



## Neenah Downtown Traffic Study

**Prepared for:**  
City of Neenah  
Winnebago County  
October 2018



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Winnebago County

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MSA was selected by the City of Neenah to complete a review of the city’s downtown transportation network. The review covers the following areas: traffic data collection, existing roadway network and traffic operations, future operations with existing geometric configurations, a review of the existing and potential parking ramp facilities, and recommendations for further study. This report summarizes the procedures and outcomes completed as part of that study. A project location map can be seen in **Attachment A**.

## Traffic Data Collection

MSA took a number of steps at the outset of the review to gather crucial background information about the corridor including traffic counts, a determination of the AM and PM peak hours, a review of volume adjustment factors and balancing the traffic counts within the study area.

### Traffic Counts

MSA collected traffic data at the following eleven intersections using traffic cameras over two days in April 2018.

- Main St & Green Bay Rd
- Main St & Torrey St
- Main St & Doty Ave
- Church St & Columbian Ave
- Church St & Doty Ave
- Church St & Wisconsin Ave
- Commercial St & Winneconne Ave
- Commercial St & Columbian Ave
- Commercial St & Doty Ave
- Commercial St & Wisconsin Ave
- Commercial St & Forest Ave

At Main St & Torrey St and Main St & Doty Ave counts were collected and processed for 14 hours (6 AM to 8 PM) for traffic signal warrant analysis. At the remaining intersections, peak hour turning movement counts (6:00 AM to 8:30 AM and 2:30 PM to 6:00 PM) were collected. The raw count value can be seen in **Attachment B**.

### Network Peak Hour Determination

To complete the analysis, it is desirable to analyze the overall peak hour for the study area. The Network peak hour is singular AM and PM peak hours where the total volume across all intersections is the highest. By looking at the individual intersection peak hours and combining the volumes, the AM and PM Network Peak Hours were determined. The Network Peak Hours are 7:15AM to 8:15AM and 4:30PM to 5:30PM. See **Attachment C** – Network Peak for comparison of the individual intersections to the network peak.

### Seasonal Adjustment Factors

In discussion with City Staff, it was determined that the time of the year the counts were taken was a good representation of the network volumes due to the proximity to schools and large businesses. Therefore, no Seasonal Adjustment Factor was applied to the data.

### Count Balancing

A limited amount of traffic volume balances was completed using the intersections of Commercial St & Doty Ave and Commercial St & Columbian Ave as the basis for all balancing. These two intersections were chosen as the baseline because they were collected on different dates and are in close proximity to one another with few outlets (i.e. Parking spots or driveways) for vehicles to stop and create an imbalance between the intersections. After these two intersections were balanced, the resulting adjustments were spread around the other network intersections using engineering judgement and approximate proportions of total vehicles making various movements. The balancing was provided to City Staff for review and approval prior to beginning analysis.

### Traffic Signal Warrants

Using the 14 hours of processed traffic count data discussed previously, Traffic Signal Warrants were completed per Wisconsin MUTCD guidelines for two of the study intersections along the corridor, Main St & Torrey St and Main St & Doty Ave. Four warrants were specifically reviewed as part of the study including Warrant 1: Eight-Hour Vehicular Volume, Warrant 2: Four-Hour Volume, Warrant 3: Peak Hour Volume and Warrant 7: Crash Experience. The results were as follows:

#### Main St & Torrey St

Warrants 1, 3 and 7 were significantly lower than the required thresholds; however, Warrant 2 met the criteria for three of four hours. The fourth hour was relatively close and depending upon the count day, volumes could occasionally be high enough to meet the four-hour warrant. At this time, it is recommended to monitor traffic volumes and development in the area with the expectation of completing signal warrants again in the near future if traffic patterns are impacted by future development. See **Attachment D** for the complete warrant analysis.

#### Main St & Doty Ave

At this time, none of the four primary Warrants are close to being met as there is minimal side street traffic on Doty Ave. Development in the area and City facilitated adjustments to traffic patterns could potentially increase side street traffic. Without a reconfiguration of primary traffic routes or significant development, and given the low crash history, it is not recommended this intersection be reviewed for further intersection improvements. See **Attachment E** for the complete warrant analysis.

## Existing Roadway Network and Traffic Operations

The goal of this part of the review is to combine field observations with the data collected at the outset of the project to best model the existing conditions and create a baseline for measuring traffic operations and comparing potential improvements and changes.

### Operational and Capacity Analysis

An operational and capacity analysis was completed for each intersection using Synchro 10 which is based on the procedures, methods, and techniques contained in the Highway Capacity Manual, 6th Edition. In order to more accurately represent the existing conditions in the model, MSA combined City provided observations and information with field and video observations.

### Calibration of Existing Conditions

MSA utilized a combination of field and video observations to help verify existing conditions.

#### Field Observations

MSA observed and took photos of a number of intersections during the peak hours. *Figures 1 and 2* show some of the delay observed in the field.



*Figure 1: Intersection of Winneconne Ave & Commercial Street looking south on Commercial Street*



Figure 2: Intersection of Wisconsin Ave & Church St looking northeast towards the Church St Ramp

#### Video Observations

Cameras were also strategically located to maximize views of approaches that were anticipated to experience significant queuing. Review of the video showed backups at the intersections of Main St & Doty Ave, Church St & Wisconsin Ave, Commercial St & Doty Ave and Commercial St & Wisconsin Ave. *Figures 3 and 4* show some of the observed queuing through the cameras.



Figure 3: Intersection of Main St & Doty Ave shows backups from the Wisconsin Ave & Church St intersection extending to the Doty Ave intersection.



Figure 4: Intersection of Commercial St & Doty Ave shows backups from the Wisconsin Ave & Commercial St intersection extending through the Doty Ave intersection to the Columbian St intersection.

#### Software Calibration

Using this information, the AM and PM existing conditions models were calibrated to more accurately model the real-world conditions drivers are experiencing. The calibration steps included:

- Modification of the timing plans based on video observations of how long the cycle lengths were typically operating
- Inputting Wisconsin standard inputs for HCM analysis into Synchro from the WisDOT Traffic Engineering, Operations & Safety Manual (TEOpS) including:
  - SimTraffic Interval parameters;
  - Saturation Flow Rate adjustments;
  - Peak Hour Factor adjustments to reflect the number of vehicles that desire to access the intersection during the peak 15-minute period without congestion;

The real-world conditions with roughly 15-20 minutes of significant queuing and delay were difficult to duplicate within Synchro because the software values for delay and level of service are averaged over the course of the entire peak hour. However, the SimTraffic Interval Parameters allow for the concentration of volume into a tighter window, and therefore more closely represent the real-world conditions. While the model reflects the average, rather than worst case conditions, that drivers experience, it is useful as a baseline for future improvement discussions.

#### 2018 Existing Conditions Operational Analysis

The Highway Capacity Manual, 6<sup>th</sup> Edition, assigns a Level of Service to each movement. Level of Service is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, LOS "A," to very poor, LOS "F." The delay is measured in seconds per vehicle, which can be used to determine the Level of Service for each movement at a given intersection. **Table 1**, below, shows the delay criteria used for determining the Level of Service at an intersection.

**Table 1: Highway Capacity Manual Level of Service**

Level of Service	Average Control Delay (sec/veh)	
	Stop Control	Signal Control
“A” (best)	0 to 10	0 to 10
“B” (good)	> 10 and ≤ 15	> 10 and ≤ 20
“C” (desirable)	> 15 and ≤ 25	> 20 and ≤ 35
“D” (delay)	> 25 and ≤ 35	> 35 and ≤ 55
“E” (congestion)	> 35 and ≤ 50	> 55 and ≤ 80
“F” (forced flow)	> 50	> 80

**Table 2** shows the anticipated LOS for each of the eleven intersections. It is important to note due to the very concentrated 15-20 minute window of heavy volume mentioned previously, drivers may experience better or worse operations during the peak hour depending when they arrive. A breakdown of some of the reasons behind certain intersections experiencing undesirable LOS values follows the table. The raw Synchro outputs can be viewed in **Attachment F**.

**Table 2: Existing Conditions Level of Service Table**












Intersection	Traffic Control	Peak Hour	Parameters	West Approach			East Approach			South Approach			North Approach			Overall Intersection			
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT				
Main Street & Green Bay Road		AM Peak	Lanes	2			1			2			2			D 50.2			
			LOS	C			D			F			F						
			Delay (s)	32.5			50.4			10.3			283.5				82.9		
			v/c ratio	-			-			-			-				-		
			Queue (ft)	450			250			100			550				425		
			PM Peak	Lanes	2			1			2			2			C 33.9		
LOS	D			D			B			D			E						
Delay (s)	44.4			48.5			11.1			54.0			58.2						
v/c ratio	-			-			-			-			-						
Queue (ft)	350			350			100			275			375						
Main Street & Torrey Street		AM Peak	Lanes	2		1	2		1	1		1				A 6.2			
			LOS	A		A	A		A	F		B							
			Delay (s)	0.0		0.0	0.0		0.0	95.7		11.9							
			v/c ratio	0.00		0.00	0.00		0.00	0.87		0.01							
			Queue (ft)	0		0	0		0	150		25							
			PM Peak	Lanes	2		1	2		1	1		1				A 4.6		
LOS	A		A	A		A	F		B										
Delay (s)	0.0		0.0	8.8		8.8	67.6		10.1										
v/c ratio	0.00		0.00	0.02		0.02	0.75		0.01										
Queue (ft)	0		0	25		25	125		25										
Main Street & Doty Avenue		AM Peak	Lanes	1		1	1		1	1		1			A 0.8				
			LOS	A		A	B		E	B		D							
			Delay (s)	0.0		10.1	10.1		38.5	33.8		33.8							
			v/c ratio	0.00		0.01	0.01		0.18	0.05		0.05							
			Queue (ft)	25		25	25		25	25		25							
			PM Peak	Lanes	1		1	1		1	1		1			A 4.0			
LOS	A		A	A		F	E		E										
Delay (s)	9.8		9.2	9.2		74.3	45.0		45.0										
v/c ratio	0.01		0.02	0.02		0.63	0.06		0.06										
Queue (ft)	25		25	25		75	25		25										
Church Street & Columbian Avenue		AM Peak	Lanes	1		1	1		1	1		1			B 10.9				
			LOS	B		A	A		B	A		A							
			Delay (s)	12.0		9.1	9.1		10.6	8.7		8.7							
			v/c ratio	0.48		0.18	0.18		0.32	0.06		0.06							
			Queue (ft)	75		25	25		50	25		25							
			PM Peak	Lanes	1		1	1		1	1		1			B 10.5			
LOS	B		A	A		A	A		A										
Delay (s)	11.7		9.0	9.0		9.3	9.5		9.5										
v/c ratio	0.47		0.15	0.15		0.17	0.19		0.19										
Queue (ft)	75		25	25		25	25		25										

Table 2 Continued...

Intersection	Traffic Control	Peak Hour	Parameters	West Approach			East Approach			South Approach			North Approach			Overall Intersection
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Church Street & Doty Avenue		AM Peak	Lanes	1			1			1			1			A 6.8
			LOS	A			A			B			A			
		Delay (s)	7.4			7.4			11.2			9.5				
		v/c ratio	0.01			0.01			0.22			0.04				
Queue (ft)	25			25			25			25						
PM Peak	Lanes	1			1			1			1			A 6.6		
	LOS	A			A			A			B					
Delay (s)	7.4			7.4			10.0			11.0						
v/c ratio	0.01			0.01			0.10			0.19						
Queue (ft)	25			25			25			25						
Church Street & Wisconsin Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	1	1	D 36.7		
			LOS	F	A	A	C	D	C	C	D					
		Delay (s)	112.3	8.2	8.9	27.3	35.2	29.2	29.1							
		v/c ratio	1.08	0.42	0.03	0.85	0.66	0.05	0.04							
Queue (ft)	#300	225	25	#525	150	25	25									
PM Peak	Lanes	1	1	1	1	1	1	1	1	1	1	B 19.4				
	LOS	D	B	A	B	C	C	C								
Delay (s)	51.6	12.5	8.6	14.8	28.8	32.7	28.8									
v/c ratio	0.56	0.46	0.03	0.58	0.49	0.64	0.50									
Queue (ft)	50	250	25	350	m50	175	50									
Commercial Street & Winnecone Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	2	D 36.6				
			LOS	C	C	A	C	D	C	C	E					
		Delay (s)	30.7	25.8	0.0	24.3	43.5	32.4	22.7	55.2						
		v/c ratio	0.78	0.47	0.00	0.12	0.80	0.79	0.53	0.77						
Queue (ft)	175	200	0	50	#350	#200	250	200								
PM Peak	Lanes	1	1	1	1	1	1	1	1	2	D 37.3					
	LOS	C	C	A	C	D	C	C	E							
Delay (s)	27.7	24.1	0.0	25.0	43.8	26.5	22.9	63.9								
v/c ratio	0.73	0.41	0.00	0.13	0.73	0.65	0.57	0.90								
Queue (ft)	200	200	0	50	#325	100	325	#300								
Commercial Street & Columbian Avenue		AM Peak	Lanes	1	1	1	1	1	2	2	B 10.6					
			LOS	D	D	D	D	A	A	A						
		Delay (s)	43.0	48.5	47.7	38.0	0.4	0.6								
		v/c ratio	0.40	0.84	0.06	0.26	0.27	0.28								
Queue (ft)	100	175	25	75	100	25										
PM Peak	Lanes	1	1	1	1	2	2	2	B 11.0							
	LOS	D	D	D	D	A	A	A								
Delay (s)	43.4	43.9	47.5	37.8	0.5	5.9										
v/c ratio	0.45	0.71	0.26	0.25	0.32	0.35										
Queue (ft)	100	150	50	50	100	150										
Commercial Street & Doty Avenue		AM Peak	Lanes	1			1			2			A 1.8			
			LOS	D			D			A						
		Delay (s)	30.2			26.9			9.1							
		v/c ratio	0.22			0.10			0.04							
Queue (ft)	25			25			25									
PM Peak	Lanes	1			1			2			A 3.8					
	LOS	E			E			A								
Delay (s)	46.2			48.6			9.8									
v/c ratio	0.47			0.39			0.04									
Queue (ft)	50			50			25									
Commercial Street & Wisconsin Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	2	C 29.3			
			LOS	E	D	C	C	E	C	B	A	B		C		
		Delay (s)	68.3	38.2	28.9	32.1	60.3	35.0	15.3	4.2	11.6	25.4				
		v/c ratio	0.93	0.56	0.03	0.17	0.81	0.10	0.17	0.68	0.01	0.74				
Queue (ft)	#250	200	25	50	#300	25	25	225	25	250						
PM Peak	Lanes	1	1	1	1	1	1	1	1	2	D 42.4					
	LOS	F	D	C	C	D	C	B	D	B		C				
Delay (s)	113.0	46.8	31.4	33.1	54.6	34.7	14.0	37.1	18.7	21.3						
v/c ratio	1.09	0.72	0.08	0.47	0.75	0.08	0.14	0.82	0.13	0.60						
Queue (ft)	#400	#275	25	100	#275	25	50	#575	25	250						
Commercial Street & Forest Avenue		AM Peak	Lanes	1			1			2			A 8.2			
			LOS	D			D			A						
		Delay (s)	29.2			32.4			4.1							
		v/c ratio	0.29			0.51			0.21							
Queue (ft)	50			75			50									
PM Peak	Lanes	1			1			2			A 9.1					
	LOS	D			D			A								
Delay (s)	28.4			34.2			6.0									
v/c ratio	0.26			0.58			0.42									
Queue (ft)	50			100			150									

HCM 6th Edition Outputs using Synchro 10 Software, queues reported using Synchro outputs.  
 #: 95th percentile volume exceed capacity, queue may be longer  
 m: volume for 95th percentile queue is metered by upstream signal



## Identification of Issues

A number of corridor issues were identified through field observation, video review, and Synchro software operational analysis. The primary observations from the downtown area and another from the standalone intersection of Main St & Green Bay Rd are discussed further:

### Intersections of Commercial St & Winneconne Ave and Commercial St & Wisconsin Ave

The volume of traffic at both of these intersections on the north, south and west approaches is almost evenly split in both the AM and PM Peak Hours. This creates a situation where the signal cycle length needs to be divided more evenly to allow movements in both directions to progress through the intersection.

Beginning at Commercial St & Winneconne Ave both the eastbound left-turn and northbound through movements have significant volume. As the individual vehicle platoons from these two movements progress north, the allocation of time to service northbound vehicles at Wisconsin Ave is limited due to conflicting traffic on Wisconsin Avenue. The signal cannot provide sufficient time to allow both the eastbound left and northbound through movements from Winneconne Ave to pass before the signal needs to serve volume from Wisconsin Ave. This creates a backup of vehicles at the Wisconsin Ave intersection in both the north/southbound direction and eastbound direction. While this window is generally only 15-20 minutes, it occurs at the beginning and end of the business work day which creates significant queuing and delay during the peak periods. These problems were observed to dissipate within a short time after the peak.

### Church St Ramp

The Church St ramp is primarily used for employee parking for the surrounding businesses. One issue with the ramp is that all vehicular traffic, inbound and outbound, flows through one signalized intersection. The major employers operate on a similar standard 8am to 5pm workday, which creates a bottleneck shown in *Figure 2* of several hundred vehicles trying to exit the ramp in the same 15-20 minute window. Combine that with a heavy east/west through movement and there is limited time to split between the various movements.

### Main St & Green Bay Rd

The primary concern at Main St & Green Bay Rd is the heavy eastbound through movement and the moderately heavy northbound and southbound movements during the AM Peak Hour. The geometry of the intersection has shared through-turn lanes which requires split phasing with protected turning movements. A review of video indicates the intersection of Main St & Green Bay Rd operates well with all queued vehicles typically clearing the intersection during each phase. However, the geometry necessitates very long cycle lengths to clear those queues. When these cycle lengths are modeled, the combination of high volumes and split phases creates an undesirable overall LOS for the intersection.

## 2018 Proposed Operational Analysis

MSA used the calibrated existing Synchro model to generate new timing plans for each of the six signalized intersections. **Table 3** below shows the anticipated operations for each of the signalized intersections using the new timing plans, see **Attachment G** for the raw Synchro outputs and **Attachment H** for the proposed timing plans. As the table shows, the existing challenges in the downtown network make it unlikely the public will realize much of an improvement from a LOS standpoint. However, the new timing plans take into account the latest recommendations and standards for intersection clearance intervals

from both a pedestrian and vehicle standpoint. While not overly significant, the additional seconds added for pedestrian crossing and yellow and red time shortens the available green time intervals which in some cases leads to limited improvement.

**Table 3: Proposed 2018 Timing Plan Level of Service Table**

Intersection	Traffic Control	Peak Hour	Parameters	West Approach			East Approach			South Approach			North Approach			Overall Intersection
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Main Street & Green Bay Road		AM Peak	Lanes	2			1			2			2			C 35.0
			LOS	D			E			D			E			
		Delay (s)	39.4			65.3			9.9			45.0				
		v/c ratio	-			-			-			-				
		Queue (ft)	475			250			100			250				
		PM Peak	Lanes	2			1			2			2			
LOS	D			D			B			D						
Delay (s)	46.8			51.3			10.7			40.0						
v/c ratio	-			-			-			-						
Queue (ft)	400			325			100			225						
Church Street & Wisconsin Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	1	1	B 15.4		
			LOS	B	A	A	B	D	D	D	D					
		Delay (s)	11.7	7.1	6.0	13.9	46.2	38.2	38.1							
		v/c ratio	0.57	0.39	0.03	0.67	0.72	0.06	0.04							
		Queue (ft)	100	225	m25	#575	m150	25	25							
		PM Peak	Lanes	1	1	1	1	1	1	1	1	1	1			
LOS	A	B	A	A	C	D	C									
Delay (s)	8.1	13.2	9.1	2.0	34.4	40.5	32.7									
v/c ratio	0.04	0.44	0.03	0.56	0.57	0.68	0.46									
Queue (ft)	25	250	m25	300	m75	175	75									
Commercial Street & Winneconne Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	2	C 32.1			
			LOS	D	C	A	C	D	C	C	C	C				
		Delay (s)	35.9	27.2	0.0	25.5	50.4	27.1	22.7							
		v/c ratio	0.82	0.49	0.00	0.12	0.85	0.72	0.53							
		Queue (ft)	#200	225	0	50	#350	#200	250							
		PM Peak	Lanes	1	1	1	1	1	1	1	1	1		2		
LOS	C	C	A	C	D	C	C	D	D	D						
Delay (s)	30.5	25.1	0.0	26.1	48.2	24.8	23.1									
v/c ratio	0.76	0.43	0.00	0.13	0.77	0.60	0.57									
Queue (ft)	200	200	0	50	#350	100	325									
Commercial Street & Columbian Avenue		AM Peak	Lanes	1	1	1	1	1	1	2	2	B 10.6				
			LOS	D	D	D	D	A	A	A	A					
		Delay (s)	43.0	48.5	47.7	38.0	0.4	0.6								
		v/c ratio	0.40	0.84	0.06	0.26	0.26	0.28								
		Queue (ft)	100	150	25	75	125	100								
		PM Peak	Lanes	1	1	1	1	1	1	1	1		2			
LOS	D	D	D	D	A	A	A									
Delay (s)	43.4	44.0	47.5	37.9	0.7	5.3										
v/c ratio	0.45	0.71	0.26	0.25	0.31	0.34										
Queue (ft)	100	150	50	50	150	50										
Commercial Street & Wisconsin Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	2	C 25.1			
			LOS	C	C	C	C	D	C	B	A	B		C		
		Delay (s)	25.4	26.9	21.8	26.7	39.7	29.4	18.0	8.3	17.5	30.9				
		v/c ratio	0.62	0.40	0.02	0.11	0.60	0.08	0.21	0.76	0.01	0.80				
		Queue (ft)	225	225	m25	50	225	25	50	400	25	250				
		PM Peak	Lanes	1	1	1	1	1	1	1	1	2				
LOS	C	C	C	C	C	C	C	E	D	D						
Delay (s)	27.5	28.8	22.6	23.2	32.9	26.2	22.0	61.2	54.7	38.1						
v/c ratio	0.69	0.47	0.05	0.28	0.47	0.05	0.26	0.93	0.27	0.79						
Queue (ft)	125	175	m25	75	200	25	50	#675	50	325						
Commercial Street & Forest Avenue		AM Peak	Lanes	1	1	1	1	1	2	2	2	A 7.7				
			LOS	C	C	C	C	A	A	A	A					
		Delay (s)	28.5	28.5	31.7	3.8	5.1									
		v/c ratio	0.28	0.28	0.51	0.21	0.45									
		Queue (ft)	50	50	75	50	150									
		PM Peak	Lanes	1	1	1	1	1	1	1	1		2			
LOS	B	B	B	A	A	A										
Delay (s)	15.1	17.3	17.3	7.4	6.6											
v/c ratio	0.20	0.45	0.45	0.52	0.42											
Queue (ft)	50	50	50	125	100											

HCM 6th Edition Outputs using Synchro 10 Software, queues reported using Synchro outputs.  
 #: 95th percentile volume exceed capacity, queue may be longer  
 m: volume for 95th percentile queue is metered by upstream signal

## Analysis of Future Conditions

As part of the study, MSA was asked to review future year 2038 volumes and operations. A review of anticipated growth rates and operations follows.

### Growth rate

MSA requested anticipated growth rates for the Neenah area from the East Central Wisconsin Regional Planning Commission (ECWRPC). Existing volumes from 2010 and anticipated 2045 volumes were provided and used to generate growth rates. A conservative 1.0% growth rate was used across the board, see **Attachment I** for the projected 2038 traffic volumes.

### Operations

After applying a 1.0% growth rate to all movements at each of the eleven intersections, the values were entered into Synchro and a general optimization was completed. The raw Synchro outputs can be seen in **Attachment J**. The LOS results are shown in **Table 4**.

**Table 4: 2038 Operational Analysis Level of Service Table**






Intersection	Traffic Control	Peak Hour	Parameters	West Approach			East Approach			South Approach			North Approach			Overall Intersection		
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT			
Main Street & Green Bay Road		Lanes			2			1		1	2			2				
		AM Peak	LOS	D		E	B	D		F	D							D
			Delay (s)	40.6		61.3	12.1	47.1		85.1								37.8
			v/c ratio	-		-	-	-		-								
			Queue (ft)	550		200	125	200		400								
		PM Peak	LOS	F		E	B	D		F	E							E
Delay (s)	113.7			78.4	12.2	50.5		127.4								59.0		
v/c ratio	-			-	-	-		-										
Queue (ft)	600			475	125	275		500										
Main Street & Torrey Street		Lanes			2	1		2		1	1							
		AM Peak	LOS	A	A	A		F		B								C
			Delay (s)	0.0	0.0	0.0		356.6		13.1								23.5
			v/c ratio	0.00	0.00	0.00		1.55		0.01								
			Queue (ft)	0	0	0		325		25								
		PM Peak	LOS	A	A	A		F		B								D
Delay (s)	0.0		0.0	9.4		472.8		10.6								31.5		
v/c ratio	0.00		0.00	0.07		1.79		0.01										
Queue (ft)	0		0	25		350		25										
Main Street & Doty Avenue		Lanes			1			1		1	1			1				
		AM Peak	LOS	A		B		F		F								A
			Delay (s)	0.0		11.0		68.6		50.5								1.4
			v/c ratio	0.00		0.01		0.25		0.07								
			Queue (ft)	25		25		25		25								
		PM Peak	LOS	B		A		F		F								B
Delay (s)	10.6			9.7		267.7		76.8								13.9		
v/c ratio	0.01			0.03		1.22		0.11										
Queue (ft)	25			25		175		25										
Church Street & Columbian Avenue		Lanes			1			1		1	1			1				
		AM Peak	LOS	C		A		B		A								B
			Delay (s)	15.6		9.9		12.3		9.3								13.4
			v/c ratio	0.61		0.22		0.40		0.07								
			Queue (ft)	100		25		50		25								
		PM Peak	LOS	B		A		B		B								B
Delay (s)	15.0			9.8		10.3		10.5								12.6		
v/c ratio	0.60			0.20		0.23		0.25										
Queue (ft)	100			25		25		25										
Church Street & Doty Avenue		Lanes			1			1		1	1			1				
		AM Peak	LOS	A		A		B		B								A
			Delay (s)	7.4		7.4		12.5		10.1								7.6
			v/c ratio	0.02		0.02		0.29		0.05								
			Queue (ft)	25		25		25		25								
		PM Peak	LOS	A		A		B		B								A
Delay (s)	7.4			7.5		10.7		12.0								6.9		
v/c ratio	0.02			0.01		0.13		0.25										
Queue (ft)	25			25		25		25										

Table 4 Continued...

Intersection	Traffic Control	Peak Hour	Parameters	West Approach			East Approach			South Approach			North Approach			Overall Intersection
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Church Street & Wisconsin Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	1	1	1		
			LOS	A	A	A	A	A	E	D	D	B				
			Delay (s)	5.6	9.0	7.2	3.9	59.0	44.0	43.9	12.1					
		v/c ratio	0.53	0.46	0.04	0.80	0.79	0.07	0.03							
		Queue (ft)	#275	275	m25	#775	m225	25	25							
		PM Peak	LOS	A	B	B	A	E	D	C	C					
Delay (s)	8.4	15.7	10.1	3.8	60.9	53.4	29.8	20.6								
v/c ratio	0.05	0.56	0.05	0.71	0.83	0.84	0.52									
Queue (ft)	25	300	m25	m350	m75	200	75									
Commercial Street & Winneconne Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	2	2			
			LOS	E	C	A	C	F	F	C	F	E				
			Delay (s)	76.3	29.1	0.0	30.1	81.7	84.7	32.6	131.9	73.8				
		v/c ratio	0.98	0.52	0.00	0.15	0.99	1.00	0.67	1.10						
		Queue (ft)	#400	275	0	50	#500	#350	375	#300						
		PM Peak	LOS	D	C	A	C	D	D	F	E					
Delay (s)	49.0	22.1	0.0	21.5	46.9	47.7	30.1	172.0	63.5							
v/c ratio	0.93	0.49	0.00	0.16	0.84	0.84	0.76	1.25								
Queue (ft)	#300	225	0	50	#375	#175	#400	#300								
Commercial Street & Columbian Avenue		AM Peak	Lanes	1	1	1	1	1	1	2	2	2	2			
			LOS	D	E	E	D	A	A	A	B					
			Delay (s)	50.6	56.7	57.6	43.4	5.8	0.8	0.33	14.3					
		v/c ratio	0.47	0.88	0.07	0.27	0.33	0.33	0.50							
		Queue (ft)	125	225	25	75	m200	50	50							
		PM Peak	LOS	D	D	D	C	A	A	A	A					
Delay (s)	38.1	38.1	42.4	32.2	0.4	1.3	7.9									
v/c ratio	0.48	0.72	0.27	0.26	0.40	0.44	0.75									
Queue (ft)	125	150	50	50	m100	m75	m75									
Commercial Street & Doty Avenue		AM Peak	Lanes	1	1	1	1	1	2	2	2	2				
			LOS	F	F	E	A	A	A	A						
			Delay (s)	55.4	39.7	9.6	9.4	2.7								
		v/c ratio	0.40	0.14	0.05	0.03	0.03									
		Queue (ft)	50	25	25	25										
		PM Peak	LOS	F	F	B	B	B	B							
Delay (s)	193.9	194.8	10.6	10.4	14.6											
v/c ratio	1.05	0.94	0.06	0.02	0.02											
Queue (ft)	150	125	25	25												
Commercial Street & Wisconsin Avenue		AM Peak	Lanes	1	1	1	1	1	1	1	1	2	2			
			LOS	D	C	C	C	D	D	A	B	A	C	C		
			Delay (s)	39.7	32.6	25.6	32.3	51.2	35.4	3.8	13.3	1.0	20.1	23.9		
		v/c ratio	0.81	0.47	0.03	0.16	0.70	0.09	0.17	0.87	0.02	0.94				
		Queue (ft)	100	200	m25	50	#325	25	#75	150	m25	275				
		PM Peak	LOS	E	C	C	C	C	C	E	E	D	E			
Delay (s)	76.7	29.7	21.3	22.3	29.1	22.0	22.3	78.8	58.3	52.9	55.7					
v/c ratio	1.01	0.59	0.06	0.41	0.52	0.06	0.38	1.09	0.40	0.95						
Queue (ft)	#275	200	m25	100	200	25	50	#775	#50	#450						
Commercial Street & Forest Avenue		AM Peak	Lanes	1	1	1	1	1	2	2	2	2				
			LOS	E	F	A	A	A	A	B						
			Delay (s)	47.7	59.6	4.8	5.4	10.9								
		v/c ratio	0.37	0.66	0.23	0.49										
		Queue (ft)	100	125	m100	225										
		PM Peak	LOS	D	E	A	A	A	A							
Delay (s)	28.3	36.8	6.8	5.9	9.8											
v/c ratio	0.29	0.63	0.51	0.40												
Queue (ft)	50	100	200	150												

HCM 6th Edition Outputs using Synchro 10 Software, queues reported using Synchro outputs.  
 #: 95th percentile volume exceed capacity, queue may be longer  
 m: volume for 95th percentile queue is metered by upstream signal

As Table 4 shows, if existing intersection geometry remains, there are a number of intersections projected to operate at LOS E or F in the year 2038. However, it is important to note that while these values follow the 1.0% growth rate, a number of variables including new development and the advancement of connected and autonomous vehicles could drastically change the projected 20 year outcomes.

## Parking Ramp Facilities

### Church Street Ramp

The City requested MSA complete a preliminary review of the existing Church St ramp for feasibility of adding a second access location that does not utilize Church St.

During the site visit, two locations, one on either corner of the backside of the ramp facing the existing Kimberly Clark building were identified as possible locations for a secondary access. See *Figures 5 and 6* and **Attachment K** for a schematic of the two proposed openings.



Figure 5: Northwest corner of existing parking ramp

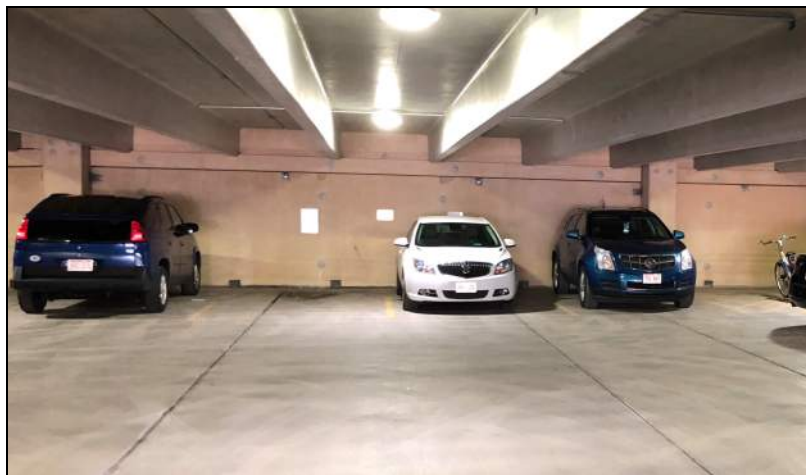


Figure 6: Northeast corner of existing parking structure

### Structural Review

The City provided Architectural details for some of the walls of the ramp which was conceptually reviewed by MSA Structural Engineers. The review concluded that it appears adding a second access is likely feasible from a structural standpoint, however, further review of a full set of structural drawings would be necessary to confirm.

Additional Considerations

While structurally another access may be possible, there are a number of limitations and conflicts that would need to be addressed before it would be worth additional investigation and investment to commission structural design plans to implement change to the structure.

Northwestern Corner:

- Currently the property behind the ramp appears to be owned by Kimberly Clark. The driveway gets narrow, approximately 20-25 feet between the ramp and the building, and a semi loading dock is between both buildings. Approval and likely a permanent access easement would need to be granted for public traffic to utilize the driveway. In addition, impacts to truck access for the facility would also need to be discussed.
- There is a grade difference of approximately 3-5 feet from the back of the ramp to existing grade with limited existing sidewalk width between the structure and parking lot to create a ramp to bring vehicles down to existing grade. At a minimum, the current “on-street” parking stalls behind the ramp would likely be eliminated to provide a ramp up to a potential entrance.

Northeastern Corner:

- Similar to the northeast corner, an opening at this location would also likely require an easement with the adjacent property owners to gain access to Commercial St. However, moving the opening to this location avoids the loading dock mentioned previously.
- There is also a grade difference which would require a smaller ramp between the parking structure and existing ground. There is also a larger sidewalk distance to transition down to existing grade.
- As shown in *Figure 7*, there are three large server or electrical boxes directly behind the potential access that would require relocation. They likely belong to the Alta building and per the architectural plans, require separate concrete equipment pads. Depending on the official use, this could have significant downtime and cost to relocate.



Figure 7: Three existing electrical or server boxes on northeast corner of parking ramp

### Recommendation

MSA believes a second access would provide congestion reduction in the downtown, however, at this time there are too many unknowns with easements, feasibility of relocating the large server/electrical boxes and how many vehicles would utilize an access to Commercial St to recommend moving forward with further structural review. If the City would like to pursue further, discussions with the adjacent property owners should be had to discuss feasibility.

## Recommendations for Further Review

As requested by the City and based on the findings of this study, the following is a list of proposed action items to further investigate and improve traffic operations within the study area. These recommendations include intersection geometry changes, parking adjustments, road safety assessments and complete traffic flow alternatives.

### Intersection Control Evaluations

After reviewing the geometry and operations of the existing intersections, there are three intersections recommended for further review through a more in-depth Intersection Control Evaluation (ICE). The three intersections to perform an ICE is as follows:

#### Main St & Green Bay Rd

The current split-phase traffic operations are typically not optimal for a signalized intersection and only utilized when limitations to capacity and space require this setup to maintain safe operations. This intersection also has heavy directional traffic depending on time of day. A road diet configuration does not provide sufficient capacity with the existing signal control during these peak times. Additional right-of-way is likely required to better optimize the safety and efficiency of the existing control. Alternatively, a roundabout may provide similar improved operations and safety with a varying amount of right-of-way requirements. An ICE report will determine which configuration will provide the most benefit and least impacts.

#### Main St & Torrey St

This intersection does not currently meet traffic signal warrants. However, with space for possible future developments on at least three of the four quadrants, it is likely this intersection will meet warrants in the future. Based on the findings of the downtown retiming analysis, the City may wish to promote inbound traffic from Main Street to use Torrey St/Smith St/Columbian Ave. The intersection may need to be reconstructed to achieve this. As part of the reconstruction design process, it is recommended that the intersection geometrics be reviewed for effectiveness of traffic signal and roundabout options both in the current location and alternately shifted to align more closely with Millview Road. This will require consideration of the grade changes coming across the bridge and two different intersection layouts in each location.

Promoting inbound traffic on Torrey St/Smith St/Columbian Ave will impact the intersection of Columbian Ave and Church St. It is recommended that the sight distance concerns at Church Street be considered with the realignment of Torrey St/Smith St/Columbian Ave. This could allow alternative traffic control at the all-way stop intersection of Church St and Columbian Ave.

Again, a more detailed ICE report would provide the ability to review development traffic, geometrics, grades and sight distance impacts for different intersection types to assess the ultimate improvement to this area.

#### Commercial St & Winneconne Ave

The Commercial St & Winneconne Ave intersection has heavy traffic movements northbound, southbound and eastbound. Because of this unique traffic demand and geometric configuration, it is recommended an ICE report be completed to review the effectiveness of a reconfigured traffic signal and a roundabout. For safety and operational considerations, the realignment of Church Street into a five-legged roundabout and possible access restrictions to surrounding businesses should also be considered.

#### Parking Ramp Alternatives

The City has identified multiple potential sites for a new parking structure. While this study has provided preliminary feasibility into access to existing and proposed new locations, a more detailed investigation assessing structural feasibility/cost, intended users, traffic patterns, and potential impacts to surrounding intersections would provide a clear picture of what location provides the greatest benefits to the surrounding area and businesses.

#### Road Safety Assessments

Based on the intersection crash reports provided by the City, a number of intersections experience higher than normal crash rates, especially for right-angle crashes, including Columbian Ave & Commercial St and Doty Ave & Church St. Columbian Ave & Commercial St is a signalized intersection that experiences a significant number of right-angle crashes. Doty Ave & Church St also experiences a number of angle crashes with low overall traffic volume and good existing intersection operations. It is recommended that a more thorough review of these intersections including field and video review and conceptual layouts for possible improvements be completed.

#### Traffic Flow Alternatives

Traditional improvements typically include adding capacity through additional thru and/or turn lanes. However, improvements to traffic operations are possible in ways beyond just infrastructure changes. In the downtown area specifically, the short blocks and relative grid system can be utilized to try to alter traffic flow patterns.

Currently, the majority of traffic entering the downtown from the west takes Main St to Wisconsin Ave and either makes a left turn at Church St into the parking ramp or a left turn at Commercial St. In coordinated networks, left turns are typically the most problematic movement at any intersection as they conflict with oncoming traffic and often take dedicated time away from the overall progression of traffic.

An alternative to this would be to create an unbalanced cross section potentially utilizing Torrey St/ Smith St/ Columbian Avenue to connect to Commercial Street. In this alternative, eastbound “through” traffic on Main St would be promoted to turn right onto Torrey St by providing two lanes of eastbound capacity and travel to Columbian Ave to connect to Commercial St.

Westbound traffic could continue to use Wisconsin Ave or a similar scenario could be created for westbound traffic on Doty Street. All streets would maintain two-way traffic, but capacity, intersection



control, and traffic signal operations would be designed to promote an informal one-way pair. This could have an added benefit of improving access to on-street parking in the commercial downtown and higher pedestrian awareness and safety where those users are heaviest.

## Closing

A thorough review of the existing downtown corridor confirms many of both the City and MSA's initial assumptions entering the review: heavy conflicting volume and tight existing intersection configurations are leading to undesirable operations at a number of intersections within the downtown corridor. While no single change to the existing infrastructure can improve all intersections, the additional studies noted are intended to incrementally improve individual areas with the ultimate goal of maximizing the safety and efficiency of the corridor.

# Attachments

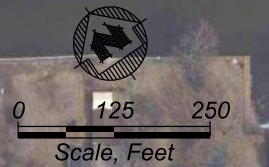
- Attachment A: Project Location Map
- Attachment B: Raw Traffic Count Values
- Attachment C: Network Peak
- Attachment D: Traffic Signal Warrants – Main St & Torrey St
- Attachment E: Traffic Signal Warrants – Main St & Doty Ave
- Attachment F: 2018 Existing Conditions Raw Synchro Outputs
- Attachment G: 2018 Proposed Raw Synchro Outputs
- Attachment H: 2018 Proposed Timing Plans
- Attachment I: 2038 Projected Traffic Volumes
- Attachment J: 2038 Raw Synchro Outputs
- Attachment K: Church Street Ramp Secondary Access Locations

# **Attachment A**

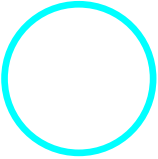
*Project Location Map*

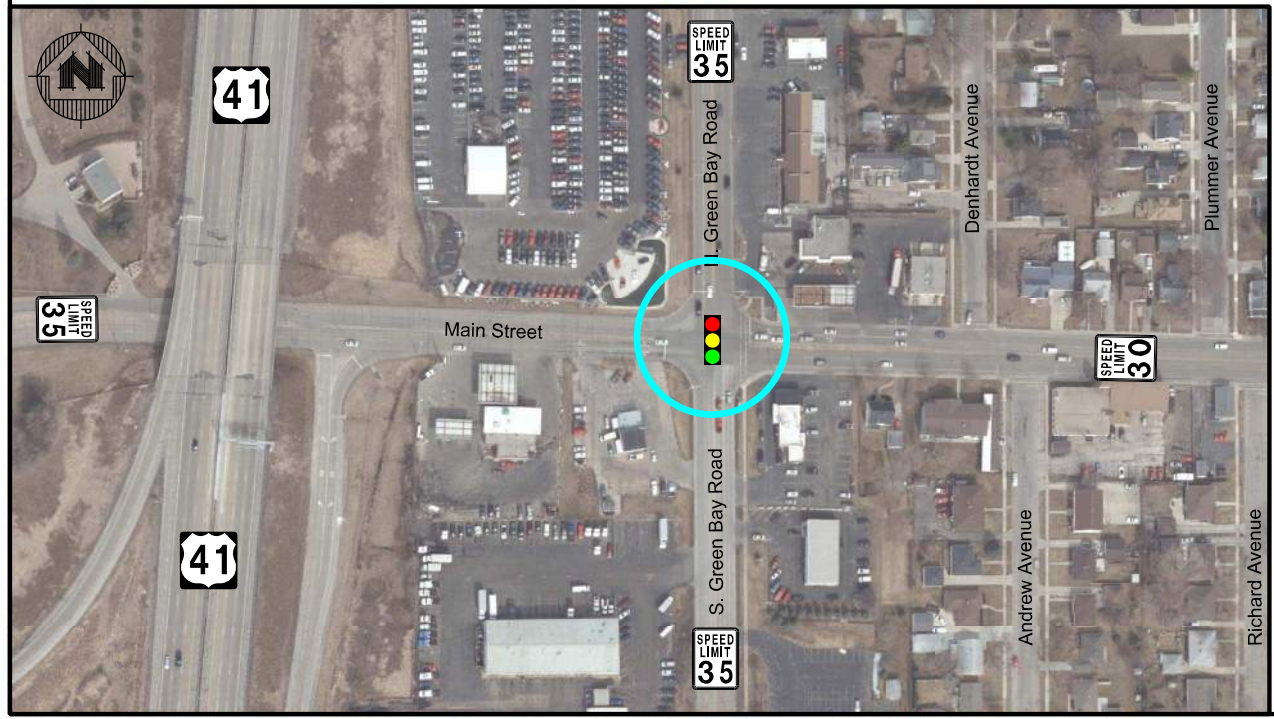
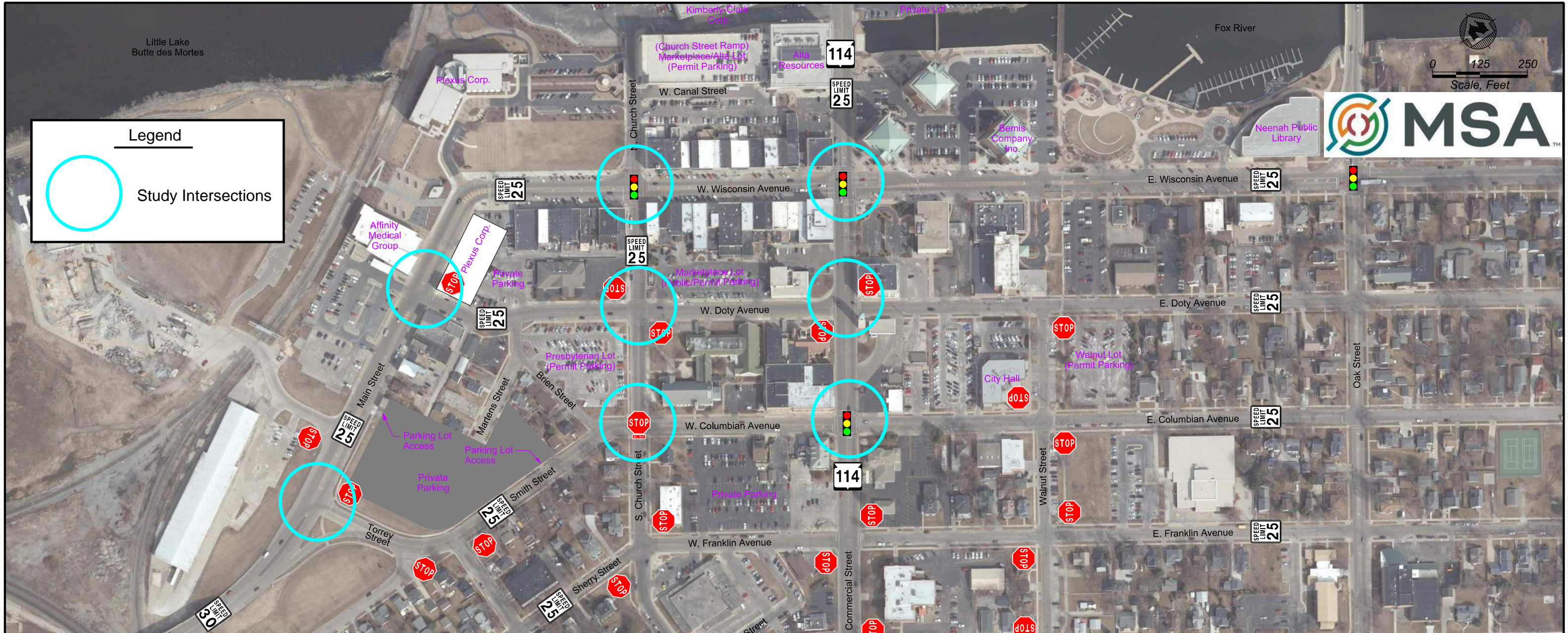
Little Lake  
Butte des Morts

Fox River



**Legend**

 Study Intersections



# **Attachment B**

*Raw Traffic Count Values*

**Main Street & Green Bay Road**



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Green Bay Road  
 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 1

### Turning Movement Data

Start Time	Green Bay Road Southbound						Main St Westbound						Green Bay Road Northbound						Main St Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
6:00 AM	2	25	2	0	0	29	28	8	3	0	0	39	6	21	0	0	0	27	7	36	3	0	0	46	141
6:15 AM	2	8	12	0	0	22	41	7	4	0	0	52	6	18	6	0	0	30	13	63	3	0	0	79	183
6:30 AM	4	21	26	0	0	51	45	12	7	0	0	64	2	29	5	0	0	36	25	97	10	0	0	132	283
6:45 AM	5	27	40	0	0	72	58	10	12	0	0	80	8	27	2	0	0	37	18	123	12	0	0	153	342
Hourly Total	13	81	80	0	0	174	172	37	26	0	0	235	22	95	13	0	0	130	63	319	28	0	0	410	949
7:00 AM	7	26	22	0	0	55	53	15	16	0	0	84	5	29	2	0	0	36	19	115	13	0	0	147	322
7:15 AM	7	36	47	0	0	90	65	14	10	0	0	89	16	42	0	0	0	58	21	156	16	0	0	193	430
7:30 AM	6	34	49	0	0	89	79	26	16	0	1	121	23	55	8	0	0	86	20	185	23	0	0	228	524
7:45 AM	5	49	52	0	0	106	95	12	17	0	0	124	21	62	8	0	0	91	32	259	33	0	0	324	645
Hourly Total	25	145	170	0	0	340	292	67	59	0	1	418	65	188	18	0	0	271	92	715	85	0	0	892	1921
8:00 AM	8	43	32	0	0	83	77	26	18	0	1	121	16	53	5	0	0	74	29	143	30	0	0	202	480
8:15 AM	5	20	27	0	0	52	67	9	19	0	0	95	16	33	6	0	0	55	26	118	25	0	0	169	371
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	13	63	59	0	0	135	144	35	37	0	1	216	32	86	11	0	0	129	55	261	55	0	0	371	851
2:30 PM	11	59	33	0	0	103	69	32	30	0	0	131	26	72	6	0	1	104	32	80	18	0	0	130	468
2:45 PM	17	52	36	0	0	105	67	29	28	0	0	124	24	70	15	0	0	109	34	109	19	0	0	162	500
Hourly Total	28	111	69	0	0	208	136	61	58	0	0	255	50	142	21	0	1	213	66	189	37	0	0	292	968
3:00 PM	18	76	47	0	0	141	93	40	32	0	0	165	23	64	5	0	0	92	26	76	30	0	0	132	530
3:15 PM	7	53	35	0	0	95	80	33	21	0	0	134	18	63	8	0	0	89	31	101	50	0	0	182	500
3:30 PM	13	72	48	0	0	133	97	30	27	0	0	154	27	83	12	0	0	122	23	82	24	0	0	129	538
3:45 PM	14	58	41	0	0	113	79	37	28	0	1	144	26	58	16	0	0	100	38	71	33	0	0	142	499
Hourly Total	52	259	171	0	0	482	349	140	108	0	1	597	94	268	41	0	0	403	118	330	137	0	0	585	2067
4:00 PM	11	57	37	0	0	105	77	40	32	0	0	149	23	53	11	0	0	87	37	88	21	0	0	146	487
4:15 PM	11	47	39	0	0	97	88	47	28	0	0	163	21	55	12	0	0	88	30	85	22	0	0	137	485
4:30 PM	16	73	40	0	0	129	96	47	37	0	0	180	15	86	9	0	0	110	34	88	35	0	0	157	576
4:45 PM	8	66	36	0	0	110	89	45	34	0	0	168	26	89	14	0	0	129	37	120	34	0	0	191	598
Hourly Total	46	243	152	0	0	441	350	179	131	0	0	660	85	283	46	0	0	414	138	381	112	0	0	631	2146
5:00 PM	7	72	38	0	0	117	89	26	26	0	0	141	13	99	6	0	0	118	45	97	21	0	0	163	539
5:15 PM	8	52	30	0	0	90	90	52	21	0	0	163	14	77	6	0	0	97	39	88	19	0	0	146	496
5:30 PM	6	44	28	0	0	78	68	28	20	0	0	116	22	69	10	0	0	101	25	83	15	0	0	123	418
5:45 PM	4	38	27	0	0	69	74	29	25	0	0	128	9	47	12	0	0	68	24	79	19	0	0	122	387
Hourly Total	25	206	123	0	0	354	321	135	92	0	0	548	58	292	34	0	0	384	133	347	74	0	0	554	1840
Grand Total	202	1108	824	0	0	2134	1764	654	511	0	3	2929	406	1354	184	0	1	1944	665	2542	528	0	0	3735	10742
Approach %	9.5	51.9	38.6	0.0	-	-	60.2	22.3	17.4	0.0	-	-	20.9	69.7	9.5	0.0	-	-	17.8	68.1	14.1	0.0	-	-	-
Total %	1.9	10.3	7.7	0.0	-	19.9	16.4	6.1	4.8	0.0	-	27.3	3.8	12.6	1.7	0.0	-	18.1	6.2	23.7	4.9	0.0	-	34.8	-
Lights	195	1089	786	0	-	2070	1692	635	497	0	-	2824	388	1319	176	0	-	1883	642	2491	507	0	-	3640	10417
% Lights	96.5	98.3	95.4	-	-	97.0	95.9	97.1	97.3	-	-	96.4	95.6	97.4	95.7	-	-	96.9	96.5	98.0	96.0	-	-	97.5	97.0

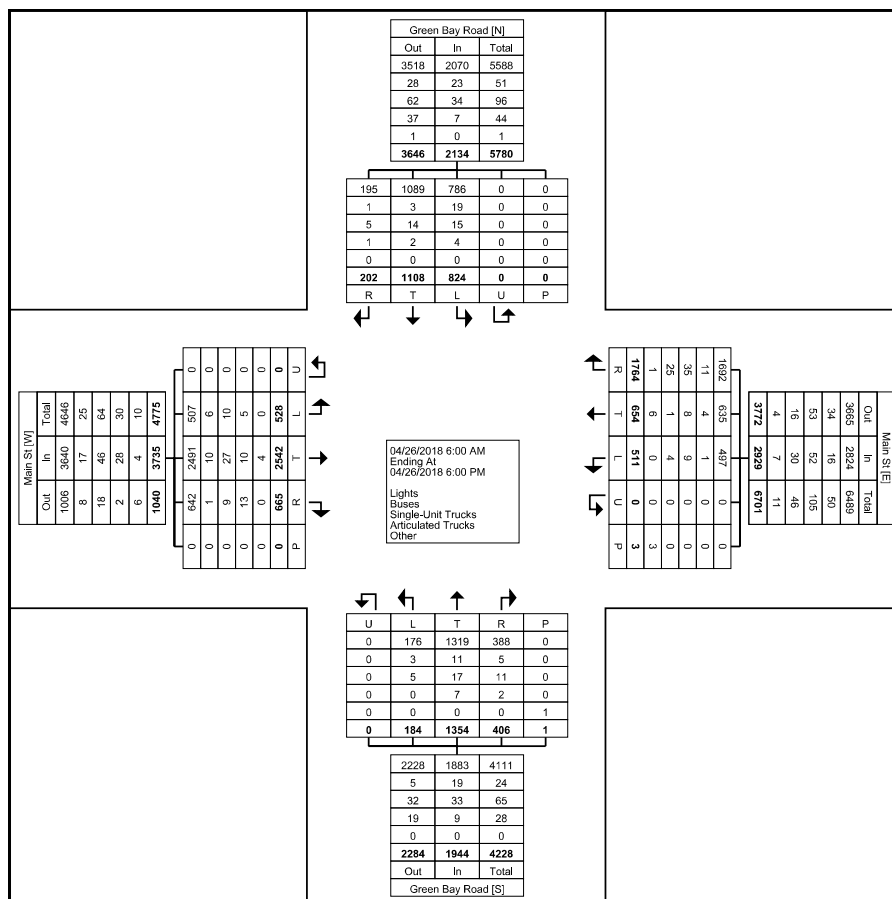






MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Green Bay Road  
 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 3



Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Green Bay Road  
 042618  
 Site Code:  
 Start Date: 04/26/2018  
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### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Green Bay Road Southbound						Main St Westbound						Green Bay Road Northbound						Main St Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	7	36	47	0	0	90	65	14	10	0	0	89	16	42	0	0	0	58	21	156	16	0	0	193	430
7:30 AM	6	34	49	0	0	89	79	26	16	0	1	121	23	55	8	0	0	86	20	185	23	0	0	228	524
7:45 AM	5	49	52	0	0	106	95	12	17	0	0	124	21	62	8	0	0	91	32	259	33	0	0	324	645
8:00 AM	8	43	32	0	0	83	77	26	18	0	1	121	16	53	5	0	0	74	29	143	30	0	0	202	480
<b>Total</b>	<b>26</b>	<b>162</b>	<b>180</b>	<b>0</b>	<b>0</b>	<b>368</b>	<b>316</b>	<b>78</b>	<b>61</b>	<b>0</b>	<b>2</b>	<b>455</b>	<b>76</b>	<b>212</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>309</b>	<b>102</b>	<b>743</b>	<b>102</b>	<b>0</b>	<b>0</b>	<b>947</b>	<b>2079</b>
Approach %	7.1	44.0	48.9	0.0	-	-	69.5	17.1	13.4	0.0	-	-	24.6	68.6	6.8	0.0	-	-	10.8	78.5	10.8	0.0	-	-	-
Total %	1.3	7.8	8.7	0.0	-	17.7	15.2	3.8	2.9	0.0	-	21.9	3.7	10.2	1.0	0.0	-	14.9	4.9	35.7	4.9	0.0	-	45.6	-
PHF	0.813	0.827	0.865	0.000	-	0.868	0.832	0.750	0.847	0.000	-	0.917	0.826	0.855	0.656	0.000	-	0.849	0.797	0.717	0.773	0.000	-	0.731	0.806
Lights	25	157	174	0	-	356	298	74	54	0	-	426	68	197	19	0	-	284	96	736	98	0	-	930	1996
% Lights	96.2	96.9	96.7	-	-	96.7	94.3	94.9	88.5	-	-	93.6	89.5	92.9	90.5	-	-	91.9	94.1	99.1	96.1	-	-	98.2	96.0
Buses	0	2	3	0	-	5	0	0	0	0	-	0	3	4	1	0	-	8	1	1	2	0	-	4	17
% Buses	0.0	1.2	1.7	-	-	1.4	0.0	0.0	0.0	-	-	0.0	3.9	1.9	4.8	-	-	2.6	1.0	0.1	2.0	-	-	0.4	0.8
Single-Unit Trucks	1	2	3	0	-	6	14	2	3	0	-	19	4	5	1	0	-	10	3	4	1	0	-	8	43
% Single-Unit Trucks	3.8	1.2	1.7	-	-	1.6	4.4	2.6	4.9	-	-	4.2	5.3	2.4	4.8	-	-	3.2	2.9	0.5	1.0	-	-	0.8	2.1
Articulated Trucks	0	1	0	0	-	1	4	0	4	0	-	8	1	6	0	0	-	7	2	2	1	0	-	5	21
% Articulated Trucks	0.0	0.6	0.0	-	-	0.3	1.3	0.0	6.6	-	-	1.8	1.3	2.8	0.0	-	-	2.3	2.0	0.3	1.0	-	-	0.5	1.0
Bicycles on Road	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	2.6	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-





MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

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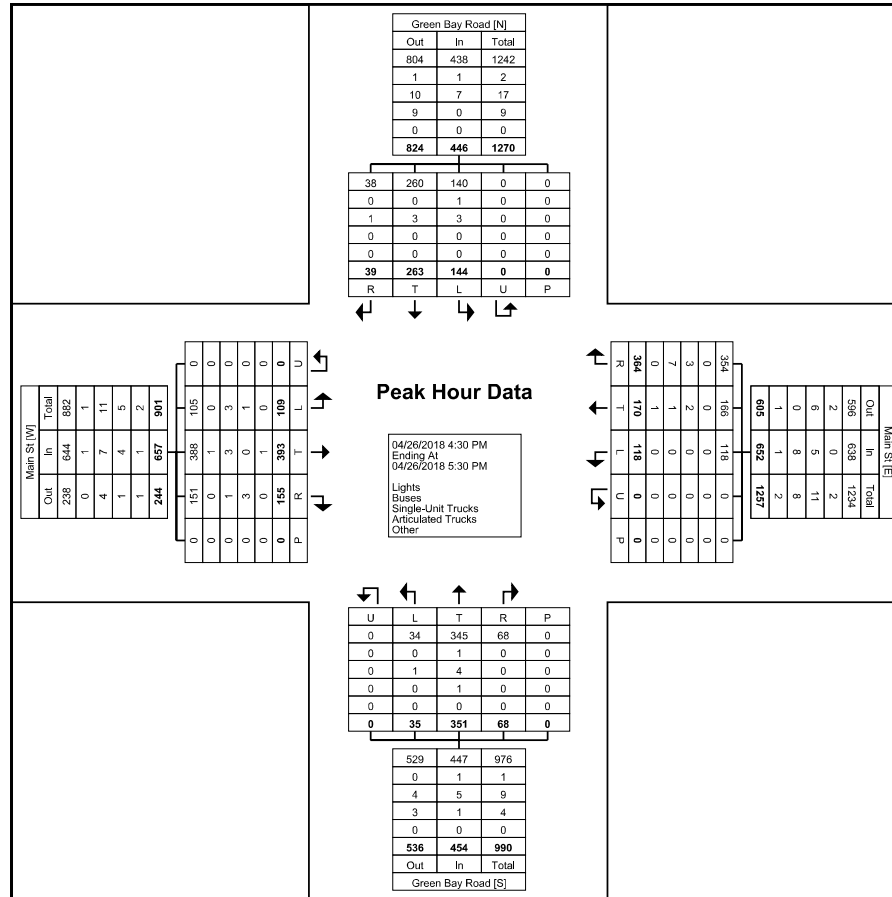
### Turning Movement Peak Hour Data (4:30 PM)

Start Time	Green Bay Road Southbound						Main St Westbound						Green Bay Road Northbound						Main St Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:30 PM	16	73	40	0	0	129	96	47	37	0	0	180	15	86	9	0	0	110	34	88	35	0	0	157	576
4:45 PM	8	66	36	0	0	110	89	45	34	0	0	168	26	89	14	0	0	129	37	120	34	0	0	191	598
5:00 PM	7	72	38	0	0	117	89	26	26	0	0	141	13	99	6	0	0	118	45	97	21	0	0	163	539
5:15 PM	8	52	30	0	0	90	90	52	21	0	0	163	14	77	6	0	0	97	39	88	19	0	0	146	496
<b>Total</b>	<b>39</b>	<b>263</b>	<b>144</b>	<b>0</b>	<b>0</b>	<b>446</b>	<b>364</b>	<b>170</b>	<b>118</b>	<b>0</b>	<b>0</b>	<b>652</b>	<b>68</b>	<b>351</b>	<b>35</b>	<b>0</b>	<b>0</b>	<b>454</b>	<b>155</b>	<b>393</b>	<b>109</b>	<b>0</b>	<b>0</b>	<b>657</b>	<b>2209</b>
Approach %	8.7	59.0	32.3	0.0	-	-	55.8	26.1	18.1	0.0	-	-	15.0	77.3	7.7	0.0	-	-	23.6	59.8	16.6	0.0	-	-	-
Total %	1.8	11.9	6.5	0.0	-	20.2	16.5	7.7	5.3	0.0	-	29.5	3.1	15.9	1.6	0.0	-	20.6	7.0	17.8	4.9	0.0	-	29.7	-
PHF	0.609	0.901	0.900	0.000	-	0.864	0.948	0.817	0.797	0.000	-	0.906	0.654	0.886	0.625	0.000	-	0.880	0.861	0.819	0.779	0.000	-	0.860	0.923
Lights	38	260	140	0	-	438	354	166	118	0	-	638	68	345	34	0	-	447	151	388	105	0	-	644	2167
% Lights	97.4	98.9	97.2	-	-	98.2	97.3	97.6	100.0	-	-	97.9	100.0	98.3	97.1	-	-	98.5	97.4	98.7	96.3	-	-	98.0	98.1
Buses	0	0	1	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	0	1	0	0	-	1	3
% Buses	0.0	0.0	0.7	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.3	0.0	-	-	0.2	0.1
Single-Unit Trucks	1	3	3	0	-	7	3	2	0	0	-	5	0	4	1	0	-	5	1	3	3	0	-	7	24
% Single-Unit Trucks	2.6	1.1	2.1	-	-	1.6	0.8	1.2	0.0	-	-	0.8	0.0	1.1	2.9	-	-	1.1	0.6	0.8	2.8	-	-	1.1	1.1
Articulated Trucks	0	0	0	0	-	0	7	1	0	0	-	8	0	1	0	0	-	1	3	0	1	0	-	4	13
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	1.9	0.6	0.0	-	-	1.2	0.0	0.3	0.0	-	-	0.2	1.9	0.0	0.9	-	-	0.6	0.6
Bicycles on Road	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	2
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.6	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Green Bay Road  
 042618  
 Site Code:  
 Start Date: 04/26/2018  
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Turning Movement Peak Hour Data Plot (4:30 PM)

**Main Street & Torrey Street**



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Torrey St 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 1

### Turning Movement Data

Start Time	Main St Southbound				Torrey St Westbound				Main St Northbound				Int. Total			
	Thru	Left	U-Turn	Peds	App. Total	Right	Left	U-Turn	Peds	App. Total	Right	Thru		U-Turn	Peds	App. Total
6:00 AM	50	0	0	0	50	1	3	0	0	4	16	39	0	0	55	109
6:15 AM	65	0	0	0	65	0	6	0	4	6	12	66	0	0	78	149
6:30 AM	71	1	0	0	72	1	18	0	0	19	25	93	0	0	118	209
6:45 AM	85	0	0	0	85	0	19	0	0	19	28	120	0	0	148	252
<b>Hourly Total</b>	<b>271</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>272</b>	<b>2</b>	<b>46</b>	<b>0</b>	<b>4</b>	<b>48</b>	<b>81</b>	<b>318</b>	<b>0</b>	<b>0</b>	<b>399</b>	<b>719</b>
7:00 AM	77	1	0	0	78	0	14	0	0	14	36	98	0	0	134	226
7:15 AM	107	0	0	0	107	1	28	0	0	29	81	179	0	0	260	396
7:30 AM	139	0	0	0	139	2	33	0	0	35	99	209	0	0	308	482
7:45 AM	126	0	0	0	126	3	36	0	0	39	118	253	0	0	371	536
<b>Hourly Total</b>	<b>449</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>450</b>	<b>6</b>	<b>111</b>	<b>0</b>	<b>0</b>	<b>117</b>	<b>334</b>	<b>739</b>	<b>0</b>	<b>0</b>	<b>1073</b>	<b>1640</b>
8:00 AM	111	1	0	0	112	0	19	0	0	19	62	169	0	0	231	362
8:15 AM	104	1	0	0	105	0	14	0	0	14	54	142	0	0	196	315
8:30 AM	75	0	0	0	75	0	12	0	1	12	42	126	0	0	168	255
8:45 AM	76	0	0	0	76	1	15	0	0	16	35	127	0	0	162	254
<b>Hourly Total</b>	<b>366</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>368</b>	<b>1</b>	<b>60</b>	<b>0</b>	<b>1</b>	<b>61</b>	<b>193</b>	<b>564</b>	<b>0</b>	<b>0</b>	<b>757</b>	<b>1186</b>
9:00 AM	81	0	0	0	81	1	12	0	0	13	29	80	0	0	109	203
9:15 AM	75	0	0	0	75	3	17	0	1	20	25	93	0	0	118	213
9:30 AM	94	0	0	0	94	2	18	0	0	20	26	103	0	0	129	243
9:45 AM	102	1	0	0	103	0	11	0	0	11	32	75	0	0	107	221
<b>Hourly Total</b>	<b>352</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>353</b>	<b>6</b>	<b>58</b>	<b>0</b>	<b>1</b>	<b>64</b>	<b>112</b>	<b>351</b>	<b>0</b>	<b>0</b>	<b>463</b>	<b>880</b>
10:00 AM	73	1	0	0	74	2	8	0	0	10	28	88	0	0	116	200
10:15 AM	82	0	0	0	82	1	11	0	0	12	28	75	0	0	103	197
10:30 AM	102	1	0	0	103	2	17	0	0	19	31	73	0	0	104	226
10:45 AM	100	2	0	0	102	2	12	0	0	14	50	83	0	0	133	249
<b>Hourly Total</b>	<b>357</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>361</b>	<b>7</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>55</b>	<b>137</b>	<b>319</b>	<b>0</b>	<b>0</b>	<b>456</b>	<b>872</b>
11:00 AM	123	3	0	0	126	1	21	0	0	22	48	103	0	0	151	299
11:15 AM	106	1	0	0	107	0	21	0	0	21	34	92	0	0	126	254
11:30 AM	134	4	0	0	138	3	21	0	3	24	36	90	0	0	126	288
11:45 AM	110	0	0	0	110	1	11	0	1	12	41	110	0	0	151	273
<b>Hourly Total</b>	<b>473</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>481</b>	<b>5</b>	<b>74</b>	<b>0</b>	<b>4</b>	<b>79</b>	<b>159</b>	<b>395</b>	<b>0</b>	<b>0</b>	<b>554</b>	<b>1114</b>
12:00 PM	121	1	0	0	122	2	30	0	0	32	38	93	0	0	131	285
12:15 PM	105	1	0	0	106	1	19	0	0	20	35	97	0	0	132	258
12:30 PM	110	2	0	0	112	2	19	0	2	21	39	82	0	0	121	254
12:45 PM	96	0	0	0	96	1	12	0	2	13	32	108	0	0	140	249
<b>Hourly Total</b>	<b>432</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>436</b>	<b>6</b>	<b>80</b>	<b>0</b>	<b>4</b>	<b>86</b>	<b>144</b>	<b>380</b>	<b>0</b>	<b>0</b>	<b>524</b>	<b>1046</b>
1:00 PM	117	1	0	0	118	1	18	0	2	19	27	96	0	0	123	260
1:15 PM	106	0	0	0	106	0	19	0	4	19	32	88	0	0	120	245
1:30 PM	97	2	0	0	99	1	18	0	0	19	35	90	0	0	125	243

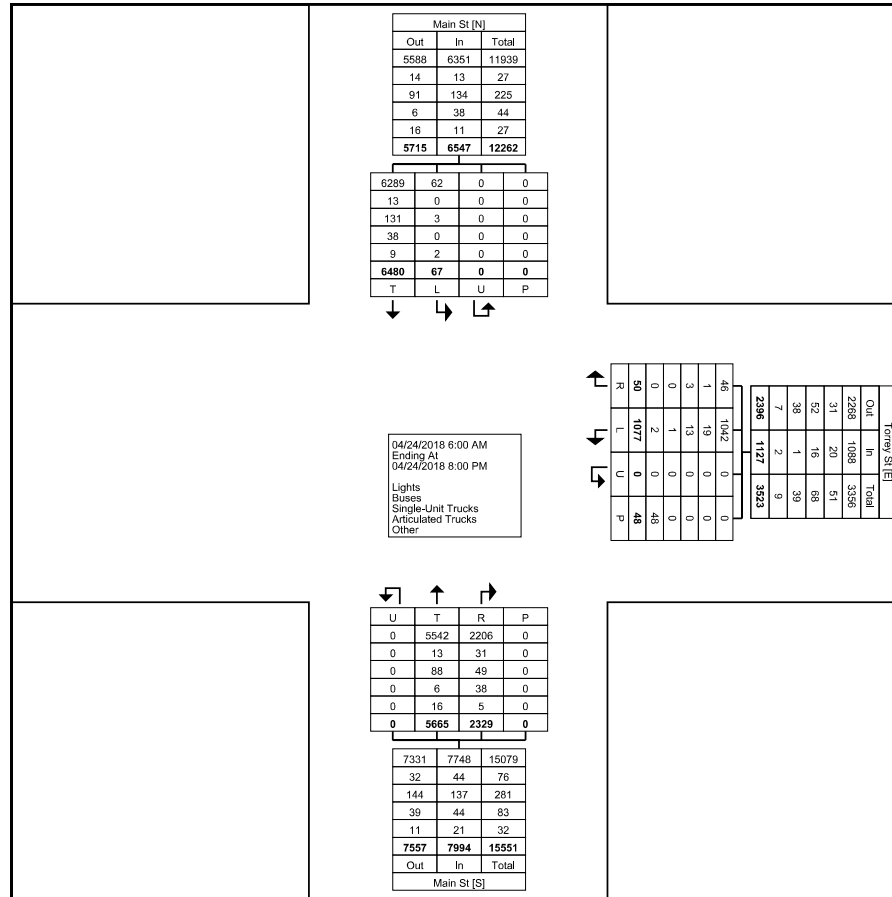
1:45 PM	99	2	0	0	101	1	22	0	0	23	36	92	0	0	128	252
Hourly Total	419	5	0	0	424	3	77	0	6	80	130	366	0	0	496	1000
2:00 PM	109	2	0	0	111	0	8	0	2	8	40	97	0	0	137	256
2:15 PM	121	0	0	0	121	1	16	0	1	17	36	82	0	0	118	256
2:30 PM	124	1	0	0	125	2	24	0	0	26	47	99	0	0	146	297
2:45 PM	134	1	0	0	135	0	28	0	2	28	52	123	0	0	175	338
Hourly Total	488	4	0	0	492	3	76	0	5	79	175	401	0	0	576	1147
3:00 PM	189	1	0	0	190	0	28	0	0	28	53	92	0	0	145	363
3:15 PM	131	2	0	0	133	2	35	0	0	37	60	124	0	0	184	354
3:30 PM	165	6	0	0	171	0	31	0	3	31	41	121	0	0	162	364
3:45 PM	161	2	0	0	163	1	35	0	0	36	53	119	0	0	172	371
Hourly Total	646	11	0	0	657	3	129	0	3	132	207	456	0	0	663	1452
4:00 PM	211	1	0	0	212	1	39	0	1	40	49	84	0	0	133	385
4:15 PM	167	1	0	0	168	1	25	0	1	26	55	111	0	0	166	360
4:30 PM	257	5	0	0	262	0	27	0	0	27	73	121	0	0	194	483
4:45 PM	227	5	0	0	232	2	29	0	1	31	69	132	0	0	201	464
Hourly Total	862	12	0	0	874	4	120	0	3	124	246	448	0	0	694	1692
5:00 PM	242	3	0	0	245	2	27	0	3	29	77	116	0	0	193	467
5:15 PM	154	1	0	0	155	0	31	0	0	31	50	113	0	0	163	349
5:30 PM	130	2	0	0	132	0	28	0	2	28	58	111	0	0	169	329
5:45 PM	121	1	0	0	122	0	14	0	3	14	45	89	0	0	134	270
Hourly Total	647	7	0	0	654	2	100	0	8	102	230	429	0	0	659	1415
6:00 PM	137	1	0	0	138	0	19	0	0	19	26	94	0	0	120	277
6:15 PM	106	1	0	0	107	0	17	0	0	17	26	72	0	0	98	222
6:30 PM	103	3	0	0	106	0	15	0	2	15	19	63	0	0	82	203
6:45 PM	83	0	0	0	83	0	12	0	0	12	29	69	0	0	98	193
Hourly Total	429	5	0	0	434	0	63	0	2	63	100	298	0	0	398	895
7:00 PM	84	0	0	0	84	0	11	0	5	11	22	61	0	0	83	178
7:15 PM	81	2	0	0	83	2	4	0	0	6	20	43	0	0	63	152
7:30 PM	66	0	0	0	66	0	17	0	1	17	25	45	0	0	70	153
7:45 PM	58	0	0	0	58	0	3	0	1	3	14	52	0	0	66	127
Hourly Total	289	2	0	0	291	2	35	0	7	37	81	201	0	0	282	610
Grand Total	6480	67	0	0	6547	50	1077	0	48	1127	2329	5665	0	0	7994	15668
Approach %	99.0	1.0	0.0	-	-	4.4	95.6	0.0	-	-	29.1	70.9	0.0	-	-	-
Total %	41.4	0.4	0.0	-	41.8	0.3	6.9	0.0	-	7.2	14.9	36.2	0.0	-	51.0	-
Lights	6289	62	0	-	6351	46	1042	0	-	1088	2206	5542	0	-	7748	15187
% Lights	97.1	92.5	-	-	97.0	92.0	96.8	-	-	96.5	94.7	97.8	-	-	96.9	96.9
Buses	13	0	0	-	13	1	19	0	-	20	31	13	0	-	44	77
% Buses	0.2	0.0	-	-	0.2	2.0	1.8	-	-	1.8	1.3	0.2	-	-	0.6	0.5
Single-Unit Trucks	131	3	0	-	134	3	13	0	-	16	49	88	0	-	137	287
% Single-Unit Trucks	2.0	4.5	-	-	2.0	6.0	1.2	-	-	1.4	2.1	1.6	-	-	1.7	1.8
Articulated Trucks	38	0	0	-	38	0	1	0	-	1	38	6	0	-	44	83
% Articulated Trucks	0.6	0.0	-	-	0.6	0.0	0.1	-	-	0.1	1.6	0.1	-	-	0.6	0.5
Bicycles on Road	9	2	0	-	11	0	2	0	-	2	5	16	0	-	21	34
% Bicycles on Road	0.1	3.0	-	-	0.2	0.0	0.2	-	-	0.2	0.2	0.3	-	-	0.3	0.2
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	8	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	16.7	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	40	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	83.3	-	-	-	-	-	-	-





MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Torrey St 042418  
 Site Code:  
 Start Date: 04/24/2018  
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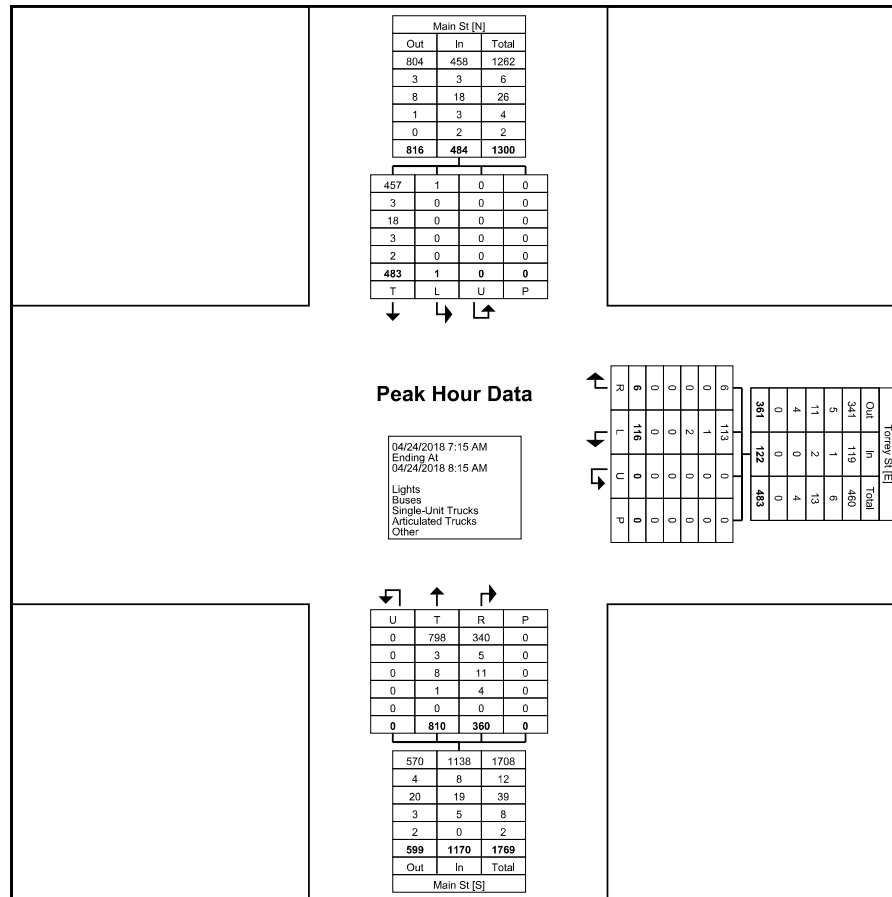
Turning Movement Data Plot





MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

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Turning Movement Peak Hour Data Plot (7:15 AM)



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

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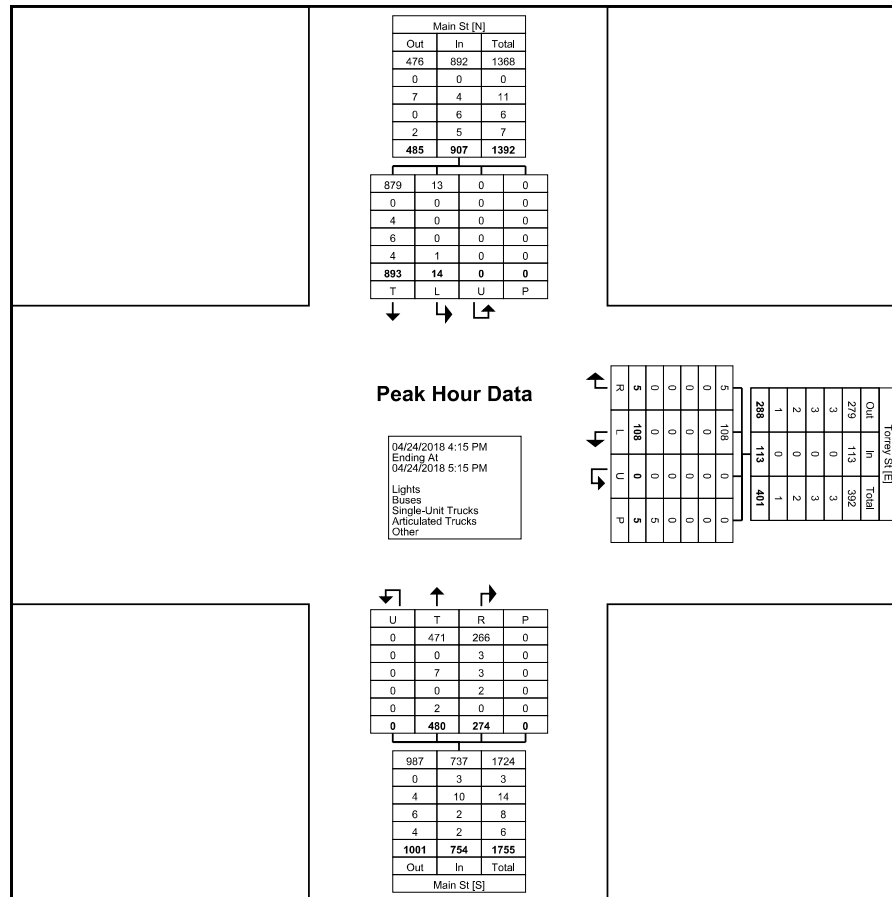
### Turning Movement Peak Hour Data (4:15 PM)

Start Time	Main St Southbound					Torrey St Westbound					Main St Northbound					Int. Total
	Thru	Left	U-Turn	Peds	App. Total	Right	Left	U-Turn	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	
4:15 PM	167	1	0	0	168	1	25	0	1	26	55	111	0	0	166	360
4:30 PM	257	5	0	0	262	0	27	0	0	27	73	121	0	0	194	483
4:45 PM	227	5	0	0	232	2	29	0	1	31	69	132	0	0	201	464
5:00 PM	242	3	0	0	245	2	27	0	3	29	77	116	0	0	193	467
<b>Total</b>	<b>893</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>907</b>	<b>5</b>	<b>108</b>	<b>0</b>	<b>5</b>	<b>113</b>	<b>274</b>	<b>480</b>	<b>0</b>	<b>0</b>	<b>754</b>	<b>1774</b>
Approach %	98.5	1.5	0.0	-	-	4.4	95.6	0.0	-	-	36.3	63.7	0.0	-	-	-
Total %	50.3	0.8	0.0	-	51.1	0.3	6.1	0.0	-	6.4	15.4	27.1	0.0	-	42.5	-
PHF	0.869	0.700	0.000	-	0.865	0.625	0.931	0.000	-	0.911	0.890	0.909	0.000	-	0.938	0.918
Lights	879	13	0	-	892	5	108	0	-	113	266	471	0	-	737	1742
% Lights	98.4	92.9	-	-	98.3	100.0	100.0	-	-	100.0	97.1	98.1	-	-	97.7	98.2
Buses	0	0	0	-	0	0	0	0	-	0	3	0	0	-	3	3
% Buses	0.0	0.0	-	-	0.0	0.0	0.0	-	-	0.0	1.1	0.0	-	-	0.4	0.2
Single-Unit Trucks	4	0	0	-	4	0	0	0	-	0	3	7	0	-	10	14
% Single-Unit Trucks	0.4	0.0	-	-	0.4	0.0	0.0	-	-	0.0	1.1	1.5	-	-	1.3	0.8
Articulated Trucks	6	0	0	-	6	0	0	0	-	0	2	0	0	-	2	8
% Articulated Trucks	0.7	0.0	-	-	0.7	0.0	0.0	-	-	0.0	0.7	0.0	-	-	0.3	0.5
Bicycles on Road	4	1	0	-	5	0	0	0	-	0	0	2	0	-	2	7
% Bicycles on Road	0.4	7.1	-	-	0.6	0.0	0.0	-	-	0.0	0.0	0.4	-	-	0.3	0.4
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	5	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

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Turning Movement Peak Hour Data Plot (4:15 PM)

Main Street & Doty Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Doty Ave 042418  
 Site Code:  
 Start Date: 04/24/2018  
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### Turning Movement Data

Start Time	Main St Southbound						Doty Ave Westbound						Main St Northbound						Private Drive Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
6:00 AM	0	50	1	0	0	51	0	0	0	0	0	0	3	38	0	0	0	41	0	0	0	0	1	0	92
6:15 AM	2	65	1	0	0	68	0	0	3	0	5	3	4	62	0	0	0	66	0	0	0	0	0	0	137
6:30 AM	0	68	0	0	0	68	0	0	4	0	2	4	4	85	0	0	0	89	0	0	0	0	0	0	161
6:45 AM	1	78	0	0	1	79	2	1	4	0	3	7	1	106	0	0	0	107	0	0	0	0	0	0	193
Hourly Total	3	261	2	0	1	266	2	1	11	0	10	14	12	291	0	0	0	303	0	0	0	0	1	0	583
7:00 AM	1	87	0	0	0	88	0	0	3	0	7	3	4	79	1	0	0	84	0	0	0	0	0	0	175
7:15 AM	5	102	0	0	0	107	0	1	2	0	4	3	11	137	0	0	0	148	0	0	0	0	0	0	258
7:30 AM	7	132	2	0	0	141	0	0	4	0	2	4	12	157	0	0	0	169	0	0	0	0	3	0	314
7:45 AM	7	116	0	0	0	123	0	1	8	0	8	9	25	194	0	0	0	219	0	0	3	0	5	3	354
Hourly Total	20	437	2	0	0	459	0	2	17	0	21	19	52	567	1	0	0	620	0	0	3	0	8	3	1101
8:00 AM	5	96	2	0	1	103	0	0	8	0	10	8	19	133	0	0	0	152	1	1	0	0	0	2	265
8:15 AM	4	98	1	0	0	103	1	0	5	0	9	6	5	120	2	0	0	127	2	1	2	0	1	5	241
8:30 AM	8	70	0	0	1	78	0	0	3	0	4	3	10	116	2	0	0	128	0	1	0	0	1	1	210
8:45 AM	2	64	1	0	3	67	0	1	2	0	4	3	12	98	3	0	0	113	4	0	0	0	0	4	187
Hourly Total	19	328	4	0	5	351	1	1	18	0	27	20	46	467	7	0	0	520	7	3	2	0	2	12	903
9:00 AM	5	59	1	0	0	65	1	1	9	0	5	11	2	67	2	0	0	71	2	1	3	0	0	6	153
9:15 AM	4	67	2	0	0	73	2	0	2	0	1	4	7	82	1	0	0	90	0	1	4	0	0	5	172
9:30 AM	5	80	1	0	0	86	1	0	2	0	0	3	12	87	3	0	0	102	1	0	1	0	1	2	193
9:45 AM	4	95	2	0	1	101	2	3	7	0	0	12	10	61	3	0	0	74	0	0	0	0	2	0	187
Hourly Total	18	301	6	0	1	325	6	4	20	0	6	30	31	297	9	0	0	337	3	2	8	0	3	13	705
10:00 AM	4	73	1	0	1	78	2	0	4	0	0	6	5	75	0	0	0	80	1	1	4	0	2	6	170
10:15 AM	5	70	1	0	0	76	0	1	7	0	0	8	4	66	3	0	0	73	1	1	4	0	1	6	163
10:30 AM	7	81	2	1	2	91	3	1	10	0	3	14	8	71	0	0	0	79	2	0	2	0	0	4	188
10:45 AM	4	88	2	0	0	94	2	0	6	0	3	8	4	76	0	0	0	80	0	0	1	0	0	1	183
Hourly Total	20	312	6	1	3	339	7	2	27	0	6	36	21	288	3	0	0	312	4	2	11	0	3	17	704
11:00 AM	3	109	1	0	0	113	2	2	8	0	1	12	13	87	1	0	0	101	1	0	2	0	0	3	229
11:15 AM	3	82	1	0	0	86	4	0	10	0	3	14	5	83	0	0	0	88	1	0	1	0	0	2	190
11:30 AM	3	115	2	0	0	120	3	0	16	0	4	19	13	72	1	0	0	86	2	0	1	0	0	3	228
11:45 AM	3	88	3	0	0	94	1	0	5	0	4	6	8	100	0	0	0	108	1	1	0	0	1	2	210
Hourly Total	12	394	7	0	0	413	10	2	39	0	12	51	39	342	2	0	0	383	5	1	4	0	1	10	857
12:00 PM	2	107	3	0	1	112	4	0	6	0	9	10	4	89	0	0	0	93	0	0	1	0	2	1	216
12:15 PM	1	85	4	0	3	90	1	0	9	0	0	10	6	84	0	0	0	90	1	1	1	0	0	3	193
12:30 PM	2	105	5	0	0	112	3	1	10	0	3	14	5	74	0	0	0	79	0	0	1	0	0	1	206
12:45 PM	6	85	1	0	0	92	3	1	10	0	3	14	9	90	2	0	0	101	0	0	0	0	2	0	207
Hourly Total	11	382	13	0	4	406	11	2	35	0	15	48	24	337	2	0	0	363	1	1	3	0	4	5	822
1:00 PM	4	103	0	0	0	107	4	1	11	0	6	16	5	85	0	0	0	90	0	1	0	0	0	1	214
1:15 PM	3	90	2	0	0	95	0	1	9	0	3	10	7	73	0	1	0	81	0	0	0	0	2	0	186

1:30 PM	1	88	2	0	1	91	1	2	7	0	2	10	7	84	2	0	0	93	0	0	0	0	1	0	194
1:45 PM	6	86	2	0	0	94	3	0	7	0	3	10	5	83	1	0	0	89	1	1	2	0	1	4	197
Hourly Total	14	367	6	0	1	387	8	4	34	0	14	46	24	325	3	1	0	353	1	2	2	0	4	5	791
2:00 PM	4	92	1	0	0	97	1	2	12	0	0	15	9	86	1	0	0	96	2	0	1	0	0	3	211
2:15 PM	1	102	3	0	0	106	3	0	10	0	0	13	6	77	1	0	0	84	1	2	0	0	0	3	206
2:30 PM	2	113	4	0	0	119	5	0	8	0	1	13	8	96	2	0	1	106	0	0	2	0	2	2	240
2:45 PM	3	122	1	0	0	126	3	0	8	0	4	11	6	112	0	0	0	118	2	0	3	0	0	5	260
Hourly Total	10	429	9	0	0	448	12	2	38	0	5	52	29	371	4	0	1	404	5	2	6	0	2	13	917
3:00 PM	4	164	2	0	1	170	2	0	11	0	0	13	3	86	2	1	0	92	1	0	3	0	1	4	279
3:15 PM	7	112	0	0	2	119	1	0	11	0	3	12	8	110	3	0	0	121	1	1	0	0	2	2	254
3:30 PM	3	155	2	0	0	160	4	0	5	0	5	9	7	118	0	0	0	125	2	0	1	0	0	3	297
3:45 PM	1	139	0	0	0	140	2	0	7	0	1	9	14	106	1	0	0	121	0	0	2	0	0	2	272
Hourly Total	15	570	4	0	3	589	9	0	34	0	9	43	32	420	6	1	0	459	4	1	6	0	3	11	1102
4:00 PM	3	189	2	0	0	194	1	0	9	0	9	10	12	73	0	0	0	85	1	0	3	0	0	4	293
4:15 PM	0	141	1	0	0	142	1	0	10	0	6	11	9	101	0	0	0	110	0	1	0	0	0	1	264
4:30 PM	4	221	8	0	0	233	6	0	11	0	8	17	10	100	1	0	0	111	0	0	0	0	1	0	361
4:45 PM	1	189	1	0	0	191	1	0	13	0	5	14	28	120	1	0	0	149	1	1	0	0	1	2	356
Hourly Total	8	740	12	0	0	760	9	0	43	0	28	52	59	394	2	0	0	455	2	2	3	0	2	7	1274
5:00 PM	0	209	3	0	0	212	2	0	17	0	9	19	11	106	0	0	1	117	0	0	2	0	1	2	350
5:15 PM	3	128	1	0	0	132	6	0	9	0	4	15	13	102	1	0	0	116	0	0	2	0	1	2	265
5:30 PM	0	111	11	0	0	122	6	0	8	0	5	14	7	104	0	0	0	111	0	1	1	0	3	2	249
5:45 PM	0	103	4	0	0	107	5	1	8	0	2	14	6	84	0	0	0	90	1	0	0	0	2	1	212
Hourly Total	3	551	19	0	0	573	19	1	42	0	20	62	37	396	1	0	1	434	1	1	5	0	7	7	1076
6:00 PM	1	129	4	0	0	134	1	0	5	0	1	6	3	93	1	0	0	97	0	0	0	0	1	0	237
6:15 PM	0	92	3	0	0	95	0	0	7	0	0	7	5	73	1	0	6	79	0	0	0	0	6	0	181
6:30 PM	0	78	2	0	0	80	1	0	23	0	4	24	5	58	2	0	0	65	1	0	0	0	0	1	170
6:45 PM	0	71	2	0	0	73	1	0	8	0	5	9	4	65	0	0	0	69	1	1	0	0	2	2	153
Hourly Total	1	370	11	0	0	382	3	0	43	0	10	46	17	289	4	0	6	310	2	1	0	0	9	3	741
7:00 PM	0	77	4	0	0	81	0	0	3	0	2	3	7	55	1	0	0	63	1	0	1	0	3	2	149
7:15 PM	0	73	0	0	0	73	2	0	9	0	2	11	3	41	0	0	2	44	0	0	0	0	2	0	128
7:30 PM	0	49	4	0	0	53	1	0	10	0	2	11	0	45	0	0	0	45	0	2	0	0	1	2	111
7:45 PM	0	47	1	0	0	48	0	0	8	0	2	8	4	45	0	0	0	49	0	1	0	0	0	1	106
Hourly Total	0	246	9	0	0	255	3	0	30	0	8	33	14	186	1	0	2	201	1	3	1	0	6	5	494
Grand Total	154	5688	110	1	18	5953	100	21	431	0	191	552	437	4970	45	2	10	5454	36	21	54	0	55	111	12070
Approach %	2.6	95.5	1.8	0.0	-	-	18.1	3.8	78.1	0.0	-	-	8.0	91.1	0.8	0.0	-	-	32.4	18.9	48.6	0.0	-	-	-
Total %	1.3	47.1	0.9	0.0	-	49.3	0.8	0.2	3.6	0.0	-	4.6	3.6	41.2	0.4	0.0	-	45.2	0.3	0.2	0.4	0.0	-	0.9	-
Lights	153	5598	107	1	-	5859	92	19	373	0	-	484	417	4921	42	2	-	5382	35	19	54	0	-	108	11833
% Lights	99.4	98.4	97.3	100.0	-	98.4	92.0	90.5	86.5	-	-	87.7	95.4	99.0	93.3	100.0	-	98.7	97.2	90.5	100.0	-	-	97.3	98.0
Buses	0	12	0	0	-	12	0	0	1	0	-	1	1	12	1	0	-	14	0	0	0	0	-	0	27
% Buses	0.0	0.2	0.0	0.0	-	0.2	0.0	0.0	0.2	-	-	0.2	0.2	0.2	2.2	0.0	-	0.3	0.0	0.0	0.0	-	-	0.0	0.2
Single-Unit Trucks	1	52	1	0	-	54	3	0	24	0	-	27	8	26	1	0	-	35	1	2	0	0	-	3	119
% Single-Unit Trucks	0.6	0.9	0.9	0.0	-	0.9	3.0	0.0	5.6	-	-	4.9	1.8	0.5	2.2	0.0	-	0.6	2.8	9.5	0.0	-	-	2.7	1.0
Articulated Trucks	0	13	0	0	-	13	0	0	32	0	-	32	0	5	1	0	-	6	0	0	0	0	-	0	51
% Articulated Trucks	0.0	0.2	0.0	0.0	-	0.2	0.0	0.0	7.4	-	-	5.8	0.0	0.1	2.2	0.0	-	0.1	0.0	0.0	0.0	-	-	0.0	0.4
Bicycles on Road	0	13	2	0	-	15	5	2	1	0	-	8	11	6	0	0	-	17	0	0	0	0	-	0	40
% Bicycles on Road	0.0	0.2	1.8	0.0	-	0.3	5.0	9.5	0.2	-	-	1.4	2.5	0.1	0.0	0.0	-	0.3	0.0	0.0	0.0	-	-	0.0	0.3
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	8	-	-	-	-	-	1	-	-	-	-	-	2	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	4.2	-	-	-	-	-	10.0	-	-	-	-	-	3.6	-	-
Pedestrians	-	-	-	-	18	-	-	-	-	-	183	-	-	-	-	-	9	-	-	-	-	-	53	-	-

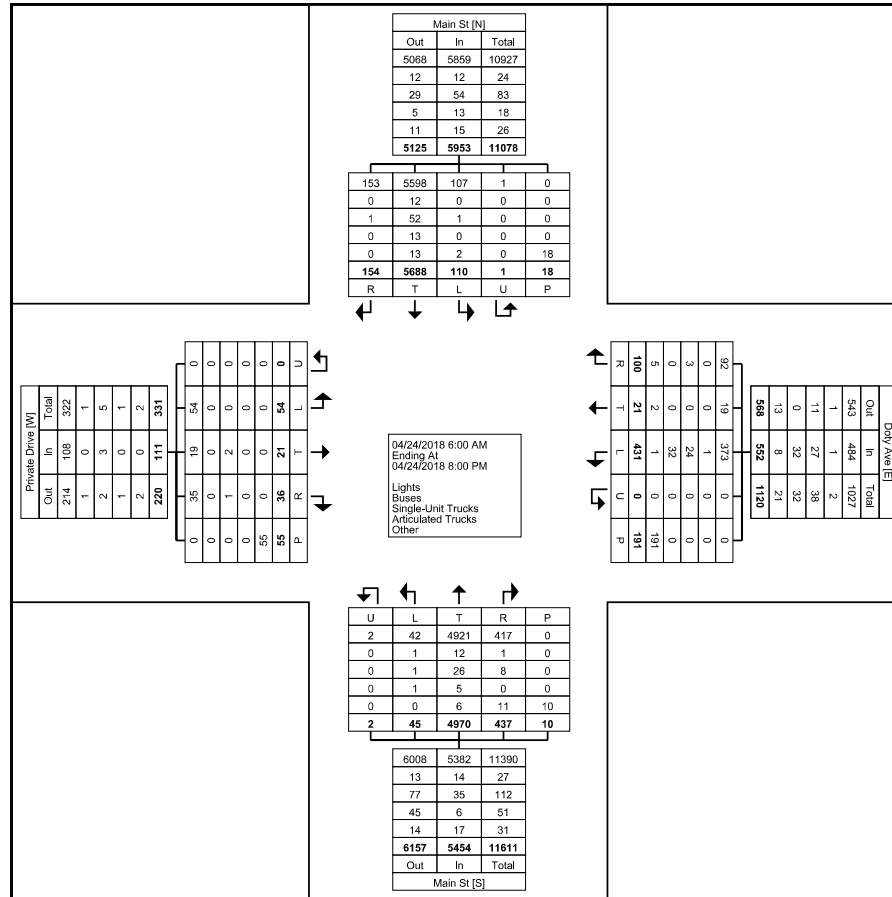


% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	95.8	-	-	-	-	-	90.0	-	-	-	-	-	96.4	-	-
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MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

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 Start Date: 04/24/2018  
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Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Doty Ave 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 5

### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Main St Southbound						Doty Ave Westbound						Main St Northbound						Private Drive Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	5	102	0	0	0	107	0	1	2	0	4	3	11	137	0	0	0	148	0	0	0	0	0	0	258
7:30 AM	7	132	2	0	0	141	0	0	4	0	2	4	12	157	0	0	0	169	0	0	0	0	3	0	314
7:45 AM	7	116	0	0	0	123	0	1	8	0	8	9	25	194	0	0	0	219	0	0	3	0	5	3	354
8:00 AM	5	96	2	0	1	103	0	0	8	0	10	8	19	133	0	0	0	152	1	1	0	0	0	2	265
<b>Total</b>	<b>24</b>	<b>446</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>474</b>	<b>0</b>	<b>2</b>	<b>22</b>	<b>0</b>	<b>24</b>	<b>24</b>	<b>67</b>	<b>621</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>688</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>8</b>	<b>5</b>	<b>1191</b>
Approach %	5.1	94.1	0.8	0.0	-	-	0.0	8.3	91.7	0.0	-	-	9.7	90.3	0.0	0.0	-	-	20.0	20.0	60.0	0.0	-	-	-
Total %	2.0	37.4	0.3	0.0	-	39.8	0.0	0.2	1.8	0.0	-	2.0	5.6	52.1	0.0	0.0	-	57.8	0.1	0.1	0.3	0.0	-	0.4	-
PHF	0.857	0.845	0.500	0.000	-	0.840	0.000	0.500	0.688	0.000	-	0.667	0.670	0.800	0.000	0.000	-	0.785	0.250	0.250	0.250	0.000	-	0.417	0.841
Lights	24	434	4	0	-	462	0	2	15	0	-	17	66	615	0	0	-	681	1	1	3	0	-	5	1165
% Lights	100.0	97.3	100.0	-	-	97.5	-	100.0	68.2	-	-	70.8	98.5	99.0	-	-	-	99.0	100.0	100.0	100.0	-	-	100.0	97.8
Buses	0	1	0	0	-	1	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	4
% Buses	0.0	0.2	0.0	-	-	0.2	-	0.0	0.0	-	-	0.0	0.0	0.5	-	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.3
Single-Unit Trucks	0	9	0	0	-	9	0	0	3	0	-	3	0	2	0	0	-	2	0	0	0	0	-	0	14
% Single-Unit Trucks	0.0	2.0	0.0	-	-	1.9	-	0.0	13.6	-	-	12.5	0.0	0.3	-	-	-	0.3	0.0	0.0	0.0	-	-	0.0	1.2
Articulated Trucks	0	1	0	0	-	1	0	0	4	0	-	4	0	1	0	0	-	1	0	0	0	0	-	0	6
% Articulated Trucks	0.0	0.2	0.0	-	-	0.2	-	0.0	18.2	-	-	16.7	0.0	0.2	-	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.5
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.2	0.0	-	-	0.2	-	0.0	0.0	-	-	0.0	1.5	0.0	-	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	24	-	-	-	-	-	0	-	-	-	-	-	8	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-





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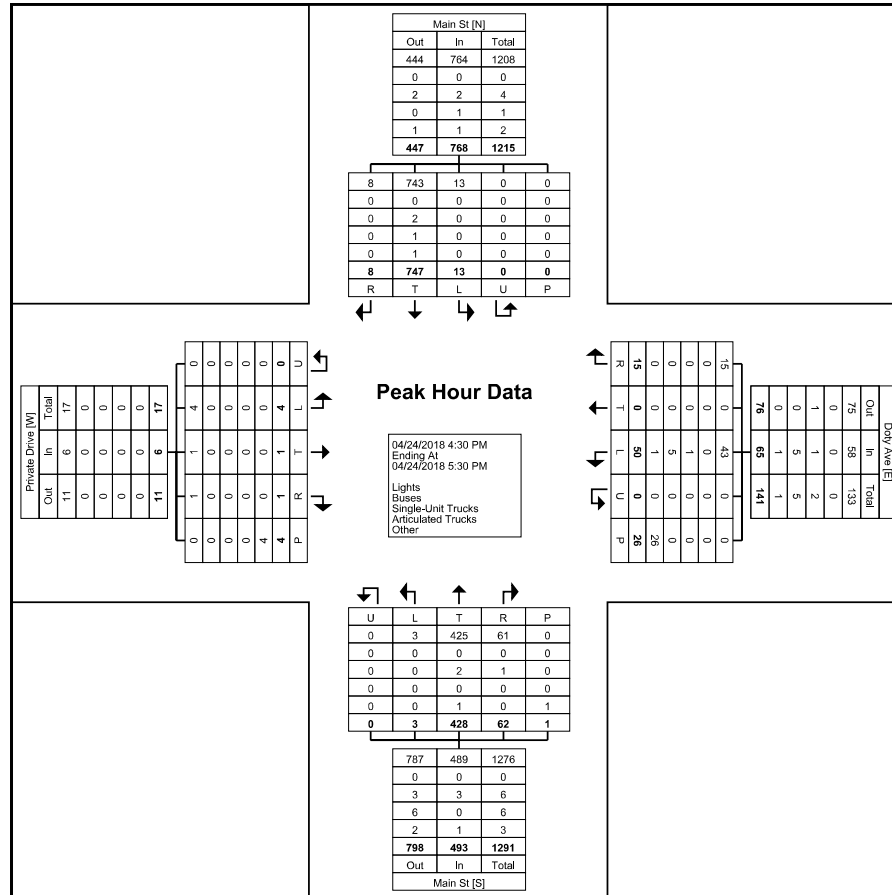
### Turning Movement Peak Hour Data (4:30 PM)

Start Time	Main St Southbound						Doty Ave Westbound						Main St Northbound						Private Drive Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:30 PM	4	221	8	0	0	233	6	0	11	0	8	17	10	100	1	0	0	111	0	0	0	0	1	0	361
4:45 PM	1	189	1	0	0	191	1	0	13	0	5	14	28	120	1	0	0	149	1	1	0	0	1	2	356
5:00 PM	0	209	3	0	0	212	2	0	17	0	9	19	11	106	0	0	1	117	0	0	2	0	1	2	350
5:15 PM	3	128	1	0	0	132	6	0	9	0	4	15	13	102	1	0	0	116	0	0	2	0	1	2	265
<b>Total</b>	<b>8</b>	<b>747</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>768</b>	<b>15</b>	<b>0</b>	<b>50</b>	<b>0</b>	<b>26</b>	<b>65</b>	<b>62</b>	<b>428</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>493</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>6</b>	<b>1332</b>
Approach %	1.0	97.3	1.7	0.0	-	-	23.1	0.0	76.9	0.0	-	-	12.6	86.8	0.6	0.0	-	-	16.7	16.7	66.7	0.0	-	-	-
Total %	0.6	56.1	1.0	0.0	-	57.7	1.1	0.0	3.8	0.0	-	4.9	4.7	32.1	0.2	0.0	-	37.0	0.1	0.1	0.3	0.0	-	0.5	-
PHF	0.500	0.845	0.406	0.000	-	0.824	0.625	0.000	0.735	0.000	-	0.855	0.554	0.892	0.750	0.000	-	0.827	0.250	0.250	0.500	0.000	-	0.750	0.922
Lights	8	743	13	0	-	764	15	0	43	0	-	58	61	425	3	0	-	489	1	1	4	0	-	6	1317
% Lights	100.0	99.5	100.0	-	-	99.5	100.0	-	86.0	-	-	89.2	98.4	99.3	100.0	-	-	99.2	100.0	100.0	100.0	-	-	100.0	98.9
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Single-Unit Trucks	0	2	0	0	-	2	0	0	1	0	-	1	1	2	0	0	-	3	0	0	0	0	-	0	6
% Single-Unit Trucks	0.0	0.3	0.0	-	-	0.3	0.0	-	2.0	-	-	1.5	1.6	0.5	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.5
Articulated Trucks	0	1	0	0	-	1	0	0	5	0	-	5	0	0	0	0	-	0	0	0	0	0	-	0	6
% Articulated Trucks	0.0	0.1	0.0	-	-	0.1	0.0	-	10.0	-	-	7.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.5
Bicycles on Road	0	1	0	0	-	1	0	0	1	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	3
% Bicycles on Road	0.0	0.1	0.0	-	-	0.1	0.0	-	2.0	-	-	1.5	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	26	-	-	-	-	-	1	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



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 608.242.7779 cwagner@msa-ps.com

Count Name: Main St & Doty Ave 042418  
 Site Code:  
 Start Date: 04/24/2018  
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Turning Movement Peak Hour Data Plot (4:30 PM)

Church Street & Wisconsin Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church & Wisconsin 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 1

### Turning Movement Data

Start Time	Church St Southbound						Wisconsin Ave Westbound						Church St Northbound						Wisconsin Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
6:00 AM	1	0	0	0	0	1	0	50	2	0	1	52	2	1	0	0	0	3	0	33	8	0	0	41	97
6:15 AM	2	1	0	0	0	3	7	62	0	0	0	69	2	2	0	0	3	4	0	43	21	0	0	64	140
6:30 AM	6	0	0	0	0	6	16	61	1	0	2	78	2	2	1	0	2	5	0	53	26	0	0	79	168
6:45 AM	4	1	0	0	0	5	17	74	1	0	2	92	1	13	0	0	3	14	1	55	50	0	0	106	217
Hourly Total	13	2	0	0	0	15	40	247	4	0	5	291	7	18	1	0	8	26	1	184	105	0	0	290	622
7:00 AM	2	1	0	0	0	3	14	87	2	0	6	103	1	12	0	0	3	13	1	50	35	0	0	86	205
7:15 AM	1	1	2	0	0	4	33	102	0	0	9	135	6	24	1	0	4	31	1	78	46	0	0	125	295
7:30 AM	7	2	0	0	1	9	32	126	5	0	12	163	4	33	6	0	3	43	0	97	61	0	1	158	373
7:45 AM	2	2	1	0	0	5	49	118	6	0	14	173	4	52	1	0	3	57	2	114	68	0	0	184	419
Hourly Total	12	6	3	0	1	21	128	433	13	0	41	574	15	121	8	0	13	144	4	339	210	0	1	553	1292
8:00 AM	1	1	1	0	0	3	32	96	4	0	11	132	3	21	1	0	2	25	2	98	55	0	0	155	315
8:15 AM	1	1	3	0	0	5	24	97	2	0	2	123	9	7	0	0	4	16	1	84	31	0	1	116	260
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	2	2	4	0	0	8	56	193	6	0	13	255	12	28	1	0	6	41	3	182	86	0	1	271	575
2:30 PM	15	1	3	0	3	19	3	104	10	0	6	117	8	2	1	0	7	11	1	94	4	0	0	99	246
2:45 PM	17	3	5	0	1	25	4	106	3	0	0	113	4	2	2	0	5	8	4	109	5	0	0	118	264
Hourly Total	32	4	8	0	4	44	7	210	13	0	6	230	12	4	3	0	12	19	5	203	9	0	0	217	510
3:00 PM	27	8	10	0	9	45	3	142	3	0	4	148	6	2	1	0	6	9	0	88	2	0	0	90	292
3:15 PM	10	6	5	0	4	21	2	105	4	0	5	111	7	3	3	0	5	13	3	109	4	0	0	116	261
3:30 PM	31	12	16	0	0	59	8	123	9	0	6	140	6	6	5	0	13	17	5	98	1	0	0	104	320
3:45 PM	27	7	9	0	0	43	3	109	7	0	4	119	11	4	2	0	6	17	5	114	0	0	0	119	298
Hourly Total	95	33	40	0	13	168	16	479	23	0	19	518	30	15	11	0	30	56	13	409	7	0	0	429	1171
4:00 PM	41	19	14	0	0	74	1	147	4	0	12	152	8	6	6	0	13	20	3	74	1	0	0	78	324
4:15 PM	39	22	20	0	0	81	2	100	4	0	9	106	10	4	1	0	5	15	7	86	8	0	0	101	303
4:30 PM	75	21	29	0	2	125	4	141	2	0	24	147	10	4	13	0	4	27	0	83	2	0	1	85	384
4:45 PM	81	28	27	0	3	136	4	106	3	0	9	113	13	5	5	0	9	23	7	116	2	0	1	125	397
Hourly Total	236	90	90	0	5	416	11	494	13	0	54	518	41	19	25	0	31	85	17	359	13	0	2	389	1408
5:00 PM	65	19	25	0	4	109	6	141	5	0	13	152	8	3	6	0	9	17	8	100	7	0	2	115	393
5:15 PM	29	14	21	0	6	64	4	102	6	0	9	112	17	1	3	0	9	21	7	91	2	0	0	100	297
5:30 PM	19	15	18	0	2	52	7	98	7	0	18	112	6	4	4	0	26	14	5	99	8	0	2	112	290
5:45 PM	12	4	12	0	4	28	14	87	2	0	5	103	13	0	5	1	13	19	5	88	4	0	0	97	247
Hourly Total	125	52	76	0	16	253	31	428	20	0	45	479	44	8	18	1	57	71	25	378	21	0	4	424	1227
Grand Total	515	189	221	0	39	925	289	2484	92	0	183	2865	161	213	67	1	157	442	68	2054	451	0	8	2573	6805
Approach %	55.7	20.4	23.9	0.0	-	-	10.1	86.7	3.2	0.0	-	-	36.4	48.2	15.2	0.2	-	-	2.6	79.8	17.5	0.0	-	-	-
Total %	7.6	2.8	3.2	0.0	-	13.6	4.2	36.5	1.4	0.0	-	42.1	2.4	3.1	1.0	0.0	-	6.5	1.0	30.2	6.6	0.0	-	37.8	-
Lights	508	187	218	0	-	913	287	2450	90	0	-	2827	134	207	64	1	-	406	67	2026	449	0	-	2542	6688
% Lights	98.6	98.9	98.6	-	-	98.7	99.3	98.6	97.8	-	-	98.7	83.2	97.2	95.5	100.0	-	91.9	98.5	98.6	99.6	-	-	98.8	98.3

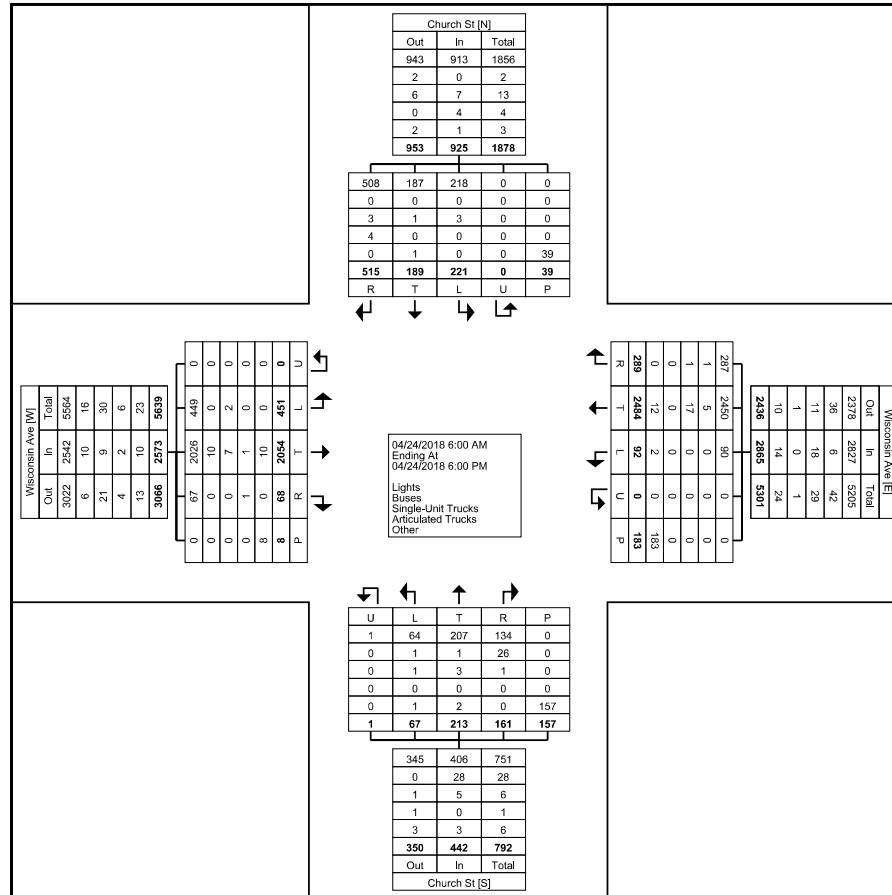


Buses	0	0	0	0	-	0	1	5	0	0	-	6	26	1	1	0	-	28	0	10	0	0	-	10	44
% Buses	0.0	0.0	0.0	-	-	0.0	0.3	0.2	0.0	-	-	0.2	16.1	0.5	1.5	0.0	-	6.3	0.0	0.5	0.0	-	-	0.4	0.6
Single-Unit Trucks	3	1	3	0	-	7	1	17	0	0	-	18	1	3	1	0	-	5	0	7	2	0	-	9	39
% Single-Unit Trucks	0.6	0.5	1.4	-	-	0.8	0.3	0.7	0.0	-	-	0.6	0.6	1.4	1.5	0.0	-	1.1	0.0	0.3	0.4	-	-	0.3	0.6
Articulated Trucks	4	0	0	0	-	4	0	0	0	0	-	0	0	0	0	-	0	1	1	0	0	-	2	6	
% Articulated Trucks	0.8	0.0	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	1.5	0.0	0.0	-	-	0.1	0.1	
Bicycles on Road	0	1	0	0	-	1	0	12	2	0	-	14	0	2	1	0	-	3	0	10	0	0	-	10	28
% Bicycles on Road	0.0	0.5	0.0	-	-	0.1	0.0	0.5	2.2	-	-	0.5	0.0	0.9	1.5	0.0	-	0.7	0.0	0.5	0.0	-	-	0.4	0.4
Bicycles on Crosswalk	-	-	-	-	4	-	-	-	-	-	1	-	-	-	-	-	6	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	10.3	-	-	-	-	-	0.5	-	-	-	-	-	3.8	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	35	-	-	-	-	-	182	-	-	-	-	-	151	-	-	-	-	-	8	-	-
% Pedestrians	-	-	-	-	89.7	-	-	-	-	-	99.5	-	-	-	-	-	96.2	-	-	-	-	-	100.0	-	-



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Turning Movement Data Plot



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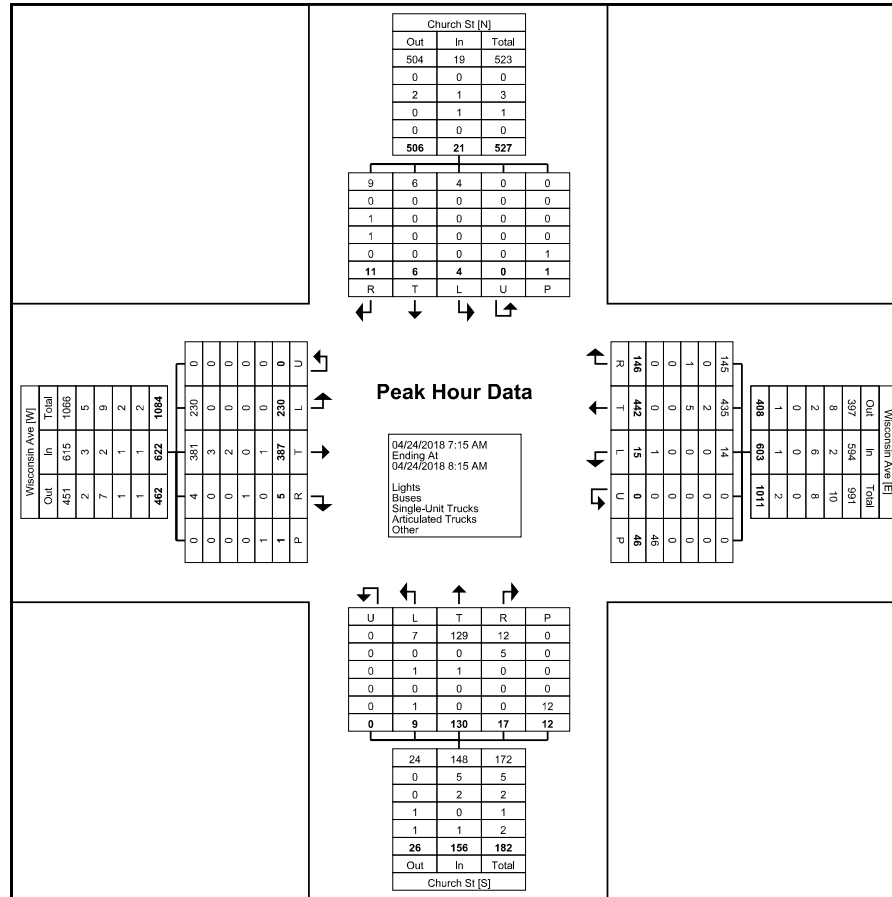
### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Church St Southbound						Wisconsin Ave Westbound						Church St Northbound						Wisconsin Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	1	1	2	0	0	4	33	102	0	0	9	135	6	24	1	0	4	31	1	78	46	0	0	125	295
7:30 AM	7	2	0	0	1	9	32	126	5	0	12	163	4	33	6	0	3	43	0	97	61	0	1	158	373
7:45 AM	2	2	1	0	0	5	49	118	6	0	14	173	4	52	1	0	3	57	2	114	68	0	0	184	419
8:00 AM	1	1	1	0	0	3	32	96	4	0	11	132	3	21	1	0	2	25	2	98	55	0	0	155	315
<b>Total</b>	<b>11</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>21</b>	<b>146</b>	<b>442</b>	<b>15</b>	<b>0</b>	<b>46</b>	<b>603</b>	<b>17</b>	<b>130</b>	<b>9</b>	<b>0</b>	<b>12</b>	<b>156</b>	<b>5</b>	<b>387</b>	<b>230</b>	<b>0</b>	<b>1</b>	<b>622</b>	<b>1402</b>
Approach %	52.4	28.6	19.0	0.0	-	-	24.2	73.3	2.5	0.0	-	-	10.9	83.3	5.8	0.0	-	-	0.8	62.2	37.0	0.0	-	-	-
Total %	0.8	0.4	0.3	0.0	-	1.5	10.4	31.5	1.1	0.0	-	43.0	1.2	9.3	0.6	0.0	-	11.1	0.4	27.6	16.4	0.0	-	44.4	-
PHF	0.393	0.750	0.500	0.000	-	0.583	0.745	0.877	0.625	0.000	-	0.871	0.708	0.625	0.375	0.000	-	0.684	0.625	0.849	0.846	0.000	-	0.845	0.837
Lights	9	6	4	0	-	19	145	435	14	0	-	594	12	129	7	0	-	148	4	381	230	0	-	615	1376
% Lights	81.8	100.0	100.0	-	-	90.5	99.3	98.4	93.3	-	-	98.5	70.6	99.2	77.8	-	-	94.9	80.0	98.4	100.0	-	-	98.9	98.1
Buses	0	0	0	0	-	0	0	2	0	0	-	2	5	0	0	0	-	5	0	3	0	0	-	3	10
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.3	29.4	0.0	0.0	-	-	3.2	0.0	0.8	0.0	-	-	0.5	0.7
Single-Unit Trucks	1	0	0	0	-	1	1	5	0	0	-	6	0	1	1	0	-	2	0	2	0	0	-	2	11
% Single-Unit Trucks	9.1	0.0	0.0	-	-	4.8	0.7	1.1	0.0	-	-	1.0	0.0	0.8	11.1	-	-	1.3	0.0	0.5	0.0	-	-	0.3	0.8
Articulated Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	2
% Articulated Trucks	9.1	0.0	0.0	-	-	4.8	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	20.0	0.0	0.0	-	-	0.2	0.1
Bicycles on Road	0	0	0	0	-	0	0	0	1	0	-	1	0	0	1	0	-	1	0	1	0	0	-	1	3
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	6.7	-	-	0.2	0.0	0.0	11.1	-	-	0.6	0.0	0.3	0.0	-	-	0.2	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	46	-	-	-	-	-	12	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church & Wisconsin 042418  
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Turning Movement Peak Hour Data Plot (7:15 AM)



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

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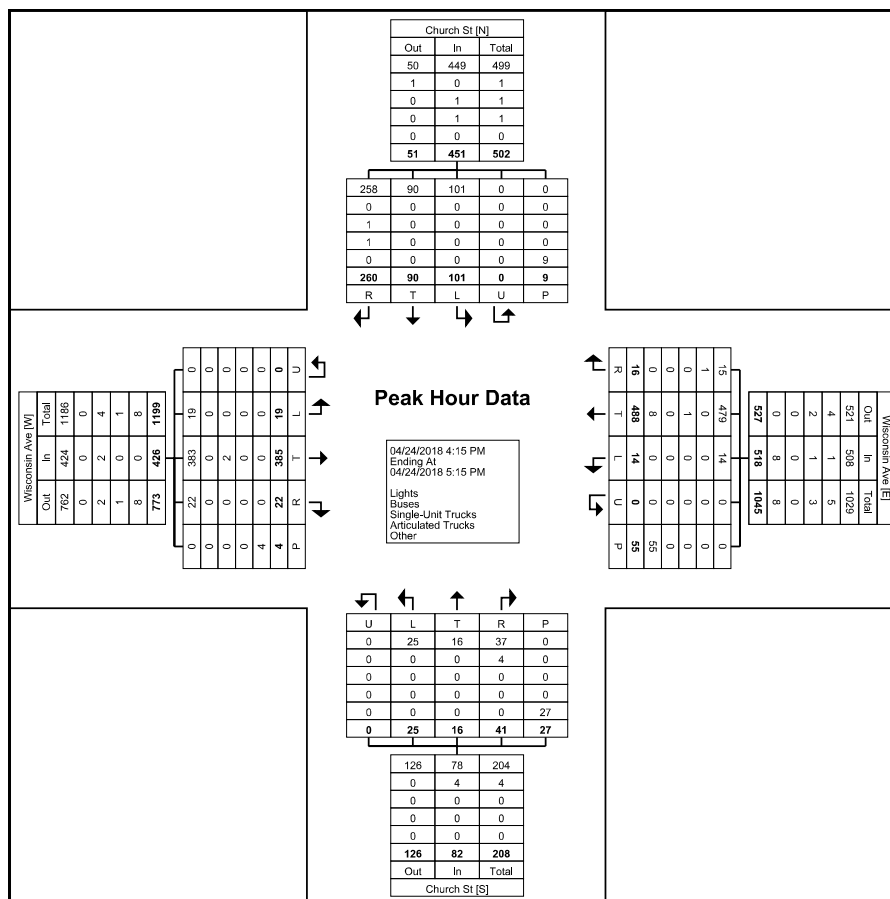
### Turning Movement Peak Hour Data (4:15 PM)

Start Time	Church St Southbound						Wisconsin Ave Westbound						Church St Northbound						Wisconsin Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:15 PM	39	22	20	0	0	81	2	100	4	0	9	106	10	4	1	0	5	15	7	86	8	0	0	101	303
4:30 PM	75	21	29	0	2	125	4	141	2	0	24	147	10	4	13	0	4	27	0	83	2	0	1	85	384
4:45 PM	81	28	27	0	3	136	4	106	3	0	9	113	13	5	5	0	9	23	7	116	2	0	1	125	397
5:00 PM	65	19	25	0	4	109	6	141	5	0	13	152	8	3	6	0	9	17	8	100	7	0	2	115	393
<b>Total</b>	<b>260</b>	<b>90</b>	<b>101</b>	<b>0</b>	<b>9</b>	<b>451</b>	<b>16</b>	<b>488</b>	<b>14</b>	<b>0</b>	<b>55</b>	<b>518</b>	<b>41</b>	<b>16</b>	<b>25</b>	<b>0</b>	<b>27</b>	<b>82</b>	<b>22</b>	<b>385</b>	<b>19</b>	<b>0</b>	<b>4</b>	<b>426</b>	<b>1477</b>
Approach %	57.6	20.0	22.4	0.0	-	-	3.1	94.2	2.7	0.0	-	-	50.0	19.5	30.5	0.0	-	-	5.2	90.4	4.5	0.0	-	-	-
Total %	17.6	6.1	6.8	0.0	-	30.5	1.1	33.0	0.9	0.0	-	35.1	2.8	1.1	1.7	0.0	-	5.6	1.5	26.1	1.3	0.0	-	28.8	-
PHF	0.802	0.804	0.871	0.000	-	0.829	0.667	0.865	0.700	0.000	-	0.852	0.788	0.800	0.481	0.000	-	0.759	0.688	0.830	0.594	0.000	-	0.852	0.930
Lights	258	90	101	0	-	449	15	479	14	0	-	508	37	16	25	0	-	78	22	383	19	0	-	424	1459
% Lights	99.2	100.0	100.0	-	-	99.6	93.8	98.2	100.0	-	-	98.1	90.2	100.0	100.0	-	-	95.1	100.0	99.5	100.0	-	-	99.5	98.8
Buses	0	0	0	0	-	0	1	0	0	0	-	1	4	0	0	0	-	4	0	0	0	0	-	0	5
% Buses	0.0	0.0	0.0	-	-	0.0	6.3	0.0	0.0	-	-	0.2	9.8	0.0	0.0	-	-	4.9	0.0	0.0	0.0	-	-	0.0	0.3
Single-Unit Trucks	1	0	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	0	2	0	0	-	2	4
% Single-Unit Trucks	0.4	0.0	0.0	-	-	0.2	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.5	0.3
Articulated Trucks	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	0.4	0.0	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	8	0	0	-	8	0	0	0	0	-	0	0	0	0	0	-	0	8
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	1.6	0.0	-	-	1.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.5
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	1.8	-	-	-	-	-	3.7	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	9	-	-	-	-	-	54	-	-	-	-	-	26	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	98.2	-	-	-	-	-	96.3	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church & Wisconsin 042418  
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Turning Movement Peak Hour Data Plot (4:15 PM)

Church Street & Doty Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church & Doty 042418  
 Site Code:  
 Start Date: 04/24/2019  
 Page No: 1

### Turning Movement Data

Start Time	Church St Southbound						Doty Ave Westbound						Church St Northbound						Doty Ave Eastbound						Int. Total	
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total		
6:00 AM	0	2	0	0	0	2	1	0	0	0	3	1	1	4	0	0	2	5	1	4	0	0	0	5	13	
6:15 AM	0	1	0	0	2	1	1	3	0	0	3	4	0	1	1	0	1	2	0	2	0	0	1	2	9	
6:30 AM	0	0	1	0	0	1	2	4	0	0	0	6	0	4	1	0	0	5	0	3	0	0	0	3	15	
6:45 AM	0	2	0	0	2	2	2	3	0	0	0	5	3	13	1	0	0	17	0	1	0	0	1	1	25	
Hourly Total	0	5	1	0	4	6	6	10	0	0	6	16	4	22	3	0	3	29	1	10	0	0	2	11	62	
7:00 AM	1	2	2	0	3	5	3	3	2	0	3	8	1	15	1	0	2	17	0	2	0	0	6	2	32	
7:15 AM	0	3	0	0	1	3	5	4	3	0	4	12	2	22	0	0	2	24	0	6	1	0	3	7	46	
7:30 AM	1	4	1	0	7	6	6	11	5	0	5	22	2	37	2	0	0	41	1	5	2	0	4	8	77	
7:45 AM	2	7	1	0	10	10	10	10	3	0	6	23	2	39	0	0	4	41	1	11	10	0	10	22	96	
Hourly Total	4	16	4	0	21	24	24	28	13	0	18	65	7	113	3	0	8	123	2	24	13	0	23	39	251	
8:00 AM	1	1	3	0	2	5	5	9	3	0	6	17	3	19	1	0	5	23	2	7	2	0	3	11	56	
8:15 AM	1	2	1	0	2	4	4	6	3	0	1	13	1	9	0	0	1	10	2	3	1	0	1	6	33	
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hourly Total	2	3	4	0	4	9	9	15	6	0	7	30	4	28	1	0	6	33	4	10	3	0	4	17	89	
2:30 PM	0	7	3	0	1	10	5	8	5	0	3	18	1	3	3	0	2	7	2	13	4	0	1	19	54	
2:45 PM	1	5	3	0	2	9	3	11	2	0	1	16	3	4	1	0	1	8	1	6	1	0	2	8	41	
Hourly Total	1	12	6	0	3	19	8	19	7	0	4	34	4	7	4	0	3	15	3	19	5	0	3	27	95	
3:00 PM	1	10	2	0	2	13	2	9	0	0	3	11	3	7	0	0	0	10	2	3	2	0	1	7	41	
3:15 PM	0	10	0	0	5	10	7	7	6	0	6	20	8	7	0	0	4	15	1	7	1	0	1	9	54	
3:30 PM	4	16	8	0	1	28	1	3	2	0	4	6	4	13	0	0	2	17	1	7	1	0	1	9	60	
3:45 PM	2	13	4	0	5	19	4	5	2	0	3	11	7	10	2	0	0	19	3	13	3	0	3	19	68	
Hourly Total	7	49	14	0	13	70	14	24	10	0	16	48	22	37	2	0	6	61	7	30	7	0	6	44	223	
4:00 PM	2	23	3	0	2	28	9	8	6	0	6	23	2	11	1	0	1	14	0	11	0	0	4	11	76	
4:15 PM	3	22	8	0	2	33	2	2	2	0	7	6	3	11	2	0	4	16	0	10	2	0	2	12	67	
4:30 PM	0	20	4	0	1	24	7	11	4	0	9	22	1	20	1	0	8	22	3	9	2	0	11	14	82	
4:45 PM	2	29	9	1	2	41	2	7	2	0	6	11	3	11	0	0	3	14	4	20	7	0	1	31	97	
Hourly Total	7	94	24	1	7	126	20	28	14	0	28	62	9	53	4	0	16	66	7	50	11	0	18	68	322	
5:00 PM	3	18	13	0	2	34	9	12	2	0	6	23	7	11	0	0	3	18	4	12	1	0	3	17	92	
5:15 PM	4	15	6	0	0	25	4	11	3	0	6	18	6	9	2	0	4	17	2	10	4	0	6	16	76	
5:30 PM	4	13	6	0	9	23	12	10	5	0	7	27	5	5	0	0	2	10	2	15	4	0	9	21	81	
5:45 PM	5	4	6	0	2	15	11	8	5	0	1	24	10	4	0	0	0	14	1	5	1	0	5	7	60	
Hourly Total	16	50	31	0	13	97	36	41	15	0	20	92	28	29	2	0	9	59	9	42	10	0	23	61	309	
Grand Total	37	229	84	1	65	351	117	165	65	0	99	347	78	289	19	0	51	386	33	185	49	0	79	267	1351	
Approach %	10.5	65.2	23.9	0.3	-	-	33.7	47.6	18.7	0.0	-	-	20.2	74.9	4.9	0.0	-	-	12.4	69.3	18.4	0.0	-	-	-	
Total %	2.7	17.0	6.2	0.1	-	26.0	8.7	12.2	4.8	0.0	-	25.7	5.8	21.4	1.4	0.0	-	28.6	2.4	13.7	3.6	0.0	-	19.8	-	
Lights	37	227	84	1	-	349	101	135	65	0	-	301	78	270	19	0	-	367	33	179	49	0	-	261	1278	
% Lights	100.0	99.1	100.0	100.0	-	99.4	86.3	81.8	100.0	-	-	86.7	100.0	93.4	100.0	-	-	95.1	100.0	96.8	100.0	-	-	-	97.8	94.6

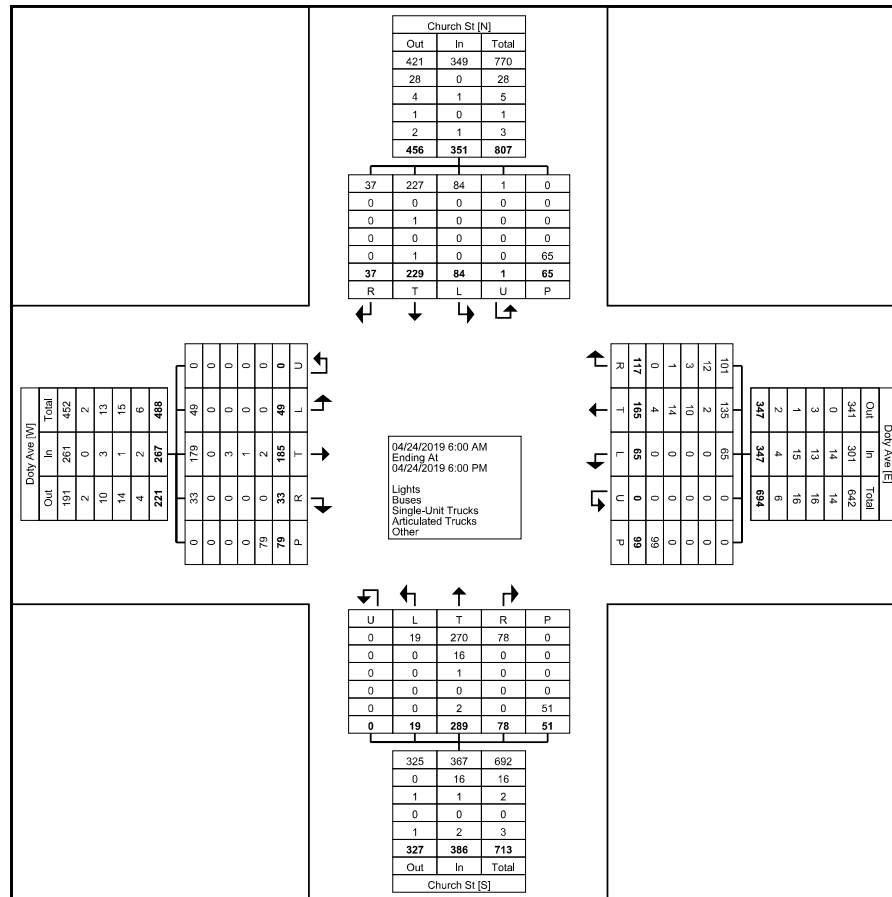


Buses	0	0	0	0	-	0	12	2	0	0	-	14	0	16	0	0	-	16	0	0	0	0	-	0	30
% Buses	0.0	0.0	0.0	0.0	-	0.0	10.3	1.2	0.0	-	-	4.0	0.0	5.5	0.0	-	-	4.1	0.0	0.0	0.0	-	-	0.0	2.2
Single-Unit Trucks	0	1	0	0	-	1	3	10	0	0	-	13	0	1	0	0	-	1	0	3	0	0	-	3	18
% Single-Unit Trucks	0.0	0.4	0.0	0.0	-	0.3	2.6	6.1	0.0	-	-	3.7	0.0	0.3	0.0	-	-	0.3	0.0	1.6	0.0	-	-	1.1	1.3
Articulated Trucks	0	0	0	0	-	0	1	14	0	0	-	15	0	0	0	0	-	0	0	1	0	0	-	1	16
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.9	8.5	0.0	-	-	4.3	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	1.2
Bicycles on Road	0	1	0	0	-	1	0	4	0	0	-	4	0	2	0	0	-	2	0	2	0	0	-	2	9
% Bicycles on Road	0.0	0.4	0.0	0.0	-	0.3	0.0	2.4	0.0	-	-	1.2	0.0	0.7	0.0	-	-	0.5	0.0	1.1	0.0	-	-	0.7	0.7
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	1.5	-	-	-	-	-	1.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	64	-	-	-	-	-	98	-	-	-	-	-	51	-	-	-	-	-	79	-	-
% Pedestrians	-	-	-	-	98.5	-	-	-	-	-	99.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church & Doty 042418  
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Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church & Doty 042418  
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### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Church St Southbound						Doty Ave Westbound						Church St Northbound						Doty Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	0	3	0	0	1	3	5	4	3	0	4	12	2	22	0	0	2	24	0	6	1	0	3	7	46
7:30 AM	1	4	1	0	7	6	6	11	5	0	5	22	2	37	2	0	0	41	1	5	2	0	4	8	77
7:45 AM	2	7	1	0	10	10	10	10	3	0	6	23	2	39	0	0	4	41	1	11	10	0	10	22	96
8:00 AM	1	1	3	0	2	5	5	9	3	0	6	17	3	19	1	0	5	23	2	7	2	0	3	11	56
<b>Total</b>	<b>4</b>	<b>15</b>	<b>5</b>	<b>0</b>	<b>20</b>	<b>24</b>	<b>26</b>	<b>34</b>	<b>14</b>	<b>0</b>	<b>21</b>	<b>74</b>	<b>9</b>	<b>117</b>	<b>3</b>	<b>0</b>	<b>11</b>	<b>129</b>	<b>4</b>	<b>29</b>	<b>15</b>	<b>0</b>	<b>20</b>	<b>48</b>	<b>275</b>
Approach %	16.7	62.5	20.8	0.0	-	-	35.1	45.9	18.9	0.0	-	-	7.0	90.7	2.3	0.0	-	-	8.3	60.4	31.3	0.0	-	-	-
Total %	1.5	5.5	1.8	0.0	-	8.7	9.5	12.4	5.1	0.0	-	26.9	3.3	42.5	1.1	0.0	-	46.9	1.5	10.5	5.5	0.0	-	17.5	-
PHF	0.500	0.536	0.417	0.000	-	0.600	0.650	0.773	0.700	0.000	-	0.804	0.750	0.750	0.375	0.000	-	0.787	0.500	0.659	0.375	0.000	-	0.545	0.716
Lights	4	15	5	0	-	24	22	27	14	0	-	63	9	115	3	0	-	127	4	29	15	0	-	48	262
% Lights	100.0	100.0	100.0	-	-	100.0	84.6	79.4	100.0	-	-	85.1	100.0	98.3	100.0	-	-	98.4	100.0	100.0	100.0	-	-	100.0	95.3
Buses	0	0	0	0	-	0	2	1	0	0	-	3	0	2	0	0	-	2	0	0	0	0	-	0	5
% Buses	0.0	0.0	0.0	-	-	0.0	7.7	2.9	0.0	-	-	4.1	0.0	1.7	0.0	-	-	1.6	0.0	0.0	0.0	-	-	0.0	1.8
Single-Unit Trucks	0	0	0	0	-	0	1	4	0	0	-	5	0	0	0	0	-	0	0	0	0	0	-	0	5
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	3.8	11.8	0.0	-	-	6.8	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.8
Articulated Trucks	0	0	0	0	-	0	1	1	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	3.8	2.9	0.0	-	-	2.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.7
Bicycles on Road	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	2.9	0.0	-	-	1.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.4
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	20	-	-	-	-	-	21	-	-	-	-	-	11	-	-	-	-	-	20	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-





MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church & Doty 042418  
 Site Code:  
 Start Date: 04/24/2019  
 Page No: 6

### Turning Movement Peak Hour Data (4:30 PM)

Start Time	Church St Southbound						Doty Ave Westbound						Church St Northbound						Doty Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:30 PM	0	20	4	0	1	24	7	11	4	0	9	22	1	20	1	0	8	22	3	9	2	0	11	14	82
4:45 PM	2	29	9	1	2	41	2	7	2	0	6	11	3	11	0	0	3	14	4	20	7	0	1	31	97
5:00 PM	3	18	13	0	2	34	9	12	2	0	6	23	7	11	0	0	3	18	4	12	1	0	3	17	92
5:15 PM	4	15	6	0	0	25	4	11	3	0	6	18	6	9	2	0	4	17	2	10	4	0	6	16	76
<b>Total</b>	<b>9</b>	<b>82</b>	<b>32</b>	<b>1</b>	<b>5</b>	<b>124</b>	<b>22</b>	<b>41</b>	<b>11</b>	<b>0</b>	<b>27</b>	<b>74</b>	<b>17</b>	<b>51</b>	<b>3</b>	<b>0</b>	<b>18</b>	<b>71</b>	<b>13</b>	<b>51</b>	<b>14</b>	<b>0</b>	<b>21</b>	<b>78</b>	<b>347</b>
Approach %	7.3	66.1	25.8	0.8	-	-	29.7	55.4	14.9	0.0	-	-	23.9	71.8	4.2	0.0	-	-	16.7	65.4	17.9	0.0	-	-	-
Total %	2.6	23.6	9.2	0.3	-	35.7	6.3	11.8	3.2	0.0	-	21.3	4.9	14.7	0.9	0.0	-	20.5	3.7	14.7	4.0	0.0	-	22.5	-
PHF	0.563	0.707	0.615	0.250	-	0.756	0.611	0.854	0.688	0.000	-	0.804	0.607	0.638	0.375	0.000	-	0.807	0.813	0.638	0.500	0.000	-	0.629	0.894
Lights	9	82	32	1	-	124	20	32	11	0	-	63	17	48	3	0	-	68	13	50	14	0	-	77	332
% Lights	100.0	100.0	100.0	100.0	-	100.0	90.9	78.0	100.0	-	-	85.1	100.0	94.1	100.0	-	-	95.8	100.0	98.0	100.0	-	-	98.7	95.7
Buses	0	0	0	0	-	0	2	0	0	0	-	2	0	3	0	0	-	3	0	0	0	0	-	0	5
% Buses	0.0	0.0	0.0	0.0	-	0.0	9.1	0.0	0.0	-	-	2.7	0.0	5.9	0.0	-	-	4.2	0.0	0.0	0.0	-	-	0.0	1.4
Single-Unit Trucks	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	1	0	0	-	1	3
% Single-Unit Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	4.9	0.0	-	-	2.7	0.0	0.0	0.0	-	-	0.0	0.0	2.0	0.0	-	-	1.3	0.9
Articulated Trucks	0	0	0	0	-	0	0	5	0	0	-	5	0	0	0	0	-	0	0	0	0	0	-	0	5
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	12.2	0.0	-	-	6.8	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.4
Bicycles on Road	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.0	0.0	0.0	-	0.0	0.0	4.9	0.0	-	-	2.7	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.6
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	5	-	-	-	-	-	27	-	-	-	-	-	18	-	-	-	-	-	21	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Church Street & Columbian Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church St & Columbian Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 1

### Turning Movement Data

Start Time	Church St Southbound						Columbian Ave Westbound						Church St Northbound						Columbian Ave Eastbound						Int. Total	
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total		
6:00 AM	0	3	0	0	0	3	0	1	0	0	1	1	1	4	3	0	1	8	2	11	1	0	0	14	26	
6:15 AM	0	1	0	0	0	1	0	3	0	0	0	3	0	1	3	0	0	4	2	9	2	0	0	13	21	
6:30 AM	0	0	0	0	0	0	0	10	0	0	1	10	0	4	5	0	0	9	3	15	1	0	0	19	38	
6:45 AM	1	1	0	0	0	2	0	8	0	0	0	8	0	17	8	0	0	25	4	16	0	0	0	20	55	
Hourly Total	1	5	0	0	0	6	0	22	0	0	2	22	1	26	19	0	1	46	11	51	4	0	0	66	140	
7:00 AM	2	1	1	0	0	4	1	4	2	0	0	7	0	14	7	0	0	21	4	23	2	0	0	29	61	
7:15 AM	3	3	1	0	0	7	0	17	0	0	3	17	0	19	13	0	0	32	15	47	5	0	0	67	123	
7:30 AM	3	6	1	0	1	10	1	17	1	0	2	19	6	36	10	0	0	52	13	73	5	0	1	91	172	
7:45 AM	2	5	1	0	0	8	5	24	0	0	2	29	6	33	22	0	0	61	9	89	4	0	2	102	200	
Hourly Total	10	15	4	0	1	29	7	62	3	0	7	72	12	102	52	0	0	166	41	232	16	0	3	289	556	
8:00 AM	1	3	1	0	1	5	1	16	0	0	1	17	4	19	11	0	0	34	8	33	3	0	0	44	100	
8:15 AM	0	5	1	0	0	6	1	12	0	0	0	13	4	8	5	0	0	17	5	41	0	0	0	46	82	
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hourly Total	1	8	2	0	1	11	2	28	0	0	1	30	8	27	16	0	0	51	13	74	3	0	0	90	182	
2:30 PM	3	9	1	0	0	13	2	10	5	0	1	17	3	5	6	0	1	14	10	35	0	0	0	45	89	
2:45 PM	0	8	1	0	0	9	2	13	1	0	0	16	4	5	6	0	2	15	12	40	0	0	0	52	92	
Hourly Total	3	17	2	0	0	22	4	23	6	0	1	33	7	10	12	0	3	29	22	75	0	0	0	97	181	
3:00 PM	0	9	2	0	0	11	1	11	2	0	2	14	4	6	8	0	0	18	20	30	2	0	0	52	95	
3:15 PM	3	12	2	0	0	17	2	18	0	0	1	20	9	8	13	0	0	30	10	39	4	0	1	53	120	
3:30 PM	1	16	2	0	2	19	3	18	3	0	2	24	6	13	8	0	0	27	7	28	1	0	1	36	106	
3:45 PM	2	12	3	0	1	17	2	18	0	0	2	20	5	12	10	0	0	27	6	40	4	0	0	50	114	
Hourly Total	6	49	9	0	3	64	8	65	5	0	7	78	24	39	39	0	0	102	43	137	11	0	2	191	435	
4:00 PM	1	24	5	0	1	30	0	20	0	0	2	20	3	14	9	0	0	26	9	37	0	0	0	46	122	
4:15 PM	1	18	4	0	0	23	1	13	3	0	0	17	7	9	6	0	3	22	13	45	6	0	1	64	126	
4:30 PM	3	23	2	0	2	28	2	17	7	0	4	26	2	17	4	0	3	23	19	66	3	0	3	88	165	
4:45 PM	1	26	6	0	0	33	2	14	5	0	3	21	6	9	5	0	3	20	10	64	3	0	1	77	151	
Hourly Total	6	91	17	0	3	114	5	64	15	0	9	84	18	49	24	0	9	91	51	212	12	0	5	275	564	
5:00 PM	4	15	5	0	1	24	1	18	2	0	4	21	8	14	10	0	0	32	21	59	3	0	0	83	160	
5:15 PM	1	14	3	0	1	18	2	14	1	0	1	17	6	12	7	0	4	25	15	38	3	0	2	56	116	
5:30 PM	3	10	5	0	0	18	2	16	3	0	2	21	2	6	5	0	1	13	16	41	2	0	1	59	111	
5:45 PM	3	9	2	0	1	14	4	11	1	0	0	16	1	5	2	0	0	8	9	28	5	0	1	42	80	
Hourly Total	11	48	15	0	3	74	9	59	7	0	7	75	17	37	24	0	5	78	61	166	13	0	4	240	467	
Grand Total	38	233	49	0	11	320	35	323	36	0	34	394	87	290	186	0	18	563	242	947	59	0	14	1248	2525	
Approach %	11.9	72.8	15.3	0.0	-	-	8.9	82.0	9.1	0.0	-	-	15.5	51.5	33.0	0.0	-	-	19.4	75.9	4.7	0.0	-	-	-	
Total %	1.5	9.2	1.9	0.0	-	12.7	1.4	12.8	1.4	0.0	-	15.6	3.4	11.5	7.4	0.0	-	22.3	9.6	37.5	2.3	0.0	-	49.4	-	
Lights	38	230	49	0	-	317	35	308	36	0	-	379	85	275	181	0	-	541	241	892	53	0	-	1186	2423	
% Lights	100.0	98.7	100.0	-	-	99.1	100.0	95.4	100.0	-	-	96.2	97.7	94.8	97.3	-	-	96.1	99.6	94.2	89.8	-	-	-	95.0	96.0

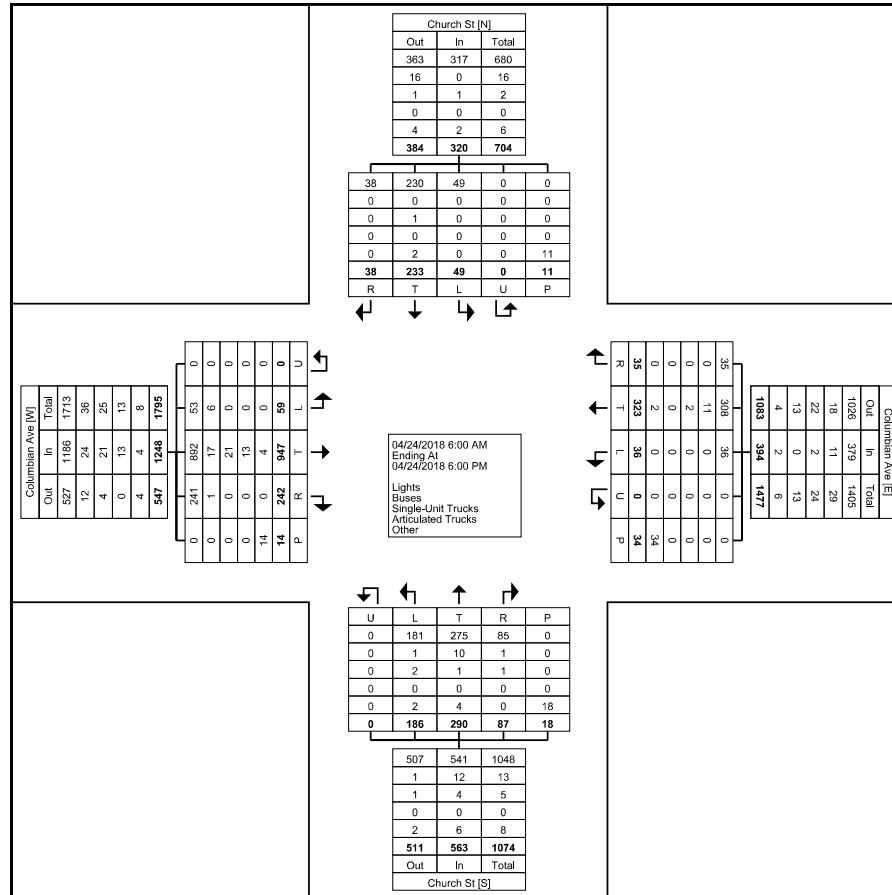


Buses	0	0	0	0	-	0	0	11	0	0	-	11	1	10	1	0	-	12	1	17	6	0	-	24	47
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	3.4	0.0	-	-	2.8	1.1	3.4	0.5	-	-	2.1	0.4	1.8	10.2	-	-	1.9	1.9
Single-Unit Trucks	0	1	0	0	-	1	0	2	0	0	-	2	1	1	2	0	-	4	0	21	0	0	-	21	28
% Single-Unit Trucks	0.0	0.4	0.0	-	-	0.3	0.0	0.6	0.0	-	-	0.5	1.1	0.3	1.1	-	-	0.7	0.0	2.2	0.0	-	-	1.7	1.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	13	0	0	-	13	13
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.4	0.0	-	-	1.0	0.5
Bicycles on Road	0	2	0	0	-	2	0	2	0	0	-	2	0	4	2	0	-	6	0	4	0	0	-	4	14
% Bicycles on Road	0.0	0.9	0.0	-	-	0.6	0.0	0.6	0.0	-	-	0.5	0.0	1.4	1.1	-	-	1.1	0.0	0.4	0.0	-	-	0.3	0.6
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	9.1	-	-	-	-	-	0.0	-	-	-	-	-	16.7	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	10	-	-	-	-	-	34	-	-	-	-	-	15	-	-	-	-	-	14	-	-
% Pedestrians	-	-	-	-	90.9	-	-	-	-	-	100.0	-	-	-	-	-	83.3	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church St & Columbian Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
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Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church St & Columbian Ave  
 042418  
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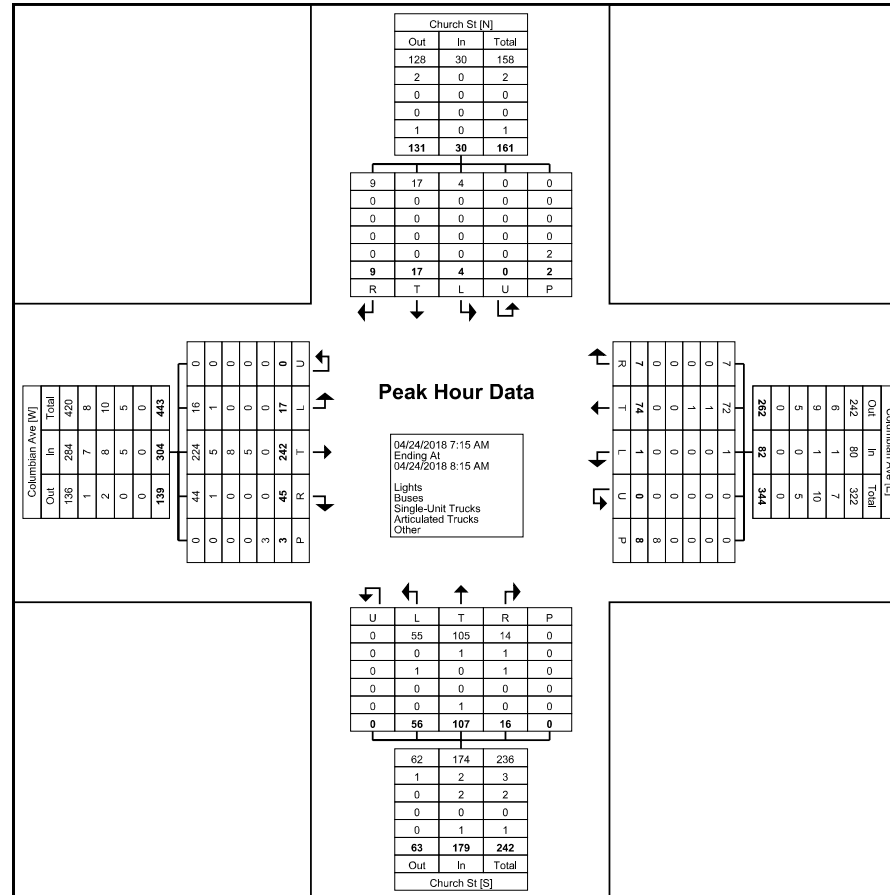
### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Church St Southbound						Columbian Ave Westbound						Church St Northbound						Columbian Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	3	3	1	0	0	7	0	17	0	0	3	17	0	19	13	0	0	32	15	47	5	0	0	67	123
7:30 AM	3	6	1	0	1	10	1	17	1	0	2	19	6	36	10	0	0	52	13	73	5	0	1	91	172
7:45 AM	2	5	1	0	0	8	5	24	0	0	2	29	6	33	22	0	0	61	9	89	4	0	2	102	200
8:00 AM	1	3	1	0	1	5	1	16	0	0	1	17	4	19	11	0	0	34	8	33	3	0	0	44	100
<b>Total</b>	<b>9</b>	<b>17</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>30</b>	<b>7</b>	<b>74</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>82</b>	<b>16</b>	<b>107</b>	<b>56</b>	<b>0</b>	<b>0</b>	<b>179</b>	<b>45</b>	<b>242</b>	<b>17</b>	<b>0</b>	<b>3</b>	<b>304</b>	<b>595</b>
Approach %	30.0	56.7	13.3	0.0	-	-	8.5	90.2	1.2	0.0	-	-	8.9	59.8	31.3	0.0	-	-	14.8	79.6	5.6	0.0	-	-	-
Total %	1.5	2.9	0.7	0.0	-	5.0	1.2	12.4	0.2	0.0	-	13.8	2.7	18.0	9.4	0.0	-	30.1	7.6	40.7	2.9	0.0	-	51.1	-
PHF	0.750	0.708	1.000	0.000	-	0.750	0.350	0.771	0.250	0.000	-	0.707	0.667	0.743	0.636	0.000	-	0.734	0.750	0.680	0.850	0.000	-	0.745	0.744
Lights	9	17	4	0	-	30	7	72	1	0	-	80	14	105	55	0	-	174	44	224	16	0	-	284	568
% Lights	100.0	100.0	100.0	-	-	100.0	100.0	97.3	100.0	-	-	97.6	87.5	98.1	98.2	-	-	97.2	97.8	92.6	94.1	-	-	93.4	95.5
Buses	0	0	0	0	-	0	0	1	0	0	-	1	1	1	0	0	-	2	1	5	1	0	-	7	10
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	1.4	0.0	-	-	1.2	6.3	0.9	0.0	-	-	1.1	2.2	2.1	5.9	-	-	2.3	1.7
Single-Unit Trucks	0	0	0	0	-	0	0	1	0	0	-	1	1	0	1	0	-	2	0	8	0	0	-	8	11
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	1.4	0.0	-	-	1.2	6.3	0.0	1.8	-	-	1.1	0.0	3.3	0.0	-	-	2.6	1.8
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	5	0	0	-	5	5
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	2.1	0.0	-	-	1.6	0.8
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.9	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	8	-	-	-	-	-	0	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church St & Columbian Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 5



Turning Movement Peak Hour Data Plot (7:15 AM)



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church St & Columbian Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 6

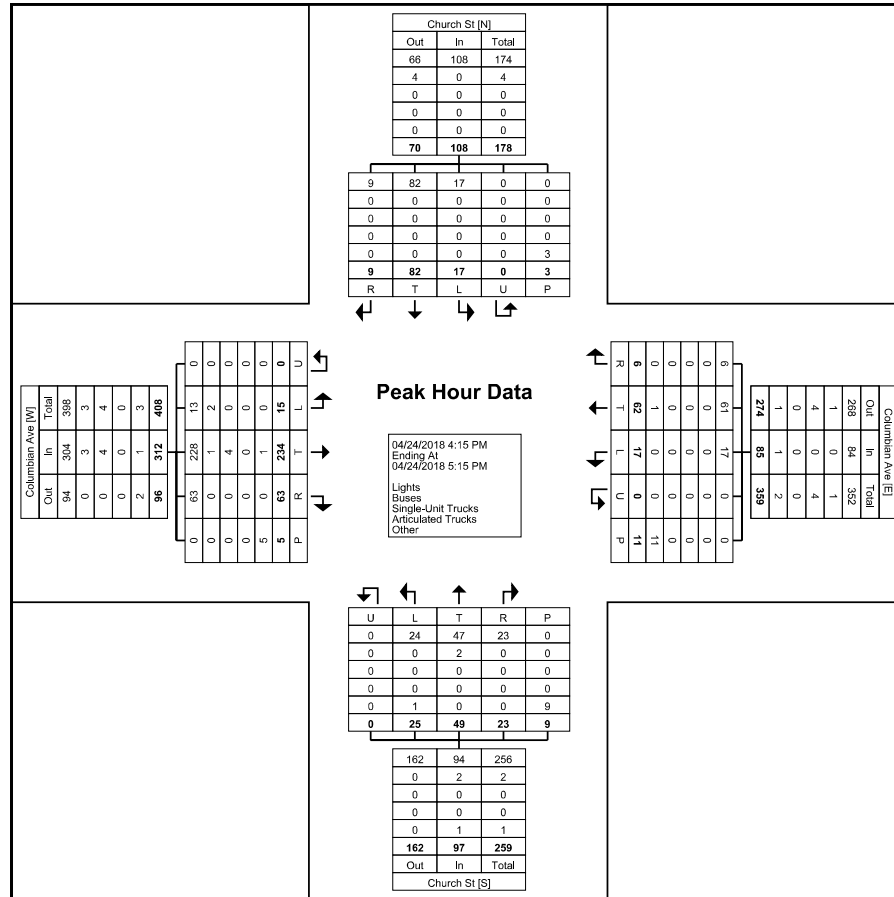
### Turning Movement Peak Hour Data (4:15 PM)

Start Time	Church St Southbound						Columbian Ave Westbound						Church St Northbound						Columbian Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:15 PM	1	18	4	0	0	23	1	13	3	0	0	17	7	9	6	0	3	22	13	45	6	0	1	64	126
4:30 PM	3	23	2	0	2	28	2	17	7	0	4	26	2	17	4	0	3	23	19	66	3	0	3	88	165
4:45 PM	1	26	6	0	0	33	2	14	5	0	3	21	6	9	5	0	3	20	10	64	3	0	1	77	151
5:00 PM	4	15	5	0	1	24	1	18	2	0	4	21	8	14	10	0	0	32	21	59	3	0	0	83	160
<b>Total</b>	<b>9</b>	<b>82</b>	<b>17</b>	<b>0</b>	<b>3</b>	<b>108</b>	<b>6</b>	<b>62</b>	<b>17</b>	<b>0</b>	<b>11</b>	<b>85</b>	<b>23</b>	<b>49</b>	<b>25</b>	<b>0</b>	<b>9</b>	<b>97</b>	<b>63</b>	<b>234</b>	<b>15</b>	<b>0</b>	<b>5</b>	<b>312</b>	<b>602</b>
Approach %	8.3	75.9	15.7	0.0	-	-	7.1	72.9	20.0	0.0	-	-	23.7	50.5	25.8	0.0	-	-	20.2	75.0	4.8	0.0	-	-	-
Total %	1.5	13.6	2.8	0.0	-	17.9	1.0	10.3	2.8	0.0	-	14.1	3.8	8.1	4.2	0.0	-	16.1	10.5	38.9	2.5	0.0	-	51.8	-
PHF	0.563	0.788	0.708	0.000	-	0.818	0.750	0.861	0.607	0.000	-	0.817	0.719	0.721	0.625	0.000	-	0.758	0.750	0.886	0.625	0.000	-	0.886	0.912
Lights	9	82	17	0	-	108	6	61	17	0	-	84	23	47	24	0	-	94	63	228	13	0	-	304	590
% Lights	100.0	100.0	100.0	-	-	100.0	100.0	98.4	100.0	-	-	98.8	100.0	95.9	96.0	-	-	96.9	100.0	97.4	86.7	-	-	97.4	98.0
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	0	1	2	0	-	3	5
% Buses	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	4.1	0.0	-	-	2.1	0.0	0.4	13.3	-	-	1.0	0.8
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	4	0	0	-	4	4
% Single-Unit Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.7	0.0	-	-	1.3	0.7
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	1	0	0	-	1	0	0	1	0	-	1	0	1	0	0	-	1	3
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	1.6	0.0	-	-	1.2	0.0	0.0	4.0	-	-	1.0	0.0	0.4	0.0	-	-	0.3	0.5
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	11	-	-	-	-	-	9	-	-	-	-	-	5	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



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 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Church St & Columbian Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 7



Turning Movement Peak Hour Data Plot (4:15 PM)

**Commercial Street & Winneconne Avenue**



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Winneconne Ave  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 1

### Turning Movement Data

Start Time	Commercial St Southbound						Winneconne Ave Westbound						Commercial St Northbound						Winneconne Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
6:00 AM	38	34	0	0	0	72	0	20	3	0	0	23	0	24	16	0	0	40	12	6	22	0	0	40	175
6:15 AM	55	34	0	0	0	89	0	30	0	0	0	30	3	34	26	0	0	63	10	16	21	0	0	47	229
6:30 AM	52	57	1	0	0	110	0	31	1	0	1	32	4	41	30	0	0	75	7	17	33	0	0	57	274
6:45 AM	57	53	0	0	0	110	0	54	3	0	0	57	1	48	21	0	2	70	15	26	34	0	3	75	312
Hourly Total	202	178	1	0	0	381	0	135	7	0	1	142	8	147	93	0	2	248	44	65	110	0	3	219	990
7:00 AM	66	51	2	0	0	119	1	43	7	0	0	51	3	39	26	0	0	68	19	30	43	0	0	92	330
7:15 AM	61	58	0	0	1	119	0	55	11	0	0	66	6	51	50	0	1	107	37	52	49	0	0	138	430
7:30 AM	67	89	0	0	1	156	0	103	9	0	3	112	9	82	60	0	0	151	82	67	68	0	0	217	636
7:45 AM	66	73	0	0	1	139	1	88	12	0	0	101	3	90	82	0	3	175	66	81	83	0	4	230	645
Hourly Total	260	271	2	0	3	533	2	289	39	0	3	330	21	262	218	0	4	501	204	230	243	0	4	677	2041
8:00 AM	62	41	2	0	0	105	3	57	8	0	0	68	9	81	40	0	0	130	23	53	63	0	0	139	442
8:15 AM	60	44	0	0	0	104	3	50	15	0	2	68	9	58	30	1	0	98	28	39	54	0	0	121	391
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	122	85	2	0	0	209	6	107	23	0	2	136	18	139	70	1	0	228	51	92	117	0	0	260	833
2:30 PM	70	72	5	0	2	147	1	46	12	0	1	59	15	73	31	0	0	119	40	57	60	0	0	157	482
2:45 PM	62	71	3	0	1	136	5	49	10	0	2	64	9	76	35	0	0	120	47	42	43	0	2	132	452
Hourly Total	132	143	8	0	3	283	6	95	22	0	3	123	24	149	66	0	0	239	87	99	103	0	2	289	934
3:00 PM	67	80	4	0	0	151	0	67	13	0	0	80	8	83	39	0	0	130	70	48	49	0	3	167	528
3:15 PM	83	59	1	0	1	143	4	84	14	0	2	102	6	106	69	0	0	181	62	47	65	0	3	174	600
3:30 PM	77	75	3	0	5	155	6	73	13	0	3	92	8	88	29	0	9	125	38	51	57	0	3	146	518
3:45 PM	74	79	4	0	3	157	2	63	11	0	7	76	8	102	22	0	0	132	34	66	63	0	1	163	528
Hourly Total	301	293	12	0	9	606	12	287	51	0	12	350	30	379	159	0	9	568	204	212	234	0	10	650	2174
4:00 PM	91	69	2	0	0	162	1	67	16	0	4	84	6	86	40	0	1	132	21	55	62	0	1	138	516
4:15 PM	85	71	3	0	0	159	3	52	7	0	0	62	13	85	30	0	1	128	30	56	69	0	0	155	504
4:30 PM	100	95	4	0	0	199	2	97	12	0	1	111	7	100	25	0	0	132	52	67	76	0	0	195	637
4:45 PM	101	84	1	0	0	186	0	56	12	0	2	68	10	85	35	0	0	130	56	56	64	0	0	176	560
Hourly Total	377	319	10	0	0	706	6	272	47	0	7	325	36	356	130	0	2	522	159	234	271	0	1	664	2217
5:00 PM	97	79	3	0	0	179	3	71	12	0	3	86	11	93	40	0	2	144	53	60	75	0	4	188	597
5:15 PM	87	76	4	0	0	167	2	69	15	0	0	86	7	90	36	0	0	133	51	56	64	0	3	171	557
5:30 PM	79	79	1	0	0	159	5	43	8	0	1	56	4	62	25	0	0	91	33	52	66	0	0	151	457
5:45 PM	80	64	6	0	3	150	1	39	6	0	4	46	12	58	22	0	0	92	44	40	42	0	0	126	414
Hourly Total	343	298	14	0	3	655	11	222	41	0	8	274	34	303	123	0	2	460	181	208	247	0	7	636	2025
Grand Total	1737	1587	49	0	18	3373	43	1407	230	0	36	1680	171	1735	859	1	19	2766	930	1140	1325	0	27	3395	11214
Approach %	51.5	47.1	1.5	0.0	-	-	2.6	83.8	13.7	0.0	-	-	6.2	62.7	31.1	0.0	-	-	27.4	33.6	39.0	0.0	-	-	-
Total %	15.5	14.2	0.4	0.0	-	30.1	0.4	12.5	2.1	0.0	-	15.0	1.5	15.5	7.7	0.0	-	24.7	8.3	10.2	11.8	0.0	-	30.3	-
Lights	1676	1533	47	0	-	3256	43	1385	219	0	-	1647	168	1693	832	1	-	2694	907	1124	1295	0	-	3326	10923
% Lights	96.5	96.6	95.9	-	-	96.5	100.0	98.4	95.2	-	-	98.0	98.2	97.6	96.9	100.0	-	97.4	97.5	98.6	97.7	-	-	98.0	97.4

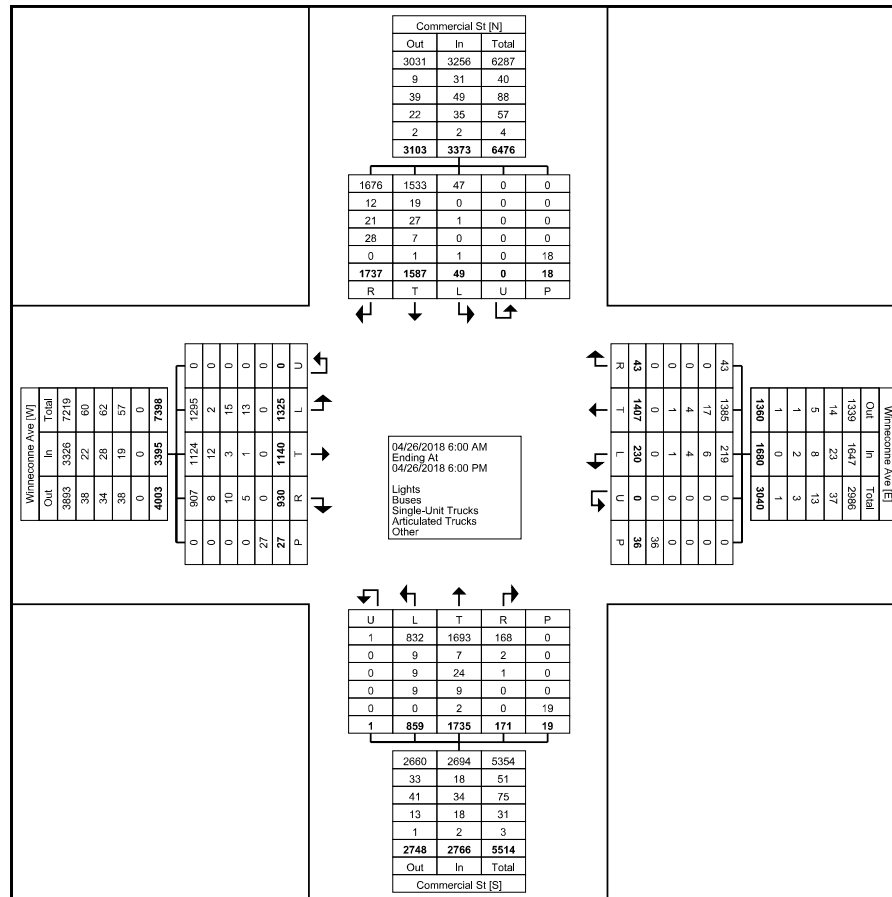


Buses	12	19	0	0	-	31	0	17	6	0	-	23	2	7	9	0	-	18	8	12	2	0	-	22	94
% Buses	0.7	1.2	0.0	-	-	0.9	0.0	1.2	2.6	-	-	1.4	1.2	0.4	1.0	0.0	-	0.7	0.9	1.1	0.2	-	-	0.6	0.8
Single-Unit Trucks	21	27	1	0	-	49	0	4	4	0	-	8	1	24	9	0	-	34	10	3	15	0	-	28	119
% Single-Unit Trucks	1.2	1.7	2.0	-	-	1.5	0.0	0.3	1.7	-	-	0.5	0.6	1.4	1.0	0.0	-	1.2	1.1	0.3	1.1	-	-	0.8	1.1
Articulated Trucks	28	7	0	0	-	35	0	1	1	0	-	2	0	9	9	0	-	18	5	1	13	0	-	19	74
% Articulated Trucks	1.6	0.4	0.0	-	-	1.0	0.0	0.1	0.4	-	-	0.1	0.0	0.5	1.0	0.0	-	0.7	0.5	0.1	1.0	-	-	0.6	0.7
Bicycles on Road	0	1	1	0	-	2	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	4
% Bicycles on Road	0.0	0.1	2.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.0	0.0	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	9	-	-	-	-	-	0	-	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	25.0	-	-	-	-	-	0.0	-	-	-	-	-	14.8	-	-
Pedestrians	-	-	-	-	18	-	-	-	-	-	27	-	-	-	-	-	19	-	-	-	-	-	23	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	75.0	-	-	-	-	-	100.0	-	-	-	-	-	85.2	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Winneconne Ave  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 3



Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Winneconne Ave  
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 Page No: 4

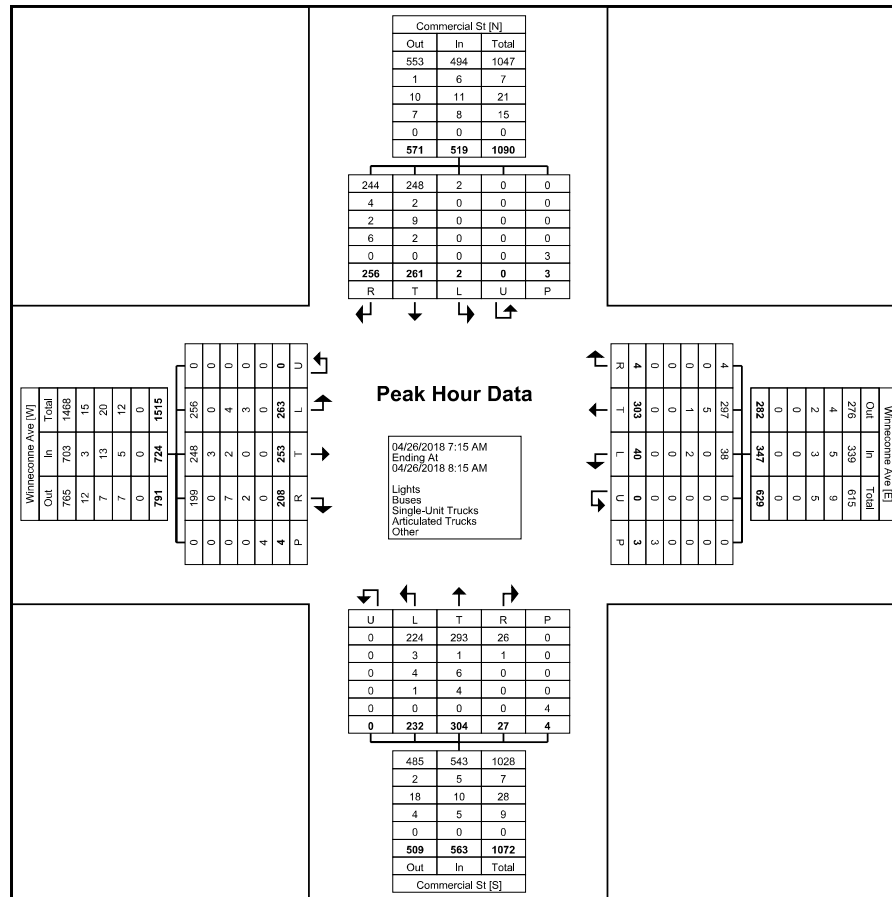
### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Commercial St Southbound						Winneconne Ave Westbound						Commercial St Northbound						Winneconne Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	61	58	0	0	1	119	0	55	11	0	0	66	6	51	50	0	1	107	37	52	49	0	0	138	430
7:30 AM	67	89	0	0	1	156	0	103	9	0	3	112	9	82	60	0	0	151	82	67	68	0	0	217	636
7:45 AM	66	73	0	0	1	139	1	88	12	0	0	101	3	90	82	0	3	175	66	81	83	0	4	230	645
8:00 AM	62	41	2	0	0	105	3	57	8	0	0	68	9	81	40	0	0	130	23	53	63	0	0	139	442
<b>Total</b>	<b>256</b>	<b>261</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>519</b>	<b>4</b>	<b>303</b>	<b>40</b>	<b>0</b>	<b>3</b>	<b>347</b>	<b>27</b>	<b>304</b>	<b>232</b>	<b>0</b>	<b>4</b>	<b>563</b>	<b>208</b>	<b>253</b>	<b>263</b>	<b>0</b>	<b>4</b>	<b>724</b>	<b>2153</b>
Approach %	49.3	50.3	0.4	0.0	-	-	1.2	87.3	11.5	0.0	-	-	4.8	54.0	41.2	0.0	-	-	28.7	34.9	36.3	0.0	-	-	-
Total %	11.9	12.1	0.1	0.0	-	24.1	0.2	14.1	1.9	0.0	-	16.1	1.3	14.1	10.8	0.0	-	26.1	9.7	11.8	12.2	0.0	-	33.6	-
PHF	0.955	0.733	0.250	0.000	-	0.832	0.333	0.735	0.833	0.000	-	0.775	0.750	0.844	0.707	0.000	-	0.804	0.634	0.781	0.792	0.000	-	0.787	0.834
Lights	244	248	2	0	-	494	4	297	38	0	-	339	26	293	224	0	-	543	199	248	256	0	-	703	2079
% Lights	95.3	95.0	100.0	-	-	95.2	100.0	98.0	95.0	-	-	97.7	96.3	96.4	96.6	-	-	96.4	95.7	98.0	97.3	-	-	97.1	96.6
Buses	4	2	0	0	-	6	0	5	0	0	-	5	1	1	3	0	-	5	0	3	0	0	-	3	19
% Buses	1.6	0.8	0.0	-	-	1.2	0.0	1.7	0.0	-	-	1.4	3.7	0.3	1.3	-	-	0.9	0.0	1.2	0.0	-	-	0.4	0.9
Single-Unit Trucks	2	9	0	0	-	11	0	1	2	0	-	3	0	6	4	0	-	10	7	2	4	0	-	13	37
% Single-Unit Trucks	0.8	3.4	0.0	-	-	2.1	0.0	0.3	5.0	-	-	0.9	0.0	2.0	1.7	-	-	1.8	3.4	0.8	1.5	-	-	1.8	1.7
Articulated Trucks	6	2	0	0	-	8	0	0	0	0	-	0	0	4	1	0	-	5	2	0	3	0	-	5	18
% Articulated Trucks	2.3	0.8	0.0	-	-	1.5	0.0	0.0	0.0	-	-	0.0	0.0	1.3	0.4	-	-	0.9	1.0	0.0	1.1	-	-	0.7	0.8
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0	-	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	33.3	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	2	-	-	-	-	-	4	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	66.7	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



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Count Name: Commercial & Winneconne Ave  
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 Page No: 5



Turning Movement Peak Hour Data Plot (7:15 AM)



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Count Name: Commercial & Winneconne Ave  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 6

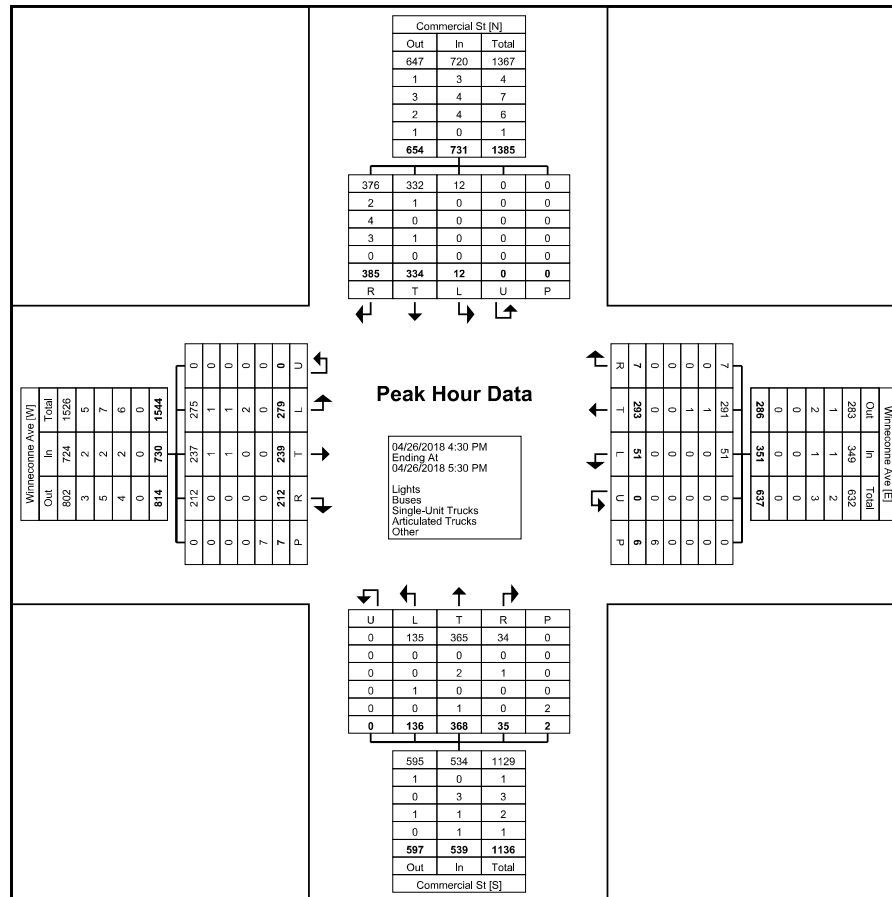
### Turning Movement Peak Hour Data (4:30 PM)

Start Time	Commercial St Southbound						Winneconne Ave Westbound						Commercial St Northbound						Winneconne Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:30 PM	100	95	4	0	0	199	2	97	12	0	1	111	7	100	25	0	0	132	52	67	76	0	0	195	637
4:45 PM	101	84	1	0	0	186	0	56	12	0	2	68	10	85	35	0	0	130	56	56	64	0	0	176	560
5:00 PM	97	79	3	0	0	179	3	71	12	0	3	86	11	93	40	0	2	144	53	60	75	0	4	188	597
5:15 PM	87	76	4	0	0	167	2	69	15	0	0	86	7	90	36	0	0	133	51	56	64	0	3	171	557
<b>Total</b>	<b>385</b>	<b>334</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>731</b>	<b>7</b>	<b>293</b>	<b>51</b>	<b>0</b>	<b>6</b>	<b>351</b>	<b>35</b>	<b>368</b>	<b>136</b>	<b>0</b>	<b>2</b>	<b>539</b>	<b>212</b>	<b>239</b>	<b>279</b>	<b>0</b>	<b>7</b>	<b>730</b>	<b>2351</b>
Approach %	52.7	45.7	1.6	0.0	-	-	2.0	83.5	14.5	0.0	-	-	6.5	68.3	25.2	0.0	-	-	29.0	32.7	38.2	0.0	-	-	-
Total %	16.4	14.2	0.5	0.0	-	31.1	0.3	12.5	2.2	0.0	-	14.9	1.5	15.7	5.8	0.0	-	22.9	9.0	10.2	11.9	0.0	-	31.1	-
PHF	0.953	0.879	0.750	0.000	-	0.918	0.583	0.755	0.850	0.000	-	0.791	0.795	0.920	0.850	0.000	-	0.936	0.946	0.892	0.918	0.000	-	0.936	0.923
Lights	376	332	12	0	-	720	7	291	51	0	-	349	34	365	135	0	-	534	212	237	275	0	-	724	2327
% Lights	97.7	99.4	100.0	-	-	98.5	100.0	99.3	100.0	-	-	99.4	97.1	99.2	99.3	-	-	99.1	100.0	99.2	98.6	-	-	99.2	99.0
Buses	2	1	0	0	-	3	0	1	0	0	-	1	0	0	0	0	-	0	0	1	1	0	-	2	6
% Buses	0.5	0.3	0.0	-	-	0.4	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.4	-	-	0.3	0.3
Single-Unit Trucks	4	0	0	0	-	4	0	1	0	0	-	1	1	2	0	0	-	3	0	1	1	0	-	2	10
% Single-Unit Trucks	1.0	0.0	0.0	-	-	0.5	0.0	0.3	0.0	-	-	0.3	2.9	0.5	0.0	-	-	0.6	0.0	0.4	0.4	-	-	0.3	0.4
Articulated Trucks	3	1	0	0	-	4	0	0	0	0	-	0	0	0	1	0	-	1	0	0	2	0	-	2	7
% Articulated Trucks	0.8	0.3	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.7	-	-	0.2	0.0	0.0	0.7	-	-	0.3	0.3
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	3	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	33.3	-	-	-	-	-	0.0	-	-	-	-	-	-	42.9	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	2	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	66.7	-	-	-	-	-	100.0	-	-	-	-	-	-	57.1	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Winneconne Ave  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 7



Turning Movement Peak Hour Data Plot (4:30 PM)

Commercial Street & Columbian Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Columbian Ave  
 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 1

### Turning Movement Data

Start Time	Commerical St Southbound						Columbian Ave Westbound						Commercial St Northbound						Columbian Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
6:00 AM	1	75	0	0	0	76	1	2	1	0	0	4	3	46	0	0	0	49	0	2	3	0	0	5	134
6:15 AM	2	89	0	0	0	91	0	1	1	0	0	2	1	53	4	0	0	58	1	4	2	0	0	7	158
6:30 AM	1	108	0	0	0	109	2	4	1	0	1	7	3	66	0	0	0	69	1	13	3	0	0	17	202
6:45 AM	3	105	0	0	1	108	1	3	0	0	0	4	2	78	2	0	0	82	4	10	5	0	1	19	213
Hourly Total	7	377	0	0	1	384	4	10	3	0	1	17	9	243	6	0	0	258	6	29	13	0	1	48	707
7:00 AM	5	120	1	0	0	126	2	6	2	0	0	10	3	72	3	0	0	78	7	16	4	0	0	27	241
7:15 AM	9	126	1	0	0	136	1	6	0	0	2	7	4	85	3	0	1	92	12	25	6	0	0	43	278
7:30 AM	5	145	3	0	0	153	1	20	1	0	0	22	5	112	6	0	2	123	16	23	13	0	0	52	350
7:45 AM	15	130	2	0	0	147	3	18	2	0	0	23	4	134	11	0	0	149	7	44	36	0	1	87	406
Hourly Total	34	521	7	0	0	562	7	50	5	0	2	62	16	403	23	0	3	442	42	108	59	0	1	209	1275
8:00 AM	9	94	2	0	1	105	1	12	0	0	0	13	5	126	4	0	0	135	6	27	17	0	0	50	303
8:15 AM	8	102	2	0	0	112	2	12	1	0	0	15	5	107	3	0	0	115	4	22	9	0	2	35	277
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	17	196	4	0	1	217	3	24	1	0	0	28	10	233	7	0	0	250	10	49	26	0	2	85	580
2:30 PM	6	139	1	0	0	146	3	10	4	0	0	17	4	130	7	0	1	141	11	27	6	0	2	44	348
2:45 PM	0	127	2	0	1	129	0	8	1	0	1	9	1	120	5	0	0	126	11	23	9	0	2	43	307
Hourly Total	6	266	3	0	1	275	3	18	5	0	1	26	5	250	12	0	1	267	22	50	15	0	4	87	655
3:00 PM	2	147	3	0	0	152	0	9	6	0	2	15	1	135	4	0	0	140	11	22	16	0	3	49	356
3:15 PM	5	140	0	0	0	145	1	7	2	0	1	10	2	160	7	0	0	169	10	24	13	0	2	47	371
3:30 PM	2	164	1	0	0	167	1	7	4	0	0	12	2	143	8	0	0	153	7	20	12	0	3	39	371
3:45 PM	5	155	0	0	0	160	1	7	7	0	0	15	5	157	6	0	1	168	11	17	19	0	1	47	390
Hourly Total	14	606	4	0	0	624	3	30	19	0	3	52	10	595	25	0	1	630	39	83	60	0	9	182	1488
4:00 PM	3	153	2	0	0	158	2	11	10	0	0	23	1	135	4	0	0	140	8	13	21	0	1	42	363
4:15 PM	1	166	1	0	0	168	4	7	4	0	1	15	1	151	6	0	0	158	11	25	24	0	2	60	401
4:30 PM	2	190	0	0	0	192	13	15	12	0	0	40	2	175	5	0	0	182	7	34	30	1	1	72	486
4:45 PM	8	160	2	0	0	170	2	7	6	0	0	15	2	152	6	0	0	160	18	23	23	0	0	64	409
Hourly Total	14	669	5	0	0	688	21	40	32	0	1	93	6	613	21	0	0	640	44	95	98	1	4	238	1659
5:00 PM	4	151	4	0	0	159	3	8	8	0	0	19	0	170	3	0	5	173	11	27	19	0	3	57	408
5:15 PM	2	152	3	0	0	157	1	6	3	0	0	10	0	153	3	0	0	156	11	25	21	0	0	57	380
5:30 PM	3	131	1	0	0	135	3	8	5	0	1	16	0	123	3	0	0	126	7	16	16	0	0	39	316
5:45 PM	6	141	1	0	2	148	0	3	5	0	2	8	1	101	2	0	0	104	10	9	6	0	1	25	285
Hourly Total	15	575	9	0	2	599	7	25	21	0	3	53	1	547	11	0	5	559	39	77	62	0	4	178	1389
Grand Total	107	3210	32	0	5	3349	48	197	86	0	11	331	57	2884	105	0	10	3046	202	491	333	1	25	1027	7753
Approach %	3.2	95.8	1.0	0.0	-	-	14.5	59.5	26.0	0.0	-	-	1.9	94.7	3.4	0.0	-	-	19.7	47.8	32.4	0.1	-	-	-
Total %	1.4	41.4	0.4	0.0	-	43.2	0.6	2.5	1.1	0.0	-	4.3	0.7	37.2	1.4	0.0	-	39.3	2.6	6.3	4.3	0.0	-	13.2	-
Lights	104	3095	31	0	-	3230	46	185	85	0	-	316	57	2820	104	0	-	2981	194	478	310	1	-	983	7510
% Lights	97.2	96.4	96.9	-	-	96.4	95.8	93.9	98.8	-	-	95.5	100.0	97.8	99.0	-	-	97.9	96.0	97.4	93.1	100.0	-	95.7	96.9

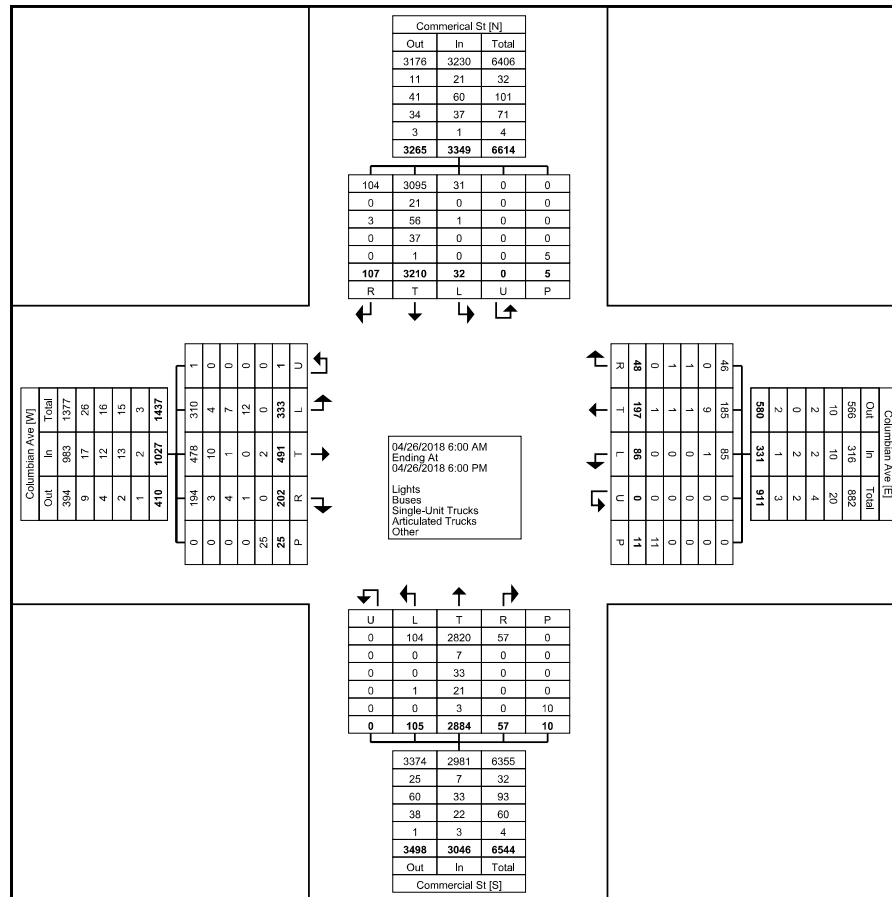


Buses	0	21	0	0	-	21	0	9	1	0	-	10	0	7	0	0	-	7	3	10	4	0	-	17	55
% Buses	0.0	0.7	0.0	-	-	0.6	0.0	4.6	1.2	-	-	3.0	0.0	0.2	0.0	-	-	0.2	1.5	2.0	1.2	0.0	-	1.7	0.7
Single-Unit Trucks	3	56	1	0	-	60	1	1	0	0	-	2	0	33	0	0	-	33	4	1	7	0	-	12	107
% Single-Unit Trucks	2.8	1.7	3.1	-	-	1.8	2.1	0.5	0.0	-	-	0.6	0.0	1.1	0.0	-	-	1.1	2.0	0.2	2.1	0.0	-	1.2	1.4
Articulated Trucks	0	37	0	0	-	37	1	1	0	0	-	2	0	21	1	0	-	22	1	0	12	0	-	13	74
% Articulated Trucks	0.0	1.2	0.0	-	-	1.1	2.1	0.5	0.0	-	-	0.6	0.0	0.7	1.0	-	-	0.7	0.5	0.0	3.6	0.0	-	1.3	1.0
Bicycles on Road	0	1	0	0	-	1	0	1	0	0	-	1	0	3	0	0	-	3	0	2	0	0	-	2	7
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.3	0.0	0.1	0.0	-	-	0.1	0.0	0.4	0.0	0.0	-	0.2	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	7	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	27.3	-	-	-	-	-	10.0	-	-	-	-	-	28.0	-	-
Pedestrians	-	-	-	-	5	-	-	-	-	-	8	-	-	-	-	-	9	-	-	-	-	-	18	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	72.7	-	-	-	-	-	90.0	-	-	-	-	-	72.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Columbian Ave  
 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 3



Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Columbian Ave  
 042618  
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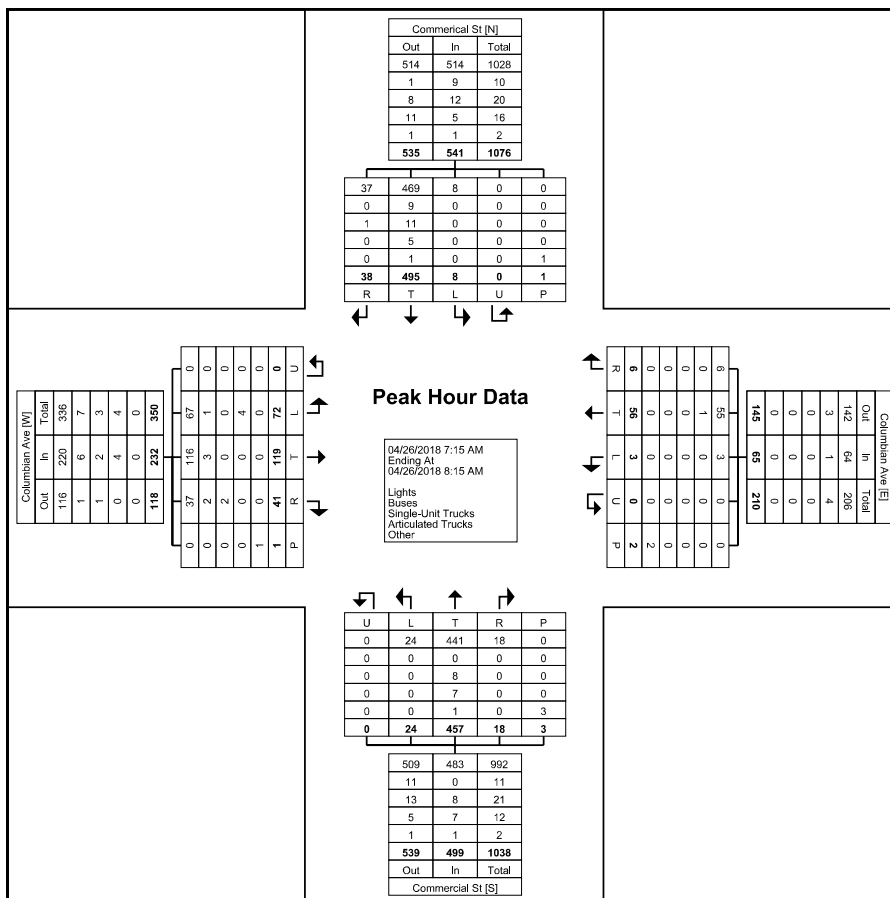
### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Commerical St Southbound						Columbian Ave Westbound						Commercial St Northbound						Columbian Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	9	126	1	0	0	136	1	6	0	0	2	7	4	85	3	0	1	92	12	25	6	0	0	43	278
7:30 AM	5	145	3	0	0	153	1	20	1	0	0	22	5	112	6	0	2	123	16	23	13	0	0	52	350
7:45 AM	15	130	2	0	0	147	3	18	2	0	0	23	4	134	11	0	0	149	7	44	36	0	1	87	406
8:00 AM	9	94	2	0	1	105	1	12	0	0	0	13	5	126	4	0	0	135	6	27	17	0	0	50	303
<b>Total</b>	<b>38</b>	<b>495</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>541</b>	<b>6</b>	<b>56</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>65</b>	<b>18</b>	<b>457</b>	<b>24</b>	<b>0</b>	<b>3</b>	<b>499</b>	<b>41</b>	<b>119</b>	<b>72</b>	<b>0</b>	<b>1</b>	<b>232</b>	<b>1337</b>
Approach %	7.0	91.5	1.5	0.0	-	-	9.2	86.2	4.6	0.0	-	-	3.6	91.6	4.8	0.0	-	-	17.7	51.3	31.0	0.0	-	-	-
Total %	2.8	37.0	0.6	0.0	-	40.5	0.4	4.2	0.2	0.0	-	4.9	1.3	34.2	1.8	0.0	-	37.3	3.1	8.9	5.4	0.0	-	17.4	-
PHF	0.633	0.853	0.667	0.000	-	0.884	0.500	0.700	0.375	0.000	-	0.707	0.900	0.853	0.545	0.000	-	0.837	0.641	0.676	0.500	0.000	-	0.667	0.823
Lights	37	469	8	0	-	514	6	55	3	0	-	64	18	441	24	0	-	483	37	116	67	0	-	220	1281
% Lights	97.4	94.7	100.0	-	-	95.0	100.0	98.2	100.0	-	-	98.5	100.0	96.5	100.0	-	-	96.8	90.2	97.5	93.1	-	-	94.8	95.8
Buses	0	9	0	0	-	9	0	1	0	0	-	1	0	0	0	0	-	0	2	3	1	0	-	6	16
% Buses	0.0	1.8	0.0	-	-	1.7	0.0	1.8	0.0	-	-	1.5	0.0	0.0	0.0	-	-	0.0	4.9	2.5	1.4	-	-	2.6	1.2
Single-Unit Trucks	1	11	0	0	-	12	0	0	0	0	-	0	0	8	0	0	-	8	2	0	0	0	-	2	22
% Single-Unit Trucks	2.6	2.2	0.0	-	-	2.2	0.0	0.0	0.0	-	-	0.0	0.0	1.8	0.0	-	-	1.6	4.9	0.0	0.0	-	-	0.9	1.6
Articulated Trucks	0	5	0	0	-	5	0	0	0	0	-	0	0	7	0	0	-	7	0	0	4	0	-	4	16
% Articulated Trucks	0.0	1.0	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	1.5	0.0	-	-	1.4	0.0	0.0	5.6	-	-	1.7	1.2
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	50.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	50.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
2901 International Lane  
Suite 300  
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608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Columbian Ave  
042618  
Site Code:  
Start Date: 04/26/2018  
Page No: 5



Turning Movement Peak Hour Data Plot (7:15 AM)



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 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Columbian Ave  
 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 6

### Turning Movement Peak Hour Data (4:15 PM)

Start Time	Commerical St Southbound						Columbian Ave Westbound						Commercial St Northbound						Columbian Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:15 PM	1	166	1	0	0	168	4	7	4	0	1	15	1	151	6	0	0	158	11	25	24	0	2	60	401
4:30 PM	2	190	0	0	0	192	13	15	12	0	0	40	2	175	5	0	0	182	7	34	30	1	1	72	486
4:45 PM	8	160	2	0	0	170	2	7	6	0	0	15	2	152	6	0	0	160	18	23	23	0	0	64	409
5:00 PM	4	151	4	0	0	159	3	8	8	0	0	19	0	170	3	0	5	173	11	27	19	0	3	57	408
<b>Total</b>	<b>15</b>	<b>667</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>689</b>	<b>22</b>	<b>37</b>	<b>30</b>	<b>0</b>	<b>1</b>	<b>89</b>	<b>5</b>	<b>648</b>	<b>20</b>	<b>0</b>	<b>5</b>	<b>673</b>	<b>47</b>	<b>109</b>	<b>96</b>	<b>1</b>	<b>6</b>	<b>253</b>	<b>1704</b>
Approach %	2.2	96.8	1.0	0.0	-	-	24.7	41.6	33.7	0.0	-	-	0.7	96.3	3.0	0.0	-	-	18.6	43.1	37.9	0.4	-	-	-
Total %	0.9	39.1	0.4	0.0	-	40.4	1.3	2.2	1.8	0.0	-	5.2	0.3	38.0	1.2	0.0	-	39.5	2.8	6.4	5.6	0.1	-	14.8	-
PHF	0.469	0.878	0.438	0.000	-	0.897	0.423	0.617	0.625	0.000	-	0.556	0.625	0.926	0.833	0.000	-	0.924	0.653	0.801	0.800	0.250	-	0.878	0.877
Lights	15	654	7	0	-	676	22	36	30	0	-	88	5	641	20	0	-	666	47	109	95	1	-	252	1682
% Lights	100.0	98.1	100.0	-	-	98.1	100.0	97.3	100.0	-	-	98.9	100.0	98.9	100.0	-	-	99.0	100.0	100.0	99.0	100.0	-	99.6	98.7
Buses	0	1	0	0	-	1	0	0	0	0	-	0	0	3	0	0	-	3	0	0	1	0	-	1	5
% Buses	0.0	0.1	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.0	0.0	1.0	0.0	-	0.4	0.3
Single-Unit Trucks	0	9	0	0	-	9	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	9
% Single-Unit Trucks	0.0	1.3	0.0	-	-	1.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.5
Articulated Trucks	0	3	0	0	-	3	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	5
% Articulated Trucks	0.0	0.4	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	0.0	-	0.0	0.3
Bicycles on Road	0	0	0	0	-	0	0	1	0	0	-	1	0	2	0	0	-	2	0	0	0	0	-	0	3
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	2.7	0.0	-	-	1.1	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	0.0	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	20.0	-	-	-	-	-	16.7	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	5	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	80.0	-	-	-	-	-	83.3	-	-



Commercial Street & Doty Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Doty Ave 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 1

### Turning Movement Data

Start Time	Commercial St Southbound						Doty Ave Westbound						Commercial St Northbound						Doty Ave Eastbound						Int. Total	
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total		
6:00 AM	1	67	1	0	0	69	2	0	0	0	0	2	1	53	0	0	0	54	0	1	2	0	0	3	128	
6:15 AM	1	76	0	0	0	77	0	1	1	0	1	2	0	62	1	0	0	63	0	2	0	0	0	2	144	
6:30 AM	4	113	3	0	0	120	1	1	1	0	1	3	2	63	2	0	0	67	1	2	1	0	1	4	194	
6:45 AM	5	106	1	0	0	112	1	0	0	0	0	1	4	66	2	0	0	72	2	0	0	0	0	2	187	
Hourly Total	11	362	5	0	0	378	4	2	2	0	2	8	7	244	5	0	0	256	3	5	3	0	1	11	653	
7:00 AM	4	112	5	0	0	121	1	1	1	0	0	3	1	82	1	0	0	84	1	3	1	0	0	5	213	
7:15 AM	4	135	1	0	0	140	2	0	0	0	0	2	9	77	3	0	0	89	1	4	2	0	2	7	238	
7:30 AM	9	154	8	0	0	171	3	3	0	0	0	6	6	127	11	0	0	144	1	4	2	0	0	7	328	
7:45 AM	7	129	8	0	2	144	0	3	0	0	1	3	4	175	14	0	0	193	0	3	3	0	1	6	346	
Hourly Total	24	530	22	0	2	576	6	7	1	0	1	14	20	461	29	0	0	510	3	14	8	0	3	25	1125	
8:00 AM	7	115	4	0	0	126	0	3	0	0	0	3	4	130	8	0	0	142	5	5	2	0	0	12	283	
8:15 AM	4	99	1	0	0	104	0	1	1	0	1	2	6	120	5	0	0	131	1	1	0	0	1	2	239	
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hourly Total	11	214	5	0	0	230	0	4	1	0	1	5	10	250	13	0	0	273	6	6	2	0	1	14	522	
2:30 PM	6	150	0	0	0	156	6	4	0	0	2	10	7	123	1	0	1	131	8	2	5	0	0	15	312	
2:45 PM	6	122	1	0	1	129	2	3	2	0	2	7	6	127	3	0	0	136	3	3	4	0	1	10	282	
Hourly Total	12	272	1	0	1	285	8	7	2	0	4	17	13	250	4	0	1	267	11	5	9	0	1	25	594	
3:00 PM	7	148	1	0	0	156	2	1	2	0	2	5	3	137	2	0	0	142	3	3	4	0	0	10	313	
3:15 PM	6	128	2	0	0	136	3	2	2	0	1	7	2	157	2	0	0	161	3	3	1	0	1	7	311	
3:30 PM	2	163	1	0	0	166	2	1	1	0	0	4	3	151	3	0	0	157	8	5	5	0	3	18	345	
3:45 PM	6	169	6	0	0	181	3	2	3	0	1	8	0	165	1	0	2	166	3	4	3	0	8	10	365	
Hourly Total	21	608	10	0	0	639	10	6	8	0	4	24	8	610	8	0	2	626	17	15	13	0	12	45	1334	
4:00 PM	7	155	2	0	0	164	6	4	2	0	1	12	2	156	1	0	0	159	7	2	4	0	1	13	348	
4:15 PM	4	141	1	0	0	146	6	0	1	0	4	7	4	178	1	0	0	183	7	4	1	0	0	12	348	
4:30 PM	8	185	4	0	0	197	7	1	3	0	5	11	2	166	5	0	0	173	10	2	4	0	5	16	397	
4:45 PM	12	159	1	0	0	172	4	2	3	0	0	9	5	178	4	0	2	187	9	6	5	0	6	20	388	
Hourly Total	31	640	8	0	0	679	23	7	9	0	10	39	13	678	11	0	2	702	33	14	14	0	12	61	1481	
5:00 PM	9	187	1	0	0	197	2	2	5	0	0	9	8	188	12	0	0	208	15	4	4	0	4	23	437	
5:15 PM	12	164	4	0	0	180	6	3	2	0	0	11	2	134	2	0	0	138	7	1	1	0	1	9	338	
5:30 PM	12	116	2	0	0	130	4	0	1	0	0	5	1	150	4	0	0	155	7	4	2	0	4	13	303	
5:45 PM	10	138	2	0	0	150	2	2	1	0	3	5	3	108	3	0	0	114	5	3	9	0	2	17	286	
Hourly Total	43	605	9	0	0	657	14	7	9	0	3	30	14	580	21	0	0	615	34	12	16	0	11	62	1364	
Grand Total	153	3231	60	0	3	3444	65	40	32	0	25	137	85	3073	91	0	5	3249	107	71	65	0	41	243	7073	
Approach %	4.4	93.8	1.7	0.0	-	-	47.4	29.2	23.4	0.0	-	-	2.6	94.6	2.8	0.0	-	-	44.0	29.2	26.7	0.0	-	-	-	
Total %	2.2	45.7	0.8	0.0	-	48.7	0.9	0.6	0.5	0.0	-	1.9	1.2	43.4	1.3	0.0	-	45.9	1.5	1.0	0.9	0.0	-	3.4	-	
Lights	115	3118	57	0	-	3290	65	37	31	0	-	133	84	2986	88	0	-	3158	104	69	63	0	-	236	6817	
% Lights	75.2	96.5	95.0	-	-	95.5	100.0	92.5	96.9	-	-	97.1	98.8	97.2	96.7	-	-	97.2	97.2	97.2	96.9	-	-	-	97.1	96.4

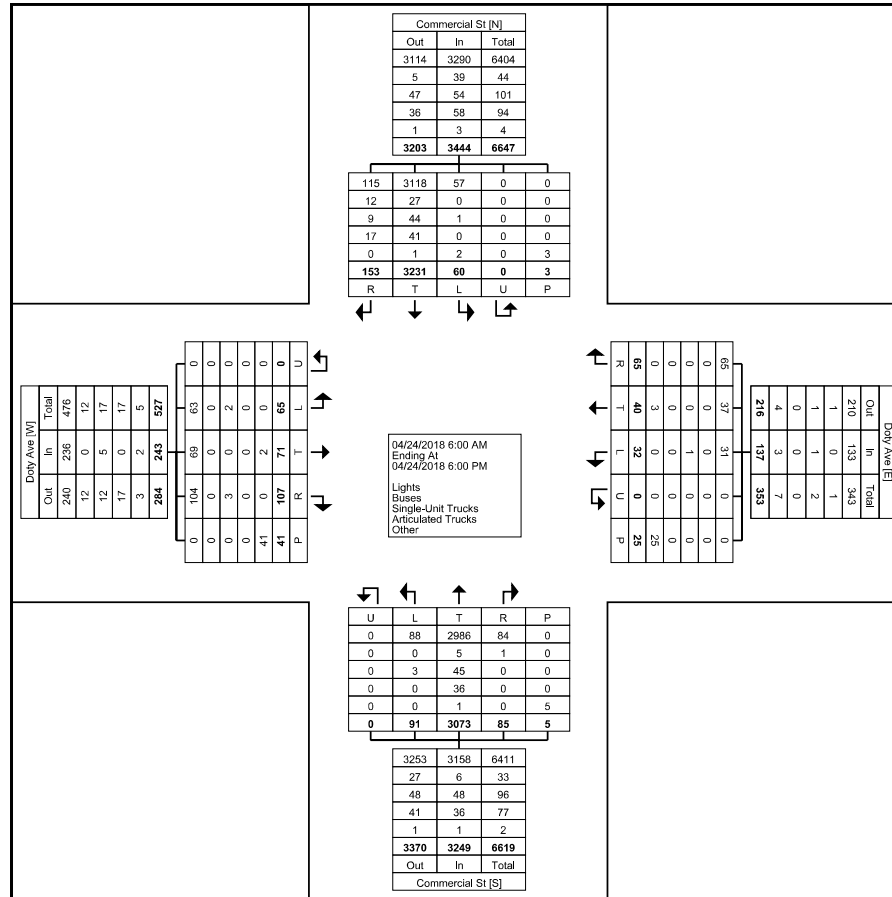


Buses	12	27	0	0	-	39	0	0	0	0	-	0	1	5	0	0	-	6	0	0	0	0	-	0	45
% Buses	7.8	0.8	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	1.2	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.6
Single-Unit Trucks	9	44	1	0	-	54	0	0	1	0	-	1	0	45	3	0	-	48	3	0	2	0	-	5	108
% Single-Unit Trucks	5.9	1.4	1.7	-	-	1.6	0.0	0.0	3.1	-	-	0.7	0.0	1.5	3.3	-	-	1.5	2.8	0.0	3.1	-	-	2.1	1.5
Articulated Trucks	17	41	0	0	-	58	0	0	0	0	-	0	0	36	0	0	-	36	0	0	0	0	-	0	94
% Articulated Trucks	11.1	1.3	0.0	-	-	1.7	0.0	0.0	0.0	-	-	0.0	0.0	1.2	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	1.3
Bicycles on Road	0	1	2	0	-	3	0	3	0	0	-	3	0	1	0	0	-	1	0	2	0	0	-	2	9
% Bicycles on Road	0.0	0.0	3.3	-	-	0.1	0.0	7.5	0.0	-	-	2.2	0.0	0.0	0.0	-	-	0.0	0.0	2.8	0.0	-	-	0.8	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	5	-	-	-	-	-	0	-	-	-	-	-	7	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	20.0	-	-	-	-	-	0.0	-	-	-	-	-	17.1	-	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	20	-	-	-	-	-	5	-	-	-	-	-	34	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	80.0	-	-	-	-	-	100.0	-	-	-	-	-	82.9	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Doty Ave 042418  
 Site Code:  
 Start Date: 04/24/2018  
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Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Doty Ave 042418  
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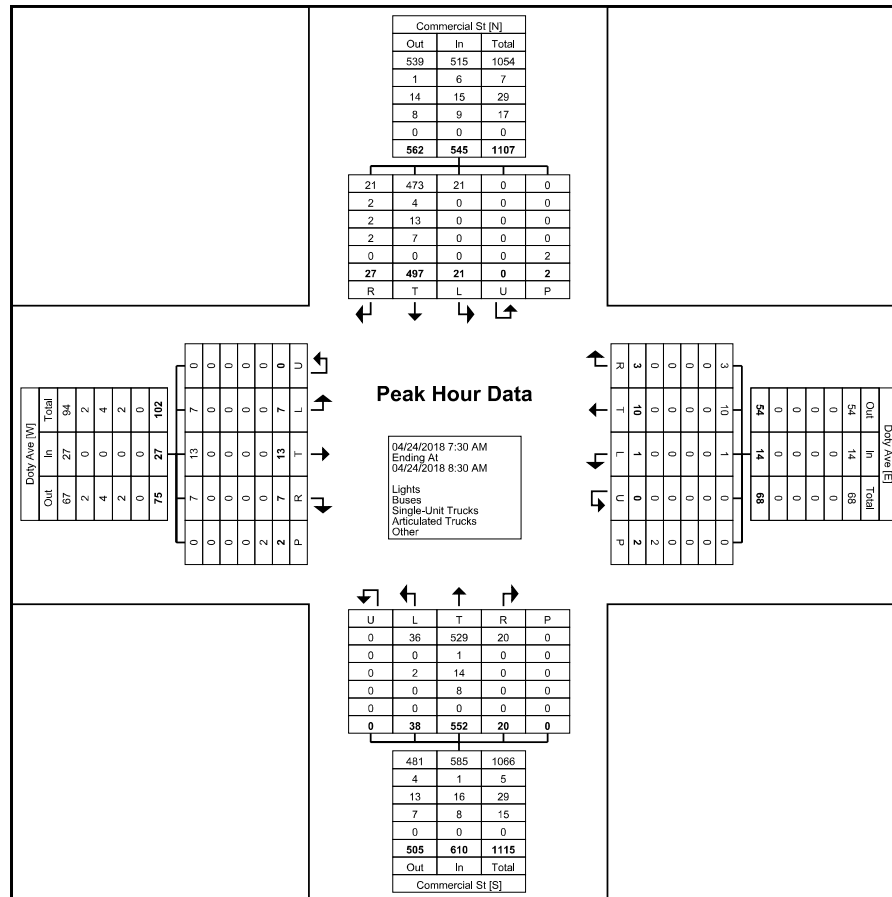
### Turning Movement Peak Hour Data (7:30 AM)

Start Time	Commercial St Southbound						Doty Ave Westbound						Commercial St Northbound						Doty Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:30 AM	9	154	8	0	0	171	3	3	0	0	0	6	6	127	11	0	0	144	1	4	2	0	0	7	328
7:45 AM	7	129	8	0	2	144	0	3	0	0	1	3	4	175	14	0	0	193	0	3	3	0	1	6	346
8:00 AM	7	115	4	0	0	126	0	3	0	0	0	3	4	130	8	0	0	142	5	5	2	0	0	12	283
8:15 AM	4	99	1	0	0	104	0	1	1	0	1	2	6	120	5	0	0	131	1	1	0	0	1	2	239
<b>Total</b>	<b>27</b>	<b>497</b>	<b>21</b>	<b>0</b>	<b>2</b>	<b>545</b>	<b>3</b>	<b>10</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>14</b>	<b>20</b>	<b>552</b>	<b>38</b>	<b>0</b>	<b>0</b>	<b>610</b>	<b>7</b>	<b>13</b>	<b>7</b>	<b>0</b>	<b>2</b>	<b>27</b>	<b>1196</b>
Approach %	5.0	91.2	3.9	0.0	-	-	21.4	71.4	7.1	0.0	-	-	3.3	90.5	6.2	0.0	-	-	25.9	48.1	25.9	0.0	-	-	-
Total %	2.3	41.6	1.8	0.0	-	45.6	0.3	0.8	0.1	0.0	-	1.2	1.7	46.2	3.2	0.0	-	51.0	0.6	1.1	0.6	0.0	-	2.3	-
PHF	0.750	0.807	0.656	0.000	-	0.797	0.250	0.833	0.250	0.000	-	0.583	0.833	0.789	0.679	0.000	-	0.790	0.350	0.650	0.583	0.000	-	0.563	0.864
Lights	21	473	21	0	-	515	3	10	1	0	-	14	20	529	36	0	-	585	7	13	7	0	-	27	1141
% Lights	77.8	95.2	100.0	-	-	94.5	100.0	100.0	100.0	-	-	100.0	100.0	95.8	94.7	-	-	95.9	100.0	100.0	100.0	-	-	100.0	95.4
Buses	2	4	0	0	-	6	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	7
% Buses	7.4	0.8	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.6
Single-Unit Trucks	2	13	0	0	-	15	0	0	0	0	-	0	0	14	2	0	-	16	0	0	0	0	-	0	31
% Single-Unit Trucks	7.4	2.6	0.0	-	-	2.8	0.0	0.0	0.0	-	-	0.0	0.0	2.5	5.3	-	-	2.6	0.0	0.0	0.0	-	-	0.0	2.6
Articulated Trucks	2	7	0	0	-	9	0	0	0	0	-	0	0	8	0	0	-	8	0	0	0	0	-	0	17
% Articulated Trucks	7.4	1.4	0.0	-	-	1.7	0.0	0.0	0.0	-	-	0.0	0.0	1.4	0.0	-	-	1.3	0.0	0.0	0.0	-	-	0.0	1.4
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



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 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Doty Ave 042418  
 Site Code:  
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Turning Movement Peak Hour Data Plot (7:30 AM)



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Doty Ave 042418  
 Site Code:  
 Start Date: 04/24/2018  
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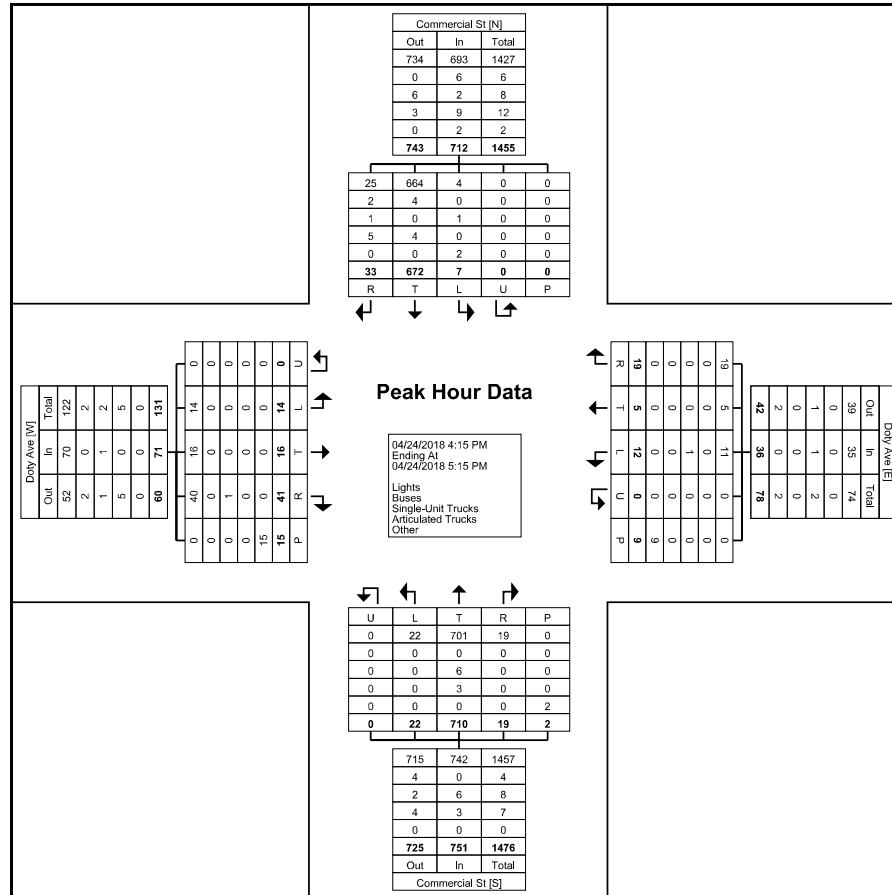
### Turning Movement Peak Hour Data (4:15 PM)

Start Time	Commercial St Southbound						Doty Ave Westbound						Commercial St Northbound						Doty Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:15 PM	4	141	1	0	0	146	6	0	1	0	4	7	4	178	1	0	0	183	7	4	1	0	0	12	348
4:30 PM	8	185	4	0	0	197	7	1	3	0	5	11	2	166	5	0	0	173	10	2	4	0	5	16	397
4:45 PM	12	159	1	0	0	172	4	2	3	0	0	9	5	178	4	0	2	187	9	6	5	0	6	20	388
5:00 PM	9	187	1	0	0	197	2	2	5	0	0	9	8	188	12	0	0	208	15	4	4	0	4	23	437
<b>Total</b>	<b>33</b>	<b>672</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>712</b>	<b>19</b>	<b>5</b>	<b>12</b>	<b>0</b>	<b>9</b>	<b>36</b>	<b>19</b>	<b>710</b>	<b>22</b>	<b>0</b>	<b>2</b>	<b>751</b>	<b>41</b>	<b>16</b>	<b>14</b>	<b>0</b>	<b>15</b>	<b>71</b>	<b>1570</b>
Approach %	4.6	94.4	1.0	0.0	-	-	52.8	13.9	33.3	0.0	-	-	2.5	94.5	2.9	0.0	-	-	57.7	22.5	19.7	0.0	-	-	-
Total %	2.1	42.8	0.4	0.0	-	45.4	1.2	0.3	0.8	0.0	-	2.3	1.2	45.2	1.4	0.0	-	47.8	2.6	1.0	0.9	0.0	-	4.5	-
PHF	0.688	0.898	0.438	0.000	-	0.904	0.679	0.625	0.600	0.000	-	0.818	0.594	0.944	0.458	0.000	-	0.903	0.683	0.667	0.700	0.000	-	0.772	0.898
Lights	25	664	4	0	-	693	19	5	11	0	-	35	19	701	22	0	-	742	40	16	14	0	-	70	1540
% Lights	75.8	98.8	57.1	-	-	97.3	100.0	100.0	91.7	-	-	97.2	100.0	98.7	100.0	-	-	98.8	97.6	100.0	100.0	-	-	98.6	98.1
Buses	2	4	0	0	-	6	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	6
% Buses	6.1	0.6	0.0	-	-	0.8	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.4
Single-Unit Trucks	1	0	1	0	-	2	0	0	1	0	-	1	0	6	0	0	-	6	1	0	0	0	-	1	10
% Single-Unit Trucks	3.0	0.0	14.3	-	-	0.3	0.0	0.0	8.3	-	-	2.8	0.0	0.8	0.0	-	-	0.8	2.4	0.0	0.0	-	-	1.4	0.6
Articulated Trucks	5	4	0	0	-	9	0	0	0	0	-	0	0	3	0	0	-	3	0	0	0	0	-	0	12
% Articulated Trucks	15.2	0.6	0.0	-	-	1.3	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.8
Bicycles on Road	0	0	2	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.0	28.6	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	22.2	-	-	-	-	-	0.0	-	-	-	-	-	6.7	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	7	-	-	-	-	-	2	-	-	-	-	-	14	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	77.8	-	-	-	-	-	100.0	-	-	-	-	-	93.3	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Doty Ave 042418  
 Site Code:  
 Start Date: 04/24/2018  
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Turning Movement Peak Hour Data Plot (4:15 PM)

Commercial Street & Wisconsin Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Wisconsin Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 1

### Turning Movement Data

Start Time	Commerical St Southbound						Wisconsin Ave Westbound						Commercial St Northbound						Wisconsin Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
6:00 AM	45	64	0	0	1	109	5	7	2	0	0	14	2	54	0	0	1	56	1	12	19	0	0	32	211
6:15 AM	56	78	2	0	2	136	2	15	2	0	1	19	10	52	1	0	1	63	1	13	30	0	0	44	262
6:30 AM	55	108	2	0	3	165	7	19	6	0	0	32	5	58	2	0	2	65	3	16	36	0	1	55	317
6:45 AM	77	107	1	0	2	185	5	19	5	0	0	29	4	66	2	0	1	72	1	25	32	0	0	58	344
Hourly Total	233	357	5	0	8	595	19	60	15	0	1	94	21	230	5	0	5	256	6	66	117	0	1	189	1134
7:00 AM	70	118	0	0	1	188	3	28	5	0	0	36	3	73	4	0	1	80	2	19	28	0	2	49	353
7:15 AM	81	128	0	0	2	209	8	52	9	0	0	69	12	69	2	0	3	83	6	38	41	0	1	85	446
7:30 AM	104	152	1	0	4	257	12	56	14	0	1	82	16	103	8	0	1	127	3	50	43	0	1	96	562
7:45 AM	104	129	4	0	2	237	11	59	9	0	2	79	22	142	10	0	3	174	2	51	55	0	4	108	598
Hourly Total	359	527	5	0	9	891	34	195	37	0	3	266	53	387	24	0	8	464	13	158	167	0	8	338	1959
8:00 AM	79	117	0	0	0	196	10	44	7	0	0	61	12	116	4	0	2	132	2	40	69	0	0	111	500
8:15 AM	88	91	0	0	0	179	8	29	14	0	0	51	11	101	5	0	2	117	5	36	55	0	2	96	443
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	167	208	0	0	0	375	18	73	21	0	0	112	23	217	9	0	4	249	7	76	124	0	2	207	943
2:30 PM	64	132	6	0	5	202	1	40	12	0	2	53	13	111	10	0	2	134	6	38	59	0	4	103	492
2:45 PM	65	101	6	0	5	172	5	40	12	0	1	57	15	110	9	0	1	134	10	46	61	0	2	117	480
Hourly Total	129	233	12	0	10	374	6	80	24	0	3	110	28	221	19	0	3	268	16	84	120	0	6	220	972
3:00 PM	75	129	5	0	6	209	5	63	19	0	2	87	11	118	13	0	3	142	9	38	57	0	2	104	542
3:15 PM	54	100	5	0	5	159	6	52	23	0	1	81	15	138	10	0	2	163	10	50	53	0	1	113	516
3:30 PM	67	142	4	0	2	213	6	67	24	0	2	97	19	126	11	0	2	156	3	57	58	0	3	118	584
3:45 PM	55	145	3	0	2	203	6	45	19	0	3	70	17	143	10	0	4	170	11	54	80	0	5	145	588
Hourly Total	251	516	17	0	15	784	23	227	85	0	8	335	62	525	44	0	11	631	33	199	248	0	11	480	2230
4:00 PM	87	124	5	0	2	216	7	64	32	0	1	103	17	136	15	0	1	168	8	33	57	0	2	98	585
4:15 PM	55	120	9	0	2	184	8	42	17	0	3	67	18	149	6	0	1	173	9	53	70	0	1	132	556
4:30 PM	80	160	2	0	12	242	10	67	23	0	8	100	12	156	10	0	4	178	7	41	58	0	10	106	626
4:45 PM	62	137	3	0	1	202	9	37	26	0	3	72	12	170	8	0	9	190	10	59	84	0	7	153	617
Hourly Total	284	541	19	0	17	844	34	210	98	0	15	342	59	611	39	0	15	709	34	186	269	0	20	489	2384
5:00 PM	71	156	10	0	10	237	8	57	33	0	3	98	10	162	20	0	2	192	8	62	67	0	7	137	664
5:15 PM	61	131	8	0	4	200	6	44	31	0	0	81	12	122	12	0	4	146	11	54	68	0	5	133	560
5:30 PM	64	100	8	0	2	172	5	31	16	0	0	52	15	112	16	0	4	143	14	39	68	0	5	121	488
5:45 PM	60	118	4	0	1	182	7	36	16	0	7	59	18	103	8	0	12	129	19	37	51	0	5	107	477
Hourly Total	256	505	30	0	17	791	26	168	96	0	10	290	55	499	56	0	22	610	52	192	254	0	22	498	2189
Grand Total	1679	2887	88	0	76	4654	160	1013	376	0	40	1549	301	2690	196	0	68	3187	161	961	1299	0	70	2421	11811
Approach %	36.1	62.0	1.9	0.0	-	-	10.3	65.4	24.3	0.0	-	-	9.4	84.4	6.1	0.0	-	-	6.7	39.7	53.7	0.0	-	-	-
Total %	14.2	24.4	0.7	0.0	-	39.4	1.4	8.6	3.2	0.0	-	13.1	2.5	22.8	1.7	0.0	-	27.0	1.4	8.1	11.0	0.0	-	20.5	-
Lights	1661	2752	88	0	-	4501	159	995	372	0	-	1526	300	2605	195	0	-	3100	139	944	1284	0	-	2367	11494
% Lights	98.9	95.3	100.0	-	-	96.7	99.4	98.2	98.9	-	-	98.5	99.7	96.8	99.5	-	-	97.3	86.3	98.2	98.8	-	-	97.8	97.3

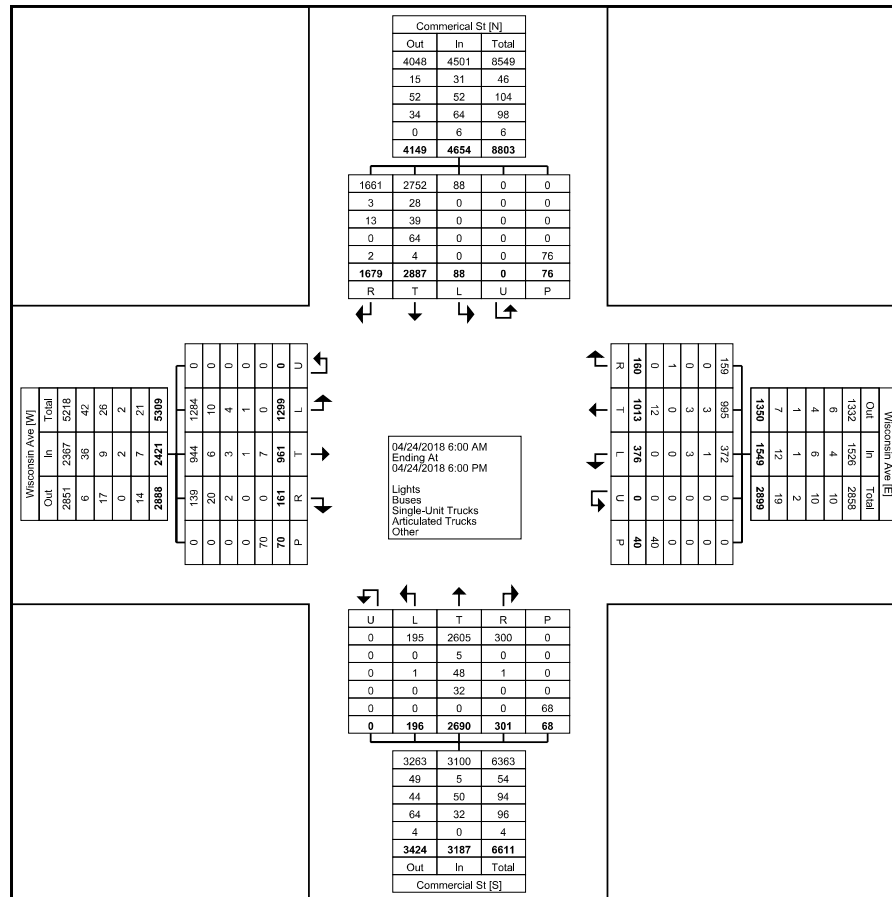


Buses	3	28	0	0	-	31	0	3	1	0	-	4	0	5	0	0	-	5	20	6	10	0	-	36	76
% Buses	0.2	1.0	0.0	-	-	0.7	0.0	0.3	0.3	-	-	0.3	0.0	0.2	0.0	-	-	0.2	12.4	0.6	0.8	-	-	1.5	0.6
Single-Unit Trucks	13	39	0	0	-	52	0	3	3	0	-	6	1	48	1	0	-	50	2	3	4	0	-	9	117
% Single-Unit Trucks	0.8	1.4	0.0	-	-	1.1	0.0	0.3	0.8	-	-	0.4	0.3	1.8	0.5	-	-	1.6	1.2	0.3	0.3	-	-	0.4	1.0
Articulated Trucks	0	64	0	0	-	64	1	0	0	0	-	1	0	32	0	0	-	32	0	1	1	0	-	2	99
% Articulated Trucks	0.0	2.2	0.0	-	-	1.4	0.6	0.0	0.0	-	-	0.1	0.0	1.2	0.0	-	-	1.0	0.0	0.1	0.1	-	-	0.1	0.8
Bicycles on Road	2	4	0	0	-	6	0	12	0	0	-	12	0	0	0	0	-	0	0	7	0	0	-	7	25
% Bicycles on Road	0.1	0.1	0.0	-	-	0.1	0.0	1.2	0.0	-	-	0.8	0.0	0.0	0.0	-	-	0.0	0.0	0.7	0.0	-	-	0.3	0.2
Bicycles on Crosswalk	-	-	-	-	10	-	-	-	-	-	8	-	-	-	-	-	3	-	-	-	-	-	7	-	-
% Bicycles on Crosswalk	-	-	-	-	13.2	-	-	-	-	-	20.0	-	-	-	-	-	4.4	-	-	-	-	-	10.0	-	-
Pedestrians	-	-	-	-	66	-	-	-	-	-	32	-	-	-	-	-	65	-	-	-	-	-	63	-	-
% Pedestrians	-	-	-	-	86.8	-	-	-	-	-	80.0	-	-	-	-	-	95.6	-	-	-	-	-	90.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Wisconsin Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
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Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Wisconsin Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
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### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Commerical St Southbound						Wisconsin Ave Westbound						Commercial St Northbound						Wisconsin Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	81	128	0	0	2	209	8	52	9	0	0	69	12	69	2	0	3	83	6	38	41	0	1	85	446
7:30 AM	104	152	1	0	4	257	12	56	14	0	1	82	16	103	8	0	1	127	3	50	43	0	1	96	562
7:45 AM	104	129	4	0	2	237	11	59	9	0	2	79	22	142	10	0	3	174	2	51	55	0	4	108	598
8:00 AM	79	117	0	0	0	196	10	44	7	0	0	61	12	116	4	0	2	132	2	40	69	0	0	111	500
<b>Total</b>	<b>368</b>	<b>526</b>	<b>5</b>	<b>0</b>	<b>8</b>	<b>899</b>	<b>41</b>	<b>211</b>	<b>39</b>	<b>0</b>	<b>3</b>	<b>291</b>	<b>62</b>	<b>430</b>	<b>24</b>	<b>0</b>	<b>9</b>	<b>516</b>	<b>13</b>	<b>179</b>	<b>208</b>	<b>0</b>	<b>6</b>	<b>400</b>	<b>2106</b>
Approach %	40.9	58.5	0.6	0.0	-	-	14.1	72.5	13.4	0.0	-	-	12.0	83.3	4.7	0.0	-	-	3.3	44.8	52.0	0.0	-	-	-
Total %	17.5	25.0	0.2	0.0	-	42.7	1.9	10.0	1.9	0.0	-	13.8	2.9	20.4	1.1	0.0	-	24.5	0.6	8.5	9.9	0.0	-	19.0	-
PHF	0.885	0.865	0.313	0.000	-	0.875	0.854	0.894	0.696	0.000	-	0.887	0.705	0.757	0.600	0.000	-	0.741	0.542	0.877	0.754	0.000	-	0.901	0.880
Lights	361	487	5	0	-	853	41	208	39	0	-	288	61	409	24	0	-	494	9	176	204	0	-	389	2024
% Lights	98.1	92.6	100.0	-	-	94.9	100.0	98.6	100.0	-	-	99.0	98.4	95.1	100.0	-	-	95.7	69.2	98.3	98.1	-	-	97.3	96.1
Buses	2	13	0	0	-	15	0	1	0	0	-	1	0	1	0	0	-	1	4	1	3	0	-	8	25
% Buses	0.5	2.5	0.0	-	-	1.7	0.0	0.5	0.0	-	-	0.3	0.0	0.2	0.0	-	-	0.2	30.8	0.6	1.4	-	-	2.0	1.2
Single-Unit Trucks	5	10	0	0	-	15	0	1	0	0	-	1	1	13	0	0	-	14	0	2	1	0	-	3	33
% Single-Unit Trucks	1.4	1.9	0.0	-	-	1.7	0.0	0.5	0.0	-	-	0.3	1.6	3.0	0.0	-	-	2.7	0.0	1.1	0.5	-	-	0.8	1.6
Articulated Trucks	0	14	0	0	-	14	0	0	0	0	-	0	0	7	0	0	-	7	0	0	0	0	-	0	21
% Articulated Trucks	0.0	2.7	0.0	-	-	1.6	0.0	0.0	0.0	-	-	0.0	0.0	1.6	0.0	-	-	1.4	0.0	0.0	0.0	-	-	0.0	1.0
Bicycles on Road	0	2	0	0	-	2	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	0	-	3
% Bicycles on Road	0.0	0.4	0.0	-	-	0.2	0.0	0.5	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	8	-	-	-	-	-	3	-	-	-	-	-	9	-	-	-	-	-	6	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-





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 2901 International Lane  
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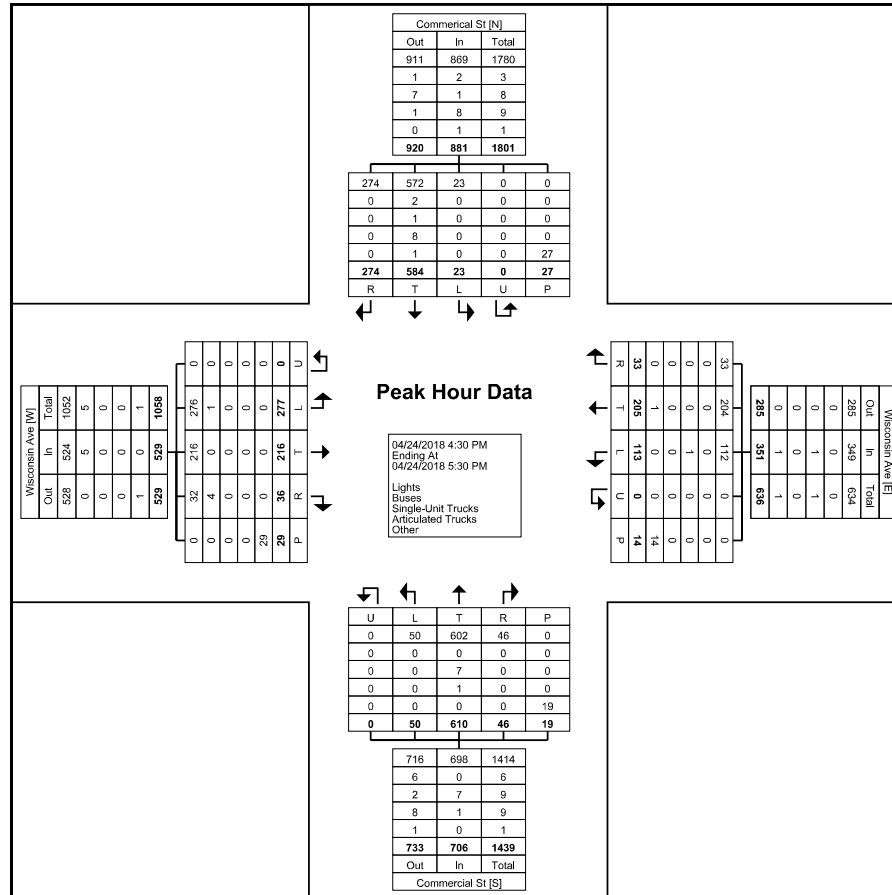
### Turning Movement Peak Hour Data (4:30 PM)

Start Time	Commerical St Southbound						Wisconsin Ave Westbound						Commercial St Northbound						Wisconsin Ave Eastbound						Int. Total	
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total		
4:30 PM	80	160	2	0	12	242	10	67	23	0	8	100	12	156	10	0	4	178	7	41	58	0	10	106	626	
4:45 PM	62	137	3	0	1	202	9	37	26	0	3	72	12	170	8	0	9	190	10	59	84	0	7	153	617	
5:00 PM	71	156	10	0	10	237	8	57	33	0	3	98	10	162	20	0	2	192	8	62	67	0	7	137	664	
5:15 PM	61	131	8	0	4	200	6	44	31	0	0	81	12	122	12	0	4	146	11	54	68	0	5	133	560	
<b>Total</b>	<b>274</b>	<b>584</b>	<b>23</b>	<b>0</b>	<b>27</b>	<b>881</b>	<b>33</b>	<b>205</b>	<b>113</b>	<b>0</b>	<b>14</b>	<b>351</b>	<b>46</b>	<b>610</b>	<b>50</b>	<b>0</b>	<b>19</b>	<b>706</b>	<b>36</b>	<b>216</b>	<b>277</b>	<b>0</b>	<b>29</b>	<b>529</b>	<b>2467</b>	
Approach %	31.1	66.3	2.6	0.0	-	-	9.4	58.4	32.2	0.0	-	-	6.5	86.4	7.1	0.0	-	-	6.8	40.8	52.4	0.0	-	-	-	
Total %	11.1	23.7	0.9	0.0	-	35.7	1.3	8.3	4.6	0.0	-	14.2	1.9	24.7	2.0	0.0	-	28.6	1.5	8.8	11.2	0.0	-	21.4	-	
PHF	0.856	0.913	0.575	0.000	-	0.910	0.825	0.765	0.856	0.000	-	0.878	0.958	0.897	0.625	0.000	-	0.919	0.818	0.871	0.824	0.000	-	0.864	0.929	
Lights	274	572	23	0	-	869	33	204	112	0	-	349	46	602	50	0	-	698	32	216	276	0	-	524	2440	
% Lights	100.0	97.9	100.0	-	-	98.6	100.0	99.5	99.1	-	-	99.4	100.0	98.7	100.0	-	-	98.9	88.9	100.0	99.6	-	-	99.1	98.9	
Buses	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	4	0	1	0	-	5	7	
% Buses	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	11.1	0.0	0.4	-	-	0.9	0.3	
Single-Unit Trucks	0	1	0	0	-	1	0	0	1	0	-	1	0	7	0	0	-	7	0	0	0	0	-	0	9	
% Single-Unit Trucks	0.0	0.2	0.0	-	-	0.1	0.0	0.0	0.9	-	-	0.3	0.0	1.1	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	0.4	
Articulated Trucks	0	8	0	0	-	8	0	0	0	0	-	0	0	1	0	0	-	1	0	0	0	0	-	0	9	
% Articulated Trucks	0.0	1.4	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	0.0	0.2	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.4	
Bicycles on Road	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	0	-	0	2
% Bicycles on Road	0.0	0.2	0.0	-	-	0.1	0.0	0.5	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1	
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	1	-	-	
% Bicycles on Crosswalk	-	-	-	-	7.4	-	-	-	-	-	21.4	-	-	-	-	-	5.3	-	-	-	-	-	3.4	-	-	
Pedestrians	-	-	-	-	25	-	-	-	-	-	11	-	-	-	-	-	18	-	-	-	-	-	28	-	-	
% Pedestrians	-	-	-	-	92.6	-	-	-	-	-	78.6	-	-	-	-	-	94.7	-	-	-	-	-	96.6	-	-	



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial St & Wisconsin Ave  
 042418  
 Site Code:  
 Start Date: 04/24/2018  
 Page No: 7



Turning Movement Peak Hour Data Plot (4:30 PM)

Commercial Street & Forest Avenue



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Forest Ave 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 1

### Turning Movement Data

Start Time	Commercial St Southbound						Forest Ave Westbound						Commercial St Northbound						Forest Ave Eastbound						Int. Total	
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total		
6:00 AM	3	94	0	0	0	97	1	0	3	0	0	4	1	41	1	0	0	43	7	2	2	0	2	11	155	
6:15 AM	0	127	0	0	1	127	0	1	4	0	0	5	3	56	1	0	0	60	14	1	5	0	1	20	212	
6:30 AM	0	173	0	0	0	173	1	2	7	0	0	10	3	67	2	0	0	72	14	3	4	0	0	21	276	
6:45 AM	2	160	0	0	0	162	2	1	3	0	0	6	6	81	0	0	4	87	19	2	7	0	0	28	283	
Hourly Total	5	554	0	0	1	559	4	4	17	0	0	25	13	245	4	0	4	262	54	8	18	0	3	80	926	
7:00 AM	1	178	0	0	0	179	0	0	12	0	0	12	2	61	3	0	0	66	19	1	5	0	2	25	282	
7:15 AM	2	220	1	0	0	223	1	1	8	0	1	10	4	73	3	0	1	80	20	4	6	0	1	30	343	
7:30 AM	5	228	3	0	0	236	0	1	9	0	1	10	9	83	3	0	1	95	25	5	7	0	0	37	378	
7:45 AM	5	234	5	0	4	244	3	12	18	0	1	33	11	98	1	0	2	110	21	9	2	0	0	32	419	
Hourly Total	13	860	9	0	4	882	4	14	47	0	3	65	26	315	10	0	4	351	85	19	20	0	3	124	1422	
8:00 AM	4	166	1	0	0	171	2	10	14	0	0	26	13	102	3	0	4	118	16	7	5	0	1	28	343	
8:15 AM	2	163	2	0	0	167	0	6	6	0	1	12	12	78	8	0	3	98	18	2	9	0	4	29	306	
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hourly Total	6	329	3	0	0	338	2	16	20	0	1	38	25	180	11	0	7	216	34	9	14	0	5	57	649	
2:30 PM	0	146	4	0	0	150	2	2	12	0	2	16	6	123	3	0	2	132	11	3	3	0	0	17	315	
2:45 PM	1	112	0	0	0	113	3	0	12	0	1	15	13	119	4	0	0	136	16	4	1	0	3	21	285	
Hourly Total	1	258	4	0	0	263	5	2	24	0	3	31	19	242	7	0	2	268	27	7	4	0	3	38	600	
3:00 PM	1	160	3	0	0	164	3	0	15	0	1	18	11	168	3	0	0	182	13	5	4	0	1	22	386	
3:15 PM	2	131	5	0	3	138	6	4	16	0	2	26	13	172	4	0	5	189	14	6	6	0	1	26	379	
3:30 PM	2	183	2	0	0	187	5	4	6	0	2	15	12	159	4	0	0	175	21	0	4	0	2	25	402	
3:45 PM	3	171	2	0	1	176	3	3	8	0	0	14	3	158	6	0	0	167	16	4	5	0	0	25	382	
Hourly Total	8	645	12	0	4	665	17	11	45	0	5	73	39	657	17	0	5	713	64	15	19	0	4	98	1549	
4:00 PM	2	151	2	0	0	155	3	1	16	0	0	20	5	166	6	0	1	177	20	6	4	0	0	30	382	
4:15 PM	1	159	3	0	0	163	5	2	12	0	0	19	3	174	3	0	0	180	19	2	4	0	1	25	387	
4:30 PM	1	177	3	0	1	181	3	2	28	0	3	33	14	188	7	0	0	209	23	5	7	0	2	35	458	
4:45 PM	2	150	1	0	0	153	3	3	18	0	0	24	11	200	2	0	0	213	33	2	8	0	1	43	433	
Hourly Total	6	637	9	0	1	652	14	8	74	0	3	96	33	728	18	0	1	779	95	15	23	0	4	133	1660	
5:00 PM	2	127	4	0	0	133	3	0	25	0	0	28	2	170	2	0	1	174	34	6	3	0	3	43	378	
5:15 PM	1	155	1	0	0	157	2	0	12	0	0	14	2	174	4	0	0	180	30	6	8	0	2	44	395	
5:30 PM	5	145	0	0	0	150	1	1	12	0	0	14	2	155	6	0	0	163	25	5	6	0	0	36	363	
5:45 PM	2	143	0	0	0	145	0	3	7	0	1	10	3	121	2	0	0	126	44	4	7	0	1	55	336	
Hourly Total	10	570	5	0	0	585	6	4	56	0	1	66	9	620	14	0	1	643	133	21	24	0	6	178	1472	
Grand Total	49	3853	42	0	10	3944	52	59	283	0	16	394	164	2987	81	0	24	3232	492	94	122	0	28	708	8278	
Approach %	1.2	97.7	1.1	0.0	-	-	13.2	15.0	71.8	0.0	-	-	5.1	92.4	2.5	0.0	-	-	69.5	13.3	17.2	0.0	-	-	-	
Total %	0.6	46.5	0.5	0.0	-	47.6	0.6	0.7	3.4	0.0	-	4.8	2.0	36.1	1.0	0.0	-	39.0	5.9	1.1	1.5	0.0	-	8.6	-	
Lights	49	3699	42	0	-	3790	49	58	275	0	-	382	163	2890	80	0	-	3133	485	93	121	0	-	699	8004	
% Lights	100.0	96.0	100.0	-	-	96.1	94.2	98.3	97.2	-	-	97.0	99.4	96.8	98.8	-	-	96.9	98.6	98.9	99.2	-	-	-	98.7	96.7

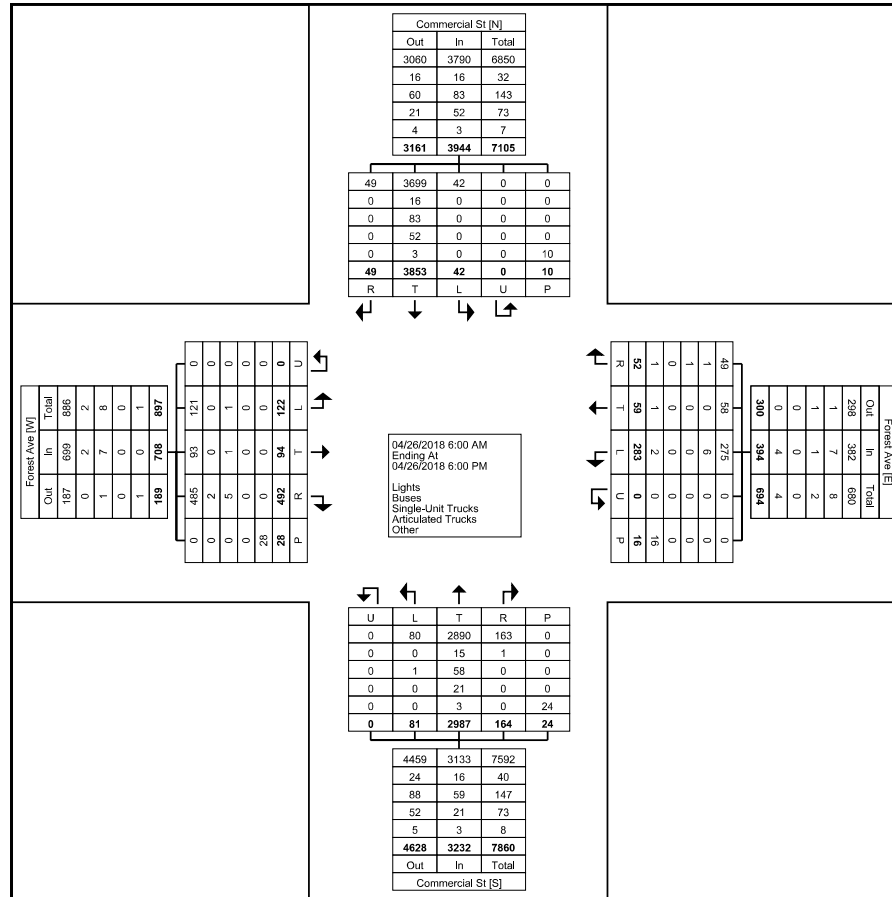


Buses	0	16	0	0	-	16	1	0	6	0	-	7	1	15	0	0	-	16	2	0	0	0	-	2	41
% Buses	0.0	0.4	0.0	-	-	0.4	1.9	0.0	2.1	-	-	1.8	0.6	0.5	0.0	-	-	0.5	0.4	0.0	0.0	-	-	0.3	0.5
Single-Unit Trucks	0	83	0	0	-	83	1	0	0	0	-	1	0	58	1	0	-	59	5	1	1	0	-	7	150
% Single-Unit Trucks	0.0	2.2	0.0	-	-	2.1	1.9	0.0	0.0	-	-	0.3	0.0	1.9	1.2	-	-	1.8	1.0	1.1	0.8	-	-	1.0	1.8
Articulated Trucks	0	52	0	0	-	52	0	0	0	0	-	0	0	21	0	0	-	21	0	0	0	0	-	0	73
% Articulated Trucks	0.0	1.3	0.0	-	-	1.3	0.0	0.0	0.0	-	-	0.0	0.0	0.7	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.9
Bicycles on Road	0	3	0	0	-	3	1	1	2	0	-	4	0	3	0	0	-	3	0	0	0	0	-	0	10
% Bicycles on Road	0.0	0.1	0.0	-	-	0.1	1.9	1.7	0.7	-	-	1.0	0.0	0.1	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	7	-	-	-	-	-	3	-	-	-	-	-	4	-	-
% Bicycles on Crosswalk	-	-	-	-	10.0	-	-	-	-	-	43.8	-	-	-	-	-	12.5	-	-	-	-	-	14.3	-	-
Pedestrians	-	-	-	-	9	-	-	-	-	-	9	-	-	-	-	-	21	-	-	-	-	-	24	-	-
% Pedestrians	-	-	-	-	90.0	-	-	-	-	-	56.3	-	-	-	-	-	87.5	-	-	-	-	-	85.7	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Forest Ave 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 3



Turning Movement Data Plot



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Forest Ave 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 4

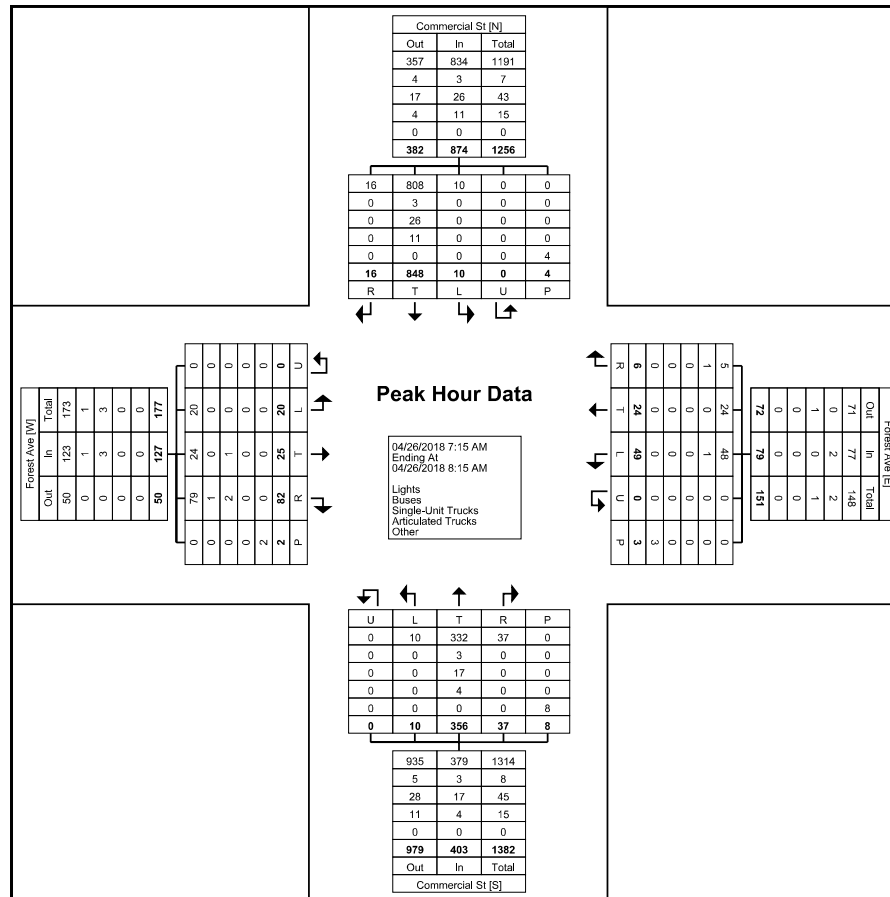
### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Commercial St Southbound						Forest Ave Westbound						Commercial St Northbound						Forest Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:15 AM	2	220	1	0	0	223	1	1	8	0	1	10	4	73	3	0	1	80	20	4	6	0	1	30	343
7:30 AM	5	228	3	0	0	236	0	1	9	0	1	10	9	83	3	0	1	95	25	5	7	0	0	37	378
7:45 AM	5	234	5	0	4	244	3	12	18	0	1	33	11	98	1	0	2	110	21	9	2	0	0	32	419
8:00 AM	4	166	1	0	0	171	2	10	14	0	0	26	13	102	3	0	4	118	16	7	5	0	1	28	343
<b>Total</b>	<b>16</b>	<b>848</b>	<b>10</b>	<b>0</b>	<b>4</b>	<b>874</b>	<b>6</b>	<b>24</b>	<b>49</b>	<b>0</b>	<b>3</b>	<b>79</b>	<b>37</b>	<b>356</b>	<b>10</b>	<b>0</b>	<b>8</b>	<b>403</b>	<b>82</b>	<b>25</b>	<b>20</b>	<b>0</b>	<b>2</b>	<b>127</b>	<b>1483</b>
Approach %	1.8	97.0	1.1	0.0	-	-	7.6	30.4	62.0	0.0	-	-	9.2	88.3	2.5	0.0	-	-	64.6	19.7	15.7	0.0	-	-	-
Total %	1.1	57.2	0.7	0.0	-	58.9	0.4	1.6	3.3	0.0	-	5.3	2.5	24.0	0.7	0.0	-	27.2	5.5	1.7	1.3	0.0	-	8.6	-
PHF	0.800	0.906	0.500	0.000	-	0.895	0.500	0.500	0.681	0.000	-	0.598	0.712	0.873	0.833	0.000	-	0.854	0.820	0.694	0.714	0.000	-	0.858	0.885
Lights	16	808	10	0	-	834	5	24	48	0	-	77	37	332	10	0	-	379	79	24	20	0	-	123	1413
% Lights	100.0	95.3	100.0	-	-	95.4	83.3	100.0	98.0	-	-	97.5	100.0	93.3	100.0	-	-	94.0	96.3	96.0	100.0	-	-	96.9	95.3
Buses	0	3	0	0	-	3	1	0	1	0	-	2	0	3	0	0	-	3	1	0	0	0	-	1	9
% Buses	0.0	0.4	0.0	-	-	0.3	16.7	0.0	2.0	-	-	2.5	0.0	0.8	0.0	-	-	0.7	1.2	0.0	0.0	-	-	0.8	0.6
Single-Unit Trucks	0	26	0	0	-	26	0	0	0	0	-	0	0	17	0	0	-	17	2	1	0	0	-	3	46
% Single-Unit Trucks	0.0	3.1	0.0	-	-	3.0	0.0	0.0	0.0	-	-	0.0	0.0	4.8	0.0	-	-	4.2	2.4	4.0	0.0	-	-	2.4	3.1
Articulated Trucks	0	11	0	0	-	11	0	0	0	0	-	0	0	4	0	0	-	4	0	0	0	0	-	0	15
% Articulated Trucks	0.0	1.3	0.0	-	-	1.3	0.0	0.0	0.0	-	-	0.0	0.0	1.1	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	1.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	33.3	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	4	-	-	-	-	-	2	-	-	-	-	-	8	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	66.7	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Forest Ave 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 5



Turning Movement Peak Hour Data Plot (7:15 AM)



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Forest Ave 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 6

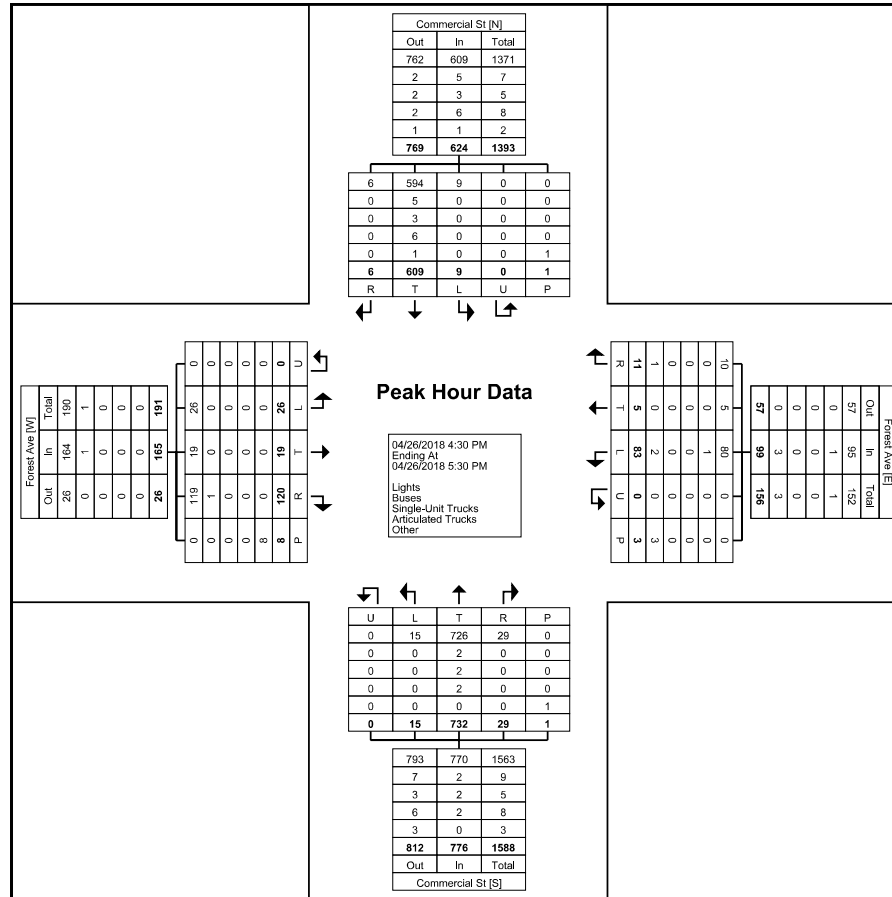
### Turning Movement Peak Hour Data (4:30 PM)

Start Time	Commercial St Southbound						Forest Ave Westbound						Commercial St Northbound						Forest Ave Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:30 PM	1	177	3	0	1	181	3	2	28	0	3	33	14	188	7	0	0	209	23	5	7	0	2	35	458
4:45 PM	2	150	1	0	0	153	3	3	18	0	0	24	11	200	2	0	0	213	33	2	8	0	1	43	433
5:00 PM	2	127	4	0	0	133	3	0	25	0	0	28	2	170	2	0	1	174	34	6	3	0	3	43	378
5:15 PM	1	155	1	0	0	157	2	0	12	0	0	14	2	174	4	0	0	180	30	6	8	0	2	44	395
<b>Total</b>	<b>6</b>	<b>609</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>624</b>	<b>11</b>	<b>5</b>	<b>83</b>	<b>0</b>	<b>3</b>	<b>99</b>	<b>29</b>	<b>732</b>	<b>15</b>	<b>0</b>	<b>1</b>	<b>776</b>	<b>120</b>	<b>19</b>	<b>26</b>	<b>0</b>	<b>8</b>	<b>165</b>	<b>1664</b>
Approach %	1.0	97.6	1.4	0.0	-	-	11.1	5.1	83.8	0.0	-	-	3.7	94.3	1.9	0.0	-	-	72.7	11.5	15.8	0.0	-	-	-
Total %	0.4	36.6	0.5	0.0	-	37.5	0.7	0.3	5.0	0.0	-	5.9	1.7	44.0	0.9	0.0	-	46.6	7.2	1.1	1.6	0.0	-	9.9	-
PHF	0.750	0.860	0.563	0.000	-	0.862	0.917	0.417	0.741	0.000	-	0.750	0.518	0.915	0.536	0.000	-	0.911	0.882	0.792	0.813	0.000	-	0.938	0.908
Lights	6	594	9	0	-	609	10	5	80	0	-	95	29	726	15	0	-	770	119	19	26	0	-	164	1638
% Lights	100.0	97.5	100.0	-	-	97.6	90.9	100.0	96.4	-	-	96.0	100.0	99.2	100.0	-	-	99.2	99.2	100.0	100.0	-	-	99.4	98.4
Buses	0	5	0	0	-	5	0	0	1	0	-	1	0	2	0	0	-	2	1	0	0	0	-	1	9
% Buses	0.0	0.8	0.0	-	-	0.8	0.0	0.0	1.2	-	-	1.0	0.0	0.3	0.0	-	-	0.3	0.8	0.0	0.0	-	-	0.6	0.5
Single-Unit Trucks	0	3	0	0	-	3	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	5
% Single-Unit Trucks	0.0	0.5	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.3
Articulated Trucks	0	6	0	0	-	6	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	8
% Articulated Trucks	0.0	1.0	0.0	-	-	1.0	0.0	0.0	0.0	-	-	0.0	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.5
Bicycles on Road	0	1	0	0	-	1	1	0	2	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	4
% Bicycles on Road	0.0	0.2	0.0	-	-	0.2	9.1	0.0	2.4	-	-	3.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	8	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



MSA Professional Services, Inc.  
 2901 International Lane  
 Suite 300  
 Madison, Wisconsin, United States 53704  
 608.242.7779 cwagner@msa-ps.com

Count Name: Commercial & Forest Ave 042618  
 Site Code:  
 Start Date: 04/26/2018  
 Page No: 7






Turning Movement Peak Hour Data Plot (4:30 PM)

# **Attachment C**

*Network Peak*

Network Peak Traffic Volumes											
	Church St & Columbian Ave	Church St & Doty Ave	Church St & Wisconsin Ave	Commerical St & Winneconne Ave	Commercial St & Columbian Ave	Commercial St & Doty Ave	Commercial St & Wisconsin Ave	Commercial St & Forest Ave	Main St & Doty Ave	Main St & Torrey St	Main St & Green Bay Rd
6:00 AM	26	13	97	175	134	128	211	155	92	109	141
6:15 AM	21	9	140	229	158	144	262	212	137	149	183
6:30 AM	38	15	168	274	202	194	317	276	161	209	283
6:45 AM	55	25	217	312	213	187	344	283	193	252	342
7:00 AM	61	32	205	330	241	213	353	282	175	226	322
7:15 AM	123	46	295	430	278	238	446	343	258	396	430
7:30 AM	172	77	373	636	350	328	562	378	314	482	524
7:45 AM	200	96	419	645	406	346	598	419	354	536	645
8:00 AM	100	56	315	442	303	283	500	343	265	362	480
8:15 AM	82	33	260	391	277	239	443	306	241	315	371
Int. Total	878	402	2489	3864	2562	2300	4036	2997	2190	3036	3721
2:30 PM	89	54	246	482	348	312	492	315	240	297	468
2:45 PM	92	41	264	452	307	282	480	285	260	338	500
3:00 PM	95	41	292	528	356	313	542	386	279	363	530
3:15 PM	120	54	261	600	371	311	516	379	254	354	500
3:30 PM	106	60	320	518	371	345	584	402	297	364	538
3:45 PM	114	68	298	528	390	365	588	382	272	371	499
4:00 PM	122	76	324	516	363	348	585	382	293	385	487
4:15 PM	126	67	303	504	401	348	556	387	264	360	485
4:30 PM	165	82	384	637	486	397	626	458	361	483	576
4:45 PM	151	97	397	560	409	388	617	433	356	464	598
5:00 PM	160	92	393	597	408	437	664	378	350	467	539
5:15 PM	116	76	297	557	380	338	560	395	265	349	496
5:30 PM	111	81	290	457	316	303	488	363	249	329	418
5:45 PM	80	60	247	414	285	286	477	336	212	270	387
Int. Total	1647	949	4316	7350	5191	4773	7775	5281	3952	5194	7021

 Network Peak  
 Intersection Peak Hour  
 Peak Overlap



# **Attachment D**

*Traffic Signal Warrants – Main St & Torrey St*

# Wisconsin Department of Transportation Traffic Signal Warrant Summary Worksheet

**100%**

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

Intersection: Main St & Torrey St  
 County: Winnebago  
 City: City of Neenah

Major Street: Main St  
 Critical Approach Speed: 30 mph  
 Lanes: 2 or more lanes

Minor Street: Torrey St  
 Critical Approach Speed: 30 mph  
 Lanes: 1 lane

% Right Turns Included	In built-up area of isolated community of < 10,000 population? No
From North (SB) 0%	Total number of approaches at intersection? 3
From East (WB) 0%	If it is a "T" intersection, inflate minor threshold to 150%? No
From South (NB) 0%	Manually set volume level? No
From West (EB) 0%	

Analysis based on **EXISTING** volume data.

Date	Day of the Week	Time (HH:MM)			
		From	AM / PM	To	AM / PM
4/24/2018	Tuesday	6:00	AM	8:00	PM

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

**Warrant Analysis Conducted By:**

Name: C. Wagner  
 Agency: MSA Professional Services  
 Date: 5/12/2018

# Warrant 1: Eight - Hour Vehicular Volume

100%

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	150	120
Number of Hours	0	2

Satisfied? No

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	75	60
Number of Hours	4	10

Satisfied? No

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

Satisfied? No

Time Period	From	To	Manually Set To:		Total
			Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	
6:00 AM Enter Start Time (Military Time) (HH:MM)					
1	6:00	7:00	590	46	636
2	7:00	8:00	1189	111	1300
3	8:00	9:00	932	60	992
4	9:00	10:00	704	58	762
5	10:00	11:00	680	48	728
6	11:00	12:00	876	74	950
7	12:00	13:00	816	80	896
8	13:00	14:00	790	77	867
9	14:00	15:00	893	76	969
10	15:00	16:00	1113	129	1242
11	16:00	17:00	1322	120	1442
12	17:00	18:00	1083	100	1183
13	18:00	19:00	732	63	795
14	19:00	20:00	492	35	527
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

# Warrant 2: Four-Hour Volume

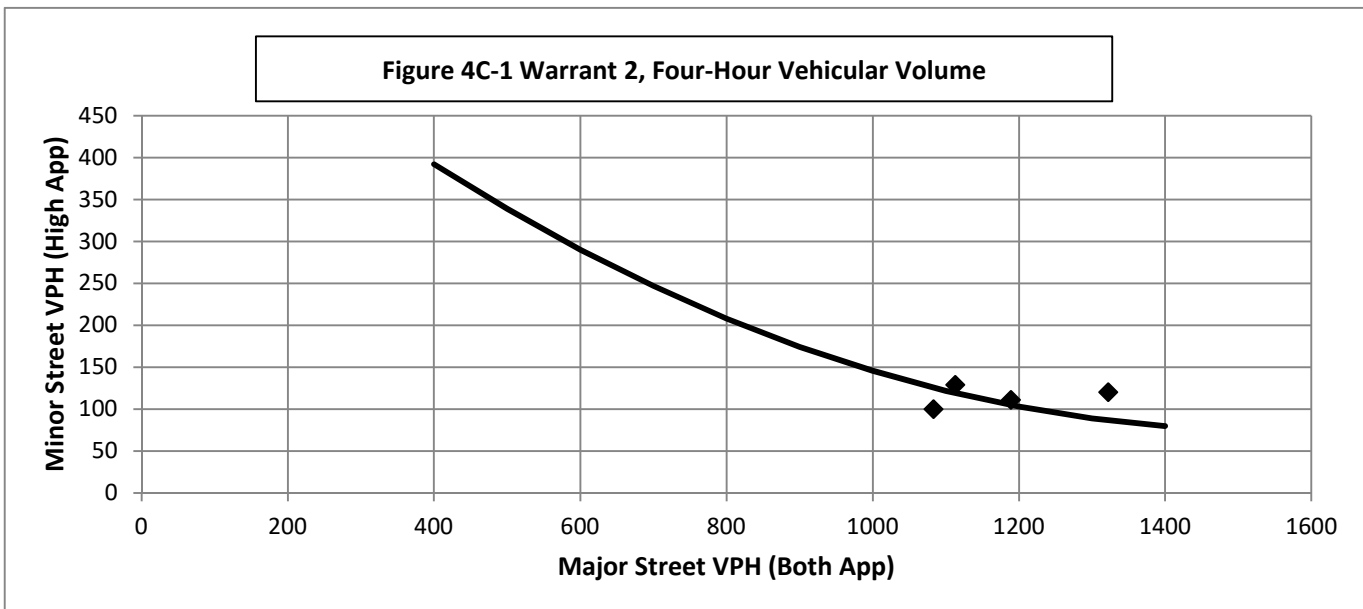
100%

Hour Start	16:00	7:00	15:00	17:00
Major Road Vol.	1322	1189	1113	1083
Minor Road Vol.	120	111	129	100

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:



## Warrant 3: Peak Hour Volume

**100%**

**Warrant Evaluated? Yes**

**Warrant Satisfied? No**

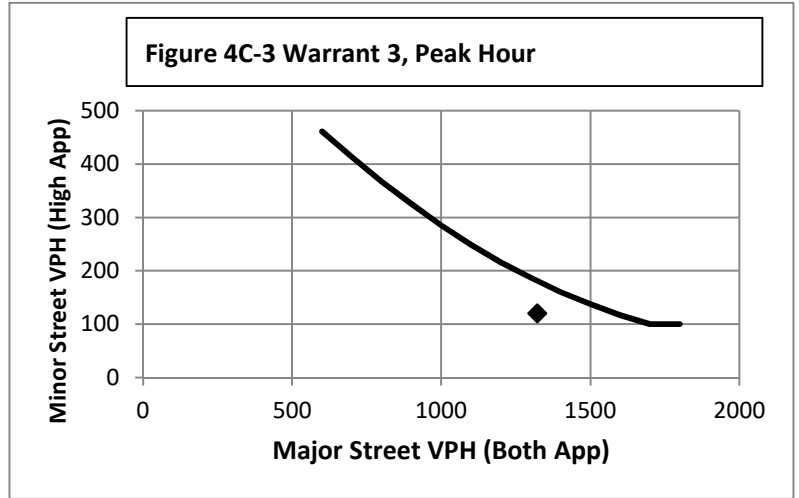
**Manually Set To:**

Condition justifying use of warrant:

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	
Total Entering Volume (veh/h)	650	

**Manually Set Peak Hour?**

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
16:00	1322	120



## Warrant 4: Pedestrian Volume

**100%**

**Warrant Evaluated? No**

**Warrant Satisfied? N/A**

**Manually Set To:**

**Criterion A: Four Hour**

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

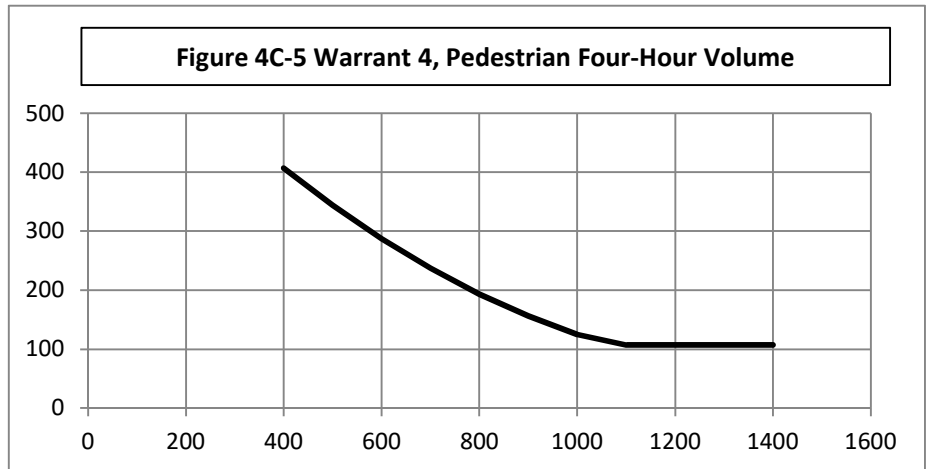
**Manually Set Major Rd Vol?**

**No**

**Avg. walk speed less than 3.5 ft/s?**

**No**

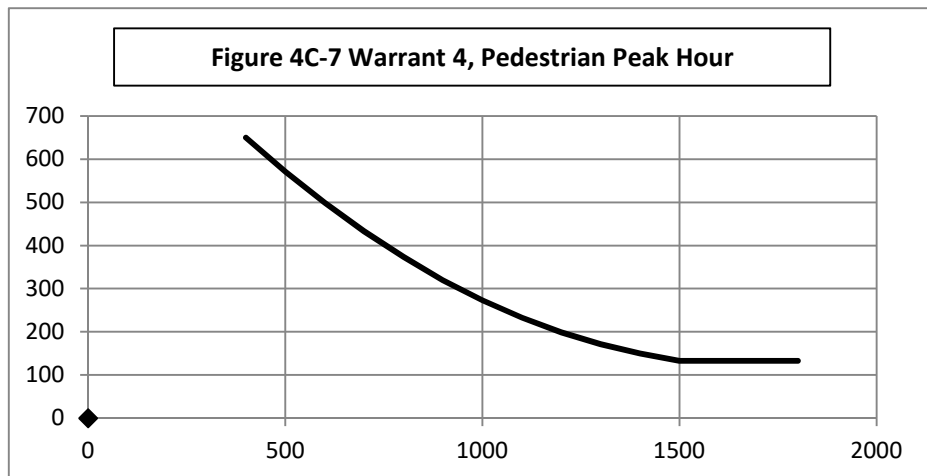
**Criterion A Satisfied?**



**Criterion B: Peak Hour**

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

**Criterion B Satisfied?**



## Warrant 5: School Crossing

**100%**

**Warrant Evaluated? No**

**Warrant Satisfied? N/A**

**Manually Set To:**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

## Warrant 6: Coordinated Signal System

**100%**

**Warrant Evaluated? No**

**Warrant Satisfied? N/A**

**Manually Set To:**

Criteria		Fulfilled?
1	Signal spacing > 1000 ft	No
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	Yes

## Warrant 7: Crash Experience

**100%**

**Warrant Evaluated? Yes**

**Warrant Satisfied? No**

**Manually Set To:**

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

## Warrant 8: Roadway Network

**100%**

**Warrant Evaluated? No**

**Warrant Satisfied? N/A**

**Manually Set To:**

Criteria		Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1442	Yes
	Five-year projected volumes that satisfy one or more of Warrants 1, 2, or 3.	2	Yes
2	Total entering vol. of at least 1,000 veh/h for each of any 5 hrs of non-normal business day (Sat. or Sun.)		
	Hour		
	Volume		

Characteristics of Major Routes - Select yes if all intersecting routes have characteristic		Fulfilled?
1	Part of the road or highway system that serves as the principal roadway network for through traffic flow	Yes
2	Rural or suburban highway outside of, entering, or traversing a city	Yes
3	Appears as a major route on an official plan	Yes

# Warrant 9: Intersection Near a Grade Crossing

100%

Warrant Evaluated? No

Warrant Satisfied? N/A

Manually Set To:

Adjustment Factors			Manually Set Peak Hour?				
Rail Traffic per Day	% High Occupancy Buses on Minor Road	% Tractor-Trailer Trucks on Minor Road	D	Peak Hour	Major Road Vol.	Minor Road Vol.	Adjusted Minor Vol.
				16:00	1322	120	120

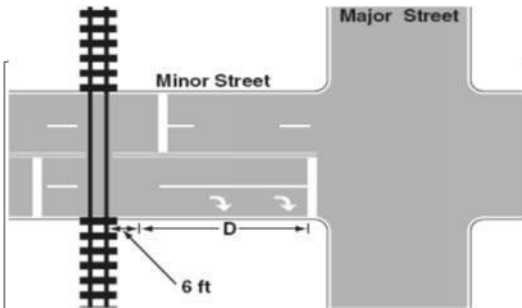
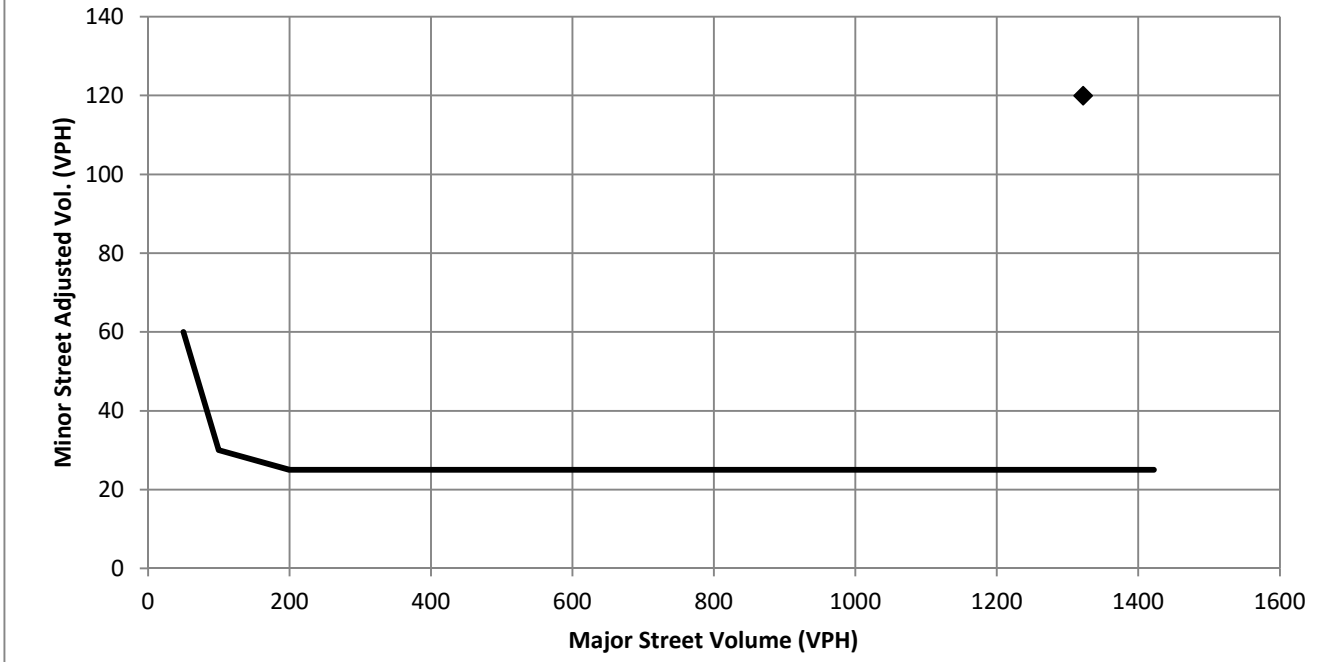


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)



Conclusions/Comments:

Updated: 6/23/2015

# **Attachment E**

*Traffic Signal Warrants – Main St & Doty Ave*

# Wisconsin Department of Transportation Traffic Signal Warrant Summary Worksheet

**100%**

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

Intersection: Main St & Doty Ave  
 County: Winnebago  
 City: City of Neenah

Major Street: Main St  
 Critical Approach Speed: 25 mph  
 Lanes: 1 lane

Minor Street: Torrey St  
 Critical Approach Speed: 25 mph  
 Lanes: 1 lane

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

Analysis based on **EXISTING** volume data.

Date	Day of the Week	Time (HH:MM)			
		From	AM / PM	To	AM / PM
4/24/2018	Tuesday	6:00	AM	8:00	PM

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

**Warrant Analysis Conducted By:**

Name: C. Wagner  
 Agency: MSA Professional Services  
 Date: 5/12/2018



# Warrant 1: Eight - Hour Vehicular Volume

100%

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:

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

Satisfied? No

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	750	600
Minor Rd. Req	75	60
Number of Hours	0	1

Satisfied? No

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

Satisfied? No

Time Period	From	To	Manually Set To:		Total
			Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	
1	6:00	7:00	569	14	583
2	7:00	8:00	1079	19	1098
3	8:00	9:00	871	20	891
4	9:00	10:00	662	30	692
5	10:00	11:00	651	36	687
6	11:00	12:00	796	51	847
7	12:00	13:00	769	48	817
8	13:00	14:00	740	46	786
9	14:00	15:00	852	52	904
10	15:00	16:00	1048	43	1091
11	16:00	17:00	1215	52	1267
12	17:00	18:00	1007	62	1069
13	18:00	19:00	692	46	738
14	19:00	20:00	456	33	489
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

# Warrant 2: Four-Hour Volume

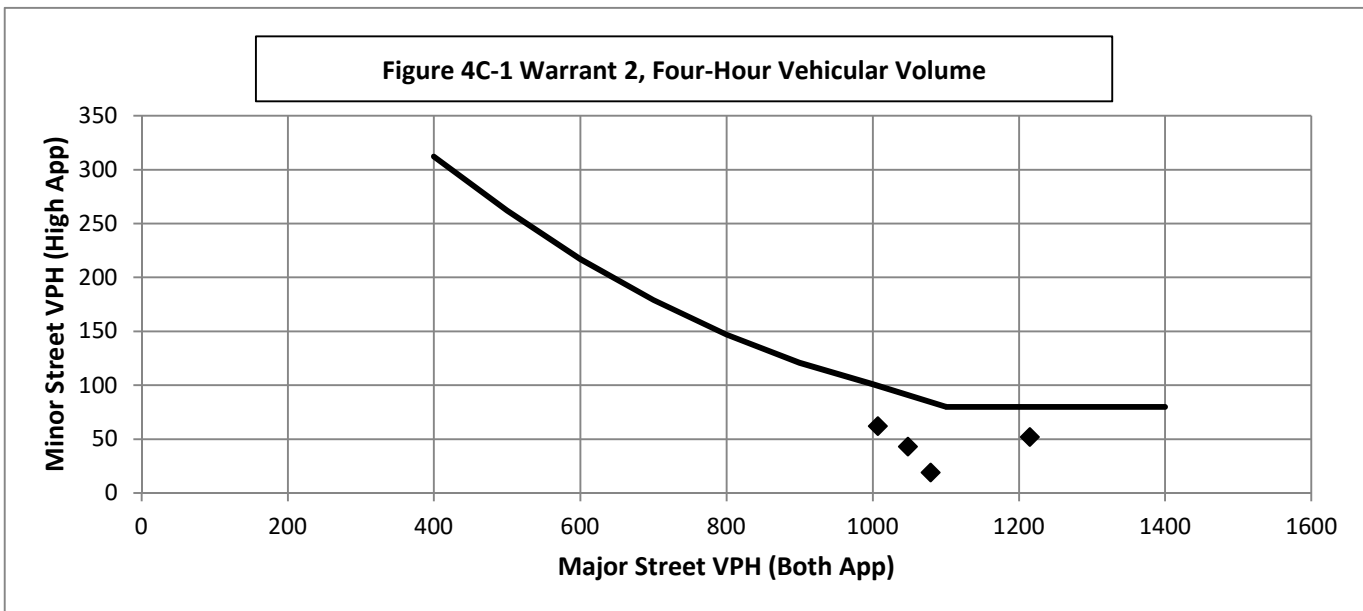
100%

Hour Start	16:00	17:00	15:00	7:00
Major Road Vol.	1215	1007	1048	1079
Minor Road Vol.	52	62	43	19

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:



## Warrant 3: Peak Hour Volume

**100%**

**Warrant Evaluated? Yes**

**Warrant Satisfied? No**

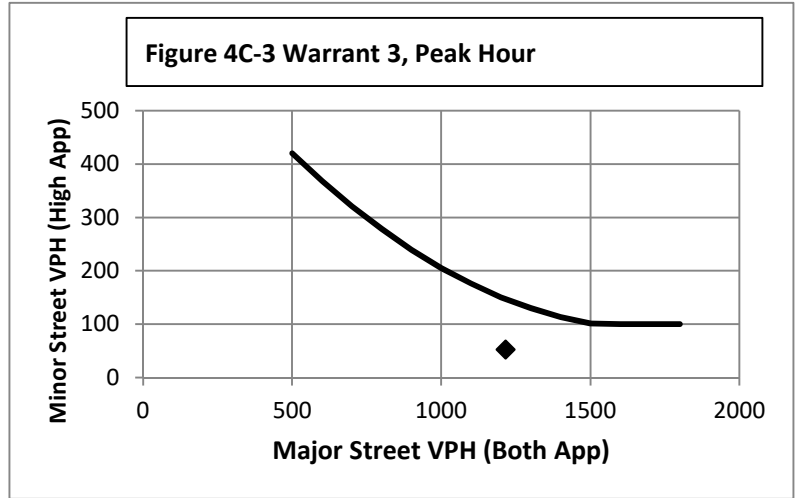
**Manually Set To:**

Condition justifying use of warrant:

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	
Total Entering Volume (veh/h)	800	

**Manually Set Peak Hour?**

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
16:00	1215	52



## Warrant 4: Pedestrian Volume

**100%**

**Warrant Evaluated? No**

**Warrant Satisfied? N/A**

**Manually Set To:**

**Criterion A: Four Hour**

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

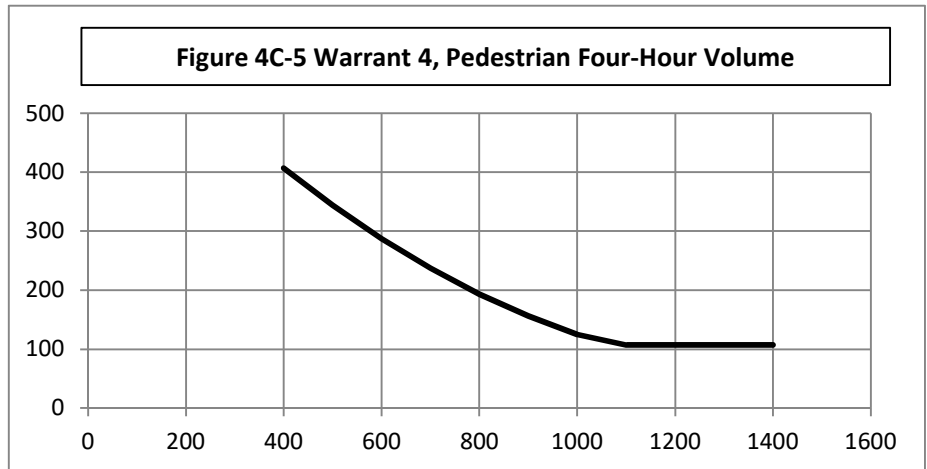
**Manually Set Major Rd Vol?**

**No**

**Avg. walk speed less than 3.5 ft/s?**

**No**

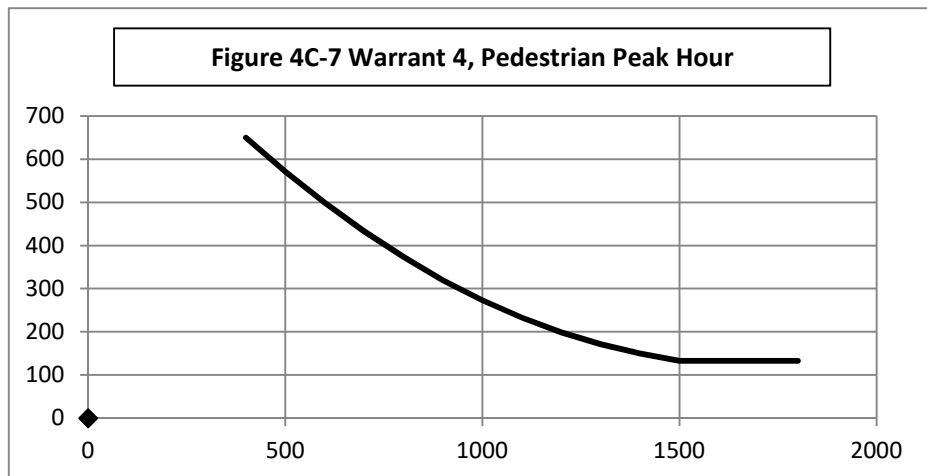
**Criterion A Satisfied?**



**Criterion B: Peak Hour**

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

**Criterion B Satisfied?**



## Warrant 5: School Crossing

**100%**

Warrant Evaluated? No

Warrant Satisfied? N/A

Manually Set To:

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

## Warrant 6: Coordinated Signal System

**100%**

Warrant Evaluated? No

Warrant Satisfied? N/A

Manually Set To:

Criteria		Fulfilled?
1	Signal spacing > 1000 ft	No
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	Yes

## Warrant 7: Crash Experience

**100%**

Warrant Evaluated? Yes

Warrant Satisfied? No

Manually Set To:

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

## Warrant 8: Roadway Network

**100%**

Warrant Evaluated? No

Warrant Satisfied? N/A

Manually Set To:

Criteria		Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1267	Yes
	Five-year projected volumes that satisfy one or more of Warrants 1, 2, or 3.	2	Yes
2	Total entering vol. of at least 1,000 veh/h for each of any 5 hrs of non-normal business day (Sat. or Sun.)		
	Hour		
	Volume		

Characteristics of Major Routes - Select yes if all intersecting routes have characteristic		Fulfilled?
1	Part of the road or highway system that serves as the principal roadway network for through traffic flow	Yes
2	Rural or suburban highway outside of, entering, or traversing a city	Yes
3	Appears as a major route on an official plan	Yes

# Warrant 9: Intersection Near a Grade Crossing

100%

Warrant Evaluated? No

Warrant Satisfied? N/A

Manually Set To:

Adjustment Factors			Manually Set Peak Hour?				
Rail Traffic per Day	% High Occupancy Buses on Minor Road	% Tractor-Trailer Trucks on Minor Road	D	Peak Hour	Major Road Vol.	Minor Road Vol.	Adjusted Minor Vol.
				16:00	1215	52	52

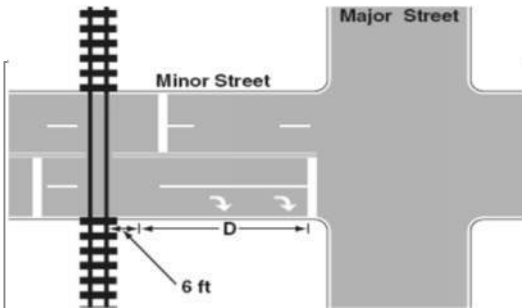
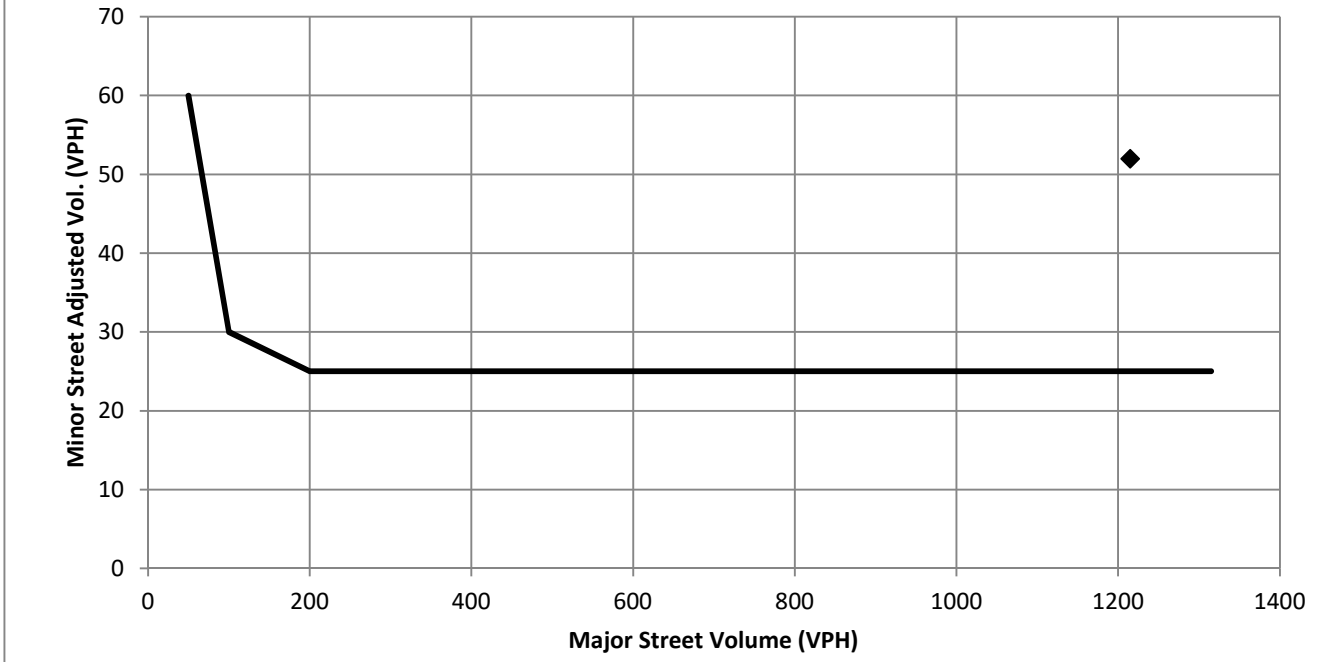


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)



Conclusions/Comments:

Updated: 6/23/2015

# **Attachment F**

*2018 Existing Conditions Raw Synchro Outputs*

Lanes, Volumes, Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕	↕		↕↕			↕↕	
Traffic Volume (vph)	100	745	100	60	80	315	20	210	75	180	160	25
Future Volume (vph)	100	745	100	60	80	315	20	210	75	180	160	25
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	11	11	10	12	12	12	12	12	12
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.984				0.850		0.963			0.990	
Flt Protected		0.995			0.979			0.997			0.976	
Satd. Flow (prot)	0	3192	0	0	1562	1310	0	3012	0	0	3150	0
Flt Permitted		0.995			0.979			0.882			0.587	
Satd. Flow (perm)	0	3192	0	0	1562	1310	0	2664	0	0	1894	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				241		20			4	
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		531			4747			644			499	
Travel Time (s)		10.3			107.9			12.5			9.7	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.95	0.95	0.95	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	6%	6%	6%	2%	2%	2%
Adj. Flow (vph)	123	920	123	74	99	241	21	221	79	222	198	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1166	0	0	173	241	0	321	0	0	451	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.16	1.16	1.21	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	20		20	20	20	20	20		20	20	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
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	Split	NA		Split	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	4	4		8	8			2		1	6	
Permitted Phases						8	2			6		

Lanes, Volumes, Timings  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2018 AM Existing Peak Hour  
 09/17/2018

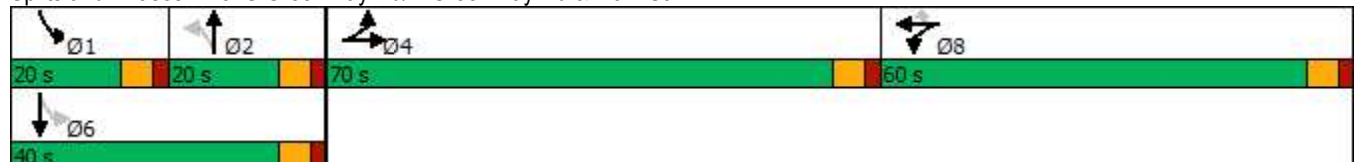


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.0	11.0	11.0	13.0	13.0		11.0	11.0	
Total Split (s)	70.0	70.0		60.0	60.0	60.0	20.0	20.0		20.0	40.0	
Total Split (%)	41.2%	41.2%		35.3%	35.3%	35.3%	11.8%	11.8%		11.8%	23.5%	
Maximum Green (s)	64.0	64.0		54.0	54.0	54.0	14.0	14.0		14.0	34.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	Max	Max		Max	Min	
Walk Time (s)							7.0	7.0				
Flash Dont Walk (s)							0.0	0.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)		56.3			20.4	20.4		14.2			34.4	
Actuated g/C Ratio		0.44			0.16	0.16		0.11			0.27	
v/c Ratio		0.84			0.70	0.59		1.04			0.92dl	
Control Delay		38.8			68.3	12.1		114.1			49.6	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		38.8			68.3	12.1		114.1			49.6	
LOS		D			E	B		F			D	
Approach Delay		38.8			35.6			114.1			49.6	
Approach LOS		D			D			F			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 170  
 Actuated Cycle Length: 129.3  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.04  
 Intersection Signal Delay: 50.6  
 Intersection LOS: D  
 Intersection Capacity Utilization 78.0%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



Queues  
3: S Green Bay Rd/N Green Bay Rd & Main St

2018 AM Existing Peak Hour  
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Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	1166	173	241	321	451
v/c Ratio	0.84	0.70	0.59	1.04	0.92dl
Control Delay	38.8	68.3	12.1	114.1	49.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	68.3	12.1	114.1	49.6
Queue Length 50th (ft)	441	141	0	~148	173
Queue Length 95th (ft)	503	204	46	#284	229
Internal Link Dist (ft)	451	4667		564	419
Turn Bay Length (ft)					
Base Capacity (vph)	1601	659	692	309	643
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.73	0.26	0.35	1.04	0.70

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.



3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.6	0.3	0.3	0.0	0.0	0.0	0.1	0.2	0.2	0.4	0.2	0.2
Total Delay (hr)	0.9	8.0	0.6	1.1	1.5	0.7	1.1	10.5	3.1	5.1	2.8	0.1
Total Del/Veh (s)	31.9	32.5	21.3	50.4	14.8	10.3	283.5	168.5	117.9	82.9	56.2	9.4

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.2
Total Delay (hr)	35.6
Total Del/Veh (s)	50.2

Intersection: 3: S Green Bay Rd/N Green Bay Rd & Main St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	505	402	301	135	549	504	440	383
Average Queue (ft)	324	262	132	65	259	239	273	175
95th Queue (ft)	452	369	240	107	540	510	413	343
Link Distance (ft)	490	490	4671	4671	603	603	458	458
Upstream Blk Time (%)	0						0	
Queuing Penalty (veh)	0						0	
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Lanes, Volumes, Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕	↗		↕↕			↕↕	
Traffic Volume (vph)	110	395	155	120	170	365	35	350	70	145	265	40
Future Volume (vph)	110	395	155	120	170	365	35	350	70	145	265	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	11	11	10	12	12	12	12	12	12
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.965				0.850		0.977			0.987	
Flt Protected		0.992			0.980			0.996			0.984	
Satd. Flow (prot)	0	3121	0	0	1625	1361	0	3172	0	0	3166	0
Flt Permitted		0.992			0.980			0.863			0.553	
Satd. Flow (perm)	0	3121	0	0	1625	1361	0	2749	0	0	1779	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25				245		11			6	
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		531			4747			644			499	
Travel Time (s)		10.3			107.9			12.5			9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	120	429	168	130	185	246	38	380	76	158	288	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	717	0	0	315	246	0	494	0	0	489	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.16	1.16	1.21	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	20		20	20	20	20	20		20	20	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
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	Split	NA		Split	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	4	4		8	8			2		1	6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		1	6	

Lanes, Volumes, Timings  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2018 PM Existing Peak Hour  
 09/17/2018

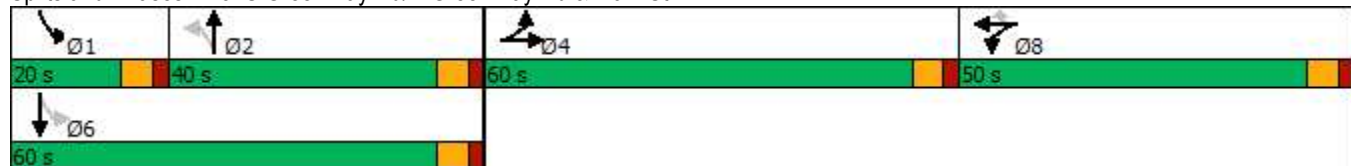


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
<b>Switch Phase</b>												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.0	11.0	11.0	13.0	13.0		11.0	11.0	
Total Split (s)	60.0	60.0		50.0	50.0	50.0	40.0	40.0		20.0	60.0	
Total Split (%)	35.3%	35.3%		29.4%	29.4%	29.4%	23.5%	23.5%		11.8%	35.3%	
Maximum Green (s)	54.0	54.0		44.0	44.0	44.0	34.0	34.0		14.0	54.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	Max	Max		Max	Min	
Walk Time (s)							7.0	7.0				
Flash Dont Walk (s)							0.0	0.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)		39.3			33.4	33.4		34.5			54.8	
Actuated g/C Ratio		0.27			0.23	0.23		0.24			0.38	
v/c Ratio		0.83			0.85	0.49		0.75			0.61	
Control Delay		58.0			75.5	8.9		60.7			40.5	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		58.0			75.5	8.9		60.7			40.5	
LOS		E			E	A		E			D	
Approach Delay		58.0			46.3			60.7			40.5	
Approach LOS		E			D			E			D	

**Intersection Summary**

Area Type: Other  
 Cycle Length: 170  
 Actuated Cycle Length: 145.8  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 51.9  
 Intersection LOS: D  
 Intersection Capacity Utilization 85.6%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



Queues  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2018 PM Existing Peak Hour  
 09/17/2018



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	717	315	246	494	489
v/c Ratio	0.83	0.85	0.49	0.75	0.61
Control Delay	58.0	75.5	8.9	60.7	40.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	58.0	75.5	8.9	60.7	40.5
Queue Length 50th (ft)	328	287	1	227	179
Queue Length 95th (ft)	438	447	78	#377	287
Internal Link Dist (ft)	451	4667		564	419
Turn Bay Length (ft)					
Base Capacity (vph)	1188	497	586	658	807
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.60	0.63	0.42	0.75	0.61

Intersection Summary

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

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.4	0.2	0.4	0.0	0.0	0.0	0.7	0.1	0.2	0.3	0.1	0.2
Total Delay (hr)	1.3	5.2	1.2	1.6	3.2	0.8	0.5	5.4	0.5	2.5	3.6	0.4
Total Del/Veh (s)	44.1	44.4	24.2	48.5	15.4	11.1	51.6	54.0	20.8	58.2	48.8	33.0

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.1
Total Delay (hr)	26.2
Total Del/Veh (s)	33.9

Intersection: 3: S Green Bay Rd/N Green Bay Rd & Main St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	368	339	383	138	314	270	473	374
Average Queue (ft)	241	200	213	67	192	161	220	162
95th Queue (ft)	342	330	343	108	270	253	377	323
Link Distance (ft)	490	490	4671	4671	603	603	458	458
Upstream Blk Time (%)							0	
Queuing Penalty (veh)							0	
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Lanes, Volumes, Timings  
8: Torrey St & Main St

2018 AM Existing Peak Hour  
09/17/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↖↑	↖	↗
Traffic Volume (vph)	810	360	0	485	115	5
Future Volume (vph)	810	360	0	485	115	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)		150	0		0	185
Storage Lanes		1	0		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected					0.950	
Satd. Flow (prot)	3260	1458	0	3197	1630	1458
Flt Permitted					0.950	
Satd. Flow (perm)	3260	1458	0	3197	1630	1458
Link Speed (mph)	30			30	30	
Link Distance (ft)	4747			195	918	
Travel Time (s)	107.9			4.4	20.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Adj. Flow (vph)	976	434	0	584	139	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	976	434	0	584	139	6
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	45.4%			ICU Level of Service A		
Analysis Period (min)	15					



Intersection						
Int Delay, s/veh	6.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑	↑
Traffic Vol, veh/h	810	360	0	485	115	5
Future Vol, veh/h	810	360	0	485	115	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	150	-	-	0	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	976	434	0	584	139	6

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	976	0	1268 488
Stage 1	-	-	-	-	976 -
Stage 2	-	-	-	-	292 -
Critical Hdwy	-	-	4.18	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	2.24	-	3.52 3.32
Pot Cap-1 Maneuver	-	-	690	-	160 526
Stage 1	-	-	-	-	326 -
Stage 2	-	-	-	-	732 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	690	-	160 526
Mov Cap-2 Maneuver	-	-	-	-	160 -
Stage 1	-	-	-	-	326 -
Stage 2	-	-	-	-	732 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	92.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	160	526	-	-	690	-
HCM Lane V/C Ratio	0.866	0.011	-	-	-	-
HCM Control Delay (s)	95.7	11.9	-	-	0	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	6	0	-	-	0	-

Lanes, Volumes, Timings  
8: Torrey St & Main St

2018 PM Existing Peak Hour  
09/17/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↖↑	↖	↗
Traffic Volume (vph)	480	270	15	880	115	5
Future Volume (vph)	480	270	15	880	115	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)		150	0		0	185
Storage Lanes		1	0		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected				0.999	0.950	
Satd. Flow (prot)	3260	1458	0	3194	1630	1458
Flt Permitted				0.999	0.950	
Satd. Flow (perm)	3260	1458	0	3194	1630	1458
Link Speed (mph)	30			30	30	
Link Distance (ft)	4747			195	918	
Travel Time (s)	107.9			4.4	20.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Adj. Flow (vph)	578	325	18	1060	139	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	578	325	0	1078	139	6
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	51.7%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	4.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑	↑
Traffic Vol, veh/h	480	270	15	880	115	5
Future Vol, veh/h	480	270	15	880	115	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	150	-	-	0	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	578	325	18	1060	139	6

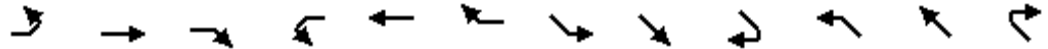
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	578	0	1144	289
Stage 1	-	-	-	-	578	-
Stage 2	-	-	-	-	566	-
Critical Hdwy	-	-	4.18	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.24	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	978	-	193	708
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	532	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	978	-	184	708
Mov Cap-2 Maneuver	-	-	-	-	184	-
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	532	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	65.2
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	184	708	-	-	978	-
HCM Lane V/C Ratio	0.753	0.009	-	-	0.018	-
HCM Control Delay (s)	67.6	10.1	-	-	8.8	0.2
HCM Lane LOS	F	B	-	-	A	A
HCM 95th %tile Q(veh)	4.9	0	-	-	0.1	-

Lanes, Volumes, Timings  
 18: Doty Ave/Private Entrance & Main St/Wisconsin Ave

2018 AM Existing Peak Hour  
 09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	0	620	65	5	440	25	5	0	0	20	0	0
Future Volume (vph)	0	620	65	5	440	25	5	0	0	20	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Frt		0.987			0.993							
Flt Protected					0.999			0.950			0.950	
Satd. Flow (prot)	0	1693	0	0	1346	0	0	1630	0	0	1630	0
Flt Permitted					0.999			0.950			0.950	
Satd. Flow (perm)	0	1693	0	0	1346	0	0	1630	0	0	1630	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		409			712			118			585	
Travel Time (s)		9.3			16.2			2.7			13.3	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	29%	29%	29%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	738	77	6	524	30	6	0	0	24	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	815	0	0	560	0	0	6	0	0	24	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes										
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	49.7%
ICU Level of Service	A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	620	65	5	440	25	5	0	0	20	0	0
Future Vol, veh/h	0	620	65	5	440	25	5	0	0	20	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	29	29	29	2	2	2	2	2	2
Mvmt Flow	0	738	77	6	524	30	6	0	0	24	0	0

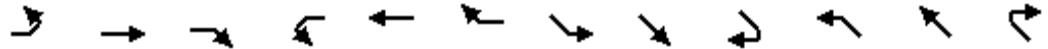
Major/Minor	Major1			Major2			Minor2			Minor1		
Conflicting Flow All	554	0	0	815	0	0	1328	1366	539	1328	1343	777
Stage 1	-	-	-	-	-	-	551	551	-	777	777	-
Stage 2	-	-	-	-	-	-	777	815	-	551	566	-
Critical Hdwy	4.12	-	-	4.39	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.461	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1016	-	-	706	-	-	132	147	542	132	152	397
Stage 1	-	-	-	-	-	-	519	515	-	390	407	-
Stage 2	-	-	-	-	-	-	390	391	-	519	507	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1016	-	-	706	-	-	131	145	542	131	150	397
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	145	-	131	150	-
Stage 1	-	-	-	-	-	-	519	509	-	390	407	-
Stage 2	-	-	-	-	-	-	390	391	-	513	501	-

Approach	EB			WB			SE			NW		
HCM Control Delay, s	0			0.1			33.8			38.5		
HCM LOS							D			E		

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SELn1
Capacity (veh/h)	131	1016	-	-	706	-	-	131
HCM Lane V/C Ratio	0.182	-	-	-	0.008	-	-	0.045
HCM Control Delay (s)	38.5	0	-	-	10.1	0	-	33.8
HCM Lane LOS	E	A	-	-	B	A	-	D
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	-	0.1

Lanes, Volumes, Timings  
 18: Doty Ave/Private Entrance & Main St/Wisconsin Ave

2018 PM Existing Peak Hour  
 09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	420	60	15	745	10	5	0	0	50	0	15
Future Volume (vph)	5	420	60	15	745	10	5	0	0	50	0	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Frt		0.983			0.998							0.969
Flt Protected		0.999			0.999			0.950				0.963
Satd. Flow (prot)	0	1685	0	0	1353	0	0	1630	0	0	1601	0
Flt Permitted		0.999			0.999			0.950				0.963
Satd. Flow (perm)	0	1685	0	0	1353	0	0	1630	0	0	1601	0
Link Speed (mph)		30			30			30				30
Link Distance (ft)		409			712			118				585
Travel Time (s)		9.3			16.2			2.7				13.3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	29%	29%	29%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	6	500	71	18	887	12	6	0	0	60	0	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	577	0	0	917	0	0	6	0	0	78	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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane		Yes										
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop				Stop

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	63.6%
ICU Level of Service	B
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	420	60	15	745	10	5	0	0	50	0	15
Future Vol, veh/h	5	420	60	15	745	10	5	0	0	50	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	29	29	29	2	2	2	2	2	2
Mvmt Flow	6	500	71	18	887	12	6	0	0	60	0	18

Major/Minor	Major1			Major2			Minor2			Minor1		
Conflicting Flow All	899	0	0	571	0	0	1486	1512	893	1477	1483	536
Stage 1	-	-	-	-	-	-	929	929	-	548	548	-
Stage 2	-	-	-	-	-	-	557	583	-	929	935	-
Critical Hdwy	4.12	-	-	4.39	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.461	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	756	-	-	881	-	-	103	120	340	104	125	545
Stage 1	-	-	-	-	-	-	321	346	-	521	517	-
Stage 2	-	-	-	-	-	-	515	499	-	321	344	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	756	-	-	881	-	-	96	114	340	100	118	545
Mov Cap-2 Maneuver	-	-	-	-	-	-	96	114	-	100	118	-
Stage 1	-	-	-	-	-	-	317	332	-	515	511	-
Stage 2	-	-	-	-	-	-	492	493	-	308	330	-

Approach	EB			WB			SE			NW		
HCM Control Delay, s	0.1			0.2			45			74.3		
HCM LOS							E			F		

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SELn1
Capacity (veh/h)	123	756	-	-	881	-	-	96
HCM Lane V/C Ratio	0.629	0.008	-	-	0.02	-	-	0.062
HCM Control Delay (s)	74.3	9.8	0	-	9.2	0	-	45
HCM Lane LOS	F	A	A	-	A	A	-	E
HCM 95th %tile Q(veh)	3.2	0	-	-	0.1	-	-	0.2

Lanes, Volumes, Timings  
 12: Church St & Torrey St/Columbian Ave

2018 AM Existing Peak Hour  
 09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	15	230	45	5	85	10	55	105	15	5	15	10
Future Volume (vph)	15	230	45	5	85	10	55	105	15	5	15	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. 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
Frt		0.979			0.986			0.988			0.954	
Flt Protected		0.997			0.998			0.984			0.992	
Satd. Flow (prot)	0	1861	0	0	1913	0	0	1890	0	0	1840	0
Flt Permitted		0.997			0.998			0.984			0.992	
Satd. Flow (perm)	0	1861	0	0	1913	0	0	1890	0	0	1840	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		918			536			271			298	
Travel Time (s)		20.9			12.2			6.2			6.8	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	19	288	56	6	106	13	69	131	19	6	19	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	363	0	0	125	0	0	219	0	0	38	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	45.3%
ICU Level of Service	A
Analysis Period (min)	15



Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	230	45	5	85	10	55	105	15	5	15	10
Future Vol, veh/h	15	230	45	5	85	10	55	105	15	5	15	10
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	4	4	4	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	288	56	6	106	13	69	131	19	6	19	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12	9.1	10.6	8.7
HCM LOS	B	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	31%	5%	5%	17%
Vol Thru, %	60%	79%	85%	50%
Vol Right, %	9%	16%	10%	33%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	175	290	100	30
LT Vol	55	15	5	5
Through Vol	105	230	85	15
RT Vol	15	45	10	10
Lane Flow Rate	219	362	125	38
Geometry Grp	1	1	1	1
Degree of Util (X)	0.313	0.474	0.173	0.056
Departure Headway (Hd)	5.144	4.706	4.988	5.35
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	693	761	711	674
Service Time	3.224	2.771	3.074	3.35
HCM Lane V/C Ratio	0.316	0.476	0.176	0.056
HCM Control Delay	10.6	12	9.1	8.7
HCM Lane LOS	B	B	A	A
HCM 95th-tile Q	1.3	2.6	0.6	0.2

Lanes, Volumes, Timings  
 12: Church St & Torrey St/Columbian Ave

2018 PM Existing Peak Hour  
 09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	215	65	15	65	5	25	50	20	15	80	10
Future Volume (vph)	10	215	65	15	65	5	25	50	20	15	80	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. 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
Frt		0.970			0.992			0.972			0.987	
Flt Protected		0.998			0.991			0.987			0.993	
Satd. Flow (prot)	0	1846	0	0	1912	0	0	1865	0	0	1906	0
Flt Permitted		0.998			0.991			0.987			0.993	
Satd. Flow (perm)	0	1846	0	0	1912	0	0	1865	0	0	1906	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		918			536			271			298	
Travel Time (s)		20.9			12.2			6.2			6.8	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	269	81	19	81	6	31	63	25	19	100	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	363	0	0	106	0	0	119	0	0	132	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	34.5%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

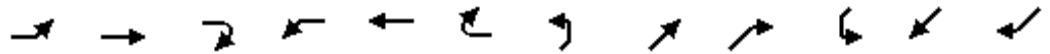
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	215	65	15	65	5	25	50	20	15	80	10
Future Vol, veh/h	10	215	65	15	65	5	25	50	20	15	80	10
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	4	4	4	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	269	81	19	81	6	31	63	25	19	100	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.7	9	9.3	9.5
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	3%	18%	14%
Vol Thru, %	53%	74%	76%	76%
Vol Right, %	21%	22%	6%	10%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	95	290	85	105
LT Vol	25	10	15	15
Through Vol	50	215	65	80
RT Vol	20	65	5	10
Lane Flow Rate	119	362	106	131
Geometry Grp	1	1	1	1
Degree of Util (X)	0.17	0.464	0.148	0.189
Departure Headway (Hd)	5.149	4.612	5.009	5.175
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	690	776	709	686
Service Time	3.232	2.672	3.089	3.256
HCM Lane V/C Ratio	0.172	0.466	0.15	0.191
HCM Control Delay	9.3	11.7	9	9.5
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.6	2.5	0.5	0.7

Lanes, Volumes, Timings  
15: Church St & Doty Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	15	30	5	15	35	25	5	115	10	5	15	5
Future Volume (vph)	15	30	5	15	35	25	5	115	10	5	15	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Frt		0.987			0.955			0.989			0.974	
Flt Protected		0.985			0.990			0.998			0.990	
Satd. Flow (prot)	0	1890	0	0	1720	0	0	1919	0	0	1875	0
Flt Permitted		0.985			0.990			0.998			0.990	
Satd. Flow (perm)	0	1890	0	0	1720	0	0	1919	0	0	1875	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		585			531			298			325	
Travel Time (s)		13.3			12.1			6.8			7.4	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	19	38	6	19	44	31	6	144	13	6	19	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	63	0	0	94	0	0	163	0	0	31	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.9%
ICU Level of Service	A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	6.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	30	5	15	35	25	5	115	10	5	15	5
Future Vol, veh/h	15	30	5	15	35	25	5	115	10	5	15	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	9	9	9	2	2	2	2	2	2
Mvmt Flow	19	38	6	19	44	31	6	144	13	6	19	6

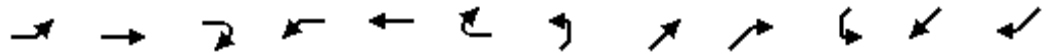
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	75	0	0	44	0	0	186	192	41	249	180	60
Stage 1	-	-	-	-	-	-	79	79	-	98	98	-
Stage 2	-	-	-	-	-	-	107	113	-	151	82	-
Critical Hdwy	4.12	-	-	4.19	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.281	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1524	-	-	1520	-	-	775	703	1030	705	714	1005
Stage 1	-	-	-	-	-	-	930	829	-	908	814	-
Stage 2	-	-	-	-	-	-	898	802	-	851	827	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1524	-	-	1520	-	-	739	685	1030	573	695	1005
Mov Cap-2 Maneuver	-	-	-	-	-	-	739	685	-	573	695	-
Stage 1	-	-	-	-	-	-	918	818	-	896	803	-
Stage 2	-	-	-	-	-	-	860	792	-	684	816	-

Approach	EB			WB			NE			SW		
HCM Control Delay, s	2.2			1.5			11.2			9.5		
HCM LOS							B			A		

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	744	1524	-	-	1520	-	-	825
HCM Lane V/C Ratio	0.218	0.012	-	-	0.012	-	-	0.038
HCM Control Delay (s)	11.2	7.4	0	-	7.4	0	-	9.5
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.8	0	-	-	0	-	-	0.1

Lanes, Volumes, Timings  
15: Church St & Doty Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	15	40	15	10	40	20	5	50	10	25	80	10
Future Volume (vph)	15	40	15	10	40	20	5	50	10	25	80	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Fr <sub>t</sub>		0.971			0.962			0.979			0.988	
Fl <sub>t</sub> Protected		0.989			0.993			0.996			0.989	
Satd. Flow (prot)	0	1867	0	0	1738	0	0	1896	0	0	1900	0
Fl <sub>t</sub> Permitted		0.989			0.993			0.996			0.989	
Satd. Flow (perm)	0	1867	0	0	1738	0	0	1896	0	0	1900	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		585			531			298			325	
Travel Time (s)		13.3			12.1			6.8			7.4	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	19	50	19	13	50	25	6	63	13	31	100	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	88	0	0	88	0	0	82	0	0	144	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	26.6%
ICU Level of Service	A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	6.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	40	15	10	40	20	5	50	10	25	80	10
Future Vol, veh/h	15	40	15	10	40	20	5	50	10	25	80	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	9	9	9	2	2	2	2	2	2
Mvmt Flow	19	50	19	13	50	25	6	63	13	31	100	13

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	75	0	0	69	0	0	237	199	60	218	196	63
Stage 1	-	-	-	-	-	-	98	98	-	89	89	-
Stage 2	-	-	-	-	-	-	139	101	-	129	107	-
Critical Hdwy	4.12	-	-	4.19	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.281	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1524	-	-	1489	-	-	717	697	1005	738	699	1002
Stage 1	-	-	-	-	-	-	908	814	-	918	821	-
Stage 2	-	-	-	-	-	-	864	811	-	875	807	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1524	-	-	1489	-	-	618	682	1005	666	684	1002
Mov Cap-2 Maneuver	-	-	-	-	-	-	618	682	-	666	684	-
Stage 1	-	-	-	-	-	-	896	803	-	906	814	-
Stage 2	-	-	-	-	-	-	742	804	-	787	797	-

Approach	EB		WB		NE		SW	
HCM Control Delay, s	1.6		1.1		10		11	
HCM LOS					B		B	

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	798	1524	-	-	1489	-	-	744
HCM Lane V/C Ratio	0.102	0.012	-	-	0.008	-	-	0.193
HCM Control Delay (s)	10	7.4	0	-	7.4	0	-	11
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.7

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	385	5	15	445	145	10	130	15	5	5	10
Future Volume (vph)	230	385	5	15	445	145	10	130	15	5	5	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	200		0	130		0	0		0	0		60
Storage Lanes	1		0	1		0	0		0	0		1
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	1.00	1.00
Frt		0.998			0.963			0.987				0.850
Flt Protected	0.950			0.950				0.997			0.976	
Satd. Flow (prot)	1630	1712	0	1630	1652	0	0	1688	0	0	1553	1352
Flt Permitted	0.950			0.496				0.981			0.877	
Satd. Flow (perm)	1630	1712	0	851	1652	0	0	1661	0	0	1395	1352
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			23			6				133
Link Speed (mph)		25			25			25				25
Link Distance (ft)		712			521			325				230
Travel Time (s)		19.4			14.2			8.9				6.3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	62%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	10%	10%	10%
Adj. Flow (vph)	274	458	6	18	530	173	12	155	18	6	6	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	274	464	0	18	703	0	0	185	0	0	12	7
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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		7	15		9	15		9
Number of Detectors	1	2		1	2		1	1		1	1	0
Detector Template							Left			Left		
Leading Detector (ft)	56	156		56	156		20	11		20	11	0
Trailing Detector (ft)	50	0		50	0		0	5		0	5	0
Detector 1 Position(ft)	50	0		50	0		0	5		0	5	5
Detector 1 Size(ft)	6	6		6	6		20	6		20	6	20
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(ft)		150			150							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm



Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

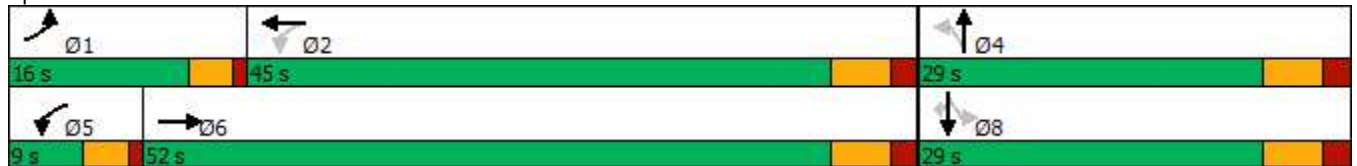
2018 AM Existing Peak Hour  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	1	6		5	2			4			8	
Permitted Phases				2			4			8		8
Detector Phase	1	6		5	2		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.0	25.0		9.0	25.0		27.0	27.0		27.0	27.0	27.0
Total Split (s)	16.0	52.0		9.0	45.0		29.0	29.0		29.0	29.0	29.0
Total Split (%)	17.8%	57.8%		10.0%	50.0%		32.2%	32.2%		32.2%	32.2%	32.2%
Maximum Green (s)	12.0	46.0		5.0	39.0		23.0	23.0		23.0	23.0	23.0
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	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		0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Max		None	Max		Min	Min		Min	Min	Min
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		12.0			12.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	12.0	51.7		46.1	39.1			13.8			13.8	13.8
Actuated g/C Ratio	0.15	0.64		0.57	0.48			0.17			0.17	0.17
v/c Ratio	1.13	0.42		0.03	0.87			0.64			0.05	0.02
Control Delay	133.9	10.6		5.5	32.8			40.8			27.5	0.2
Queue Delay	0.0	0.0		0.0	1.0			0.0			0.0	0.0
Total Delay	133.9	10.6		5.5	33.8			40.8			27.5	0.2
LOS	F	B		A	C			D			C	A
Approach Delay		56.4			33.1			40.8			17.4	
Approach LOS		E			C			D			B	

Intersection Summary

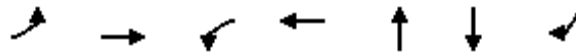
Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	80.9
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.13
Intersection Signal Delay:	44.1
Intersection LOS:	D
Intersection Capacity Utilization:	77.9%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 14: Church St & Wisconsin Ave



Queues  
14: Church St & Wisconsin Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	274	464	18	703	185	12	7
v/c Ratio	1.13	0.42	0.03	0.87	0.64	0.05	0.02
Control Delay	133.9	10.6	5.5	32.8	40.8	27.5	0.2
Queue Delay	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Total Delay	133.9	10.6	5.5	33.8	40.8	27.5	0.2
Queue Length 50th (ft)	~163	87	2	292	85	5	0
Queue Length 95th (ft)	#305	214	9	#514	137	18	0
Internal Link Dist (ft)		632		441	245	150	
Turn Bay Length (ft)	200		130				60
Base Capacity (vph)	242	1094	532	809	477	397	480
Starvation Cap Reductn	0	0	0	21	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.13	0.42	0.03	0.89	0.39	0.03	0.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary  
 14: Church St & Wisconsin Ave

2018 AM Existing Peak Hour  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	385	5	15	445	145	10	130	15	5	5	10
Future Volume (veh/h)	230	385	5	15	445	145	10	130	15	5	5	10
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1614	1614	1614
Adj Flow Rate, veh/h	274	458	6	18	530	173	12	155	18	6	6	7
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	10	10	10
Cap, veh/h	254	1080	14	593	625	204	57	200	22	138	109	187
Arrive On Green	0.15	0.64	0.64	0.02	0.50	0.50	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1641	1696	22	1641	1244	406	54	1464	164	502	798	1367
Grp Volume(v), veh/h	274	0	464	18	0	703	185	0	0	12	0	7
Grp Sat Flow(s),veh/h/ln	1641	0	1719	1641	0	1650	1681	0	0	1299	0	1367
Q Serve(g_s), s	12.0	0.0	10.4	0.4	0.0	28.7	2.9	0.0	0.0	0.0	0.0	0.3
Cycle Q Clear(g_c), s	12.0	0.0	10.4	0.4	0.0	28.7	8.3	0.0	0.0	0.5	0.0	0.3
Prop In Lane	1.00		0.01	1.00		0.25	0.06		0.10	0.50		1.00
Lane Grp Cap(c), veh/h	254	0	1094	593	0	829	279	0	0	247	0	187
V/C Ratio(X)	1.08	0.00	0.42	0.03	0.00	0.85	0.66	0.00	0.00	0.05	0.00	0.04
Avail Cap(c_a), veh/h	254	0	1094	664	0	829	546	0	0	460	0	405
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.8	0.0	7.0	8.9	0.0	16.7	32.5	0.0	0.0	29.1	0.0	29.1
Incr Delay (d2), s/veh	79.5	0.0	1.2	0.0	0.0	10.5	2.7	0.0	0.0	0.1	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	16.1	0.0	6.6	0.3	0.0	18.1	6.3	0.0	0.0	0.4	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	112.3	0.0	8.2	8.9	0.0	27.3	35.2	0.0	0.0	29.2	0.0	29.1
LnGrp LOS	F	A	A	A	A	C	D	A	A	C	A	C
Approach Vol, veh/h		738			721			185				19
Approach Delay, s/veh		46.9			26.8			35.2				29.2
Approach LOS		D			C			D				C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	16.0	45.0		16.6	5.6	55.4		16.6				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	12.0	39.0		23.0	5.0	46.0		23.0				
Max Q Clear Time (g_c+I1), s	14.0	30.7		10.3	2.4	12.4		2.5				
Green Ext Time (p_c), s	0.0	4.2		0.4	0.0	5.2		0.0				

Intersection Summary												
HCM 6th Ctrl Delay											36.7	
HCM 6th LOS											D	

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	385	25	15	490	20	25	15	50	100	80	250
Future Volume (vph)	20	385	25	15	490	20	25	15	50	100	80	250
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	200		0	130		0	0		0	0		60
Storage Lanes	1		0	1		0	0		0	0		1
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	1.00	1.00
Frt		0.991			0.994			0.925				0.850
Flt Protected	0.950			0.950				0.986			0.973	
Satd. Flow (prot)	1630	1700	0	1630	1705	0	0	1565	0	0	1669	1458
Flt Permitted	0.950			0.474				0.864			0.810	
Satd. Flow (perm)	1630	1700	0	813	1705	0	0	1371	0	0	1390	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			3			54				157
Link Speed (mph)		25			25			25				25
Link Distance (ft)		712			521			325				230
Travel Time (s)		19.4			14.2			8.9				6.3
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	62%
Adj. Flow (vph)	22	414	27	16	527	22	27	16	54	108	86	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	441	0	16	549	0	0	97	0	0	194	167
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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		7	15		9	15		9
Number of Detectors	1	2		1	2		1	1		1	1	0
Detector Template							Left			Left		
Leading Detector (ft)	56	156		56	156		20	11		20	11	0
Trailing Detector (ft)	50	0		50	0		0	5		0	5	0
Detector 1 Position(ft)	50	0		50	0		0	5		0	5	5
Detector 1 Size(ft)	6	6		6	6		20	6		20	6	20
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(ft)		150			150							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			4				8

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

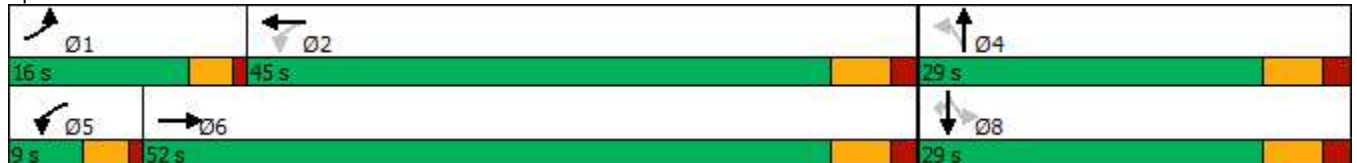
2018 PM Existing Peak Hour  
09/17/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				2			4			8		8
Detector Phase	1	6		5	2		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.0	25.0		9.0	25.0		27.0	27.0		27.0	27.0	27.0
Total Split (s)	16.0	52.0		9.0	45.0		29.0	29.0		29.0	29.0	29.0
Total Split (%)	17.8%	57.8%		10.0%	50.0%		32.2%	32.2%		32.2%	32.2%	32.2%
Maximum Green (s)	12.0	46.0		5.0	39.0		23.0	23.0		23.0	23.0	23.0
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	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		0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Max		None	Max		Min	Min		Min	Min	Min
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		12.0			12.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	5.7	47.1		48.6	44.8			15.7			15.7	15.7
Actuated g/C Ratio	0.07	0.62		0.64	0.59			0.21			0.21	0.21
v/c Ratio	0.18	0.42		0.03	0.55			0.30			0.68	0.39
Control Delay	39.9	10.7		6.0	14.9			15.8			41.0	8.5
Queue Delay	0.0	0.0		0.0	0.4			0.0			0.0	0.0
Total Delay	39.9	10.7		6.0	15.3			15.8			41.0	8.5
LOS	D	B		A	B			B			D	A
Approach Delay		12.1			15.1			15.8			26.0	
Approach LOS		B			B			B			C	

Intersection Summary

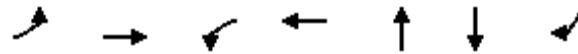
Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 76.5  
 Natural Cycle: 65  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.68  
 Intersection Signal Delay: 16.8      Intersection LOS: B  
 Intersection Capacity Utilization 60.4%      ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 14: Church St & Wisconsin Ave



Queues  
14: Church St & Wisconsin Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	22	441	16	549	97	194	167
v/c Ratio	0.18	0.42	0.03	0.55	0.30	0.68	0.39
Control Delay	39.9	10.7	6.0	14.9	15.8	41.0	8.5
Queue Delay	0.0	0.0	0.0	0.4	0.0	0.0	0.0
Total Delay	39.9	10.7	6.0	15.3	15.8	41.0	8.5
Queue Length 50th (ft)	10	87	2	119	16	81	4
Queue Length 95th (ft)	35	238	10	343	m57	166	53
Internal Link Dist (ft)		632		441	245	150	
Turn Bay Length (ft)	200		130				60
Base Capacity (vph)	258	1048	570	999	454	422	552
Starvation Cap Reductn	0	0	0	134	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.42	0.03	0.63	0.21	0.46	0.30

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 14: Church St & Wisconsin Ave

2018 PM Existing Peak Hour  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	385	25	15	490	20	25	15	50	100	80	250
Future Volume (veh/h)	20	385	25	15	490	20	25	15	50	100	80	250
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	22	414	27	16	527	22	27	16	54	108	86	167
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	39	892	58	501	907	38	69	50	79	180	121	335
Arrive On Green	0.02	0.56	0.56	0.02	0.55	0.55	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1641	1600	104	1641	1642	69	59	216	346	490	527	1460
Grp Volume(v), veh/h	22	0	441	16	0	549	97	0	0	194	0	167
Grp Sat Flow(s),veh/h/ln	1641	0	1704	1641	0	1710	621	0	0	1017	0	1460
Q Serve(g_s), s	1.1	0.0	12.7	0.3	0.0	17.4	0.8	0.0	0.0	0.0	0.0	8.2
Cycle Q Clear(g_c), s	1.1	0.0	12.7	0.3	0.0	17.4	16.9	0.0	0.0	16.0	0.0	8.2
Prop In Lane	1.00		0.06	1.00		0.04	0.28		0.56	0.56		1.00
Lane Grp Cap(c), veh/h	39	0	951	501	0	945	198	0	0	301	0	335
V/C Ratio(X)	0.56	0.00	0.46	0.03	0.00	0.58	0.49	0.00	0.00	0.64	0.00	0.50
Avail Cap(c_a), veh/h	239	0	951	570	0	945	267	0	0	375	0	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	0.0	10.9	8.6	0.0	12.2	26.9	0.0	0.0	30.1	0.0	27.6
Incr Delay (d2), s/veh	11.8	0.0	1.6	0.0	0.0	2.6	1.9	0.0	0.0	2.6	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.0	0.0	8.5	0.2	0.0	11.1	3.0	0.0	0.0	6.9	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.6	0.0	12.5	8.6	0.0	14.8	28.8	0.0	0.0	32.7	0.0	28.8
LnGrp LOS	D	A	B	A	A	B	C	A	A	C	A	C
Approach Vol, veh/h		463			565			97				361
Approach Delay, s/veh		14.4			14.6			28.8				30.9
Approach LOS		B			B			C				C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	51.6		24.9	5.5	52.0		24.9				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	12.0	39.0		23.0	5.0	46.0		23.0				
Max Q Clear Time (g_c+I1), s	3.1	19.4		18.9	2.3	14.7		18.0				
Green Ext Time (p_c), s	0.0	5.3		0.1	0.0	4.8		0.1				

Intersection Summary

HCM 6th Ctrl Delay	19.4
HCM 6th LOS	B

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	255	210	40	305	5	230	305	25	0	260	255
Future Volume (vph)	265	255	210	40	305	5	230	305	25	0	260	255
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		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	0.95	0.95	0.95
Fr <sub>t</sub>			0.850		0.998			0.989			0.926	
Fl <sub>t</sub> Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1576	1658	1653	1576	1655	0	1560	1624	0	0	2862	0
Fl <sub>t</sub> Permitted	0.264			0.573			0.187					
Satd. Flow (perm)	438	1658	1653	950	1655	0	307	1624	0	0	2862	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175		1			5			235	
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1213	
Travel Time (s)		12.5			11.0			12.3			33.1	
Peak Hour Factor	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	308	307	157	48	367	6	277	367	30	0	313	307
Shared Lane Traffic (%)												
Lane Group Flow (vph)	308	307	157	48	373	0	277	397	0	0	620	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)		11			11			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.16	1.16	0.95	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0		1	0		1	0	
Detector Template										Left		
Leading Detector (ft)	66	0	0	31	0		56	0		20	0	
Trailing Detector (ft)	60	0	0	25	0		50	0		0	0	
Detector 1 Position(ft)	60	5	5	25	5		50	5		0	5	
Detector 1 Size(ft)	6	6	20	6	6		6	6		20	6	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Turn Type	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA			NA	
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		Free	4			6			2		
Detector Phase	3	8		7	4		1	6		2	2	
Switch Phase												



Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 AM Existing Peak Hour  
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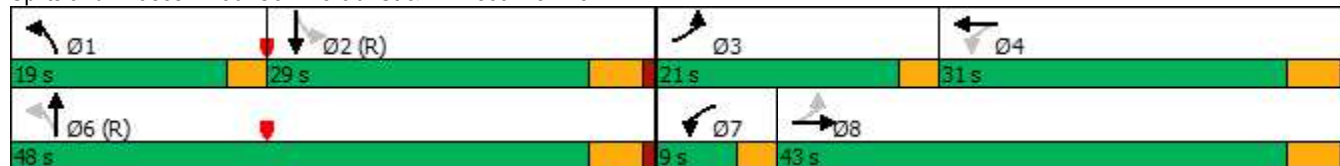


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	6.0	19.0		6.0	19.0		6.0	19.0		19.0	19.0	
Minimum Split (s)	9.0	25.0		9.0	25.0		9.0	25.0		25.0	25.0	
Total Split (s)	21.0	43.0		9.0	31.0		19.0	48.0		29.0	29.0	
Total Split (%)	21.0%	43.0%		9.0%	31.0%		19.0%	48.0%		29.0%	29.0%	
Maximum Green (s)	18.0	38.0		6.0	26.0		16.0	43.0		24.0	24.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	1.0		0.0	1.0		0.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	3.0	5.0		3.0	5.0		3.0	5.0			5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Min		None	C-Max		C-Max	C-Max	
Walk Time (s)		6.0			6.0			6.0		6.0	6.0	
Flash Dont Walk (s)		14.0			14.0			14.0		14.0	14.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	49.0	41.6	100.0	36.1	28.1		45.0	43.0				25.1
Actuated g/C Ratio	0.49	0.42	1.00	0.36	0.28		0.45	0.43				0.25
v/c Ratio	0.78	0.44	0.09	0.13	0.80		0.85	0.57				0.69
Control Delay	31.4	24.6	0.1	15.5	48.7		45.5	25.1				24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Delay	31.4	24.6	0.1	15.5	48.7		45.5	25.1				24.3
LOS	C	C	A	B	D		D	C				C
Approach Delay		22.3			44.9			33.5				24.3
Approach LOS		C			D			C				C

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green, Master Intersection  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 29.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 85.3%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 30: Commercial St & Winneconne Ave



Queues  
30: Commercial St & Winneconne Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	308	307	157	48	373	277	397	620
v/c Ratio	0.78	0.44	0.09	0.13	0.80	0.85	0.57	0.69
Control Delay	31.4	24.6	0.1	15.5	48.7	45.5	25.1	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	24.6	0.1	15.5	48.7	45.5	25.1	24.3
Queue Length 50th (ft)	120	146	0	16	225	115	184	145
Queue Length 95th (ft)	176	204	0	32	#337	#201	248	191
Internal Link Dist (ft)		468			323		459	1133
Turn Bay Length (ft)			150					
Base Capacity (vph)	419	690	1653	380	466	338	701	895
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.44	0.09	0.13	0.80	0.82	0.57	0.69

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
30: Commercial St & Winneconne Ave

2018 AM Existing Peak Hour  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	255	210	40	305	5	230	305	25	0	260	255
Future Volume (veh/h)	265	255	210	40	305	5	230	305	25	0	260	255
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	1723	1723	1792	1723	1723	1723	1709	1709	1709	1695	1695	1695
Adj Flow Rate, veh/h	308	307	0	48	367	6	277	367	30	0	313	307
Peak Hour Factor	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	4	4	4
Cap, veh/h	393	655		408	459	7	352	695	57	0	447	399
Arrive On Green	0.15	0.38	0.00	0.04	0.27	0.27	0.14	0.45	0.45	0.00	0.09	0.09
Sat Flow, veh/h	1641	1723	1518	1641	1690	28	1628	1559	127	0	1695	1437
Grp Volume(v), veh/h	308	307	0	48	0	373	277	0	397	0	313	307
Grp Sat Flow(s),veh/h/ln	1641	1723	1518	1641	0	1718	1628	0	1686	0	1611	1437
Q Serve(g_s), s	12.8	13.4	0.0	2.1	0.0	20.2	11.6	0.0	17.1	0.0	18.9	20.9
Cycle Q Clear(g_c), s	12.8	13.4	0.0	2.1	0.0	20.2	11.6	0.0	17.1	0.0	18.9	20.9
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.08	0.00		1.00
Lane Grp Cap(c), veh/h	393	655		408	0	466	352	0	752	0	447	399
V/C Ratio(X)	0.78	0.47		0.12	0.00	0.80	0.79	0.00	0.53	0.00	0.70	0.77
Avail Cap(c_a), veh/h	437	655		434	0	466	387	0	752	0	447	399
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.96	0.96
Uniform Delay (d), s/veh	22.5	23.4	0.0	24.2	0.0	33.9	22.9	0.0	20.1	0.0	41.4	42.3
Incr Delay (d2), s/veh	8.2	2.4	0.0	0.1	0.0	9.6	9.5	0.0	2.6	0.0	8.5	12.9
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(95%),veh/ln	9.5	9.7	0.0	1.5	0.0	14.7	8.9	0.0	11.4	0.0	14.1	14.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.7	25.8	0.0	24.3	0.0	43.5	32.4	0.0	22.7	0.0	49.9	55.2
LnGrp LOS	C	C		C	A	D	C	A	C	A	D	E
Approach Vol, veh/h		615	A		421			674			620	
Approach Delay, s/veh		28.3			41.3			26.7			52.5	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	16.8	32.7	18.3	32.1		49.6	7.4	43.0				
Change Period (Y+Rc), s	3.0	5.0	3.0	5.0		5.0	3.0	5.0				
Max Green Setting (Gmax), s	16.0	24.0	18.0	26.0		43.0	6.0	38.0				
Max Q Clear Time (g_c+I1), s	13.6	0.0	14.8	0.0		0.0	4.1	0.0				
Green Ext Time (p_c), s	0.3	0.0	0.4	0.0		0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	36.6
HCM 6th LOS	D

Notes

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

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	240	210	50	295	5	135	370	35	10	335	385
Future Volume (vph)	280	240	210	50	295	5	135	370	35	10	335	385
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		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	0.95	0.95	0.95
Fr <sub>t</sub>			0.850		0.998			0.987			0.921	
Fl <sub>t</sub> Protected	0.950			0.950			0.950				0.999	
Satd. Flow (prot)	1576	1658	1653	1576	1655	0	1576	1637	0	0	2899	0
Fl <sub>t</sub> Permitted	0.326			0.598			0.142				0.947	
Satd. Flow (perm)	541	1658	1653	992	1655	0	236	1637	0	0	2748	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175		1			6			264	
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1213	
Travel Time (s)		12.5			11.0			12.3			33.1	
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
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	304	261	142	54	321	5	147	402	38	11	364	418
Shared Lane Traffic (%)												
Lane Group Flow (vph)	304	261	142	54	326	0	147	440	0	0	793	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)		11			11			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.16	1.16	0.95	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0		1	0		1	0	
Detector Template											Left	
Leading Detector (ft)	66	0	0	31	0		56	0		20	0	
Trailing Detector (ft)	60	0	0	25	0		50	0		0	0	
Detector 1 Position(ft)	60	5	5	25	5		50	5		0	5	
Detector 1 Size(ft)	6	6	20	6	6		6	6		20	6	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Turn Type	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		Free	4			6			2		
Detector Phase	3	8		7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	6.0	19.0		6.0	19.0		6.0	19.0		19.0	19.0	

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 PM Existing Peak Hour  
09/17/2018

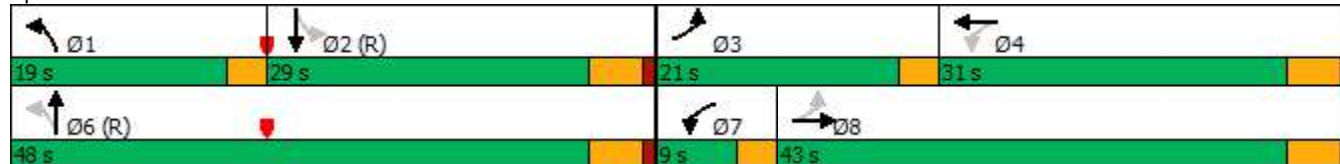


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.0	25.0		9.0	25.0		9.0	25.0		25.0	25.0	
Total Split (s)	21.0	43.0		9.0	31.0		19.0	48.0		29.0	29.0	
Total Split (%)	21.0%	43.0%		9.0%	31.0%		19.0%	48.0%		29.0%	29.0%	
Maximum Green (s)	18.0	38.0		6.0	26.0		16.0	43.0		24.0	24.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	1.0		0.0	1.0		0.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	3.0	5.0		3.0	5.0		3.0	5.0				5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	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	None	Min		None	Max		None	C-Max		C-Max	C-Max	
Walk Time (s)		6.0			6.0			6.0		6.0	6.0	
Flash Dont Walk (s)		14.0			14.0			14.0		14.0	14.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	49.0	39.8	100.0	36.7	28.7		45.0	43.0				30.0
Actuated g/C Ratio	0.49	0.40	1.00	0.37	0.29		0.45	0.43				0.30
v/c Ratio	0.72	0.40	0.09	0.14	0.69		0.61	0.62				0.79
Control Delay	26.7	24.5	0.1	15.5	41.3		28.3	26.6				32.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Delay	26.7	24.5	0.1	15.5	41.3		28.3	26.6				32.6
LOS	C	C	A	B	D		C	C				C
Approach Delay		20.6			37.6			27.0				32.6
Approach LOS		C			D			C				C

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green, Master Intersection  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.79  
 Intersection Signal Delay: 28.6      Intersection LOS: C  
 Intersection Capacity Utilization 97.1%      ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 30: Commercial St & Winneconne Ave



Queues  
30: Commercial St & Winneconne Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	304	261	142	54	326	147	440	793
v/c Ratio	0.72	0.40	0.09	0.14	0.69	0.61	0.62	0.79
Control Delay	26.7	24.5	0.1	15.5	41.3	28.3	26.6	32.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	24.5	0.1	15.5	41.3	28.3	26.6	32.6
Queue Length 50th (ft)	118	120	0	18	187	55	210	212
Queue Length 95th (ft)	184	191	0	38	#318	97	316	#300
Internal Link Dist (ft)		468			323		459	1133
Turn Bay Length (ft)			150					
Base Capacity (vph)	451	660	1653	398	475	320	707	1008
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.40	0.09	0.14	0.69	0.46	0.62	0.79

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
30: Commercial St & Winneconne Ave

2018 PM Existing Peak Hour  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗		↖	↗			↖↗	
Traffic Volume (veh/h)	280	240	210	50	295	5	135	370	35	10	335	385
Future Volume (veh/h)	280	240	210	50	295	5	135	370	35	10	335	385
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	1723	1723	1792	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	304	261	0	54	321	5	147	402	38	11	364	418
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	415	631		432	440	7	225	708	67	43	592	466
Arrive On Green	0.15	0.37	0.00	0.05	0.26	0.26	0.08	0.46	0.46	0.12	0.12	0.12
Sat Flow, veh/h	1641	1723	1518	1641	1692	26	1641	1550	147	18	1689	1329
Grp Volume(v), veh/h	304	261	0	54	0	326	147	0	440	375	0	418
Grp Sat Flow(s),veh/h/ln	1641	1723	1518	1641	0	1718	1641	0	1696	1708	0	1329
Q Serve(g_s), s	12.9	11.3	0.0	2.4	0.0	17.3	5.4	0.0	19.0	0.0	0.0	31.0
Cycle Q Clear(g_c), s	12.9	11.3	0.0	2.4	0.0	17.3	5.4	0.0	19.0	20.7	0.0	31.0
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.09	0.03		1.00
Lane Grp Cap(c), veh/h	415	631		432	0	447	225	0	775	636	0	466
V/C Ratio(X)	0.73	0.41		0.13	0.00	0.73	0.65	0.00	0.57	0.59	0.00	0.90
Avail Cap(c_a), veh/h	459	655		454	0	447	362	0	775	636	0	466
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.00	0.93
Uniform Delay (d), s/veh	22.3	23.6	0.0	24.9	0.0	33.8	23.3	0.0	19.9	37.9	0.0	42.4
Incr Delay (d2), s/veh	5.4	0.4	0.0	0.1	0.0	10.1	3.2	0.0	3.0	3.7	0.0	21.5
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(95%),veh/ln	9.2	8.1	0.0	1.7	0.0	13.2	4.0	0.0	12.5	15.3	0.0	19.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.7	24.1	0.0	25.0	0.0	43.8	26.5	0.0	22.9	41.6	0.0	63.9
LnGrp LOS	C	C		C	A	D	C	A	C	D	A	E
Approach Vol, veh/h		565	A		380			587			793	
Approach Delay, s/veh		26.0			41.2			23.8			53.3	
Approach LOS		C			D			C			D	
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	10.6	40.1	18.3	31.0		50.7	7.7	41.6				
Change Period (Y+Rc), s	3.0	5.0	3.0	5.0		5.0	3.0	5.0				
Max Green Setting (Gmax), s	16.0	24.0	18.0	26.0		43.0	6.0	38.0				
Max Q Clear Time (g_c+I1), s	7.4	0.0	14.9	0.0		0.0	4.4	0.0				
Green Ext Time (p_c), s	0.3	0.0	0.4	0.0		0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	37.3
HCM 6th LOS	D

Notes

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

Lanes, Volumes, Timings  
19: Commercial St & Columbian Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	130	40	5	50	5	20	470	20	10	495	35
Future Volume (vph)	75	130	40	5	50	5	20	470	20	10	495	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	11	11	11	11	11
Storage Length (ft)	0		180	75		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Fr <sub>t</sub>		0.965			0.987			0.994			0.990	
Fl <sub>t</sub> Protected	0.950			0.950				0.998			0.999	
Satd. Flow (prot)	1506	1530	0	1521	1580	0	0	3096	0	0	3086	0
Fl <sub>t</sub> Permitted	0.713			0.462				0.914			0.942	
Satd. Flow (perm)	1131	1530	0	740	1580	0	0	2835	0	0	2910	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			6			6			11	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		536			509			1213			296	
Travel Time (s)		14.6			13.9			33.1			8.1	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	91	159	49	6	61	6	24	573	24	12	604	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	208	0	6	67	0	0	621	0	0	659	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)		10			10			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	25	11		25	11		20	0		20	0	
Trailing Detector (ft)	5	5		5	5		0	0		0	0	
Detector 1 Position(ft)	5	5		5	5		0	5		0	5	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
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	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	



Lanes, Volumes, Timings  
 19: Commercial St & Columbian Ave

2018 AM Existing Peak Hour  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	26.0	26.0		26.0	26.0		28.0	28.0		28.0	28.0	
Total Split (s)	42.0	42.0		42.0	42.0		58.0	58.0		58.0	58.0	
Total Split (%)	42.0%	42.0%		42.0%	42.0%		58.0%	58.0%		58.0%	58.0%	
Maximum Green (s)	36.0	36.0		36.0	36.0		52.0	52.0		52.0	52.0	
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	Min	Min		Min	Min		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	6.0	6.0		6.0	6.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	17.9	17.9		17.9	17.9			70.1			70.1	
Actuated g/C Ratio	0.18	0.18		0.18	0.18			0.70			0.70	
v/c Ratio	0.45	0.72		0.05	0.23			0.31			0.32	
Control Delay	42.1	49.0		31.0	31.9			3.9			1.9	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	42.1	49.0		31.0	31.9			3.9			1.9	
LOS	D	D		C	C			A			A	
Approach Delay		46.9			31.8			3.9			1.9	
Approach LOS		D			C			A			A	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	36 (36%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle:	55
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.72
Intersection Signal Delay:	12.1
Intersection LOS:	B
Intersection Capacity Utilization	52.0%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 19: Commercial St & Columbian Ave



Queues  
19: Commercial St & Columbian Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	91	208	6	67	621	659
v/c Ratio	0.45	0.72	0.05	0.23	0.31	0.32
Control Delay	42.1	49.0	31.0	31.9	3.9	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	49.0	31.0	31.9	3.9	1.9
Queue Length 50th (ft)	52	116	3	34	25	18
Queue Length 95th (ft)	84	158	12	59	84	24
Internal Link Dist (ft)		456		429	1133	216
Turn Bay Length (ft)			75			
Base Capacity (vph)	407	561	266	572	1987	2042
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	0.22	0.37	0.02	0.12	0.31	0.32
<b>Intersection Summary</b>						

HCM 6th Signalized Intersection Summary  
 19: Commercial St & Columbian Ave

2018 AM Existing Peak Hour  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Volume (veh/h)	75	130	40	5	50	5	20	470	20	10	495	35
Future Volume (veh/h)	75	130	40	5	50	5	20	470	20	10	495	35
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	1709	1709	1709	1723	1723	1723	1709	1709	1709	1709	1709	1709
Adj Flow Rate, veh/h	91	159	49	6	61	6	24	573	24	12	604	43
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	3	3	3
Cap, veh/h	226	190	59	105	234	23	97	2145	89	56	2160	152
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1324	1253	386	1174	1544	152	80	2944	122	25	2964	209
Grp Volume(v), veh/h	91	0	208	6	0	67	320	0	301	346	0	313
Grp Sat Flow(s),veh/h/ln	1324	0	1640	1174	0	1695	1613	0	1533	1681	0	1518
Q Serve(g_s), s	6.5	0.0	12.3	0.5	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.0	0.0	12.3	12.8	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		0.24	1.00		0.09	0.08		0.08	0.03		0.14
Lane Grp Cap(c), veh/h	226	0	248	105	0	257	1214	0	1117	1262	0	1106
V/C Ratio(X)	0.40	0.00	0.84	0.06	0.00	0.26	0.26	0.00	0.27	0.27	0.00	0.28
Avail Cap(c_a), veh/h	502	0	590	350	0	610	1214	0	1117	1262	0	1106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.70	0.00	0.70	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.9	0.0	41.2	47.5	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	7.3	0.2	0.0	0.5	0.4	0.0	0.4	0.5	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	0.0	9.3	0.3	0.0	2.7	0.2	0.0	0.2	0.3	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.0	0.0	48.5	47.7	0.0	38.0	0.4	0.0	0.4	0.5	0.0	0.6
LnGrp LOS	D	A	D	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		299			73			621			659	
Approach Delay, s/veh		46.9			38.8			0.4			0.6	
Approach LOS		D			D			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		78.8		21.2		78.8		21.2				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		52.0		36.0		52.0		36.0				
Max Q Clear Time (g_c+I1), s		0.0		14.8		0.0		14.3				
Green Ext Time (p_c), s		0.0		0.1		0.0		0.8				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				10.6								
HCM 6th LOS				B								

Lanes, Volumes, Timings  
19: Commercial St & Columbian Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	110	45	30	35	20	15	630	5	15	680	20
Future Volume (vph)	90	110	45	30	35	20	15	630	5	15	680	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	11	11	11	11	11
Storage Length (ft)	0		180	75		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Fr <sub>t</sub>		0.956			0.945			0.999			0.996	
Fl <sub>t</sub> Protected	0.950			0.950				0.999			0.999	
Satd. Flow (prot)	1521	1531	0	1521	1513	0	0	3145	0	0	3135	0
Fl <sub>t</sub> Permitted	0.716			0.509				0.928			0.933	
Satd. Flow (perm)	1147	1531	0	815	1513	0	0	2921	0	0	2928	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			23			1			4	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		536			509			1213			296	
Travel Time (s)		14.6			13.9			33.1			8.1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	103	126	52	34	40	23	17	724	6	17	782	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	178	0	34	63	0	0	747	0	0	822	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)		10			10			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	25	11		25	11		20	0		20	0	
Trailing Detector (ft)	5	5		5	5		0	0		0	0	
Detector 1 Position(ft)	5	5		5	5		0	5		0	5	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
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	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6				2
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		28.0	28.0		28.0	28.0	

Lanes, Volumes, Timings  
 19: Commercial St & Columbian Ave

2018 PM Existing Peak Hour  
 09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	42.0	42.0		42.0	42.0		58.0	58.0		58.0	58.0	
Total Split (%)	42.0%	42.0%		42.0%	42.0%		58.0%	58.0%		58.0%	58.0%	
Maximum Green (s)	36.0	36.0		36.0	36.0		52.0	52.0		52.0	52.0	
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	Min	Min		Min	Min		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	6.0	6.0		6.0	6.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	15.5	15.5		15.5	15.5			72.5			72.5	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.72			0.72	
v/c Ratio	0.58	0.69		0.27	0.25			0.35			0.39	
Control Delay	51.0	48.0		40.3	26.3			3.3			3.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	51.0	48.0		40.3	26.3			3.3			3.6	
LOS	D	D		D	C			A			A	
Approach Delay		49.1			31.2			3.3			3.6	
Approach LOS		D			C			A			A	

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 36 (36%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 11.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 61.2%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 19: Commercial St & Columbian Ave



Queues  
19: Commercial St & Columbian Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	103	178	34	63	747	822
v/c Ratio	0.58	0.69	0.27	0.25	0.35	0.39
Control Delay	51.0	48.0	40.3	26.3	3.3	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	48.0	40.3	26.3	3.3	3.6
Queue Length 50th (ft)	62	94	19	22	30	24
Queue Length 95th (ft)	104	148	44	53	94	131
Internal Link Dist (ft)		456		429	1133	216
Turn Bay Length (ft)			75			
Base Capacity (vph)	412	565	293	559	2116	2122
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	4	0	0	6	14	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.32	0.12	0.11	0.36	0.39
<b>Intersection Summary</b>						

HCM 6th Signalized Intersection Summary  
 19: Commercial St & Columbian Ave

2018 PM Existing Peak Hour  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	110	45	30	35	20	15	630	5	15	680	20
Future Volume (veh/h)	90	110	45	30	35	20	15	630	5	15	680	20
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	103	126	52	34	40	23	17	724	6	17	782	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	231	177	73	132	157	90	64	2301	19	60	2259	66
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	1.00	1.00	1.00	0.73	0.73	0.73
Sat Flow, veh/h	1339	1159	478	1206	1026	590	37	3166	26	32	3108	90
Grp Volume(v), veh/h	103	0	178	34	0	63	386	0	361	428	0	394
Grp Sat Flow(s),veh/h/ln	1339	0	1637	1206	0	1616	1666	0	1563	1679	0	1551
Q Serve(g_s), s	7.3	0.0	10.3	2.8	0.0	3.4	0.0	0.0	0.0	0.0	0.0	9.3
Cycle Q Clear(g_c), s	10.8	0.0	10.3	13.1	0.0	3.4	0.0	0.0	0.0	9.0	0.0	9.3
Prop In Lane	1.00		0.29	1.00		0.37	0.04		0.02	0.04		0.06
Lane Grp Cap(c), veh/h	231	0	251	132	0	248	1248	0	1136	1258	0	1128
V/C Ratio(X)	0.45	0.00	0.71	0.26	0.00	0.25	0.31	0.00	0.32	0.34	0.00	0.35
Avail Cap(c_a), veh/h	508	0	589	382	0	582	1248	0	1136	1258	0	1128
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.70	0.00	0.70	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.1	0.0	40.2	46.5	0.0	37.3	0.0	0.0	0.0	5.0	0.0	5.0
Incr Delay (d2), s/veh	1.3	0.0	3.7	1.0	0.0	0.5	0.5	0.0	0.5	0.7	0.0	0.9
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(95%),veh/ln	4.5	0.0	7.9	1.6	0.0	2.5	0.3	0.0	0.3	5.5	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.4	0.0	43.9	47.5	0.0	37.8	0.5	0.0	0.5	5.7	0.0	5.9
LnGrp LOS	D	A	D	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		281			97			747			822	
Approach Delay, s/veh		43.7			41.2			0.5			5.8	
Approach LOS		D			D			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		78.7		21.3		78.7		21.3				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		52.0		36.0		52.0		36.0				
Max Q Clear Time (g_c+I1), s		0.0		15.1		0.0		12.8				
Green Ext Time (p_c), s		0.0		0.2		0.0		0.8				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				11.0								
HCM 6th LOS				B								

Lanes, Volumes, Timings  
20: Commercial St & Doty Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	15	10	0	10	5	30	500	20	20	535	25
Future Volume (vph)	10	15	10	0	10	5	30	500	20	20	535	25
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	12	11	11	11	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.960			0.955			0.995			0.994	
Flt Protected		0.986						0.997			0.998	
Satd. Flow (prot)	0	1841	0	0	1857	0	0	3066	0	0	3037	0
Flt Permitted		0.986						0.997			0.998	
Satd. Flow (perm)	0	1841	0	0	1857	0	0	3066	0	0	3037	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		531			531			296			317	
Travel Time (s)		12.1			12.1			6.7			7.2	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%
Adj. Flow (vph)	12	17	12	0	12	6	35	581	23	23	622	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	41	0	0	18	0	0	639	0	0	674	0
Enter Blocked Intersection	No	No	No	No	No	No	No	Yes	No	No	Yes	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.11	1.16	1.16	1.16	1.16	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	53.0%
ICU Level of Service	A
Analysis Period (min)	15



Intersection												
Int Delay, s/veh	1.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	15	10	0	10	5	30	500	20	20	535	25
Future Vol, veh/h	10	15	10	0	10	5	30	500	20	20	535	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	5	5	5
Mvmt Flow	12	17	12	0	12	6	35	581	23	23	622	29

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1050	1357	326	1029	1360	302	651	0	0	604	0	0
Stage 1	683	683	-	663	663	-	-	-	-	-	-	-
Stage 2	367	674	-	366	697	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.18	-	-	4.2	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.24	-	-	2.25	-	-
Pot Cap-1 Maneuver	181	148	670	188	147	694	918	-	-	949	-	-
Stage 1	405	447	-	417	457	-	-	-	-	-	-	-
Stage 2	625	452	-	626	441	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	156	134	670	155	133	694	918	-	-	949	-	-
Mov Cap-2 Maneuver	156	134	-	155	133	-	-	-	-	-	-	-
Stage 1	382	430	-	393	430	-	-	-	-	-	-	-
Stage 2	568	426	-	568	424	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	30.2		26.9		0.7		0.5	
HCM LOS	D		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	918	-	-	183	182	949	-
HCM Lane V/C Ratio	0.038	-	-	0.222	0.096	0.025	-
HCM Control Delay (s)	9.1	0.2	-	30.2	26.9	8.9	0.2
HCM Lane LOS	A	A	-	D	D	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.8	0.3	0.1	-

Lanes, Volumes, Timings  
20: Commercial St & Doty Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	15	15	35	15	10	20	30	685	20	10	665	40
Future Volume (vph)	15	15	35	15	10	20	30	685	20	10	665	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	12	11	11	11	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.926			0.940			0.996			0.992	
Flt Protected		0.989			0.984			0.998			0.999	
Satd. Flow (prot)	0	1781	0	0	1799	0	0	3072	0	0	3034	0
Flt Permitted		0.989			0.984			0.998			0.999	
Satd. Flow (perm)	0	1781	0	0	1799	0	0	3072	0	0	3034	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		531			531			296			317	
Travel Time (s)		12.1			12.1			6.7			7.2	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%
Adj. Flow (vph)	17	17	41	17	12	23	35	797	23	12	773	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	75	0	0	52	0	0	855	0	0	832	0
Enter Blocked Intersection	No	No	No	No	No	No	No	Yes	No	No	Yes	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.11	1.16	1.16	1.16	1.16	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	56.7%
ICU Level of Service	B
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	3.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	15	35	15	10	20	30	685	20	10	665	40
Future Vol, veh/h	15	15	35	15	10	20	30	685	20	10	665	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	5	5	5
Mvmt Flow	17	17	41	17	12	23	35	797	23	12	773	47

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1296	1711	410	1298	1723	410	820	0	0	820	0	0
Stage 1	821	821	-	879	879	-	-	-	-	-	-	-
Stage 2	475	890	-	419	844	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.18	-	-	4.2	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.24	-	-	2.25	-	-
Pot Cap-1 Maneuver	120	90	591	119	88	591	792	-	-	786	-	-
Stage 1	335	387	-	309	363	-	-	-	-	-	-	-
Stage 2	539	359	-	582	377	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	94	80	591	85	78	591	792	-	-	786	-	-
Mov Cap-2 Maneuver	94	80	-	85	78	-	-	-	-	-	-	-
Stage 1	308	376	-	284	333	-	-	-	-	-	-	-
Stage 2	459	330	-	502	366	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	46.2		48.6		0.8		0.2	
HCM LOS	E		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	792	-	-	160	133	786	-
HCM Lane V/C Ratio	0.044	-	-	0.472	0.393	0.015	-
HCM Control Delay (s)	9.8	0.4	-	46.2	48.6	9.6	0.1
HCM Lane LOS	A	A	-	E	E	A	A
HCM 95th %tile Q(veh)	0.1	-	-	2.2	1.7	0	-

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	180	15	40	210	40	25	430	60	5	525	370
Future Volume (vph)	210	180	15	40	210	40	25	430	60	5	525	370
Ideal Flow (vphpl)	1750	1665	1750	1750	1665	1750	1750	1700	1750	1750	1665	1750
Lane Width (ft)	11	11	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	95		65	65		65	0		0	75		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	50			50			25			50		
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
Fr <sub>t</sub>			0.850			0.850		0.988			0.938	
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1576	1420	1653	1630	1469	1653	1599	1615	0	1614	2881	0
Fl <sub>t</sub> Permitted	0.318			0.618			0.148			0.297		
Satd. Flow (perm)	527	1420	1653	1060	1469	1653	249	1615	0	505	2881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		6			249	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		521			520			317			1667	
Travel Time (s)		14.2			14.2			8.6			45.5	
Peak Hour Factor	0.80	0.80	0.80	0.88	0.88	0.88	0.80	0.80	0.80	0.80	0.80	0.80
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Parking (#/hr)		0			0							
Adj. Flow (vph)	263	225	12	45	239	28	31	538	47	6	656	463
Shared Lane Traffic (%)												
Lane Group Flow (vph)	263	225	12	45	239	28	31	585	0	6	1119	0
Enter Blocked Intersection	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh
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	1.16	1.41	0.95	1.11	1.35	0.95	1.11	1.15	1.11	1.11	1.18	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0	0	1	0		1	0	
Detector Template												
Leading Detector (ft)	60	0	0	56	0	0	56	0		60	0	
Trailing Detector (ft)	42	0	0	50	0	0	50	0		42	0	
Detector 1 Position(ft)	42	5	5	50	5	5	50	5		42	5	
Detector 1 Size(ft)	18	6	20	6	6	20	6	6		18	6	
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	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4		4	6			2		
Detector Phase	3	8	8	7	4	4	1	6		5	2	

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 AM Existing Peak Hour  
09/17/2018

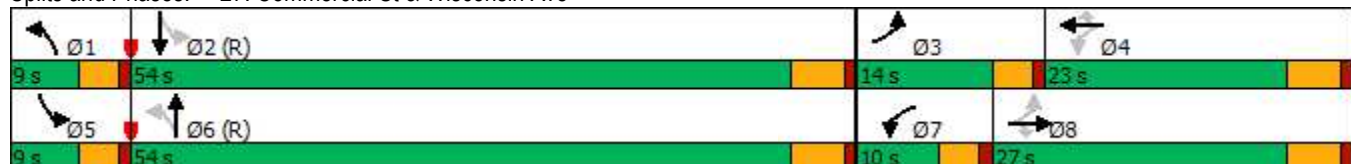


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	25.0	25.0	9.0	25.0	25.0	9.0	25.0		9.0	25.0	
Total Split (s)	14.0	27.0	27.0	10.0	23.0	23.0	9.0	54.0		9.0	54.0	
Total Split (%)	14.0%	27.0%	27.0%	10.0%	23.0%	23.0%	9.0%	54.0%		9.0%	54.0%	
Maximum Green (s)	10.0	22.0	22.0	6.0	18.0	18.0	5.0	49.0		5.0	49.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
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)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0		4.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
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	Max	None	Max	Max	None	C-Max		None	C-Max	
Walk Time (s)		6.0	6.0		6.0	6.0		6.0			6.0	
Flash Dont Walk (s)		14.0	14.0		14.0	14.0		14.0			14.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	
Act Effct Green (s)	33.0	26.0	26.0	24.6	18.0	18.0	58.2	56.2		56.6	52.6	
Actuated g/C Ratio	0.33	0.26	0.26	0.25	0.18	0.18	0.58	0.56		0.57	0.53	
v/c Ratio	0.95	0.61	0.02	0.15	0.91	0.07	0.15	0.64		0.02	0.69	
Control Delay	73.1	42.6	0.1	24.9	77.4	0.4	8.8	16.6		8.6	16.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1		0.0	0.0	
Total Delay	73.1	42.6	0.1	24.9	77.4	0.4	8.8	16.7		8.6	16.5	
LOS	E	D	A	C	E	A	A	B		A	B	
Approach Delay		57.6			62.9			16.3			16.5	
Approach LOS		E			E			B			B	

Intersection Summary

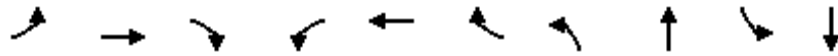
Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 14 (14%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 30.2  
 Intersection Capacity Utilization 67.0%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service C

Splits and Phases: 27: Commercial St & Wisconsin Ave



Queues  
27: Commercial St & Wisconsin Ave

2018 AM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	263	225	12	45	239	28	31	585	6	1119
v/c Ratio	0.95	0.61	0.02	0.15	0.91	0.07	0.15	0.64	0.02	0.69
Control Delay	73.1	42.6	0.1	24.9	77.4	0.4	8.8	16.6	8.6	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	73.1	42.6	0.1	24.9	77.4	0.4	8.8	16.7	8.6	16.5
Queue Length 50th (ft)	134	134	0	20	151	0	7	187	2	225
Queue Length 95th (ft)	#230	189	0	44	#284	0	16	220	6	241
Internal Link Dist (ft)		441			440			237		1587
Turn Bay Length (ft)	95		65	65		65			75	
Base Capacity (vph)	278	369	510	299	264	386	212	910	341	1633
Starvation Cap Reductn	0	0	0	0	0	0	0	17	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	0.95	0.61	0.02	0.15	0.91	0.07	0.15	0.66	0.02	0.69

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
27: Commercial St & Wisconsin Ave

2018 AM Existing Peak Hour  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	180	15	40	210	40	25	430	60	5	525	370
Future Volume (veh/h)	210	180	15	40	210	40	25	430	60	5	525	370
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	1723	1639	1792	1723	1639	1792	1695	1647	1695	1709	1626	1709
Adj Flow Rate, veh/h	262	225	12	45	239	28	31	538	46	6	656	462
Peak Hour Factor	0.80	0.80	0.80	0.88	0.88	0.88	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	4	4	4	3	3	3
Cap, veh/h	281	400	371	272	295	273	224	796	68	506	886	622
Arrive On Green	0.10	0.24	0.24	0.04	0.18	0.18	0.06	1.00	1.00	0.01	0.51	0.51
Sat Flow, veh/h	1641	1639	1518	1641	1639	1518	1615	1496	128	1628	1734	1218
Grp Volume(v), veh/h	262	225	12	45	239	28	31	0	584	6	584	534
Grp Sat Flow(s),veh/h/ln	1641	1639	1518	1641	1639	1518	1615	0	1624	1628	1545	1407
Q Serve(g_s), s	10.0	12.0	0.6	2.2	14.0	1.5	0.9	0.0	0.0	0.2	29.7	29.9
Cycle Q Clear(g_c), s	10.0	12.0	0.6	2.2	14.0	1.5	0.9	0.0	0.0	0.2	29.7	29.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.08	1.00		0.87
Lane Grp Cap(c), veh/h	281	400	371	272	295	273	224	0	864	506	790	719
V/C Ratio(X)	0.93	0.56	0.03	0.17	0.81	0.10	0.14	0.00	0.68	0.01	0.74	0.74
Avail Cap(c_a), veh/h	281	400	371	312	295	273	258	0	864	575	790	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	0.91	1.00	1.00	1.00	1.00	0.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	34.0	33.1	28.8	31.8	39.4	34.3	15.1	0.0	0.0	11.6	19.2	19.3
Incr Delay (d2), s/veh	34.3	5.1	0.1	0.3	20.9	0.8	0.3	0.0	4.2	0.0	5.6	6.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.1	9.0	0.4	1.6	11.8	1.1	0.6	0.0	1.8	0.1	16.8	15.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.3	38.2	28.9	32.1	60.3	35.0	15.3	0.0	4.2	11.6	24.8	25.4
LnGrp LOS	E	D	C	C	E	D	B	A	A	B	C	C
Approach Vol, veh/h		499			312			615			1124	
Approach Delay, s/veh		53.8			53.9			4.8			25.0	
Approach LOS		D			D			A			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.9	56.1	14.0	23.0	4.8	58.2	7.6	29.4				
Change Period (Y+Rc), s	4.0	5.0	4.0	5.0	4.0	5.0	4.0	5.0				
Max Green Setting (Gmax), s	5.0	49.0	10.0	18.0	5.0	49.0	6.0	22.0				
Max Q Clear Time (g_c+I1), s	2.9	0.0	12.0	0.0	2.2	0.0	4.2	0.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	29.3
HCM 6th LOS	C

Notes

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

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	220	35	110	205	35	50	620	45	25	575	275
Future Volume (vph)	275	220	35	110	205	35	50	620	45	25	575	275
Ideal Flow (vphpl)	1750	1665	1750	1750	1665	1750	1750	1700	1750	1750	1665	1750
Lane Width (ft)	11	11	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	95		65	65		65	0		0	75		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	50			50			25			50		
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
Fr <sub>t</sub>			0.850			0.850		0.994			0.951	
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1576	1420	1653	1630	1469	1653	1630	1657	0	1630	2949	0
Fl <sub>t</sub> Permitted	0.327			0.466			0.225			0.200		
Satd. Flow (perm)	542	1420	1653	800	1469	1653	386	1657	0	343	2949	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		3				113
Link Speed (mph)		25			25			25				25
Link Distance (ft)		521			520			317				1667
Travel Time (s)		14.2			14.2			8.6				45.5
Peak Hour Factor	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	100%
Parking (#/hr)		0			0							
Adj. Flow (vph)	324	259	26	118	220	23	54	667	30	27	618	296
Shared Lane Traffic (%)												
Lane Group Flow (vph)	324	259	26	118	220	23	54	697	0	27	914	0
Enter Blocked Intersection	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh
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	1.16	1.41	0.95	1.11	1.35	0.95	1.11	1.15	1.11	1.11	1.18	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0	0	1	0		1	0	
Detector Template												
Leading Detector (ft)	60	0	0	56	0	0	56	0		60	0	
Trailing Detector (ft)	42	0	0	50	0	0	50	0		42	0	
Detector 1 Position(ft)	42	5	5	50	5	5	50	5		42	5	
Detector 1 Size(ft)	18	6	20	6	6	20	6	6		18	6	
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	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4		4	6			2		
Detector Phase	3	8	8	7	4	4	1	6		5	2	
Switch Phase												



Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 PM Existing Peak Hour  
09/17/2018

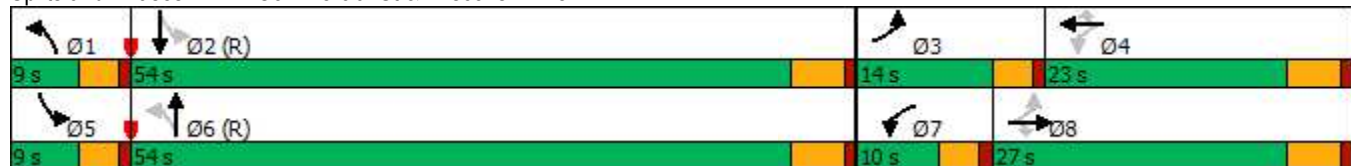


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	25.0	25.0	9.0	25.0	25.0	9.0	25.0		9.0	25.0	
Total Split (s)	14.0	27.0	27.0	10.0	23.0	23.0	9.0	54.0		9.0	54.0	
Total Split (%)	14.0%	27.0%	27.0%	10.0%	23.0%	23.0%	9.0%	54.0%		9.0%	54.0%	
Maximum Green (s)	10.0	22.0	22.0	6.0	18.0	18.0	5.0	49.0		5.0	49.0	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
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)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0		4.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
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	Max	None	Max	Max	None	C-Max		None	C-Max	
Walk Time (s)		6.0	6.0		6.0	6.0		6.0			6.0	
Flash Dont Walk (s)		14.0	14.0		14.0	14.0		14.0			14.0	
Pedestrian Calls (#/hr)		0	0		0	0		0			0	
Act Effct Green (s)	33.0	22.1	22.1	24.9	18.0	18.0	56.6	52.6		55.8	50.8	
Actuated g/C Ratio	0.33	0.22	0.22	0.25	0.18	0.18	0.57	0.53		0.56	0.51	
v/c Ratio	1.15	0.83	0.06	0.48	0.83	0.06	0.19	0.80		0.11	0.59	
Control Delay	130.3	60.1	0.2	32.8	66.5	0.3	9.7	26.9		9.6	17.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	130.3	60.1	0.2	32.8	66.5	0.3	9.7	26.9		9.6	17.2	
LOS	F	E	A	C	E	A	A	C		A	B	
Approach Delay		94.9			51.3			25.6			17.0	
Approach LOS		F			D			C			B	

Intersection Summary

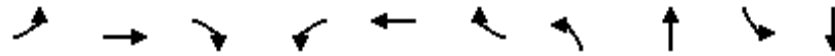
Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.15  
 Intersection Signal Delay: 41.9  
 Intersection LOS: D  
 Intersection Capacity Utilization 85.6%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 27: Commercial St & Wisconsin Ave



Queues  
27: Commercial St & Wisconsin Ave

2018 PM Existing Peak Hour  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	324	259	26	118	220	23	54	697	27	914
v/c Ratio	1.15	0.83	0.06	0.48	0.83	0.06	0.19	0.80	0.11	0.59
Control Delay	130.3	60.1	0.2	32.8	66.5	0.3	9.7	26.9	9.6	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	130.3	60.1	0.2	32.8	66.5	0.3	9.7	26.9	9.6	17.2
Queue Length 50th (ft)	~206	159	0	54	137	0	11	265	7	187
Queue Length 95th (ft)	#381	#265	0	98	#263	0	32	#573	18	251
Internal Link Dist (ft)		441			440			237		1587
Turn Bay Length (ft)	95		65	65		65			75	
Base Capacity (vph)	282	313	449	249	264	386	280	873	256	1553
Starvation Cap Reductn	0	0	0	0	0	0	0	1	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	1.15	0.83	0.06	0.47	0.83	0.06	0.19	0.80	0.11	0.59

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary  
27: Commercial St & Wisconsin Ave

2018 PM Existing Peak Hour  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	220	35	110	205	35	50	620	45	25	575	275
Future Volume (veh/h)	275	220	35	110	205	35	50	620	45	25	575	275
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	1723	1639	1792	1723	1639	1792	1723	1673	1723	1723	1639	1723
Adj Flow Rate, veh/h	324	259	26	118	220	23	54	667	30	27	618	296
Peak Hour Factor	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	361	334	251	295	273	310	816	37	213	1023	490
Arrive On Green	0.10	0.22	0.22	0.06	0.18	0.18	0.03	0.34	0.34	0.03	0.50	0.50
Sat Flow, veh/h	1641	1639	1518	1641	1639	1518	1641	1589	71	1641	2042	978
Grp Volume(v), veh/h	324	259	26	118	220	23	54	0	697	27	471	443
Grp Sat Flow(s),veh/h/ln	1641	1639	1518	1641	1639	1518	1641	0	1661	1641	1557	1463
Q Serve(g_s), s	10.0	14.6	1.4	5.9	12.7	1.3	1.6	0.0	38.3	0.8	21.6	21.7
Cycle Q Clear(g_c), s	10.0	14.6	1.4	5.9	12.7	1.3	1.6	0.0	38.3	0.8	21.6	21.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.04	1.00		0.67
Lane Grp Cap(c), veh/h	296	361	334	251	295	273	310	0	853	213	780	733
V/C Ratio(X)	1.09	0.72	0.08	0.47	0.75	0.08	0.17	0.00	0.82	0.13	0.60	0.60
Avail Cap(c_a), veh/h	296	361	334	251	295	273	328	0	853	252	780	733
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	0.91	1.00	1.00	1.00	1.00	0.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	35.6	36.1	30.9	31.8	38.8	34.1	13.7	0.0	28.5	18.5	17.8	17.8
Incr Delay (d2), s/veh	77.4	10.7	0.4	1.4	15.7	0.6	0.3	0.0	8.5	0.3	3.3	3.5
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(95%),veh/ln	14.5	11.0	1.0	4.4	10.5	0.9	1.1	0.0	24.9	0.5	12.9	12.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.0	46.8	31.4	33.1	54.6	34.7	14.0	0.0	37.1	18.7	21.1	21.3
LnGrp LOS	F	D	C	C	D	C	B	A	D	B	C	C
Approach Vol, veh/h		609			361			751			941	
Approach Delay, s/veh		81.4			46.3			35.4			21.2	
Approach LOS		F			D			D			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.9	55.1	14.0	23.0	6.6	56.4	10.0	27.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	5.0	4.0	5.0	4.0	5.0				
Max Green Setting (Gmax), s	5.0	49.0	10.0	18.0	5.0	49.0	6.0	22.0				
Max Q Clear Time (g_c+I1), s	3.6	0.0	12.0	0.0	2.8	0.0	7.9	0.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	42.4
HCM 6th LOS	D

Notes

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

Lanes, Volumes, Timings  
 23: Commercial St & Forest Ave

2018 AM Existing Peak Hour  
 09/18/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕↗			↕↗	
Traffic Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15
Future Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	12	12	11	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Flt			0.850			0.850		0.987			0.997	
Flt Protected		0.978			0.968			0.999			0.999	
Satd. Flow (prot)	0	1566	1361	0	1550	1361	0	3214	0	0	3247	0
Flt Permitted		0.814			0.767			0.929			0.950	
Satd. Flow (perm)	0	1303	1361	0	1228	1361	0	2989	0	0	3088	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			56			36		20			3	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		305			861			1667			254	
Travel Time (s)		8.3			23.5			45.5			6.9	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	23	28	56	57	28	4	11	403	40	11	966	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	51	56	0	85	4	0	454	0	0	994	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	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.11	1.11	1.16	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	0	1	1	0	1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	0	0	20	0	0	20	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	5	5	0	5	5	0	5		0	5	
Detector 1 Size(ft)	20	20	20	20	20	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Call	Cl+Ex	Cl+Ex	Call	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	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	27.0	42.0	42.0		42.0	42.0	
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	59.0	59.0		59.0	59.0	
Total Split (%)	34.4%	34.4%	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%		65.6%	65.6%	

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

2018 AM Existing Peak Hour  
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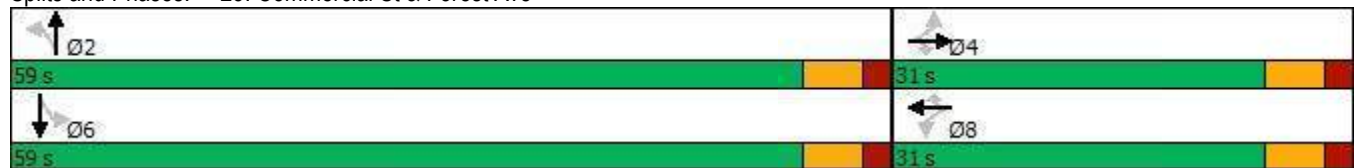


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0	25.0	53.0	53.0		53.0	53.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0			0.0	0.0		0.0		0.0	
Total 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		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Max	Max		Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	22.0	22.0		22.0	22.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)		10.4	10.4		10.4	10.4		53.1			53.1	
Actuated g/C Ratio		0.14	0.14		0.14	0.14		0.70			0.70	
v/c Ratio		0.29	0.24		0.51	0.02		0.22			0.46	
Control Delay		33.0	11.2		40.8	0.2		4.4			6.1	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		33.0	11.2		40.8	0.2		4.4			6.1	
LOS		C	B		D	A		A			A	
Approach Delay		21.6			38.9			4.4			6.1	
Approach LOS		C			D			A			A	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	75.5
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.51
Intersection Signal Delay:	8.4
Intersection LOS:	A
Intersection Capacity Utilization:	54.8%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 23: Commercial St & Forest Ave



Queues  
23: Commercial St & Forest Ave





















2018 AM Existing Peak Hour  
09/18/2018



Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	51	56	85	4	454	994
v/c Ratio	0.29	0.24	0.51	0.02	0.22	0.46
Control Delay	33.0	11.2	40.8	0.2	4.4	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	11.2	40.8	0.2	4.4	6.1
Queue Length 50th (ft)	22	0	38	0	30	87
Queue Length 95th (ft)	51	28	78	0	56	147
Internal Link Dist (ft)	225		781		1587	174
Turn Bay Length (ft)						
Base Capacity (vph)	432	489	407	475	2108	2173
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	0.12	0.11	0.21	0.01	0.22	0.46
<b>Intersection Summary</b>						

HCM Signalized Intersection Capacity Analysis  
 23: Commercial St & Forest Ave

2018 AM Existing Peak Hour  
 09/18/2018

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15		
Future Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	10	10	10	10	10	10	11	12	12	11	12	12		
Total Lost time (s)		6.0	6.0		6.0	6.0		6.0		6.0		6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95		0.95		0.95		
Frt		1.00	0.85		1.00	0.85		0.99		0.99		1.00		
Flt Protected		0.98	1.00		0.97	1.00		1.00		1.00		1.00		
Satd. Flow (prot)		1566	1361		1549	1361		3213		3213		3250		
Flt Permitted		0.81	1.00		0.77	1.00		0.93		0.93		0.95		
Satd. Flow (perm)		1304	1361		1229	1361		2989		2989		3087		
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88		
Growth Factor (vph)	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%		
Adj. Flow (vph)	23	28	56	57	28	4	11	403	40	11	966	17		
RTOR Reduction (vph)	0	0	48	0	0	3	0	6	0	0	1	0		
Lane Group Flow (vph)	0	51	8	0	85	1	0	448	0	0	993	0		
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA			
Protected Phases		4			8			2			6			
Permitted Phases	4		4	8		8	2			6				
Actuated Green, G (s)		10.3	10.3		10.3	10.3		53.1			53.1			
Effective Green, g (s)		10.3	10.3		10.3	10.3		53.1			53.1			
Actuated g/C Ratio		0.14	0.14		0.14	0.14		0.70			0.70			
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0			6.0			
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0			
Lane Grp Cap (vph)		178	185		167	185		2104			2174			
v/s Ratio Prot														
v/s Ratio Perm		0.04	0.01		c0.07	0.00		0.15			c0.32			
v/c Ratio		0.29	0.04		0.51	0.00		0.21			0.46			
Uniform Delay, d1		29.2	28.3		30.2	28.1		3.9			4.9			
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00			
Incremental Delay, d2		0.9	0.1		2.4	0.0		0.2			0.7			
Delay (s)		30.1	28.4		32.6	28.1		4.1			5.6			
Level of Service		C	C		C	C		A			A			
Approach Delay (s)		29.2			32.4			4.1			5.6			
Approach LOS		C			C			A			A			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			8.2									HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio			0.46											
Actuated Cycle Length (s)			75.4								12.0			
Intersection Capacity Utilization			54.8%										ICU Level of Service	A
Analysis Period (min)			15											

c Critical Lane Group

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

2018 PM Existing Peak Hour  
09/18/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔			↔	↔
Traffic Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Future Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	12	12	11	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Flt			0.850			0.850		0.994			0.999	
Flt Protected		0.973			0.955			0.999			0.999	
Satd. Flow (prot)	0	1558	1361	0	1529	1361	0	3237	0	0	3253	0
Flt Permitted		0.784			0.701			0.937			0.940	
Satd. Flow (perm)	0	1255	1361	0	1123	1361	0	3036	0	0	3061	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			36		8			2	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		305			861			1667			254	
Travel Time (s)		8.3			23.5			45.5			6.9	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	28	23	85	97	6	7	17	830	34	11	693	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	51	85	0	103	7	0	881	0	0	710	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	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.11	1.11	1.16	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	0	1	1	0	1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	0	0	20	0	0	20	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	5	5	0	5	5	0	5		0	5	
Detector 1 Size(ft)	20	20	20	20	20	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Call	Cl+Ex	Cl+Ex	Call	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	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0	27.0	27.0	27.0	27.0	42.0	42.0		42.0	42.0	
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	59.0	59.0		59.0	59.0	
Total Split (%)	34.4%	34.4%	34.4%	34.4%	34.4%	34.4%	65.6%	65.6%		65.6%	65.6%	



Lanes, Volumes, Timings  
 23: Commercial St & Forest Ave

2018 PM Existing Peak Hour  
 09/18/2018

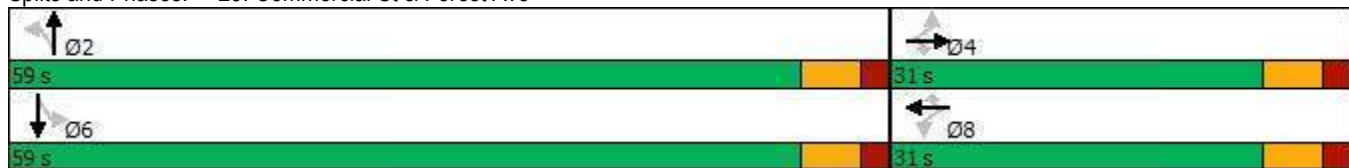


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0	25.0	53.0	53.0		53.0	53.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0			0.0	0.0		0.0		0.0	
Total 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		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Max	Max		Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	22.0	22.0		22.0	22.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)		12.3	12.3		12.3	12.3		53.2			53.2	
Actuated g/C Ratio		0.16	0.16		0.16	0.16		0.69			0.69	
v/c Ratio		0.26	0.30		0.58	0.03		0.42			0.34	
Control Delay		31.2	9.7		43.2	0.2		6.6			6.0	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		31.2	9.7		43.2	0.2		6.6			6.0	
LOS		C	A		D	A		A			A	
Approach Delay		17.8			40.4			6.6			6.0	
Approach LOS		B			D			A			A	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 77.5  
 Natural Cycle: 70  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.58  
 Intersection Signal Delay: 9.3  
 Intersection Capacity Utilization 56.7%  
 Analysis Period (min) 15  
 Intersection LOS: A  
 ICU Level of Service B

Splits and Phases: 23: Commercial St & Forest Ave



Queues  
23: Commercial St & Forest Ave

2018 PM Existing Peak Hour  
09/18/2018



Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	51	85	103	7	881	710
v/c Ratio	0.26	0.30	0.58	0.03	0.42	0.34
Control Delay	31.2	9.7	43.2	0.2	6.6	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.2	9.7	43.2	0.2	6.6	6.0
Queue Length 50th (ft)	22	0	46	0	82	61
Queue Length 95th (ft)	51	33	92	0	145	111
Internal Link Dist (ft)	225		781		1587	174
Turn Bay Length (ft)						
Base Capacity (vph)	405	497	363	464	2084	2099
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	0.13	0.17	0.28	0.02	0.42	0.34
Intersection Summary						

HCM Signalized Intersection Capacity Analysis  
 23: Commercial St & Forest Ave

2018 PM Existing Peak Hour  
 09/18/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗		↖↗			↖↗	
Traffic Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Future Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	10	10	10	10	10	10	11	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0		6.0			6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		0.99			1.00	
Flt Protected		0.97	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1559	1361		1529	1361		3238			3253	
Flt Permitted		0.78	1.00		0.70	1.00		0.94			0.94	
Satd. Flow (perm)		1255	1361		1123	1361		3036			3060	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	28	23	85	97	6	7	17	830	34	11	693	6
RTOR Reduction (vph)	0	0	72	0	0	6	0	3	0	0	1	0
Lane Group Flow (vph)	0	51	13	0	103	1	0	878	0	0	709	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		12.3	12.3		12.3	12.3		53.2			53.2	
Effective Green, g (s)		12.3	12.3		12.3	12.3		53.2			53.2	
Actuated g/C Ratio		0.16	0.16		0.16	0.16		0.69			0.69	
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0			6.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		199	216		178	216		2084			2100	
v/s Ratio Prot												
v/s Ratio Perm		0.04	0.01		c0.09	0.00		c0.29			0.23	
v/c Ratio		0.26	0.06		0.58	0.01		0.42			0.34	
Uniform Delay, d1		28.6	27.7		30.2	27.4		5.4			5.0	
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.7	0.1		4.5	0.0		0.6			0.4	
Delay (s)		29.3	27.8		34.7	27.5		6.0			5.4	
Level of Service		C	C		C	C		A			A	
Approach Delay (s)		28.4			34.2			6.0			5.4	
Approach LOS		C			C			A			A	

Intersection Summary		
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.45	A
Actuated Cycle Length (s)	77.5	Sum of lost time (s)
Intersection Capacity Utilization	56.7%	12.0
Analysis Period (min)	15	ICU Level of Service
		B

c Critical Lane Group

# **Attachment G**

*2018 Proposed Raw Synchro Outputs*

Lanes, Volumes, Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2018 AM Peak Hour Proposed  
09/19/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕	↕		↕↕			↕↕	
Traffic Volume (vph)	100	745	100	60	80	315	20	210	75	180	160	25
Future Volume (vph)	100	745	100	60	80	315	20	210	75	180	160	25
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	11	11	10	12	12	12	12	12	12
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.984				0.850		0.963			0.990	
Flt Protected		0.995			0.979			0.997			0.976	
Satd. Flow (prot)	0	3192	0	0	1562	1310	0	3012	0	0	3150	0
Flt Permitted		0.995			0.979			0.897			0.617	
Satd. Flow (perm)	0	3192	0	0	1562	1310	0	2710	0	0	1991	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				241		24			5	
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		531			4747			644			499	
Travel Time (s)		10.3			107.9			12.5			9.7	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.95	0.95	0.95	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	6%	6%	6%	2%	2%	2%
Adj. Flow (vph)	123	920	123	74	99	241	21	221	79	222	198	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1166	0	0	173	241	0	321	0	0	451	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.16	1.16	1.21	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	20		20	20	20	20	20		20	20	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
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	Split	NA		Split	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	4	4		8	8			2		1	6	
Permitted Phases						8	2			6		

Lanes, Volumes, Timings  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2018 AM Peak Hour Proposed  
 09/19/2018

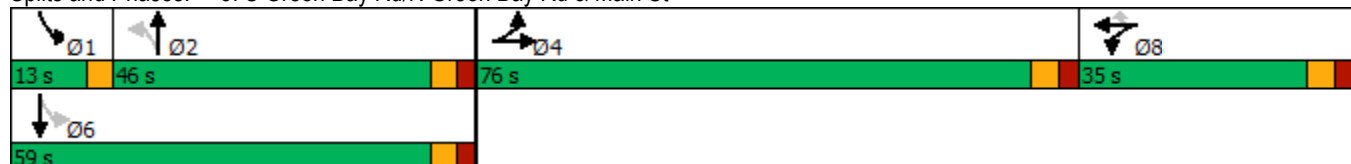


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.0	11.0	11.0	37.0	37.0		11.0	11.0	
Total Split (s)	76.0	76.0		35.0	35.0	35.0	46.0	46.0		13.0	59.0	
Total Split (%)	44.7%	44.7%		20.6%	20.6%	20.6%	27.1%	27.1%		7.6%	34.7%	
Maximum Green (s)	70.0	70.0		29.0	29.0	29.0	40.0	40.0		9.5	53.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		0.0	2.5	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	Max	Max		Max	Min	
Walk Time (s)							5.0	5.0				
Flash Dont Walk (s)							26.0	26.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)		62.1			22.3	22.3		40.4			53.5	
Actuated g/C Ratio		0.40			0.14	0.14		0.26			0.34	
v/c Ratio		0.91			0.78	0.61		0.45			0.61	
Control Delay		56.0			88.8	13.9		49.2			47.0	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		56.0			88.8	13.9		49.2			47.0	
LOS		E			F	B		D			D	
Approach Delay		56.0			45.1			49.2			47.0	
Approach LOS		E			D			D			D	

Intersection Summary

Area Type:	Other
Cycle Length:	170
Actuated Cycle Length:	156
Natural Cycle:	110
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.91
Intersection Signal Delay:	51.4
Intersection LOS:	D
Intersection Capacity Utilization:	78.0%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2018 AM Peak Hour Proposed  
09/19/2018

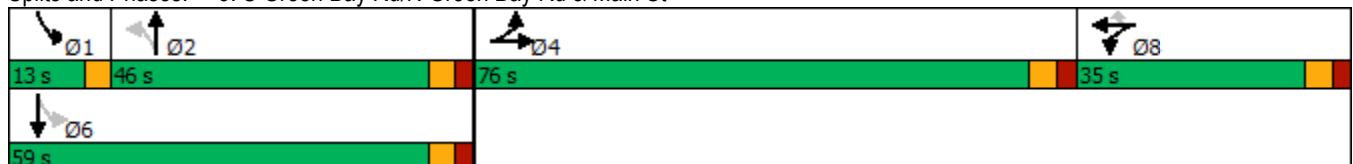


Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔		↔		↔
Traffic Volume (vph)	745	80	315	20	210	180	160
Future Volume (vph)	745	80	315	20	210	180	160
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases	4	8			2	1	6
Permitted Phases			8	2		6	
Detector Phase	4	8	8	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	37.0	37.0	11.0	11.0
Total Split (s)	76.0	35.0	35.0	46.0	46.0	13.0	59.0
Total Split (%)	44.7%	20.6%	20.6%	27.1%	27.1%	7.6%	34.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	0.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0		6.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	Min	Min	Min	Max	Max	Max	Min
Act Effct Green (s)	62.1	22.3	22.3		40.4		53.5
Actuated g/C Ratio	0.40	0.14	0.14		0.26		0.34
v/c Ratio	0.91	0.78	0.61		0.45		0.61
Control Delay	56.0	88.8	13.9		49.2		47.0
Queue Delay	0.0	0.0	0.0		0.0		0.0
Total Delay	56.0	88.8	13.9		49.2		47.0
LOS	E	F	B		D		D
Approach Delay	56.0	45.1			49.2		47.0
Approach LOS	E	D			D		D

Intersection Summary

Cycle Length: 170  
 Actuated Cycle Length: 156  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 51.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 78.0%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.6	0.3	0.5	0.0	0.0	0.0	0.3	0.2	0.2	0.4	0.2	0.1
Total Del/Veh (s)	36.7	39.4	28.8	65.3	17.2	9.9	44.9	45.0	16.9	60.2	41.4	6.2

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	35.0



Intersection: 3: S Green Bay Rd/N Green Bay Rd & Main St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	504	504	283	99	232	213	361	283
Average Queue (ft)	350	295	151	63	158	115	219	119
95th Queue (ft)	463	418	255	96	246	214	332	248
Link Distance (ft)	490	490	4671	4671	603	603	458	458
Upstream Blk Time (%)	0	0						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Lanes, Volumes, Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2018 PM Peak Hour Proposed  
10/19/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕	↗		↕↕			↕↕	
Traffic Volume (vph)	110	395	155	120	170	365	35	350	70	145	265	40
Future Volume (vph)	110	395	155	120	170	365	35	350	70	145	265	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	11	11	10	12	12	12	12	12	12
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.965				0.850		0.977			0.987	
Flt Protected		0.992			0.980			0.996			0.984	
Satd. Flow (prot)	0	3121	0	0	1625	1361	0	3172	0	0	3166	0
Flt Permitted		0.992			0.980			0.868			0.572	
Satd. Flow (perm)	0	3121	0	0	1625	1361	0	2764	0	0	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32				246		17			9	
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		531			4747			644			499	
Travel Time (s)		10.3			107.9			12.5			9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	120	429	168	130	185	246	38	380	76	158	288	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	717	0	0	315	246	0	494	0	0	489	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.16	1.16	1.21	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	20		20	20	20	20	20		20	20	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
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	Split	NA		Split	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	4	4		8	8			2		1	6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		1	6	

Lanes, Volumes, Timings  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2018 PM Peak Hour Proposed  
 10/19/2018

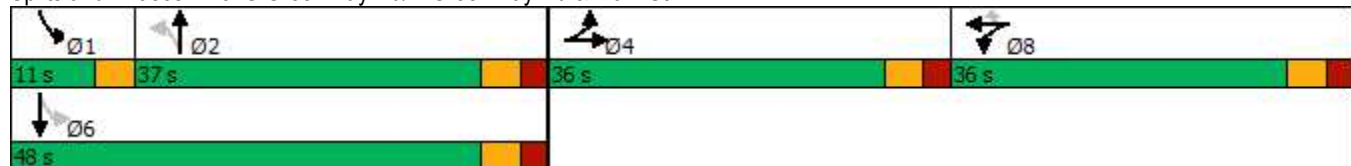


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
<b>Switch Phase</b>												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.5	11.5	11.5	37.0	37.0		8.5	11.0	
Total Split (s)	36.0	36.0		36.0	36.0	36.0	37.0	37.0		11.0	48.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%	30.0%	30.8%	30.8%		9.2%	40.0%	
Maximum Green (s)	30.0	30.0		30.0	30.0	30.0	31.0	31.0		7.5	42.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		0.0	2.5	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	Min	Min		Max	Min	
Walk Time (s)							5.0	5.0				
Flash Dont Walk (s)							26.0	26.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)		27.5			25.0	25.0		23.8			35.0	
Actuated g/C Ratio		0.26			0.24	0.24		0.22			0.33	
v/c Ratio		0.86			0.82	0.48		0.78			0.72	
Control Delay		48.4			57.9	8.0		47.4			37.1	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		48.4			57.9	8.0		47.4			37.1	
LOS		D			E	A		D			D	
Approach Delay		48.4			36.0			47.4			37.1	
Approach LOS		D			D			D			D	

**Intersection Summary**

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 105.9  
 Natural Cycle: 100  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 42.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 85.6%  
 ICU Level of Service E  
 Analysis Period (min) 15

**Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St**



Queues  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2018 PM Peak Hour Proposed  
 10/19/2018



Lane Group	EBT	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	717	315	246	494	489
v/c Ratio	0.86	0.82	0.48	0.78	0.72
Control Delay	48.4	57.9	8.0	47.4	37.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	57.9	8.0	47.4	37.1
Queue Length 50th (ft)	244	211	0	171	145
Queue Length 95th (ft)	#380	#362	66	237	199
Internal Link Dist (ft)	451	4667		564	419
Turn Bay Length (ft)					
Base Capacity (vph)	925	469	568	838	814
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.78	0.67	0.43	0.59	0.60

Intersection Summary

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

HCM 6th Edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 1.

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.4	0.2	0.3	0.0	0.0	0.0	0.2	0.1	0.2	0.4	0.1	0.2
Total Delay (hr)	1.9	5.9	1.6	1.7	3.0	0.7	0.4	3.2	0.4	1.8	2.5	0.1
Total Del/Veh (s)	52.9	52.4	36.4	50.3	14.5	10.7	36.6	31.9	16.3	50.4	35.3	9.8

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.1
Total Delay (hr)	23.4
Total Del/Veh (s)	31.0

Intersection: 3: S Green Bay Rd/N Green Bay Rd & Main St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	505	423	376	123	263	211	327	290
Average Queue (ft)	243	196	192	60	154	106	179	109
95th Queue (ft)	406	360	320	102	221	184	271	230
Link Distance (ft)	490	490	4671	4671	603	603	458	458
Upstream Blk Time (%)	1							
Queuing Penalty (veh)	0							
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	385	5	15	445	145	10	130	15	5	5	10
Future Volume (vph)	230	385	5	15	445	145	10	130	15	5	5	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	200		0	130		0	0		0	0		60
Storage Lanes	1		0	1		0	0		0	0		1
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	1.00	1.00
Frt		0.998			0.963			0.987				0.850
Flt Protected	0.950			0.950				0.997			0.976	
Satd. Flow (prot)	1630	1712	0	1630	1652	0	0	1688	0	0	1553	1352
Flt Permitted	0.227			0.496				0.981			0.865	
Satd. Flow (perm)	389	1712	0	851	1652	0	0	1661	0	0	1376	1352
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			22			5				93
Link Speed (mph)		25			25			25				25
Link Distance (ft)		712			521			325				230
Travel Time (s)		19.4			14.2			8.9				6.3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	62%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	10%	10%	10%
Adj. Flow (vph)	274	458	6	18	530	173	12	155	18	6	6	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	274	464	0	18	703	0	0	185	0	0	12	7
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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		7	15		9	15		9
Number of Detectors	1	2		1	2		1	1		1	1	0
Detector Template							Left			Left		
Leading Detector (ft)	56	156		56	156		20	11		20	11	0
Trailing Detector (ft)	50	0		50	0		0	5		0	5	0
Detector 1 Position(ft)	50	0		50	0		0	5		0	5	5
Detector 1 Size(ft)	6	6		6	6		20	6		20	6	20
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(ft)		150			150							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm



Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

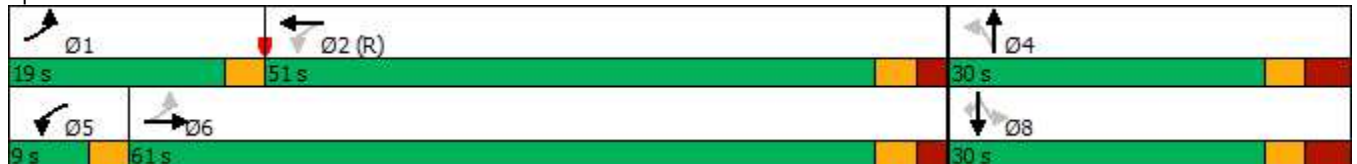
2018 AM Peak Hour Proposed  
09/17/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.0	28.5		9.0	28.5		29.5	29.5		29.5	29.5	29.5
Total Split (s)	19.0	61.0		9.0	51.0		30.0	30.0		30.0	30.0	30.0
Total Split (%)	19.0%	61.0%		9.0%	51.0%		30.0%	30.0%		30.0%	30.0%	30.0%
Maximum Green (s)	16.0	55.5		6.0	45.5		23.5	23.5		23.5	23.5	23.5
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	0.0	2.5		0.0	2.5		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	3.0	5.5		3.0	5.5			6.5			6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Max		None	C-Max		Min	Min		Min	Min	Min
Walk Time (s)		5.0			5.0		5.0	5.0				
Flash Dont Walk (s)		18.0			18.0		18.0	18.0				
Pedestrian Calls (#/hr)		0			0		0	0				
Act Effct Green (s)	74.5	68.8		63.9	56.4			16.0			16.0	16.0
Actuated g/C Ratio	0.74	0.69		0.64	0.56			0.16			0.16	0.16
v/c Ratio	0.61	0.39		0.03	0.75			0.69			0.05	0.02
Control Delay	11.1	9.4		4.8	16.6			50.4			33.2	0.2
Queue Delay	0.0	0.0		0.0	1.1			0.0			0.0	0.0
Total Delay	11.1	9.4		4.8	17.7			50.4			33.2	0.2
LOS	B	A		A	B			D			C	A
Approach Delay		10.0			17.4			50.4			21.0	
Approach LOS		B			B			D			C	

Intersection Summary

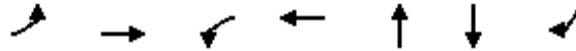
Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 85 (85%), Referenced to phase 2:WBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.75  
 Intersection Signal Delay: 17.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 77.9%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 14: Church St & Wisconsin Ave



Queues  
14: Church St & Wisconsin Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	274	464	18	703	185	12	7
v/c Ratio	0.61	0.39	0.03	0.75	0.69	0.05	0.02
Control Delay	11.1	9.4	4.8	16.6	50.4	33.2	0.2
Queue Delay	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Total Delay	11.1	9.4	4.8	17.7	50.4	33.2	0.2
Queue Length 50th (ft)	45	97	2	261	108	7	0
Queue Length 95th (ft)	84	215	m5	#564	m153	20	0
Internal Link Dist (ft)		632		441	245	150	
Turn Bay Length (ft)	200		130				60
Base Capacity (vph)	492	1178	598	940	394	323	388
Starvation Cap Reductn	0	0	0	81	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.39	0.03	0.82	0.47	0.04	0.02

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
14: Church St & Wisconsin Ave

2018 AM Peak Hour Proposed  
09/17/2018






















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	385	5	15	445	145	10	130	15	5	5	10
Future Volume (veh/h)	230	385	5	15	445	145	10	130	15	5	5	10
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1614	1614	1614
Adj Flow Rate, veh/h	274	458	6	18	530	173	12	155	18	6	6	7
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	10	10	10
Cap, veh/h	480	1187	16	651	795	260	45	191	21	112	90	179
Arrive On Green	0.08	0.70	0.70	0.02	0.64	0.64	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1641	1696	22	1641	1244	406	54	1463	164	444	689	1367
Grp Volume(v), veh/h	274	0	464	18	0	703	185	0	0	12	0	7
Grp Sat Flow(s),veh/h/ln	1641	0	1719	1641	0	1650	1681	0	0	1133	0	1367
Q Serve(g_s), s	5.2	0.0	11.1	0.4	0.0	26.8	4.2	0.0	0.0	0.0	0.0	0.4
Cycle Q Clear(g_c), s	5.2	0.0	11.1	0.4	0.0	26.8	10.7	0.0	0.0	0.7	0.0	0.4
Prop In Lane	1.00		0.01	1.00		0.25	0.06		0.10	0.50		1.00
Lane Grp Cap(c), veh/h	480	0	1203	651	0	1055	258	0	0	202	0	179
V/C Ratio(X)	0.57	0.00	0.39	0.03	0.00	0.67	0.72	0.00	0.00	0.06	0.00	0.04
Avail Cap(c_a), veh/h	611	0	1203	717	0	1055	432	0	0	341	0	321
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	0.77	0.00	0.77	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.6	0.0	6.2	6.0	0.0	11.3	42.4	0.0	0.0	38.1	0.0	38.0
Incr Delay (d2), s/veh	1.1	0.0	0.9	0.0	0.0	2.6	3.7	0.0	0.0	0.1	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.4	0.0	7.1	0.2	0.0	14.3	8.3	0.0	0.0	0.5	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	0.0	7.1	6.0	0.0	13.9	46.2	0.0	0.0	38.2	0.0	38.1
LnGrp LOS	B	A	A	A	A	B	D	A	A	D	A	D
Approach Vol, veh/h		738			721			185				19
Approach Delay, s/veh		8.8			13.7			46.2				38.2
Approach LOS		A			B			D				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	69.5		19.6	5.0	75.5		19.6				
Change Period (Y+Rc), s	3.0	5.5		6.5	3.0	5.5		6.5				
Max Green Setting (Gmax), s	16.0	45.5		23.5	6.0	55.5		23.5				
Max Q Clear Time (g_c+I1), s	7.2	28.8		12.7	2.4	13.1		2.7				
Green Ext Time (p_c), s	0.8	6.8		0.3	0.0	5.4		0.0				

Intersection Summary

HCM 6th Ctrl Delay	15.4
HCM 6th LOS	B

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

2018 PM Peak Hour Proposed  
09/17/2018

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	385	25	15	490	20	25	15	50	100	80	250
Future Volume (vph)	20	385	25	15	490	20	25	15	50	100	80	250
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	200		0	130		0	0		0	0		60
Storage Lanes	1		0	1		0	0		0	0		1
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	1.00	1.00
Frt		0.991			0.994			0.925				0.850
Flt Protected	0.950			0.950				0.986			0.973	
Satd. Flow (prot)	1630	1700	0	1630	1705	0	0	1565	0	0	1669	1458
Flt Permitted	0.383			0.458				0.849			0.799	
Satd. Flow (perm)	657	1700	0	786	1705	0	0	1347	0	0	1371	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			3			54				145
Link Speed (mph)		25			25			25				25
Link Distance (ft)		712			521			325				230
Travel Time (s)		19.4			14.2			8.9				6.3
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	62%
Adj. Flow (vph)	22	414	27	16	527	22	27	16	54	108	86	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	441	0	16	549	0	0	97	0	0	194	167
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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		7	15		9	15		9
Number of Detectors	1	2		1	2		1	1		1	1	0
Detector Template							Left			Left		
Leading Detector (ft)	56	156		56	156		20	11		20	11	0
Trailing Detector (ft)	50	0		50	0		0	5		0	5	0
Detector 1 Position(ft)	50	0		50	0		0	5		0	5	5
Detector 1 Size(ft)	6	6		6	6		20	6		20	6	20
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(ft)		150			150							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			4				8

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

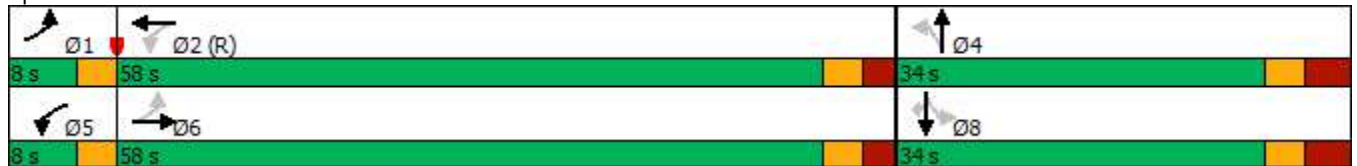
2018 PM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	8.0	28.5		8.0	28.5		29.5	29.5		11.5	11.5	11.5
Total Split (s)	8.0	58.0		8.0	58.0		34.0	34.0		34.0	34.0	34.0
Total Split (%)	8.0%	58.0%		8.0%	58.0%		34.0%	34.0%		34.0%	34.0%	34.0%
Maximum Green (s)	5.0	52.5		5.0	52.5		27.5	27.5		27.5	27.5	27.5
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	0.0	2.5		0.0	2.5		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	3.0	5.5		3.0	5.5			6.5			6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Max		None	C-Max		Min	Min		Min	Min	Min
Walk Time (s)		5.0			5.0		5.0	5.0				
Flash Dont Walk (s)		18.0			18.0		18.0	18.0				
Pedestrian Calls (#/hr)		0			0		0	0				
Act Effct Green (s)	70.0	65.4		69.9	65.4			19.3			19.3	19.3
Actuated g/C Ratio	0.70	0.65		0.70	0.65			0.19			0.19	0.19
v/c Ratio	0.04	0.40		0.03	0.49			0.32			0.73	0.42
Control Delay	5.9	11.2		4.4	10.5			20.2			53.3	10.7
Queue Delay	0.0	0.0		0.0	0.3			0.0			0.0	0.0
Total Delay	5.9	11.2		4.4	10.8			20.2			53.3	10.7
LOS	A	B		A	B			C			D	B
Approach Delay		11.0			10.7			20.2			33.6	
Approach LOS		B			B			C			C	

Intersection Summary

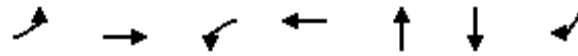
Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 93 (93%), Referenced to phase 2:WBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 17.0      Intersection LOS: B  
 Intersection Capacity Utilization 60.8%      ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 14: Church St & Wisconsin Ave



Queues  
14: Church St & Wisconsin Ave

2018 PM Peak Hour Proposed  
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Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	22	441	16	549	97	194	167
v/c Ratio	0.04	0.40	0.03	0.49	0.32	0.73	0.42
Control Delay	5.9	11.2	4.4	10.5	20.2	53.3	10.7
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Total Delay	5.9	11.2	4.4	10.8	20.2	53.3	10.7
Queue Length 50th (ft)	4	104	2	148	24	117	12
Queue Length 95th (ft)	13	251	m5	298	m63	178	62
Internal Link Dist (ft)		632		441	245	150	
Turn Bay Length (ft)	200		130				60
Base Capacity (vph)	509	1113	592	1115	409	377	506
Starvation Cap Reductn	0	0	0	175	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.40	0.03	0.58	0.24	0.51	0.33

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 14: Church St & Wisconsin Ave

2018 PM Peak Hour Proposed  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	385	25	15	490	20	25	15	50	100	80	250
Future Volume (veh/h)	20	385	25	15	490	20	25	15	50	100	80	250
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	22	414	27	16	527	22	27	16	54	108	86	167
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	606	933	61	516	949	40	59	43	70	168	116	364
Arrive On Green	0.02	0.58	0.58	0.04	1.00	1.00	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1641	1600	104	1641	1642	69	51	172	280	449	467	1460
Grp Volume(v), veh/h	22	0	441	16	0	549	97	0	0	194	0	167
Grp Sat Flow(s),veh/h/ln	1641	0	1704	1641	0	1710	503	0	0	915	0	1460
Q Serve(g_s), s	0.5	0.0	14.6	0.4	0.0	0.0	1.2	0.0	0.0	0.0	0.0	9.7
Cycle Q Clear(g_c), s	0.5	0.0	14.6	0.4	0.0	0.0	22.9	0.0	0.0	21.6	0.0	9.7
Prop In Lane	1.00		0.06	1.00		0.04	0.28		0.56	0.56		1.00
Lane Grp Cap(c), veh/h	606	0	993	516	0	989	171	0	0	284	0	364
V/C Ratio(X)	0.04	0.00	0.44	0.03	0.00	0.56	0.57	0.00	0.00	0.68	0.00	0.46
Avail Cap(c_a), veh/h	650	0	993	569	0	989	207	0	0	322	0	401
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.88	0.00	0.88	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.1	0.0	11.7	9.1	0.0	0.0	31.5	0.0	0.0	35.6	0.0	31.8
Incr Delay (d2), s/veh	0.0	0.0	1.4	0.0	0.0	2.0	2.9	0.0	0.0	5.0	0.0	0.9
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(95%),veh/ln	0.3	0.0	9.6	0.2	0.0	1.0	3.6	0.0	0.0	8.6	0.0	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.1	0.0	13.2	9.1	0.0	2.0	34.4	0.0	0.0	40.5	0.0	32.7
LnGrp LOS	A	A	B	A	A	A	C	A	A	D	A	C
Approach Vol, veh/h		463			565			97			361	
Approach Delay, s/veh		12.9			2.2			34.4			36.9	
Approach LOS		B			A			C			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.3	63.3		31.4	4.8	63.8		31.4				
Change Period (Y+Rc), s	3.0	5.5		6.5	3.0	5.5		6.5				
Max Green Setting (Gmax), s	5.0	52.5		27.5	5.0	52.5		27.5				
Max Q Clear Time (g_c+I1), s	2.5	2.0		24.9	2.4	16.6		23.6				
Green Ext Time (p_c), s	0.0	7.0		0.0	0.0	5.0		0.1				

Intersection Summary												
HCM 6th Ctrl Delay				16.1								
HCM 6th LOS				B								

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	255	210	40	305	5	230	305	25	0	260	255
Future Volume (vph)	265	255	210	40	305	5	230	305	25	0	260	255
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		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	0.95	0.95	0.95
Fr <sub>t</sub>			0.850		0.998			0.989			0.926	
Fl <sub>t</sub> Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1576	1658	1653	1576	1655	0	1560	1624	0	0	2862	0
Fl <sub>t</sub> Permitted	0.257			0.573			0.204					
Satd. Flow (perm)	426	1658	1653	950	1655	0	335	1624	0	0	2862	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191		1			5			235	
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1213	
Travel Time (s)		12.5			11.0			12.3			33.1	
Peak Hour Factor	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	308	307	157	48	367	6	277	367	30	0	313	307
Shared Lane Traffic (%)												
Lane Group Flow (vph)	308	307	157	48	373	0	277	397	0	0	620	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)		11			11			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.16	1.16	0.95	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0		1	0		1	0	
Detector Template										Left		
Leading Detector (ft)	66	0	0	31	0		56	0		20	0	
Trailing Detector (ft)	60	0	0	25	0		50	0		0	0	
Detector 1 Position(ft)	60	5	5	25	5		50	5		0	5	
Detector 1 Size(ft)	6	6	20	6	6		6	6		20	6	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Turn Type	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA			NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		Free	4			6			2		
Detector Phase	3	8		7	4		1	6		2	2	
Switch Phase												



Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 AM Peak Hour Proposed  
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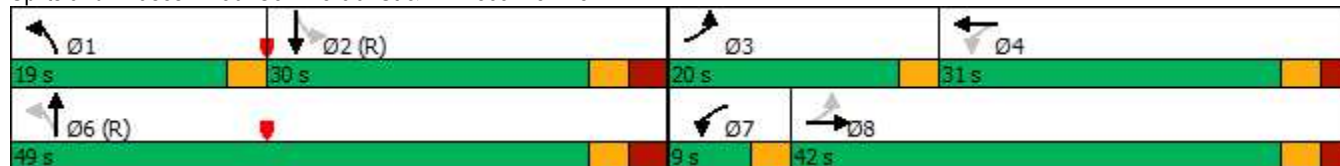


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	6.0	19.0		6.0	19.0		6.0	19.0		19.0	19.0	
Minimum Split (s)	9.0	28.5		9.0	28.5		9.0	30.0		30.0	30.0	
Total Split (s)	20.0	42.0		9.0	31.0		19.0	49.0		30.0	30.0	
Total Split (%)	20.0%	42.0%		9.0%	31.0%		19.0%	49.0%		30.0%	30.0%	
Maximum Green (s)	17.0	36.5		6.0	25.5		16.0	43.0		24.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	2.5		0.0	2.5		0.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	3.0	5.5		3.0	5.5		3.0	6.0			6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Min		None	C-Max		C-Max	C-Max	
Walk Time (s)		5.0			5.0			5.0		5.0	5.0	
Flash Dont Walk (s)		18.0			18.0			19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	48.0	40.1	100.0	35.4	26.9		46.0	43.0			25.3	
Actuated g/C Ratio	0.48	0.40	1.00	0.35	0.27		0.46	0.43			0.25	
v/c Ratio	0.80	0.46	0.09	0.13	0.84		0.83	0.57			0.69	
Control Delay	34.7	26.0	0.1	15.9	53.1		40.7	25.1			31.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	34.7	26.0	0.1	15.9	53.1		40.7	25.1			31.3	
LOS	C	C	A	B	D		D	C			C	
Approach Delay		24.2			48.8			31.5			31.3	
Approach LOS		C			D			C			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green, Master Intersection  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 32.1  
 Intersection LOS: C  
 Intersection Capacity Utilization 87.4%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 30: Commercial St & Winneconne Ave



Queues  
30: Commercial St & Winneconne Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	308	307	157	48	373	277	397	620
v/c Ratio	0.80	0.46	0.09	0.13	0.84	0.83	0.57	0.69
Control Delay	34.7	26.0	0.1	15.9	53.1	40.7	25.1	31.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	26.0	0.1	15.9	53.1	40.7	25.1	31.3
Queue Length 50th (ft)	122	150	0	16	229	112	184	152
Queue Length 95th (ft)	#194	209	0	33	#343	#185	248	121
Internal Link Dist (ft)		468			323		459	1133
Turn Bay Length (ft)			150					
Base Capacity (vph)	399	665	1653	374	446	350	701	900
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.46	0.09	0.13	0.84	0.79	0.57	0.69

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
30: Commercial St & Winneconne Ave

2018 AM Peak Hour Proposed  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	255	210	40	305	5	230	305	25	0	260	255
Future Volume (veh/h)	265	255	210	40	305	5	230	305	25	0	260	255
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	1723	1723	1792	1723	1723	1723	1709	1709	1709	1695	1695	1695
Adj Flow Rate, veh/h	308	307	0	48	367	6	277	367	30	0	313	307
Peak Hour Factor	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	4	4	4
Cap, veh/h	374	629		388	430	7	386	695	57	0	447	399
Arrive On Green	0.15	0.37	0.00	0.04	0.25	0.25	0.14	0.45	0.45	0.00	0.55	0.55
Sat Flow, veh/h	1641	1723	1518	1641	1690	28	1628	1559	127	0	1695	1437
Grp Volume(v), veh/h	308	307	0	48	0	373	277	0	397	0	313	307
Grp Sat Flow(s),veh/h/ln	1641	1723	1518	1641	0	1718	1628	0	1686	0	1611	1437
Q Serve(g_s), s	13.2	13.8	0.0	2.1	0.0	20.7	11.6	0.0	17.1	0.0	14.2	16.6
Cycle Q Clear(g_c), s	13.2	13.8	0.0	2.1	0.0	20.7	11.6	0.0	17.1	0.0	14.2	16.6
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.08	0.00		1.00
Lane Grp Cap(c), veh/h	374	629		388	0	437	386	0	752	0	447	399
V/C Ratio(X)	0.82	0.49		0.12	0.00	0.85	0.72	0.00	0.53	0.00	0.70	0.77
Avail Cap(c_a), veh/h	399	629		414	0	438	421	0	752	0	447	399
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.96	0.96
Uniform Delay (d), s/veh	23.5	24.5	0.0	25.4	0.0	35.5	21.8	0.0	20.1	0.0	19.2	19.8
Incr Delay (d2), s/veh	12.5	2.7	0.0	0.1	0.0	14.9	5.3	0.0	2.6	0.0	8.5	12.9
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(95%),veh/ln	10.3	10.0	0.0	1.5	0.0	15.7	8.4	0.0	11.4	0.0	8.4	8.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.9	27.2	0.0	25.5	0.0	50.4	27.1	0.0	22.7	0.0	27.8	32.7
LnGrp LOS	D	C		C	A	D	C	A	C	A	C	C
Approach Vol, veh/h		615	A		421			674			620	
Approach Delay, s/veh		31.6			47.6			24.5			30.2	
Approach LOS		C			D			C			C	
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	16.8	33.7	18.5	31.0		50.6	7.4	42.0				
Change Period (Y+Rc), s	3.0	6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s	16.0	24.0	17.0	25.5		43.0	6.0	36.5				
Max Q Clear Time (g_c+I1), s	13.6	0.0	15.2	0.0		0.0	4.1	0.0				
Green Ext Time (p_c), s	0.3	0.0	0.3	0.0		0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	32.1
HCM 6th LOS	C

Notes

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

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 PM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	240	210	50	295	5	135	370	35	10	335	385
Future Volume (vph)	280	240	210	50	295	5	135	370	35	10	335	385
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		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	0.95	0.95	0.95
Frt			0.850		0.998			0.987				0.921
Flt Protected	0.950			0.950			0.950					0.999
Satd. Flow (prot)	1576	1658	1653	1576	1655	0	1576	1637	0	0	2899	0
Flt Permitted	0.305			0.598			0.159					0.946
Satd. Flow (perm)	506	1658	1653	992	1655	0	264	1637	0	0	2745	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191		1			6				287
Link Speed (mph)		30			25			30				25
Link Distance (ft)		548			403			539				1213
Travel Time (s)		12.5			11.0			12.3				33.1
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
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	304	261	142	54	321	5	147	402	38	11	364	418
Shared Lane Traffic (%)												
Lane Group Flow (vph)	304	261	142	54	326	0	147	440	0	0	793	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)		11			11			11				11
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.16	1.16	0.95	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	0	1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	25	100	0	25	100		25	100		20	100	
Trailing Detector (ft)	5	5	0	5	5		5	5		0	5	
Detector 1 Position(ft)	5	5	5	5	5		5	5		0	5	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
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	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2018 PM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		Free	4			6			2		
Detector Phase	3	8		7	4		1	6		2		2
Switch Phase												
Minimum Initial (s)	6.0	19.0		6.0	19.0		6.0	19.0		19.0		19.0
Minimum Split (s)	9.5	30.0		9.5	30.0		9.5	30.5		30.5		30.5
Total Split (s)	21.0	41.0		10.0	30.0		13.0	49.0		36.0		36.0
Total Split (%)	21.0%	41.0%		10.0%	30.0%		13.0%	49.0%		36.0%		36.0%
Maximum Green (s)	18.0	35.5		7.0	24.5		10.0	43.0		30.0		30.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
All-Red Time (s)	0.0	2.5		0.0	2.5		0.0	3.0		3.0		3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	3.0	5.5		3.0	5.5		3.0	6.0				6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag		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	None	Min		None	Max		None	C-Max		C-Max		C-Max
Walk Time (s)		5.0			5.0			5.0		5.0		5.0
Flash Dont Walk (s)		18.0			18.0			19.0		19.0		19.0
Pedestrian Calls (#/hr)		0			0			0		0		0
Act Effct Green (s)	48.0	37.6	100.0	35.4	26.2		46.0	43.0				30.7
Actuated g/C Ratio	0.48	0.38	1.00	0.35	0.26		0.46	0.43				0.31
v/c Ratio	0.73	0.42	0.09	0.14	0.75		0.60	0.62				0.76
Control Delay	28.1	26.6	0.1	16.0	47.0		27.1	26.6				13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Delay	28.1	26.6	0.1	16.0	47.0		27.1	26.6				13.5
LOS	C	C	A	B	D		C	C				B
Approach Delay		21.9			42.6			26.7				13.5
Approach LOS		C			D			C				B

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green, Master Intersection  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.76  
 Intersection Signal Delay: 23.5  
 Intersection LOS: C  
 Intersection Capacity Utilization 99.2%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 30: Commercial St & Winneconne Ave



Queues  
30: Commercial St & Winneconne Ave

2018 PM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	304	261	142	54	326	147	440	793
v/c Ratio	0.73	0.42	0.09	0.14	0.75	0.60	0.62	0.76
Control Delay	28.1	26.6	0.1	16.0	47.0	27.1	26.6	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	26.6	0.1	16.0	47.0	27.1	26.6	13.5
Queue Length 50th (ft)	120	126	0	18	195	54	210	35
Queue Length 95th (ft)	188	199	0	39	#335	94	316	79
Internal Link Dist (ft)		468			323		459	1133
Turn Bay Length (ft)			150					
Base Capacity (vph)	435	624	1653	395	434	252	707	1040
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.42	0.09	0.14	0.75	0.58	0.62	0.76

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
30: Commercial St & Winneconne Ave

2018 PM Peak Hour Proposed  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	240	210	50	295	5	135	370	35	10	335	385
Future Volume (veh/h)	280	240	210	50	295	5	135	370	35	10	335	385
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	1723	1723	1792	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	304	261	0	54	321	5	147	402	38	11	364	418
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	398	608		414	414	6	247	706	67	43	593	466
Arrive On Green	0.15	0.35	0.00	0.05	0.25	0.25	0.07	0.46	0.46	0.59	0.59	0.59
Sat Flow, veh/h	1641	1723	1518	1641	1692	26	1641	1550	147	18	1689	1329
Grp Volume(v), veh/h	304	261	0	54	0	326	147	0	440	375	0	418
Grp Sat Flow(s),veh/h/ln	1641	1723	1518	1641	0	1718	1641	0	1696	1708	0	1329
Q Serve(g_s), s	13.2	11.6	0.0	2.4	0.0	17.7	5.5	0.0	19.1	0.0	0.0	27.4
Cycle Q Clear(g_c), s	13.2	11.6	0.0	2.4	0.0	17.7	5.5	0.0	19.1	14.2	0.0	27.4
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.09	0.03		1.00
Lane Grp Cap(c), veh/h	398	608		414	0	421	247	0	772	637	0	466
V/C Ratio(X)	0.76	0.43		0.13	0.00	0.77	0.60	0.00	0.57	0.59	0.00	0.90
Avail Cap(c_a), veh/h	439	612		453	0	421	289	0	772	637	0	466
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.67	1.67	1.67
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.00	0.93
Uniform Delay (d), s/veh	23.4	24.7	0.0	25.9	0.0	35.2	22.4	0.0	20.0	16.4	0.0	19.1
Incr Delay (d2), s/veh	7.1	0.5	0.0	0.1	0.0	13.0	2.4	0.0	3.0	3.7	0.0	21.3
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(95%),veh/ln	9.6	8.3	0.0	1.7	0.0	13.8	3.9	0.0	12.5	8.4	0.0	13.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	25.1	0.0	26.1	0.0	48.2	24.8	0.0	23.1	20.1	0.0	40.4
LnGrp LOS	C	C		C	A	D	C	A	C	C	A	D
Approach Vol, veh/h		565	A		380			587				793
Approach Delay, s/veh		28.0			45.1			23.5				30.8
Approach LOS		C			D			C				C
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	10.4	41.1	18.5	30.0		51.5	7.7	40.8				
Change Period (Y+Rc), s	3.0	6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s	10.0	30.0	18.0	24.5		43.0	7.0	35.5				
Max Q Clear Time (g_c+I1), s	7.5	29.4	15.2	19.7		21.1	4.4	13.6				
Green Ext Time (p_c), s	0.1	0.3	0.3	0.8		2.8	0.0	1.5				

Intersection Summary

HCM 6th Ctrl Delay	30.6
HCM 6th LOS	C

Notes

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

Lanes, Volumes, Timings  
19: Commercial St & Columbian Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	130	40	5	50	5	20	470	20	10	495	35
Future Volume (vph)	75	130	40	5	50	5	20	470	20	10	495	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	11	11	11	11	11
Storage Length (ft)	0		180	75		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Fr <sub>t</sub>		0.965			0.987			0.994			0.990	
Fl <sub>t</sub> Protected	0.950			0.950				0.998			0.999	
Satd. Flow (prot)	1506	1530	0	1521	1580	0	0	3096	0	0	3086	0
Fl <sub>t</sub> Permitted	0.713			0.444				0.916			0.942	
Satd. Flow (perm)	1131	1530	0	711	1580	0	0	2841	0	0	2910	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			6			6			11	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		536			509			1213			296	
Travel Time (s)		14.6			13.9			33.1			8.1	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	91	159	49	6	61	6	24	573	24	12	604	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	91	208	0	6	67	0	0	621	0	0	659	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)		10			10			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	25	11		25	11		20	0		20	0	
Trailing Detector (ft)	5	5		5	5		0	0		0	0	
Detector 1 Position(ft)	5	5		5	5		0	5		0	5	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
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	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	



Lanes, Volumes, Timings  
 19: Commercial St & Columbian Ave

2018 AM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	26.0	26.0		26.0	26.0		28.0	28.0		28.0	28.0	
Total Split (s)	42.0	42.0		42.0	42.0		58.0	58.0		58.0	58.0	
Total Split (%)	42.0%	42.0%		42.0%	42.0%		58.0%	58.0%		58.0%	58.0%	
Maximum Green (s)	36.5	36.5		36.5	36.5		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		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)	5.5	5.5		5.5	5.5			5.0			5.0	
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	Min	Min		Min	Min		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)	17.9	17.9		17.9	17.9			71.6			71.6	
Actuated g/C Ratio	0.18	0.18		0.18	0.18			0.72			0.72	
v/c Ratio	0.45	0.72		0.05	0.23			0.31			0.32	
Control Delay	42.1	49.0		31.2	31.9			4.5			5.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	42.1	49.0		31.2	31.9			4.5			5.3	
LOS	D	D		C	C			A			A	
Approach Delay		46.9			31.8			4.5			5.3	
Approach LOS		D			C			A			A	

Intersection Summary

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 83 (83%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 13.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 50.7%  
 ICU Level of Service A  
 Analysis Period (min) 15

Splits and Phases: 19: Commercial St & Columbian Ave



Queues  
19: Commercial St & Columbian Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	91	208	6	67	621	659
v/c Ratio	0.45	0.72	0.05	0.23	0.31	0.32
Control Delay	42.1	49.0	31.2	31.9	4.5	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	49.0	31.2	31.9	4.5	5.3
Queue Length 50th (ft)	52	116	3	34	25	49
Queue Length 95th (ft)	84	158	12	59	112	83
Internal Link Dist (ft)		456		429	1133	216
Turn Bay Length (ft)			75			
Base Capacity (vph)	412	569	259	580	2034	2085
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	4	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.37	0.02	0.12	0.31	0.32
<b>Intersection Summary</b>						

HCM 6th Signalized Intersection Summary  
 19: Commercial St & Columbian Ave

2018 AM Peak Hour Proposed  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Volume (veh/h)	75	130	40	5	50	5	20	470	20	10	495	35
Future Volume (veh/h)	75	130	40	5	50	5	20	470	20	10	495	35
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	1709	1709	1709	1723	1723	1723	1709	1709	1709	1709	1709	1709
Adj Flow Rate, veh/h	91	159	49	6	61	6	24	573	24	12	604	43
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	3	3	3
Cap, veh/h	226	190	59	105	234	23	99	2188	91	56	2203	155
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1324	1253	386	1174	1544	152	81	2942	122	26	2964	209
Grp Volume(v), veh/h	91	0	208	6	0	67	319	0	302	346	0	313
Grp Sat Flow(s),veh/h/ln	1324	0	1640	1174	0	1695	1612	0	1533	1681	0	1518
Q Serve(g_s), s	6.5	0.0	12.3	0.5	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.0	0.0	12.3	12.8	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		0.24	1.00		0.09	0.08		0.08	0.03		0.14
Lane Grp Cap(c), veh/h	226	0	248	105	0	257	1237	0	1140	1287	0	1128
V/C Ratio(X)	0.40	0.00	0.84	0.06	0.00	0.26	0.26	0.00	0.26	0.27	0.00	0.28
Avail Cap(c_a), veh/h	509	0	598	356	0	619	1237	0	1140	1287	0	1128
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.69	0.00	0.69	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.9	0.0	41.2	47.5	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	7.3	0.2	0.0	0.5	0.3	0.0	0.4	0.5	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.0	0.0	9.3	0.3	0.0	2.7	0.2	0.0	0.2	0.3	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.0	0.0	48.5	47.7	0.0	38.0	0.3	0.0	0.4	0.5	0.0	0.6
LnGrp LOS	D	A	D	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		299			73			621			659	
Approach Delay, s/veh		46.9			38.8			0.4			0.6	
Approach LOS		D			D			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		79.3		20.7		79.3		20.7				
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5				
Max Green Setting (Gmax), s		53.0		36.5		53.0		36.5				
Max Q Clear Time (g_c+I1), s		0.0		14.8		0.0		14.3				
Green Ext Time (p_c), s		0.0		0.1		0.0		0.8				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				10.6								
HCM 6th LOS				B								

Lanes, Volumes, Timings  
19: Commercial St & Columbian Ave

2018 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	110	45	30	35	20	15	630	5	15	680	20
Future Volume (vph)	90	110	45	30	35	20	15	630	5	15	680	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	11	11	11	11	11
Storage Length (ft)	0		180	75		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Fr <sub>t</sub>		0.956			0.945			0.999			0.996	
Fl <sub>t</sub> Protected	0.950			0.950				0.999			0.999	
Satd. Flow (prot)	1521	1531	0	1521	1513	0	0	3145	0	0	3135	0
Fl <sub>t</sub> Permitted	0.716			0.489				0.929			0.934	
Satd. Flow (perm)	1147	1531	0	783	1513	0	0	2924	0	0	2931	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			23			1			5	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		536			509			1213			296	
Travel Time (s)		14.6			13.9			33.1			8.1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	103	126	52	34	40	23	17	724	6	17	782	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	178	0	34	63	0	0	747	0	0	822	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)		10			10			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	25	11		25	11		20	0		20	0	
Trailing Detector (ft)	5	5		5	5		0	0		0	0	
Detector 1 Position(ft)	5	5		5	5		0	5		0	5	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
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	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6				2
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.5	25.5		25.5	25.5		25.5	25.5		25.5	25.5	

Lanes, Volumes, Timings  
 19: Commercial St & Columbian Ave

2018 PM Peak Hour Proposed  
 09/17/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0		64.0	64.0	
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%		64.0%	64.0%	
Maximum Green (s)	30.5	30.5		30.5	30.5		59.0	59.0		59.0	59.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		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)	5.5	5.5		5.5	5.5			5.0			5.0	
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	Min	Min		Min	Min		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	15.6	15.6		15.6	15.6			73.9			73.9	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.74			0.74	
v/c Ratio	0.58	0.70		0.28	0.25			0.35			0.38	
Control Delay	51.0	48.7		41.0	26.3			5.1			2.2	
Queue Delay	0.4	0.0		0.0	0.1			0.0			0.0	
Total Delay	51.3	48.7		41.0	26.4			5.1			2.2	
LOS	D	D		D	C			A			A	
Approach Delay		49.7			31.5			5.1			2.2	
Approach LOS		D			C			A			A	

**Intersection Summary**

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 80 (80%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 11.7

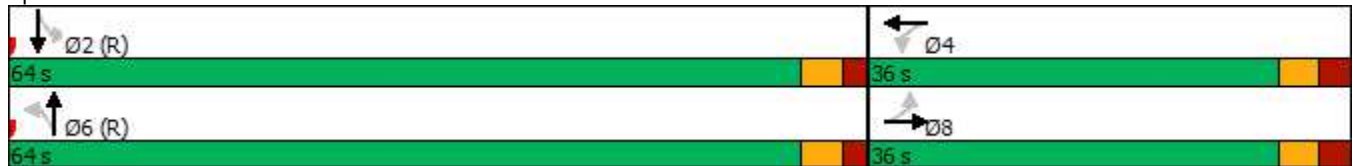
Intersection LOS: B

Intersection Capacity Utilization 59.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 19: Commercial St & Columbian Ave



Queues  
19: Commercial St & Columbian Ave

2018 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	103	178	34	63	747	822
v/c Ratio	0.58	0.70	0.28	0.25	0.35	0.38
Control Delay	51.0	48.7	41.0	26.3	5.1	2.2
Queue Delay	0.4	0.0	0.0	0.1	0.0	0.0
Total Delay	51.3	48.7	41.0	26.4	5.1	2.2
Queue Length 50th (ft)	62	96	19	22	45	23
Queue Length 95th (ft)	104	149	44	53	136	39
Internal Link Dist (ft)		456		429	1133	216
Turn Bay Length (ft)			75			
Base Capacity (vph)	349	481	238	477	2161	2168
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	57	0	0	75	11	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.37	0.14	0.16	0.35	0.38
<b>Intersection Summary</b>						

HCM 6th Signalized Intersection Summary  
 19: Commercial St & Columbian Ave

2018 PM Peak Hour Proposed  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	110	45	30	35	20	15	630	5	15	680	20
Future Volume (veh/h)	90	110	45	30	35	20	15	630	5	15	680	20
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	103	126	52	34	40	23	17	724	6	17	782	23
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	231	177	73	132	157	90	65	2349	19	61	2306	67
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.99	0.99	0.99	0.74	0.74	0.74
Sat Flow, veh/h	1339	1159	478	1206	1026	590	37	3165	26	32	3108	90
Grp Volume(v), veh/h	103	0	178	34	0	63	386	0	361	428	0	394
Grp Sat Flow(s),veh/h/ln	1339	0	1637	1206	0	1616	1665	0	1563	1679	0	1551
Q Serve(g_s), s	7.3	0.0	10.3	2.8	0.0	3.4	0.0	0.0	0.4	0.0	0.0	8.8
Cycle Q Clear(g_c), s	10.8	0.0	10.3	13.1	0.0	3.4	0.4	0.0	0.4	8.5	0.0	8.8
Prop In Lane	1.00		0.29	1.00		0.37	0.04		0.02	0.04		0.06
Lane Grp Cap(c), veh/h	231	0	250	132	0	247	1273	0	1160	1283	0	1151
V/C Ratio(X)	0.45	0.00	0.71	0.26	0.00	0.25	0.30	0.00	0.31	0.33	0.00	0.34
Avail Cap(c_a), veh/h	434	0	499	315	0	493	1273	0	1160	1283	0	1151
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.69	0.00	0.69	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.1	0.0	40.3	46.5	0.0	37.3	0.2	0.0	0.2	4.4	0.0	4.5
Incr Delay (d2), s/veh	1.4	0.0	3.7	1.0	0.0	0.5	0.4	0.0	0.5	0.7	0.0	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(95%),veh/ln	4.5	0.0	7.9	1.6	0.0	2.5	0.4	0.0	0.4	5.0	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.4	0.0	44.0	47.5	0.0	37.9	0.6	0.0	0.7	5.1	0.0	5.3
LnGrp LOS	D	A	D	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		281			97			747				822
Approach Delay, s/veh		43.8			41.2			0.6				5.2
Approach LOS		D			D			A				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		79.2		20.8		79.2		20.8				
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5				
Max Green Setting (Gmax), s		59.0		30.5		59.0		30.5				
Max Q Clear Time (g_c+I1), s		0.0		15.1		0.0		12.8				
Green Ext Time (p_c), s		0.0		0.2		0.0		0.7				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				10.8								
HCM 6th LOS				B								

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	180	15	40	210	40	25	430	60	5	525	370
Future Volume (vph)	210	180	15	40	210	40	25	430	60	5	525	370
Ideal Flow (vphpl)	1750	1665	1750	1750	1665	1750	1750	1700	1750	1750	1665	1750
Lane Width (ft)	11	11	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	95		65	65		65	0		0	75		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	50			50			25			50		
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
Fr <sub>t</sub>			0.850			0.850		0.988			0.938	
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1576	1420	1653	1630	1469	1653	1599	1615	0	1614	2881	0
Fl <sub>t</sub> Permitted	0.431			0.618			0.141			0.249		
Satd. Flow (perm)	715	1420	1653	1060	1469	1653	237	1615	0	423	2881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			98		6				240
Link Speed (mph)		25			25			25				25
Link Distance (ft)		521			520			317				1667
Travel Time (s)		14.2			14.2			8.6				45.5
Peak Hour Factor	0.80	0.80	0.80	0.88	0.88	0.88	0.80	0.80	0.80	0.80	0.80	0.80
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Parking (#/hr)		0			0							
Adj. Flow (vph)	263	225	12	45	239	28	31	538	47	6	656	463
Shared Lane Traffic (%)												
Lane Group Flow (vph)	263	225	12	45	239	28	31	585	0	6	1119	0
Enter Blocked Intersection	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh
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	1.16	1.41	0.95	1.11	1.35	0.95	1.11	1.15	1.11	1.11	1.18	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0	0	1	0		1	0	
Detector Template												
Leading Detector (ft)	60	0	0	56	0	0	56	0		60	0	
Trailing Detector (ft)	42	0	0	50	0	0	50	0		42	0	
Detector 1 Position(ft)	42	5	5	50	5	5	50	5		42	5	
Detector 1 Size(ft)	18	6	20	6	6	20	6	6		18	6	
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	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	3	8		7	4			6				2
Permitted Phases	8		8	4		4	6			2		
Detector Phase	3	8	8	7	4	4	6	6		2	2	



Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 AM Peak Hour Proposed  
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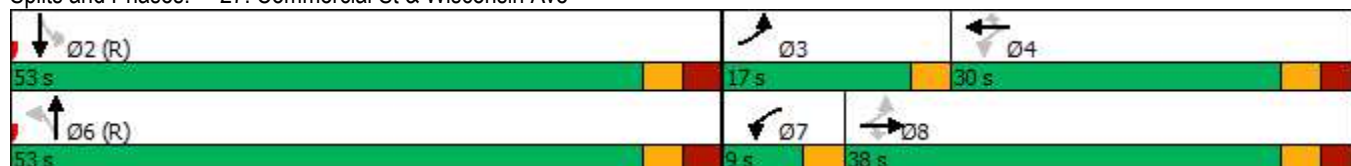


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	25.5	25.5	9.0	25.5	25.5	34.0	34.0		34.0	34.0	
Total Split (s)	17.0	38.0	38.0	9.0	30.0	30.0	53.0	53.0		53.0	53.0	
Total Split (%)	17.0%	38.0%	38.0%	9.0%	30.0%	30.0%	53.0%	53.0%		53.0%	53.0%	
Maximum Green (s)	14.0	32.5	32.5	6.0	24.5	24.5	47.0	47.0		47.0	47.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	3.0	3.0		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)	3.0	5.5	5.5	3.0	5.5	5.5	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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	Max	None	Max	Max	C-Max	C-Max		C-Max	C-Max	
Walk Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)		15.0	15.0		15.0	15.0	23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	
Act Effct Green (s)	44.0	36.2	36.2	33.6	25.5	25.5	47.0	47.0		47.0	47.0	
Actuated g/C Ratio	0.44	0.36	0.36	0.34	0.26	0.26	0.47	0.47		0.47	0.47	
v/c Ratio	0.62	0.44	0.02	0.12	0.64	0.06	0.28	0.77		0.03	0.76	
Control Delay	37.2	40.0	3.1	17.6	42.5	0.2	26.8	33.3		15.0	20.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0		0.0	0.4	
Total Delay	37.2	40.0	3.1	17.6	42.5	0.2	27.4	33.3		15.0	21.0	
LOS	D	D	A	B	D	A	C	C		B	C	
Approach Delay		37.6			35.2			33.1			21.0	
Approach LOS		D			D			C			C	

Intersection Summary

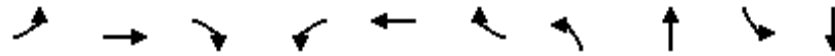
Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	89 (89%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	28.9
Intersection LOS:	C
Intersection Capacity Utilization:	68.3%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 27: Commercial St & Wisconsin Ave



Queues  
27: Commercial St & Wisconsin Ave

2018 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	263	225	12	45	239	28	31	585	6	1119
v/c Ratio	0.62	0.44	0.02	0.12	0.64	0.06	0.28	0.77	0.03	0.76
Control Delay	37.2	40.0	3.1	17.6	42.5	0.2	26.8	33.3	15.0	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.4
Total Delay	37.2	40.0	3.1	17.6	42.5	0.2	27.4	33.3	15.0	21.0
Queue Length 50th (ft)	106	96	0	16	138	0	16	328	2	238
Queue Length 95th (ft)	227	205	m1	36	218	0	39	397	8	255
Internal Link Dist (ft)		441			440			237		1587
Turn Bay Length (ft)	95		65	65		65			75	
Base Capacity (vph)	435	513	639	395	375	494	111	762	198	1481
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	12	0	0	75
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.44	0.02	0.11	0.64	0.06	0.31	0.77	0.03	0.80

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
27: Commercial St & Wisconsin Ave

2018 AM Peak Hour Proposed  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	180	15	40	210	40	25	430	60	5	525	370
Future Volume (veh/h)	210	180	15	40	210	40	25	430	60	5	525	370
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	1723	1639	1792	1723	1639	1792	1695	1647	1695	1709	1626	1709
Adj Flow Rate, veh/h	262	225	12	45	239	28	31	538	46	6	656	462
Peak Hour Factor	0.80	0.80	0.80	0.88	0.88	0.88	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	4	4	4	3	3	3
Cap, veh/h	422	564	522	405	402	372	149	711	61	412	824	579
Arrive On Green	0.13	0.34	0.34	0.04	0.25	0.25	0.95	0.95	0.95	0.48	0.48	0.48
Sat Flow, veh/h	1641	1639	1518	1641	1639	1518	496	1496	128	824	1734	1218
Grp Volume(v), veh/h	262	225	12	45	239	28	31	0	584	6	584	534
Grp Sat Flow(s),veh/h/ln	1641	1639	1518	1641	1639	1518	496	0	1624	824	1545	1407
Q Serve(g_s), s	11.4	10.4	0.5	2.0	12.9	1.4	4.9	0.0	6.3	0.4	31.9	32.1
Cycle Q Clear(g_c), s	11.4	10.4	0.5	2.0	12.9	1.4	37.0	0.0	6.3	6.8	31.9	32.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.08	1.00		0.87
Lane Grp Cap(c), veh/h	422	564	522	405	402	372	149	0	772	412	734	669
V/C Ratio(X)	0.62	0.40	0.02	0.11	0.60	0.08	0.21	0.00	0.76	0.01	0.80	0.80
Avail Cap(c_a), veh/h	431	564	522	444	402	372	149	0	772	412	734	669
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	1.00	1.00	1.00	1.00	0.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	22.9	24.9	21.7	26.6	33.4	29.0	14.9	0.0	1.5	17.4	22.1	22.2
Incr Delay (d2), s/veh	2.5	2.0	0.1	0.1	6.4	0.4	3.2	0.0	6.8	0.1	7.9	8.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.0	7.7	0.4	1.5	9.8	1.0	1.1	0.0	3.9	0.2	18.4	17.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.4	26.9	21.8	26.7	39.7	29.4	18.0	0.0	8.3	17.5	30.1	30.9
LnGrp LOS	C	C	C	C	D	C	B	A	A	B	C	C
Approach Vol, veh/h		499			312			615			1124	
Approach Delay, s/veh		26.0			36.9			8.8			30.4	
Approach LOS		C			D			A			C	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		53.5	16.5	30.0		53.5	6.6	39.9				
Change Period (Y+Rc), s		6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s		47.0	14.0	24.5		47.0	6.0	32.5				
Max Q Clear Time (g_c+I1), s		8.8	13.4	0.0		39.0	4.0	0.0				
Green Ext Time (p_c), s		0.3	0.1	0.0		0.1	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	25.1
HCM 6th LOS	C

Notes

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

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	220	35	110	205	35	50	620	45	25	575	275
Future Volume (vph)	275	220	35	110	205	35	50	620	45	25	575	275
Ideal Flow (vphpl)	1750	1665	1750	1750	1665	1750	1750	1700	1750	1750	1665	1750
Lane Width (ft)	11	11	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	95		65	65		65	0		0	75		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	50			50			25			50		
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
Fr <sub>t</sub>			0.850			0.850		0.994			0.951	
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1576	1420	1653	1630	1469	1653	1630	1657	0	1630	2949	0
Fl <sub>t</sub> Permitted	0.475			0.556			0.163			0.171		
Satd. Flow (perm)	788	1420	1653	954	1469	1653	280	1657	0	293	2949	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			98			98		3				91
Link Speed (mph)		25			25			25				25
Link Distance (ft)		521			520			317				1667
Travel Time (s)		14.2			14.2			8.6				45.5
Peak Hour Factor	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	100%
Parking (#/hr)		0			0							
Adj. Flow (vph)	324	259	26	118	220	23	54	667	30	27	618	296
Shared Lane Traffic (%)												
Lane Group Flow (vph)	324	259	26	118	220	23	54	697	0	27	914	0
Enter Blocked Intersection	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh
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	1.16	1.41	0.95	1.11	1.35	0.95	1.11	1.15	1.11	1.11	1.18	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0	0	1	0		1	0	
Detector Template												
Leading Detector (ft)	60	0	0	56	0	0	56	0		60	0	
Trailing Detector (ft)	42	0	0	50	0	0	50	0		42	0	
Detector 1 Position(ft)	42	5	5	50	5	5	50	5		42	5	
Detector 1 Size(ft)	18	6	20	6	6	20	6	6		18	6	
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	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		8	4		4	6			2		
Detector Phase	3	8	8	7	4	4	1	6		2	2	
Switch Phase												

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2018 PM Peak Hour Proposed  
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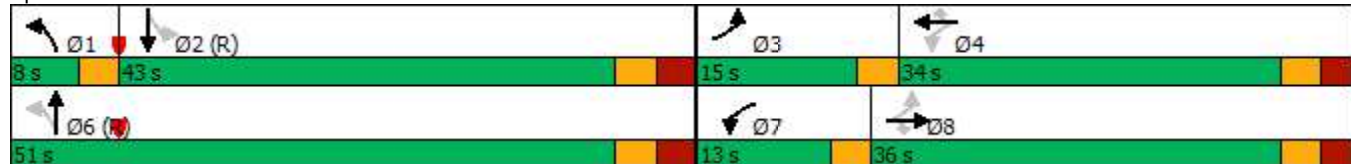


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	33.5	33.5	8.0	33.5	33.5	8.0	34.0		34.0	34.0	
Total Split (s)	15.0	36.0	36.0	13.0	34.0	34.0	8.0	51.0		43.0	43.0	
Total Split (%)	15.0%	36.0%	36.0%	13.0%	34.0%	34.0%	8.0%	51.0%		43.0%	43.0%	
Maximum Green (s)	12.0	30.5	30.5	10.0	28.5	28.5	5.0	45.0		37.0	37.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	3.0		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)	3.0	5.5	5.5	3.0	5.5	5.5	3.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?												
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	Max	None	Max	Max	None	C-Max		C-Max	C-Max	
Walk Time (s)		5.0	5.0		5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		23.0		23.0	23.0	
Pedestrian Calls (#/hr)		0	0		0	0		0		0	0	
Act Effct Green (s)	45.7	32.4	32.4	39.2	28.6	28.6	48.0	45.0		38.6	38.6	
Actuated g/C Ratio	0.46	0.32	0.32	0.39	0.29	0.29	0.48	0.45		0.39	0.39	
v/c Ratio	0.71	0.56	0.04	0.28	0.53	0.04	0.27	0.93		0.24	0.77	
Control Delay	25.6	30.1	0.1	17.8	35.5	0.1	19.4	50.3		28.9	29.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	25.6	30.1	0.1	17.8	35.5	0.1	19.4	50.3		28.9	29.6	
LOS	C	C	A	B	D	A	B	D		C	C	
Approach Delay		26.4			27.4			48.1			29.6	
Approach LOS		C			C			D			C	

Intersection Summary

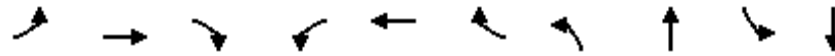
Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 52 (52%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 85  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 33.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 86.9%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 27: Commercial St & Wisconsin Ave



Queues  
27: Commercial St & Wisconsin Ave

2018 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	324	259	26	118	220	23	54	697	27	914
v/c Ratio	0.71	0.56	0.04	0.28	0.53	0.04	0.27	0.93	0.24	0.77
Control Delay	25.6	30.1	0.1	17.8	35.5	0.1	19.4	50.3	28.9	29.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	30.1	0.1	17.8	35.5	0.1	19.4	50.3	28.9	29.6
Queue Length 50th (ft)	160	147	0	42	118	0	12	396	12	245
Queue Length 95th (ft)	124	170	m0	77	193	0	47	#671	36	327
Internal Link Dist (ft)		441			440			237		1587
Turn Bay Length (ft)	95		65	65		65			75	
Base Capacity (vph)	454	460	601	459	419	542	201	747	113	1194
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	0.71	0.56	0.04	0.26	0.53	0.04	0.27	0.93	0.24	0.77

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
27: Commercial St & Wisconsin Ave

2018 PM Peak Hour Proposed  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	220	35	110	205	35	50	620	45	25	575	275
Future Volume (veh/h)	275	220	35	110	205	35	50	620	45	25	575	275
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	1723	1639	1792	1723	1639	1792	1723	1673	1723	1723	1639	1723
Adj Flow Rate, veh/h	324	259	26	118	220	23	54	667	30	27	618	296
Peak Hour Factor	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	467	552	511	416	467	433	204	715	32	98	778	373
Arrive On Green	0.12	0.34	0.34	0.07	0.28	0.28	0.01	0.15	0.15	0.38	0.38	0.38
Sat Flow, veh/h	1641	1639	1518	1641	1639	1518	1641	1589	71	748	2042	978
Grp Volume(v), veh/h	324	259	26	118	220	23	54	0	697	27	471	443
Grp Sat Flow(s),veh/h/ln	1641	1639	1518	1641	1639	1518	1641	0	1661	748	1557	1463
Q Serve(g_s), s	12.0	12.5	1.2	5.0	11.1	1.1	1.9	0.0	41.5	3.5	26.8	26.9
Cycle Q Clear(g_c), s	12.0	12.5	1.2	5.0	11.1	1.1	1.9	0.0	41.5	38.1	26.8	26.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.04	1.00		0.67
Lane Grp Cap(c), veh/h	467	552	511	416	467	433	204	0	747	98	593	558
V/C Ratio(X)	0.69	0.47	0.05	0.28	0.47	0.05	0.26	0.00	0.93	0.27	0.79	0.79
Avail Cap(c_a), veh/h	467	552	511	468	467	433	223	0	747	98	593	558
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.92	0.92	1.00	1.00	1.00	1.00	0.00	1.00	0.95	0.95	0.95
Uniform Delay (d), s/veh	23.5	26.1	22.4	22.8	29.5	26.0	21.4	0.0	41.1	48.3	27.5	27.5
Incr Delay (d2), s/veh	4.1	2.6	0.2	0.4	3.4	0.2	0.7	0.0	20.1	6.5	10.0	10.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.7	8.9	0.8	3.6	8.4	0.8	1.4	0.0	30.4	1.5	16.9	16.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.5	28.8	22.6	23.2	32.9	26.2	22.0	0.0	61.2	54.7	37.5	38.1
LnGrp LOS	C	C	C	C	C	C	C	A	E	D	D	D
Approach Vol, veh/h		609			361			751			941	
Approach Delay, s/veh		27.8			29.3			58.3			38.3	
Approach LOS		C			C			E			D	
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	6.9	44.1	15.0	34.0		51.0	9.8	39.2				
Change Period (Y+Rc), s	3.0	6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s	5.0	37.0	12.0	28.5		45.0	10.0	30.5				
Max Q Clear Time (g_c+I1), s	3.9	40.1	14.0	0.0		0.0	7.0	0.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0		0.0	0.1	0.0				

Intersection Summary

HCM 6th Ctrl Delay	40.3
HCM 6th LOS	D

Notes

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

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

2018 AM Peak Hour Proposed  
09/18/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗		↖↗			↖↗	
Traffic Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15
Future Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	12	12	11	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt			0.850			0.850		0.987			0.997	
Flt Protected		0.978			0.968			0.999			0.999	
Satd. Flow (prot)	0	1566	1361	0	1550	1361	0	3214	0	0	3247	0
Flt Permitted		0.822			0.767			0.930			0.950	
Satd. Flow (perm)	0	1316	1361	0	1228	1361	0	2992	0	0	3088	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			56			27		15			3	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		305			861			1667			254	
Travel Time (s)		8.3			23.5			45.5			6.9	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	23	28	56	57	28	4	11	403	40	11	966	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	51	56	0	85	4	0	454	0	0	994	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	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.11	1.11	1.16	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	0	1	1	0	1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	0	0	20	0	0	20	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	5	5	0	5	5	0	5		0	5	
Detector 1 Size(ft)	20	20	20	20	20	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Call	Cl+Ex	Cl+Ex	Call	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	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	41.5	41.5	41.5	41.5	41.5	41.5	42.0	42.0		42.0	42.0	
Total Split (s)	42.0	42.0	42.0	42.0	42.0	42.0	58.0	58.0		58.0	58.0	
Total Split (%)	42.0%	42.0%	42.0%	42.0%	42.0%	42.0%	58.0%	58.0%		58.0%	58.0%	



Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

2018 AM Peak Hour Proposed  
09/18/2018

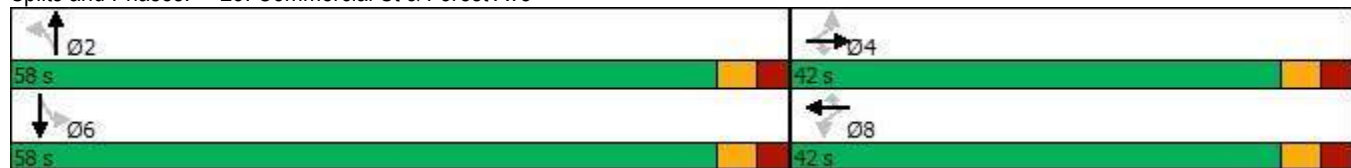


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	36.5	36.5	36.5	36.5	36.5	36.5	52.5	52.5		52.5	52.5	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0			0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.5	5.5			5.5	5.5		5.5		5.5	
Lead/Lag												
Lead-Lag Optimize?												
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	Min	Min	Min	Min	Min	Min	Max	Max		Max	Max	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0	18.0	17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)		10.1	10.1		10.1	10.1		52.6			52.6	
Actuated g/C Ratio		0.14	0.14		0.14	0.14		0.71			0.71	
v/c Ratio		0.28	0.24		0.51	0.02		0.21			0.45	
Control Delay		32.3	11.1		40.1	0.2		4.0			5.6	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		32.3	11.1		40.1	0.2		4.0			5.6	
LOS		C	B		D	A		A			A	
Approach Delay		21.2			38.3			4.0			5.6	
Approach LOS		C			D			A			A	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	73.7
Natural Cycle:	85
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.51
Intersection Signal Delay:	8.0
Intersection LOS:	A
Intersection Capacity Utilization	54.0%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 23: Commercial St & Forest Ave



Queues  
23: Commercial St & Forest Ave





















2018 AM Peak Hour Proposed  
09/18/2018



Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	51	56	85	4	454	994
v/c Ratio	0.28	0.24	0.51	0.02	0.21	0.45
Control Delay	32.3	11.1	40.1	0.2	4.0	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	11.1	40.1	0.2	4.0	5.6
Queue Length 50th (ft)	21	0	37	0	28	80
Queue Length 95th (ft)	50	28	76	0	53	136
Internal Link Dist (ft)	225		781		1587	174
Turn Bay Length (ft)						
Base Capacity (vph)	652	703	609	688	2138	2203
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	0.08	0.08	0.14	0.01	0.21	0.45
<b>Intersection Summary</b>						

HCM Signalized Intersection Capacity Analysis  
 23: Commercial St & Forest Ave

2018 AM Peak Hour Proposed  
 09/18/2018

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15		
Future Volume (vph)	20	25	80	50	25	5	10	355	35	10	850	15		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	10	10	10	10	10	10	11	12	12	11	12	12		
Total Lost time (s)		5.5	5.5		5.5	5.5		5.5			5.5			
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95			
Fr <sub>t</sub>		1.00	0.85		1.00	0.85		0.99			1.00			
Fl <sub>t</sub> Protected		0.98	1.00		0.97	1.00		1.00			1.00			
Satd. Flow (prot)		1566	1361		1549	1361		3213			3250			
Fl <sub>t</sub> Permitted		0.82	1.00		0.77	1.00		0.93			0.95			
Satd. Flow (perm)		1316	1361		1229	1361		2992			3088			
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88		
Growth Factor (vph)	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%		
Adj. Flow (vph)	23	28	56	57	28	4	11	403	40	11	966	17		
RTOR Reduction (vph)	0	0	48	0	0	3	0	4	0	0	1	0		
Lane Group Flow (vph)	0	51	8	0	85	1	0	450	0	0	993	0		
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA			
Protected Phases		4			8			2			6			
Permitted Phases	4		4	8		8	2			6				
Actuated Green, G (s)		10.1	10.1		10.1	10.1		52.6			52.6			
Effective Green, g (s)		10.1	10.1		10.1	10.1		52.6			52.6			
Actuated g/C Ratio		0.14	0.14		0.14	0.14		0.71			0.71			
Clearance Time (s)		5.5	5.5		5.5	5.5		5.5			5.5			
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0			
Lane Grp Cap (vph)		180	186		168	186		2135			2203			
v/s Ratio Prot														
v/s Ratio Perm		0.04	0.01		c0.07	0.00		0.15			c0.32			
v/c Ratio		0.28	0.04		0.51	0.00		0.21			0.45			
Uniform Delay, d <sub>1</sub>		28.6	27.6		29.5	27.5		3.6			4.5			
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00			
Incremental Delay, d <sub>2</sub>		0.9	0.1		2.4	0.0		0.2			0.7			
Delay (s)		29.4	27.7		31.9	27.5		3.8			5.1			
Level of Service		C	C		C	C		A			A			
Approach Delay (s)		28.5			31.7			3.8			5.1			
Approach LOS		C			C			A			A			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			7.7									HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio			0.46											
Actuated Cycle Length (s)			73.7								11.0			
Intersection Capacity Utilization			54.0%										ICU Level of Service	A
Analysis Period (min)			15											
c Critical Lane Group														

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

09/20/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕↗			↕↗	
Traffic Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Future Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	12	12	11	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Flt			0.850			0.850		0.994			0.999	
Flt Protected		0.973			0.955			0.999			0.999	
Satd. Flow (prot)	0	1558	1361	0	1529	1361	0	3237	0	0	3253	0
Flt Permitted		0.784			0.701			0.937			0.939	
Satd. Flow (perm)	0	1255	1361	0	1123	1361	0	3036	0	0	3058	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			85			45		8			2	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		305			861			1667			254	
Travel Time (s)		8.3			23.5			45.5			6.9	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	28	23	85	97	6	7	17	830	34	11	693	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	51	85	0	103	7	0	881	0	0	710	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	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.11	1.11	1.16	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	0	1	1	0	1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	0	0	20	0	0	20	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	5	5	0	5	5	0	5		0	5	
Detector 1 Size(ft)	20	20	20	20	20	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Call	Cl+Ex	Cl+Ex	Call	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	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	28.5	28.5	28.5	28.5	28.5	28.5	27.5	27.5		27.5	27.5	
Total Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	31.0	31.0		31.0	31.0	
Total Split (%)	48.3%	48.3%	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%		51.7%	51.7%	

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

09/20/2018

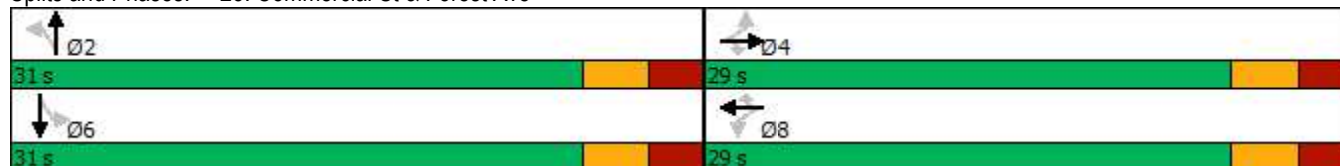


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	23.5	23.5	23.5	23.5	23.5	23.5	25.5	25.5		25.5	25.5	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0			0.0	0.0		0.0			0.0
Total Lost Time (s)		5.5	5.5			5.5	5.5		5.5			5.5
Lead/Lag												
Lead-Lag Optimize?												
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	Min	Min	Min	Min	Min	Min	Max	Max		Max	Max	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0	18.0	17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)		9.3	9.3		9.3	9.3		25.6			25.6	
Actuated g/C Ratio		0.20	0.20		0.20	0.20		0.56			0.56	
v/c Ratio		0.20	0.25		0.45	0.02		0.52			0.42	
Control Delay		16.7	6.4		22.6	0.2		8.2			7.4	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		16.7	6.4		22.6	0.2		8.2			7.4	
LOS		B	A		C	A		A			A	
Approach Delay		10.3			21.1			8.2			7.4	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type:	Other
Cycle Length:	60
Actuated Cycle Length:	45.9
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.52
Intersection Signal Delay:	8.8
Intersection LOS:	A
Intersection Capacity Utilization:	55.8%
ICU Level of Service:	B
Analysis Period (min):	15

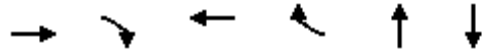
Splits and Phases: 23: Commercial St & Forest Ave



Queues

23: Commercial St & Forest Ave

09/20/2018



Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	51	85	103	7	881	710
v/c Ratio	0.20	0.25	0.45	0.02	0.52	0.42
Control Delay	16.7	6.4	22.6	0.2	8.2	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.7	6.4	22.6	0.2	8.2	7.4
Queue Length 50th (ft)	11	0	24	0	63	47
Queue Length 95th (ft)	31	23	56	0	124	94
Internal Link Dist (ft)	225		781		1587	174
Turn Bay Length (ft)						
Base Capacity (vph)	644	740	576	720	1695	1704
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	0.08	0.11	0.18	0.01	0.52	0.42

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 23: Commercial St & Forest Ave

09/20/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗		↖↗			↖↗	
Traffic Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Future Volume (vph)	25	20	120	85	5	10	15	730	30	10	610	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	10	10	10	10	10	10	11	12	12	11	12	12
Total Lost time (s)		5.5	5.5		5.5	5.5		5.5			5.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		0.99			1.00	
Flt Protected		0.97	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1559	1361		1529	1361		3238			3253	
Flt Permitted		0.78	1.00		0.70	1.00		0.94			0.94	
Satd. Flow (perm)		1255	1361		1123	1361		3038			3058	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	28	23	85	97	6	7	17	830	34	11	693	6
RTOR Reduction (vph)	0	0	68	0	0	6	0	4	0	0	1	0
Lane Group Flow (vph)	0	51	17	0	103	1	0	877	0	0	709	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		9.3	9.3		9.3	9.3		25.6			25.6	
Effective Green, g (s)		9.3	9.3		9.3	9.3		25.6			25.6	
Actuated g/C Ratio		0.20	0.20		0.20	0.20		0.56			0.56	
Clearance Time (s)		5.5	5.5		5.5	5.5		5.5			5.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		254	275		227	275		1694			1705	
v/s Ratio Prot												
v/s Ratio Perm		0.04	0.01		0.09	0.00		0.29			0.23	
v/c Ratio		0.20	0.06		0.45	0.01		0.52			0.42	
Uniform Delay, d1		15.2	14.8		16.1	14.6		6.3			5.8	
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.4	0.1		1.4	0.0		1.1			0.7	
Delay (s)		15.6	14.9		17.5	14.6		7.4			6.6	
Level of Service		B	B		B	B		A			A	
Approach Delay (s)		15.1			17.3			7.4			6.6	
Approach LOS		B			B			A			A	

### Intersection Summary

HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	45.9	Sum of lost time (s)	11.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

# **Attachment H**

*2018 Proposed Timing Plans*



Intersection of Main St & Green Bay Rd				Signal Timing Parameters		
				<b>AM Period</b>		
G min - 5 sec G max - 9.5 sec		G min - 5 sec G max - 53 sec		<b>Cycle Length</b> <b>170 Seconds</b>		
No Ped Phase		G ped Φ2 - 31 sec		<b>Phase</b> <b>Yellow</b> <b>Red</b>		
Total = 11 sec min Total = 46 sec max Total = 37 sec ped		No Ped Phase		Φ1      3.5 sec      0 sec Φ2      3.5 sec      2.5 sec Φ4      3.5 sec      2.5 sec Φ6      3.5 sec      2.5 sec Φ8      3.5 sec      2.5 sec		
Total max time = 59 sec		G min - 5 sec G max - 70 sec		<b>Pedestrian Signal Timings</b>		
<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for Φ1, otherwise this phase shall be skipped		<b>Notes:</b> Activate pedestrian signals only when called by push button activation  Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase		Walk Time      5 sec FDW for crossing East approach of Main      26 sec		
<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for Φ4, otherwise this phase shall be skipped		<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for Φ8, otherwise this phase shall be skipped		<b>Overnight Signal Operations</b>		
				<b>Signal Coordination</b>		
				Master Intersection      -- Offset      -- Offset Phase      --		
				<b>Notes</b>		

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



Intersection of Main St & Green Bay Rd				Signal Timing Parameters		
				PM Period		
G min - 5 sec G max - 7.5 sec	G min - 5 sec G max - 42 sec	G min - 5 sec G max - 30 sec	G min - 5 sec G max - 30 sec	Cycle Length		120 Seconds
No Ped Phase		No Ped Phase		Phase	Yellow	Red
	G ped Φ2 - 31 sec			Φ1	3.5 sec	0 sec
	Total = 11 sec min Total = 48 sec max Total = 37 sec ped	Total = 11 sec min Total = 36 sec max	Total = 11 sec min Total = 36 sec max	Φ2	3.5 sec	2.5 sec
Total max time = 48 sec				Φ4	3.5 sec	2.5 sec
<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for Φ1, otherwise this phase shall be skipped	<b>Notes:</b> Activate pedestrian signals only when called by push button activation  Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase	<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for Φ4, otherwise this phase shall be skipped	<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for Φ8, otherwise this phase shall be skipped	Φ6	3.5 sec	2.5 sec
				Φ8	3.5 sec	2.5 sec
				Pedestrian Signal Timings		
				Walk Time	5 sec	
				FDW for crossing East approach of Main	26 sec	
				Overnight Signal Operations		
				Signal Coordination		
				Master Intersection	--	
				Offset	--	
				Offset Phase	--	
				Notes		

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



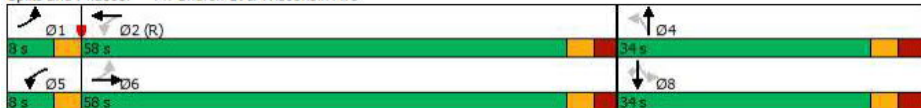
Intersection of Wisconsin Ave & Church St					Signal Timing Parameters																						
					AM Period																						
G min - 5 sec G max - 6 sec	G min - 5 sec G max - 16 sec	G min - 5 sec G max - 6 sec	G min - 10 sec G max - 55.5 sec	G min - 5 sec G max - 23.5 sec	Cycle Length		100 Seconds																				
No Ped Phase		G ped Φ6 - 23 sec*		G ped Φ4 - 23 sec	Phase	Yellow	Red																				
Total max LT phase = 19 sec		Total = 15.5 sec min Total = 61 sec max Total = 28.5 sec ped		Total = 11.5 sec min Total = 30 sec max Total = 29.5 sec ped	Φ1	3 sec	0 sec																				
Total max time = 70 sec					Φ2	3 sec	2.5 sec																				
<p><b>Notes:</b> No pedestrian phasing during this vehicle phase</p> <p>Utilize if call for both Φ1 Φ5 otherwise this phase shall be skipped</p> <p>Φ1 &amp; Φ5 do not need to terminate together</p>					<p><b>Notes:</b> Activate pedestrian signal with start of phase</p> <p>If ped phase (Φ6) is activated, it will extend to Φ2,6 and end prior to green interval to maintain consistent ped timing.</p> <p>Utilize if call for Φ1, otherwise this phase shall be skipped.</p>					Φ4	3 sec	3.5 sec															
										<p><b>Notes:</b> Activate pedestrian signal with start of phase</p> <p>If ped phase (Φ2) is activated, it will extend to Φ2,6 and end prior to green interval to maintain consistent ped timing.</p> <p>Utilize if call for Φ5, otherwise this phase shall be skipped.</p>					Φ5	3 sec	0 sec										
															<p><b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped shall not restart if it was called for in previous phase.</p> <p>If calls to Φ1 or Φ5 during permissive phase, enable switch phase to extend Φ2 or Φ6 accordingly</p> <p>Allow for max out only if calls have been made for opposing phases, otherwise rest in green</p> <p>Recall pedestrian phase until a call is made for Φ1,5,4, or Φ8</p>					Φ6	3 sec	2.5 sec					
																				<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>					Φ8	3 sec	3.5 sec
																									<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>		
<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>					Walk Time	5 sec																					
					<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>					FDW for crossing East/West approach of Wisconsin	18 sec																
										<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>					FDW for crossing North/South approach of Church	18 sec											
															<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>					<b>Overnight Signal Operations</b>							
																				<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>					<b>Signal Coordination</b>		
<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>																									Master Intersection	Commercial & Winneconne	
					<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>																				Offset	85 sec	
										<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>															Offset Phase	Φ2	
															<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>										<b>Notes</b>		
																				<p><b>Notes:</b> Activate pedestrian signals only when called by push button activation</p> <p>Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out</p>					* Combined time shall not exceed 21 sec		

Splits and Phases: 14: Church St & Wisconsin Ave



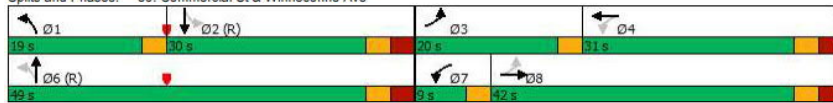
Intersection of Wisconsin Ave & Church St					Signal Timing Parameters		
					<b>PM Period</b>		
G min - 5 sec G max - 5 sec	G min - 5 sec G max - 5 sec	G min - 5 sec G max - 5 sec	G min - 10 sec G max - 52.5 sec	G min - 5 sec G max - 27.5 sec	<b>Cycle Length 100 Seconds</b>		
					<b>Phase</b>	<b>Yellow</b>	<b>Red</b>
No Ped Phase					Φ1	3 sec	0 sec
					Φ2	3 sec	2.5 sec
					Φ4	3 sec	3.5 sec
					Φ5	3 sec	0 sec
					Φ6	3 sec	2.5 sec
					Φ8	3 sec	3.5 sec
Total max LT phase = 8 sec			Total = 15.5 sec min Total = 58 sec max Total = 28.5 sec ped	Total = 11.5 sec min Total = 34 sec max Total = 29.5 sec ped			
Total max time = 66 sec							
<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for both Φ1 & Φ5 otherwise this phase shall be skipped  Φ1 & Φ5 do not need to terminate together	<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ6) is activated, it will extend to Φ2,6 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ1, otherwise this phase shall be skipped.	<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ2) is activated, it will extend to Φ2,6 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ5, otherwise this phase shall be skipped.	<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped shall not restart if it was called for in previous phase.  If calls to Φ1 or Φ5 during permissive phase, enable switch phase to extend Φ2 or Φ6 accordingly  Allow for max out only if calls have been made for opposing phases, otherwise rest in green  Recall pedestrian phase until a call is made for Φ1,5,4, or Φ8	<b>Notes:</b> Activate pedestrian signals only when called by push button activation  Allow for gap out if vehicles or pedestrians not present regardless of calls for opposing phases otherwise max out			
					<b>Pedestrian Signal Timings</b>		
					Walk Time	5 sec	
					FDW for crossing East/West approach of Wisconsin	18 sec	
					FDW for crossing North/South approach of Church	18 sec	
					<b>Overnight Signal Operations</b>		
					<b>Signal Coordination</b>		
					Master Intersection	Commercial & Winneconne	
					Offset	93 sec	
					Offset Phase	Φ2	
					<b>Notes</b>		
					* Combined time shall not exceed 23 sec		

Splits and Phases: 14: Church St & Wisconsin Ave



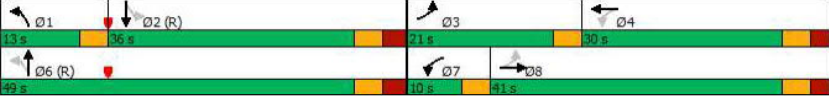
Intersection of Commercial St & Winneconne Ave					
G min - 6 sec G max - 16 sec	G min - 19 sec G max - 43 sec	G min - 6 sec G max - 6 sec	G min - 6 sec G max - 17 sec	G min - 6 sec G max - 6 sec	G min - 19 sec G max - 36.5 sec
G ped Φ6 - 24 sec		No Ped Phase	G ped Φ8 - 23 sec*	G ped Φ8 - 23 sec*	
G ped Φ2 - 24 sec		Total max LT phase = 20 sec		G ped Φ4 - 23 sec	
Total = 25 sec min Total = 49 sec max Total = 30 sec ped		Total max time = 51 sec		Total = 24.5 sec min Total = 42 sec max Total = 28.5 sec ped	
Total max time = 49 sec		Total max time = 51 sec			
<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ6) is activated, it will extend to Φ2,6 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ1, otherwise this phase shall be skipped	<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped Φ6 shall not restart if Φ1 was called.  Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase  If calls to Φ1 during permissive phase, enable switch phase to extend Φ2 or Φ6 accordingly.  Recall pedestrian phase until a call is made for Φ1,3,7,4, or Φ8	<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if calls to both Φ3 & Φ7, otherwise this phase shall be skipped.  Φ3 & Φ7 do not need to terminate together	<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ8) is activated, it will extend to Φ4,8 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ3, otherwise this phase shall be skipped	<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ4) is activated, it will extend to Φ4,8 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ7, otherwise this phase shall be skipped	<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped shall not restart if it was called for in previous phase.  Allow for gap out if vehicles not present regardless of calls for opposing phases otherwise max out  If calls to Φ3 or Φ7 during permissive phase, enable switch phase to extend Φ4 or Φ8 accordingly
<b>Signal Timing Parameters</b>					
<b>AM Period</b>					
<b>Cycle Length 100 Seconds</b>					
		<b>Phase</b>		<b>Yellow</b>	<b>Red</b>
		Φ1		3 sec	0 sec
		Φ2		3 sec	3 sec
		Φ3		3 sec	0 sec
		Φ4		3 sec	2.5 sec
		Φ6		3 sec	3 sec
		Φ7		3 sec	0 sec
		Φ8		3 sec	2.5 sec
<b>Pedestrian Signal Timings</b>					
Walk Time				5 sec	
FDW for crossing East/West approach of Winneconne				19 sec	
FDW for crossing North/South approach of Commercial				18 sec	
<b>Overnight Signal Operations</b>					
<b>Signal Coordination</b>					
Master Intersection		Commercial & Winneconne			
Offset		0 sec			
Offset Phase		Φ2 & Φ6			
<b>Notes</b>					
* Combined time shall not exceed 23 sec					

Splits and Phases: 30: Commercial St & Winneconne Ave



Intersection of Commercial St & Winneconne Ave						Signal Timing Parameters		
						PM Period		
G min - 6 sec G max - 10 sec	G min - 19 sec G max - 43 sec	G min - 6 sec G max - 7 sec	G min - 6 sec G max - 18 sec	G min - 6 sec G max - 7 sec	G min - 19 sec G max - 35.5 sec	<b>Cycle Length 100 Seconds</b>		
G ped Φ6 - 24 sec		No Ped Phase	G ped Φ8 - 23 sec*	G ped Φ4 - 23 sec		<b>Phase</b>	<b>Yellow</b>	<b>Red</b>
G ped Φ2 - 24 sec		Total max LT phase = 21 sec		G ped Φ8 - 23 sec*		Φ1	3 sec	0 sec
Total = 25 sec min Total = 49 sec max Total = 30 sec ped				Total = 24.5 sec min Total = 41 sec max Total = 28.5 sec ped		Φ2	3 sec	3 sec
Total max time = 49 sec		Total max time = 51 sec				Φ3	3 sec	0 sec
						Φ4	3 sec	2.5 sec
						Φ6	3 sec	3 sec
						Φ7	3 sec	0 sec
						Φ8	3 sec	2.5 sec
<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ6) is activated, it will extend to Φ2,6 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ1, otherwise this phase shall be skipped		<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if calls to both Φ3 & Φ7, otherwise this phase shall be skipped.  Φ3 & Φ7 do not need to terminate together		<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ8) is activated, it will extend to Φ4,8 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ3, otherwise this phase shall be skipped		<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped shall not restart if it was called for in previous phase.  Allow for gap out if vehicles not present regardless of calls for opposing phases otherwise max out  If calls to Φ3 or Φ7 during permissive phase, enable switch phase to extend Φ4 or Φ8 accordingly		
<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped Φ6 shall not restart if Φ1 was called.  Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase  If calls to Φ1 during permissive phase, enable switch phase to extend Φ2 or Φ6 accordingly.  Recall pedestrian phase until a call is made for Φ1,3,7,4, or Φ8						<b>Pedestrian Signal Timings</b>		
						Walk Time	5 sec	
						FDW for crossing East/West approach of Winneconne	19 sec	
						FDW for crossing North/South approach of Commercial	18 sec	
						<b>Overnight Signal Operations</b>		
						<b>Signal Coordination</b>		
						Master Intersection	Commercial & Winneconne	
						Offset	0 sec	
						Offset Phase	Φ2 & Φ6	
						<b>Notes</b>		
						* Combined time shall not exceed 23 sec		

Splits and Phases: 30: Commercial St & Winneconne Ave



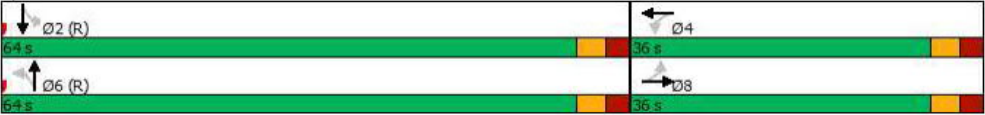
Intersection of Commercial St & Columbian Ave														
		<b>Signal Timing Parameters</b>  <b>AM Period</b>												
G min - 5 sec G max - 53 sec	G min - 5 sec G max - 36.5 sec	<b>Cycle Length      100 Seconds</b>												
G ped Φ2,6 - 19 sec	G ped Φ4,8 - 20 sec	<table border="0"> <tr> <td style="padding-right: 20px;">Φ2</td> <td style="padding-right: 20px;">3 sec</td> <td>2 sec</td> </tr> <tr> <td>Φ4</td> <td>3 sec</td> <td>2.5 sec</td> </tr> <tr> <td>Φ6</td> <td>3 sec</td> <td>2 sec</td> </tr> <tr> <td>Φ8</td> <td>3 sec</td> <td>2.5 sec</td> </tr> </table>	Φ2	3 sec	2 sec	Φ4	3 sec	2.5 sec	Φ6	3 sec	2 sec	Φ8	3 sec	2.5 sec
Φ2	3 sec	2 sec												
Φ4	3 sec	2.5 sec												
Φ6	3 sec	2 sec												
Φ8	3 sec	2.5 sec												
Total = 10 sec min Total = 58 sec max Total = 24 sec ped	Total = 15.5 sec min Total = 42 sec max Total = 25.5 sec ped													
<b>Notes:</b> Activate pedestrian signal with start of phase  Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase  Recall pedestrian phase until a call is made for Φ4 or Φ8	<b>Notes:</b> Activate pedestrian signals only when called by push button activation													
<b>Pedestrian Signal Timings</b>														
Walk Time		5 sec												
FDW for crossing East/West approach of Columbian		14 sec												
FDW for crossing North/South approach of Commercial		15 sec												
<b>Overnight Signal Operations</b>														
<b>Signal Coordination</b>														
Master Intersection		Commercial & Winneconne												
Offset		83 sec												
Offset Phase		Φ2 & Φ6												
<b>Notes</b>														

Splits and Phases: 19: Commercial St & Columbian Ave



Intersection of Commercial St & Columbian Ave		Signal Timing Parameters		
		PM Period		
G min - 5 sec G max - 59 sec	G min - 5 sec G max - 30.5 sec	Cycle Length 100 Seconds		
G ped Φ2,6 - 19 sec	G ped Φ4,8 - 20 sec	Phase	Yellow	Red
Total = 10 sec min Total = 64 sec max Total = 24 sec ped	Total = 10.5 sec min Total = 36 sec max Total = 25.5 sec ped	Φ2	3 sec	2 sec
		Φ4	3 sec	2.5 sec
		Φ6	3 sec	2 sec
		Φ8	3 sec	2.5 sec
<b>Notes:</b> Activate pedestrian signal with start of phase	<b>Notes:</b> Activate pedestrian signals only when called by push button activation	<b>Pedestrian Signal Timings</b>		
Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase		Walk Time	5 sec	
Recall pedestrian phase until a call is made for Φ4 or Φ8		FDW for crossing East/West approach of Columbian	14 sec	
		FDW for crossing North/South approach of Commercial	15 sec	
		<b>Overnight Signal Operations</b>		
		<b>Signal Coordination</b>		
		Master Intersection	Commercial & Winneconne	
		Offset	80 sec	
		Offset Phase	Φ2 & Φ6	
		<b>Notes</b>		

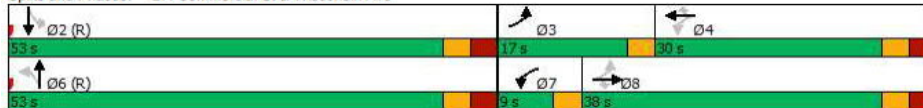
Splits and Phases: 19: Commercial St & Columbian Ave





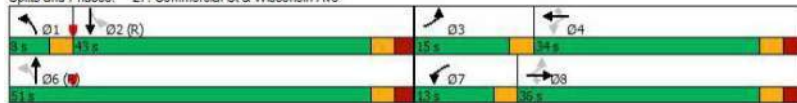
Intersection of Commercial St & Wisconsin Ave					Signal Timing Parameters		
					AM Period		
G min - 5 sec G max - 47 sec	G min - 5 sec G max - 6 sec	G min - 5 sec G max - 14 sec	G min - 5 sec G max - 6 sec	G min - 5 sec G max - 32.5 sec	Cycle Length 100 Seconds		
G ped Φ2,6 - 28 sec	No Ped Phase	G ped Φ8 - 20 sec*	G ped Φ4 - 20 sec		Phase	Yellow	Red
Total = 11 sec min Total = 53 sec max Total = 34 sec ped	Total max LT phase = 17 sec		Total = 10.5 sec min Total = 38 sec max Total = 25.5 sec ped		Φ2	3 sec	3 sec
Total max time = 47 sec					Φ3	3 sec	0 sec
<b>Notes:</b> Activate pedestrian signal with start of phase  Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase  Recall pedestrian phase until a call is made for Φ3,7,4, or Φ8	<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for both Φ3 Φ7 otherwise this phase shall be skipped  Φ3 & Φ7 do not need to terminate together	<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ8) is activated, it will extend to Φ4,8 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ3, otherwise this phase shall be skipped.	<b>Notes:</b> If ped phase (Φ4) is activated, it will extend to Φ4,8 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ7, otherwise this phase shall be skipped.	<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped shall not restart if it was called for in previous phase.  Allow for gap out if vehicles not present regardless of calls for opposing phases otherwise max out  If calls to Φ3 or Φ7 during permissive phase, enable switch phase to extend Φ4 or Φ8 accordingly	Φ4	3 sec	2.5 sec
					Φ6	3 sec	3 sec
					Φ7	3 sec	0 sec
					Φ8	3 sec	2.5 sec
					Pedestrian Signal Timings		
					Walk Time	5 sec	
					FDW for crossing East/West approach of Wisconsin	23 sec	
					FDW for crossing North/South approach of Commercial	15 sec	
					Overnight Signal Operations		
					Signal Coordination		
					Master Intersection	Commercial & Winneconne	
					Offset	89 sec	
					Offset Phase	Φ2 & Φ6	
					Notes		
					* Combined time shall not exceed 20 sec		

Splits and Phases: 27: Commercial St & Wisconsin Ave



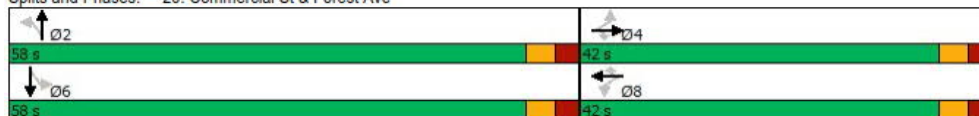
Intersection of Commercial St & Wisconsin Ave						Signal Timing Parameters																																						
						PM Period																																						
						<table border="1"> <thead> <tr> <th colspan="2">Cycle Length</th> <th colspan="2">100 Seconds</th> </tr> <tr> <th>Phase</th> <th>Yellow</th> <th>Red</th> <th></th> </tr> </thead> <tbody> <tr><td>Φ1</td><td>3 sec</td><td>0 sec</td><td></td></tr> <tr><td>Φ2</td><td>3 sec</td><td>3 sec</td><td></td></tr> <tr><td>Φ3</td><td>3 sec</td><td>0 sec</td><td></td></tr> <tr><td>Φ4</td><td>3 sec</td><td>2.5 sec</td><td></td></tr> <tr><td>Φ6</td><td>3 sec</td><td>3 sec</td><td></td></tr> <tr><td>Φ7</td><td>3 sec</td><td>0 sec</td><td></td></tr> <tr><td>Φ8</td><td>3 sec</td><td>2.5 sec</td><td></td></tr> </tbody> </table>			Cycle Length		100 Seconds		Phase	Yellow	Red		Φ1	3 sec	0 sec		Φ2	3 sec	3 sec		Φ3	3 sec	0 sec		Φ4	3 sec	2.5 sec		Φ6	3 sec	3 sec		Φ7	3 sec	0 sec		Φ8	3 sec	2.5 sec	
Cycle Length		100 Seconds																																										
Phase	Yellow	Red																																										
Φ1	3 sec	0 sec																																										
Φ2	3 sec	3 sec																																										
Φ3	3 sec	0 sec																																										
Φ4	3 sec	2.5 sec																																										
Φ6	3 sec	3 sec																																										
Φ7	3 sec	0 sec																																										
Φ8	3 sec	2.5 sec																																										
G min - 5 sec G max - 5 sec	G min - 5 sec G max - 45 sec	G min - 5 sec G max - 10 sec	G min - 5 sec G max - 12 sec	G min - 5 sec G max - 10 sec	G min - 5 sec G max - 30.5 sec																																							
G ped Φ6 - 28 sec		No Ped Phase	G ped Φ8 - 20 sec*	G ped Φ4,8 - 20 sec*																																								
G ped Φ2 - 28 sec		Total max LT phase = 15 sec		G ped Φ4 - 20 sec																																								
Total = 11 sec min Total = 51 sec max Total = 34 sec ped				Total = 10.5 sec min Total = 36 sec max Total = 25.5 sec ped																																								
Total max time = 51 sec		Total max time = 49 sec																																										
<b>Notes:</b> Activate pedestrian signal with start of phase  Utilize if call for Φ1, otherwise this phase shall be skipped	<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped shall not restart if it was called for in previous phase.  Allow for max out only if calls have been made for opposing phases, otherwise rest in green  Recall pedestrian phase until a call is made for Φ1,3,7,4, or Φ8	<b>Notes:</b> No pedestrian phasing during this vehicle phase  Utilize if call for both Φ3 Φ7 otherwise this phase shall be skipped  Φ3 & Φ7 do not need to terminate together	<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ8) is activated, it will extend to Φ4,8 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ3, otherwise this phase shall be skipped.	<b>Notes:</b> Activate pedestrian signal with start of phase  If ped phase (Φ4) is activated, it will extend to Φ4,8 and end prior to green interval to maintain consistent ped timing.  Utilize if call for Φ7, otherwise this phase shall be skipped.	<b>Notes:</b> Activate pedestrian signal with start of phase. Timing for ped shall not restart if it was called for in previous phase.  Allow for gap out if vehicles not present regardless of calls for opposing phases otherwise max out  If calls to Φ3 or Φ7 during permissive phase, enable switch phase to extend Φ4 or Φ8 accordingly	<b>Pedestrian Signal Timings</b> <table border="1"> <tr><td>Walk Time</td><td>5 sec</td></tr> <tr><td>FDW for crossing East/West approach of Wisconsin</td><td>23 sec</td></tr> <tr><td>FDW for crossing North/South approach of Commercial</td><td>15 sec</td></tr> </table> <b>Overnight Signal Operations</b>  <b>Signal Coordination</b> <table border="1"> <tr><td>Master Intersection</td><td>Commercial &amp; Winneconne</td></tr> <tr><td>Offset</td><td>52 sec</td></tr> <tr><td>Offset Phase</td><td>Φ2 &amp; Φ6</td></tr> </table> <b>Notes</b> * Combined time shall not exceed 20 sec			Walk Time	5 sec	FDW for crossing East/West approach of Wisconsin	23 sec	FDW for crossing North/South approach of Commercial	15 sec	Master Intersection	Commercial & Winneconne	Offset	52 sec	Offset Phase	Φ2 & Φ6																								
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Offset Phase	Φ2 & Φ6																																											

Splits and Phases: 27: Commercial St & Wisconsin Ave



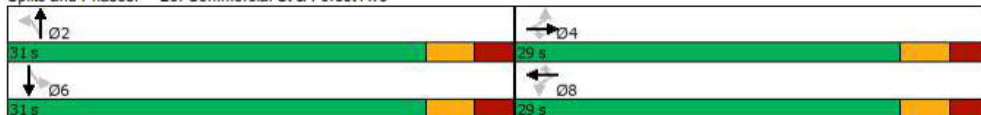
Intersection of Commercial St & Forest Ave																	
		<p align="center"><b>Signal Timing Parameters</b></p> <p align="center"><b>AM Period</b></p>															
G min - 5 sec G max - 52.5 sec	G min - 5 sec G max - 36.5 sec	<b>Cycle Length 100 Seconds</b>															
G ped Φ2,6 - 22 sec	G ped Φ4,8 - 23 sec	<table border="1"> <thead> <tr> <th>Phase</th> <th>Yellow</th> <th>Red</th> </tr> </thead> <tbody> <tr> <td>Φ2</td> <td>3 sec</td> <td>2.5 sec</td> </tr> <tr> <td>Φ4</td> <td>3 sec</td> <td>2.5 sec</td> </tr> <tr> <td>Φ6</td> <td>3 sec</td> <td>2.5 sec</td> </tr> <tr> <td>Φ8</td> <td>3 sec</td> <td>2.5 sec</td> </tr> </tbody> </table>	Phase	Yellow	Red	Φ2	3 sec	2.5 sec	Φ4	3 sec	2.5 sec	Φ6	3 sec	2.5 sec	Φ8	3 sec	2.5 sec
Phase	Yellow	Red															
Φ2	3 sec	2.5 sec															
Φ4	3 sec	2.5 sec															
Φ6	3 sec	2.5 sec															
Φ8	3 sec	2.5 sec															
Total = 10.5 sec min Total = 58 sec max Total = 27.5 sec ped	Total = 10.5 sec min Total = 42 sec max Total = 28.5 sec ped																
<b>Notes:</b> Activate pedestrian signals only when called by push button activation	<b>Notes:</b> Activate pedestrian signals only when called by push button activation																
Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase																	
		<b>Pedestrian Signal Timings</b>															
		Walk Time 5 sec															
		FDW for crossing East/West approach of Forest 17 sec															
		FDW for crossing North/South approach of Commercial 18 sec															
		<b>Overnight Signal Operations</b>															
		<b>Signal Coordination</b>															
		Master Intersection --															
		Offset --															
		Offset Phase --															
		<b>Notes</b>															

Splits and Phases: 23: Commercial St & Forest Ave



Intersection of Commercial St & Forest Ave		Signal Timing Parameters		
G min - 5 sec G max - 25.5 sec	G min - 5 sec G max - 23.5 sec	<b>Cycle Length 60 Seconds</b>		
G ped Φ2,6 - 22 sec	G ped Φ4,8 - 23 sec	<b>Phase</b>	<b>Yellow</b>	<b>Red</b>
Total = 10.5 sec min Total = 31 sec max Total = 27.5 sec ped	Total = 10.5 sec min Total = 29 sec max Total = 28.5 sec ped	Φ2	3 sec	2.5 sec
		Φ4	3 sec	2.5 sec
		Φ6	3 sec	2.5 sec
		Φ8	3 sec	2.5 sec
<b>Notes:</b> Activate pedestrian signals only when called by push button activation	<b>Notes:</b> Activate pedestrian signals only when called by push button activation			
Allow for max out only if calls have been made for opposing phases, otherwise rest in green for this phase				
		<b>Pedestrian Signal Timings</b>		
		Walk Time	5 sec	
		FDW for crossing East/West approach of Forest	17 sec	
		FDW for crossing North/South approach of Commercial	18 sec	
		<b>Overnight Signal Operations</b>		
		<b>Signal Coordination</b>		
		Master Intersection	--	
		Offset	--	
		Offset Phase	--	
		<b>Notes</b>		

Splits and Phases: 23: Commercial St & Forest Ave



# **Attachment I**

*2038 Projected Traffic Volumes*



# **Attachment J**

*2038 Raw Synchro Outputs*

Lanes, Volumes, Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2038 AM Peak Hour Proposed  
09/19/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↖	↗		↕↕			↕↕	
Traffic Volume (vph)	120	895	120	70	95	380	25	250	90	215	190	30
Future Volume (vph)	120	895	120	70	95	380	25	250	90	215	190	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	11	11	10	12	12	12	12	12	12
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.984				0.850		0.963			0.990	
Flt Protected		0.995			0.979			0.997			0.976	
Satd. Flow (prot)	0	3192	0	0	1562	1310	0	3012	0	0	3150	0
Flt Permitted		0.995			0.979			0.881			0.586	
Satd. Flow (perm)	0	3192	0	0	1562	1310	0	2661	0	0	1891	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				291		32			6	
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		531			4747			644			499	
Travel Time (s)		10.3			107.9			12.5			9.7	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.95	0.95	0.95	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	6%	6%	6%	2%	2%	2%
Adj. Flow (vph)	148	1105	148	86	117	291	26	263	95	265	235	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1401	0	0	203	291	0	384	0	0	537	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.16	1.16	1.21	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	20		20	20	20	20	20		20	20	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
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	Split	NA		Split	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	4	4		8	8			2		1	6	
Permitted Phases						8	2			6		



Lanes, Volumes, Timings  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2038 AM Peak Hour Proposed  
 09/19/2018

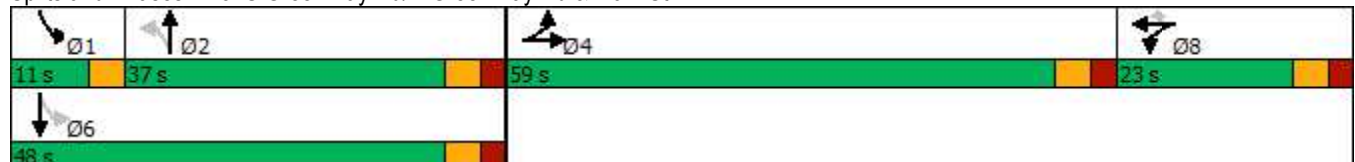


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4		8	8	8	2	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.0	11.0	11.0	37.0	37.0		11.0	11.0	
Total Split (s)	59.0	59.0		23.0	23.0	23.0	37.0	37.0		11.0	48.0	
Total Split (%)	45.4%	45.4%		17.7%	17.7%	17.7%	28.5%	28.5%		8.5%	36.9%	
Maximum Green (s)	53.0	53.0		17.0	17.0	17.0	31.0	31.0		7.5	42.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		0.0	2.5	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	Max	Max		Max	Min	
Walk Time (s)							5.0	5.0				
Flash Dont Walk (s)							26.0	26.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)		53.0			17.0	17.0		31.0			42.0	
Actuated g/C Ratio		0.41			0.13	0.13		0.24			0.32	
v/c Ratio		1.07			1.00	0.69		0.58			1.07dl	
Control Delay		83.3			118.0	14.8		44.1			49.4	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		83.3			118.0	14.8		44.1			49.4	
LOS		F			F	B		D			D	
Approach Delay		83.3			57.2			44.1			49.4	
Approach LOS		F			E			D			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Natural Cycle: 130  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 1.07  
 Intersection Signal Delay: 66.9  
 Intersection LOS: E  
 Intersection Capacity Utilization 89.4%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2038 AM Peak Hour Proposed  
09/19/2018

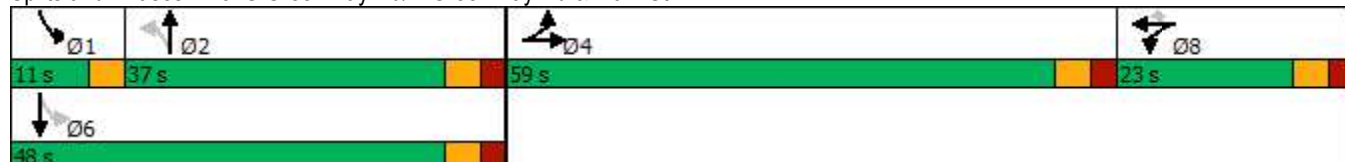


Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔↔	↔	↔		↔↔		↔↔
Traffic Volume (vph)	895	95	380	25	250	215	190
Future Volume (vph)	895	95	380	25	250	215	190
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases	4	8			2	1	6
Permitted Phases			8	2		6	
Detector Phase	4	8	8	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	37.0	37.0	11.0	11.0
Total Split (s)	59.0	23.0	23.0	37.0	37.0	11.0	48.0
Total Split (%)	45.4%	17.7%	17.7%	28.5%	28.5%	8.5%	36.9%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	0.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0		6.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	Min	Min	Min	Max	Max	Max	Min
Act Effct Green (s)	53.0	17.0	17.0		31.0		42.0
Actuated g/C Ratio	0.41	0.13	0.13		0.24		0.32
v/c Ratio	1.07	1.00	0.69		0.58		1.07dl
Control Delay	83.3	118.0	14.8		44.1		49.4
Queue Delay	0.0	0.0	0.0		0.0		0.0
Total Delay	83.3	118.0	14.8		44.1		49.4
LOS	F	F	B		D		D
Approach Delay	83.3	57.2			44.1		49.4
Approach LOS	F	E			D		D

Intersection Summary

Cycle Length: 130  
 Actuated Cycle Length: 130  
 Natural Cycle: 130  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 1.07  
 Intersection Signal Delay: 66.9  
 Intersection LOS: E  
 Intersection Capacity Utilization 89.4%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.9	0.6	0.7	0.0	0.0	0.0	0.2	0.1	0.2	0.4	0.1	0.1
Total Del/Veh (s)	40.6	40.2	29.4	61.3	12.4	12.1	43.1	47.1	24.9	85.1	52.4	14.2

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	37.8

Intersection: 3: S Green Bay Rd/N Green Bay Rd & Main St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	540	505	265	145	227	235	410	318
Average Queue (ft)	389	334	116	74	143	111	286	202
95th Queue (ft)	541	479	205	118	204	196	386	327
Link Distance (ft)	490	490	4671	4671	603	603	458	458
Upstream Blk Time (%)	4	1						
Queuing Penalty (veh)	0	0						
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Lanes, Volumes, Timings  
 3: S Green Bay Rd/N Green Bay Rd & Main St

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕	↕		↕↕			↕↕	
Traffic Volume (vph)	130	475	185	145	205	440	40	420	85	175	320	50
Future Volume (vph)	130	475	185	145	205	440	40	420	85	175	320	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	12	12	12	11	11	10	12	12	12	12	12	12
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.965				0.850		0.977			0.986	
Flt Protected		0.992			0.980			0.996			0.984	
Satd. Flow (prot)	0	3121	0	0	1625	1361	0	3172	0	0	3163	0
Flt Permitted		0.992			0.980			0.855			0.550	
Satd. Flow (perm)	0	3121	0	0	1625	1361	0	2723	0	0	1768	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34				297		19			11	
Link Speed (mph)		35			30			35			35	
Link Distance (ft)		531			4747			644			499	
Travel Time (s)		10.3			107.9			12.5			9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	141	516	201	158	223	297	43	457	92	190	348	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	858	0	0	381	297	0	592	0	0	592	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.16	1.16	1.21	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	20		20	20	20	20	20		20	20	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
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	Split	NA		Split	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	4	4		8	8			2		1	6	
Permitted Phases						8	2			6		
Detector Phase	4	4		8	8	8	2	2		1	6	

Lanes, Volumes, Timings  
 3: S Green Bay Rd/N Green Bay Rd & Main St

2038 PM Peak Hour Proposed  
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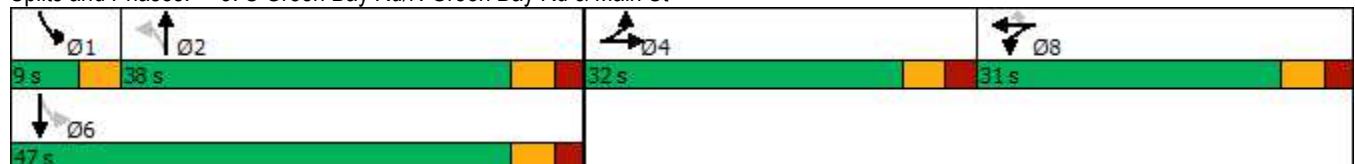


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.5	11.5	11.5	37.0	37.0		8.5	11.0	
Total Split (s)	32.0	32.0		31.0	31.0	31.0	38.0	38.0		9.0	47.0	
Total Split (%)	29.1%	29.1%		28.2%	28.2%	28.2%	34.5%	34.5%		8.2%	42.7%	
Maximum Green (s)	26.0	26.0		25.0	25.0	25.0	32.0	32.0		5.5	41.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		0.0	2.5	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0			0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	Min	Min		Max	Min	
Walk Time (s)							5.0	5.0				
Flash Dont Walk (s)							26.0	26.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)		26.1		25.1	25.1		28.3				37.3	
Actuated g/C Ratio		0.25		0.24	0.24		0.27				0.35	
v/c Ratio		1.09		1.00	0.54		0.80				1.02dl	
Control Delay		96.2		88.0	8.2		44.3				47.8	
Queue Delay		0.0		0.0	0.0		0.0				0.0	
Total Delay		96.2		88.0	8.2		44.3				47.8	
LOS		F		F	A		D				D	
Approach Delay		96.2		53.0			44.3				47.8	
Approach LOS		F		D			D				D	

Intersection Summary

Area Type: Other  
 Cycle Length: 110  
 Actuated Cycle Length: 106.5  
 Natural Cycle: 110  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 63.6  
 Intersection LOS: E  
 Intersection Capacity Utilization 98.9%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



Timings  
3: S Green Bay Rd/N Green Bay Rd & Main St

2038 PM Peak Hour Proposed  
09/19/2018

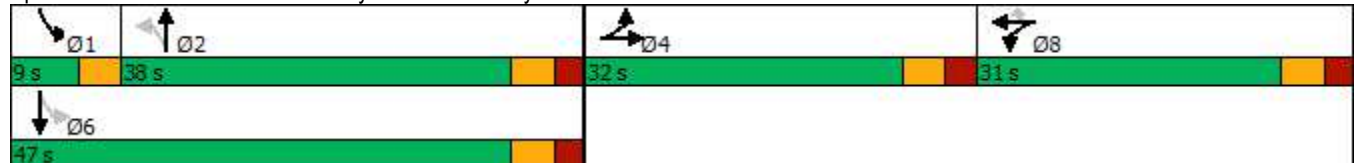


Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↔↔	↔	↔		↔↔		↔↔
Traffic Volume (vph)	475	205	440	40	420	175	320
Future Volume (vph)	475	205	440	40	420	175	320
Turn Type	NA	NA	Perm	Perm	NA	pm+pt	NA
Protected Phases	4	8			2	1	6
Permitted Phases			8	2		6	
Detector Phase	4	8	8	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.5	11.5	37.0	37.0	8.5	11.0
Total Split (s)	32.0	31.0	31.0	38.0	38.0	9.0	47.0
Total Split (%)	29.1%	28.2%	28.2%	34.5%	34.5%	8.2%	42.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	0.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0		6.0
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?							
Recall Mode	Min	Min	Min	Min	Min	Max	Min
Act Effct Green (s)	26.1	25.1	25.1		28.3		37.3
Actuated g/C Ratio	0.25	0.24	0.24		0.27		0.35
v/c Ratio	1.09	1.00	0.54		0.80		1.02dl
Control Delay	96.2	88.0	8.2		44.3		47.8
Queue Delay	0.0	0.0	0.0		0.0		0.0
Total Delay	96.2	88.0	8.2		44.3		47.8
LOS	F	F	A		D		D
Approach Delay	96.2	53.0			44.3		47.8
Approach LOS	F	D			D		D

Intersection Summary

Cycle Length: 110  
 Actuated Cycle Length: 106.5  
 Natural Cycle: 110  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 1.09  
 Intersection Signal Delay: 63.6  
 Intersection LOS: E  
 Intersection Capacity Utilization 98.9%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3: S Green Bay Rd/N Green Bay Rd & Main St



3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.2	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Denied Del/Veh (s)	6.1	6.8	6.4	0.0	0.0	0.0	0.4	0.1	0.1	1.7	1.4	0.5
Total Delay (hr)	4.3	15.9	4.6	2.7	4.7	0.8	0.6	4.6	0.4	7.0	4.5	0.2
Total Del/Veh (s)	107.8	113.7	101.6	78.4	22.7	12.2	50.5	38.5	15.3	127.4	47.2	14.8

3: S Green Bay Rd/N Green Bay Rd & Main St Performance by movement

Movement	All
Denied Delay (hr)	1.7
Denied Del/Veh (s)	2.1
Total Delay (hr)	50.3
Total Del/Veh (s)	59.0



Intersection: 3: S Green Bay Rd/N Green Bay Rd & Main St

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	R	LT	TR	LT	TR
Maximum Queue (ft)	542	505	495	119	285	252	473	473
Average Queue (ft)	440	406	260	60	187	142	314	249
95th Queue (ft)	606	584	460	107	257	241	485	450
Link Distance (ft)	490	490	4671	4671	603	603	458	458
Upstream Blk Time (%)	23	18					9	3
Queuing Penalty (veh)	0	0					0	0
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Lanes, Volumes, Timings  
8: Torrey St & Main St

2038 AM Peak Hour Proposed  
09/17/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↖↑	↖	↗
Traffic Volume (vph)	975	430	0	580	140	5
Future Volume (vph)	975	430	0	580	140	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)		150	0		0	185
Storage Lanes		1	0		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected					0.950	
Satd. Flow (prot)	3260	1458	0	3197	1630	1458
Flt Permitted					0.950	
Satd. Flow (perm)	3260	1458	0	3197	1630	1458
Link Speed (mph)	30			30	30	
Link Distance (ft)	4747			195	918	
Travel Time (s)	107.9			4.4	20.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Adj. Flow (vph)	1175	518	0	699	169	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1175	518	0	699	169	6
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	53.0%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	23.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑	↑
Traffic Vol, veh/h	975	430	0	580	140	5
Future Vol, veh/h	975	430	0	580	140	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	150	-	-	0	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	1175	518	0	699	169	6

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1175	0	1525
Stage 1	-	-	-	-	1175
Stage 2	-	-	-	-	350
Critical Hdwy	-	-	4.18	-	6.84
Critical Hdwy Stg 1	-	-	-	-	5.84
Critical Hdwy Stg 2	-	-	-	-	5.84
Follow-up Hdwy	-	-	2.24	-	3.52
Pot Cap-1 Maneuver	-	-	579	-	~ 109
Stage 1	-	-	-	-	256
Stage 2	-	-	-	-	684
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	579	-	~ 109
Mov Cap-2 Maneuver	-	-	-	-	~ 109
Stage 1	-	-	-	-	256
Stage 2	-	-	-	-	684

Approach	EB	WB	NB
HCM Control Delay, s	0	0	\$ 344.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	109	452	-	-	579	-
HCM Lane V/C Ratio	1.547	0.013	-	-	-	-
HCM Control Delay (s)	\$ 356.6	13.1	-	-	0	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	12.5	0	-	-	0	-

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

Lanes, Volumes, Timings  
8: Torrey St & Main St

2038 PM Peak Hour Proposed  
09/17/2018

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↖↑	↖	↗
Traffic Volume (vph)	575	325	50	1055	140	5
Future Volume (vph)	575	325	50	1055	140	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Storage Length (ft)		150	0		0	185
Storage Lanes		1	0		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected				0.998	0.950	
Satd. Flow (prot)	3260	1458	0	3191	1630	1458
Flt Permitted				0.998	0.950	
Satd. Flow (perm)	3260	1458	0	3191	1630	1458
Link Speed (mph)	30			30	30	
Link Distance (ft)	4747			195	918	
Travel Time (s)	107.9			4.4	20.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%
Adj. Flow (vph)	693	392	60	1271	169	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	693	392	0	1331	169	6
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	68.9%			ICU Level of Service C		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	31.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑	↑
Traffic Vol, veh/h	575	325	50	1055	140	5
Future Vol, veh/h	575	325	50	1055	140	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	150	-	-	0	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	2	2	4	4	2	2
Mvmt Flow	693	392	60	1271	169	6

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	693	0	1449 347
Stage 1	-	-	-	-	693 -
Stage 2	-	-	-	-	756 -
Critical Hdwy	-	-	4.18	-	6.84 6.94
Critical Hdwy Stg 1	-	-	-	-	5.84 -
Critical Hdwy Stg 2	-	-	-	-	5.84 -
Follow-up Hdwy	-	-	2.24	-	3.52 3.32
Pot Cap-1 Maneuver	-	-	885	-	~ 122 649
Stage 1	-	-	-	-	457 -
Stage 2	-	-	-	-	424 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	885	-	~ 94 649
Mov Cap-2 Maneuver	-	-	-	-	~ 94 -
Stage 1	-	-	-	-	351 -
Stage 2	-	-	-	-	424 -

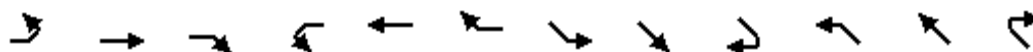
Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	\$ 456.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	94	649	-	-	885	-
HCM Lane V/C Ratio	1.794	0.009	-	-	0.068	-
HCM Control Delay (s)	\$ 472.8	10.6	-	-	9.4	1
HCM Lane LOS	F	B	-	-	A	A
HCM 95th %tile Q(veh)	13.9	0	-	-	0.2	-

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

Lanes, Volumes, Timings  
18: Doty Ave/Private Entrance & Main St/Wisconsin Ave

2038 AM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	0	745	80	5	530	30	5	0	0	25	0	0
Future Volume (vph)	0	745	80	5	530	30	5	0	0	25	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Frt		0.987			0.993							
Flt Protected								0.950			0.950	
Satd. Flow (prot)	0	1693	0	0	1347	0	0	1630	0	0	1630	0
Flt Permitted								0.950			0.950	
Satd. Flow (perm)	0	1693	0	0	1347	0	0	1630	0	0	1630	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		409			712			118			585	
Travel Time (s)		9.3			16.2			2.7			13.3	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	29%	29%	29%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	887	95	6	631	36	6	0	0	30	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	982	0	0	673	0	0	6	0	0	30	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes										
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 57.8% ICU Level of Service B

Analysis Period (min) 15

Intersection												
Int Delay, s/veh	1.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	745	80	5	530	30	5	0	0	25	0	0
Future Vol, veh/h	0	745	80	5	530	30	5	0	0	25	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	29	29	29	2	2	2	2	2	2
Mvmt Flow	0	887	95	6	631	36	6	0	0	30	0	0

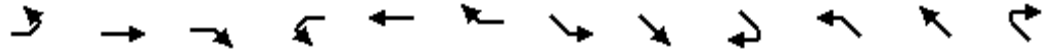
Major/Minor	Major1			Major2			Minor2			Minor1		
Conflicting Flow All	667	0	0	982	0	0	1596	1643	649	1596	1614	935
Stage 1	-	-	-	-	-	-	661	661	-	935	935	-
Stage 2	-	-	-	-	-	-	935	982	-	661	679	-
Critical Hdwy	4.12	-	-	4.39	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.461	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	923	-	-	606	-	-	86	100	470	86	104	322
Stage 1	-	-	-	-	-	-	452	460	-	318	344	-
Stage 2	-	-	-	-	-	-	318	327	-	452	451	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	923	-	-	606	-	-	85	98	470	85	102	322
Mov Cap-2 Maneuver	-	-	-	-	-	-	85	98	-	85	102	-
Stage 1	-	-	-	-	-	-	452	453	-	318	344	-
Stage 2	-	-	-	-	-	-	318	327	-	445	444	-

Approach	EB			WB			SE			NW		
HCM Control Delay, s	0			0.1			50.5			68.6		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SELn1
Capacity (veh/h)	85	923	-	-	606	-	-	85
HCM Lane V/C Ratio	0.35	-	-	-	0.01	-	-	0.07
HCM Control Delay (s)	68.6	0	-	-	11	0	-	50.5
HCM Lane LOS	F	A	-	-	B	A	-	F
HCM 95th %tile Q(veh)	1.4	0	-	-	0	-	-	0.2

Lanes, Volumes, Timings  
 18: Doty Ave/Private Entrance & Main St/Wisconsin Ave

2038 PM Peak Hour Proposed  
 09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	5	505	70	20	895	10	5	0	0	60	0	20
Future Volume (vph)	5	505	70	20	895	10	5	0	0	60	0	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Frt		0.984			0.999							0.966
Flt Protected					0.999			0.950				0.964
Satd. Flow (prot)	0	1688	0	0	1354	0	0	1630	0	0	1598	0
Flt Permitted					0.999			0.950				0.964
Satd. Flow (perm)	0	1688	0	0	1354	0	0	1630	0	0	1598	0
Link Speed (mph)		30			30			30				30
Link Distance (ft)		409			712			118				585
Travel Time (s)		9.3			16.2			2.7				13.3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	29%	29%	29%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	6	601	83	24	1065	12	6	0	0	71	0	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	690	0	0	1101	0	0	6	0	0	95	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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane		Yes										
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop				Stop

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	76.9%
ICU Level of Service	D
Analysis Period (min)	15



Intersection												
Int Delay, s/veh	13.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	505	70	20	895	10	5	0	0	60	0	20
Future Vol, veh/h	5	505	70	20	895	10	5	0	0	60	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	29	29	29	2	2	2	2	2	2
Mvmt Flow	6	601	83	24	1065	12	6	0	0	71	0	24

Major/Minor	Major1		Major2		Minor2		Minor1					
Conflicting Flow All	1077	0	0	684	0	0	1786	1815	1071	1774	1780	643
Stage 1	-	-	-	-	-	-	1119	1119	-	655	655	-
Stage 2	-	-	-	-	-	-	667	696	-	1119	1125	-
Critical Hdwy	4.12	-	-	4.39	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.461	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	647	-	-	795	-	-	63	78	268	~ 65	82	473
Stage 1	-	-	-	-	-	-	251	282	-	455	463	-
Stage 2	-	-	-	-	-	-	448	443	-	251	280	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	647	-	-	795	-	-	56	71	268	~ 61	75	473
Mov Cap-2 Maneuver	-	-	-	-	-	-	56	71	-	~ 61	75	-
Stage 1	-	-	-	-	-	-	247	261	-	448	456	-
Stage 2	-	-	-	-	-	-	419	436	-	232	259	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	0.1	0.2	76.8	267.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SELn1
Capacity (veh/h)	78	647	-	-	795	-	-	56
HCM Lane V/C Ratio	1.221	0.009	-	-	0.03	-	-	0.106
HCM Control Delay (s)	267.7	10.6	0	-	9.7	0	-	76.8
HCM Lane LOS	F	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	7.2	0	-	-	0.1	-	-	0.3

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

Lanes, Volumes, Timings  
12: Church St & Torrey St/Columbian Ave

2038 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	275	55	5	100	10	65	125	20	5	20	10
Future Volume (vph)	20	275	55	5	100	10	65	125	20	5	20	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. 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
Frt		0.979			0.988			0.987			0.960	
Flt Protected		0.997			0.998			0.985			0.993	
Satd. Flow (prot)	0	1861	0	0	1917	0	0	1890	0	0	1854	0
Flt Permitted		0.997			0.998			0.985			0.993	
Satd. Flow (perm)	0	1861	0	0	1917	0	0	1890	0	0	1854	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		918			536			271			298	
Travel Time (s)		20.9			12.2			6.2			6.8	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	344	69	6	125	13	81	156	25	6	25	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	438	0	0	144	0	0	262	0	0	44	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	52.9%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	13.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	275	55	5	100	10	65	125	20	5	20	10
Future Vol, veh/h	20	275	55	5	100	10	65	125	20	5	20	10
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	4	4	4	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	344	69	6	125	13	81	156	25	6	25	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	15.6	9.9	12.3	9.3
HCM LOS	C	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	31%	6%	4%	14%
Vol Thru, %	60%	79%	87%	57%
Vol Right, %	10%	16%	9%	29%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	210	350	115	35
LT Vol	65	20	5	5
Through Vol	125	275	100	20
RT Vol	20	55	10	10
Lane Flow Rate	262	438	144	44
Geometry Grp	1	1	1	1
Degree of Util (X)	0.403	0.61	0.216	0.07
Departure Headway (Hd)	5.521	5.023	5.408	5.796
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	651	722	663	616
Service Time	3.56	3.023	3.448	3.849
HCM Lane V/C Ratio	0.402	0.607	0.217	0.071
HCM Control Delay	12.3	15.6	9.9	9.3
HCM Lane LOS	B	C	A	A
HCM 95th-tile Q	1.9	4.2	0.8	0.2

Lanes, Volumes, Timings  
12: Church St & Torrey St/Columbian Ave

2038 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	260	80	20	80	5	30	60	25	20	95	10
Future Volume (vph)	10	260	80	20	80	5	30	60	25	20	95	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. 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
Frt		0.969			0.994			0.971			0.989	
Flt Protected		0.999			0.991			0.987			0.992	
Satd. Flow (prot)	0	1846	0	0	1915	0	0	1864	0	0	1908	0
Flt Permitted		0.999			0.991			0.987			0.992	
Satd. Flow (perm)	0	1846	0	0	1915	0	0	1864	0	0	1908	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		918			536			271			298	
Travel Time (s)		20.9			12.2			6.2			6.8	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	13	325	100	25	100	6	38	75	31	25	119	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	438	0	0	131	0	0	144	0	0	157	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	39.4%
ICU Level of Service	A
Analysis Period (min)	15

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

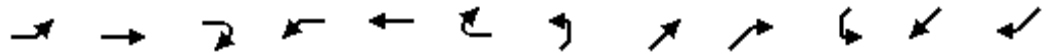
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	260	80	20	80	5	30	60	25	20	95	10
Future Vol, veh/h	10	260	80	20	80	5	30	60	25	20	95	10
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles, %	4	4	4	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	325	100	25	100	6	38	75	31	25	119	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	15	9.8	10.3	10.5
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	3%	19%	16%
Vol Thru, %	52%	74%	76%	76%
Vol Right, %	22%	23%	5%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	115	350	105	125
LT Vol	30	10	20	20
Through Vol	60	260	80	95
RT Vol	25	80	5	10
Lane Flow Rate	144	438	131	156
Geometry Grp	1	1	1	1
Degree of Util (X)	0.224	0.599	0.198	0.245
Departure Headway (Hd)	5.606	4.933	5.436	5.642
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	640	735	659	636
Service Time	3.652	2.933	3.478	3.688
HCM Lane V/C Ratio	0.225	0.596	0.199	0.245
HCM Control Delay	10.3	15	9.8	10.5
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	0.9	4	0.7	1

Lanes, Volumes, Timings  
15: Church St & Doty Ave

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	35	5	20	40	30	5	140	10	5	20	5
Future Volume (vph)	20	35	5	20	40	30	5	140	10	5	20	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Fr <sub>t</sub>		0.989			0.955			0.991			0.978	
Fl <sub>t</sub> Protected		0.984			0.989			0.998			0.992	
Satd. Flow (prot)	0	1892	0	0	1719	0	0	1923	0	0	1886	0
Fl <sub>t</sub> Permitted		0.984			0.989			0.998			0.992	
Satd. Flow (perm)	0	1892	0	0	1719	0	0	1923	0	0	1886	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		585			531			298			325	
Travel Time (s)		13.3			12.1			6.8			7.4	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	44	6	25	50	38	6	175	13	6	25	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	75	0	0	113	0	0	194	0	0	37	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.5%
ICU Level of Service	A
Analysis Period (min)	15

Intersection												
Int Delay, s/veh	7.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	35	5	20	40	30	5	140	10	5	20	5
Future Vol, veh/h	20	35	5	20	40	30	5	140	10	5	20	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	9	9	9	2	2	2	2	2	2
Mvmt Flow	25	44	6	25	50	38	6	175	13	6	25	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	88	0	0	50	0	0	229	235	47	304	219	69
Stage 1	-	-	-	-	-	-	97	97	-	119	119	-
Stage 2	-	-	-	-	-	-	132	138	-	185	100	-
Critical Hdwy	4.12	-	-	4.19	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.281	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1508	-	-	1513	-	-	726	666	1022	648	679	994
Stage 1	-	-	-	-	-	-	910	815	-	885	797	-
Stage 2	-	-	-	-	-	-	871	782	-	817	812	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1508	-	-	1513	-	-	682	643	1022	493	656	994
Mov Cap-2 Maneuver	-	-	-	-	-	-	682	643	-	493	656	-
Stage 1	-	-	-	-	-	-	895	801	-	870	783	-
Stage 2	-	-	-	-	-	-	824	769	-	620	798	-

Approach	EB			WB			NE			SW		
HCM Control Delay, s	2.5			1.6			12.5			10.1		
HCM LOS							B			B		

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	675	1508	-	-	1513	-	-	738
HCM Lane V/C Ratio	0.287	0.017	-	-	0.017	-	-	0.051
HCM Control Delay (s)	12.5	7.4	0	-	7.4	0	-	10.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.2	0.1	-	-	0.1	-	-	0.2

Lanes, Volumes, Timings  
15: Church St & Doty Ave

2038 PM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	50	20	10	50	25	5	60	10	30	95	10
Future Volume (vph)	20	50	20	10	50	25	5	60	10	30	95	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Storage Length (ft)	0		50	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		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	1.00	1.00
Frt		0.970			0.961			0.981			0.990	
Flt Protected		0.989			0.994			0.997			0.989	
Satd. Flow (prot)	0	1865	0	0	1738	0	0	1902	0	0	1904	0
Flt Permitted		0.989			0.994			0.997			0.989	
Satd. Flow (perm)	0	1865	0	0	1738	0	0	1902	0	0	1904	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		585			531			298			325	
Travel Time (s)		13.3			12.1			6.8			7.4	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	2%	2%	2%	9%	9%	9%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	25	63	25	13	63	31	6	75	13	38	119	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	113	0	0	107	0	0	94	0	0	170	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			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 30.4%

ICU Level of Service A

Analysis Period (min) 15



Intersection												
Int Delay, s/veh	6.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	50	20	10	50	25	5	60	10	30	95	10
Future Vol, veh/h	20	50	20	10	50	25	5	60	10	30	95	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	9	9	9	2	2	2	2	2	2
Mvmt Flow	25	63	25	13	63	31	6	75	13	38	119	13

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	94	0	0	88	0	0	290	246	76	268	243	79
Stage 1	-	-	-	-	-	-	126	126	-	105	105	-
Stage 2	-	-	-	-	-	-	164	120	-	163	138	-
Critical Hdwy	4.12	-	-	4.19	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.281	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1500	-	-	1465	-	-	662	656	985	685	659	981
Stage 1	-	-	-	-	-	-	878	792	-	901	808	-
Stage 2	-	-	-	-	-	-	838	796	-	839	782	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1500	-	-	1465	-	-	549	638	985	603	641	981
Mov Cap-2 Maneuver	-	-	-	-	-	-	549	638	-	603	641	-
Stage 1	-	-	-	-	-	-	862	778	-	885	801	-
Stage 2	-	-	-	-	-	-	698	789	-	735	768	-

Approach	EB		WB		NE		SW	
HCM Control Delay, s	1.7		0.9		10.7		12	
HCM LOS					B		B	

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	727	1500	-	-	1465	-	-	682
HCM Lane V/C Ratio	0.129	0.017	-	-	0.009	-	-	0.247
HCM Control Delay (s)	10.7	7.4	0	-	7.5	0	-	12
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	1

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	460	5	20	535	175	10	155	20	5	5	10
Future Volume (vph)	275	460	5	20	535	175	10	155	20	5	5	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	200		0	130		0	0		0	0		60
Storage Lanes	1		0	1		0	0		0	0		1
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	1.00	1.00
Frt		0.998			0.963			0.985				0.850
Flt Protected	0.950			0.950				0.997			0.976	
Satd. Flow (prot)	1630	1712	0	1630	1652	0	0	1685	0	0	1553	1352
Flt Permitted	0.121			0.457				0.985			0.818	
Satd. Flow (perm)	208	1712	0	784	1652	0	0	1665	0	0	1301	1352
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			21			5				77
Link Speed (mph)		25			25			25				25
Link Distance (ft)		712			521			325				230
Travel Time (s)		19.4			14.2			8.9				6.3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	62%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	10%	10%	10%
Adj. Flow (vph)	327	548	6	24	637	208	12	185	24	6	6	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	327	554	0	24	845	0	0	221	0	0	12	7
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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		7	15		9	15		9
Number of Detectors	1	2		1	2		1	1		1	1	0
Detector Template							Left			Left		
Leading Detector (ft)	56	156		56	156		20	11		20	11	0
Trailing Detector (ft)	50	0		50	0		0	5		0	5	0
Detector 1 Position(ft)	50	0		50	0		0	5		0	5	5
Detector 1 Size(ft)	6	6		6	6		20	6		20	6	20
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(ft)		150			150							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

2038 AM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.0	28.5		9.0	28.5		29.5	29.5		29.5	29.5	29.5
Total Split (s)	22.0	81.2		9.0	68.2		29.8	29.8		29.8	29.8	29.8
Total Split (%)	18.3%	67.7%		7.5%	56.8%		24.8%	24.8%		24.8%	24.8%	24.8%
Maximum Green (s)	19.0	75.7		6.0	62.7		23.3	23.3		23.3	23.3	23.3
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	0.0	2.5		0.0	2.5		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	3.0	5.5		3.0	5.5			6.5			6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Max		None	C-Max		Min	Min		Min	Min	Min
Walk Time (s)		5.0			5.0		5.0	5.0				
Flash Dont Walk (s)		18.0			18.0		18.0	18.0				
Pedestrian Calls (#/hr)		0			0		0	0				
Act Effct Green (s)	90.9	83.5		73.8	66.2			19.6			19.6	19.6
Actuated g/C Ratio	0.76	0.70		0.62	0.55			0.16			0.16	0.16
v/c Ratio	0.85	0.47		0.05	0.92			0.80			0.06	0.02
Control Delay	42.3	11.0		7.9	33.4			69.1			40.8	0.2
Queue Delay	0.0	0.0		0.0	0.1			0.0			0.0	0.0
Total Delay	42.3	11.0		7.9	33.5			69.1			40.8	0.2
LOS	D	B		A	C			E			D	A
Approach Delay		22.6			32.8			69.1			25.8	
Approach LOS		C			C			E			C	

Intersection Summary

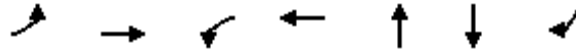
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	110 (92%), Referenced to phase 2:WBTL, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	32.2
Intersection LOS:	C
Intersection Capacity Utilization	89.4%
ICU Level of Service	E
Analysis Period (min)	15

Splits and Phases: 14: Church St & Wisconsin Ave



Queues  
14: Church St & Wisconsin Ave

2038 AM Peak Hour Proposed  
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Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	327	554	24	845	221	12	7
v/c Ratio	0.85	0.47	0.05	0.92	0.80	0.06	0.02
Control Delay	42.3	11.0	7.9	33.4	69.1	40.8	0.2
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	42.3	11.0	7.9	33.5	69.1	40.8	0.2
Queue Length 50th (ft)	139	197	7	396	159	8	0
Queue Length 95th (ft)	#263	269	m8	#770	m219	23	0
Internal Link Dist (ft)		632		441	245	150	
Turn Bay Length (ft)	200		130				60
Base Capacity (vph)	393	1191	530	920	327	252	324
Starvation Cap Reductn	0	0	0	1	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.47	0.05	0.92	0.68	0.05	0.02

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
 14: Church St & Wisconsin Ave

2038 AM Peak Hour Proposed  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	460	5	20	535	175	10	155	20	5	5	10
Future Volume (veh/h)	275	460	5	20	535	175	10	155	20	5	5	10
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1614	1614	1614
Adj Flow Rate, veh/h	327	548	6	24	637	208	12	185	24	6	6	7
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	10	10	10
Cap, veh/h	622	1198	13	579	794	259	38	215	27	98	80	202
Arrive On Green	0.09	0.70	0.70	0.05	1.00	1.00	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1641	1701	19	1641	1244	406	45	1452	182	358	539	1367
Grp Volume(v), veh/h	327	0	554	24	0	845	221	0	0	12	0	7
Grp Sat Flow(s),veh/h/ln	1641	0	1719	1641	0	1650	1680	0	0	897	0	1367
Q Serve(g_s), s	7.7	0.0	16.9	0.6	0.0	0.0	6.5	0.0	0.0	0.0	0.0	0.5
Cycle Q Clear(g_c), s	7.7	0.0	16.9	0.6	0.0	0.0	15.5	0.0	0.0	0.8	0.0	0.5
Prop In Lane	1.00		0.01	1.00		0.25	0.05		0.11	0.50		1.00
Lane Grp Cap(c), veh/h	622	0	1211	579	0	1053	280	0	0	178	0	202
V/C Ratio(X)	0.53	0.00	0.46	0.04	0.00	0.80	0.79	0.00	0.00	0.07	0.00	0.03
Avail Cap(c_a), veh/h	736	0	1211	623	0	1053	357	0	0	238	0	265
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.58	0.00	0.58	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	5.0	0.0	7.8	7.2	0.0	0.0	50.1	0.0	0.0	43.9	0.0	43.8
Incr Delay (d2), s/veh	0.7	0.0	1.2	0.0	0.0	3.9	8.8	0.0	0.0	0.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.5	0.0	10.4	0.4	0.0	2.0	11.6	0.0	0.0	0.6	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	5.6	0.0	9.0	7.2	0.0	3.9	59.0	0.0	0.0	44.0	0.0	43.9
LnGrp LOS	A	A	A	A	A	A	E	A	A	D	A	D
Approach Vol, veh/h		881			869			221				19
Approach Delay, s/veh		7.8			4.0			59.0				44.0
Approach LOS		A			A			E				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.7	82.1		24.3	5.8	90.0		24.3				
Change Period (Y+Rc), s	3.0	5.5		6.5	3.0	5.5		6.5				
Max Green Setting (Gmax), s	19.0	62.7		23.3	6.0	75.7		23.3				
Max Q Clear Time (g_c+I1), s	9.7	2.0		17.5	2.6	18.9		2.8				
Green Ext Time (p_c), s	1.0	14.9		0.3	0.0	7.1		0.0				

Intersection Summary

HCM 6th Ctrl Delay	12.1
HCM 6th LOS	B

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

2038 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	460	30	20	590	25	30	20	60	120	95	300
Future Volume (vph)	25	460	30	20	590	25	30	20	60	120	95	300
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Storage Length (ft)	200		0	130		0	0		0	0		60
Storage Lanes	1		0	1		0	0		0	0		1
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	1.00	1.00
Frt		0.991			0.994			0.926				0.850
Flt Protected	0.950			0.950				0.987			0.973	
Satd. Flow (prot)	1630	1700	0	1630	1705	0	0	1568	0	0	1669	1458
Flt Permitted	0.292			0.384				0.806			0.783	
Satd. Flow (perm)	501	1700	0	659	1705	0	0	1281	0	0	1343	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			4			65				159
Link Speed (mph)		25			25			25				25
Link Distance (ft)		712			521			325				230
Travel Time (s)		19.4			14.2			8.9				6.3
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	62%
Adj. Flow (vph)	27	495	32	22	634	27	32	22	65	129	102	200
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	527	0	22	661	0	0	119	0	0	231	200
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			0				0
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		7	15		9	15		9
Number of Detectors	1	2		1	2		1	1		1	1	0
Detector Template							Left			Left		
Leading Detector (ft)	56	156		56	156		20	11		20	11	0
Trailing Detector (ft)	50	0		50	0		0	5		0	5	0
Detector 1 Position(ft)	50	0		50	0		0	5		0	5	5
Detector 1 Size(ft)	6	6		6	6		20	6		20	6	20
Detector 1 Type	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
Detector 1 Queue (s)	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
Detector 2 Position(ft)		150			150							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			4				8

Lanes, Volumes, Timings  
14: Church St & Wisconsin Ave

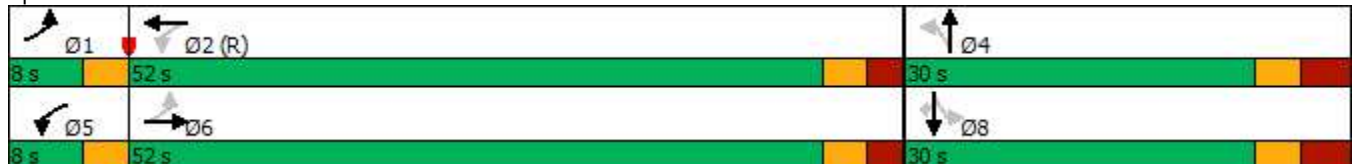
2038 PM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	8.0	28.5		8.0	28.5		29.5	29.5		11.5	11.5	11.5
Total Split (s)	8.0	52.0		8.0	52.0		30.0	30.0		30.0	30.0	30.0
Total Split (%)	8.9%	57.8%		8.9%	57.8%		33.3%	33.3%		33.3%	33.3%	33.3%
Maximum Green (s)	5.0	46.5		5.0	46.5		23.5	23.5		23.5	23.5	23.5
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	0.0	2.5		0.0	2.5		3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Lost Time (s)	3.0	5.5		3.0	5.5			6.5			6.5	6.5
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Max		None	C-Max		Min	Min		Min	Min	Min
Walk Time (s)		5.0			5.0		5.0	5.0				
Flash Dont Walk (s)		18.0			18.0		18.0	18.0				
Pedestrian Calls (#/hr)		0			0		0	0				
Act Effct Green (s)	59.8	55.3		59.8	55.3			19.5			19.5	19.5
Actuated g/C Ratio	0.66	0.61		0.66	0.61			0.22			0.22	0.22
v/c Ratio	0.07	0.50		0.04	0.63			0.36			0.80	0.46
Control Delay	6.3	13.6		3.1	11.9			19.0			53.0	11.2
Queue Delay	0.0	0.0		0.0	0.3			0.0			0.0	0.0
Total Delay	6.3	13.6		3.1	12.2			19.0			53.0	11.2
LOS	A	B		A	B			B			D	B
Approach Delay		13.2			11.9			19.0			33.6	
Approach LOS		B			B			B			C	

Intersection Summary

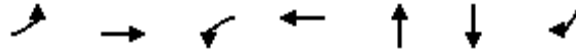
Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 69 (77%), Referenced to phase 2:WBTL, Start of Green  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.80  
 Intersection Signal Delay: 18.0  
 Intersection Capacity Utilization 70.2%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 14: Church St & Wisconsin Ave



Queues  
14: Church St & Wisconsin Ave

2038 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	27	527	22	661	119	231	200
v/c Ratio	0.07	0.50	0.04	0.63	0.36	0.80	0.46
Control Delay	6.3	13.6	3.1	11.9	19.0	53.0	11.2
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Total Delay	6.3	13.6	3.1	12.2	19.0	53.0	11.2
Queue Length 50th (ft)	5	139	2	146	27	123	19
Queue Length 95th (ft)	14	299	m4	m336	m69	199	73
Internal Link Dist (ft)		632		441	245	150	
Turn Bay Length (ft)	200		130				60
Base Capacity (vph)	395	1047	492	1049	382	350	498
Starvation Cap Reductn	0	0	0	85	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.50	0.04	0.69	0.31	0.66	0.40

Intersection Summary

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



HCM 6th Signalized Intersection Summary  
 14: Church St & Wisconsin Ave

2038 PM Peak Hour Proposed  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	460	30	20	590	25	30	20	60	120	95	300
Future Volume (veh/h)	25	460	30	20	590	25	30	20	60	120	95	300
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	27	495	32	22	634	27	32	22	65	129	102	200
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	546	878	57	422	894	38	51	42	50	170	105	381
Arrive On Green	0.03	0.55	0.55	0.05	1.00	1.00	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	1641	1601	103	1641	1640	70	0	161	193	413	404	1460
Grp Volume(v), veh/h	27	0	527	22	0	661	119	0	0	231	0	200
Grp Sat Flow(s),veh/h/ln	1641	0	1704	1641	0	1710	354	0	0	817	0	1460
Q Serve(g_s), s	0.6	0.0	18.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6
Cycle Q Clear(g_c), s	0.6	0.0	18.2	0.5	0.0	0.0	23.5	0.0	0.0	23.5	0.0	10.6
Prop In Lane	1.00		0.06	1.00		0.04	0.27		0.55	0.56		1.00
Lane Grp Cap(c), veh/h	546	0	935	422	0	932	143	0	0	276	0	381
V/C Ratio(X)	0.05	0.00	0.56	0.05	0.00	0.71	0.83	0.00	0.00	0.84	0.00	0.52
Avail Cap(c_a), veh/h	593	0	935	475	0	932	143	0	0	276	0	381
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.83	0.00	0.83	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.4	0.0	13.3	10.1	0.0	0.0	28.8	0.0	0.0	33.6	0.0	28.5
Incr Delay (d2), s/veh	0.0	0.0	2.5	0.0	0.0	3.8	32.1	0.0	0.0	19.8	0.0	1.3
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(95%),veh/ln	0.4	0.0	11.6	0.3	0.0	1.8	6.0	0.0	0.0	10.8	0.0	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.4	0.0	15.7	10.1	0.0	3.8	60.9	0.0	0.0	53.4	0.0	29.8
LnGrp LOS	A	A	B	B	A	A	E	A	A	D	A	C
Approach Vol, veh/h		554			683			119				431
Approach Delay, s/veh		15.4			4.0			60.9				42.5
Approach LOS		B			A			E				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.5	54.5		30.0	5.1	54.9		30.0				
Change Period (Y+Rc), s	3.0	5.5		6.5	3.0	5.5		6.5				
Max Green Setting (Gmax), s	5.0	46.5		23.5	5.0	46.5		23.5				
Max Q Clear Time (g_c+I1), s	2.6	2.0		25.5	2.5	20.2		25.5				
Green Ext Time (p_c), s	0.0	9.0		0.0	0.0	5.7		0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				20.6								
HCM 6th LOS				C								

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

2038 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	320	305	250	50	365	5	275	365	30	0	310	305
Future Volume (vph)	320	305	250	50	365	5	275	365	30	0	310	305
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		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	0.95	0.95	0.95
Fr <sub>t</sub>			0.850		0.998			0.989			0.926	
Fl <sub>t</sub> Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1576	1658	1653	1576	1655	0	1560	1624	0	0	2862	0
Fl <sub>t</sub> Permitted	0.138			0.543			0.136					
Satd. Flow (perm)	229	1658	1653	901	1655	0	223	1624	0	0	2862	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159		1			4				192
Link Speed (mph)		30			25			30				25
Link Distance (ft)		548			403			539				1213
Travel Time (s)		12.5			11.0			12.3				33.1
Peak Hour Factor	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	372	367	187	60	440	6	331	440	36	0	373	367
Shared Lane Traffic (%)												
Lane Group Flow (vph)	372	367	187	60	446	0	331	476	0	0	740	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)		11			11			11				11
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.16	1.16	0.95	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0		1	0		1	0	
Detector Template										Left		
Leading Detector (ft)	66	0	0	31	0		56	0		20	0	
Trailing Detector (ft)	60	0	0	25	0		50	0		0	0	
Detector 1 Position(ft)	60	5	5	25	5		50	5		0	5	
Detector 1 Size(ft)	6	6	20	6	6		6	6		20	6	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Turn Type	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA			NA	
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		Free	4			6			2		
Detector Phase	3	8		7	4		1	6		2		2
Switch Phase												

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

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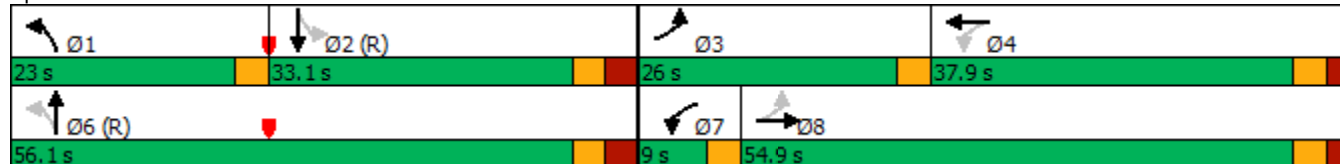


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	6.0	19.0		6.0	19.0		6.0	19.0		19.0	19.0	
Minimum Split (s)	9.0	28.5		9.0	28.5		9.0	30.0		30.0	30.0	
Total Split (s)	26.0	54.9		9.0	37.9		23.0	56.1		33.1	33.1	
Total Split (%)	21.7%	45.8%		7.5%	31.6%		19.2%	46.8%		27.6%	27.6%	
Maximum Green (s)	23.0	49.4		6.0	32.4		20.0	50.1		27.1	27.1	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	2.5		0.0	2.5		0.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	3.0	5.5		3.0	5.5		3.0	6.0				6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?		Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Min		None	C-Max		C-Max	C-Max	
Walk Time (s)		5.0			5.0			5.0		5.0	5.0	
Flash Dont Walk (s)		18.0			18.0			19.0		19.0	19.0	
Pedestrian Calls (#/hr)		0			0			0		0	0	
Act Effct Green (s)	60.9	51.2	120.0	40.9	32.4		53.1	50.1				27.1
Actuated g/C Ratio	0.51	0.43	1.00	0.34	0.27		0.44	0.42				0.23
v/c Ratio	0.99	0.52	0.11	0.18	1.00		1.03	0.70				0.93
Control Delay	76.8	29.3	0.1	18.3	86.2		91.1	35.2				38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Delay	76.8	29.3	0.1	18.3	86.2		91.1	35.2				38.1
LOS	E	C	A	B	F		F	D				D
Approach Delay		42.5			78.1			58.2				38.1
Approach LOS		D			E			E				D

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green, Master Intersection  
 Natural Cycle: 110  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.03  
 Intersection Signal Delay: 51.7  
 Intersection LOS: D  
 Intersection Capacity Utilization 101.1%  
 ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 30: Commercial St & Winneconne Ave





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	372	367	187	60	446	331	476	740
v/c Ratio	0.99	0.52	0.11	0.18	1.00	1.03	0.70	0.93
Control Delay	76.8	29.3	0.1	18.3	86.2	91.1	35.2	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.8	29.3	0.1	18.3	86.2	91.1	35.2	38.1
Queue Length 50th (ft)	229	211	0	23	345	~223	296	225
Queue Length 95th (ft)	#398	275	0	43	#492	#355	376	#285
Internal Link Dist (ft)		468			323		459	1133
Turn Bay Length (ft)			150					
Base Capacity (vph)	374	707	1653	340	447	321	680	794
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.52	0.11	0.18	1.00	1.03	0.70	0.93

**Intersection Summary**

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

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

HCM 6th Signalized Intersection Summary  
30: Commercial St & Winneconne Ave

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗		↖	↗			↖↗	
Traffic Volume (veh/h)	320	305	250	50	365	5	275	365	30	0	310	305
Future Volume (veh/h)	320	305	250	50	365	5	275	365	30	0	310	305
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	1723	1723	1792	1723	1723	1723	1709	1709	1709	1695	1695	1695
Adj Flow Rate, veh/h	372	367	0	60	440	6	331	440	36	0	373	367
Peak Hour Factor	0.86	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	4	4	4
Cap, veh/h	379	709		387	446	6	331	661	54	0	375	334
Arrive On Green	0.19	0.41	0.00	0.04	0.26	0.26	0.17	0.42	0.42	0.00	0.08	0.08
Sat Flow, veh/h	1641	1723	1518	1641	1695	23	1628	1559	128	0	1695	1437
Grp Volume(v), veh/h	372	367	0	60	0	446	331	0	476	0	373	367
Grp Sat Flow(s),veh/h/ln	1641	1723	1518	1641	0	1719	1628	0	1686	0	1611	1437
Q Serve(g_s), s	22.3	19.1	0.0	3.2	0.0	31.0	20.0	0.0	27.2	0.0	27.8	27.9
Cycle Q Clear(g_c), s	22.3	19.1	0.0	3.2	0.0	31.0	20.0	0.0	27.2	0.0	27.8	27.9
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.08	0.00		1.00
Lane Grp Cap(c), veh/h	379	709		387	0	452	331	0	715	0	375	334
V/C Ratio(X)	0.98	0.52		0.15	0.00	0.99	1.00	0.00	0.67	0.00	1.00	1.10
Avail Cap(c_a), veh/h	379	709		398	0	464	331	0	715	0	375	334
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.93	0.93
Uniform Delay (d), s/veh	35.2	26.4	0.0	30.0	0.0	44.0	35.5	0.0	27.7	0.0	55.3	55.4
Incr Delay (d2), s/veh	41.0	2.7	0.0	0.2	0.0	37.7	49.2	0.0	4.8	0.0	43.8	76.5
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(95%),veh/ln	21.7	13.0	0.0	2.3	0.0	24.9	18.1	0.0	17.4	0.0	23.1	26.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.3	29.1	0.0	30.1	0.0	81.7	84.7	0.0	32.6	0.0	99.1	131.9
LnGrp LOS	E	C		C	A	F	F	A	C	A	F	F
Approach Vol, veh/h		739	A		506			807			740	
Approach Delay, s/veh		52.8			75.5			53.9			115.4	
Approach LOS		D			E			D			F	
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	23.0	33.9	26.0	37.1		56.9	8.2	54.9				
Change Period (Y+Rc), s	3.0	6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s	20.0	27.1	23.0	32.4		50.1	6.0	49.4				
Max Q Clear Time (g_c+I1), s	22.0	0.0	24.3	0.0		0.0	5.2	0.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0		0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	73.8
HCM 6th LOS	E

Notes

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

Lanes, Volumes, Timings  
30: Commercial St & Winneconne Ave

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	335	290	250	60	355	5	160	445	40	10	400	460
Future Volume (vph)	335	290	250	60	355	5	160	445	40	10	400	460
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		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	0.95	0.95	0.95
Fr <sub>t</sub>			0.850		0.998			0.988			0.921	
Fl <sub>t</sub> Protected	0.950			0.950			0.950				0.999	
Satd. Flow (prot)	1576	1658	1653	1576	1655	0	1576	1639	0	0	2899	0
Fl <sub>t</sub> Permitted	0.238			0.569			0.136				0.946	
Satd. Flow (perm)	395	1658	1653	944	1655	0	226	1639	0	0	2745	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			212		1			6			321	
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1213	
Travel Time (s)		12.5			11.0			12.3			33.1	
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
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	364	315	168	65	386	5	174	484	43	11	435	500
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	315	168	65	391	0	174	527	0	0	946	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)		11			11			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.16	1.16	0.95	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	0	1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	25	100	0	25	100		25	100		20	100	
Trailing Detector (ft)	5	5	0	5	5		5	5		0	5	
Detector 1 Position(ft)	5	5	5	5	5		5	5		0	5	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	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	
Detector 1 Queue (s)	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	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
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	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA		Perm	NA	

Lanes, Volumes, Timings  
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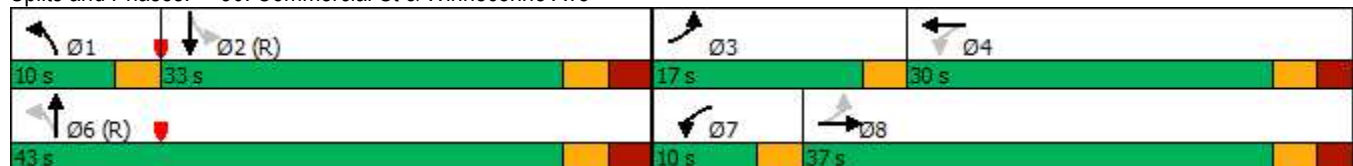


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		Free	4			6			2		
Detector Phase	3	8		7	4		1	6		2		2
Switch Phase												
Minimum Initial (s)	6.0	19.0		6.0	19.0		6.0	19.0		19.0		19.0
Minimum Split (s)	9.5	30.0		9.5	30.0		9.5	30.5		30.5		30.5
Total Split (s)	17.0	37.0		10.0	30.0		10.0	43.0		33.0		33.0
Total Split (%)	18.9%	41.1%		11.1%	33.3%		11.1%	47.8%		36.7%		36.7%
Maximum Green (s)	14.0	31.5		7.0	24.5		7.0	37.0		27.0		27.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
All-Red Time (s)	0.0	2.5		0.0	2.5		0.0	3.0		3.0		3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0				0.0
Total Lost Time (s)	3.0	5.5		3.0	5.5		3.0	6.0				6.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag		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	None	Min		None	Max		None	C-Max		C-Max		C-Max
Walk Time (s)		5.0			5.0			5.0		5.0		5.0
Flash Dont Walk (s)		18.0			18.0			19.0		19.0		19.0
Pedestrian Calls (#/hr)		0			0			0		0		0
Act Effct Green (s)	44.0	33.6	90.0	33.7	24.5		40.0	37.0				27.0
Actuated g/C Ratio	0.49	0.37	1.00	0.37	0.27		0.44	0.41				0.30
v/c Ratio	0.97	0.51	0.10	0.16	0.87		0.85	0.78				0.90
Control Delay	58.9	26.3	0.1	14.0	52.3		53.6	32.4				22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0				0.0
Total Delay	58.9	26.3	0.1	14.0	52.3		53.6	32.4				22.1
LOS	E	C	A	B	D		D	C				C
Approach Delay		35.1			46.8			37.6				22.1
Approach LOS		D			D			D				C

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green, Master Intersection  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.97  
 Intersection Signal Delay: 33.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 115.1%  
 ICU Level of Service H  
 Analysis Period (min) 15

Splits and Phases: 30: Commercial St & Winneconne Ave





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	364	315	168	65	391	174	527	946
v/c Ratio	0.97	0.51	0.10	0.16	0.87	0.85	0.78	0.90
Control Delay	58.9	26.3	0.1	14.0	52.3	53.6	32.4	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.9	26.3	0.1	14.0	52.3	53.6	32.4	22.1
Queue Length 50th (ft)	132	142	0	19	211	60	251	106
Queue Length 95th (ft)	#301	225	0	41	#374	#162	#397	#302
Internal Link Dist (ft)		468			323		459	1133
Turn Bay Length (ft)			150					
Base Capacity (vph)	376	619	1653	405	451	205	677	1048
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.51	0.10	0.16	0.87	0.85	0.78	0.90

**Intersection Summary**

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



HCM 6th Signalized Intersection Summary  
30: Commercial St & Winneconne Ave

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	335	290	250	60	355	5	160	445	40	10	400	460
Future Volume (veh/h)	335	290	250	60	355	5	160	445	40	10	400	460
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	1723	1723	1792	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	364	315	0	65	386	5	174	484	43	11	435	500
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	393	645		417	462	6	208	641	57	46	508	399
Arrive On Green	0.16	0.37	0.00	0.05	0.27	0.27	0.08	0.41	0.41	0.10	0.10	0.10
Sat Flow, veh/h	1641	1723	1518	1641	1697	22	1641	1559	139	15	1693	1329
Grp Volume(v), veh/h	364	315	0	65	0	391	174	0	527	446	0	500
Grp Sat Flow(s),veh/h/ln	1641	1723	1518	1641	0	1719	1641	0	1698	1708	0	1329
Q Serve(g_s), s	14.0	12.6	0.0	2.5	0.0	19.3	6.4	0.0	23.9	6.1	0.0	27.0
Cycle Q Clear(g_c), s	14.0	12.6	0.0	2.5	0.0	19.3	6.4	0.0	23.9	23.1	0.0	27.0
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.08	0.02		1.00
Lane Grp Cap(c), veh/h	393	645		417	0	468	208	0	698	553	0	399
V/C Ratio(X)	0.93	0.49		0.16	0.00	0.84	0.84	0.00	0.76	0.81	0.00	1.25
Avail Cap(c_a), veh/h	393	645		457	0	468	208	0	698	553	0	399
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	0.87	0.00	0.87
Uniform Delay (d), s/veh	21.1	21.6	0.0	21.4	0.0	30.9	22.8	0.0	22.6	38.7	0.0	40.5
Incr Delay (d2), s/veh	27.9	0.6	0.0	0.2	0.0	16.1	25.0	0.0	7.4	10.5	0.0	131.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.8	8.7	0.0	1.8	0.0	15.1	6.8	0.0	15.8	17.5	0.0	36.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.0	22.1	0.0	21.5	0.0	46.9	47.7	0.0	30.1	49.2	0.0	172.0
LnGrp LOS	D	C		C	A	D	D	A	C	D	A	F
Approach Vol, veh/h		679	A		456			701			946	
Approach Delay, s/veh		36.5			43.3			34.5			114.1	
Approach LOS		D			D			C			F	
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	10.0	33.0	17.0	30.0		43.0	7.8	39.2				
Change Period (Y+Rc), s	3.0	6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s	7.0	27.0	14.0	24.5		37.0	7.0	31.5				
Max Q Clear Time (g_c+I1), s	8.4	29.0	16.0	21.3		25.9	4.5	14.6				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.7		2.6	0.0	1.7				

Intersection Summary

HCM 6th Ctrl Delay	63.5
HCM 6th LOS	E

Notes

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

Lanes, Volumes, Timings  
19: Commercial St & Columbian Ave

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	155	50	5	60	5	25	565	25	10	595	40
Future Volume (vph)	90	155	50	5	60	5	25	565	25	10	595	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	11	11	11	11	11
Storage Length (ft)	0		180	75		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Fr <sub>t</sub>		0.963			0.989			0.994			0.991	
Fl <sub>t</sub> Protected	0.950			0.950				0.998			0.999	
Satd. Flow (prot)	1506	1527	0	1521	1584	0	0	3096	0	0	3089	0
Fl <sub>t</sub> Permitted	0.706			0.354				0.895			0.941	
Satd. Flow (perm)	1120	1527	0	567	1584	0	0	2776	0	0	2910	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			4			5			9	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		536			509			1213			296	
Travel Time (s)		14.6			13.9			33.1			8.1	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Adj. Flow (vph)	110	189	61	6	73	6	30	689	30	12	726	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	110	250	0	6	79	0	0	749	0	0	787	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)		10			10			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	25	11		25	11		20	0		20	0	
Trailing Detector (ft)	5	5		5	5		0	0		0	0	
Detector 1 Position(ft)	5	5		5	5		0	5		0	5	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
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	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Lanes, Volumes, Timings  
19: Commercial St & Columbian Ave

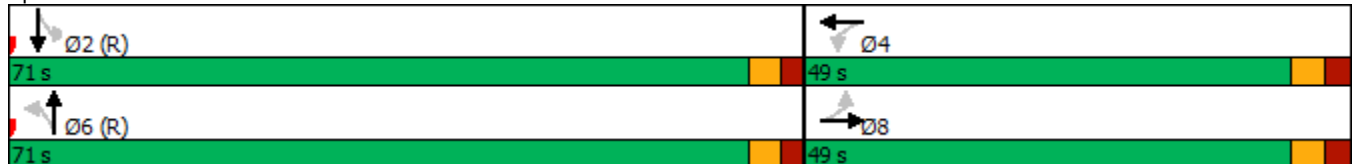
2038 AM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	26.0	26.0		26.0	26.0		28.0	28.0		28.0	28.0	
Total Split (s)	49.0	49.0		49.0	49.0		71.0	71.0		71.0	71.0	
Total Split (%)	40.8%	40.8%		40.8%	40.8%		59.2%	59.2%		59.2%	59.2%	
Maximum Green (s)	43.5	43.5		43.5	43.5		66.0	66.0		66.0	66.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		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)	5.5	5.5		5.5	5.5			5.0			5.0	
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	Min	Min		Min	Min		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	24.1	24.1		24.1	24.1			85.4			85.4	
Actuated g/C Ratio	0.20	0.20		0.20	0.20			0.71			0.71	
v/c Ratio	0.49	0.78		0.05	0.25			0.38			0.38	
Control Delay	48.4	59.1		35.6	37.9			9.2			3.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	48.4	59.1		35.6	37.9			9.2			3.0	
LOS	D	E		D	D			A			A	
Approach Delay		55.8			37.7			9.2			3.0	
Approach LOS		E			D			A			A	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 53 (44%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 16.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 58.8%  
 ICU Level of Service B  
 Analysis Period (min) 15

Splits and Phases: 19: Commercial St & Columbian Ave



Queues  
19: Commercial St & Columbian Ave

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Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	110	250	6	79	749	787
v/c Ratio	0.49	0.78	0.05	0.25	0.38	0.38
Control Delay	48.4	59.1	35.6	37.9	9.2	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	59.1	35.6	37.9	9.2	3.0
Queue Length 50th (ft)	76	175	4	49	157	37
Queue Length 95th (ft)	110	217	13	77	m183	47
Internal Link Dist (ft)		456		429	1133	216
Turn Bay Length (ft)			75			
Base Capacity (vph)	406	563	205	576	1976	2073
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	33	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.44	0.03	0.14	0.39	0.38

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 19: Commercial St & Columbian Ave

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Volume (veh/h)	90	155	50	5	60	5	25	565	25	10	595	40
Future Volume (veh/h)	90	155	50	5	60	5	25	565	25	10	595	40
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	1709	1709	1709	1723	1723	1723	1709	1709	1709	1709	1709	1709
Adj Flow Rate, veh/h	110	189	61	6	73	6	30	689	30	12	726	49
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	3	3	3	2	2	2	3	3	3	3	3	3
Cap, veh/h	235	216	70	89	274	22	99	2137	92	47	2199	147
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.74	0.74	0.74	1.00	1.00	1.00
Sat Flow, veh/h	1309	1238	399	1130	1570	129	90	2895	125	21	2979	199
Grp Volume(v), veh/h	110	0	250	6	0	79	381	0	368	413	0	374
Grp Sat Flow(s),veh/h/ln	1309	0	1637	1130	0	1699	1577	0	1533	1680	0	1519
Q Serve(g_s), s	9.5	0.0	17.9	0.6	0.0	4.8	0.0	0.0	9.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.4	0.0	17.9	18.5	0.0	4.8	9.0	0.0	9.9	0.0	0.0	0.0
Prop In Lane	1.00		0.24	1.00		0.08	0.08		0.08	0.03		0.13
Lane Grp Cap(c), veh/h	235	0	285	89	0	296	1197	0	1132	1271	0	1122
V/C Ratio(X)	0.47	0.00	0.88	0.07	0.00	0.27	0.32	0.00	0.33	0.33	0.00	0.33
Avail Cap(c_a), veh/h	482	0	593	301	0	616	1197	0	1132	1271	0	1122
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.45	0.00	0.45	1.00	0.00	1.00
Uniform Delay (d), s/veh	49.1	0.0	48.3	57.3	0.0	42.9	5.3	0.0	5.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	8.4	0.3	0.0	0.5	0.3	0.0	0.3	0.7	0.0	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(95%),veh/ln	5.8	0.0	12.6	0.3	0.0	3.8	5.0	0.0	5.0	0.4	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.6	0.0	56.7	57.6	0.0	43.4	5.6	0.0	5.8	0.7	0.0	0.8
LnGrp LOS	D	A	E	E	A	D	A	A	A	A	A	A
Approach Vol, veh/h		360			85			749			787	
Approach Delay, s/veh		54.8			44.4			5.7			0.7	
Approach LOS		D			D			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		93.6		26.4		93.6		26.4				
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5				
Max Green Setting (Gmax), s		66.0		43.5		66.0		43.5				
Max Q Clear Time (g_c+I1), s		0.0		20.5		0.0		19.9				
Green Ext Time (p_c), s		0.0		0.2		0.0		1.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				14.3								
HCM 6th LOS				B								

Lanes, Volumes, Timings  
19: Commercial St & Columbian Ave

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	130	55	35	40	25	20	755	5	20	815	25
Future Volume (vph)	110	130	55	35	40	25	20	755	5	20	815	25
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	11	11	11	11	11
Storage Length (ft)	0		180	75		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Fr <sub>t</sub>		0.955			0.942			0.999			0.996	
Fl <sub>t</sub> Protected	0.950			0.950				0.999			0.999	
Satd. Flow (prot)	1521	1529	0	1521	1508	0	0	3145	0	0	3135	0
Fl <sub>t</sub> Permitted	0.708			0.459				0.914			0.922	
Satd. Flow (perm)	1134	1529	0	735	1508	0	0	2877	0	0	2894	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			29			1			6	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		536			509			1213			296	
Travel Time (s)		14.6			13.9			33.1			8.1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	126	149	63	40	46	29	23	868	6	23	937	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	212	0	40	75	0	0	897	0	0	989	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)		10			10			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.16	1.16	1.16	1.16	1.16
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	25	11		25	11		20	0		20	0	
Trailing Detector (ft)	5	5		5	5		0	0		0	0	
Detector 1 Position(ft)	5	5		5	5		0	5		0	5	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
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	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6				2
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	25.5	25.5		25.5	25.5		25.5	25.5		25.5	25.5	

Lanes, Volumes, Timings  
 19: Commercial St & Columbian Ave

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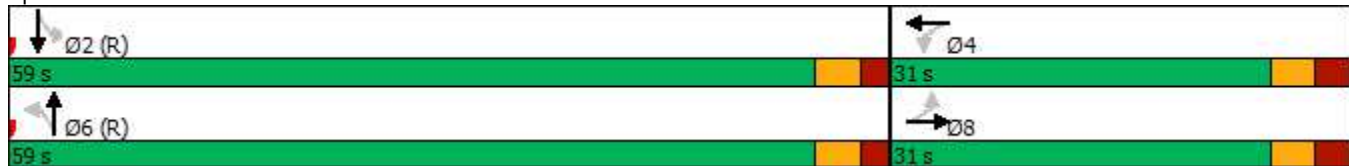


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	31.0	31.0		31.0	31.0		59.0	59.0		59.0	59.0	
Total Split (%)	34.4%	34.4%		34.4%	34.4%		65.6%	65.6%		65.6%	65.6%	
Maximum Green (s)	25.5	25.5		25.5	25.5		54.0	54.0		54.0	54.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		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)	5.5	5.5		5.5	5.5			5.0			5.0	
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	Min	Min		Min	Min		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	15.0	15.0		15.0	15.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	16.3	16.3		16.3	16.3			63.2			63.2	
Actuated g/C Ratio	0.18	0.18		0.18	0.18			0.70			0.70	
v/c Ratio	0.61	0.72		0.30	0.25			0.44			0.49	
Control Delay	45.8	43.5		35.8	21.5			3.4			4.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	45.8	43.5		35.8	21.5			3.4			4.0	
LOS	D	D		D	C			A			A	
Approach Delay		44.4			26.5			3.4			4.0	
Approach LOS		D			C			A			A	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 32 (36%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 10.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 69.5%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 19: Commercial St & Columbian Ave



Queues  
19: Commercial St & Columbian Ave

2038 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	126	212	40	75	897	989
v/c Ratio	0.61	0.72	0.30	0.25	0.44	0.49
Control Delay	45.8	43.5	35.8	21.5	3.4	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.8	43.5	35.8	21.5	3.4	4.0
Queue Length 50th (ft)	67	101	20	22	36	57
Queue Length 95th (ft)	109	154	44	53	m89	m75
Internal Link Dist (ft)		456		429	1133	216
Turn Bay Length (ft)			75			
Base Capacity (vph)	321	450	208	448	2020	2033
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	0.39	0.47	0.19	0.17	0.44	0.49

Intersection Summary

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



HCM 6th Signalized Intersection Summary  
 19: Commercial St & Columbian Ave

2038 PM Peak Hour Proposed  
 09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	130	55	35	40	25	20	755	5	20	815	25
Future Volume (veh/h)	110	130	55	35	40	25	20	755	5	20	815	25
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	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	126	149	63	40	46	29	23	868	6	23	937	29
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	207	87	147	178	112	71	2212	15	66	2170	66
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	1.00	1.00	1.00	1.00	1.00	1.00
Sat Flow, veh/h	1325	1149	486	1170	988	623	41	3145	21	35	3084	94
Grp Volume(v), veh/h	126	0	212	40	0	75	460	0	437	512	0	477
Grp Sat Flow(s),veh/h/ln	1325	0	1635	1170	0	1611	1643	0	1564	1663	0	1551
Q Serve(g_s), s	8.1	0.0	11.0	3.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	11.7	0.0	11.0	14.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		0.30	1.00		0.39	0.05		0.01	0.04		0.06
Lane Grp Cap(c), veh/h	265	0	294	147	0	290	1198	0	1100	1212	0	1091
V/C Ratio(X)	0.48	0.00	0.72	0.27	0.00	0.26	0.38	0.00	0.40	0.42	0.00	0.44
Avail Cap(c_a), veh/h	402	0	463	268	0	456	1198	0	1100	1212	0	1091
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.40	0.00	0.40	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.8	0.0	34.8	41.4	0.0	31.8	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	3.3	1.0	0.0	0.5	0.4	0.0	0.4	1.1	0.0	1.3
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(95%),veh/ln	4.9	0.0	8.1	1.6	0.0	2.6	0.2	0.0	0.2	0.7	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.1	0.0	38.1	42.4	0.0	32.2	0.4	0.0	0.4	1.1	0.0	1.3
LnGrp LOS	D	A	D	D	A	C	A	A	A	A	A	A
Approach Vol, veh/h		338			115			897				989
Approach Delay, s/veh		38.1			35.7			0.4				1.2
Approach LOS		D			D			A				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		68.3		21.7		68.3		21.7				
Change Period (Y+Rc), s		5.0		5.5		5.0		5.5				
Max Green Setting (Gmax), s		54.0		25.5		54.0		25.5				
Max Q Clear Time (g_c+I1), s		0.0		16.0		0.0		13.7				
Green Ext Time (p_c), s		0.0		0.2		0.0		0.8				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				7.9								
HCM 6th LOS				A								

Lanes, Volumes, Timings  
20: Commercial St & Doty Ave

2038 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	10	20	10	0	10	5	35	600	25	25	640	30
Future Volume (vph)	10	20	10	0	10	5	35	600	25	25	640	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	12	11	11	11	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.966			0.955			0.994			0.994	
Flt Protected		0.987						0.997			0.998	
Satd. Flow (prot)	0	1854	0	0	1857	0	0	3063	0	0	3037	0
Flt Permitted		0.987						0.997			0.998	
Satd. Flow (perm)	0	1854	0	0	1857	0	0	3063	0	0	3037	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		531			531			296			317	
Travel Time (s)		12.1			12.1			6.7			7.2	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%
Adj. Flow (vph)	12	23	12	0	12	6	41	698	29	29	744	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	47	0	0	18	0	0	768	0	0	808	0
Enter Blocked Intersection	No	No	No	No	No	No	No	Yes	No	No	Yes	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.11	1.16	1.16	1.16	1.16	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	60.1%
Analysis Period (min)	15
	ICU Level of Service B

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	20	10	0	10	5	35	600	25	25	640	30
Future Vol, veh/h	10	20	10	0	10	5	35	600	25	25	640	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	5	5	5
Mvmt Flow	12	23	12	0	12	6	41	698	29	29	744	35

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1257	1629	390	1237	1632	364	779	0	0	727	0	0
Stage 1	820	820	-	795	795	-	-	-	-	-	-	-
Stage 2	437	809	-	442	837	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.18	-	-	4.2	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.24	-	-	2.25	-	-
Pot Cap-1 Maneuver	128	101	609	132	100	633	821	-	-	853	-	-
Stage 1	335	387	-	347	398	-	-	-	-	-	-	-
Stage 2	568	392	-	564	380	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	102	87	609	92	86	633	821	-	-	853	-	-
Mov Cap-2 Maneuver	102	87	-	92	86	-	-	-	-	-	-	-
Stage 1	307	364	-	318	365	-	-	-	-	-	-	-
Stage 2	499	359	-	487	357	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	55.4		39.7		0.9		0.6	
HCM LOS	F		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	821	-	-	116	121	853	-
HCM Lane V/C Ratio	0.05	-	-	0.401	0.144	0.034	-
HCM Control Delay (s)	9.6	0.4	-	55.4	39.7	9.4	0.3
HCM Lane LOS	A	A	-	F	E	A	A
HCM 95th %tile Q(veh)	0.2	-	-	1.7	0.5	0.1	-

Lanes, Volumes, Timings  
20: Commercial St & Doty Ave

2038 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (vph)	20	20	40	20	10	25	35	820	25	10	800	50
Future Volume (vph)	20	20	40	20	10	25	35	820	25	10	800	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	16	16	16	16	16	16	12	11	11	11	11	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.932			0.939			0.996			0.991	
Flt Protected		0.988			0.982			0.998			0.999	
Satd. Flow (prot)	0	1790	0	0	1793	0	0	3072	0	0	3031	0
Flt Permitted		0.988			0.982			0.998			0.999	
Satd. Flow (perm)	0	1790	0	0	1793	0	0	3072	0	0	3031	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		531			531			296			317	
Travel Time (s)		14.5			14.5			8.1			8.6	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	5%	5%	5%
Adj. Flow (vph)	23	23	47	23	12	29	41	953	29	12	930	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	93	0	0	64	0	0	1023	0	0	1000	0
Enter Blocked Intersection	No	No	No	No	No	No	No	Yes	No	No	Yes	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.11	1.16	1.16	1.16	1.16	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	66.0%
Analysis Period (min)	15
	ICU Level of Service C

Intersection												
Int Delay, s/veh	14.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	20	40	20	10	25	35	820	25	10	800	50
Future Vol, veh/h	20	20	40	20	10	25	35	820	25	10	800	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	5	5	5
Mvmt Flow	23	23	47	23	12	29	41	953	29	12	930	58

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1548	2047	494	1551	2062	491	988	0	0	982	0	0
Stage 1	983	983	-	1050	1050	-	-	-	-	-	-	-
Stage 2	565	1064	-	501	1012	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.18	-	-	4.2	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.24	-	-	2.25	-	-
Pot Cap-1 Maneuver	78	55	521	77	54	523	683	-	-	681	-	-
Stage 1	267	325	-	243	302	-	-	-	-	-	-	-
Stage 2	477	298	-	521	315	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	52	46	521	37	45	523	683	-	-	681	-	-
Mov Cap-2 Maneuver	52	46	-	37	45	-	-	-	-	-	-	-
Stage 1	231	312	-	211	262	-	-	-	-	-	-	-
Stage 2	373	258	-	422	302	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	193.9		194.8		1		0.3	
HCM LOS	F		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	683	-	-	89	68	681	-
HCM Lane V/C Ratio	0.06	-	-	1.045	0.94	0.017	-
HCM Control Delay (s)	10.6	0.6	-	193.9	194.8	10.4	0.2
HCM Lane LOS	B	A	-	F	F	B	A
HCM 95th %tile Q(veh)	0.2	-	-	6.2	4.7	0.1	-

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2038 AM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	215	20	50	250	50	30	515	70	5	630	445
Future Volume (vph)	250	215	20	50	250	50	30	515	70	5	630	445
Ideal Flow (vphpl)	1750	1665	1750	1750	1665	1750	1750	1700	1750	1750	1665	1750
Lane Width (ft)	11	11	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	95		65	65		65	0		0	75		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	50			50			25			50		
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
Fr <sub>t</sub>			0.850			0.850		0.988			0.938	
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1576	1420	1653	1630	1469	1653	1599	1615	0	1614	2881	0
Fl <sub>t</sub> Permitted	0.336			0.594			0.085			0.174		
Satd. Flow (perm)	557	1420	1653	1019	1469	1653	143	1615	0	296	2881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55			82		5				209
Link Speed (mph)		25			25			25				25
Link Distance (ft)		521			520			317				1667
Travel Time (s)		14.2			14.2			8.6				45.5
Peak Hour Factor	0.80	0.80	0.80	0.88	0.88	0.88	0.80	0.80	0.80	0.80	0.80	0.80
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Parking (#/hr)		0			0							
Adj. Flow (vph)	313	269	16	57	284	35	38	644	54	6	788	556
Shared Lane Traffic (%)												
Lane Group Flow (vph)	313	269	16	57	284	35	38	698	0	6	1344	0
Enter Blocked Intersection	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh
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	1.16	1.41	0.95	1.11	1.35	0.95	1.11	1.15	1.11	1.11	1.18	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0	0	1	0			1	0
Detector Template												
Leading Detector (ft)	60	0	0	56	0	0	56	0		60	0	
Trailing Detector (ft)	42	0	0	50	0	0	50	0		42	0	
Detector 1 Position(ft)	42	5	5	50	5	5	50	5		42	5	
Detector 1 Size(ft)	18	6	20	6	6	20	6	6		18	6	
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	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	3	8		7	4			6				2
Permitted Phases	8		8	4		4	6			2		
Detector Phase	3	8	8	7	4	4	6	6		2	2	

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2038 AM Peak Hour Proposed  
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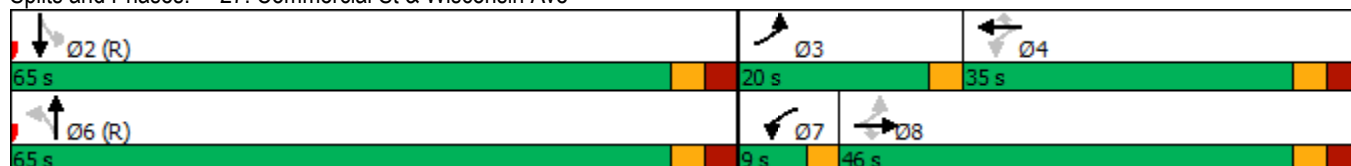


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	25.5	25.5	9.0	25.5	25.5	34.0	34.0		34.0	34.0	
Total Split (s)	20.0	46.0	46.0	9.0	35.0	35.0	65.0	65.0		65.0	65.0	
Total Split (%)	16.7%	38.3%	38.3%	7.5%	29.2%	29.2%	54.2%	54.2%		54.2%	54.2%	
Maximum Green (s)	17.0	40.5	40.5	6.0	29.5	29.5	59.0	59.0		59.0	59.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	3.0	3.0		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)	3.0	5.5	5.5	3.0	5.5	5.5	6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?												
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	Max	None	Max	Max	C-Max	C-Max		C-Max	C-Max	
Walk Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)		15.0	15.0		15.0	15.0	23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)		0	0		0	0	0	0		0	0	
Act Effct Green (s)	52.0	42.4	42.4	38.2	29.9	29.9	59.0	59.0		59.0	59.0	
Actuated g/C Ratio	0.43	0.35	0.35	0.32	0.25	0.25	0.49	0.49		0.49	0.49	
v/c Ratio	0.82	0.54	0.03	0.16	0.78	0.07	0.54	0.88		0.04	0.88	
Control Delay	35.1	27.9	0.2	22.1	57.8	0.3	37.8	26.1		16.0	25.7	
Queue Delay	0.0	0.0	0.0	0.0	1.4	0.0	1.3	0.0		0.0	0.8	
Total Delay	35.1	27.9	0.2	22.1	59.2	0.3	39.1	26.1		16.0	26.5	
LOS	D	C	A	C	E	A	D	C		B	C	
Approach Delay		30.9			48.1			26.7			26.4	
Approach LOS		C			D			C			C	

Intersection Summary

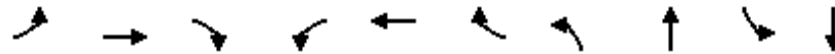
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	45 (38%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	30.1
Intersection LOS:	C
Intersection Capacity Utilization	79.1%
ICU Level of Service	D
Analysis Period (min)	15

Splits and Phases: 27: Commercial St & Wisconsin Ave



Queues  
27: Commercial St & Wisconsin Ave

2038 AM Peak Hour Proposed  
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	313	269	16	57	284	35	38	698	6	1344
v/c Ratio	0.82	0.54	0.03	0.16	0.78	0.07	0.54	0.88	0.04	0.88
Control Delay	35.1	27.9	0.2	22.1	57.8	0.3	37.8	26.1	16.0	25.7
Queue Delay	0.0	0.0	0.0	0.0	1.4	0.0	1.3	0.0	0.0	0.8
Total Delay	35.1	27.9	0.2	22.1	59.2	0.3	39.1	26.1	16.0	26.5
Queue Length 50th (ft)	107	173	0	25	207	0	7	397	2	264
Queue Length 95th (ft)	97	189	m0	51	#328	0	#62	140	m5	261
Internal Link Dist (ft)		441			440			237		1587
Turn Bay Length (ft)	95		65	65		65			75	
Base Capacity (vph)	385	501	619	357	366	474	70	796	145	1522
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	17	0	3	0	0	41
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.54	0.03	0.16	0.81	0.07	0.57	0.88	0.04	0.91

Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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



HCM 6th Signalized Intersection Summary  
27: Commercial St & Wisconsin Ave

2038 AM Peak Hour Proposed  
09/17/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	250	215	20	50	250	50	30	515	70	5	630	445
Future Volume (veh/h)	250	215	20	50	250	50	30	515	70	5	630	445
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	1723	1639	1792	1723	1639	1792	1695	1647	1695	1709	1626	1709
Adj Flow Rate, veh/h	312	269	16	57	284	35	38	644	54	6	788	556
Peak Hour Factor	0.80	0.80	0.80	0.88	0.88	0.88	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	4	4	4	3	3	3
Cap, veh/h	386	576	533	364	403	373	219	737	62	387	857	595
Arrive On Green	0.14	0.35	0.35	0.04	0.25	0.25	0.98	0.98	0.98	0.98	0.98	0.98
Sat Flow, veh/h	1641	1639	1518	1641	1639	1518	400	1499	126	742	1744	1209
Grp Volume(v), veh/h	312	269	16	57	284	35	38	0	698	6	696	648
Grp Sat Flow(s),veh/h/ln	1641	1639	1518	1641	1639	1518	400	0	1624	742	1545	1408
Q Serve(g_s), s	16.8	15.3	0.8	3.1	19.0	2.1	2.9	0.0	6.1	0.1	9.2	11.4
Cycle Q Clear(g_c), s	16.8	15.3	0.8	3.1	19.0	2.1	14.4	0.0	6.1	6.2	9.2	11.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.08	1.00		0.86
Lane Grp Cap(c), veh/h	386	576	533	364	403	373	219	0	799	387	759	692
V/C Ratio(X)	0.81	0.47	0.03	0.16	0.70	0.09	0.17	0.00	0.87	0.02	0.92	0.94
Avail Cap(c_a), veh/h	386	576	533	387	403	373	219	0	799	387	759	692
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	0.88	0.88	0.88	1.00	1.00	1.00	1.00	0.00	1.00	0.87	0.87	0.87
Uniform Delay (d), s/veh	28.9	30.2	25.5	32.1	41.3	34.9	2.1	0.0	0.6	0.9	0.6	0.6
Incr Delay (d2), s/veh	10.9	2.4	0.1	0.2	9.9	0.5	1.7	0.0	12.8	0.1	16.0	19.5
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(95%),veh/ln	12.1	10.4	0.6	2.3	13.7	1.5	0.3	0.0	5.7	0.0	6.6	7.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.7	32.6	25.6	32.3	51.2	35.4	3.8	0.0	13.3	1.0	16.5	20.1
LnGrp LOS	D	C	C	C	D	D	A	A	B	A	B	C
Approach Vol, veh/h		597			376			736			1350	
Approach Delay, s/veh		36.1			46.9			12.8			18.2	
Approach LOS		D			D			B			B	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		65.0	20.0	35.0		65.0	7.3	47.7				
Change Period (Y+Rc), s		6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s		59.0	17.0	29.5		59.0	6.0	40.5				
Max Q Clear Time (g_c+I1), s		8.2	18.8	0.0		16.4	5.1	0.0				
Green Ext Time (p_c), s		0.3	0.0	0.0		0.2	0.0	0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				23.9								
HCM 6th LOS				C								
<b>Notes</b>												
User approved pedestrian interval to be less than phase max green.												

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2038 PM Peak Hour Proposed  
09/17/2018



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	265	40	130	245	40	60	745	55	30	690	330
Future Volume (vph)	330	265	40	130	245	40	60	745	55	30	690	330
Ideal Flow (vphpl)	1750	1665	1750	1750	1665	1750	1750	1700	1750	1750	1665	1750
Lane Width (ft)	11	11	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	95		65	65		65	0		0	75		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	50			50			25			50		
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
Fr <sub>t</sub>			0.850			0.850		0.993			0.951	
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1576	1420	1653	1630	1469	1653	1630	1655	0	1630	2949	0
Fl <sub>t</sub> Permitted	0.471			0.443			0.107			0.116		
Satd. Flow (perm)	781	1420	1653	760	1469	1653	184	1655	0	199	2949	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		3			102	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		521			520			317			1667	
Travel Time (s)		14.2			14.2			8.6			45.5	
Peak Hour Factor	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	62%	100%	100%	100%
Parking (#/hr)		0			0							
Adj. Flow (vph)	388	312	29	140	263	27	65	801	37	32	742	355
Shared Lane Traffic (%)												
Lane Group Flow (vph)	388	312	29	140	263	27	65	838	0	32	1097	0
Enter Blocked Intersection	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh	2 veh
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	1.16	1.41	0.95	1.11	1.35	0.95	1.11	1.15	1.11	1.11	1.18	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0	0	1	0	0	1	0		1	0	
Detector Template												
Leading Detector (ft)	60	0	0	56	0	0	56	0		60	0	
Trailing Detector (ft)	42	0	0	50	0	0	50	0		42	0	
Detector 1 Position(ft)	42	5	5	50	5	5	50	5		42	5	
Detector 1 Size(ft)	18	6	20	6	6	20	6	6		18	6	
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	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6				2
Permitted Phases	8		8	4		4	6			2		
Detector Phase	3	8	8	7	4	4	1	6		2	2	
Switch Phase												

Lanes, Volumes, Timings  
27: Commercial St & Wisconsin Ave

2038 PM Peak Hour Proposed  
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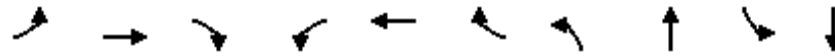
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	33.5	33.5	8.0	33.5	33.5	8.0	34.0		34.0	34.0	
Total Split (s)	9.0	34.5	34.5	8.0	33.5	33.5	8.0	47.5		39.5	39.5	
Total Split (%)	10.0%	38.3%	38.3%	8.9%	37.2%	37.2%	8.9%	52.8%		43.9%	43.9%	
Maximum Green (s)	6.0	29.0	29.0	5.0	28.0	28.0	5.0	41.5		33.5	33.5	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	0.0	2.5	2.5	0.0	2.5	2.5	0.0	3.0		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)	3.0	5.5	5.5	3.0	5.5	5.5	3.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?												
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	Max	None	Max	Max	None	C-Max		C-Max	C-Max	
Walk Time (s)		5.0	5.0		5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)		15.0	15.0		15.0	15.0		23.0		23.0	23.0	
Pedestrian Calls (#/hr)		0	0		0	0		0		0	0	
Act Effct Green (s)	37.5	29.0	29.0	35.5	28.0	28.0	44.5	41.5		35.1	35.1	
Actuated g/C Ratio	0.42	0.32	0.32	0.39	0.31	0.31	0.49	0.46		0.39	0.39	
v/c Ratio	1.03	0.68	0.05	0.40	0.58	0.05	0.38	1.10		0.42	0.91	
Control Delay	73.4	29.9	0.1	20.3	32.0	0.2	19.2	82.8		41.1	36.3	
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0		0.0	0.0	
Total Delay	73.4	29.9	0.1	20.3	32.1	0.2	19.2	82.8		41.1	36.3	
LOS	E	C	A	C	C	A	B	F		D	D	
Approach Delay		51.9			26.3			78.2			36.4	
Approach LOS		D			C			E			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 35 (39%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green  
 Natural Cycle: 115  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.10  
 Intersection Signal Delay: 50.4  
 Intersection LOS: D  
 Intersection Capacity Utilization 101.6%  
 ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 27: Commercial St & Wisconsin Ave





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	388	312	29	140	263	27	65	838	32	1097
v/c Ratio	1.03	0.68	0.05	0.40	0.58	0.05	0.38	1.10	0.42	0.91
Control Delay	73.4	29.9	0.1	20.3	32.0	0.2	19.2	82.8	41.1	36.3
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	73.4	29.9	0.1	20.3	32.1	0.2	19.2	82.8	41.1	36.3
Queue Length 50th (ft)	~181	164	0	47	125	0	15	~557	13	288
Queue Length 95th (ft)	#271	182	m0	86	206	0	45	#772	#54	#432
Internal Link Dist (ft)		441			440			237		1587
Turn Bay Length (ft)	95		65	65		65			75	
Base Capacity (vph)	378	457	606	348	457	589	171	764	77	1212
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	10	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.68	0.05	0.40	0.59	0.05	0.38	1.10	0.42	0.91

**Intersection Summary**

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
27: Commercial St & Wisconsin Ave

2038 PM Peak Hour Proposed  
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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↗		↖	↗	
Traffic Volume (veh/h)	330	265	40	130	245	40	60	745	55	30	690	330
Future Volume (veh/h)	330	265	40	130	245	40	60	745	55	30	690	330
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	1723	1639	1792	1723	1639	1792	1723	1673	1723	1723	1639	1723
Adj Flow Rate, veh/h	388	312	29	140	263	27	65	801	37	32	742	355
Peak Hour Factor	0.85	0.85	0.85	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	385	528	489	340	510	472	169	732	34	80	783	374
Arrive On Green	0.07	0.32	0.32	0.06	0.31	0.31	0.06	0.61	0.61	0.38	0.38	0.38
Sat Flow, veh/h	1641	1639	1518	1641	1639	1518	1641	1587	73	656	2044	977
Grp Volume(v), veh/h	388	312	29	140	263	27	65	0	838	32	565	532
Grp Sat Flow(s),veh/h/ln	1641	1639	1518	1641	1639	1518	1641	0	1660	656	1557	1463
Q Serve(g_s), s	6.0	14.3	1.2	5.0	11.9	1.1	2.0	0.0	41.5	0.0	31.6	31.7
Cycle Q Clear(g_c), s	6.0	14.3	1.2	5.0	11.9	1.1	2.0	0.0	41.5	34.5	31.6	31.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.04	1.00		0.67
Lane Grp Cap(c), veh/h	385	528	489	340	510	472	169	0	766	80	597	561
V/C Ratio(X)	1.01	0.59	0.06	0.41	0.52	0.06	0.38	0.00	1.09	0.40	0.95	0.95
Avail Cap(c_a), veh/h	385	528	489	340	510	472	187	0	766	80	597	561
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	0.86	1.00	1.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	32.1	25.5	21.1	21.5	25.4	21.7	20.9	0.0	17.4	45.0	26.9	26.9
Incr Delay (d2), s/veh	44.6	4.1	0.2	0.8	3.7	0.2	1.4	0.0	61.4	13.3	24.7	26.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	15.6	9.9	0.8	3.8	8.8	0.8	1.4	0.0	35.7	1.8	21.6	20.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.7	29.7	21.3	22.3	29.1	22.0	22.3	0.0	78.8	58.3	51.5	52.9
LnGrp LOS	F	C	C	C	C	C	C	A	F	E	D	D
Approach Vol, veh/h		729			430			903			1129	
Approach Delay, s/veh		54.4			26.4			74.8			52.4	
Approach LOS		D			C			E			D	
Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	7.0	40.5	9.0	33.5		47.5	8.0	34.5				
Change Period (Y+Rc), s	3.0	6.0	3.0	5.5		6.0	3.0	5.5				
Max Green Setting (Gmax), s	5.0	33.5	6.0	28.0		41.5	5.0	29.0				
Max Q Clear Time (g_c+I1), s	4.0	36.5	8.0	0.0		0.0	7.0	0.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0		0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	55.7
HCM 6th LOS	E

Notes

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

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗		↖↗			↖↗	
Traffic Volume (vph)	25	30	95	60	30	5	10	425	40	10	1020	20
Future Volume (vph)	25	30	95	60	30	5	10	425	40	10	1020	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	12	12	11	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Flt			0.850			0.850		0.987			0.997	
Flt Protected		0.978			0.968			0.999				
Satd. Flow (prot)	0	1566	1361	0	1550	1361	0	3214	0	0	3250	0
Flt Permitted		0.821			0.762			0.923			0.949	
Satd. Flow (perm)	0	1315	1361	0	1220	1361	0	2970	0	0	3084	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			67			23		14			3	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		305			861			1667			254	
Travel Time (s)		8.3			23.5			45.5			6.9	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	28	34	67	68	34	4	11	483	45	11	1159	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	67	0	102	4	0	539	0	0	1193	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	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.11	1.11	1.16	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	0	1	1	0	1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	0	0	20	0	0	20	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	5	5	0	5	5	0	5		0	5	
Detector 1 Size(ft)	20	20	20	20	20	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Call	Cl+Ex	Cl+Ex	Call	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	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2				6
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	41.5	41.5	41.5	41.5	41.5	41.5	42.0	42.0		42.0	42.0	
Total Split (s)	43.0	43.0	43.0	43.0	43.0	43.0	77.0	77.0		77.0	77.0	
Total Split (%)	35.8%	35.8%	35.8%	35.8%	35.8%	35.8%	64.2%	64.2%		64.2%	64.2%	

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

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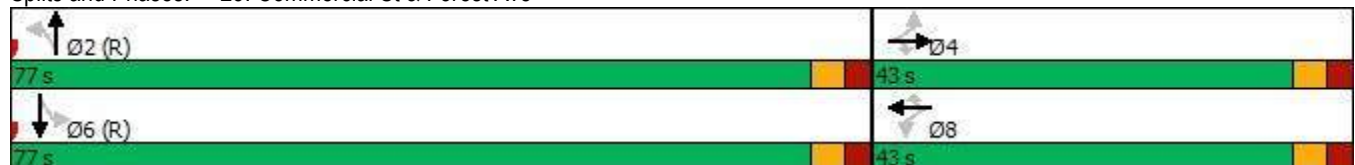


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	37.5	37.5	37.5	37.5	37.5	37.5	71.5	71.5		71.5	71.5	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0			0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.5	5.5			5.5	5.5		5.5		5.5	
Lead/Lag												
Lead-Lag Optimize?												
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	Min	Min	Min	Min	Min	Min	C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0	18.0	17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)		15.2	15.2			15.2	15.2		93.8		93.8	
Actuated g/C Ratio		0.13	0.13			0.13	0.13		0.78		0.78	
v/c Ratio		0.37	0.29			0.66	0.02		0.23		0.49	
Control Delay		52.7	13.5			69.3	0.2		5.3		6.0	
Queue Delay		0.0	0.0			0.0	0.0		0.0		0.0	
Total Delay		52.7	13.5			69.3	0.2		5.3		6.0	
LOS		D	B			E	A		A		A	
Approach Delay		32.3				66.7			5.3		6.0	
Approach LOS		C				E			A		A	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 120  
 Offset: 45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 85  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.66  
 Intersection Signal Delay: 10.8  
 Intersection Capacity Utilization 60.1%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service B

Splits and Phases: 23: Commercial St & Forest Ave



Queues  
23: Commercial St & Forest Ave

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Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	62	67	102	4	539	1193
v/c Ratio	0.37	0.29	0.66	0.02	0.23	0.49
Control Delay	52.7	13.5	69.3	0.2	5.3	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.7	13.5	69.3	0.2	5.3	6.0
Queue Length 50th (ft)	45	0	77	0	61	142
Queue Length 95th (ft)	82	38	126	0	m101	228
Internal Link Dist (ft)	225		781		1587	174
Turn Bay Length (ft)						
Base Capacity (vph)	410	471	381	441	2325	2412
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	0.15	0.14	0.27	0.01	0.23	0.49





















Intersection Summary

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



HCM Signalized Intersection Capacity Analysis  
23: Commercial St & Forest Ave

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	95	60	30	5	10	425	40	10	1020	20
Future Volume (vph)	25	30	95	60	30	5	10	425	40	10	1020	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	10	10	10	10	10	10	11	12	12	11	12	12
Total Lost time (s)		5.5	5.5		5.5	5.5		5.5			5.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		0.99			1.00	
Flt Protected		0.98	1.00		0.97	1.00		1.00			1.00	
Satd. Flow (prot)		1566	1361		1550	1361		3216			3249	
Flt Permitted		0.82	1.00		0.76	1.00		0.92			0.95	
Satd. Flow (perm)		1315	1361		1220	1361		2973			3085	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor (vph)	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	28	34	67	68	34	4	11	483	45	11	1159	23
RTOR Reduction (vph)	0	0	59	0	0	3	0	3	0	0	1	0
Lane Group Flow (vph)	0	62	8	0	102	1	0	536	0	0	1192	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		15.2	15.2		15.2	15.2		93.8			93.8	
Effective Green, g (s)		15.2	15.2		15.2	15.2		93.8			93.8	
Actuated g/C Ratio		0.13	0.13		0.13	0.13		0.78			0.78	
Clearance Time (s)		5.5	5.5		5.5	5.5		5.5			5.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		166	172		154	172		2323			2411	
v/s Ratio Prot												
v/s Ratio Perm		0.05	0.01		c0.08	0.00		0.18			c0.39	
v/c Ratio		0.37	0.05		0.66	0.00		0.23			0.49	
Uniform Delay, d1		48.0	46.1		50.0	45.8		3.5			4.7	
Progression Factor		1.00	1.00		1.00	1.00		1.35			1.00	
Incremental Delay, d2		1.4	0.1		10.2	0.0		0.1			0.7	
Delay (s)		49.5	46.2		60.2	45.8		4.8			5.4	
Level of Service		D	D		E	D		A			A	
Approach Delay (s)		47.7			59.6			4.8			5.4	
Approach LOS		D			E			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			10.9					HCM 2000 Level of Service			B	
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			120.0					Sum of lost time (s)		11.0		
Intersection Capacity Utilization			60.1%					ICU Level of Service		B		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗		↖↗			↖↗	
Traffic Volume (vph)	30	25	145	100	5	10	20	875	35	10	730	5
Future Volume (vph)	30	25	145	100	5	10	20	875	35	10	730	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	10	10	10	10	10	10	11	12	12	11	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Flt			0.850			0.850		0.994			0.999	
Flt Protected		0.973			0.955			0.999			0.999	
Satd. Flow (prot)	0	1558	1361	0	1529	1361	0	3237	0	0	3253	0
Flt Permitted		0.785			0.692			0.926			0.939	
Satd. Flow (perm)	0	1257	1361	0	1108	1361	0	3000	0	0	3058	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			102			27		6			1	
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		568			513			1660			355	
Travel Time (s)		15.5			14.0			45.3			9.7	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	34	28	102	114	6	7	23	994	40	11	830	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	102	0	120	7	0	1057	0	0	847	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	1.21	1.21	1.21	1.21	1.21	1.21	1.16	1.11	1.11	1.16	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	0	1	1	0	1	0		1	0	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	0	0	20	0	0	20	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	5	5	0	5	5	0	5		0	5	
Detector 1 Size(ft)	20	20	20	20	20	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Call	Cl+Ex	Cl+Ex	Call	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	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	28.5	28.5	28.5	28.5	28.5	28.5	27.5	27.5		27.5	27.5	
Total Split (s)	40.0	40.0	40.0	40.0	40.0	40.0	60.0	60.0		60.0	60.0	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	60.0%	60.0%		60.0%	60.0%	

Lanes, Volumes, Timings  
23: Commercial St & Forest Ave

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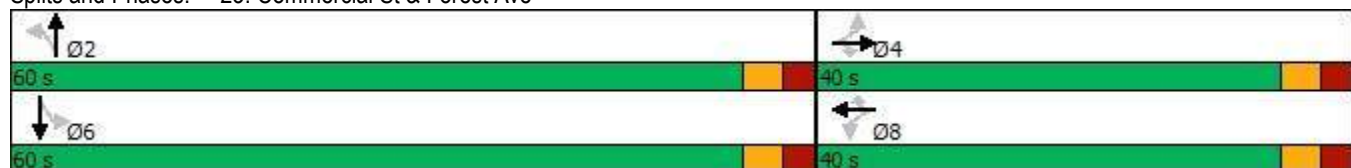


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	34.5	34.5	34.5	34.5	34.5	34.5	54.5	54.5		54.5	54.5	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)		0.0	0.0			0.0	0.0		0.0		0.0	
Total Lost Time (s)		5.5	5.5			5.5	5.5		5.5		5.5	
Lead/Lag												
Lead-Lag Optimize?												
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	Min	Min	Min	Min	Min	Min	Max	Max		Max	Max	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0	18.0	17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)		13.7	13.7		13.7	13.7		54.6			54.6	
Actuated g/C Ratio		0.17	0.17		0.17	0.17		0.69			0.69	
v/c Ratio		0.29	0.32		0.63	0.03		0.51			0.40	
Control Delay		31.4	9.0		45.1	1.2		7.7			6.6	
Queue Delay		0.0	0.0		0.0	0.0		0.0			0.0	
Total Delay		31.4	9.0		45.1	1.2		7.7			6.6	
LOS		C	A		D	A		A			A	
Approach Delay		17.4			42.7			7.7			6.6	
Approach LOS		B			D			A			A	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	79.4
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	10.0
Intersection LOS:	B
Intersection Capacity Utilization:	65.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 23: Commercial St & Forest Ave



Queues  
23: Commercial St & Forest Ave





















2038 PM Peak Hour Proposed  
09/18/2018



Lane Group	EBT	EBR	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	62	102	120	7	1057	847
v/c Ratio	0.29	0.32	0.63	0.03	0.51	0.40
Control Delay	31.4	9.0	45.1	1.2	7.7	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	9.0	45.1	1.2	7.7	6.6
Queue Length 50th (ft)	27	0	56	0	111	80
Queue Length 95th (ft)	59	36	106	2	196	143
Internal Link Dist (ft)	488		433		1580	275
Turn Bay Length (ft)						
Base Capacity (vph)	547	650	482	608	2066	2104
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	0.11	0.16	0.25	0.01	0.51	0.40
<b>Intersection Summary</b>						

HCM Signalized Intersection Capacity Analysis  
23: Commercial St & Forest Ave

2038 PM Peak Hour Proposed  
09/18/2018

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	30	25	145	100	5	10	20	875	35	10	730	5		
Future Volume (vph)	30	25	145	100	5	10	20	875	35	10	730	5		
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750		
Lane Width	10	10	10	10	10	10	11	12	12	11	12	12		
Total Lost time (s)		5.5	5.5		5.5	5.5		5.5		5.5		5.5		
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95		0.95		0.95		
Frt		1.00	0.85		1.00	0.85		0.99		1.00		1.00		
Flt Protected		0.97	1.00		0.95	1.00		1.00		1.00		1.00		
Satd. Flow (prot)		1559	1361		1529	1361		3238		3254		3254		
Flt Permitted		0.78	1.00		0.69	1.00		0.93		0.94		0.94		
Satd. Flow (perm)		1257	1361		1107	1361		3003		3058		3058		
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88		
Growth Factor (vph)	100%	100%	62%	100%	100%	62%	100%	100%	100%	100%	100%	100%		
Adj. Flow (vph)	34	28	102	114	6	7	23	994	40	11	830	6		
RTOR Reduction (vph)	0	0	84	0	0	6	0	2	0	0	0	0		
Lane Group Flow (vph)	0	62	18	0	120	1	0	1055	0	0	847	0		
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA			
Protected Phases		4			8			2			6			
Permitted Phases	4		4	8		8	2			6				
Actuated Green, G (s)		13.7	13.7		13.7	13.7		54.7			54.7			
Effective Green, g (s)		13.7	13.7		13.7	13.7		54.7			54.7			
Actuated g/C Ratio		0.17	0.17		0.17	0.17		0.69			0.69			
Clearance Time (s)		5.5	5.5		5.5	5.5		5.5			5.5			
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0			
Lane Grp Cap (vph)		216	234		191	234		2068			2106			
v/s Ratio Prot														
v/s Ratio Perm		0.05	0.01		c0.11	0.00		c0.35			0.28			
v/c Ratio		0.29	0.08		0.63	0.01		0.51			0.40			
Uniform Delay, d1		28.6	27.5		30.5	27.2		5.9			5.3			
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00			
Incremental Delay, d2		0.7	0.1		6.3	0.0		0.9			0.6			
Delay (s)		29.3	27.7		36.8	27.2		6.8			5.9			
Level of Service		C	C		D	C		A			A			
Approach Delay (s)		28.3			36.3			6.8			5.9			
Approach LOS		C			D			A			A			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			9.8									HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio			0.53											
Actuated Cycle Length (s)			79.4								11.0			
Intersection Capacity Utilization			65.2%										ICU Level of Service	C
Analysis Period (min)			15											

c Critical Lane Group

# **Attachment K**

*Church St Ramp Secondary Access Locations*

Attachment K: Possible Secondary Ramp Access

