

Traffic & Microsimulation Report

US 231/US 68/US 68X Intersection Study – Warren County

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Prepared for:



In Partnership with:



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1.0 Project Description

The Kentucky Transportation Cabinet (KYTC) initiated an intersection study to develop and evaluate conceptual improvements to the US 231/US 68/US 68X (Russellville Road/Veterans Memorial Lane/Campbell Lane) intersection in Bowling Green in Warren County. **Figure 1** shows the study area.

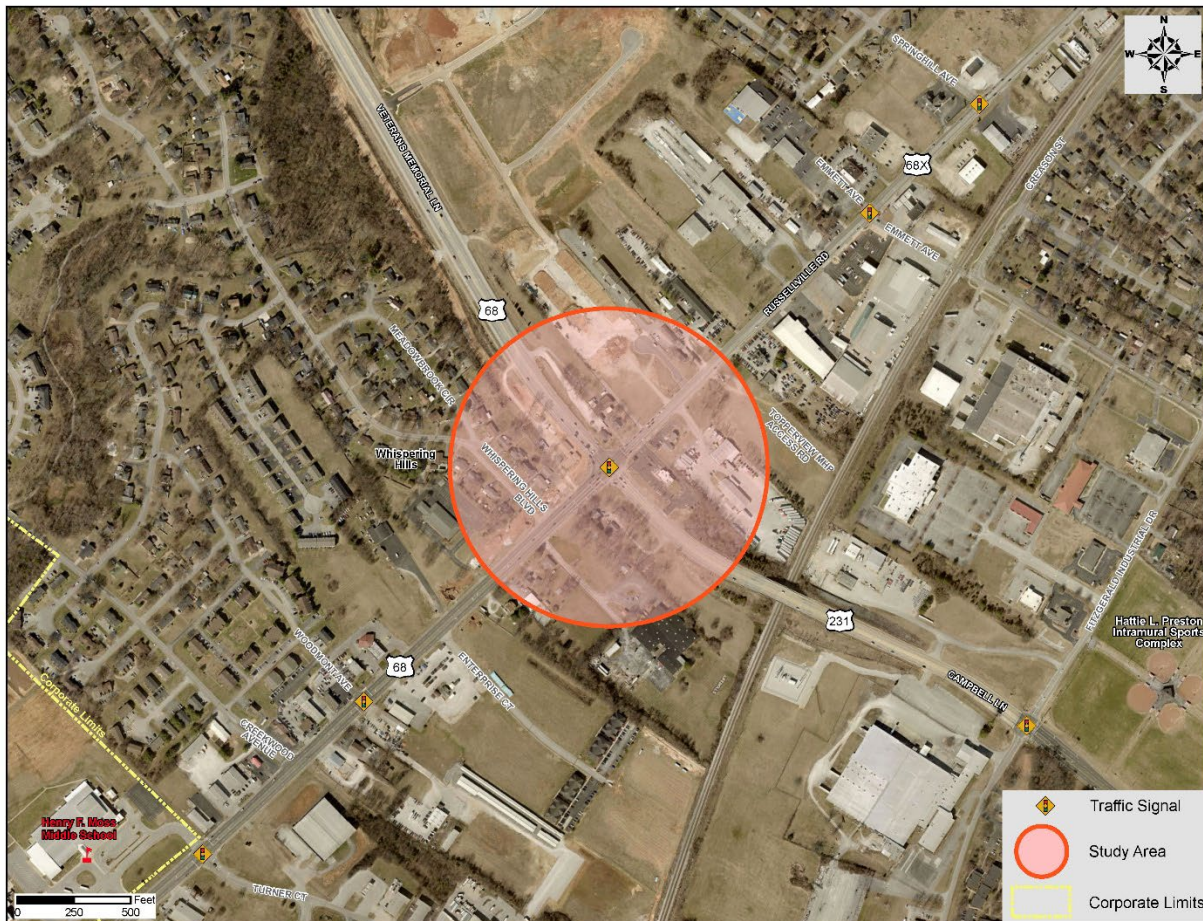


Figure 1: Study Area Map

This report describes traffic data collection, forecasting, and operational analyses for the project. Existing traffic data was collected in August 2021. Analyses focused on calibration to existing traffic flows and modeling of a 2045 build forecast scenarios. The Bowling Green / Warren County regional travel demand model (Warren TDM) formed the basis for the build forecasts, which examined projected development in the region. A Vissim microsimulation model was used to understand the impacts on traffic operations at the primary intersection while a Synchro model was developed for metrics at the nearest signalized intersections beyond the study area. The following chapters outline the processes and findings of this traffic analysis.

2.0 Data Collection Efforts

2.1. Historic Traffic Counts

KYTC data provided historic traffic volumes, truck percentages, K-factors, and peak hour directional distributions throughout the study area as available. The most recent traffic data at nearby KYTC count stations is summarized in **Table 1**. K-factor represents the peak hour volume as a percentage of the Average Daily Traffic (ADT) while the D-factor expresses the percentage of the peak hour volume in the peak direction. In review of 24-hour count data collected in 2018 for these four stations, similar K-factors and peaking characteristics are present. As this region continues to develop, behavioral travel changes like peak-spreading, often identified with changes in K-factors, should continue to be monitored.

Table 1: Historic KYTC Traffic Count Data

ID	Route	BMP	EMP	Year	ADT	Truck %	K-factor	D-factor
114A13	US 68X	0.000	1.216	2018	17,371	11.37	8.3	53
114A79	US 231	13.042	13.882	2020	20,017	5.25	7.6	50
114A14	US 68 (SW)	8.584	9.334	2020	20,681	6.95	7.1	54
114C89	US 68 (NW)	9.334	10.816	2020	16,280	5.25	7.1	52

2.2. Current (2021) Traffic Counts

Turning movement counts were conducted at eight intersections (**Figure 2**) during August 25-26, 2021. Counts included the primary study intersection (US 231/US 68/US 68X), three adjacent cross streets/driveways, and the nearest signal on each approach.

Turning movement counts, compared against the most recent KYTC counts, were used to define existing traffic including daily, AM, and PM peak hour volumes. A twelve-hour Miovision turning movement count was conducted at the primary US 231/US 68/US 68X intersection, with four-hour Miovision peak counts collected at the other seven intersections. These counts classify vehicles into one of five categories: motorcycles, cars, buses, single-unit trucks, and articulated trucks.

Count data from this effort at each intersection is shown in **Appendix A**.



Figure 2: 2021 Count Locations

2.3. Vehicle Classifications

At the primary US 231/US 68/US 68X intersection, the 12-hour classification data is summarized in **Table 2**. Heavy vehicles (i.e., buses, single-unit trucks, and articulated trucks) represent 3% of the unadjusted 12-hour traffic volume. This share is lower than what the historical data suggests, which ranged between 5.25% and 11.37%. However, this difference was deemed reasonable by the project team and may simply reflect sampling variations between the seasonally adjusted annual average count and the observed 12-hour count.

To simulate using current peak hour conditions, the field-collected data informed parameters within the Vissim microsimulation model. The 4-hour counts from the other study area intersections provided inputs to traffic analysis completed in Synchro.

Table 2: Unadjusted Classification Data at US 231/US 68/US 68X Intersection

Classification	12-Hour Count	Share
Motorcycles	98	0.29%
Cars & Light Goods	32,458	96.49%
Buses	236	0.70%
Single-Unit Trucks	599	1.78%
Articulated Trucks	249	0.74%
Total	33,640	100.00%

2.4. Queue Lengths

To capture real-time data corresponding to queues and turning movements, drone imagery was utilized. Imagery was recorded on August 25, 2021, covering AM (7-9 AM) and PM (4-6 PM) peak periods. This was also used to help quantify unmet demand. The longest queues were captured at the southwest US 68 (Russellville Rd) approach during both AM and PM periods. From the resulting imagery, maximum queue lengths were estimated and used for microsimulation calibration to represent current traffic operations.

Figure 3 and **Figure 4** on the following pages illustrate representative maximum queue lengths observed during the AM and PM peak periods.



Figure 3: Drone Observed Maximum AM Queue Length



Figure 4: Drone Observed Maximum PM Queue Lengths

3.0 Microsimulation Model Calibration

Microsimulation models using the Vissim software package¹ were developed for AM and PM peak period operations during each scenario. The AM peak simulated operations from 7-9 AM; the PM peak simulated operations from 3-6 PM. The Existing 2021 scenario was calibrated using data collected specifically capturing the existing conditions for this project, outlined in **Section 2.0** to ensure models replicate existing performance. The starting model parameters replicated an early release (received in October 2021) of the KYTC *Microsimulation Guidelines*. From these defaults, parameters were calibrated to reflect the data collected and driver behavior specific to this region.

3.1. Vissim Inputs for Calibration

AM and PM Vissim models were built to evaluate traffic operations under the Existing, No-Build, and Build scenarios. To ensure accuracy of these models, AM and PM Existing models were calibrated by 15-minute volumes on links, observed queue lengths, peak travel speeds, and vehicle types.

The Wiedemann 74 car-following model was used to replicate local driver behavior patterns. Adjusting these model assumptions can result in an increase or decrease to driver aggression. A decrease in the distance distribution values results in an increase to driver aggressiveness. As shown in **Table 3**, one adjustment was made. A minor decrease to 8.0 feet of average standstill distance resulted in slightly increased flows through study area intersections, compared to the default KYTC guideline of 9.0 feet and served to better calibrate to observed data.

Table 3: Car-Following Model Adjustments

Parameter	KYTC Guidance	Adjusted
Average Standstill Distance	9.00 ft	8.00 ft
Additive Part of Safety Distance	2.00	No Change
Multiplicative Part of Safety Distance	3.00	No Change

Vehicle composition consisted of two classes, Cars and Heavy Goods Vehicles (HGVs). These inputs were configured to match the field-collected classification data (**Table 2**) and are presented in **Table 4**.

Table 4: Fleet Composition Assumptions

Vehicle Class	% in Network
Cars	97.0%
Heavy Goods Vehicles	3.0%

All other parameters, including speed curve distribution and fleet mixes, were unmodified from the KYTC *Microsimulation Guidelines* recommended defaults. Applying these parameters to the calibration process, the microsimulation results provided a reasonably accurate representation of existing conditions at the study intersection as shown in **Table 5**. **Figure 5** provides a visual comparison of modeled and field-observed maximum queues during the PM peak. It should be noted that while queuing measurements are provided, queue lengths were not explicitly measured

¹ PTV Vissim 10.00 – 16 [79178]

and were estimated from drone video capture. Queue length performance were qualitatively assessed, as modeled queues were able to reflect the impacts of observed queues. The *KYTC Microsimulation Guidelines* recognizes and provides guidance on both qualitative and quantitative calibration metrics for queue lengths, based on data collection efforts of the project.

Table 5: Calibration Metrics at US 231/US 68/US 68X Intersection

Intersection Approach	Volumes			Queues (ft)		
	Collected	Modeled	Difference	Collected*	Modeled	Difference
AM Peak						
US 231 Northbound	562	556	-1.1%	270	286.3	7.6%
US 68 Eastbound	1169	1181	1.0%	970	1031.1	6.3%
US 68 Southbound	726	721	-0.7%	300	277.6	-7.5%
US 68X Westbound	449	454	1.1%	300	289.5	-3.5%
AM Total	2906	2912	0.2%			
PM Peak						
US 231 Northbound	904	894	-1.1%	560	455.4	-18.7%
US 68 Eastbound	1011	946	-6.4%	900	1093.9	21.5%
US 68 Southbound	713	711	-0.3%	350	289.5	-17.3%
US 68X Westbound	802	795	-0.9%	540	486.9	-9.8%
PM Total	3430	3346	-2.4%			

* Approximation of queue lengths from drone footage and satellite imagery



Figure 5: Comparison of Collected (top) vs Modeled (bottom) PM Queues

4.0 Existing Performance Outputs

Vissim software summarizes volumes, queue lengths, level of service (LOS), and delay for individual turn movements of the primary US 231/US 68/US 68X intersection in the existing scenario. All other intersections were evaluated in Synchro software². Overall LOS and delay at study intersections are summarized in **Table 6**.

Table 6: Intersection LOS and Delay - 2021 Existing Scenario

Intersection	Model	Control	AM LOS	AM Delay (sec)	PM LOS	PM Delay (sec)
US 231 & US 68	Vissim	Signal	D	44.5	D	49.9
US 68 & Whispering Hills Blvd	Synchro	2-way Stop	B	N/A*	C	N/A*
US 68 & Woodmont Ave	Synchro	Signal	C	26.0	C	26.7
US 231 & Industrial Drive	Synchro	Signal	C	21.3	C	23.8
US 68X & Emmett Ave	Synchro	Signal	C	20.9	B	16.0
US 68 & Tomblinson Way	Synchro	Signal	B	11.4	B	10.4

*LOS calculated via Intersection Capacity Utilization (ICU) methodology for unsignalized intersections

For the 2021 existing scenario, the primary study intersection exhibits the most delay in the study area, operating at LOS D during both peak hours. Per the *Highway Capacity Manual, Sixth Edition* (HCM6), LOS D indicates the intersection has acceptable service but is approaching unstable flow. All other study intersections operate at LOS B or C during peak hours, which indicate near free-flow operation.

5.0 Future Year No-Build Scenario

Forecasts for a future year of 2045 were generated using the Bowling Green-Warren County regional travel demand model (Warren TDM), version 20170321³.

5.1. Growth Assumptions

The Warren TDM formed the basis of future growth forecasts, requiring review and adjustments of socioeconomic assumptions to mimic current anticipated growth patterns. Resulting from discussion in the first project team meeting, the Warren TDM inputs were adjusted to reflect two developments unaccounted for in the existing model. The impacted zones are identified in **Figure 6**.

² Synchro Version 10.3 (10.3.151.0)

³ Model package received on July 8, 2021

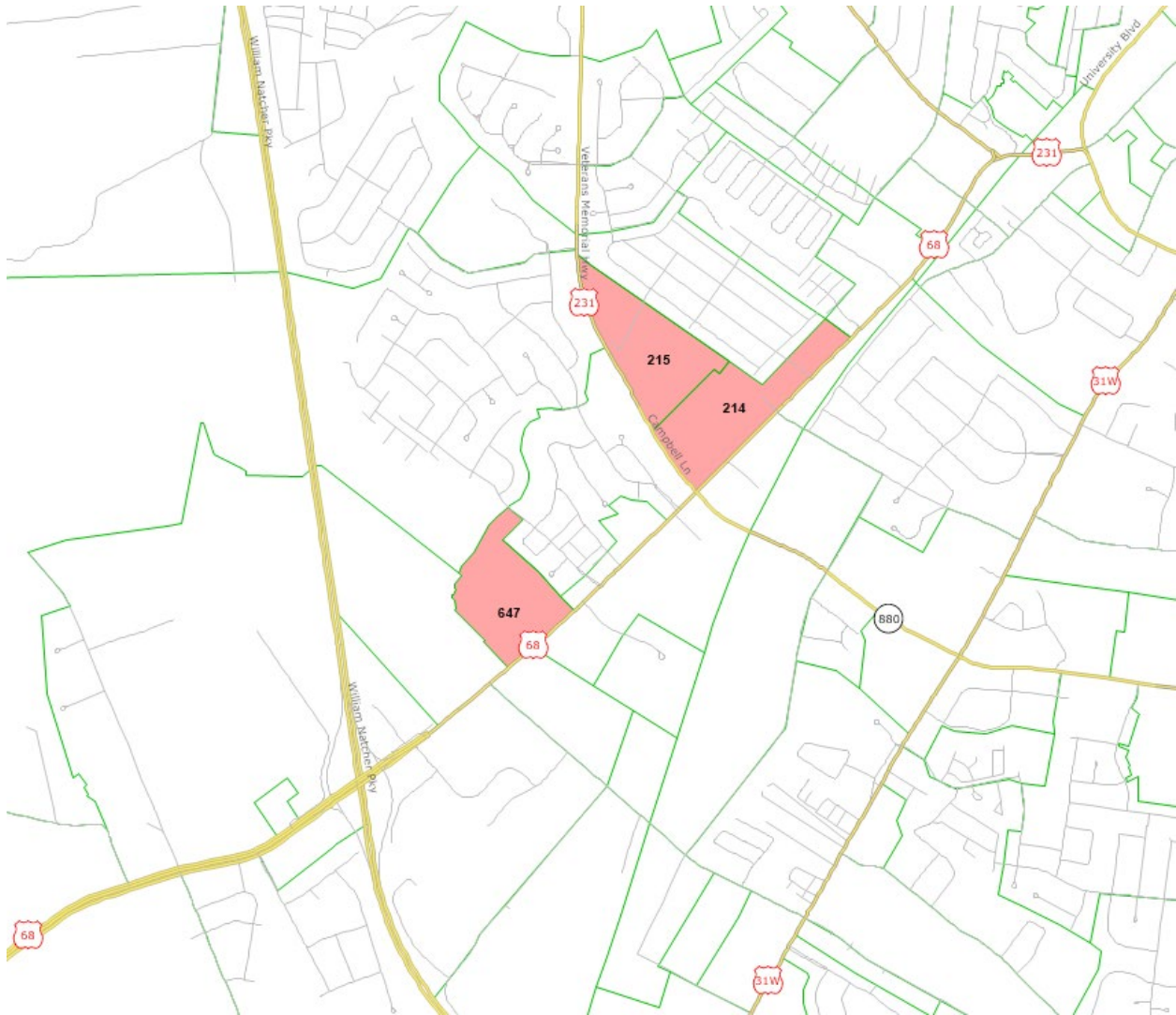


Figure 6: Adjusted Model Zones from New / Expected Development

The first socioeconomic adjustment reflected Jennings Creek Elementary School, which opened in August 2018. Using data available from the Kentucky Department of Education⁴, roughly 800 students have been enrolled since opening. Thus, 800 additional K-12 students were added to TAZ 647 (increasing the zonal total K-12 enrollment from 623 to 1,423).

The second adjustment was for the proposed Keystone Commons mixed-use development along Veterans Memorial Lane. Utilizing data from the 2019 *Signal Warrant Study*⁵ for the development, employment variables for TAZ 214 and household variables for TAZ 215 were adjusted. For employment forecasts, *NHCRP Report 466*⁶ rates for office structures (333 square feet per

⁴https://www.kyschoolreportcard.com/organization/155431/school_overview/students/enrollment?year=2021

⁵ Keystone Commons - Signal Warrant Study, January 2019, Cannon & Cannon Inc, PROJECT NO. 01428-0000

⁶ NCHRP Report 466 (2002). *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, National Research Council, Transportation Research Board, Washington, DC.

employee) were applied to assumed land use sizes, resulting in 100 additional employees. For household forecasts, 624 housing units were added and secondary household variables (population, vehicles, workers, students) were generated by taking average household rates from adjacent zones. The model fields and their final forecasted values are summarized in **Table 7** and **Table 8**.

Table 7: Model Employment Adjustments for Keystone Commons (TAZ 214)

Variable	Model Field	Existing	Adjusted	Change
Employment	EMP_TOT	346	446	+100
Service Emp	EMP_SERV	76	121	+45
Retail Emp	EMP_RET	270	295	+25
NonRetail Emp	EMP_NRET	0	30	+30

Table 8: Model Household Adjustments for Keystone Commons (TAZ 215)

Variable	Model Field	HH Rates	Existing	Adjusted	Change
Housing Units	HOUSE_OCC		45	669	+624
Population	Est_POP	2.70	127	1814	+1687
Vehicles	VEHICLES	1.71	3	1073	+1070
Workers	WORKERS	1.36	50	901	+851
K12 Students	K12_Home	0.33	15	223	+208
College Commuters	College_Home	0.02	1	15	+14

No existing/committed transportation projects in the vicinity were added to the model network.

5.2. Forecast Inputs from Warren County TDM

Model outputs from the adjusted Warren TDM were assessed to estimate volume growth rates for all future year scenarios, alongside existing traffic data from other sources discussed in **Section 2.0**. The 2021 Miovision counts serve as a baseline for the existing volumes in the microsimulation network. Data from these sources are summarized in **Table 9**. The 2045 model forecast volumes by approach are provided in **Table 10**. The growth of the US 231/US 68/US 68X intersection, considering the model forecasts of all approaches, provides an annual growth rate of 2.10%.

Table 9: Existing Volume (ADT) Data Comparison

Approach	KYTC ADT (2018 - 2020)	Miovision Count ⁷ (2021)	Warren TDM Volume (2018)
Northwest - US 68 (Veterans Memorial Ln)	16,280	14,500	10,011
Southwest - US 68 (Russellville Rd)	20,681	20,300	26,290
Southeast - US 231 (Campbell Ln)	20,017	18,300	19,694
Northeast - US 68X (Russellville Rd)	17,371	14,000	15,753

Table 10: Warren TDM Growth from Forecasted Volumes

Approach	TDM ID	2018 Volume	2045 Volume	Annual Growth
Northwest - US 68 (Veterans Memorial Ln)	372793 373042	10,011	19,689	3.58%
Southwest - US 68 (Russellville Rd)	372577	26,290	42,591	2.30%
Southeast - US 231 (Campbell Ln)	372569	19,694	27,075	1.39%
Northeast - US 68X (Russellville Rd)	372631	15,753	23,076	1.72%
Total		71,749	112,430	2.10%

6.0 Future Year Build Scenarios

The three 2045 build scenarios were developed; each was modeled in Vissim to simulate network performance.

- Build 1 (**Figure 7**) adds displaced left turn lanes along the bypass approaches with signalized crossovers. Conventional dual left turn lanes are added to the other two approaches.
- Build 2 (**Figure 8**) adds conventional dual left turn lanes for northeast, southeast, and southwest approaches.
- Build 3 (**Figure 9**) constructs a two-lane roundabout.

⁷ 12-hour Miovision data were factored to represent daily travel

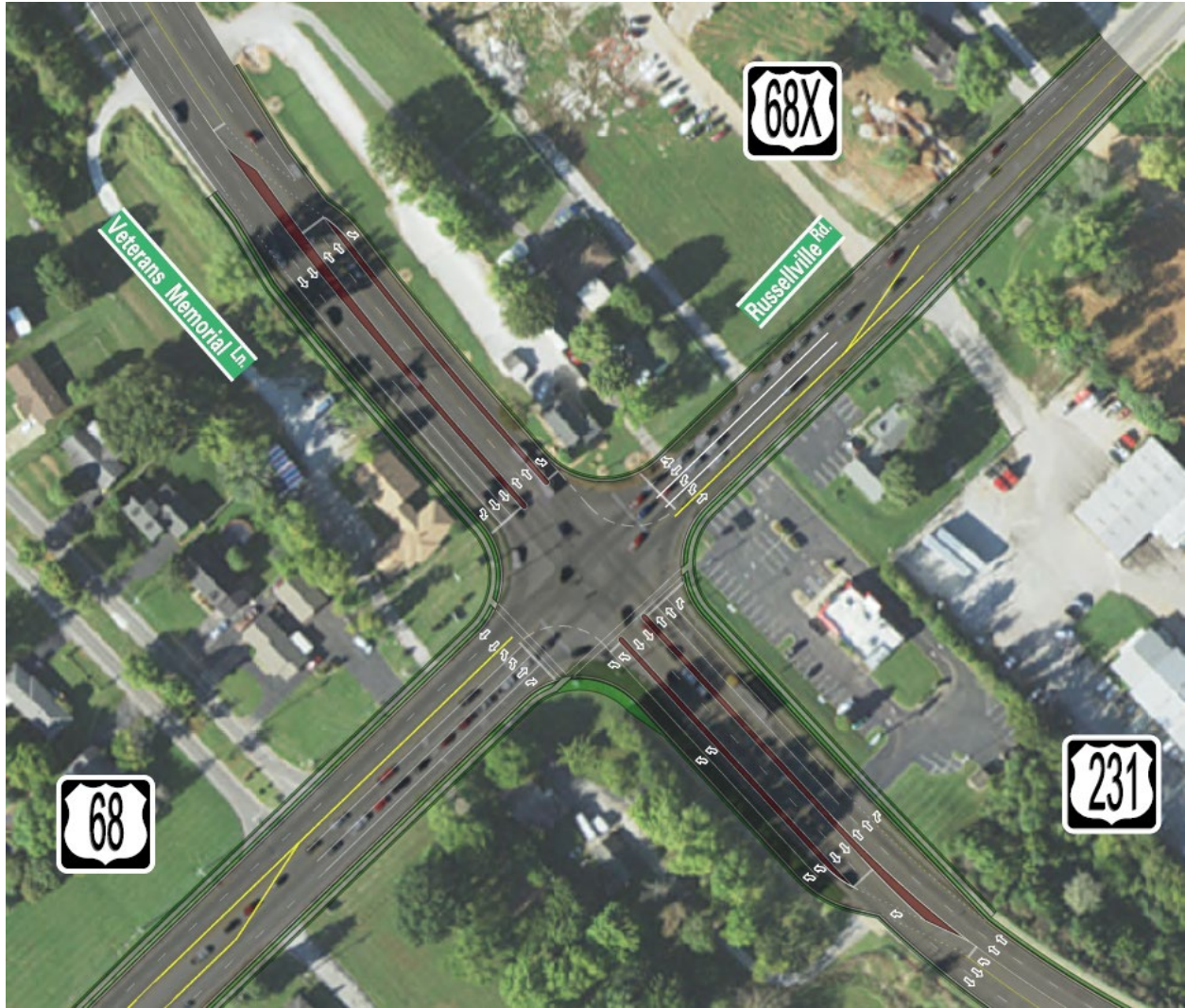


Figure 7: Build 1, Displaced Left Turns



Figure 8: Build 2, Conventional Dual Left Turns

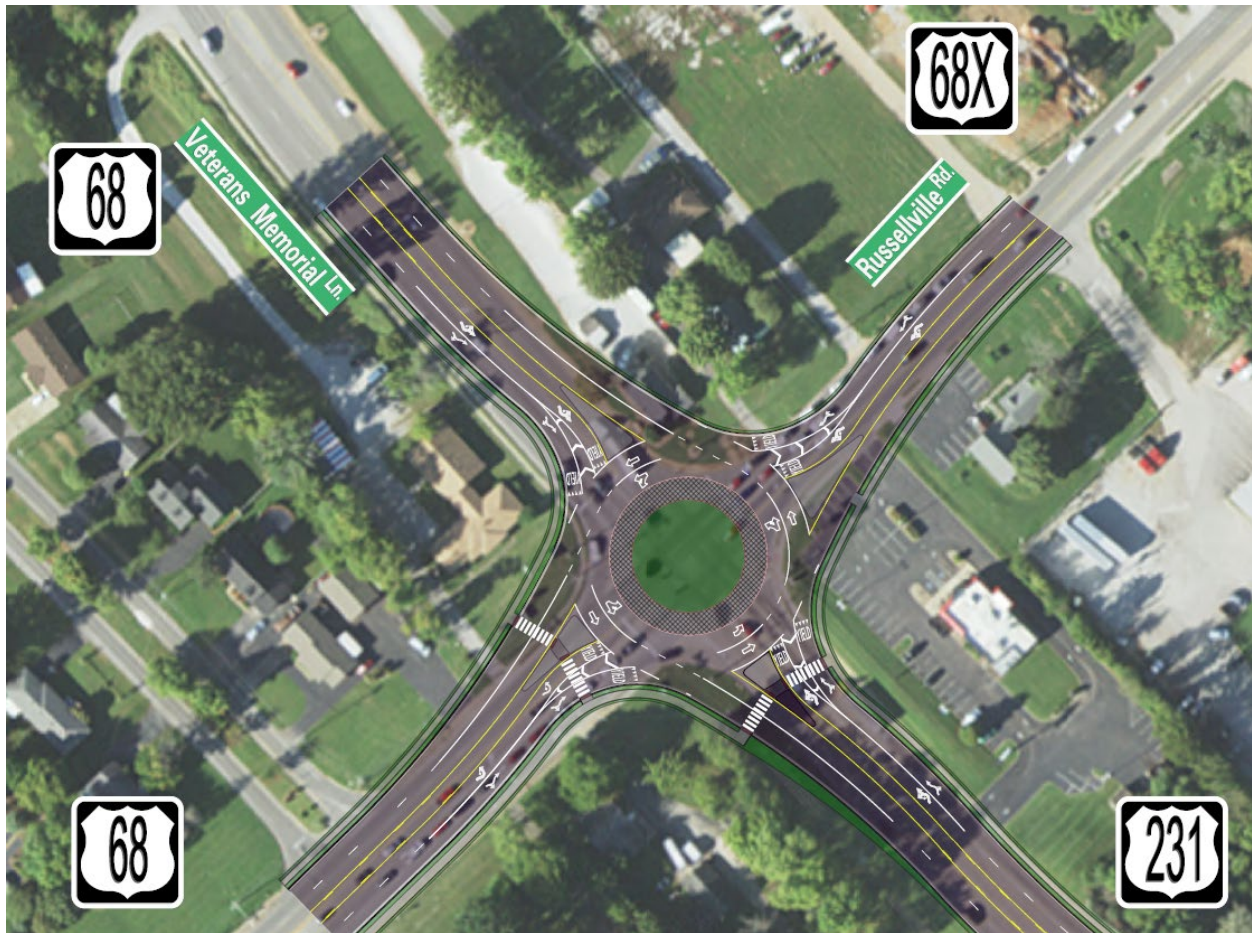


Figure 9: Build 3, Roundabout

7.0 Future Scenario Outputs

The four 2045 scenarios were run in Vissim with optimized signal timing, where appropriate, to enhance network operations. Signal timing optimization was performed in Synchro software and parameters were transferred to Vissim models. Outputs summarize volumes, queue lengths, level of service (LOS), and delay for the US 231/US 68/US 68X intersection in each future year scenario for AM and PM peak conditions.

7.1. No-Build Results

The 2045 No-Build scenario serves as a baseline to the other concepts and assumes future volumes with no geometric changes from the existing configuration. The No-Build operates at LOS E/F (AM/PM), which was expected given some LOS E and F movements in the 2021 existing condition.

Table 11 summarizes operations at the primary study intersection and adjacent signals in the 2045 No-Build scenario.

Table 11: Intersection LOS and Delay – 2045 No-Build Scenario

Intersection	2021 AM LOS	2045 AM LOS	2045 AM Delay (sec)	2021 PM LOS	2045 PM LOS	2045 PM Delay (sec)
US 231/US 68/US 68X	D	E	64.2	D	F	106.2
US 68 & Whispering Hills Blvd	B	D	N/A*	C	F	N/A*
US 68 & Woodmont Ave	C	C	21.2	C	C	26.3
US 231 & Industrial Drive	C	C	24.5	C	E	55.8
US 68X & Emmett Ave	C	D	40.3	B	C	31.5
US 68 & Tomblinson Way	B	B	13.1	B	B	13.3

*LOS calculated via ICU methodology for unsignalized intersections

7.2. 2045 Build Results

For Build 1, the displaced lefts, the primary intersection operates at LOS E/D (AM/PM), with the worst performing movement, the Russellville Road left turns, performing at LOS F/E.

Build 2, conventional dual lefts, is the best performing out of the three build alternatives, with the intersection operating at LOS D for both peak periods.

Build 3 does not provide capacity required for the estimated 2045 volumes, where the service volumes grow from 41,000 (2021) to 72,000 (2045). The Vissim network processes about 78-85% of the demand compared to the Build 1 and Build 2 scenarios. The *KYTC Roundabout Interim Requirements and Guidelines*⁸ provides capacity ranges for different roundabout lane configurations, shown in **Table 12**. The estimated 2045 volumes exceed the recommended daily capacity for the triple lane roundabout. The intersection is oversaturated and queues overflow beyond the Vissim-modeled area. A triple lane roundabout was not considered given its prohibitive size and cost.

Table 12: KYTC Guidance for Planning Level Maximum Roundabout Capacities

Volume	Single Lane	Double Lane	Triple Lane
Peak Hour (vehicles/hour)	<2,000	2,000-4,000	4,000-7,000
Daily (vehicles/day)	<20,000	20,000-40,000	40,000-70,000

AM and PM peak operational measures are summarized by turn movement for each of the Build scenarios. **Table 13** presents outputs for the AM peak; **Table 14** presents outputs for the PM peak.

Across all 2045 scenarios tested, maximum queues were highest for the US 68 (Russellville Rd) approach in the AM peak and US 231 approach in the PM peak, both corresponding to the highest period approach volumes. The No-Build configuration provides a total average intersection delay of 64.2 seconds for the AM peak and 106.2 seconds for the PM peak. Build 1 improves on most approach delays but struggles with the US 68 (Russellville Road) approach in the AM. Build 2 was the best performing model with the smallest delays.

⁸[https://transportation.ky.gov/Planning/Documents/KYTC%20Roundabout%20Feasibility%20Policy%20Markup%20%20\(partial\).pdf](https://transportation.ky.gov/Planning/Documents/KYTC%20Roundabout%20Feasibility%20Policy%20Markup%20%20(partial).pdf)

Table 13: 2045 AM Vissim Simulation Summary

Approach	Movement	No-Build				Build 1: Displaced Left			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	582	1668	F	119.8	676	1672	E	57.0
	EB Left	279	674	D	49.0	548	1686	F	168.3
	EB Right	514	1579	E	64.6	496	1672	E	72.3
US 231 - Campbell Ln	NB Thru	340	420	D	44.5	435	239	D	45.7
	NB Left	221	361	E	64.9	265	179	D	47.8
	NB Right	282	456	D	40.1	151	149	B	13.9
US 68 - Veterans Memorial Blvd	SB Thru	700	564	E	78.6	673	304	D	50.8
	SB Left	94	295	E	68.3	68	107	D	51.1
	SB Right	301	199	B	10.4	365	346	B	13.4
US 68X - Russellville Rd	WB Thru	434	338	D	48.5	449	223	C	27.9
	WB Left	198	331	E	59.2	165	148	E	63.2
	WB Right	49	112	D	35.6	63	223	D	35.1
Total		3994	1668	E	64.2	4354	1686	E	61.8

Approach	Movement	Build 2: Dual Left				Build 3: Roundabout ⁹			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	684	1686	E	67.0	435	N/A	F	113.1
	EB Left	553	550	F	99.5	345	N/A	F	91.1
	EB Right	504	1662	C	28.7	319	N/A	F	112.2
US 231 - Campbell Ln	NB Thru	434	260	C	30.5	461	N/A	C	19.1
	NB Left	271	176	D	37.2	241	N/A	E	42.5
	NB Right	151	313	C	23.1	151	N/A	A	5.5
US 68 - Veterans Memorial Blvd	SB Thru	664	342	D	49.6	643	N/A	F	56.3
	SB Left	68	178	E	59.6	72	N/A	F	70.5
	SB Right	366	336	B	11.8	351	N/A	F	70.7
US 68X - Russellville Rd	WB Thru	445	280	C	31.0	439	N/A	E	35.3
	WB Left	163	149	D	52.3	179	N/A	E	35.8
	WB Right	63	0	B	19.3	66	N/A	D	34.9
Total		4366	1686	D	47.4	3702	N/A	F	61.2

⁹ Some results omitted as model simulation could not fully evaluate forecasted 2045 conditions for a dual-lane roundabout configuration

Table 14: 2045 PM Vissim Simulation Summary

Approach	Movement	No-Build				Build 1: Displaced Left			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	545	1673	F	125.1	560	643	C	31.2
	EB Left	265	578	E	56.2	457	536	E	77.7
	EB Right	502	1577	D	53.1	412	643	D	50.1
US 231 - Campbell Ln	NB Thru	537	1662	F	87.3	712	405	D	51.1
	NB Left	330	1658	F	178.5	429	464	E	59.9
	NB Right	428	1662	F	91.3	238	254	B	16.5
US 68 - Veterans Memorial Blvd	SB Thru	666	1459	F	157.8	659	365	D	51.3
	SB Left	90	383	F	91.8	68	99	E	55.1
	SB Right	293	444	E	58.6	363	237	B	16.3
US 68X - Russellville Rd	WB Thru	733	1346	E	64.5	783	444	C	32.0
	WB Left	325	1695	F	222.0	288	227	E	60.2
	WB Right	81	650	E	60.1	116	444	D	41.5
Total		4795	1695	F	106.2	5085	643	D	45.3

Approach	Movement	Build 2: Dual Left				Build 3: Roundabout ¹⁰			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	566	737	D	43.6	445	N/A	F	107.7
	EB Left	457	342	D	50.5	366	N/A	F	80.1
	EB Right	409	705	B	15.1	323	N/A	F	102.1
US 231 - Campbell Ln	NB Thru	696	574	D	40.6	594	N/A	F	107.6
	NB Left	430	256	D	41.9	308	N/A	F	174.2
	NB Right	235	627	D	38.9	184	N/A	F	65.6
US 68 - Veterans Memorial Blvd	SB Thru	645	369	D	49.8	617	N/A	F	67.5
	SB Left	70	148	E	57.2	67	N/A	F	78.0
	SB Right	363	251	B	12.2	336	N/A	F	91.3
US 68X - Russellville Rd	WB Thru	801	387	C	34.9	471	N/A	F	189.5
	WB Left	290	215	D	49.6	196	N/A	F	192.3
	WB Right	117	47	C	30.5	68	N/A	F	177.3
Total		5079	737	D	38.6	3975	N/A	F	114.8

¹⁰ Some results omitted as model simulation could not fully evaluate forecasted 2045 conditions for a dual-lane roundabout configuration

2045 Operations at Adjacent Driveways

Three nearby access points to the US 231 and US 68 intersection—Whispering Hills Blvd and both Hardee’s driveways—were analyzed in the 2045 microsimulation models to assess queuing impacts during peak hours. The location of these access points aligns with the collected count locations (numbers 2, 4, 6 in **Figure 2**). Using queuing data from the microsimulation models, a percentage of time during the peak hour was calculated when queues would obstruct the “left out” movement onto the highway, summarized in **Table 15**. This data shows the conventional dual left concept (Build 2) results in the least queuing impacts to these three driveways.

Table 15: Share of Peak-Hour Simulated Queue Impacts to Nearby Driveways

Intersection	Build 1	Build 1	Build 2	Build 2	Build 3	Build 3
	(Disp. LT) AM	(Disp. LT) PM	(Dual Left) AM	(Dual Left) PM	(Rbt) AM	(Rbt) PM
US 68 & Whispering Hills	87.50%	9.17%	22.78%	0.28%	100%	99.44%
US 68X & Hardee’s Entrance	11.39%	25.83%	1.39%	6.39%	N/A*	N/A*
US 231 & Hardee’s Entrance	N/A*	N/A*	0.00%	18.89%	17.22%	100%

*Movements deemed infeasible due to scenario design

Whispering Hills sees the most impact from AM queues, as the left turn movement onto US 68 (Russellville Road) is often blocked by queuing vehicles in the left lane heading toward Veterans Memorial Lane. The results reflect the higher volumes on this approach captured in the AM, with lefts blocked during 87.5% of the AM peak hour for Build 1 (displaced left) and 22.8% of the AM peak hour for Build 2 (conventional dual left). The results also reflect insufficient capacity for Build 3 (roundabout) which presents a queue across over the full simulated duration.

Similarly for PM queues, Build 2 exhibits the fewest impacts from queues, with a queue blocking left turn movements 6% of the peak hour for the Hardee’s US 68X entrance and 19% of the peak hour for the Hardee’s US 231 entrance.

2045 Operations at Adjacent Signals

For Build 2, operations at adjacent signals mimic the No-Build operations described in **Table 11** above.

For Build 1, further queue analysis was performed for queue lengths at the signalized crossovers. **Table 16** provides the maximum queues from the Build 1 simulation models. These queues remain relatively short for both peak hours, with the longest queue of 412 feet for northbound traffic on US 231. Mapping this to the preliminary design drawings, this queue distance extends traffic to the crest of the bridge over the CSX rail line.

As noted above, the Build 3 roundabout configuration did provide sufficient capacity and could not adequately simulate 2045 conditions, particularly for peak PM conditions.

Table 16: Maximum Queues of DLT Crossover Movements

Crossover	AM Maximum Queue (ft)	PM Maximum Queue (ft)
Southbound US 68 (Veterans Memorial Blvd)	106	97
Northbound US 231	179	412

7.3. Roundabout Sensitivity Analyses

A sensitivity analysis was run in Vissim to determine how much growth the roundabout can handle before operations break down. Starting with the 2021 volumes, traffic was added following the current turning movement distribution to determine at what point the roundabout configuration would reach LOS D, E, and F. That is, the same growth factor was applied to each movement.

As shown in **Table 17**, the proposed roundabout reaches LOS E once PM peak volumes grow 6% over existing; the proposed roundabout fails (LOS F) before reaching 9% growth. The US 68 (Russellville Road) approach demonstrates the worst delay in the AM peak while US 68X approach fails first in the PM peak. Summary tables describing volume, queue lengths, and delay by movement are included as **Table 18** and **Table 19** for the AM and PM peaks respectively.

Table 17: Roundabout Sensitivity Analysis

Roundabout LOS	AM Peak Hour		PM Peak Hour	
	VPH Increase	Entering VPH	VPH Increase	Entering VPH
Existing Volumes	--	2,914	--	3,382
LOS D	14.5%	3,337	5.5%	3,569
LOS E	23.8%	3,608	6.1%	3,588
LOS F	27.0%	3,702	8.7%	3,675

Table 18: Roundabout LOS Thresholds, AM Peak Hour

Approach	Movement	Existing 2021 Volumes				LOS D (+14.5% over Existing)			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	465	940	C	17.3	494	1593	F	68.7
	EB Left	373	940	A	9.1	419	1593	E	42.9
	EB Right	339	966	C	15.2	356	1619	F	67.9
US 231 - Campbell Ln	NB Thru	301	298	A	8.6	359	263	B	11.5
	NB Left	158	298	C	15.6	185	263	C	18.9
	NB Right	105	298	A	4.3	125	263	A	6.9
US 68 - Veterans Memorial Ln	SB Thru	436	179	A	5.3	511	322	A	8.4
	SB Left	47	179	A	6.8	57	322	B	11.1
	SB Right	243	183	A	4.6	295	326	A	7.8
US 68X - Russellville Rd	WB Thru	299	125	A	5.9	350	299	B	13.8
	WB Left	111	125	A	7.5	142	299	C	15.4
	WB Right	37	125	A	3.5	44	301	B	10.5
Total		2914	966	A	9.8	3337	1619	D	29.8

Approach	Movement	LOS E (+23.8% over Existing)				LOS F (+27.0% over Existing)			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	506	1579	F	89.4	435	1584	F	113.1
	EB Left	423	1579	F	65.1	345	1584	F	91.1
	EB Right	362	1605	F	85.6	319	1610	F	112.2
US 231 - Campbell Ln	NB Thru	407	688	C	21.7	461	749	C	19.1
	NB Left	210	688	E	49.2	241	749	E	42.5
	NB Right	135	688	A	5.8	151	749	A	5.5
US 68 - Veterans Memorial Ln	SB Thru	579	608	B	14.2	643	1180	F	56.3
	SB Left	62	608	C	16.9	72	1180	F	70.5
	SB Right	325	611	C	15.2	351	1183	F	70.7
US 68X - Russellville Rd	WB Thru	387	369	C	18.3	439	608	E	35.3
	WB Left	161	369	C	15.1	179	608	E	35.8
	WB Right	51	371	C	16.9	66	610	D	34.9
Total		3608	1605	E	41.1	3702	1610	F	61.2

Table 19: Roundabout LOS Thresholds, PM Peak Hour

Approach	Movement	Existing				LOS D (+5.5% over Existing)			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	379	699	C	16.0	399	680	C	15.1
	EB Left	303	699	A	9.7	328	680	B	11.7
	EB Right	274	725	B	12.9	286	705	B	14.4
US 231 - Campbell Ln	NB Thru	484	439	B	11.3	521	435	B	12.6
	NB Left	261	439	C	21.0	272	435	C	23.2
	NB Right	154	439	A	5.0	159	435	A	5.9
US 68 - Veterans Memorial Ln	SB Thru	429	473	C	15.6	448	443	C	18.2
	SB Left	48	473	C	22.4	53	443	C	20.6
	SB Right	241	476	C	17.7	254	447	C	19.3
US 68X - Russellville Rd	WB Thru	526	770	E	40.5	548	1054	F	90.3
	WB Left	211	770	D	28.6	225	1054	F	61.3
	WB Right	72	771	D	32.7	76	1055	F	93.4
Total		3382	771	C	19.5	3569	1055	D	31.5

Approach	Movement	LOS E (+6.1% over Existing)				LOS F (+8.7% over Existing)			
		Volume	Max Queue	LOS	Delay	Volume	Max Queue	LOS	Delay
US 68 - Russellville Rd	EB Thru	402	874	C	19.3	418	802	C	23.2
	EB Left	333	874	B	11.9	351	802	B	14.3
	EB Right	290	900	C	17.0	305	828	C	18.3
US 231 - Campbell Ln	NB Thru	526	699	C	18.9	541	1102	D	25.5
	NB Left	274	699	E	41.9	286	1102	F	61.4
	NB Right	163	714	A	6.0	172	1117	A	7.3
US 68 - Veterans Memorial Ln	SB Thru	455	604	C	22.5	473	576	C	19.2
	SB Left	52	604	E	36.9	52	576	C	24.2
	SB Right	256	608	D	28.8	273	580	C	21.1
US 68X - Russellville Rd	WB Thru	542	1123	F	108.7	519	1686	F	163.9
	WB Left	222	1123	E	46.1	213	1686	F	146.5
	WB Right	73	1125	F	113.8	72	1688	F	170.5
Total		3588	1125	E	37.9	3675	1688	F	53.8

Appendix A:

Turning Movement Counts

Study Name US 68 & Emmett Ave**Start Date 08/25/2021****Start Time 7:00 AM****Site Code****Cars & Light Goods**

Start Time	Entrance Southbound			US 68 Westbound			Emmett Ave Northbound			US 68 Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
7:00 AM	1	2	0	0	83	22	19	0	9	6	141	2
7:15 AM	1	0	1	1	91	10	21	2	9	13	171	4
7:30 AM	1	0	0	4	92	7	28	4	9	20	153	5
7:45 AM	3	0	0	4	98	11	24	2	15	15	147	5
8:00 AM	1	1	0	2	106	15	19	2	9	12	118	7
8:15 AM	2	1	1	1	67	12	18	3	12	13	136	7
8:30 AM	4	0	0	1	80	11	25	2	7	12	137	8
8:45 AM	7	1	0	4	89	13	14	4	7	14	141	7
4:00 PM	4	2	8	1	151	16	33	3	26	8	117	4
4:15 PM	6	1	3	4	162	24	28	1	16	11	147	6
4:30 PM	7	1	2	6	154	21	26	3	20	9	131	3
4:45 PM	9	4	2	6	152	29	28	7	30	6	117	7
5:00 PM	7	3	7	6	176	22	24	1	31	12	130	3
5:15 PM	10	2	3	4	155	18	24	3	26	7	124	10
5:30 PM	13	2	3	3	143	22	24	2	19	12	95	5
5:45 PM	5	0	1	3	155	19	24	0	18	7	102	5

Study Name US 68 & Emmett Ave**Start Date 08/25/2021****Start Time 7:00 AM****Site Code****Total Volume**

Start Time	Entrance Southbound			US 68 Westbound			Emmett Ave Northbound			US 68 Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
7:00 AM	1	2	0	0	93	22	21	0	10	6	158	2
7:15 AM	1	0	1	1	97	12	21	2	10	14	178	4
7:30 AM	1	0	0	4	94	8	28	4	10	20	158	5
7:45 AM	3	0	0	4	102	12	24	2	15	15	149	5
8:00 AM	1	1	0	2	109	15	19	2	9	13	122	7
8:15 AM	2	1	1	1	68	12	18	3	12	13	138	7
8:30 AM	4	0	0	1	84	11	25	2	10	14	144	9
8:45 AM	8	1	0	4	93	13	16	4	8	14	143	7
4:00 PM	5	2	8	1	152	17	34	3	27	8	122	4
4:15 PM	6	1	3	4	166	24	29	1	16	11	149	6
4:30 PM	7	1	2	6	158	22	27	3	21	9	132	5
4:45 PM	10	4	2	7	155	29	29	7	31	6	117	7
5:00 PM	7	3	7	6	181	22	24	1	31	12	132	3
5:15 PM	10	2	4	4	158	18	24	3	27	7	129	10
5:30 PM	13	2	3	3	148	22	24	2	19	13	99	5
5:45 PM	5	0	1	3	156	19	24	0	21	7	103	5

Study Name US 68 & Hardee's Entrance

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Cars & Light Goods

Start Time	US 68 Westbound		Hardee's Entrance Northbound		US 68 Eastbound	
	Thru	Left	Right	Left	Right	Thru
7:00 AM	86	8	8	4	6	153
7:15 AM	99	7	8	3	9	177
7:30 AM	105	5	19	3	10	178
7:45 AM	118	7	3	3	9	175
8:00 AM	99	8	6	3	14	143
8:15 AM	83	2	7	3	8	153
8:30 AM	90	1	7	5	11	161
8:45 AM	96	6	10	2	10	144
4:00 PM	180	1	3	3	10	114
4:15 PM	190	0	2	0	4	157
4:30 PM	192	0	1	3	4	149
4:45 PM	190	1	4	2	1	122
5:00 PM	223	4	4	1	5	150
5:15 PM	187	2	5	1	7	130
5:30 PM	181	4	3	2	4	106
5:45 PM	167	2	1	1	0	113

Study Name US 68 & Hardee's Entrance

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Totals

Start Time	US 68 Westbound		Hardee's Entrance Northbound		US 68 Eastbound	
	Thru	Left	Right	Left	Right	Thru
7:00 AM	97	9	8	4	6	169
7:15 AM	106	8	8	3	9	185
7:30 AM	108	5	19	3	10	185
7:45 AM	123	8	3	3	9	179
8:00 AM	102	8	6	3	14	147
8:15 AM	86	2	7	3	8	157
8:30 AM	98	1	7	5	11	173
8:45 AM	102	6	10	2	10	146
4:00 PM	184	1	3	3	10	120
4:15 PM	193	0	2	0	4	160
4:30 PM	197	0	1	3	4	153
4:45 PM	195	1	4	2	1	123
5:00 PM	227	4	4	1	6	153
5:15 PM	190	3	5	1	7	134
5:30 PM	186	4	5	2	4	111
5:45 PM	172	2	1	1	0	114

Study Name US 68 & US 231

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Cars & Light Goods

Start Time	US 231 Southbound			US 68 Westbound			US 231 Northbound			US 68 Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
7:00 AM	41	93	12	5	64	28	30	43	34	69	118	66
7:15 AM	43	102	19	4	58	33	51	72	30	84	120	63
7:30 AM	41	97	17	5	61	36	46	47	30	125	125	72
7:45 AM	53	134	17	13	85	31	42	56	43	131	130	49
8:00 AM	54	93	22	12	62	28	29	56	41	91	97	51
8:15 AM	42	81	14	7	58	23	31	44	38	83	119	62
8:30 AM	32	76	10	15	54	27	31	48	28	85	131	42
8:45 AM	32	80	23	11	44	36	27	72	35	79	111	38
9:00 AM	34	59	7	21	58	20	17	52	34	70	97	38
9:15 AM	38	74	9	9	58	25	19	57	36	55	86	35
9:30 AM	43	58	12	13	68	41	22	63	44	81	74	38
9:45 AM	40	91	20	15	77	30	37	48	48	107	87	38
10:00 AM	30	83	9	8	70	24	30	70	39	78	75	27
10:15 AM	35	69	11	6	80	38	25	64	46	71	84	39
10:30 AM	46	82	12	13	76	39	23	65	50	70	76	37
10:45 AM	37	83	16	12	64	43	25	62	53	71	95	45
11:00 AM	43	100	19	14	81	41	36	68	58	58	84	30
11:15 AM	31	73	15	17	86	38	42	56	52	67	75	41
11:30 AM	36	66	12	16	81	50	44	71	50	65	68	33
11:45 AM	34	88	10	12	85	60	29	79	57	82	63	36
12:00 PM	46	76	13	13	96	50	31	81	62	69	84	42
12:15 PM	47	89	13	14	85	48	40	93	65	60	84	36
12:30 PM	55	77	10	17	100	53	44	80	46	68	72	35
12:45 PM	32	85	11	13	112	45	37	79	60	93	97	55
1:00 PM	47	93	10	11	73	46	38	74	58	85	88	49
1:15 PM	52	101	14	20	90	33	44	99	71	65	70	51
1:30 PM	53	99	13	18	95	30	26	70	65	72	98	52
1:45 PM	52	79	17	9	85	47	32	89	66	59	82	43
2:00 PM	63	88	9	19	106	44	24	98	53	51	91	55
2:15 PM	53	70	11	13	89	49	44	64	73	60	74	47
2:30 PM	63	95	11	11	113	55	44	116	81	76	90	30
2:45 PM	67	89	12	13	164	61	51	105	65	60	96	58
3:00 PM	55	86	10	16	122	56	35	104	76	51	79	45
3:15 PM	71	93	6	24	116	52	54	108	97	57	82	59
3:30 PM	55	86	12	19	142	62	28	96	71	68	92	70
3:45 PM	56	115	12	26	122	49	52	103	74	72	119	68
4:00 PM	55	105	19	14	119	50	27	119	63	76	67	68
4:15 PM	64	98	10	14	135	37	43	139	73	79	87	54
4:30 PM	57	81	9	18	140	46	28	114	78	60	99	54
4:45 PM	62	97	11	17	119	49	31	103	83	59	77	62
5:00 PM	53	86	9	21	154	47	33	132	68	60	112	44
5:15 PM	65	99	22	10	113	58	41	118	88	61	74	66
5:30 PM	63	92	9	15	115	43	27	116	87	65	75	61
5:45 PM	28	88	11	20	101	39	30	112	58	62	71	60
6:00 PM	38	72	10	10	91	48	41	93	69	60	64	48
6:15 PM	45	80	11	17	75	37	28	79	57	65	54	42
6:30 PM	35	59	14	20	79	31	31	99	70	63	65	42
6:45 PM	37	61	11	19	93	20	18	90	64	44	60	34

Study Name US 68 & US 231

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Totals

Start Time	US 231 Southbound			US 68 Westbound			US 231 Northbound			US 68 Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
7:00 AM	45	95	12	5	74	32	35	50	35	73	130	72
7:15 AM	51	106	19	5	62	36	53	78	32	86	124	66
7:30 AM	44	97	17	5	64	36	49	47	31	125	131	74
7:45 AM	59	135	17	13	90	32	42	56	44	132	133	49
8:00 AM	63	95	23	12	63	29	29	58	41	95	100	54
8:15 AM	46	81	14	7	62	23	32	45	39	86	120	69
8:30 AM	37	76	11	16	61	28	31	50	29	93	145	48
8:45 AM	42	84	23	13	48	37	28	74	37	85	112	48
9:00 AM	35	61	7	21	63	20	17	54	37	73	107	44
9:15 AM	41	78	9	10	61	26	19	59	39	59	89	41
9:30 AM	47	62	13	14	73	41	22	70	46	81	81	41
9:45 AM	42	94	20	15	87	32	37	48	49	111	92	40
10:00 AM	37	83	9	8	75	24	31	71	42	78	78	27
10:15 AM	40	71	11	6	84	38	27	64	47	75	86	42
10:30 AM	50	82	13	13	78	41	24	66	52	75	85	40
10:45 AM	38	87	16	14	66	43	26	65	54	71	104	46
11:00 AM	47	102	21	14	88	41	39	68	62	58	88	35
11:15 AM	34	73	15	17	91	39	43	58	55	68	80	44
11:30 AM	36	71	13	16	87	50	45	72	52	65	74	35
11:45 AM	39	90	10	14	88	60	29	85	59	84	66	38
12:00 PM	49	78	13	13	99	50	32	83	62	69	86	45
12:15 PM	50	91	13	17	87	50	43	98	70	62	90	38
12:30 PM	57	79	10	17	104	54	44	83	47	70	78	36
12:45 PM	36	86	11	13	116	45	37	83	65	98	104	57
1:00 PM	48	94	10	12	76	48	38	75	59	86	91	52
1:15 PM	54	101	14	21	91	33	44	101	72	67	74	57
1:30 PM	58	101	13	18	100	30	26	70	66	73	104	57
1:45 PM	57	80	18	9	87	48	32	90	67	60	83	47
2:00 PM	64	91	9	19	111	45	24	98	54	51	91	59
2:15 PM	56	73	11	13	94	51	46	68	74	62	97	53
2:30 PM	68	95	11	11	115	55	52	123	82	77	95	32
2:45 PM	72	91	13	13	170	64	51	109	65	62	99	65
3:00 PM	63	86	10	16	124	57	36	105	76	53	81	49
3:15 PM	76	94	6	24	120	52	55	111	98	58	88	63
3:30 PM	59	87	12	20	142	62	28	98	72	69	95	73
3:45 PM	62	120	12	26	125	50	52	104	76	76	121	72
4:00 PM	58	105	19	14	123	50	27	122	65	77	73	70
4:15 PM	68	100	10	15	138	37	43	142	75	83	88	58
4:30 PM	60	82	9	19	144	46	29	115	78	64	102	56
4:45 PM	64	99	12	18	122	50	31	105	85	60	77	65
5:00 PM	60	86	9	21	156	48	33	133	72	62	114	46
5:15 PM	70	99	22	10	116	58	42	119	90	63	77	68
5:30 PM	66	93	10	15	118	43	28	118	87	65	78	63
5:45 PM	31	88	11	20	107	39	30	113	58	62	72	61
6:00 PM	40	73	10	11	91	48	41	93	69	60	65	49
6:15 PM	45	81	11	17	75	37	28	80	57	66	55	43
6:30 PM	36	60	14	20	80	31	31	99	71	66	69	43
6:45 PM	38	61	12	19	95	20	18	90	65	44	62	35

Study Name US 68 & Whispering Hills Blvd

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Cars & Light Goods

Start Time	Whispering Hills Blvd Southbound		US 68 Westbound		US 68 Eastbound	
	Right	Left	Right	Thru	Thru	Left
7:00 AM	7	4	3	123	235	4
7:15 AM	6	3	4	132	270	3
7:30 AM	14	2	1	132	299	2
7:45 AM	16	2	6	174	291	1
8:00 AM	10	1	6	154	243	9
8:15 AM	8	3	2	131	259	5
8:30 AM	3	1	3	113	252	4
8:45 AM	4	2	3	110	232	2
4:00 PM	11	1	12	218	201	11
4:15 PM	3	0	9	263	236	12
4:30 PM	2	3	19	252	224	2
4:45 PM	7	4	17	252	200	11
5:00 PM	4	1	9	277	216	8
5:15 PM	13	1	18	249	192	10
5:30 PM	6	3	20	253	197	10
5:45 PM	9	5	10	189	182	5

Study Name US 68 & Whispering Hills Blvd

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Totals

Start Time	Whispering Hills Blvd Southbound		US 68 Westbound		US 68 Eastbound	
	Right	Left	Right	Thru	Thru	Left
7:00 AM	7	4	3	140	255	4
7:15 AM	7	3	4	144	281	3
7:30 AM	14	2	1	139	303	2
7:45 AM	16	2	8	184	296	1
8:00 AM	11	1	6	163	253	9
8:15 AM	8	3	2	141	268	5
8:30 AM	3	1	3	125	274	4
8:45 AM	4	2	3	125	247	2
4:00 PM	11	1	12	228	211	11
4:15 PM	3	0	9	271	246	12
4:30 PM	2	4	19	259	230	2
4:45 PM	8	4	17	259	203	11
5:00 PM	4	1	9	290	224	8
5:15 PM	13	2	18	257	196	10
5:30 PM	6	3	20	259	201	10
5:45 PM	9	5	10	197	184	5

Study Name US 231 & Hardee's Entrance

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Cars & Light Goods

Start Time	US 68 Southbound		Hardee's Entrance Westbound		US 68 Northbound	
	Thru	Left	Right	Left	Right	Thru
7:00 AM	178	3	5	4	3	107
7:15 AM	216	2	2	4	5	145
7:30 AM	244	3	3	3	7	127
7:45 AM	280	2	3	4	4	142
8:00 AM	207	2	6	3	4	115
8:15 AM	187	0	5	4	3	106
8:30 AM	191	0	6	2	4	108
8:45 AM	200	1	4	2	3	125
4:00 PM	235	2	13	0	5	208
4:15 PM	216	0	4	1	1	235
4:30 PM	191	2	1	0	3	214
4:45 PM	206	0	9	0	4	204
5:00 PM	192	0	2	0	2	218
5:15 PM	221	1	0	0	0	242
5:30 PM	197	0	0	0	1	209
5:45 PM	208	0	1	0	1	200

Study Name US 231 & Hardee's Entrance

Start Date 08/25/2021

Start Time 7:00 AM

Site Code

Totals

Start Time	US 68 Southbound		Hardee's Entrance Westbound		US 68 Northbound	
	Thru	Left	Right	Left	Right	Thru
7:00 AM	185	3	6	4	3	119
7:15 AM	223	2	2	4	5	155
7:30 AM	244	3	3	3	7	132
7:45 AM	283	2	3	4	4	143
8:00 AM	214	2	6	3	4	117
8:15 AM	190	0	5	4	3	109
8:30 AM	198	0	6	2	4	111
8:45 AM	210	1	4	2	3	129
4:00 PM	238	2	13	0	5	214
4:15 PM	223	0	4	1	1	239
4:30 PM	195	2	2	0	3	215
4:45 PM	210	0	9	0	4	208
5:00 PM	194	0	2	0	2	223
5:15 PM	223	1	0	0	0	246
5:30 PM	197	0	0	0	1	210
5:45 PM	208	0	1	0	1	201

Study Name US 231 & Industrial Dr**Start Date 08/26/2021****Start Time 7:00 AM****Site Code****Cars & Light Goods**

Start Time	US 231 Southbound			Industrial Dr Westbound			US 231 Northbound			Industrial Dr Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
7:00 AM	26	160	10	1	6	0	4	91	2	9	15	19
7:15 AM	23	161	17	5	1	4	12	85	3	11	11	35
7:30 AM	25	183	16	7	4	2	15	108	6	11	25	26
7:45 AM	23	226	23	1	9	8	9	101	5	16	25	17
8:00 AM	15	161	9	2	7	4	6	99	8	7	15	25
8:15 AM	16	161	14	1	3	2	7	86	7	8	9	24
8:30 AM	10	182	7	6	3	0	5	84	3	6	4	23
8:45 AM	10	184	8	2	5	2	7	107	7	11	8	10
4:00 PM	11	172	3	5	13	12	16	163	18	14	14	13
4:15 PM	18	224	18	3	11	12	18	208	13	12	11	18
4:30 PM	14	177	10	6	15	17	19	222	13	6	15	28
4:45 PM	20	229	12	7	28	39	18	240	11	13	16	31
5:00 PM	17	246	7	31	18	19	18	203	16	14	10	59
5:15 PM	23	241	7	38	23	22	12	199	17	13	5	47
5:30 PM	16	212	3	8	17	22	14	181	10	13	10	22
5:45 PM	16	197	5	4	11	17	13	201	9	3	1	12

Study Name US 231 & Industrial Dr**Start Date 08/26/2021****Start Time 7:00 AM****Site Code****Totals**

Start Time	US 231 Southbound			Industrial Dr Westbound			US 231 Northbound			Industrial Dr Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
7:00 AM	27	164	10	1	7	0	5	102	2	9	15	22
7:15 AM	23	163	17	5	2	4	12	89	3	12	12	37
7:30 AM	25	187	16	7	6	2	15	111	7	11	26	27
7:45 AM	24	230	24	2	10	8	9	101	5	20	25	19
8:00 AM	15	165	9	2	7	5	6	103	8	7	15	26
8:15 AM	16	174	14	1	4	2	7	88	7	8	9	28
8:30 AM	12	193	7	6	4	0	5	88	3	7	4	24
8:45 AM	11	190	8	2	6	2	7	107	7	11	8	11
4:00 PM	11	175	3	5	14	12	16	164	18	14	14	14
4:15 PM	18	227	18	3	12	12	18	209	13	13	11	18
4:30 PM	15	183	10	6	16	17	19	225	14	6	16	28
4:45 PM	21	233	12	7	28	39	18	245	11	13	17	32
5:00 PM	17	247	7	31	18	19	18	208	16	14	10	59
5:15 PM	24	243	7	38	24	22	12	204	17	13	5	48
5:30 PM	16	213	3	8	17	24	14	181	10	13	11	22
5:45 PM	16	198	5	4	11	17	13	201	10	3	1	12

Study Name US 231 & Tomblinson Way

Start Date 08/26/2021

Start Time 7:00 AM

Site Code

Cars & Light Goods

Start Time	US 231 Southbound		US 231 Northbound		Tomblinson Way Eastbound	
	Right	Thru	Thru	Left	Right	Left
7:00 AM	22	141	109	8	23	34
7:15 AM	13	110	124	6	22	33
7:30 AM	25	146	117	8	25	37
7:45 AM	17	180	111	6	29	29
8:00 AM	11	122	79	9	9	31
8:15 AM	16	118	105	15	12	24
8:30 AM	18	121	82	7	24	23
8:45 AM	14	122	112	7	21	24
4:00 PM	28	138	150	26	26	34
4:15 PM	42	185	184	26	30	32
4:30 PM	37	173	184	29	21	37
4:45 PM	44	147	194	36	19	43
5:00 PM	44	152	199	37	26	18
5:15 PM	45	155	157	53	29	40
5:30 PM	37	152	174	41	32	41
5:45 PM	39	138	166	30	18	43

Study Name US 231 & Tomblinson Way

Start Date 08/26/2021

Start Time 7:00 AM

Site Code

Totals

Start Time	US 231 Southbound		US 231 Northbound		Tomblinson Way Eastbound	
	Right	Thru	Thru	Left	Right	Left
7:00 AM	23	151	122	8	24	34
7:15 AM	13	111	131	7	22	36
7:30 AM	25	151	121	9	25	38
7:45 AM	18	191	115	6	29	29
8:00 AM	13	126	89	9	11	32
8:15 AM	16	124	114	15	12	24
8:30 AM	19	127	99	9	25	23
8:45 AM	14	132	122	7	21	25
4:00 PM	29	142	155	26	26	34
4:15 PM	44	189	187	26	31	34
4:30 PM	37	177	185	29	21	37
4:45 PM	46	151	198	36	19	43
5:00 PM	44	154	203	37	26	18
5:15 PM	45	158	159	53	29	40
5:30 PM	37	155	178	41	32	41
5:45 PM	39	144	168	30	18	43

Appendix B:

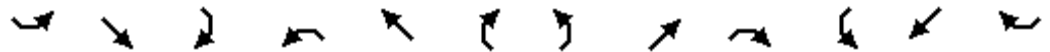
Synchro/HCM Model Data

2045 AM HCM6

HCM 6th Signalized Intersection Summary

4: US-68 & Woodmont Ave


























12/16/2021



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (veh/h)	91	15	30	0	0	15	15	1617	15	15	997	15
Future Volume (veh/h)	91	15	30	0	0	15	15	1617	15	15	997	15
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	99	16	33	0	0	16	16	1758	16	16	1084	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	351	63	92	0	0	439	284	1943	18	137	1930	28
Arrive On Green	0.28	0.28	0.28	0.00	0.00	0.28	0.54	0.54	0.54	0.54	0.54	0.54
Sat Flow, veh/h	933	228	333	0	0	1585	513	3608	33	268	3585	53
Grp Volume(v), veh/h	148	0	0	0	0	16	16	865	909	16	537	563
Grp Sat Flow(s),veh/h/ln	1494	0	0	0	0	1585	513	1777	1864	268	1777	1861
Q Serve(g_s), s	4.0	0.0	0.0	0.0	0.0	0.5	1.4	28.4	28.6	3.7	13.0	13.0
Cycle Q Clear(g_c), s	5.0	0.0	0.0	0.0	0.0	0.5	14.4	28.4	28.6	32.3	13.0	13.0
Prop In Lane	0.67		0.22	0.00		1.00	1.00		0.02	1.00		0.03
Lane Grp Cap(c), veh/h	506	0	0	0	0	439	284	957	1004	137	957	1002
V/C Ratio(X)	0.29	0.00	0.00	0.00	0.00	0.04	0.06	0.90	0.91	0.12	0.56	0.56
Avail Cap(c_a), veh/h	506	0	0	0	0	439	284	957	1004	137	957	1002
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.7	0.0	0.0	0.0	0.0	17.2	14.7	13.5	13.5	28.1	9.9	9.9
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.0	0.0	0.2	0.4	13.5	13.1	1.7	2.4	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	0.0	0.0	0.0	0.2	0.2	12.7	13.3	0.3	4.8	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.2	0.0	0.0	0.0	0.0	17.3	15.1	27.0	26.7	29.8	12.3	12.2
LnGrp LOS	C	A	A	A	A	B	B	C	C	C	B	B
Approach Vol, veh/h		148			16			1790			1116	
Approach Delay, s/veh		20.2			17.3			26.7			12.5	
Approach LOS		C			B			C			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		41.0		24.0		41.0		24.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		35.0		18.0		35.0		18.0				
Max Q Clear Time (g_c+I1), s		30.6		2.5		34.3		7.0				
Green Ext Time (p_c), s		3.7		0.0		0.5		0.5				
Intersection Summary												
HCM 6th Ctrl Delay				21.2								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary
 7: US-68 & US-231 & US-68X























12/16/2021

													
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations													
Traffic Volume (veh/h)	121	650	332	227	363	257	363	725	620	196	423	60	
Future Volume (veh/h)	121	650	332	227	363	257	363	725	620	196	423	60	
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	1870	1870	1870	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	132	707	361	247	395	279	395	788	674	213	460	65	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2	
Cap, veh/h	150	746	706	220	498	348	419	700	789	181	752	106	
Arrive On Green	0.08	0.21	0.21	0.12	0.25	0.25	0.24	0.37	0.37	0.10	0.24	0.24	
Sat Flow, veh/h	1781	3554	1585	1781	1999	1396	1781	1870	1585	1781	3128	440	
Grp Volume(v), veh/h	132	707	361	247	351	323	395	788	674	213	260	265	
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1619	1781	1870	1585	1781	1777	1791	
Q Serve(g_s), s	11.0	29.5	24.6	18.6	27.8	28.2	32.8	56.3	55.9	15.3	19.6	19.8	
Cycle Q Clear(g_c), s	11.0	29.5	24.6	18.6	27.8	28.2	32.8	56.3	55.9	15.3	19.6	19.8	
Prop In Lane	1.00		1.00	1.00		0.86	1.00		1.00	1.00		0.25	
Lane Grp Cap(c), veh/h	150	746	706	220	443	403	419	700	789	181	427	431	
V/C Ratio(X)	0.88	0.95	0.51	1.12	0.79	0.80	0.94	1.13	0.85	1.18	0.61	0.61	
Avail Cap(c_a), veh/h	150	746	706	220	443	403	472	700	789	181	427	431	
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	68.1	58.6	30.0	65.9	52.8	53.0	56.5	47.1	33.0	67.6	50.9	51.0	
Incr Delay (d2), s/veh	40.3	22.4	2.6	97.3	13.5	15.4	26.0	74.3	9.1	122.3	2.5	2.6	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	6.6	15.1	9.7	14.2	13.8	13.0	17.4	39.7	22.4	13.0	8.9	9.1	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d),s/veh	108.4	81.0	32.6	163.3	66.4	68.4	82.5	121.4	42.1	189.9	53.4	53.6	
LnGrp LOS	F	F	C	F	E	E	F	F	D	F	D	D	
Approach Vol, veh/h		1200			921			1857				738	
Approach Delay, s/veh		69.5			93.1			84.4				92.9	
Approach LOS		E			F			F				F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8					
Phs Duration (G+Y+Rc), s	19.1	44.4	43.1	43.9	25.0	38.5	23.0	64.0					
Change Period (Y+Rc), s	* 6.4	* 6.9	7.7	7.7	* 6.4	* 6.9	7.7	7.7					
Max Green Setting (Gmax), s	* 13	* 37	39.9	31.7	* 19	* 32	15.3	56.3					
Max Q Clear Time (g_c+I1), s	13.0	30.2	34.8	21.8	20.6	31.5	17.3	58.3					
Green Ext Time (p_c), s	0.0	2.1	0.6	1.9	0.0	0.0	0.0	0.0					
Intersection Summary													
HCM 6th Ctrl Delay												83.6	
HCM 6th LOS												F	
Notes													
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.													

HCM 6th Signalized Intersection Summary

10: Industrial Dr S/Industrial Dr N

12/16/2021

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	212	136	91	30	45	30	121	1209	151	45	604	60
Future Volume (veh/h)	212	136	91	30	45	30	121	1209	151	45	604	60
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	230	148	99	33	49	33	132	1314	164	49	657	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	309	151	466	100	307	207	413	1558	695	205	1480	660
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.06	0.44	0.44	0.04	0.42	0.42
Sat Flow, veh/h	799	514	1585	1133	1042	702	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	378	0	99	33	0	82	132	1314	164	49	657	65
Grp Sat Flow(s),veh/h/ln	1313	0	1585	1133	0	1744	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	19.8	0.0	3.7	0.6	0.0	2.7	3.3	25.9	5.1	1.2	10.4	2.0
Cycle Q Clear(g_c), s	22.5	0.0	3.7	23.1	0.0	2.7	3.3	25.9	5.1	1.2	10.4	2.0
Prop In Lane	0.61		1.00	1.00		0.40	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	460	0	466	100	0	513	413	1558	695	205	1480	660
V/C Ratio(X)	0.82	0.00	0.21	0.33	0.00	0.16	0.32	0.84	0.24	0.24	0.44	0.10
Avail Cap(c_a), veh/h	460	0	466	100	0	513	447	1558	695	244	1480	660
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.9	0.0	20.9	39.2	0.0	20.5	12.3	19.6	13.8	16.1	16.4	13.9
Incr Delay (d2), s/veh	15.2	0.0	1.0	8.6	0.0	0.7	0.4	5.7	0.8	0.6	1.0	0.3
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	8.5	0.0	1.4	0.9	0.0	1.2	1.2	10.3	1.7	0.4	3.9	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.0	0.0	21.9	47.8	0.0	21.2	12.7	25.4	14.6	16.7	17.4	14.2
LnGrp LOS	D	A	C	D	A	C	B	C	B	B	B	B
Approach Vol, veh/h		477			115			1610			771	
Approach Delay, s/veh		39.4			28.8			23.2			17.1	
Approach LOS		D			C			C			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.9	38.6		29.0	9.2	40.3		29.0				
Change Period (Y+Rc), s	5.9	5.9		* 5.9	5.9	5.9		* 5.9				
Max Green Setting (Gmax), s	6.5	32.7		* 23	5.0	34.2		* 23				
Max Q Clear Time (g_c+I1), s	5.3	12.4		25.1	3.2	27.9		24.5				
Green Ext Time (p_c), s	0.0	4.1		0.0	0.0	4.3		0.0				

Intersection Summary

HCM 6th Ctrl Delay	24.5
HCM 6th LOS	C

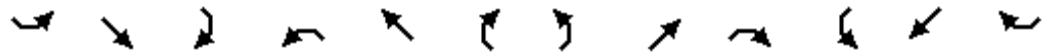
Notes

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

HCM 6th Signalized Intersection Summary

13: Emmett Ave E/Emmett Ave W

12/16/2021



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (veh/h)	15	15	15	76	15	136	30	982	91	76	620	15
Future Volume (veh/h)	15	15	15	76	15	136	30	982	91	76	620	15
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	16	16	83	16	148	33	1067	99	83	674	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	111	109	86	128	30	164	527	1021	95	153	2204	52
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.03	0.61	0.61	0.05	0.62	0.62
Sat Flow, veh/h	355	616	485	450	169	926	1781	1686	156	1781	3548	84
Grp Volume(v), veh/h	48	0	0	247	0	0	33	0	1166	83	337	353
Grp Sat Flow(s),veh/h/ln	1456	0	0	1546	0	0	1781	0	1842	1781	1777	1855
Q Serve(g_s), s	0.0	0.0	0.0	13.2	0.0	0.0	0.7	0.0	60.0	1.7	8.8	8.8
Cycle Q Clear(g_c), s	2.3	0.0	0.0	15.5	0.0	0.0	0.7	0.0	60.0	1.7	8.8	8.8
Prop In Lane	0.33		0.33	0.34		0.60	1.00		0.08	1.00		0.05
Lane Grp Cap(c), veh/h	306	0	0	322	0	0	527	0	1116	153	1104	1152
V/C Ratio(X)	0.16	0.00	0.00	0.77	0.00	0.00	0.06	0.00	1.04	0.54	0.31	0.31
Avail Cap(c_a), veh/h	313	0	0	329	0	0	563	0	1116	163	1104	1152
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.5	0.0	0.0	39.8	0.0	0.0	7.0	0.0	19.5	24.5	8.8	8.8
Incr Delay (d2), s/veh	0.2	0.0	0.0	10.2	0.0	0.0	0.0	0.0	39.3	3.2	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	1.0	0.0	0.0	6.7	0.0	0.0	0.2	0.0	34.8	1.3	3.2	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.7	0.0	0.0	49.9	0.0	0.0	7.0	0.0	58.9	27.7	8.9	8.9
LnGrp LOS	C	A	A	D	A	A	A	A	F	C	A	A
Approach Vol, veh/h		48			247			1199				773
Approach Delay, s/veh		34.7			49.9			57.4				10.9
Approach LOS		C			D			E				B
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.5	66.0		23.5	8.0	67.5		23.5				
Change Period (Y+Rc), s	5.0	6.0		6.0	5.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	60.0		18.0	5.0	60.0		18.0				
Max Q Clear Time (g_c+I1), s	3.7	62.0		17.5	2.7	10.8		4.3				
Green Ext Time (p_c), s	0.0	0.0		0.1	0.0	4.7		0.1				

Intersection Summary

HCM 6th Ctrl Delay	40.3
HCM 6th LOS	D

HCM 6th Signalized Intersection Summary

17: US-68 & Tomblinson Way

12/16/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	212	151	45	740	952	121	
Future Volume (veh/h)	212	151	45	740	952	121	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach	No			No	No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	230	164	49	804	1035	132	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	
Cap, veh/h	282	251	337	2306	1827	815	
Arrive On Green	0.16	0.16	0.04	0.65	0.51	0.51	
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585	
Grp Volume(v), veh/h	230	164	49	804	1035	132	
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585	
Q Serve(g_s), s	8.4	6.6	0.8	6.9	13.5	3.0	
Cycle Q Clear(g_c), s	8.4	6.6	0.8	6.9	13.5	3.0	
Prop In Lane	1.00	1.00	1.00			1.00	
Lane Grp Cap(c), veh/h	282	251	337	2306	1827	815	
V/C Ratio(X)	0.82	0.65	0.15	0.35	0.57	0.16	
Avail Cap(c_a), veh/h	480	427	393	2306	1827	815	
HCM Platoon Ratio	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	
Uniform Delay (d), s/veh	27.4	26.7	7.9	5.4	11.2	8.7	
Incr Delay (d2), s/veh	5.7	2.9	0.2	0.4	1.3	0.4	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	3.9	2.6	0.2	1.5	4.0	0.8	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	33.1	29.5	8.1	5.8	12.5	9.1	
LnGrp LOS	C	C	A	A	B	A	
Approach Vol, veh/h	394			853	1167		
Approach Delay, s/veh	31.6			5.9	12.1		
Approach LOS	C			A	B		
Timer - Assigned Phs		2			5	6	8
Phs Duration (G+Y+Rc), s		51.0			9.1	41.9	16.5
Change Period (Y+Rc), s		* 7.2			6.1	* 7.2	5.8
Max Green Setting (Gmax), s		* 44			5.1	* 33	18.2
Max Q Clear Time (g_c+I1), s		8.9			2.8	15.5	10.4
Green Ext Time (p_c), s		5.1			0.0	6.2	0.3

Intersection Summary

HCM 6th Ctrl Delay	13.1
HCM 6th LOS	B

Notes

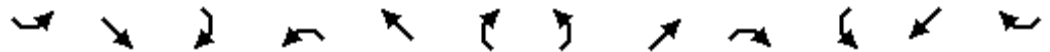
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

2045 PM HCM6

HCM 6th Signalized Intersection Summary

4: US-68 & Woodmont Ave

12/16/2021


























Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (veh/h)	91	15	30	0	0	15	30	1421	15	30	1526	15
Future Volume (veh/h)	91	15	30	0	0	15	30	1421	15	30	1526	15
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	99	16	33	0	0	16	33	1545	16	33	1659	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	380	68	100	0	0	476	142	1802	19	161	1803	17
Arrive On Green	0.30	0.30	0.30	0.00	0.00	0.30	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	933	228	333	0	0	1585	296	3603	37	330	3606	35
Grp Volume(v), veh/h	148	0	0	0	0	16	33	761	800	33	817	858
Grp Sat Flow(s),veh/h/ln	1494	0	0	0	0	1585	296	1777	1864	330	1777	1864
Q Serve(g_s), s	3.4	0.0	0.0	0.0	0.0	0.4	4.4	22.5	22.5	5.8	25.5	25.6
Cycle Q Clear(g_c), s	4.4	0.0	0.0	0.0	0.0	0.4	30.0	22.5	22.5	28.4	25.5	25.6
Prop In Lane	0.67		0.22	0.00		1.00	1.00		0.02	1.00		0.02
Lane Grp Cap(c), veh/h	548	0	0	0	0	476	142	888	932	161	888	932
V/C Ratio(X)	0.27	0.00	0.00	0.00	0.00	0.03	0.23	0.86	0.86	0.20	0.92	0.92
Avail Cap(c_a), veh/h	548	0	0	0	0	476	142	888	932	161	888	932
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.2	0.0	0.0	0.0	0.0	14.9	28.6	13.1	13.1	25.6	13.9	13.9
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.0	0.0	0.1	3.8	10.4	10.1	2.9	16.0	15.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	0.0	0.0	0.2	0.6	9.8	10.2	0.6	12.2	12.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.4	0.0	0.0	0.0	0.0	15.0	32.4	23.6	23.2	28.4	29.9	29.5
LnGrp LOS	B	A	A	A	A	B	C	C	C	C	C	C
Approach Vol, veh/h		148			16			1594			1708	
Approach Delay, s/veh		17.4			15.0			23.6			29.7	
Approach LOS		B			B			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		36.0		24.0		36.0		24.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		30.0		18.0		30.0		18.0				
Max Q Clear Time (g_c+I1), s		32.0		2.4		30.4		6.4				
Green Ext Time (p_c), s		0.0		0.0		0.0		0.5				
Intersection Summary												
HCM 6th Ctrl Delay				26.3								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary

7: US-68 & US-231 & US-68X

12/16/2021

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	76	650	393	453	740	257	468	574	438	302	801	121
Future Volume (veh/h)	76	650	393	453	740	257	468	574	438	302	801	121
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	83	707	427	492	804	279	509	624	476	328	871	132
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	103	651	581	326	799	277	326	514	726	326	851	129
Arrive On Green	0.06	0.18	0.18	0.18	0.31	0.31	0.18	0.27	0.27	0.18	0.27	0.27
Sat Flow, veh/h	1781	3554	1585	1781	2588	897	1781	1870	1585	1781	3094	469
Grp Volume(v), veh/h	83	707	427	492	552	531	509	624	476	328	500	503
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1709	1781	1870	1585	1781	1777	1786
Q Serve(g_s), s	7.5	30.0	30.0	30.0	50.5	50.5	30.0	45.0	38.1	30.0	45.0	45.0
Cycle Q Clear(g_c), s	7.5	30.0	30.0	30.0	50.5	50.5	30.0	45.0	38.1	30.0	45.0	45.0
Prop In Lane	1.00		1.00	1.00		0.53	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	103	651	581	326	548	527	326	514	726	326	488	491
V/C Ratio(X)	0.80	1.09	0.73	1.51	1.01	1.01	1.56	1.21	0.66	1.00	1.02	1.02
Avail Cap(c_a), veh/h	326	651	581	326	548	527	326	514	726	326	488	491
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	76.2	66.9	45.0	66.9	56.6	56.6	66.9	59.4	34.3	66.9	59.3	59.4
Incr Delay (d2), s/veh	13.4	60.7	8.0	243.6	40.0	41.0	266.2	113.1	2.1	51.0	47.0	46.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	18.7	16.1	35.5	28.2	27.3	37.6	37.0	14.8	18.0	26.2	26.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	89.6	127.6	53.0	310.4	96.6	97.6	333.0	172.4	36.5	117.9	106.3	106.2
LnGrp LOS	F	F	D	F	F	F	F	F	D	F	F	F
Approach Vol, veh/h		1217			1575			1609			1331	
Approach Delay, s/veh		98.8			163.7			183.0			109.1	
Approach LOS		F			F			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.9	57.4	37.7	52.7	36.4	36.9	37.7	52.7				
Change Period (Y+Rc), s	* 6.4	* 6.9	7.7	7.7	* 6.4	* 6.9	7.7	7.7				
Max Green Setting (Gmax), s	* 30	* 30	30.0	45.0	* 30	* 30	30.0	45.0				
Max Q Clear Time (g_c+I1), s	9.5	52.5	32.0	47.0	32.0	32.0	32.0	47.0				
Green Ext Time (p_c), s	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	142.7
HCM 6th LOS	F























Notes

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

HCM 6th Signalized Intersection Summary

10: Industrial Dr S/Industrial Dr N

12/16/2021

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	212	76	76	151	136	121	60	1209	121	76	1088	91
Future Volume (veh/h)	212	76	76	151	136	121	60	1209	121	76	1088	91
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	230	83	83	164	148	132	65	1314	132	83	1183	99
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	271	73	552	81	318	283	209	1437	641	188	1452	647
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.04	0.40	0.40	0.05	0.41	0.41
Sat Flow, veh/h	578	209	1585	1220	911	813	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	313	0	83	164	0	280	65	1314	132	83	1183	99
Grp Sat Flow(s),veh/h/ln	787	0	1585	1220	0	1724	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	19.8	0.0	3.2	0.0	0.0	11.3	1.9	31.2	4.8	2.4	26.3	3.5
Cycle Q Clear(g_c), s	31.1	0.0	3.2	31.1	0.0	11.3	1.9	31.2	4.8	2.4	26.3	3.5
Prop In Lane	0.73		1.00	1.00		0.47	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	344	0	552	81	0	601	209	1437	641	188	1452	647
V/C Ratio(X)	0.91	0.00	0.15	2.03	0.00	0.47	0.31	0.91	0.21	0.44	0.82	0.15
Avail Cap(c_a), veh/h	344	0	552	81	0	601	231	1437	641	203	1452	647
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.0	0.0	20.0	44.6	0.0	22.6	18.5	25.1	17.3	20.7	23.4	16.7
Incr Delay (d2), s/veh	30.2	0.0	0.6	505.3	0.0	2.6	0.8	10.5	0.7	1.6	5.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	0.0	1.2	13.1	0.0	4.8	0.7	13.8	1.7	1.0	10.9	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.2	0.0	20.6	550.0	0.0	25.2	19.3	35.6	18.0	22.3	28.6	17.2
LnGrp LOS	E	A	C	F	A	C	B	D	B	C	C	B
Approach Vol, veh/h		396			444			1511			1365	
Approach Delay, s/veh		56.6			219.0			33.4			27.4	
Approach LOS		E			F			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.9	42.4		37.0	10.3	42.0		37.0				
Change Period (Y+Rc), s	5.9	5.9		* 5.9	5.9	5.9		* 5.9				
Max Green Setting (Gmax), s	5.1	36.1		* 31	5.1	36.1		* 31				
Max Q Clear Time (g_c+I1), s	3.9	28.3		33.1	4.4	33.2		33.1				
Green Ext Time (p_c), s	0.0	4.5		0.0	0.0	2.1		0.0				

Intersection Summary

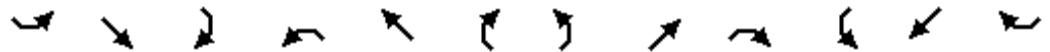
HCM 6th Ctrl Delay	55.8
HCM 6th LOS	E

Notes

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

HCM 6th Signalized Intersection Summary
 13: Emmett Ave E/Emmett Ave W

12/16/2021



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕↕			↕↕		↗	↖		↗	↕↕	
Traffic Volume (veh/h)	15	15	45	151	15	166	30	801	60	151	1028	30
Future Volume (veh/h)	15	15	45	151	15	166	30	801	60	151	1028	30
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	16	49	164	16	180	33	871	65	164	1117	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	102	228	216	21	179	299	895	67	197	1921	57
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.03	0.52	0.52	0.06	0.55	0.55
Sat Flow, veh/h	202	434	973	673	91	763	1781	1719	128	1781	3524	104
Grp Volume(v), veh/h	81	0	0	360	0	0	33	0	936	164	563	587
Grp Sat Flow(s),veh/h/ln	1609	0	0	1526	0	0	1781	0	1847	1781	1777	1852
Q Serve(g_s), s	0.0	0.0	0.0	17.5	0.0	0.0	0.8	0.0	44.2	3.9	18.9	18.9
Cycle Q Clear(g_c), s	3.5	0.0	0.0	21.0	0.0	0.0	0.8	0.0	44.2	3.9	18.9	18.9
Prop In Lane	0.20		0.60	0.46		0.50	1.00		0.07	1.00		0.06
Lane Grp Cap(c), veh/h	425	0	0	416	0	0	299	0	962	197	969	1009
V/C Ratio(X)	0.19	0.00	0.00	0.87	0.00	0.00	0.11	0.00	0.97	0.83	0.58	0.58
Avail Cap(c_a), veh/h	425	0	0	416	0	0	343	0	968	197	969	1009
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	0.0	34.1	0.0	0.0	10.9	0.0	20.9	20.9	13.6	13.6
Incr Delay (d2), s/veh	0.2	0.0	0.0	17.2	0.0	0.0	0.2	0.0	22.5	25.5	0.9	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	9.6	0.0	0.0	0.3	0.0	23.2	3.0	7.2	7.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.9	0.0	0.0	51.3	0.0	0.0	11.0	0.0	43.4	46.4	14.5	14.4
LnGrp LOS	C	A	A	D	A	A	B	A	D	D	B	B
Approach Vol, veh/h		81			360			969			1314	
Approach Delay, s/veh		27.9			51.3			42.3			18.4	
Approach LOS		C			D			D			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.0	52.7		27.0	7.8	54.9		27.0				
Change Period (Y+Rc), s	5.0	6.0		6.0	5.0	6.0		6.0				
Max Green Setting (Gmax), s	5.0	47.0		21.0	5.0	47.0		21.0				
Max Q Clear Time (g_c+I1), s	5.9	46.2		23.0	2.8	20.9		5.5				
Green Ext Time (p_c), s	0.0	0.5		0.0	0.0	8.5		0.2				

Intersection Summary

HCM 6th Ctrl Delay	31.5
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

17: US-68 & Tomblinson Way

12/16/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Volume (veh/h)	196	151	196	1133	967	257	
Future Volume (veh/h)	196	151	196	1133	967	257	
Initial Q (Qb), veh	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	
Work Zone On Approach	No			No	No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	
Adj Flow Rate, veh/h	213	164	213	1232	1051	279	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Percent Heavy Veh, %	2	2	2	2	2	2	
Cap, veh/h	266	236	367	2334	1710	763	
Arrive On Green	0.15	0.15	0.08	0.66	0.48	0.48	
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585	
Grp Volume(v), veh/h	213	164	213	1232	1051	279	
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585	
Q Serve(g_s), s	7.7	6.6	3.7	12.2	14.6	7.4	
Cycle Q Clear(g_c), s	7.7	6.6	3.7	12.2	14.6	7.4	
Prop In Lane	1.00	1.00	1.00			1.00	
Lane Grp Cap(c), veh/h	266	236	367	2334	1710	763	
V/C Ratio(X)	0.80	0.69	0.58	0.53	0.61	0.37	
Avail Cap(c_a), veh/h	479	426	410	2334	1710	763	
HCM Platoon Ratio	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	
Uniform Delay (d), s/veh	27.5	27.0	10.5	6.0	12.8	10.9	
Incr Delay (d2), s/veh	5.6	3.6	1.7	0.9	1.7	1.4	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	3.6	2.6	1.0	2.5	4.6	2.2	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	33.1	30.7	12.1	6.9	14.5	12.3	
LnGrp LOS	C	C	B	A	B	B	
Approach Vol, veh/h				1445	1330		
Approach Delay, s/veh				7.7	14.0		
Approach LOS				A	B		
Timer - Assigned Phs		2			5	6	8
Phs Duration (G+Y+Rc), s		51.2			11.8	39.4	15.8
Change Period (Y+Rc), s		* 7.2			6.1	* 7.2	5.8
Max Green Setting (Gmax), s		* 44			7.3	* 31	18.0
Max Q Clear Time (g_c+I1), s		14.2			5.7	16.6	9.7
Green Ext Time (p_c), s		8.9			0.1	6.2	0.2

Intersection Summary

HCM 6th Ctrl Delay	13.3
HCM 6th LOS	B

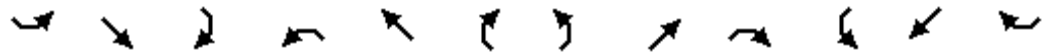
Notes

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

2045 AM Intersection Summaries

Lanes, Volumes, Timings
4: US-68 & Woodmont Ave

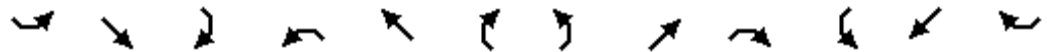
12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕↔		↕	↕↔	
Traffic Volume (vph)	91	15	30	0	0	15	15	1617	15	15	997	15
Future Volume (vph)	91	15	30	0	0	15	15	1617	15	15	997	15
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	200		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.970			0.865			0.999			0.998	
Flt Protected		0.968					0.950			0.950		
Satd. Flow (prot)	0	1749	0	0	1611	0	1770	3536	0	1770	3532	0
Flt Permitted		0.789					0.198			0.114		
Satd. Flow (perm)	0	1426	0	0	1611	0	369	3536	0	212	3532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			50			2			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		345			149			650			1148	
Travel Time (s)		7.8			3.4			14.8			26.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	16	33	0	0	16	16	1758	16	16	1084	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	148	0	0	16	0	16	1774	0	16	1100	0
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
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
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left								
Leading Detector (ft)	20	94		20	94		30	94		30	94	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	30		20	30		30	30		30	30	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		0			0			0			0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		

Lanes, Volumes, Timings
4: US-68 & Woodmont Ave

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		30.0	30.0		30.0	30.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		36.0	36.0		36.0	36.0	
Total Split (s)	24.0	24.0		24.0	24.0		41.0	41.0		41.0	41.0	
Total Split (%)	36.9%	36.9%		36.9%	36.9%		63.1%	63.1%		63.1%	63.1%	
Maximum Green (s)	18.0	18.0		18.0	18.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		18.0			18.0		35.0	35.0		35.0	35.0	
Actuated g/C Ratio		0.28			0.28		0.54	0.54		0.54	0.54	
v/c Ratio		0.36			0.03		0.08	0.93		0.14	0.58	
Control Delay		19.0			0.8		8.6	25.1		11.2	11.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		19.0			0.8		8.6	25.1		11.2	11.6	
LOS		B			A		A	C		B	B	
Approach Delay		19.0			0.8			24.9			11.5	
Approach LOS		B			A			C			B	
Queue Length 50th (ft)		39			0		3	312		3	140	
Queue Length 95th (ft)		85			3		12	#496		14	192	
Internal Link Dist (ft)		265			69			570			1068	
Turn Bay Length (ft)							100			200		
Base Capacity (vph)		410			482		198	1904		114	1903	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.36			0.03		0.08	0.93		0.14	0.58	

Intersection Summary

Area Type:	Other
Cycle Length:	65
Actuated Cycle Length:	65
Natural Cycle:	65
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.93
Intersection Signal Delay:	19.7
Intersection LOS:	B
Intersection Capacity Utilization:	69.5%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Lanes, Volumes, Timings
4: US-68 & Woodmont Ave

12/16/2021

Splits and Phases: 4: US-68 & Woodmont Ave



Lanes, Volumes, Timings
6: US-68 & Whispering Hills Blvd

12/16/2021


























Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	15	76	30	1693	952	30
Future Volume (vph)	15	76	30	1693	952	30
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Fr _t	0.887				0.995	
Fl _t Protected	0.992			0.999		
Satd. Flow (prot)	1639	0	0	3536	3522	0
Fl _t Permitted	0.992			0.999		
Satd. Flow (perm)	1639	0	0	3536	3522	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	459			1148	365	
Travel Time (s)	10.4			26.1	8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	83	33	1840	1035	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	99	0	0	1873	1068	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	80.3%
Analysis Period (min)	15
	ICU Level of Service D

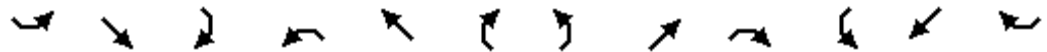
Lanes, Volumes, Timings
7: US-68 & US-231 & US-68X

12/16/2021

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	121	650	332	227	363	257	363	725	620	196	423	60
Future Volume (vph)	121	650	332	227	363	257	363	725	620	196	423	60
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	200		0	200		0	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Frt			0.850		0.938				0.850		0.981	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3320	0	1770	1863	1583	1770	3472	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3320	0	1770	1863	1583	1770	3472	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			81		113				84		9	
Link Speed (mph)		55			45			45			45	
Link Distance (ft)		3893			346			365			199	
Travel Time (s)		48.3			5.2			5.5			3.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	707	361	247	395	279	395	788	674	213	460	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	132	707	361	247	674	0	395	788	674	213	525	0
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
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
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template												
Leading Detector (ft)	30	94	0	30	94		30	94	30	30	94	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	30	0	0	30	0		30	30	30	30	30	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		0			0			0			0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	1	6	3	5	2		3	8	5	7	4	
Permitted Phases			6						8			

Lanes, Volumes, Timings
7: US-68 & US-231 & US-68X

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	1	6	3	5	2		3	8	5	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.2	24.4	14.7	13.4	24.9		14.7	25.7	13.4	14.7	25.7	
Total Split (s)	19.1	38.0	47.6	25.0	43.9		47.6	64.0	25.0	23.0	39.4	
Total Split (%)	12.7%	25.3%	31.7%	16.7%	29.3%		31.7%	42.7%	16.7%	15.3%	26.3%	
Maximum Green (s)	12.7	31.6	39.9	18.6	37.0		39.9	56.3	18.6	15.3	31.7	
Yellow Time (s)	4.2	4.2	4.7	4.2	4.7		4.7	4.7	4.2	4.7	4.7	
All-Red Time (s)	2.2	2.2	3.0	2.2	2.2		3.0	3.0	2.2	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.4	6.4	7.7	6.4	6.9		7.7	7.7	6.4	7.7	7.7	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	Max	None	None	Max		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	12.7	31.6	74.9	18.6	37.0		36.9	56.3	82.6	15.3	34.7	
Actuated g/C Ratio	0.08	0.21	0.50	0.12	0.25		0.25	0.38	0.55	0.10	0.23	
v/c Ratio	0.89	0.95	0.43	1.13	0.75		0.91	1.13	0.74	1.18	0.65	
Control Delay	115.5	80.7	19.4	156.4	48.9		80.0	117.4	28.1	180.4	56.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	115.5	80.7	19.4	156.4	48.9		80.0	117.4	28.1	180.4	56.3	
LOS	F	F	B	F	D		F	F	C	F	E	
Approach Delay		66.1			77.7			77.1			92.1	
Approach LOS		E			E			E			F	
Queue Length 50th (ft)	130	363	162	~278	272		368	~889	432	~249	249	
Queue Length 95th (ft)	#260	#486	243	#461	347		#537	#1143	602	#421	316	
Internal Link Dist (ft)		3813			266			285			119	
Turn Bay Length (ft)	300		300	200			200			150		
Base Capacity (vph)	149	745	861	219	904		470	699	909	180	810	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.89	0.95	0.42	1.13	0.75		0.84	1.13	0.74	1.18	0.65	

Intersection Summary

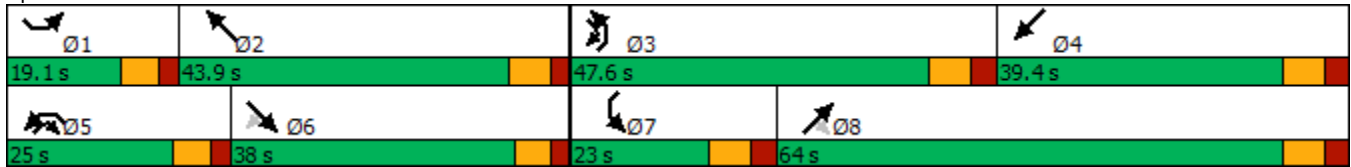
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.18
Intersection Signal Delay:	76.8
Intersection LOS:	E
Intersection Capacity Utilization:	103.1%
ICU Level of Service:	G
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	

Lanes, Volumes, Timings
 7: US-68 & US-231 & US-68X

12/16/2021























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

Splits and Phases: 7: US-68 & US-231 & US-68X















Lanes, Volumes, Timings
10: Industrial Dr S/Industrial Dr N

12/16/2021

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	212	136	91	30	45	30	121	1209	151	45	604	60
Future Volume (vph)	212	136	91	30	45	30	121	1209	151	45	604	60
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	100		0	150		150	150		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.940				0.850			0.850
Flt Protected		0.970		0.950			0.950			0.950		
Satd. Flow (prot)	0	1807	1583	1770	1751	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.766		0.323			0.322			0.117		
Satd. Flow (perm)	0	1427	1583	602	1751	0	600	3539	1583	218	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		33				164			120
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		433			448			1840			679	
Travel Time (s)		8.4			8.7			27.9			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	148	99	33	49	33	132	1314	164	49	657	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	378	99	33	82	0	132	1314	164	49	657	65
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes				
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
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left											
Leading Detector (ft)	20	94	0	30	94		30	94	30	30	94	30
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	30	0	30	0		30	30	30	30	30	30
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		0			0			0			0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		2

Lanes, Volumes, Timings
10: Industrial Dr S/Industrial Dr N

12/16/2021

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector Phase	8	8	8	4	4		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	23.9	23.9	23.9	23.9	23.9		10.9	23.9	23.9	10.9	23.9	23.9
Total Split (s)	29.0	29.0	29.0	29.0	29.0		12.4	40.1	40.1	10.9	38.6	38.6
Total Split (%)	36.3%	36.3%	36.3%	36.3%	36.3%		15.5%	50.1%	50.1%	13.6%	48.3%	48.3%
Maximum Green (s)	23.1	23.1	23.1	23.1	23.1		6.5	34.2	34.2	5.0	32.7	32.7
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		4.4	4.4	4.4	4.4	4.4	4.4
All-Red Time (s)	2.3	2.3	2.3	2.3	2.3		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max		None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0		0	0
Act Effect Green (s)		23.2	23.2	23.2	23.2		40.2	36.4	36.4	37.0	33.1	33.1
Actuated g/C Ratio		0.30	0.30	0.30	0.30		0.52	0.47	0.47	0.48	0.43	0.43
v/c Ratio		0.89	0.18	0.18	0.15		0.32	0.79	0.20	0.24	0.44	0.09
Control Delay		52.7	4.1	24.7	15.0		10.7	23.3	3.2	11.3	17.6	0.8
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		52.7	4.1	24.7	15.0		10.7	23.3	3.2	11.3	17.6	0.8
LOS		D	A	C	B		B	C	A	B	B	A
Approach Delay		42.6			17.8			20.2			15.8	
Approach LOS		D			B			C			B	
Queue Length 50th (ft)		182	0	12	18		29	304	0	10	122	0
Queue Length 95th (ft)		#346	25	35	50		54	#412	33	24	167	6
Internal Link Dist (ft)		353			368			1760			599	
Turn Bay Length (ft)			100	100			150		150	150		150
Base Capacity (vph)		425	555	179	545		408	1656	828	203	1507	743
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.89	0.18	0.18	0.15		0.32	0.79	0.20	0.24	0.44	0.09



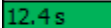
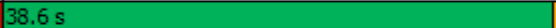
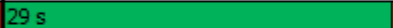





Intersection Summary

Area Type:	Other
Cycle Length:	80
Actuated Cycle Length:	77.8
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	22.6
Intersection LOS:	C
Intersection Capacity Utilization:	77.9%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Lanes, Volumes, Timings
 10: Industrial Dr S/Industrial Dr N

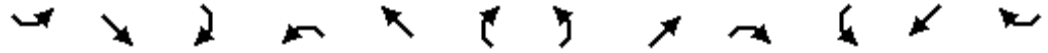
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Splits and Phases: 10: Industrial Dr S/Industrial Dr N

 Ø1	 Ø2	 Ø4
 12.4 s	 38.6 s	 29 s
 Ø5	 Ø6	 Ø8
 10.9 s	 40.1 s	 29 s

Lanes, Volumes, Timings
 13: Emmett Ave E/Emmett Ave W

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↖		↗	↕	
Traffic Volume (vph)	15	15	15	76	15	136	30	982	91	76	620	15
Future Volume (vph)	15	15	15	76	15	136	30	982	91	76	620	15
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.955			0.919			0.987			0.997	
Flt Protected		0.984			0.983		0.950			0.950		
Satd. Flow (prot)	0	1750	0	0	1683	0	1770	1839	0	1770	3529	0
Flt Permitted		0.778			0.869		0.377			0.064		
Satd. Flow (perm)	0	1384	0	0	1488	0	702	1839	0	119	3529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			66			8			4	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		419			453			1413			631	
Travel Time (s)		9.5			10.3			32.1			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	16	16	83	16	148	33	1067	99	83	674	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	247	0	33	1166	0	83	690	0
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes				
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
Number of Detectors	1	1		1	2		1	2		1	2	
Detector Template	Left			Left	Thru							
Leading Detector (ft)	20	30		20	100		30	94		30	94	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	30		20	6		30	30		30	30	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)					94			94			94	
Detector 2 Size(ft)					6			0			0	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		

Lanes, Volumes, Timings
 13: Emmett Ave E/Emmett Ave W

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		10.0	66.0		10.0	66.0	
Total Split (%)	24.0%	24.0%		24.0%	24.0%		10.0%	66.0%		10.0%	66.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		5.0	60.0		5.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		5.0	6.0		5.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effect Green (s)		15.6			15.6		65.2	60.4		66.2	62.3	
Actuated g/C Ratio		0.16			0.16		0.68	0.63		0.69	0.65	
v/c Ratio		0.20			0.83		0.06	1.00		0.49	0.30	
Control Delay		28.0			52.4		4.6	48.2		20.0	8.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		28.0			52.4		4.6	48.2		20.0	8.6	
LOS		C			D		A	D		B	A	
Approach Delay		28.0			52.4			47.0			9.8	
Approach LOS		C			D			D			A	
Queue Length 50th (ft)		17			111		5	~817		14	105	
Queue Length 95th (ft)		50			#232		14	#1071		50	139	
Internal Link Dist (ft)		339			373			1333			551	
Turn Bay Length (ft)							200			200		
Base Capacity (vph)		274			334		534	1161		169	2298	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.18			0.74		0.06	1.00		0.49	0.30	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	95.8
Natural Cycle:	100
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	1.00
Intersection Signal Delay:	34.5
Intersection LOS:	C
Intersection Capacity Utilization:	90.7%
ICU Level of Service:	E
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	

Lanes, Volumes, Timings
 13: Emmett Ave E/Emmett Ave W

12/16/2021

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

Splits and Phases: 13: Emmett Ave E/Emmett Ave W

 Ø1	 Ø2	 Ø4
10 s	66 s	24 s
 Ø5	 Ø6	 Ø8
10 s	66 s	24 s

Lanes, Volumes, Timings
17: US-68 & Tomblinson Way

12/16/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	212	151	45	740	952	121
Future Volume (vph)	212	151	45	740	952	121
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	100	150			150
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.950		0.185			
Satd. Flow (perm)	1770	1583	345	3539	3539	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		164				132
Link Speed (mph)	25			55	55	
Link Distance (ft)	491			3893	772	
Travel Time (s)	13.4			48.3	9.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	164	49	804	1035	132
Shared Lane Traffic (%)						
Lane Group Flow (vph)	230	164	49	804	1035	132
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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
Number of Detectors	1	1	1	2	2	1
Detector Template						
Leading Detector (ft)	30	0	30	94	94	30
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	30	0	30	30	30	30
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				0	0	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	8		5	2	6	
Permitted Phases		8	2			6

Lanes, Volumes, Timings
 17: US-68 & Tomblinson Way

12/16/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	8	8	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	30.0	30.0	30.0
Minimum Split (s)	23.8	23.8	11.1	37.2	37.2	37.2
Total Split (s)	24.0	24.0	11.2	51.0	39.8	39.8
Total Split (%)	32.0%	32.0%	14.9%	68.0%	53.1%	53.1%
Maximum Green (s)	18.2	18.2	5.1	43.8	32.6	32.6
Yellow Time (s)	3.0	3.0	3.0	6.0	6.0	6.0
All-Red Time (s)	2.8	2.8	3.1	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	6.1	7.2	7.2	7.2
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effect Green (s)	14.2	14.2	45.7	44.6	38.0	38.0
Actuated g/C Ratio	0.20	0.20	0.64	0.62	0.53	0.53
v/c Ratio	0.66	0.37	0.15	0.37	0.55	0.15
Control Delay	35.9	6.9	6.8	7.7	14.6	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	6.9	6.8	7.7	14.6	3.1
LOS	D	A	A	A	B	A
Approach Delay	23.8			7.6	13.3	
Approach LOS	C			A	B	
Queue Length 50th (ft)	93	0	7	81	174	0
Queue Length 95th (ft)	161	44	21	131	261	28
Internal Link Dist (ft)	411			3813	692	
Turn Bay Length (ft)		100	150			150
Base Capacity (vph)	449	523	320	2198	1873	900
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.31	0.15	0.37	0.55	0.15

Intersection Summary

Area Type:	Other
Cycle Length:	75
Actuated Cycle Length:	71.8
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.66
Intersection Signal Delay:	13.0
Intersection LOS:	B
Intersection Capacity Utilization:	58.1%
ICU Level of Service:	B
Analysis Period (min):	15

Lanes, Volumes, Timings
17: US-68 & Tomblinson Way

12/16/2021

Splits and Phases: 17: US-68 & Tomblinson Way



Lanes, Volumes, Timings
 20: US-231 & Hardees_231

12/16/2021



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	15	1451	816	30	30	30
Future Volume (vph)	15	1451	816	30	30	30
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.995		0.932	
Flt Protected	0.950				0.976	
Satd. Flow (prot)	1770	3539	3522	0	1694	0
Flt Permitted	0.950				0.976	
Satd. Flow (perm)	1770	3539	3522	0	1694	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		346	1840		158	
Travel Time (s)		7.9	41.8		3.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1577	887	33	33	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	1577	920	0	66	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			Yes			
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 Capacity Utilization	50.3%
ICU Level of Service	A
Analysis Period (min)	15

Lanes, Volumes, Timings
 21: US-68X & Hardees_68X

12/16/2021



Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	15	60	1043	60	45	665
Future Volume (vph)	15	60	1043	60	45	665
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt	0.892		0.993			
Flt Protected	0.990				0.950	
Satd. Flow (prot)	1645	0	1850	0	1770	3539
Flt Permitted	0.990				0.950	
Satd. Flow (perm)	1645	0	1850	0	1770	3539
Link Speed (mph)	30		30			30
Link Distance (ft)	246		199			1413
Travel Time (s)	5.6		4.5			32.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	65	1134	65	49	723
Shared Lane Traffic (%)						
Lane Group Flow (vph)	81	0	1199	0	49	723
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

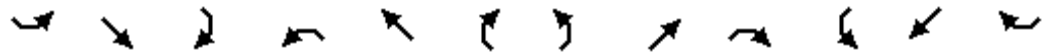
Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	69.7%
ICU Level of Service	C
Analysis Period (min)	15

2045 PM Intersection Summaries

Lanes, Volumes, Timings
4: US-68 & Woodmont Ave

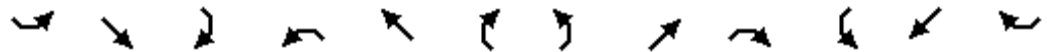
12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕↔		↕	↕↔	
Traffic Volume (vph)	91	15	30	0	0	15	30	1421	15	30	1526	15
Future Volume (vph)	91	15	30	0	0	15	30	1421	15	30	1526	15
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	200		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.970			0.865			0.998			0.999	
Flt Protected		0.968					0.950			0.950		
Satd. Flow (prot)	0	1749	0	0	1611	0	1770	3532	0	1770	3536	0
Flt Permitted		0.789					0.133			0.133		
Satd. Flow (perm)	0	1426	0	0	1611	0	248	3532	0	248	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			55			2			2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		345			149			650			1148	
Travel Time (s)		7.8			3.4			14.8			26.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	16	33	0	0	16	33	1545	16	33	1659	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	148	0	0	16	0	33	1561	0	33	1675	0
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
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
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left								
Leading Detector (ft)	20	94		20	94		30	94		30	94	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	30		20	30		30	30		30	30	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		0			0			0			0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		

Lanes, Volumes, Timings
4: US-68 & Woodmont Ave

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		30.0	30.0		30.0	30.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		36.0	36.0		36.0	36.0	
Total Split (s)	24.0	24.0		24.0	24.0		36.0	36.0		36.0	36.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		18.0			18.0		30.0	30.0		30.0	30.0	
Actuated g/C Ratio		0.30			0.30		0.50	0.50		0.50	0.50	
v/c Ratio		0.34			0.03		0.27	0.88		0.27	0.95	
Control Delay		17.8			0.3		15.6	21.5		15.6	28.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		17.8			0.3		15.6	21.5		15.6	28.1	
LOS		B			A		B	C		B	C	
Approach Delay		17.8			0.3			21.3			27.9	
Approach LOS		B			A			C			C	
Queue Length 50th (ft)		38			0		6	245		6	278	
Queue Length 95th (ft)		81			1		26	#400		26	#450	
Internal Link Dist (ft)		265			69			570			1068	
Turn Bay Length (ft)							100			200		
Base Capacity (vph)		435			521		124	1767		124	1769	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.34			0.03		0.27	0.88		0.27	0.95	

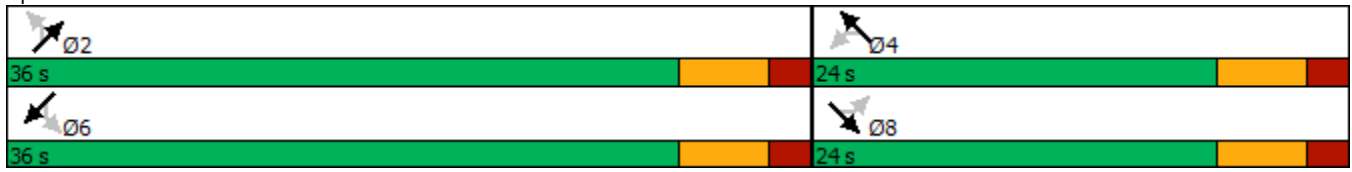
Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	60
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.95
Intersection Signal Delay:	24.3
Intersection LOS:	C
Intersection Capacity Utilization:	67.0%
ICU Level of Service:	C
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Lanes, Volumes, Timings
4: US-68 & Woodmont Ave

12/16/2021

Splits and Phases: 4: US-68 & Woodmont Ave



Lanes, Volumes, Timings
6: US-68 & Whispering Hills Blvd

12/16/2021

























Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	15	30	60	1466	1541	91
Future Volume (vph)	15	30	60	1466	1541	91
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	0.95	0.95	0.95
Frt	0.909				0.992	
Flt Protected	0.984			0.998		
Satd. Flow (prot)	1666	0	0	3532	3511	0
Flt Permitted	0.984			0.998		
Satd. Flow (perm)	1666	0	0	3532	3511	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	459			1148	365	
Travel Time (s)	10.4			26.1	8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	33	65	1593	1675	99
Shared Lane Traffic (%)						
Lane Group Flow (vph)	49	0	0	1658	1774	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	94.5%
Analysis Period (min)	15
	ICU Level of Service F

Lanes, Volumes, Timings
7: US-68 & US-231 & US-68X

12/16/2021

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	76	650	393	453	740	257	468	574	438	302	801	121
Future Volume (vph)	76	650	393	453	740	257	468	574	438	302	801	121
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	200		0	200		0	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95
Frt			0.850		0.961				0.850		0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3401	0	1770	1863	1583	1770	3468	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	1770	3401	0	1770	1863	1583	1770	3468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			74		26				78		10	
Link Speed (mph)		55			45			45			45	
Link Distance (ft)		3893			346			365			199	
Travel Time (s)		48.3			5.2			5.5			3.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	707	427	492	804	279	509	624	476	328	871	132
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	707	427	492	1083	0	509	624	476	328	1003	0
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
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
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template												
Leading Detector (ft)	30	94	0	30	94		30	94	30	30	94	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	30	0	0	30	0		30	30	30	30	30	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		0			0			0			0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	1	6	3	5	2		3	8	5	7	4	
Permitted Phases			6						8			

Lanes, Volumes, Timings
7: US-68 & US-231 & US-68X

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	1	6	3	5	2		3	8	5	7	4	
Switch Phase												
Minimum Initial (s)	7.0	12.0	7.0	7.0	12.0		7.0	10.0	7.0	7.0	10.0	
Minimum Split (s)	14.2	24.4	14.7	13.4	24.9		14.7	25.7	13.4	14.7	25.7	
Total Split (s)	36.4	36.4	37.7	36.4	36.4		37.7	52.7	36.4	37.7	52.7	
Total Split (%)	22.3%	22.3%	23.1%	22.3%	22.3%		23.1%	32.3%	22.3%	23.1%	32.3%	
Maximum Green (s)	30.0	30.0	30.0	30.0	29.5		30.0	45.0	30.0	30.0	45.0	
Yellow Time (s)	4.2	4.2	4.7	4.2	4.7		4.7	4.7	4.2	4.7	4.7	
All-Red Time (s)	2.2	2.2	3.0	2.2	2.2		3.0	3.0	2.2	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.4	6.4	7.7	6.4	6.9		7.7	7.7	6.4	7.7	7.7	
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	Max	None	None	Max		None	None	None	None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effect Green (s)	13.0	30.0	66.4	30.0	46.5		30.0	45.0	82.7	30.0	45.0	
Actuated g/C Ratio	0.08	0.18	0.41	0.18	0.28		0.18	0.28	0.51	0.18	0.28	
v/c Ratio	0.59	1.09	0.62	1.51	1.10		1.57	1.22	0.57	1.01	1.04	
Control Delay	88.7	121.7	35.9	289.0	110.2		310.2	162.7	25.9	116.7	95.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	88.7	121.7	35.9	289.0	110.2		310.2	162.7	25.9	116.7	95.9	
LOS	F	F	D	F	F		F	F	C	F	F	
Approach Delay		89.3			166.1			168.9			101.0	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)	87	~444	301	~728	~676		~766	~812	290	~359	~603	
Queue Length 95th (ft)	145	#576	425	#961	#878		#1000	#1058	406	#571	#744	
Internal Link Dist (ft)		3813			266			285			119	
Turn Bay Length (ft)	300		300	200			200			150		
Base Capacity (vph)	325	650	687	325	987		325	513	840	325	963	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.26	1.09	0.62	1.51	1.10		1.57	1.22	0.57	1.01	1.04	

Intersection Summary









Area Type:	Other
Cycle Length:	163.2
Actuated Cycle Length:	163.2
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.57
Intersection Signal Delay:	135.5
Intersection LOS:	F
Intersection Capacity Utilization:	118.5%
ICU Level of Service:	H
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	

Lanes, Volumes, Timings
 7: US-68 & US-231 & US-68X

12/16/2021























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

Splits and Phases: 7: US-68 & US-231 & US-68X

 Ø1	 Ø2	 Ø3	 Ø4
36.4 s	36.4 s	37.7 s	52.7 s
 Ø5	 Ø6	 Ø7	 Ø8
36.4 s	36.4 s	37.7 s	52.7 s













Lanes, Volumes, Timings
10: Industrial Dr S/Industrial Dr N

12/16/2021

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	212	76	76	151	136	121	60	1209	121	76	1088	91
Future Volume (vph)	212	76	76	151	136	121	60	1209	121	76	1088	91
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	100		0	150		150	150		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.929				0.850			0.850
Flt Protected		0.965		0.950			0.950			0.950		
Satd. Flow (prot)	0	1798	1583	1770	1730	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.523		0.455			0.110			0.110		
Satd. Flow (perm)	0	974	1583	848	1730	0	205	3539	1583	205	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107		55				132			107
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		433			448			1840			679	
Travel Time (s)		8.4			8.7			27.9			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	230	83	83	164	148	132	65	1314	132	83	1183	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	313	83	164	280	0	65	1314	132	83	1183	99
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes				
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
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left											
Leading Detector (ft)	20	94	0	30	94		30	94	30	30	94	30
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	30	0	30	0		30	30	30	30	30	30
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		0			0			0			0	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4			6		6	2		2

Lanes, Volumes, Timings
 10: Industrial Dr S/Industrial Dr N

12/16/2021

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector Phase	8	8	8	4	4		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	23.9	23.9	23.9	23.9	23.9		10.9	23.9	23.9	10.9	23.9	23.9
Total Split (s)	37.0	37.0	37.0	37.0	37.0		11.0	42.0	42.0	11.0	42.0	42.0
Total Split (%)	41.1%	41.1%	41.1%	41.1%	41.1%		12.2%	46.7%	46.7%	12.2%	46.7%	46.7%
Maximum Green (s)	31.1	31.1	31.1	31.1	31.1		5.1	36.1	36.1	5.1	36.1	36.1
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		4.4	4.4	4.4	4.4	4.4	4.4
All-Red Time (s)	2.3	2.3	2.3	2.3	2.3		1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.9	5.9	5.9	5.9		5.9	5.9	5.9	5.9	5.9	5.9
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max		None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0		0	0
Act Effect Green (s)		31.2	31.2	31.2	31.2		40.2	36.2	36.2	40.2	36.2	36.2
Actuated g/C Ratio		0.36	0.36	0.36	0.36		0.46	0.41	0.41	0.46	0.41	0.41
v/c Ratio		0.91	0.13	0.54	0.43		0.35	0.90	0.18	0.45	0.81	0.14
Control Delay		60.1	3.1	31.9	20.2		16.4	34.9	4.0	19.2	28.9	3.8
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		60.1	3.1	31.9	20.2		16.4	34.9	4.0	19.2	28.9	3.8
LOS		E	A	C	C		B	C	A	B	C	A
Approach Delay		48.1			24.5			31.4			26.5	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)		169	0	75	96		17	366	0	22	311	0
Queue Length 95th (ft)		#333	20	143	167		37	#511	34	45	399	27
Internal Link Dist (ft)		353			368			1760			599	
Turn Bay Length (ft)			100	100			150		150	150		150
Base Capacity (vph)		345	631	301	649		184	1459	730	184	1459	715
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio		0.91	0.13	0.54	0.43		0.35	0.90	0.18	0.45	0.81	0.14






Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 87.8
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 30.6
 Intersection LOS: C
 Intersection Capacity Utilization 87.6%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
 10: Industrial Dr S/Industrial Dr N

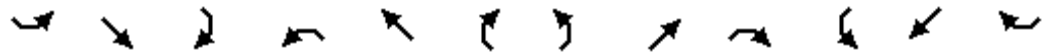
12/16/2021

Splits and Phases: 10: Industrial Dr S/Industrial Dr N

 Ø1	 Ø2	 Ø4
11 s	42 s	37 s
 Ø5	 Ø6	 Ø8
11 s	42 s	37 s

Lanes, Volumes, Timings
13: Emmett Ave E/Emmett Ave W

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (vph)	15	15	45	151	15	166	30	801	60	151	1028	30
Future Volume (vph)	15	15	45	151	15	166	30	801	60	151	1028	30
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.918			0.932			0.990			0.996	
Flt Protected		0.990			0.978		0.950			0.950		
Satd. Flow (prot)	0	1693	0	0	1698	0	1770	1844	0	1770	3525	0
Flt Permitted		0.891			0.831		0.182			0.079		
Satd. Flow (perm)	0	1524	0	0	1443	0	339	1844	0	147	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			52			6			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		419			453			1413			631	
Travel Time (s)		9.5			10.3			32.1			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	16	49	164	16	180	33	871	65	164	1117	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	81	0	0	360	0	33	936	0	164	1150	0
Enter Blocked Intersection	No	No	No	No	No	No	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			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes				
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
Number of Detectors	1	1		1	2		1	2		1	2	
Detector Template	Left			Left	Thru							
Leading Detector (ft)	20	30		20	100		30	94		30	94	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	30		20	6		30	30		30	30	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)					94			94			94	
Detector 2 Size(ft)					6			0			0	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		

Lanes, Volumes, Timings
 13: Emmett Ave E/Emmett Ave W

12/16/2021



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		10.0	24.0		10.0	24.0	
Total Split (s)	27.0	27.0		27.0	27.0		10.0	53.0		10.0	53.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%		11.1%	58.9%		11.1%	58.9%	
Maximum Green (s)	21.0	21.0		21.0	21.0		5.0	47.0		5.0	47.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		5.0	6.0		5.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0			0			0	
Act Effct Green (s)		21.0			21.0		52.5	46.5		54.5	50.5	
Actuated g/C Ratio		0.23			0.23		0.59	0.52		0.61	0.56	
v/c Ratio		0.21			0.95		0.12	0.97		0.92	0.58	
Control Delay		15.1			67.0		6.9	46.0		68.0	14.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		15.1			67.0		6.9	46.0		68.0	14.8	
LOS		B			E		A	D		E	B	
Approach Delay		15.1			67.0			44.6			21.4	
Approach LOS		B			E			D			C	
Queue Length 50th (ft)		14			177		6	485		45	230	
Queue Length 95th (ft)		51			#352		16	#775		#167	295	
Internal Link Dist (ft)		339			373			1333			551	
Turn Bay Length (ft)							200			200		
Base Capacity (vph)		395			378		279	970		179	1992	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.21			0.95		0.12	0.96		0.92	0.58	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 89.5
 Natural Cycle: 90
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 35.5
 Intersection LOS: D
 Intersection Capacity Utilization 94.3%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
 13: Emmett Ave E/Emmett Ave W

12/16/2021

Splits and Phases: 13: Emmett Ave E/Emmett Ave W

 Ø1	 Ø2	 Ø4
10 s	53 s	27 s
 Ø5	 Ø6	 Ø8
10 s	53 s	27 s

Lanes, Volumes, Timings
17: US-68 & Tomblinson Way

12/16/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	196	151	196	1133	967	257
Future Volume (vph)	196	151	196	1133	967	257
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	100	150			150
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3539	1583
Flt Permitted	0.950		0.150			
Satd. Flow (perm)	1770	1583	279	3539	3539	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		164				279
Link Speed (mph)	25			55	55	
Link Distance (ft)	491			3893	772	
Travel Time (s)	13.4			48.3	9.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	213	164	213	1232	1051	279
Shared Lane Traffic (%)						
Lane Group Flow (vph)	213	164	213	1232	1051	279
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	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
Number of Detectors	1	1	1	2	2	1
Detector Template						
Leading Detector (ft)	30	0	30	94	94	30
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	30	0	30	30	30	30
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				0	0	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	8		5	2	6	
Permitted Phases		8	2			6

Lanes, Volumes, Timings
17: US-68 & Tomblinson Way

12/16/2021

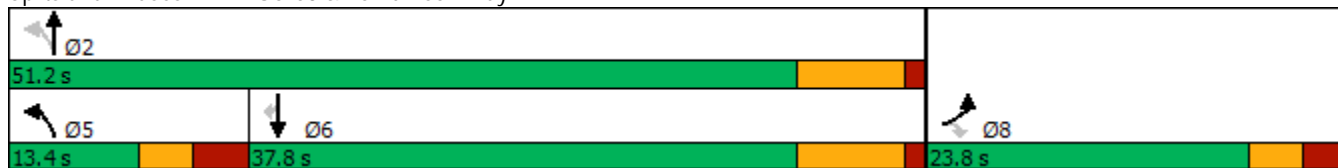


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	8	8	5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0	10.0	5.0	30.0	30.0	30.0
Minimum Split (s)	23.8	23.8	11.1	37.2	37.2	37.2
Total Split (s)	23.8	23.8	13.4	51.2	37.8	37.8
Total Split (%)	31.7%	31.7%	17.9%	68.3%	50.4%	50.4%
Maximum Green (s)	18.0	18.0	7.3	44.0	30.6	30.6
Yellow Time (s)	3.0	3.0	3.0	6.0	6.0	6.0
All-Red Time (s)	2.8	2.8	3.1	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.8	5.8	6.1	7.2	7.2	7.2
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	Max	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	13.7	13.7	45.2	44.1	30.7	30.7
Actuated g/C Ratio	0.19	0.19	0.64	0.62	0.43	0.43
v/c Ratio	0.62	0.37	0.65	0.56	0.68	0.33
Control Delay	34.6	7.1	17.7	9.4	19.5	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	7.1	17.7	9.4	19.5	3.2
LOS	C	A	B	A	B	A
Approach Delay	22.6			10.6	16.1	
Approach LOS	C			B	B	
Queue Length 50th (ft)	86	0	33	142	185	0
Queue Length 95th (ft)	150	44	#110	229	281	42
Internal Link Dist (ft)	411			3813	692	
Turn Bay Length (ft)		100	150			150
Base Capacity (vph)	450	525	332	2203	1535	844
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.31	0.64	0.56	0.68	0.33

Intersection Summary

Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 70.8
 Natural Cycle: 75
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 14.4
 Intersection LOS: B
 Intersection Capacity Utilization 64.4%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 17: US-68 & Tomblinson Way



Lanes, Volumes, Timings
 20: US-231 & Hardees_231

12/16/2021



Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	15	1375	1405	15	15	45
Future Volume (vph)	15	1375	1405	15	15	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.998		0.898	
Flt Protected	0.950				0.988	
Satd. Flow (prot)	1770	3539	3532	0	1653	0
Flt Permitted	0.950				0.988	
Satd. Flow (perm)	1770	3539	3532	0	1653	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		346	1840		158	
Travel Time (s)		7.9	41.8		3.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1495	1527	16	16	49
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	1495	1543	0	65	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			Yes			
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 Capacity Utilization	49.6%
ICU Level of Service	A
Analysis Period (min)	15

Lanes, Volumes, Timings
 21: US-68X & Hardees_68X

12/16/2021



Lane Group	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	15	15	876	30	15	1209
Future Volume (vph)	15	15	876	30	15	1209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	150	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt	0.932		0.995			
Flt Protected	0.976				0.950	
Satd. Flow (prot)	1694	0	1853	0	1770	3539
Flt Permitted	0.976				0.950	
Satd. Flow (perm)	1694	0	1853	0	1770	3539
Link Speed (mph)	30		30			30
Link Distance (ft)	246		199			1413
Travel Time (s)	5.6		4.5			32.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	16	952	33	16	1314
Shared Lane Traffic (%)						
Lane Group Flow (vph)	32	0	985	0	16	1314
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.9%
	ICU Level of Service B
Analysis Period (min)	15