	0.013	-
HCM Control Delay (s)	10.4	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings

2023 Full Build (Kwik Trip + 450 MF Units)

400: Vettelson Road/Hartland Quarry Driveway & Capitol Drive

AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↗		↕	
Traffic Volume (vph)	30	35	10	15	35	10	20	1	15	25	5	90
Future Volume (vph)	30	35	10	15	35	10	20	1	15	25	5	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		477			924			458			371	
Travel Time (s)		13.0			25.2			12.5			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	5%	5%	5%	10%	10%	10%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	100	0	0	80	0	0	28	20	0	160	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	60		9	15		60	15		9	60		60
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

HCM 6th TWSC
 400: Vettelson Road/Hartland Quarry Driveway & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)

AM Peak Hour

Intersection												
Int Delay, s/veh	6.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↕		↕	
Traffic Vol, veh/h	30	35	10	15	35	10	20	1	15	25	5	90
Future Vol, veh/h	30	35	10	15	35	10	20	1	15	25	5	90
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	11	11	11	5	5	5	10	10	10	2	2	2
Mvmt Flow	40	47	13	20	47	13	27	1	20	33	7	120

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	60	0	0	60	0	0	291	234	54	238	234	54
Stage 1	-	-	-	-	-	-	134	134	-	94	94	-
Stage 2	-	-	-	-	-	-	157	100	-	144	140	-
Critical Hdwy	4.21	-	-	4.15	-	-	7.2	6.6	6.3	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.2	5.6	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.2	5.6	-	6.12	5.52	-
Follow-up Hdwy	2.299	-	-	2.245	-	-	3.59	4.09	3.39	3.518	4.018	3.318
Pot Cap-1 Maneuver	1488	-	-	1525	-	-	646	653	991	716	666	1013
Stage 1	-	-	-	-	-	-	851	770	-	913	817	-
Stage 2	-	-	-	-	-	-	827	797	-	859	781	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1488	-	-	1525	-	-	547	626	991	678	638	1013
Mov Cap-2 Maneuver	-	-	-	-	-	-	547	626	-	678	638	-
Stage 1	-	-	-	-	-	-	827	748	-	887	806	-
Stage 2	-	-	-	-	-	-	713	786	-	817	759	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	3			1.8			10.6			9.9		
HCM LOS							B			A		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	550	991	1488	-	-	1525	-	-	899
HCM Lane V/C Ratio	0.051	0.02	0.027	-	-	0.013	-	-	0.178
HCM Control Delay (s)	11.9	8.7	7.5	0	-	7.4	0	-	9.9
HCM Lane LOS	B	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0.1	0.1	-	-	0	-	-	0.6

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

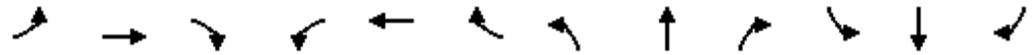
2023 Full Build (Kwik Trip + 450 MF Units)
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	40	35	90	25	180	50	625	160	205	365	105
Future Volume (vph)	95	40	35	90	25	180	50	625	160	205	365	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	330		200	105		135	335		150	200		305
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		439			374			627			633	
Travel Time (s)		12.0			10.2			12.2			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	62%
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	42	23	95	26	117	53	658	104	216	384	69
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			16			16	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6		6	2		2
Detector Phase	4	4	4	8	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	6.0	12.0	12.0	6.0	12.0	12.0
Minimum Split (s)	16.3	16.3	16.3	16.3	16.3	16.3	10.5	17.6	17.6	10.5	17.6	17.6
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	14.0	50.0	50.0	14.0	50.0	50.0
Total Split (%)	28.9%	28.9%	28.9%	28.9%	28.9%	28.9%	15.6%	55.6%	55.6%	15.6%	55.6%	55.6%
Maximum Green (s)	19.7	19.7	19.7	19.7	19.7	19.7	9.5	44.4	44.4	9.5	44.4	44.4
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	3.5	3.6	3.6	3.5	3.6	3.6
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.5	5.6	5.6	4.5	5.6	5.6
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	4.9	4.9	1.5	4.9	4.9
Minimum Gap (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0

Lanes, Volumes, Timings
100: STH 83 & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)

PM Peak Hour

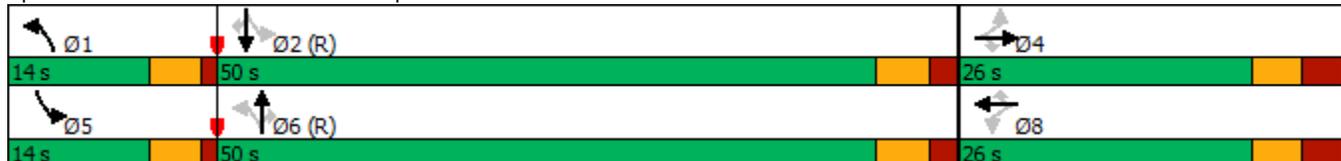


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	12.0	12.0	30.0	12.0	12.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	33.0	0.0	33.0	33.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max						
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.55	0.17	0.11	0.54	0.11	0.57	0.07	0.30	0.11	0.38	0.16	0.07
Control Delay	48.1	35.5	34.5	47.6	34.3	47.5	3.9	9.7	8.9	5.5	6.8	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.1	35.5	34.5	47.6	34.3	47.5	3.9	9.7	8.9	5.5	6.8	7.2
Queue Length 50th (ft)	55	22	12	52	14	64	6	82	21	26	42	13
Queue Length 95th (ft)	101	49	33	96	35	113	18	143	54	58	73	34
Internal Link Dist (ft)	359				294				547		553	
Turn Bay Length (ft)	330		200	105		135	335		150	200		305
Base Capacity (vph)	304	411	350	297	407	346	796	2160	966	605	2339	1046
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.10	0.07	0.32	0.06	0.34	0.07	0.30	0.11	0.36	0.16	0.07

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 30 (33%), Referenced to phase 2:SBTL and 6:NBTL, Start of 1st Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated

Splits and Phases: 100: STH 83 & Capitol Drive



HCM 6th Signalized Intersection Summary
 100: STH 83 & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	40	35	90	25	180	50	625	160	205	365	105
Future Volume (veh/h)	95	40	35	90	25	180	50	625	160	205	365	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1870	1870	1870	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	100	42	23	95	26	117	53	658	104	216	384	69
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	2	2	2	1	1	1	3	3	3
Cap, veh/h	208	215	183	206	214	181	747	2282	1018	585	2308	1029
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.05	0.64	0.64	0.07	0.65	0.65
Sat Flow, veh/h	1255	1885	1598	1337	1870	1585	1795	3582	1598	1767	3526	1572
Grp Volume(v), veh/h	100	42	23	95	26	117	53	658	104	216	384	69
Grp Sat Flow(s),veh/h/ln	1255	1885	1598	1337	1870	1585	1795	1791	1598	1767	1763	1572
Q Serve(g_s), s	7.0	1.8	1.2	6.2	1.1	6.4	0.9	7.3	2.3	3.7	3.8	1.4
Cycle Q Clear(g_c), s	8.1	1.8	1.2	8.1	1.1	6.4	0.9	7.3	2.3	3.7	3.8	1.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	208	215	183	206	214	181	747	2282	1018	585	2308	1029
V/C Ratio(X)	0.48	0.20	0.13	0.46	0.12	0.65	0.07	0.29	0.10	0.37	0.17	0.07
Avail Cap(c_a), veh/h	339	413	350	346	409	347	848	2282	1018	655	2308	1029
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	1.00	1.00
Uniform Delay (d), s/veh	39.5	36.1	35.8	39.8	35.8	38.1	4.6	7.3	6.3	4.9	6.0	5.6
Incr Delay (d2), s/veh	0.6	0.2	0.1	0.6	0.1	1.4	0.0	0.3	0.2	0.1	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.8	0.5	2.1	0.5	2.5	0.3	2.5	0.7	1.1	1.2	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.1	36.3	35.9	40.4	35.9	39.6	4.6	7.6	6.5	5.1	6.2	5.7
LnGrp LOS	D	D	D	D	D	D	A	A	A	A	A	A
Approach Vol, veh/h		165			238			815			669	
Approach Delay, s/veh		38.5			39.5			7.3			5.8	
Approach LOS		D			D			A			A	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	64.5		16.6	10.5	62.9		16.6				
Change Period (Y+Rc), s	4.5	5.6		* 6.3	4.5	5.6		* 6.3				
Max Green Setting (Gmax), s	9.5	44.4		* 20	9.5	44.4		* 20				
Max Q Clear Time (g_c+I1), s	2.9	5.8		10.1	5.7	9.3		10.1				
Green Ext Time (p_c), s	0.0	5.6		0.2	0.1	10.2		0.2				

Intersection Summary

HCM 6th Ctrl Delay	13.5
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
 200: Kwik Trip N. Dwy/Palmer Drive & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	200	105	5	145	5	95	10	10	10	10	55
Future Volume (vph)	100	200	105	5	145	5	95	10	10	10	10	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		100	0		0	0		0	0		0
Storage Lanes	1		1	0		0	0		0	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25				25
Link Distance (ft)		374			284			219				419
Travel Time (s)		10.2			7.7			6.0				11.4
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%				0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	222	117	0	173	0	0	128	0	0	83	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗		↕			↕			↕	
Traffic Vol, veh/h	100	200	105	5	145	5	95	10	10	10	10	55
Future Vol, veh/h	100	200	105	5	145	5	95	10	10	10	10	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	100	-	100	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	5	5	5	2	2	2	2	2	2	2	2	2
Mvmt Flow	111	222	117	6	161	6	106	11	11	11	11	61

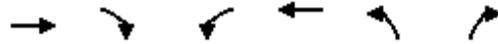
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	167	0	0	339	0	0	656	623	222	690	737	164
Stage 1	-	-	-	-	-	-	444	444	-	176	176	-
Stage 2	-	-	-	-	-	-	212	179	-	514	561	-
Critical Hdwy	4.15	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.245	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1393	-	-	1220	-	-	379	402	818	359	346	881
Stage 1	-	-	-	-	-	-	593	575	-	826	753	-
Stage 2	-	-	-	-	-	-	790	751	-	543	510	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1393	-	-	1220	-	-	321	368	818	324	317	881
Mov Cap-2 Maneuver	-	-	-	-	-	-	321	368	-	324	317	-
Stage 1	-	-	-	-	-	-	546	529	-	760	749	-
Stage 2	-	-	-	-	-	-	721	747	-	483	469	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.9			0.3			21.6			12		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	343	1393	-	-	1220	-	-	601
HCM Lane V/C Ratio	0.373	0.08	-	-	0.005	-	-	0.139
HCM Control Delay (s)	21.6	7.8	-	-	8	0	-	12
HCM Lane LOS	C	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.7	0.3	-	-	0	-	-	0.5

Lanes, Volumes, Timings
 300: Kwik Trip S. Dwy & Capitol Drive

2023 Full Build (Kwik Trip + 450 MF Units)
 PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	185	35	15	115	40	10
Future Volume (vph)	185	35	15	115	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)		0	0		0	0
Storage Lanes		0	0		1	0
Taper Length (ft)			100		100	
Link Speed (mph)	25			25	25	
Link Distance (ft)	284			477	220	
Travel Time (s)	7.7			13.0	6.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	245	0	0	145	55	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					

Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	185	35	15	115	40	10
Future Vol, veh/h	185	35	15	115	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	5	2	2	2	2
Mvmt Flow	206	39	17	128	44	11

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	245	0	388
Stage 1	-	-	-	-	226
Stage 2	-	-	-	-	162
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1321	-	616
Stage 1	-	-	-	-	812
Stage 2	-	-	-	-	867
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1321	-	607
Mov Cap-2 Maneuver	-	-	-	-	607
Stage 1	-	-	-	-	812
Stage 2	-	-	-	-	855

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	639	-	-	1321	-
HCM Lane V/C Ratio	0.087	-	-	0.013	-
HCM Control Delay (s)	11.2	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings

2023 Full Build (Kwik Trip + 450 MF Units)

400: Vettelson Road/Hartland Quarry Driveway & Capitol Drive

PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↗		↕	
Traffic Volume (vph)	105	75	15	20	50	25	20	5	20	15	5	60
Future Volume (vph)	105	75	15	20	50	25	20	5	20	15	5	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		50	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	100			100			100			100		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		477			924			458			371	
Travel Time (s)		13.0			25.2			12.5			10.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	235	0	0	114	0	0	30	24	0	96	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway 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
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection

Int Delay, s/veh 5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↕		↕	
Traffic Vol, veh/h	105	75	15	20	50	25	20	5	20	15	5	60
Future Vol, veh/h	105	75	15	20	50	25	20	5	20	15	5	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	6	6	6	1	1	1	1	1	1	2	2	2
Mvmt Flow	127	90	18	24	60	30	24	6	24	18	6	72

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	90	0	0	108
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.16	-	-	4.11
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.254	-	-	2.209
Pot Cap-1 Maneuver	1480	-	-	1489
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	1480	-	-	1489
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.1	1.6	12.1	10.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	403	960	1480	-	-	1489	-	-	746
HCM Lane V/C Ratio	0.075	0.025	0.085	-	-	0.016	-	-	0.129
HCM Control Delay (s)	14.7	8.8	7.7	0	-	7.5	0	-	10.5
HCM Lane LOS	B	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0.1	0.3	-	-	0	-	-	0.4

HCS Roundabouts Report

General Information					Site Information									
Analyst	TADI									Intersection	Capitol Drive & Kwik Trip So...			
Agency or Co.	Village of Hartland									E/W Street Name	Capitol Drive			
Date Performed	3/24/2023									N/S Street Name	Kwik Trip South Driveway			
Analysis Year	2023									Analysis Time Period, hrs	0.25			
Time Analyzed	Full Build - AM Peak									Peak Hour Factor	0.82			
Project Description	3047 Kwik Trip-Apartments T...									Jurisdiction	Hartland			

Volume Adjustments and Site Characteristics																
Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
Lane Assignment	TR				LT				LR							
Volume (V), veh/h	0		65	35	0	15	130		0	40		10				
Percent Heavy Vehicles, %	7		7	7	5	5	5		2	2		2				
Flow Rate (V _{PCE}), pc/h	0		85	46	0	19	166		0	50		12				
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1							
Pedestrians Crossing, p/h	0				0				0							
Proportion of CAVs	0															

Critical and Follow-Up Headway Adjustment													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	
Critical Headway, s		4.7000			4.7000			4.7000					
Follow-Up Headway, s		2.6000			2.6000			2.6000					

Flow Computations, Capacity and v/c Ratios													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass										
Entry Flow (v _e), pc/h		131			185			62					
Entry Volume, veh/h		122			176			61					
Circulating Flow (v _c), pc/h	19			50			85			235			
Exiting Flow (v _{ex}), pc/h	97			216			0			65			
Capacity (C _{PCE}), pc/h		1360			1321			1278					
Capacity (c), veh/h		1271			1258			1253					
v/c Ratio (x)		0.10			0.14			0.05					

Delay and Level of Service													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass										
Lane Control Delay (d), s/veh		3.6			4.0			3.3					
Lane LOS		A			A			A					
95% Queue, veh		0.3			0.5			0.2					
Approach Delay, s/veh	3.6			4.0			3.3						
Approach LOS	A			A			A						
Intersection Delay, s/veh LOS	3.8						A						

HCS Roundabouts Report

General Information					Site Information									
Analyst	TADI									Intersection	Capitol Drive & Kwik Trip So...			
Agency or Co.	Village of Hartland									E/W Street Name	Capitol Drive			
Date Performed	3/24/2023									N/S Street Name	Kwik Trip South Driveway			
Analysis Year	2023									Analysis Time Period, hrs	0.25			
Time Analyzed	Full Build - PM Peak									Peak Hour Factor	0.90			
Project Description	3047 Kwik Trip-Apartments T...									Jurisdiction	Hartland			

Volume Adjustments and Site Characteristics																
Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
Lane Assignment	TR				LT				LR							
Volume (V), veh/h	0		185	35	0	15	115		0	40		10				
Percent Heavy Vehicles, %	5		5	5	2	2	2		2	2		2				
Flow Rate (V _{PCE}), pc/h	0		216	41	0	17	130		0	45		11				
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1							
Pedestrians Crossing, p/h	0				0				0							
Proportion of CAVs	0															

Critical and Follow-Up Headway Adjustment													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	
Critical Headway, s		4.7000			4.7000			4.7000					
Follow-Up Headway, s		2.6000			2.6000			2.6000					

Flow Computations, Capacity and v/c Ratios													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass										
Entry Flow (v _e), pc/h		257			147			56					
Entry Volume, veh/h		245			144			55					
Circulating Flow (v _c), pc/h	17			45			216			192			
Exiting Flow (v _{ex}), pc/h	227			175			0			58			
Capacity (C _{PCE}), pc/h		1363			1327			1129					
Capacity (c), veh/h		1298			1301			1107					
v/c Ratio (x)		0.19			0.11			0.05					

Delay and Level of Service													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass										
Lane Control Delay (d), s/veh		4.4			3.7			3.7					
Lane LOS		A			A			A					
95% Queue, veh		0.7			0.4			0.2					
Approach Delay, s/veh	4.4			3.7			3.7						
Approach LOS	A			A			A						
Intersection Delay, s/veh LOS	4.0						A						

HCS Roundabouts Report

General Information					Site Information									
Analyst	TADI									Intersection	Capitol Drive & Vettelson Ro...			
Agency or Co.	Village of Hartland									E/W Street Name	Capitol Drive			
Date Performed	3/24/2023									N/S Street Name	Vettelson/Apartment Drivew...			
Analysis Year	2023									Analysis Time Period, hrs	0.25			
Time Analyzed	Full Build - AM Peak									Peak Hour Factor	0.75			
Project Description	3047 Kwik Trip-Apartments T...									Jurisdiction	Hartland			

Volume Adjustments and Site Characteristics																
Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	30	35	10	0	15	35	10	0	20	1	15	0	25	5	90
Percent Heavy Vehicles, %	11	11	11	11	5	5	5	5	10	10	10	10	2	2	2	2
Flow Rate (V _{PCE}), pc/h	0	44	52	15	0	21	49	14	0	29	1	22	0	34	7	122
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs	0															

Critical and Follow-Up Headway Adjustment													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass										
Critical Headway, s		4.7000			4.7000			4.7000			4.7000		
Follow-Up Headway, s		2.6000			2.6000			2.6000			2.6000		

Flow Computations, Capacity and v/c Ratios													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass										
Entry Flow (v _e), pc/h		111			84			52			163		
Entry Volume, veh/h		100			80			47			160		
Circulating Flow (v _c), pc/h		62			74			130			99		
Exiting Flow (v _{ex}), pc/h		108			200			59			43		
Capacity (C _{PCE}), pc/h		1306			1291			1225			1261		
Capacity (c), veh/h		1176			1230			1113			1236		
v/c Ratio (x)		0.09			0.07			0.04			0.13		

Delay and Level of Service													
Approach	EB			WB			NB			SB			
Lane	Left	Right	Bypass										
Lane Control Delay (d), s/veh		3.8			3.5			3.6			4.0		
Lane LOS		A			A			A			A		
95% Queue, veh		0.3			0.2			0.1			0.4		
Approach Delay, s/veh		3.8			3.5			3.6			4.0		
Approach LOS		A			A			A			A		
Intersection Delay, s/veh LOS	3.8						A						

HCS Roundabouts Report

General Information					Site Information									
Analyst	TADI									Intersection	Capitol Drive & Vettelson Ro...			
Agency or Co.	Village of Hartland									E/W Street Name	Capitol Drive			
Date Performed	3/24/2023									N/S Street Name	Vettelson/Apartment Drivew...			
Analysis Year	2023									Analysis Time Period, hrs	0.25			
Time Analyzed	Full Build - PM Peak									Peak Hour Factor	0.83			
Project Description	3047 Kwik Trip-Apartments T...									Jurisdiction	Hartland			

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement																
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment	LTR				LTR				LTR				LTR			
Volume (V), veh/h	0	105	75	15	0	20	50	25	0	20	5	20	0	15	5	60
Percent Heavy Vehicles, %	6	6	6	6	1	1	1	1	1	1	1	1	2	2	2	2
Flow Rate (V _{PCE}), pc/h	0	134	96	19	0	24	61	30	0	24	6	24	0	18	6	74
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			
Proportion of CAVs	0															

Critical and Follow-Up Headway Adjustment

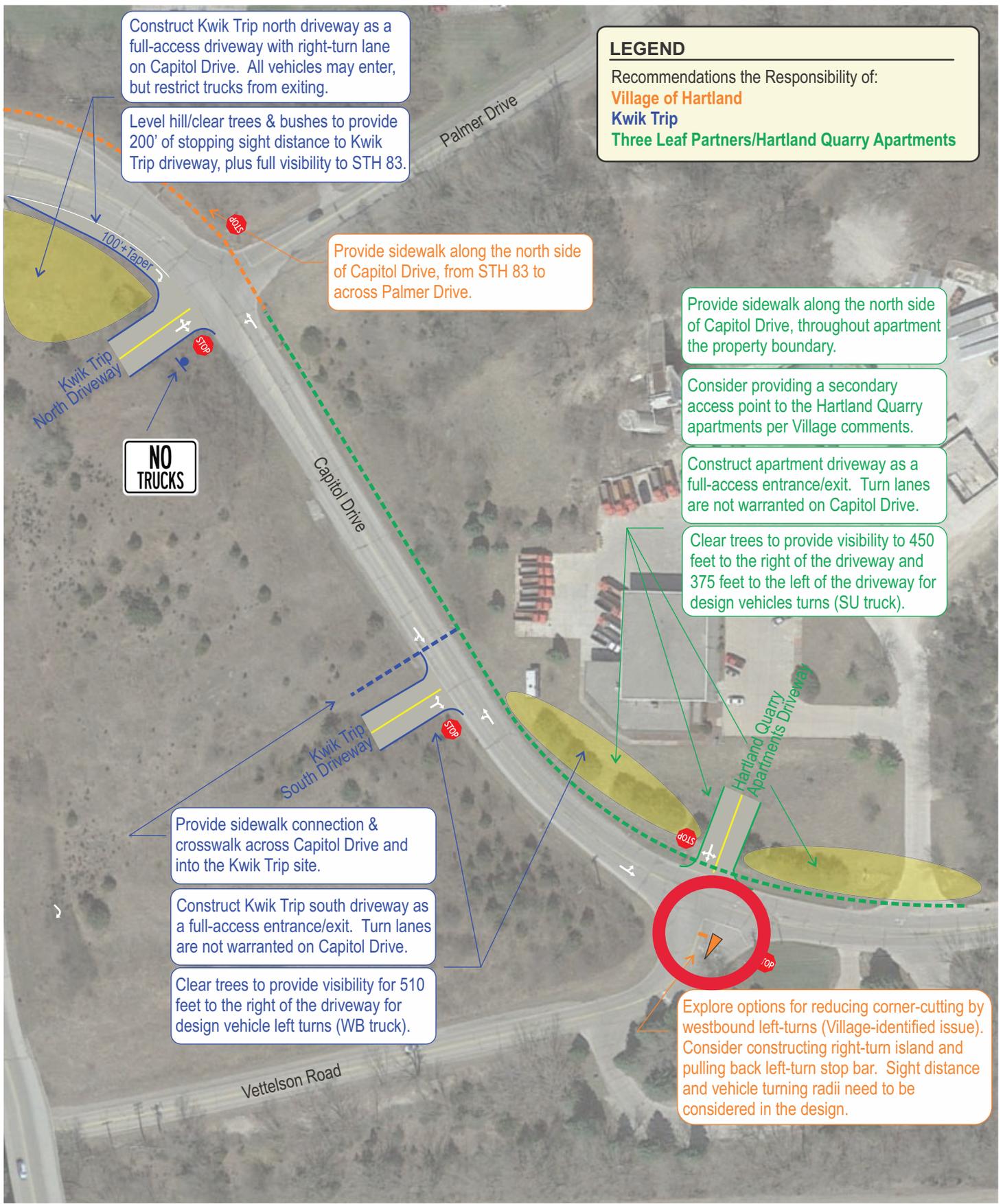
Approach	EB			WB			NB			SB		
	Left	Right	Bypass									
Critical Headway, s		4.7000			4.7000			4.7000			4.7000	
Follow-Up Headway, s		2.6000			2.6000			2.6000			2.6000	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
	Left	Right	Bypass									
Entry Flow (V _e), pc/h		249			115			54			98	
Entry Volume, veh/h		235			114			53			96	
Circulating Flow (V _c), pc/h	48			164			248			109		
Exiting Flow (V _{ex}), pc/h	138			159			170			49		
Capacity (C _{PCE}), pc/h		1323			1186			1095			1249	
Capacity (c), veh/h		1248			1174			1085			1225	
v/c Ratio (x)		0.19			0.10			0.05			0.08	

Delay and Level of Service

Approach	EB			WB			NB			SB		
	Left	Right	Bypass									
Lane Control Delay (d), s/veh		4.5			3.9			3.7			3.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.7			0.3			0.2			0.3	
Approach Delay, s/veh	4.5			3.9			3.7			3.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh LOS	4.1						A					



Construct Kwik Trip north driveway as a full-access driveway with right-turn lane on Capitol Drive. All vehicles may enter, but restrict trucks from exiting.

Level hill/clear trees & bushes to provide 200' of stopping sight distance to Kwik Trip driveway, plus full visibility to STH 83.

Provide sidewalk along the north side of Capitol Drive, from STH 83 to across Palmer Drive.

Provide sidewalk along the north side of Capitol Drive, throughout apartment the property boundary.

Consider providing a secondary access point to the Hartland Quarry apartments per Village comments.

Construct apartment driveway as a full-access entrance/exit. Turn lanes are not warranted on Capitol Drive.

Clear trees to provide visibility to 450 feet to the right of the driveway and 375 feet to the left of the driveway for design vehicles turns (SU truck).

Provide sidewalk connection & crosswalk across Capitol Drive and into the Kwik Trip site.

Construct Kwik Trip south driveway as a full-access entrance/exit. Turn lanes are not warranted on Capitol Drive.

Clear trees to provide visibility for 510 feet to the right of the driveway for design vehicle left turns (WB truck).

Explore options for reducing corner-cutting by westbound left-turns (Village-identified issue). Consider constructing right-turn island and pulling back left-turn stop bar. Sight distance and vehicle turning radii need to be considered in the design.

LEGEND

Recommendations the Responsibility of:

- Village of Hartland
- Kwik Trip
- Three Leaf Partners/Hartland Quarry Apartments