Study Summary

To:	James Merten, PE, City of Neenah, City Traffic Engineer
From:	Eric Frailing, PE, PTOE, MSA Professional Services, Inc.
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Subject:	Winneconne Ave & Commercial St Intersection Control Evaluation Summary
Date:	February 22, 2023

INTRODUCTION

MSA Professional Services, Inc. (MSA) was asked to complete an intersection control evaluation (ICE) for the intersection of Winneconne Avenue at Commercial Street, in Neenah, Wisconsin (city). The west[1] and north legs of the intersection are also part of STH 114 as well as the Wisconsin Department of Transportation (WisDOT) Connecting Highways system.

The intersection was identified by the city as having ongoing issues with safety, operations, and capacity and was targeted for investigation of potential improvements. Initial operation reviews indicated regular queues of 200 – 300-feet on all approaches with the existing configuration and traffic signal control. The southbound right-turn movement was calculated to be nearing capacity under current conditions. Over the last five years of available crash data, the intersection experienced 34 crash events. The eastbound approach experienced eight front-to-rear (rear-end)-type of crashes, the most of any other approach or crash manner. Of the 34 crash events, eight involved injuries, none of which were worse than severity level B (suspected minor injury). No fatalities were reported during the period. Roadway conditions were noted as a possible factor in at least ten of the overall crashes (snow, slush, ice, or wet pavement). Failure to yield was cited in 11 of the overall crashes.

In order to identify viable alternatives and ultimately recommend one for improving operations and safety, Phase I and Phase II ICE reports were completed for the intersection, following WisDOT reporting standards.

PHASE I ICE

The Phase I ICE investigation focused on determining what potential improvements were viable for the intersection based on a high-level review of the identified issues and space available. Results from the Phase I analyses indicated the following alternatives were viable and should be analyzed further as part of a more detailed Phase II ICE report:

[1] The Winneconne Avenue approaches are oriented in a southwest to northeast direction, but will be referred to as west and east legs for simplicity of discussion.

1. Modified Traffic Signal – Lane modifications and updated signal phasing
2. Roundabout, 4-Leg – Convert the existing intersection into a multilane roundabout
3. Roundabout, 5-Leg – Convert the existing intersection into a multilane roundabout which realigns Church Street to be part of the main intersection.

PHASE II ICE

The Phase II ICE investigation used the viable alternatives from the Phase I ICE report and looked more in-depth at existing (2022) design year (2042) operations, projected safety performance using the Interactive Highway Safety Design Model (IHSDM) procedures, conceptual level intersection layouts, business and right-of-way (R/W) impacts, and estimated construction costs. Conceptual layouts for the three alternatives are included in the Phase II ICE report.

Results of the analyses indicated that all alternatives are expected to provide acceptable levels of operation (delay, queue, and capacity) through the design year. The roundabout alternatives are expected to provide the most significant and longest-lasting operational and capacity benefits but would cost the most to construct and would have the greatest R/W and business impacts. Including estimated R/W acquisition costs, the four-leg roundabout alternative is expected to cost $1.8 million more than the modified traffic signal alternative. Both roundabout alternatives would require the purchase of the entire parcel in the northwest corner of the intersection, whereas the modified traffic signal would only require a small strip of R/W to be acquired. The roundabouts would also require the purchase and relocation of the commercial pylon signs for parcels in the north and southeast corners, in addition to relocation of the “Welcome to Historic Downtown Neenah” monument sign and adjacent flagpole. These impacts are shown in Figure 1 and Figure 2.

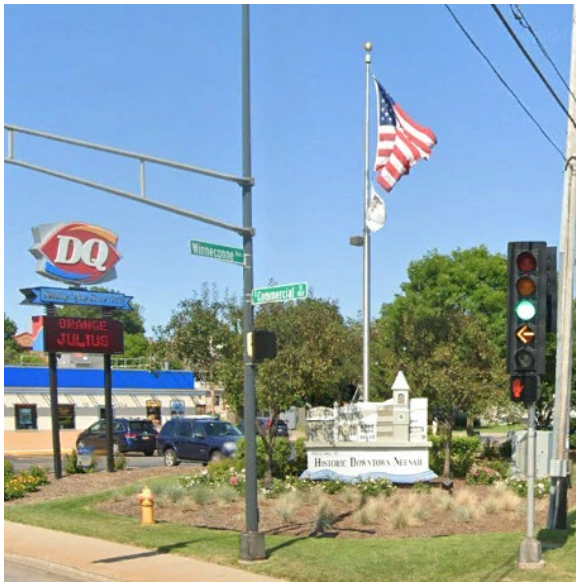


Figure 1, The existing monument sign, flagpole, and commercial pylon sign in the northeast corner

Figure 2, The existing commercial pylon sign in the southeast corner

For safety and geometric constraint reasons, access between Winneconne Avenue and Church Street would be restricted to right-in/right-out movements only for the modified traffic signal and 4-leg roundabout alternatives. The existing intersection of Winneconne Avenue at Church Street

is within the functional area of the intersection of Winneconne Avenue at Commercial Street. This proximity results in a larger number of conflict points (places where vehicle paths overlap) in a smaller area, which results in a higher probability for crashes to occur.

The roundabout alternatives are expected to generate the largest numbers of crashes, showing an increase over the no-build alternative. Recent studies have shown increases in the overall number of crashes occur when multilane roundabouts are constructed; however, the magnitude of injuries are lower than other intersection types. Due to the geometric design of a roundabout, the most severe manners of collision (head-on and T-bone) which result in K and A-level severity injuries (fatal and suspected serious injury), are all but completely eliminated. Other intersection types such as stop or traffic signal control do not have physical barriers preventing vehicles from colliding in this manner, while also allowing for faster approach speeds prior to any impact.

When construction costs and projected safety benefits are compared, the modified traffic signal alternative has a benefit/cost ratio of 0.46; the 4-leg roundabout alternative is -2.47. (Note, due to limitations of the IHSDM, a benefit/cost ratio for a 5-leg roundabout is not able to be calculated. It is expected to be lower than the 4-leg alternative.)

The 5-leg roundabout alternative is the only alternative that does not have a significant impact to the Valley Transit (Route 32) line that uses Winneconne Avenue and Church Street. Turn movement restrictions would require at least part of the bus route to be moved to a different street in order to access northbound Church Street with the modified traffic signal alternative. The 5-leg roundabout alternative would still allow direct access to northbound Church Street within the intersection. Indirect access to northbound Church Street would be allowed with the 4-leg roundabout alternative; however, this would require the bus to make a U-turn at the roundabout in order to turn right onto northbound Church Street.

CONCLUSIONS

Conclusions discussed below are based on the results of the alternatives considered in the Phase II ICE investigation. Development changes being considered for the adjacent properties could allow for some modifications of the alternatives investigated as part of the formal Phase II ICE. Additional analysis would be necessary to determine the impacts “fine tuning” the proposed alternatives, such as modifications of downstream lane configurations (lane reductions/merges) or other geometric adjustments and could be done as a preferred alternative is selected.

Based on the raw results of the Phase II ICE investigation, the modified traffic signal is the preferred option. The modified traffic signal has the best benefit/cost ratio, reduces the expected number of crashes, results in the least amount of R/W impacts, and does not require any businesses to be acquired. Unlike the roundabout alternatives, the modified traffic signal has reduced operations (higher delay and queues, lower residual capacity). The modified traffic signal improves on existing operations through the design year, just not to the same extent as the roundabout alternatives. The modified traffic signal alternative does not significantly reduce the likelihood of severe crashes (injury level B, A, or fatalities (K)). However, in the last five years, crashes of this injury magnitude were not reported.

In order to accommodate the design vehicle movements along the STH 114 portions of the intersection, the stop bars for the southbound and eastbound approaches need to be relocated upstream of the intersection in order to allow the design vehicles enough room to complete their

maneuvers. The eastbound stop bar could remain in its current location; however, in order to accommodate the southbound right turn, additional R/W would be necessary as well as the relocation of at least one significant utility pole.

Restricting access to Church Street down to right-in and right-out movements will impact the existing Route 32 Valley Transit bus line, as it currently turns left from eastbound Winneconne Avenue onto northbound Church Street. The bus line would need to be modified to accommodate this new restriction. Several potential alternatives exist, including:

- Moving northbound operations to Commercial Street and using Church Street for southbound operations
- Relocating the eastbound left-turn to Isabella Street, then using Adams Street to reconnect with Church Street

Current cost estimates included implementing traffic signal changes necessary to accommodate the proposed lane adjustments only, as crash patterns did not indicate the need for additional signalization infrastructure changes for the other intersection approaches. Any further changes would require an increase in funding, but could all be implemented at the same time.

Additional considerations that could be evaluated with the development of further design plans could include:

- Install a raised median on the north approach to separate the southbound right-turn lane from the through lane. The raised median would allow a place of pedestrian refuge, shortening the distance that would need to be crossed at one time, in addition to providing additional signal timing flexibility. Installation of such an island would significantly increase the alternative's impacts to the property in the northwest corner of the intersection and Church Street.
- Install a raised median on the west approach to separate the eastbound and westbound lanes. The physical barrier would better prevent left turns to and from Church Street than if regulatory signs were used alone. Addition of the median would increase the R/W impacts as well:
    - Northern Shift
        - No R/W would need to be acquired on the south side of the approach
        - Creates additional impacts for design vehicles completing southbound right turns from Commercial Street
    - Southern Shift
        - Creates new R/W impacts on the south side of the road where there were few or none previously
        - Allows for realignment of the eastbound left-turn lanes. This could reduce the impacts these left turns have on the southbound approach lanes.
- Upgrading to monotube and signal head-per-lane for all approaches. This would maximize signal visibility, which could further reduce the incidence of front-to-rear crashes. It would also bring the signal infrastructure to the latest WisDOT design standards. Depending on the size of poles needed, additional utility modification may be required in order to accommodate the new poles and associated foundations.
- Converting five-section, protected/permissive left-turn signals to four-section flashing yellow arrow (FYA) indications. This conversion not only offers additional crash reduction potential, but also offers more signal phasing flexibility to accommodate future growth.

- Adding pedestrian push buttons for calling pedestrian phases. Currently, the pedestrian phase is called with every green light. When there are no pedestrians present, this results in additional phase time being used for a phase that may not need it, when it could be used to instead serve other phases requiring more time. It could also allow for conflicting pedestrian phases to be served sooner. Given the existing traffic signal pole layout, additional “pedestrian button poles” may be needed in order to comply with ADA and PROWAG location regulations.
- Adding emergency vehicle preemption (EVP). EVP can allow for certain emergency vehicles to pass through the intersection faster by being able to call for their own green light indication. This equipment does require transponder equipment to be installed on each emergency vehicle in order for it to be effective. The signal infrastructure could be installed now to save implementation costs later.

Implementing some or all of the additional traffic signal modifications listed above, beyond what is required for the modified traffic signal alternative would require additional discussion and further investigation to determine a better cost estimate. Simultaneous implementation would have several benefits, including better public perception of only making modifications at one time rather than coming back later for additional work. Completing all the work at once would increase the overall implementation cost estimate, but it would have cost efficiencies with construction mobilization and necessary underground rewiring to accommodate the new signals. It could also offer additional timing flexibilities to better accommodate future growth.

Attachment A : Phase 2 ICE Report (Text & Attachments)
Attachment B : Phase 1 ICE Report (Text Only)

Project and Analyst Information:

Project ID:	n/a
Project Type:	Other
Location:	STH 114 (Winneconne Avenue) at STH 114 (Commercial Street) City of Neenah Winnebago County Northeast Region
Analyst:	Eric Frailing, PE, PTOE
Agency:	MSA Professional Service, Inc
Date:	February 2023

Background Information:

Project Need:	Safety and Operations
Project Objective(s):	The objective of the proposed project is to reduce the number of severe injury crashes while improving intersection operations. A Phase I ICE report identified three feasible alternatives for further consideration to meet the proposed objectives: Modified Traffic Signal, 4-Leg Roundabout, and a 5-Leg Roundabout. These intersection alternatives are evaluated in this Phase II ICE report in order to determine the optimal intersection modification to meet the operational needs of the intersection without sacrificing safety.
Additional Information:	The City of Neenah has identified the intersection of STH 114 (Winneconne Avenue) at STH 114 (Commercial Street) as a target for improvements due to ongoing operational/capacity and safety issues. The area is surrounded by mostly commercial developments, with residential development surrounding the commercial development. Valley Transit operates bus routes through the area. Routes currently use all approaches of this intersection except for the east leg of the intersection. Bus routes are also shown to use Church Street as well. A project location map is included in Attachment 2. A construction year has not been formally identified; however, it is assumed that construction is desired to occur as soon as financially feasible and practical. For the purposes of completing IHSDM analyses, a construction year of 2023 was selected, with the first year of the evaluation period (the first year the roadway is open to traffic after the proposed construction is completed) being 2024. Existing and design years of analysis were identified in the Phase I ICE report (2022 and 2042, respectively), and were carried forward in this Phase II ICE assessment for consistency.

Existing Crash Information:

Observed Crash History:

A total of 34 crashes were reported at this intersection from 2017 – 2021. Seven of the crashes resulted in injuries. A crash diagram is provided in Attachment 3.

Years: 2017 – 2021

Crash Type	Fatal	Injury A	Injury B	Injury C	KABC	PDO	Total
Rear-End (Front-to-Rear)	0	0	0	2	2	14	16

Crash Type	Fatal	Injury A	Injury B	Injury C	KABC	PDO	Total
Angle (Front-to-Side)	0	0	2	0	2	6	8
Single Vehicle – Other	0	0	3	0	3	1	4
Sideswipe – Same Direction	0	0	0	0	0	3	3
Head-On (Front-to-Front)	0	0	0	1	1	1	2
Sideswipe – Opposite Direction	0	0	0	0	0	1	1
Total	0	0	5	3	8	26	34

(add more rows as needed)

Crash Trends:

The intersection has a significant number of front-to-rear crash events, with most occurring on the eastbound approach. The majority of this crash type were property damage only; however, two were of severity C (possible injury). Higher numbers of these crashes are common for traffic signals versus stop or yield-controlled intersections. Front-to-side crash events were the next most common, with no particular approach having a significant number of this crash type. Two of these crashes resulted in severity B (suspected minor injury) magnitude injuries. Three of the single-vehicle crashes resulted in injuries – all severity B (suspected minor injury) magnitude injuries. One of these events involved a pedestrian being struck by a southbound left-turning vehicle; one of the events involved a bicyclist being struck by a southbound right-turning vehicle.

Contributing Factors:

Weather may have been a factor in two of the crashes (rain). Road conditions may have been a factor in at least ten crashes: five wet, three snow, one slush, and one ice. Drug impairment was cited in two crashes. Failure to yield was cited in 11 crashes. Distracted driving was identified in nine crashes. Disregard of a red light was cited in three crashes. Speed was cited in two crashes (too fast for conditions). Improper crossing was cited in the crash that involved a pedestrian.

Additional Modes of Transportation:

Mode	Need? Yes/No	Nearby Generators and Existing Facilities	Volume	
			#	Unit
PED/BIKE	Yes	Sidewalk is provided on both sides of the street for all approaches. Except for the eastbound channelized right-turn lane, crosswalks and pedestrian signals (no call buttons) are present across all approaches of the intersection. The right-turn lane has a crosswalk, with a Yield sign present prior to the crosswalk. No bicycle lanes are present on any of the approaches, no is width available to add them with the existing cross section of pavement. Several schools and parks exist just outside of a quarter-mile radius of this intersection. Numerous commercial businesses are present directly adjacent to the intersection.	Varies	n/a
OSOW	No	STH 114 is not an official OSOW nor a designated long-truck route, nor are any of the non-STH approaches to this intersection	n/a	n/a

(add more rows as needed)

Other Information: The approaches to this intersection are classified as "Major Urban Streets" by the Winnebago County Bicyclist Map. As such, bicycling conditions are not presented for these streets and "are likely to have high volumes of traffic".

Summary Tables:

Descriptions:

Alt.	Traffic Control	Description of Alternative
1	Modified Traffic Signal	An exclusive southbound right-turn lane would be added. The eastbound approach would add an additional exclusive left-turn lane and its phasing would switch from protected/permissive to protected only operations. The eastbound approach would also implement signal head-per-lane indications to accommodate the phasing change. Church Street would be restricted to right-in/right-out access. Accommodation of the design vehicles require the stop bars for the eastbound and southbound left-turn lanes to be pulled further upstream from the intersection in order to avoid more extensive modifications and ROW acquisitions to the northwest corner.
2	Roundabout – 4-Leg	The existing intersection would be converted into a multilane roundabout with two-lane approaches for all directions. Church Street would be restricted to right-in/right-out access.
3	Roundabout – 5-Leg	The existing intersection would be converted into a multilane roundabout. The alignment of Church Street would be modified to tie the approach into the main roundabout intersection. All approaches except for Church Street would be two-lanes; Church Street would have a single-lane approach.

Alternative concept layouts are included in Attachments 4A-C.

Costs and Impacts:

Alt.	Traffic Control	Construction Cost	Real Estate Impacts			Environmental Impacts	
			# Build	# Acres	Cost	Impact Type	# Acres
1	Modified Traffic Signal	$272,400	0	0.04	$15,800	Choose an item.	
2	Roundabout – 4-Leg	$1,478,300	1	0.71	$370,700	Choose an item.	
3	Roundabout – 5-Leg	$1,680,500	1	0.70	$373,100	Choose an item.	

Environmental impact evaluations will be completed as the project progresses. Based on preliminary schematics, the roundabout alternatives are expected to have the highest impacts if environmental resources are found. Preliminary cost estimates are included in Attachment 5.

Safety Performance:

Alt.	Traffic Control	Analysis Period	KABC	PDO	Total
-	Existing Conditions	2017 – 2021	8	26	34
-	Future No-Build	2024 – 2033	17.9	31.6	49.5
1	Modified Traffic Signal	2024 – 2033	16.6	28.8	45.4
2	Roundabout – 4-Leg	2024 – 2033	23.4	129.2	152.6
3	Roundabout – 5-Leg	2024 – 2033	n/a	n/a	n/a

Safety performance was evaluated using safety performance functions based on Wisconsin-calibrated data in the IHSDM 2020 release for the 10-year period of 2024 to 2033.

> *Note that the IHSDM tool does not currently have data sets which cover 5-leg roundabouts. Based on crash frequency prediction models found in NCHRP Report 672[1], 5-leg roundabouts with two circulating lanes are expected to have higher crash frequencies for both injury and PDO crash types. Therefore, for the purpose of this report, 5-leg roundabouts will be assumed to have poorer benefit/cost ratios and higher present value of crash costs than a 4-leg roundabout.*

Traffic volumes for 2031 were grown based on a conservative growth rate for background traffic determined values used in the Phase I ICE report. An economic analysis of the safety performance for the analysis period of 2024 to 2033 was also completed with the Wisconsin-calibrated data in the IHSDM. The modified traffic signal alternative has a higher Benefit/Cost ratio than either roundabout alternative:

- Alternative 1, Modified Traffic Signal: 0.46
- Alternative 2, Roundabout – 4-Leg: -2.47
- Alternative 3, Roundabout – 5-Leg: < -2.47 (*estimated*)

The roundabout alternative is predicted to have a higher number of crashes than the modified traffic signal alternative, both from an injury/fatal event and property damage only event perspectives. However, the expected injury severity of any roundabout crashes is expected to be less than the traffic signal alternatives. Present value of crash cost for the alternatives over the 10-year period are:

- Alternative 1, Modified Traffic Signal: $1,688,557
- Alternative 2, Roundabout – 4-Leg: $6,604,387
- Alternative 3, Roundabout – 5-Leg: >$6,604,387 (*estimated*)

Full IHSDM analysis output is included in Attachment 6. Supporting traffic volumes and operational analyses are included in Attachments 7 and 8, respectively.

Recommendation:

Alternative: Modified Traffic Signal

Influencing Factors: Expected operations (delay and queues) are better with either roundabout alternative, with both roundabouts expected to be able to accommodate more traffic than the modified traffic signal alternative.

The 4-leg roundabout alternative requires Church Street to intersect Winneconne Avenue within the functional area of the roundabout exit path and places the associated pedestrian crossing of Winneconne Avenue in higher-speed/more vulnerable location. The pedestrian crossing location also requires users to travel further out of their way to cross the west side of the intersection. The 5-leg roundabout alternative improves both of the aforementioned deficiencies (Church Street alignment and pedestrian crossing location). However, multilane 5-leg roundabouts are more difficult to direct motorists through without additional guide signs and spiraling lanes within the circulatory roadway.

The modified traffic signal alternative is the best alternative when compared for construction costs, business and right-of-way impacts, utility impacts, and ease (time) to implement/construct. Because

[1] *NCHRP Report 672, Roundabouts: An Informational Guide, Second Edition*. TRB, 2010.

of the geometric design of the roundabout, fatal and high-level injury crashes (A and B-level) are less likely than a stop or traffic signal-controlled intersection. However, less severe injury (C-level) and property damage only crashes typically are higher for multilane roundabouts than the other intersection types.

Based on the calculated cost and safety benefits, the modified traffic signal is the preferred intersection alternative at this location.

Existing & Future No-Build Conditions:

Practicality:

Public Opinion:	Formal public involvement meetings have not occurred with the proposed alternatives. Complaints have been previously received regarding the current operational and safety of the existing intersection configuration.
Business Impacts:	None
ROW Impacts:	None
Utility Impacts:	None
Cost Estimate:	$0
Additional Info:	The no-build scenario does not address the existing safety and operational issues, nor concerns with future traffic volumes.

Safety Analysis:

Safety Performance Measures:

	Analysis Period	KABC	PDO	Total
Existing Conditions	2017 – 2021	8	26	34
Future No-Build	2024 – 2033	17.9	31.6	49.5

Operational Analysis:

Warrant Analysis:	n/a
Queue Impacts:	Existing and projected queues are expected to impact access to existing driveways on all approaches.
Additional Capacity:	None. At least one movement is near capacity, with several projected to be over capacity or acceptable levels of delay during the design year.
Railroad Impacts:	None
Additional Info:	

Operational Performance Measures:

Year: 2022

Existing Conditions

AM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	-	T/R
# Lanes	1	1	1	1	-	1	1	-	1	1	-	1
LOS	C	C	C	C	-	D	C	-	C	D	-	D
Delay (s)	30.7	25.3	23.3	25.9	-	49.2	28.6	-	20.5	42.6	-	51.6
v/c	0.76	0.45	0.27	0.12	-	0.80	0.74	-	0.47	0.54	-	0.73
Queue (ft.)	175	225	50	25	-	350	200	-	250	200	-	200
Storage (ft.)	n/a	n/a	150	260	-	n/a	670	-	n/a	n/a	-	n/a

PM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	-	T/R
# Lanes	1	1	1	1	-	1	1	-	1	1	-	1
LOS	C	C	C	C	-	D	C	-	C	D	-	F
Delay (s)	29.3	24.2	22.6	25.0	-	44.9	29.2	-	24.1	44.7	-	83.2
v/c	0.75	0.41	0.27	0.15	-	0.75	0.74	-	0.59	0.65	-	0.99
Queue (ft.)	200	200	50	50	-	325	100	-	325	325	-	325
Storage (ft.)	n/a	n/a	150	260	-	n/a	670	-	n/a	n/a	-	n/a

Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)

Year: 2042

Future No-Build Conditions (Design Year)

AM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	-	T/R
# Lanes	1	1	1	1	-	1	1	-	1	1	-	1
LOS	F	C	C	C	-	F	F	-	C	E	-	F
Delay (s)	81.9	28.7	24.2	26.8	-	110.0	80.6	-	26.1	63.2	-	152.3
v/c	1.03	0.57	0.33	0.18	-	1.09	1.01	-	0.65	0.86	-	1.18
Queue (ft.)	350	250	25	50	-	450	325	-	325	250	-	250
Storage (ft.)	n/a	n/a	150	260	-	n/a	670	-	n/a	n/a	-	n/a

PM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	-	T/R
# Lanes	1	1	1	1	-	1	1	-	1	1	-	1
LOS	D	C	C	C	-	E	C	-	C	E	-	F
Delay (s)	47.8	23.9	22.0	25.0	-	56.1	32.6	-	29.6	56.8	-	185.0
v/c	0.91	0.47	0.30	0.18	-	0.88	0.78	-	0.72	0.84	-	1.27
Queue (ft.)	350	225	50	50	-	425	125	-	400	450	-	450
Storage (ft.)	n/a	n/a	150	260	-	n/a	670	-	n/a	n/a	-	n/a

Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)

Alt. 1: Modified Traffic Signal:

Practicality:

Public Opinion:	Formal public involvement meetings have not occurred with the proposed alternatives. Complaints have been previously received regarding the current operational and safety of the existing intersection configuration.
Business Impacts:	None
ROW Impacts:	0.04-acres
Utility Impacts:	None anticipated
Cost Estimate:	$340,000
Additional Info:	Restricting turn movements to/from Church Street are expected to improve safety and operations for general traffic along Winneconne Avenue. However, adjustments to the Route 32 bus that uses Church Street will be necessary. Accommodation of the design vehicles require the stop bars for the eastbound and southbound left-turn lanes to be pulled further upstream from the intersection. If the eastbound left-turn stop bars remain in their current location, the impacts to the parcel in the northwest quadrant would have more significant ROW impacts. Additionally, at least one significant utility pole would need to be relocated to accommodate the new curb line.

Safety Analysis:

Crash Trend(s) and Contributing Factors:	Additional signal heads and signal phasing/operation improvements may reduce the number of front-to-rear manner of collision events. Modification of signal phasing and capacity improvements may also reduce the number of front-to-side manner of collision crashes.
Conflict Points:	*(Vehicle-vehicle conflicts only)* • Existing intersection: 34 (excluding Church Street) • Alt. 1: Modified Traffic Signal: 40 (excluding Church Street) • Alt. 2: Roundabout – 4-Leg: 24 (excluding Church Street) • Alt. 3: Roundabout – 5-Leg: 28
Vulnerable Users:	Pedestrians, bicyclists
Additional Info:	Accommodation of the design vehicles require the stop bars for the eastbound and southbound left-turn lanes to be pulled further upstream from the intersection in order to avoid more extensive modifications and ROW acquisitions to the northwest corner.

Safety Performance Measures:

	Analysis Period	KABC	PDO	Total
Existing Conditions	2017 – 2021	8	26	34
Future No-Build	2024 – 2033	17.9	31.6	49.5
Alt. 1: Modified Traffic Signal:	2024 – 2033	16.6	28.8	45.4

Operational Analysis:

Warrant Analysis:	n/a
Queue Impacts:	The 95th percentile queues for southbound right-turns are not able to be accommodated in the 2022 PM peak without acquiring another business to the north. However, with the exception of the 2042 AM peak period, the 50th percentile queues are expected to be

	accommodated through the design year without the additional acquisition. Similar business driveway access is expected with the proposed alternative.
Additional Capacity:	Analysis indicates the modified traffic signal can accommodate approximately 27% more traffic (above 2022 volumes). This additional capacity is accommodated without additional lanes.
Railroad Impacts:	None
Additional Info:	The currently proposed modifications to the existing traffic signals do not include EVP, adding pedestrian call buttons, flashing yellow arrow (FYA) conversion or full implementation of signal head-per-lane in the alternative cost estimates. Crash patterns do not indicate there are current safety issues that would trigger implementation of FYAs or signal head-per-lane for the southbound, westbound, or northbound approaches. The addition of pedestrian call buttons would allow for additional traffic signal time split variations, which have the potential of small additional operational improvements. Existing overhead utilities and narrow terraces may make signal head-per-lane implementation more challenging. Unknown underground utility impacts will need to be considered as well. From a public perception and construction/mobilization impact perspective, signal improvements for all approaches may be more prudent. Should the modified traffic signal alternative be selected, additional discussions will need to occur to determine if full-intersection signalization improvements are desirable by the city. Additional features such as signal head-per-lane, FYAs, EVP, pedestrian call buttons have proactive operational and safety benefits; however, there would be additional costs above what is estimated as part of this Phase II ICE report in order to implement them. The magnitude of the additional costs would need further investigation to determine the extents of utility impacts created by additional monotube signal structures as well as necessary infrastructure needed to implement pedestrian call buttons which comply with PROWAG and ADA standards.

Operational Performance Measures:

Year: 2022	Alt. 1: Modified Traffic Signal											
AM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	T	R
# Lanes	2	1	1	1	-	1	1	-	1	1	1	1
LOS	D	C	C	C	-	D	C	-	C	D	D	C
Delay (s)	50.3	23.7	21.8	23.1	-	38.9	22.0	-	22.1	38.4	39.0	28.7
v/c	0.80	0.42	0.25	0.12	-	0.69	0.57	-	0.49	0.31	0.33	0.32
Queue (ft.)	125	200	50	25	-	300	175	-	250	150	150	100
Storage (ft.)	150	n/a	150	260	-	n/a	670	-	n/a	n/a	n/a	105
PM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	T	R
# Lanes	2	1	1	1	-	1	1	-	1	1	1	1
LOS	D	C	C	C	-	D	B	-	C	D	D	C
Delay (s)	49.6	24.1	22.5	23.6	-	40.2	20.0	-	24.2	35.8	36.3	26.7
v/c	0.80	0.41	0.26	0.15	-	0.70	0.42	-	0.59	0.34	0.36	0.40
Queue (ft.)	150	200	50	50	-	300	100	-	350	175	175	150
Storage (ft.)	150	n/a	150	260	-	n/a	670	-	n/a	n/a	n/a	105
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Year: 2042	Alt. 1: Modified Traffic Signal											
AM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	T	R
# Lanes	2	1	1	1	-	1	1	-	1	1	1	1
LOS	D	C	C	C	-	D	D	-	C	D	D	D
Delay (s)	53.4	22.9	20.5	22.4	-	50.7	54.9	-	30.6	44.0	45.6	38.5
v/c	0.84	0.51	0.30	0.16	-	0.87	0.91	-	0.70	0.47	0.51	0.69
Queue (ft.)	150	250	25	25	-	400	300	-	350	150	150	225
Storage (ft.)		n/a	150	260	-	n/a	670	-	n/a	n/a	n/a	105
PM Peak	EB			WB			NB			SB		
	L	T	R	L	-	T/R	L	-	T/R	L/T	T	R
# Lanes	2	1	1	1	-	1	1	-	1	1	1	1
LOS	D	C	C	C	-	D	C	-	C	D	D	C
Delay (s)	52.1	24.0	22.1	23.6	-	47.5	22.4	-	29.3	39.7	40.7	29.1
v/c	0.83	0.46	0.30	0.18	-	0.81	0.52	-	0.72	0.44	0.47	0.49
Queue (ft.)	175	225	50	50	-	400	125	-	425	200	200	200
Storage (ft.)		n/a	150	260	-	n/a	670	-	n/a	n/a	n/a	105
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Alt. 2: Roundabout – 4-Leg:

Practicality:

Public Opinion:	Formal public involvement meetings have not occurred with the proposed alternatives. Given the magnitude of ROW impacts, it is not expected to be the preferred option.
Business Impacts:	The Boost Mobile parcel on the northwest corner of Winneconne Avenue at Commercial Street would need to be acquired. The Dairy Queen, Walgreens, Mobil fuel station, Tobacco Outlet Plus and the residential property on the northwest corner of Winneconne Avenue at Church Street would all require varying levels of right-of-way acquisitions. The Dairy Queen and Walgreens pylon signs would need to be relocated. Walgreen's western-most driveway along Winneconne Avenue would need to be closed and operations consolidated to the existing driveway further east on Winneconne Avenue.
ROW Impacts:	0.71-acres
Utility Impacts:	Several overhead utility poles will need to be relocated along the north side of Winneconne Avenue, and along the east side of Commercial Street, south of the intersection.
Cost Estimate:	$2,110,000
Additional Info:	Restricting turn movements to/from Church Street are expected to improve safety and operations for general traffic along Winneconne Avenue. However, adjustments to the Route 32 bus that uses Church Street will be necessary. The roundabout design would allow a natural place for the Route 32 bus to make a U-turn in order to access northbound Church Street from eastbound Winneconne Avenue. The flagpole and "Historic Downtown Neenah" monument sign in the northeast corner will need to be relocated.

Safety Analysis:

Crash Trend(s) being Improved with Alt.:	Sideswipe and head-on crashes should be significantly reduced and likely eliminated altogether, given the geometric design of a roundabout.
Geometric Concerns:	Maintaining access between Winneconne Avenue and Church Street requires an intersection to be placed closer to the roundabout than is desirable. The angle of intersection is such that a channelizing island cannot be placed on the Church Street approach to further force southbound traffic to make right turns only. This alignment also forces the crosswalk for crossing the westbound exit lane to be further away from the roundabout, forcing pedestrians to travel further out of their way in addition to being placed in a position where exiting roundabout traffic is able to achieve higher speeds.
Additional Info:	

Safety Performance Measures:

	Analysis Period	KABC	PDO	Total
Existing Conditions	2017 – 2021	8	26	34
Future No-Build	2024 – 2033	17.9	31.6	49.5
Alt. 2: Roundabout – 4-Leg:	2024 – 2033	23.4	129.2	152.6

Operational Analysis:

Warrant Analysis:	n/a

Queue Impacts:	Except for the southbound approach, expected 95th percentile queues are not anticipated to impact adjacent business access.
Additional Capacity:	Analysis indicates the modified traffic signal can accommodate approximately 36% more traffic (above 2022 volumes). This additional capacity is accommodated without additional lanes.
Railroad Impacts:	None
Additional Info:	

Operational Performance Measures:

Year: 2022	Alt. 2: Roundabout – 4-Leg											
AM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	A	-	A	B	-	B	B	-	B	B	-	B
Delay (s)	9.4	-	9.2	12.8	-	11.9	11.4	-	10.9	12.0	-	11.4
v/c	0.47	-	0.47	0.39	-	0.39	0.47	-	0.47	0.46	-	0.46
Queue (ft.)	75	-	75	50	-	50	75	-	75	75	-	75
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
PM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	A	-	A	B	-	A	A	-	A	B	-	B
Delay (s)	9.3	-	9.1	10.2	-	9.6	9.1	-	8.8	10.4	-	10.6
v/c	0.44	-	0.44	0.31	-	0.31	0.37	-	0.37	0.47	-	0.50
Queue (ft.)	75	-	75	25	-	25	50	-	50	75	-	75
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Year: 2042	Alt. 2: Roundabout – 4-Leg											
AM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	B	-	B	C	-	C	C	-	C	C	-	C
Delay (s)	12.3	-	11.9	18.7	-	17.2	16.1	-	15.3	17.2	-	16.2
v/c	0.58	-	0.58	0.52	-	0.52	0.60	-	0.60	0.60	-	0.60
Queue (ft.)	125	-	125	75	-	75	100	-	100	100	-	100
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
PM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	B	-	B	B	-	B	B	-	B	B	-	B
Delay (s)	12.2	-	11.8	13.7	-	12.7	11.9	-	11.3	14.4	-	14.8
v/c	0.56	-	0.56	0.42	-	0.42	0.48	-	0.48	0.60	-	0.63
Queue (ft.)	100	-	100	50	-	50	75	-	75	125	-	125
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Alt. 3: Roundabout – 5-Leg:

Practicality:

Public Opinion:	Formal public involvement meetings have not occurred with the proposed alternatives. Given the magnitude of ROW impacts, it is not expected to be the preferred option.
Business Impacts:	The Boost Mobile parcel on the northwest corner of Winneconne Avenue at Commercial Street would need to be acquired. The Dairy Queen, Walgreens, Mobil fuel station, Tobacco Outlet Plus and the residential property on the northwest corner of Winneconne Avenue at Church Street would all require varying levels of right-of-way acquisitions. The Dairy Queen and Walgreens pylon signs would need to be relocated. Walgreen's western-most driveway along Winneconne Avenue would need to be closed and operations consolidated to the existing driveway further east on Winneconne Avenue.
ROW Impacts:	0.70-acres
Utility Impacts:	Several overhead utility poles will need to be relocated along the north side of Winneconne Avenue, and along the east side of Commercial Street, south of the intersection.
Cost Estimate:	$2,350,000
Additional Info:	Incorporating Church Street into the main intersection will allow for safer access from Winneconne Avenue without having to change the Route 32 bus path. The flagpole and "Historic Downtown Neenah" monument sign in the northeast corner will need to be relocated.

Safety Analysis:

Crash Trend(s) being Improved with Alt.:	Sideswipe and head-on crashes should be significantly reduced and likely eliminated altogether, given the geometric design of a roundabout.
Geometric Concerns:	Maintaining access between Winneconne Avenue and Church Street requires an intersection to be placed closer to the roundabout than is desirable. The angle of intersection is such that a channelizing island cannot be placed on the Church Street approach to further force southbound traffic to make right turns only. This alignment also forces the crosswalk for crossing the westbound exit lane to be further away from the roundabout, forcing pedestrians to travel further out of their way in addition to being placed in a position where exiting roundabout traffic is able to achieve higher speeds.
Additional Info:	*The IHSDM tool does not currently have data sets which cover 5-leg roundabouts. Based on crash frequency prediction models found in NCHRP Report 672[2], 5-leg roundabouts with two circulating lanes are expected to have higher crash frequencies for both injury and PDO crash types. Therefore, for the purpose of this report, 5-leg roundabouts will be assumed to have poorer benefit/cost ratios and higher present value of crash costs than a 4-leg roundabout.*

Safety Performance Measures:

	Analysis Period	KABC	PDO	Total
Existing Conditions	2017 – 2021	8	26	34
Future No-Build	2024 – 2033	17.9	31.6	49.5
Alt. 3: Roundabout – 5-Leg:	2024 – 2033	n/a	n/a	n/a

[2] *NCHRP Report 672, Roundabouts: An Informational Guide, Second Edition*. TRB, 2010.

Operational Analysis:

Warrant Analysis:	n/a
Queue Impacts:	Except for the southbound approach, expected 95th percentile queues are not anticipated to impact adjacent business access.
Additional Capacity:	Analysis indicates the modified traffic signal can accommodate approximately 30% more traffic (above 2022 volumes). This additional capacity is accommodated without additional lanes.
Railroad Impacts:	None
Additional Info:	WB-65s are not able to make the hard southbound right turn from Commercial Street onto Church Street. Given the surrounding street network, this is not a significant concern. WB-50s would be able to make this movement.

Operational Performance Measures:

Year: 2022	Alt. 3: Roundabout – 5-Leg											
AM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	A	-	A	B	-	B	B	-	B	B	-	B
Delay (s)	10.0	-	9.8	13.7	-	12.7	12.3	-	11.7	12.9	-	12.2
v/c	0.49	-	0.49	0.40	-	0.40	0.49	-	0.49	0.48	-	0.48
Queue (ft.)	75	-	75	50	-	50	75	-	75	75	-	75
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
PM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	B	-	A	B	-	B	B	-	A	B	-	B
Delay (s)	10.1	-	9.8	11.2	-	10.4	10.1	-	9.6	11.6	-	11.8
v/c	0.48	-	0.48	0.33	-	0.33	0.40	-	0.40	0.50	-	0.53
Queue (ft.)	75	-	75	25	-	25	50	-	50	75	-	100
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Year: 2042	Alt. 3: Roundabout – 5-Leg											
AM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	B	-	B	C	-	C	C	-	C	C	-	C
Delay (s)	13.4	-	13.0	20.6	-	18.9	18.0	-	17.0	19.2	-	18.0
v/c	0.61	-	0.61	0.55	-	0.55	0.63	-	0.63	0.63	-	0.63
Queue (ft.)	150	-	150	75	-	75	125	-	125	100	-	100
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
PM Peak	EB			WB			NB			SB		
	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R	L/T	-	T/R
# Lanes	1	-	1	1	-	1	1	-	1	1	-	1
LOS	B	-	B	C	-	B	B	-	B	C	-	C
Delay (s)	13.7	-	13.2	15.4	-	14.3	13.6	-	12.9	17.0	-	17.3
v/c	0.60	-	0.60	0.45	-	0.45	0.51	-	0.51	0.64	-	0.67
Queue (ft.)	125	-	125	50	-	50	75	-	75	125	-	150
Storage (ft.)	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a	n/a	-	n/a
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Operational Performance Measures:

Year: 2022	Alt. 3: Roundabout – 5-Leg											
AM Peak	SB Church St											
	-	All	-	-	-	-	-	-	-	-	-	-
# Lanes	-	1	-	-	-	-	-	-	-	-	-	-
LOS	-	C	-	-	-	-	-	-	-	-	-	-
Delay (s)	-	15.2	-	-	-	-	-	-	-	-	-	-
v/c	-	0.27	-	-	-	-	-	-	-	-	-	-
Queue (ft.)	-	25	-	-	-	-	-	-	-	-	-	-
Storage (ft.)	-	n/a	-	-	-	-	-	-	-	-	-	-
PM Peak	SB Church St											
	-	All	-	-	-	-	-	-	-	-	-	-
# Lanes	-	1	-	-	-	-	-	-	-	-	-	-
LOS	-	B	-	-	-	-	-	-	-	-	-	-
Delay (s)	-	12.6	-	-	-	-	-	-	-	-	-	-
v/c	-	0.17	-	-	-	-	-	-	-	-	-	-
Queue (ft.)	-	25	-	-	-	-	-	-	-	-	-	-
Storage (ft.)	-	n/a	-	-	-	-	-	-	-	-	-	-
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Year: 2042	Alt. 3: Roundabout – 5-Leg											
AM Peak	SB Church St											
	-	All	-	-	-	-	-	-	-	-	-	-
# Lanes	-	1	-	-	-	-	-	-	-	-	-	-
LOS	-	C	-	-	-	-	-	-	-	-	-	-
Delay (s)	-	22.6	-	-	-	-	-	-	-	-	-	-
v/c	-	0.39	-	-	-	-	-	-	-	-	-	-
Queue (ft.)	-	50	-	-	-	-	-	-	-	-	-	-
Storage (ft.)	-	n/a	-	-	-	-	-	-	-	-	-	-
PM Peak	SB Church St											
	-	All	-	-	-	-	-	-	-	-	-	-
# Lanes	-	1	-	-	-	-	-	-	-	-	-	-
LOS	-	C	-	-	-	-	-	-	-	-	-	-
Delay (s)	-	17.5	-	-	-	-	-	-	-	-	-	-
v/c	-	0.25	-	-	-	-	-	-	-	-	-	-
Queue (ft.)	-	25	-	-	-	-	-	-	-	-	-	-
Storage (ft.)	-	n/a	-	-	-	-	-	-	-	-	-	-
Additional Information	Queues are 95th-percentile, rounded to the nearest 25 ft (25 ft minimum)											

Attachments:

(Provide attachments outline in FDM 11-25-3 Attachment 3.7 as appropriate)

1. ICE Report Checklist
2. Project Location Map
3. Intersection Crash Diagram
4. Conceptual Layouts
    a. Alternative 1: Modified Traffic Signal
    b. Alternative 2: Roundabout 4-Leg
    c. Alternative 3: Roundabout 5-Leg
5. Preliminary Design Estimate of Probable Cost
6. IHSDM Crash Prediction Evaluations
7. Traffic Volumes
8. Traffic Analysis Output Reports

ICE SUBMITTAL CHECKLIST

Level of ICE (Check Applicable Box): ☐ **Phase I: Scoping ICE** ☒ **Phase II: Alternative Selection ICE**

Documentation	Submittal Requirements		Submittal to City		Submittal to BTO	
	Phase I ICE	Phase II ICE	Included	N/A	Included	N/A
Report						
▪ Phase I: ICE Memorandum	Required	N/A	☐	☑	☐	☐
▪ Phase I: ICE Brainstorming Guide	Required	N/A	☐	☑	☐	☐
▪ Phase II: ICE Worksheet	N/A	Required	☑	☐	☐	☐
Project Description						
▪ Project Location Map	Required	Required	☑	☐	☐	☐
▪ Aerial Photo of Intersection	Optional	Optional	☑	☐	☐	☐
Traffic Volume Data						
▪ Turning Movement Counts (field count data)	Optional	Required	☑	☐	☐	☐
▪ Segment Traffic Forecasts	Optional	Required	☐	☑	☐	☐
▪ Intersection Traffic Forecasts	Optional	Required	☑	☐	☐	☐
Safety Considerations						
▪ Intersection Crash Diagram with summary of crashes	Required	Required	☑	☐	☐	☐
▪ Predictive Safety Analysis	Optional	Required	☑	☐	☐	☐
Additional Modes of Transportation						
▪ Wisconsin Bike Map (bike rating)	Optional	Optional	☐	☑	☐	☐
▪ 5-Year Summary of OSOW and Long Truck Routes	Optional	Optional	☐	☑	☐	☐
Operational Analysis (as applicable) [(a)]						
▪ AWSC Warrants	Optional	Required	☐	☑	☐	☐
▪ Traffic Signal Warrants	Optional	Required	☐	☑	☐	☐
▪ Model Files for HCS, Sidra, & Synchro	Optional [(a)]	Required	☑	☐	Not Applicable	

(a) Completion of the operational analysis for the Phase I: ICE is optional, however, if conducted the analyst shall submit all applicable warrants, model files, and model output worksheets. Region shall submit all DT1887 and DT2291 to BTO for all HCM-based and microsimulation analyses that is conducted.

ICE SUBMITTAL CHECKLIST

Level of ICE (Check Applicable Box): ☐ **Phase I: Scoping ICE** ☒ **Phase II: Alternative Selection ICE**

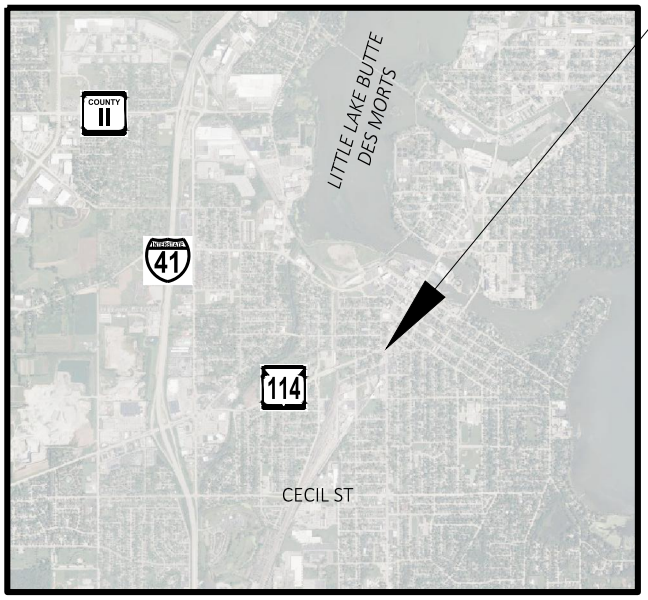
Documentation	Submittal Requirements		Submittal to City		Submittal to BTO	
	Phase I ICE	Phase II ICE	Included	N/A	Included	N/A
▪ HCS Worksheets	Optional	Required				
~ *HCS7 Formatted Summary Report (AWSC, TWSC, Roundabouts)*			☐	☑	☐	☐
~ *HCS7 Full Formatted Report (Signals)*			☐	☑	☐	☐
▪ Sidra Worksheets (Roundabouts only) [(b)]	Optional	Required				
~ *Site Layout*			☑	☐	☐	☐
~ *Input Volumes*			☑	☐	☐	☐
~ *Input Comparison ("with Standard Model Defaults")*			☑	☐	☐	☐
~ *Movement Summary*			☑	☐	☐	☐
~ *Lane Summary*			☑	☐	☐	☐
▪ Synchro Worksheets [(c)]	Optional	Required				
~ *Signalized Intersection Report (with following data: Lane Inputs, Volume Inputs, Timing Inputs, Actuated Inputs, Queues)*			☑	☐	☐	☐
~ *HCM 6th Edition Signalized "Summary" report (with 95th percentile queue)*			☑	☐	☐	☐
~ *Unsignalized Intersection Report (with following data: Lane Inputs, Volume Inputs)*			☐	☑	☐	☐
~ *HCM 6th Edition AWSC or TWSC*			☐	☑	☐	☐
▪ SimTraffic Outputs for each run	Optional	Required	☐	☑	☐	☐
Traffic Model Peer Review (as applicable) [(a)]						
▪ DT 1887 for all HCM-based Analyses	Optional	Required	Not Applicable		☐	☐
▪ DT 2291 for Microsimulation Analyses (specifically SimTraffic) [(d)]	Optional	Required	Not Applicable		☐	☐
Region Comments						
▪ Region Comments on Phase I: ICE	Optional	Optional	Not Applicable		☐	☐
Other Reference Material (as applicable)						
▪ TIA (relevant pages)	Optional	Optional	☐	☑	☐	☐

(b) If Sidra analysis is conducted, submit copies of **all** five worksheets listed below.

(c) If Synchro analysis is conducted, submit **both** the intersection report (signalized or unsignalized as applicable) and the HCM 6th Edition report (signalized summary, AWSC or TWSC as applicable)

(d) Submit all Paramics or Vissim models to BTO for review as a separate process outside of the ICE process. BTO does not generally review the SimTraffic analyses, thus the DT 2291 form for SimTraffic models should be submitted along with the ICE report to ensure that all SimTraffic analyses referenced in the ICE report has gone through the Traffic Model Peer Review Process

PROJECT AREA



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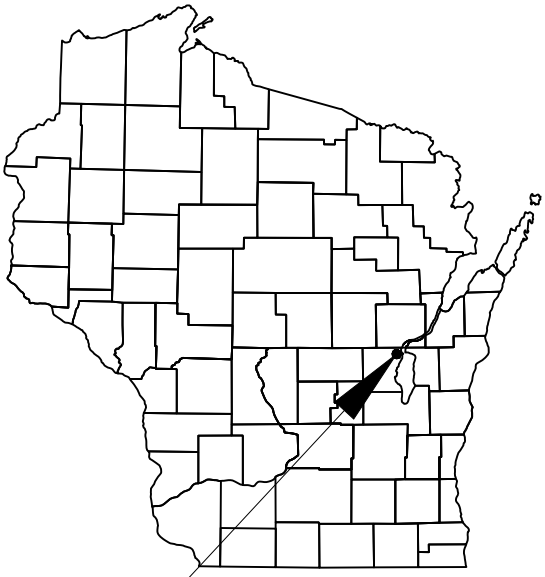
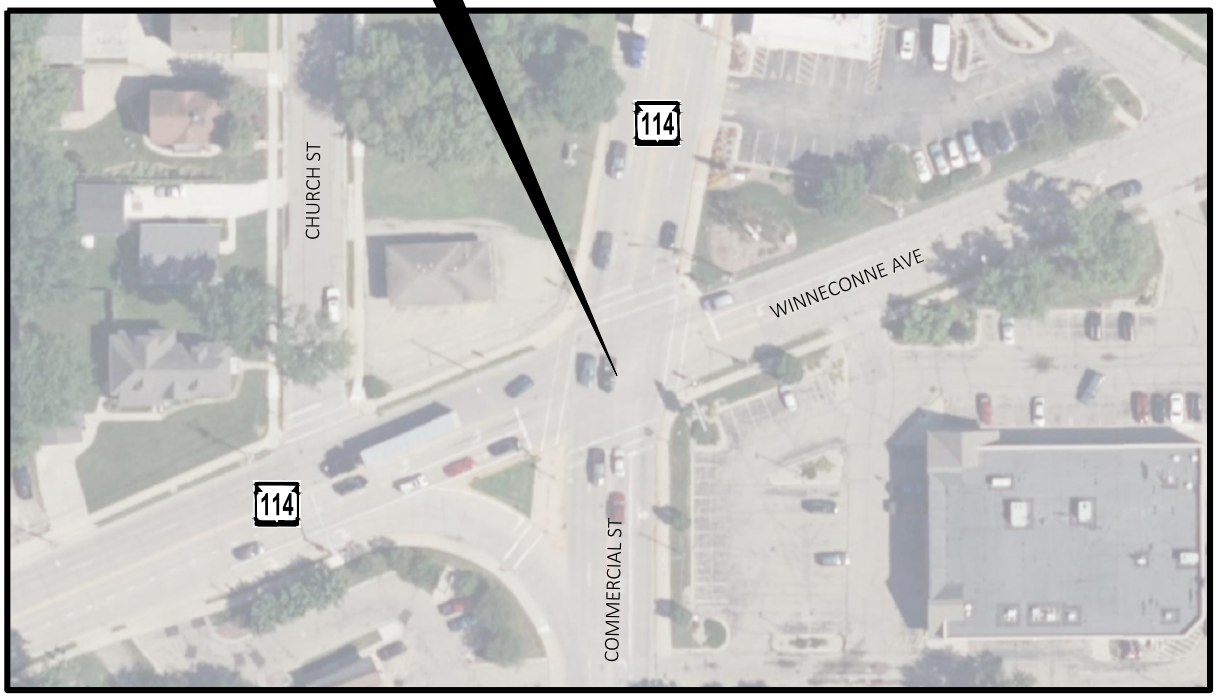


PROJECT LOCATION

CITY OF NEENAH



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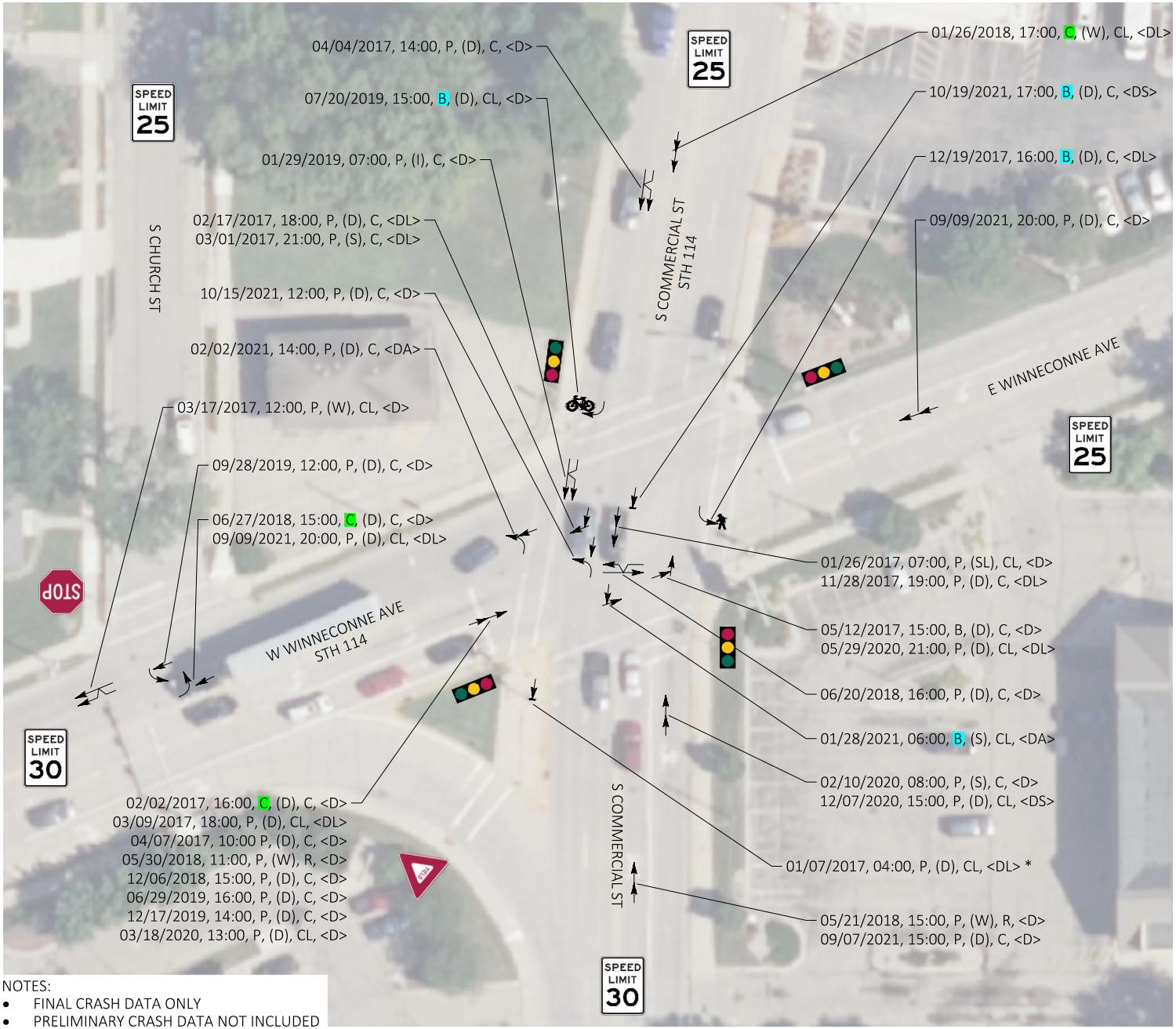
MSA

Attachment 2, Site Location Map
WINNECONNE AVENUE AT COMMERCIAL STREET
WINNEBAGO COUNTY



NOTES:
- FINAL CRASH DATA ONLY
- PRELIMINARY CRASH DATA NOT INCLUDED

LEGEND

- FRONT TO REAR
- FRONT TO FRONT
- REAR TO SIDE
- REAR TO REAR
- REAR TO FRONT
- SIDESWIPE, OPPOSITE DIRECTIONS
- SIDESWIPE, SAME DIRECTION
- FRONT TO SIDE (ANGLE)
- FRONT TO SIDE, TURNING RIGHT
- FRONT TO SIDE, TURNING LEFT
- FRONT TO SIDE, TURNING LEFT
- OVERTAKE
- FIXED OBJECT
- PARKED VEHICLE
- OUT OF CONTROL
- OVERTURN
- BICYCLE, PEDESTRIAN INVOLVED
- * UNDER THE INFLUENCE
- CONSTRUCTION ZONE

INJURY SEVERITY

K	FATALITY
A	SUSPECTED SERIOUS INJURY
B	SUSPECTED MINOR INJURY
C	POSSIBLE INJURY
P	PROPERTY DAMAGE ONLY

ROADWAY CONDITIONS

(D)	DRY
(W)	WET
(S)	SNOW
(SL)	SLUSH
(I)	ICE
(SW)	STANDING WATER
(G)	GRAVEL
(O)	OIL
(U)	OTHER/UNKNOWN

WEATHER CONDITIONS

C	CLEAR
CL	CLOUDY
R	RAIN
S	SNOW
BS	BLOWING SNOW
FR	FREEZING RAIN
F	FOG
SM	SMOG/SMOKE
SH	SLEET/HAIL
W	WINDY
BD	BLOWING DEBRIS
U	OTHER/UNKNOWN

TIME OF DAY/LIGHTING

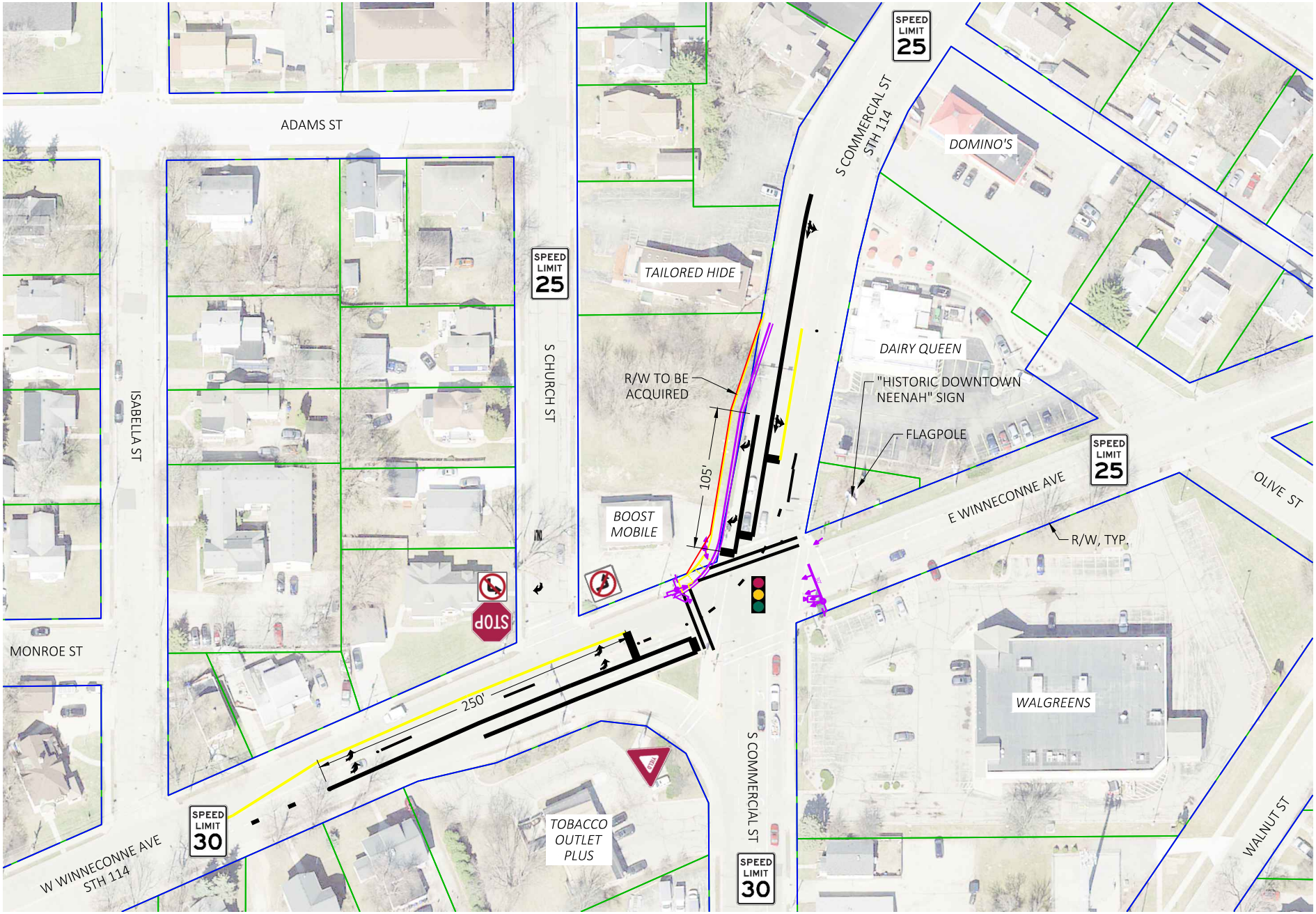
<D>	DAY
<DA>	DAWN
<DS>	DUSK
<DL>	DARK, LIGHTED
<DU>	DARK, UNLIT
<D?>	DARK, UNKNOWN LIGHTING

01/2017 - 12/2021
34 CRASHES

MSA

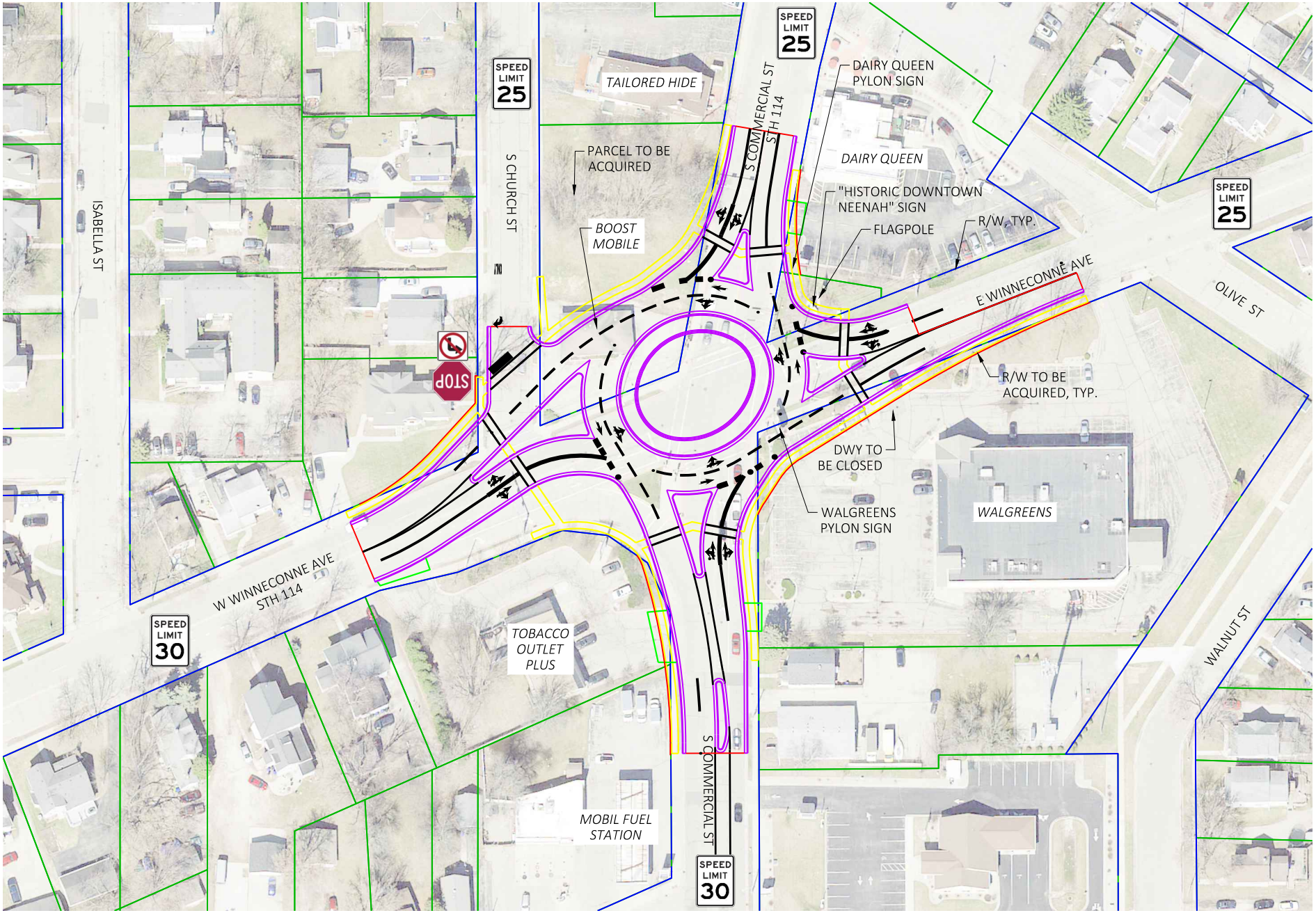
Attachment 3, Intersection Crash Diagram

WINNECONNE AVENUE AT COMMERCIAL STREET
WINNEBAGO COUNTY



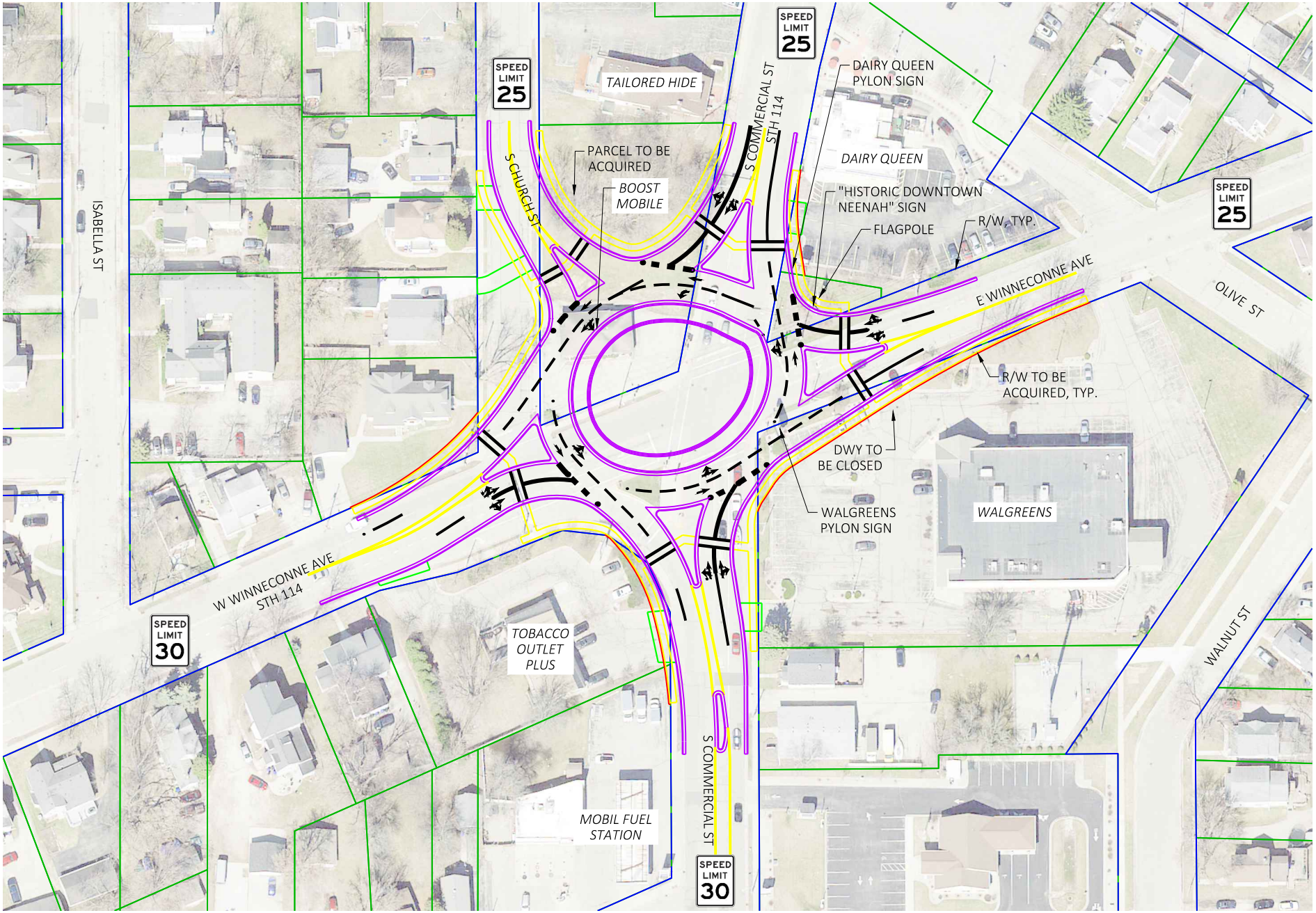
MSA

Attachment 4A, Conceptual Improvement, Alternative 1: Modified Traffic Signal
WINNECONNE AVENUE AT COMMERCIAL STREET
WINNEBAGO COUNTY



MSA

Attachment 4B, Conceptual Improvement, Alternative 2: Roundabout, 4-Leg
WINNECONNE AVENUE AT COMMERCIAL STREET
WINNEBAGO COUNTY



MSA

Attachment 4C, Conceptual Improvement, Alternative 3: Roundabout, 5-Leg

WINNECONNE AVENUE AT COMMERCIAL STREET
WINNEBAGO COUNTY

Winneconne Avenue & Commercial Street, Neenah, WI
Signal Alternative
Project ID: MSA #07578063
Winnebago County
Date: 1/31/2023

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	REMOVALS	LS	1	$18,000.00	$ 18,000
				SUBTOTAL REMOVALS	$ 18,000
2	EARTHWORK		% of Items 1 & 3-4	N/A	$ -
2.01	Excavation Common	CY	230	$26.00	$ 6,000
				SUBTOTAL EARTHWORK	$ 6,000
3	BASE				
3.02	Base Aggregate Dense 1 1/4"	TON	200	$22.00	$ 4,400
				SUBTOTAL BASE	$ 4,400
4	PAVEMENT				
4.01	Concrete Pavement 8"	SY	220	$100.00	$ 22,000
				SUBTOTAL PAVEMENT	$ 22,000
5	ROADWAY MISCELLANEOUS		% of Items 1 & 3-4	N/A	$ -
	Concrete Curb and Gutter	LF	230	$30.00	$ 6,900
5.07	Concrete Curb Pedestrian	LF	20	$50.00	$ 1,000
5.08	Concrete Sidewalk 5-Inch	SF	150	$10.00	$ 1,500
				SUBTOTAL ROADWAY MISCELLANEOUS	$ 9,400
6	DRAINAGE/STORM SEWER	LS	1	$5,000.00	$ 5,000
				SUBTOTAL DRAINAGE/STORM SEWER	$ 5,000
				SUBTOTAL ROADWAY COSTS (ITEMS 1-6)	$ 64,800
7	TRAFFIC SIGNALS	LS	1	$66,000.00	$ 66,000
8	ITS	LS	1	$45,000.00	$ 45,000
9	TRAFFIC CONTROL	LS	1	$20,000.00	$ 20,000
10	EROSION CONTROL	LS	5 % of Items 1-6	N/A	$ 3,200
11	LIGHTING	LS	0		$ -
12	SIGNING/MARKING	LS	1	$24,000.00	$ 24,000
13	WETLAND MITIGATION	LS	0		$ -
14	HAZMAT	LS	0		$ -
15	ROADWAY INCIDENTALS	LS	30 % of Items 1-6	N/A	$ 19,400
				TOTAL ROADWAY COSTS (Items 1-15)	$ 242,400
16	STRUCTURES				
				TOTAL STRUCTURE COSTS	$ -
17	MOBILIZATION	LS	1	$30,000.00	$ 30,000
				CONSTRUCTION SUBTOTAL (Items 1-17)	$ 272,400
18	E&C	LS	15 % of Items 1-17	N/A	$ 40,900
19	ROW Acquisition	LS	1	$20,000.00	$ 20,000
	TOTAL PROJECT COST				$ 340,000

Assumptions

Pavement Structure: 8" Concrete over 8" Base Aggregate
Signal pole and accessories in northwest quadrant are moved to new location with new signal heads
Eastbound far-side signal replaced with monotube with signal heads per lane
Westbound far-side, right-side signal replaced with new signal heads
Improvements constructed under traffic

Winneconne Avenue & Commercial Street, Neenah, WI
4 Leg Roundabout Alternative
Project ID: MSA #07578063
Winnebago County
Date: 1/31/2023

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	REMOVALS	LS	1	$70,000.00	$ 70,000
				SUBTOTAL REMOVALS	$ 70,000
2	EARTHWORK		% of Items 1 & 3-4	N/A	$ -
2.01	Excavation Common	CY	5,500	$18.00	$ 99,000
2.05	Select Borrow	CY	1,100	$12.00	$ 13,200
				SUBTOTAL EARTHWORK	$ 112,200
3	BASE				
3.02	Base Aggregate Dense 1 1/4"	TON	3,500	$20.00	$ 70,000
				SUBTOTAL BASE	$ 70,000
4	PAVEMENT				
4.01	Concrete Pavement 8"	SY	5,100	$60.00	$ 306,000
4.05	Concrete Driveway 6"	SY	160	$70.00	$ 11,200
4.21	Concrete Truck Apron 12"	SY	380	$90.00	$ 34,200
4.22	Coloring Concrete WisDOT Red	CY	130	$90.00	$ 11,700
				SUBTOTAL PAVEMENT	$ 363,100
5	ROADWAY MISCELLANEOUS		% of Items 1 & 3-4	N/A	$ -
5.01	Concrete Curb and Gutter	LF	2,920	$25.00	$ 73,000
5.08	Concrete Sidewalk 4-Inch	SF	3,600	$6.00	$ 21,600
5.09	Concrete Sidewalk 5-Inch	SF	6,300	$9.00	$ 56,700
				SUBTOTAL ROADWAY MISCELLANEOUS	$ 151,300
6	DRAINAGE/STORM SEWER	LS	1	$30,000.00	$ 30,000
				SUBTOTAL DRAINAGE/STORM SEWER	$ 30,000
				SUBTOTAL ROADWAY COSTS (ITEMS 1-6)	$ 796,600
7	TRAFFIC SIGNALS	LS	0		$ -
8	ITS	LS	0		$ -
9	TRAFFIC CONTROL	LS	15 % of Items 1-6	N/A	$ 119,500
10	EROSION CONTROL	LS	3 % of Items 1-6	N/A	$ 23,900
11	LIGHTING	LS	1	$40,000.00	$ 40,000
12	SIGNING/MARKING	LS	1	$110,000.00	$ 110,000
13	WETLAND MITIGATION	LS	0		$ -
14	HAZMAT	LS	0		$ -
15	ROADWAY INCIDENTALS	LS	35 % of Items 1-6	N/A	$ 278,800
				TOTAL ROADWAY COSTS (Items 1-15)	$ 1,368,800
16	STRUCTURES				
				TOTAL STRUCTURE COSTS	$ -
17	MOBILIZATION	LS	8 % of Items 1-16	N/A	$ 109,500
				CONSTRUCTION SUBTOTAL (Items 1-17)	$ 1,478,300
18	E&C	LS	12 % of Items 1-17	N/A	$ 177,400
19	ROW Acquisition	LS	1	$450,000.00	$ 450,000
	TOTAL PROJECT COST				$ 2,110,000

Assumptions

Pavement Structure: 8" Concrete over 8" Base Aggregate
Signing/Marking includes two overhead sign structures
Intersection is constructed under traffic
ROW Acquisition includes moving two signs

Winneconne Avenue & Commercial Street, Neenah, WI
5 Leg Roundabout Alternative
Project ID: MSA #07578063
Winnebago County
Date: 1/31/2023

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1	REMOVALS	LS	1	$70,000.00	$ 70,000
				SUBTOTAL REMOVALS	$ 70,000
2	EARTHWORK		% of Items 1 & 3-4	N/A	$ -
2.01	Excavation Common	CY	6,500	$18.00	$ 117,000
2.05	Select Borrow	CY	1,300	$12.00	$ 15,600
				SUBTOTAL EARTHWORK	$ 132,600
3	BASE				
3.02	Base Aggregate Dense 1 1/4"	TON	3,900	$20.00	$ 78,000
				SUBTOTAL BASE	$ 78,000
4	PAVEMENT				
4.01	Concrete Pavement 8"	SY	5,800	$60.00	$ 348,000
4.05	Concrete Driveway 6"	SY	230	$70.00	$ 16,100
4.21	Concrete Truck Apron 12"	SY	490	$90.00	$ 44,100
4.22	Coloring Concrete WisDOT Red	CY	160	$90.00	$ 14,400
				SUBTOTAL PAVEMENT	$ 422,600
5	ROADWAY MISCELLANEOUS		% of Items 1 & 3-4	N/A	$ -
5.01	Concrete Curb and Gutter	LF	3,500	$25.00	$ 87,500
5.07	Concrete Sidewalk 4-Inch	SF	3,700	$6.00	$ 22,200
5.08	Concrete Sidewalk 5-Inch	SF	6,800	$9.00	$ 61,200
				SUBTOTAL ROADWAY MISCELLANEOUS	$ 170,900
6	DRAINAGE/STORM SEWER	LS	1	$35,000.00	$ 35,000
				SUBTOTAL DRAINAGE/STORM SEWER	$ 35,000
				SUBTOTAL ROADWAY COSTS (ITEMS 1-6)	$ 909,100
7	TRAFFIC SIGNALS	Each	0		$ -
8	ITS	LS	0		$ -
9	TRAFFIC CONTROL	LS	15 % of Items 1-6	N/A	$ 136,400
10	EROSION CONTROL	LS	3 % of Items 1-6	N/A	$ 27,300
11	LIGHTING	LS	1	$50,000.00	$ 50,000
12	SIGNING/MARKING	LS	1	$115,000.00	$ 115,000
13	WETLAND MITIGATION	LS	0		$ -
14	HAZMAT	LS	0		$ -
15	ROADWAY INCIDENTALS	LS	35 % of Items 1-6	N/A	$ 318,200
				TOTAL ROADWAY COSTS (Items 1-15)	$ 1,556,000
16	STRUCTURES				
				TOTAL STRUCTURE COSTS	$ -
17	MOBILIZATION	LS	8 % of Items 1-16	N/A	$ 124,500
				CONSTRUCTION SUBTOTAL (Items 1-17)	$ 1,680,500
18	E&C	LS	12 % of Items 1-17	N/A	$ 201,700
19	ROW Acquisition	LS	1	$460,000.00	$ 460,000
	TOTAL PROJECT COST				$ 2,350,000

Assumptions

Pavement Structure: 8" Concrete over 8" Base Aggregate
Signing/Marking includes two overhead sign structures
Intersection is constructed under traffic
ROW Acquisition includes moving three signs

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

February 2, 2023

Disclaimer

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Report Overview

Report Generated: Feb 2, 2023 4:36 PM
Report Template: System: Single Page, 508 Compliant [System] (sscpm5, Nov 17, 2021 8:25 AM)

Evaluation Date: Thu Feb 02 16:35:56 CST 2023
IHSDM Version: v16.0.0 (Sep 30, 2020)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: efrailing
Organization Name:
Phone:
E-Mail:

Project Title: Winneconne Ave at Commercial St
Project Comment: Created Fri Jan 27 08:43:01 CST 2023
Project Unit System: U.S. Customary

Site Set: Existing Traffic Signal
Site Set Comment: Created Fri Jan 27 09:36:34 CST 2023
Site Set Version: v1

Evaluation Title: 2024-2033 Traffic Signal Analysis, WisDOT
Evaluation Comment: Created Thu Feb 02 16:35:34 CST 2023
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: WisDOT_Calibration_v16-2
Crash Distribution: WisDOT_Distributions_v16-2
Model/CMF: WisDOT_Models_v16-2
Note: A Model Data Set other than the HSM (Highway Safety Manual) Configuration was selected for this Evaluation. If Crash Modification Factors (CMFs) were modified, then the results will not be in accordance with the HSM (see HSM Appendix to Part C, section A.1.3).
First Year of Analysis: 2024
Last Year of Analysis: 2033
Empirical-Bayes Analysis: None

Disclaimer Regarding Crash Prediction Method

IMPORTANT NOTICE ABOUT COMPARING RESULTS FROM HIGHWAY SAFETY MANUAL FIRST EDITION (2010) MODELS TO RESULTS FROM NEW MODELS DEVELOPED UNDER NCHRP PROJECTS 17-70 AND 17-58

Since the publication of the Highway Safety Manual - First Edition (HSM-1), in 2010 by the American Association of State

Highway and Transportation Officials (AASHTO), multiple research efforts have been undertaken through the National Cooperative Highway Research Program (NCHRP) to develop safety performance models for road segment and intersection facility types that were not initially reflected in the HSM-1, in order to expand the breadth and depth of the HSM in the future.

The IHSDM Crash Prediction Module (CPM) is intended as a faithful implementation of HSM Part C predictive methods. As NCHRP projects to develop new predictive methods for the HSM are completed, FHWA works to incorporate the new methods into IHSDM, sometimes in advance of publication in the HSM. The following new crash predictive methods have been accepted by NCHRP project panels and incorporated into IHSDM, while pending AASHTO's approval for incorporation into a future edition of the HSM:

- Roundabouts: completed in 2018 under NCHRP Project 17-70, the new methods will provide improved outcomes for the safety analysis of roundabouts.
- 6+ lane and one-way urban/suburban arterials (including models for segments and intersections): completed under NCHRP Project 17-58.

However, in the absence of local calibration factors (see HSM-1 Part C, Appendix A for guidance on calibration of the predictive models), it is neither appropriate nor advisable to directly compare the results from new models (from NCHRP Projects 17-58 and 17-70) to results from HSM-1 models, as the models were not calibrated to the same base state data sets, and consequently can produce unexpected results. If local calibration factors are available and applied to both new models and HSM-1 models, then it may be appropriate to directly compare the results.*[Note: Work being performed under NCHRP Project 17-72 (Update of Crash Modification Factors for the Highway Safety Manual) is expected to re-calibrate many of the old (HSM-1) and new (e.g., NCHRP 17-70) models to data from a single (or small number of) states, that would allow results from all models to be directly compared.]*

The models produced for NCHRP Project 17-70 have independent value in terms of informing the design of a roundabout and assessing the effects of different design characteristics on the expected safety performance of a roundabout.

The HSM-1 interim method previously included in IHSDM for evaluating roundabouts on urban/suburban arterials (i.e., evaluating an existing intersection and then applying a Crash Modification Factor for replacing the existing intersection with a roundabout) has been deactivated in IHSDM, to minimize any confusion with the new roundabout methodology.

Section Types

Urban Arterial Site Set CPM Evaluation

Site Type

Type: 4SG
Calibration Factor: 1

Table 1. Evaluation and Crash Data (CSD) (if applicable) Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	Winneconne Ave	Winneconne Ave & Commercial Street	2024: 16238; 2025: 16372; 2026: 16506; 2027: 16640; 2028: 16774; 2029: 16908; 2030: 17042; 2031: 17176; 2032: 17310; 2033: 17444	2024: 14571; 2025: 14691; 2026: 14812; 2027: 14932; 2028: 15053; 2029: 15173; 2030: 15294; 2031: 15414; 2032: 15535; 2033: 15655	3	1	yes	1	3	0	0	no	240	4	4	1	2

Table 2. Predicted Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Intersection Travel Crash Rate (crashes/million veh)	Intersection Crash Rate (crashes/yr)
1	4SG	Winneconne Ave	Winneconne Ave & Commercial Street	49.508	4.9508	1.7902	3.1606	0.42	4.9508
		Total	Total	49.508	4.9508	1.7902	3.1606	0.42	4.9508

Table 3. Predicted Crash Frequencies by Year (4SG)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	4.74	1.72	36.218	3.02	63.782
2025	4.79	1.73	36.205	3.05	63.795
2026	4.83	1.75	36.191	3.08	63.809
2027	4.88	1.76	36.178	3.11	63.822
2028	4.93	1.78	36.166	3.15	63.834
2029	4.97	1.80	36.154	3.18	63.846
2030	5.02	1.81	36.142	3.21	63.858
2031	5.07	1.83	36.130	3.24	63.870
2032	5.12	1.85	36.119	3.27	63.881
2033	5.17	1.86	36.108	3.30	63.892
Total	49.51	17.90	36.160	31.61	63.840
Average	4.95	1.79	36.160	3.16	63.840

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 4. Predicted 4SG Crash Type Distribution

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Intersection	Collision with Animal	0.00	0.0	0.05	0.1	0.05	0.1
Intersection	Collision with Bicycle	0.67	1.5	0.00	0.0	0.67	1.5
Intersection	Collision with Fixed Object	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Non-Collision	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Other Object	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Other Single-vehicle Collision	0.01	0.0	0.05	0.1	0.07	0.1
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	3.88	8.6	0.00	0.0	3.88	8.6
Intersection	Total Intersection Single Vehicle Crashes	4.57	10.1	0.10	0.2	4.67	10.4
Intersection	Angle Collision	5.50	12.2	8.80	19.5	14.30	31.7
Intersection	Head-on Collision	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Other Multi-vehicle Collision	0.30	0.7	2.51	5.6	2.81	6.2
Intersection	Rear-end Collision	6.16	13.7	11.51	25.5	17.66	39.1
Intersection	Sideswipe	0.56	1.2	5.12	11.3	5.68	12.6
Intersection	Total Intersection Multiple Vehicle Crashes	12.52	27.7	27.94	61.9	40.45	89.6
Intersection	Total Intersection Crashes	17.08	37.9	28.04	62.1	45.13	100.0
	Total Crashes	17.08	37.9	28.04	62.1	45.13	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

February 2, 2023

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Report Overview

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Evaluation Date: Thu Feb 02 16:38:16 CST 2023
IHSDM Version: v16.0.0 (Sep 30, 2020)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: efrailing
Organization Name:
Phone:
E-Mail:

Project Title: Winneconne Ave at Commercial St
Project Comment: Created Fri Jan 27 08:43:01 CST 2023
Project Unit System: U.S. Customary

Site Set: Modified Traffic Signal
Site Set Comment: Copied from Existing Traffic Signal (v1)
Site Set Version: v1

Evaluation Title: 2024-2033 Modified Traffic Signal Analysis, WisDOT
Evaluation Comment: Created Thu Feb 02 16:37:58 CST 2023
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: WisDOT_Calibration_v16-2
Crash Distribution: WisDOT_Distributions_v16-2
Model/CMF: WisDOT_Models_v16-2
Note: A Model Data Set other than the HSM (Highway Safety Manual) Configuration was selected for this Evaluation. If Crash Modification Factors (CMFs) were modified, then the results will not be in accordance with the HSM (see HSM Appendix to Part C, section A.1.3).
First Year of Analysis: 2024
Last Year of Analysis: 2033
Empirical-Bayes Analysis: None

Disclaimer Regarding Crash Prediction Method

IMPORTANT NOTICE ABOUT COMPARING RESULTS FROM HIGHWAY SAFETY MANUAL FIRST EDITION (2010) MODELS TO RESULTS FROM NEW MODELS DEVELOPED UNDER NCHRP PROJECTS 17-70 AND 17-58

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Section Types

Urban Arterial Site Set CPM Evaluation

Site Type

Type: 4SG
Calibration Factor: 1

Table 1. Evaluation and Crash Data (CSD) (if applicable) Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	Winneconne Ave	Winneconne Ave & Commercial Street	2024: 16238; 2025: 16372; 2026: 16506; 2027: 16640; 2028: 16774; 2029: 16908; 2030: 17042; 2031: 17176; 2032: 17310; 2033: 17444	2024: 14571; 2025: 14691; 2026: 14812; 2027: 14932; 2028: 15053; 2029: 15173; 2030: 15294; 2031: 15414; 2032: 15535; 2033: 15655	3	2	yes	1	2	1	0	no	240	4	4	1	2

Table 2. Predicted Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Intersection Travel Crash Rate (crashes/million veh)	Intersection Crash Rate (crashes/yr)
1	4SG	Winneconne Ave	Winneconne Ave & Commercial Street	45.398	4.5398	1.6639	2.8759	0.39	4.5398
		Total	Total	45.398	4.5398	1.6639	2.8759	0.39	4.5398

Table 3. Predicted Crash Frequencies by Year (4SG)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	4.35	1.60	36.724	2.75	63.276
2025	4.39	1.61	36.707	2.78	63.293
2026	4.43	1.63	36.691	2.81	63.309
2027	4.47	1.64	36.675	2.83	63.325
2028	4.52	1.66	36.659	2.86	63.341
2029	4.56	1.67	36.644	2.89	63.356
2030	4.60	1.69	36.629	2.92	63.371
2031	4.65	1.70	36.615	2.95	63.385
2032	4.69	1.72	36.600	2.97	63.400
2033	4.74	1.73	36.587	3.00	63.413
Total	45.40	16.64	36.652	28.76	63.348
Average	4.54	1.66	36.652	2.88	63.348

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 4. Predicted 4SG Crash Type Distribution

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Intersection	Collision with Animal	0.00	0.0	0.05	0.1	0.05	0.1
Intersection	Collision with Bicycle	0.61	1.5	0.00	0.0	0.61	1.5
Intersection	Collision with Fixed Object	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Non-Collision	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Other Object	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Other Single-vehicle Collision	0.01	0.0	0.05	0.1	0.06	0.1
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	3.88	9.4	0.00	0.0	3.88	9.4
Intersection	Total Intersection Single Vehicle Crashes	4.50	10.9	0.09	0.2	4.60	11.1
Intersection	Angle Collision	5.01	12.1	8.01	19.3	13.02	31.4
Intersection	Head-on Collision	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Other Multi-vehicle Collision	0.27	0.7	2.29	5.5	2.56	6.2
Intersection	Rear-end Collision	5.61	13.5	10.47	25.3	16.07	38.8
Intersection	Sideswipe	0.51	1.2	4.66	11.2	5.17	12.5
Intersection	Total Intersection Multiple Vehicle Crashes	11.39	27.5	25.42	61.4	36.81	88.9
Intersection	Total Intersection Crashes	15.89	38.4	25.52	61.6	41.41	100.0
	Total Crashes	15.89	38.4	25.52	61.6	41.41	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

February 2, 2023

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Report Overview

Report Generated: Feb 2, 2023 4:40 PM
Report Template: System: Single Page, 508 Compliant [System] (sscpm5, Nov 17, 2021 8:25 AM)

Evaluation Date: Thu Feb 02 16:40:32 CST 2023
IHSDM Version: v16.0.0 (Sep 30, 2020)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: efrailing
Organization Name:
Phone:
E-Mail:

Project Title: Winneconne Ave at Commercial St
Project Comment: Created Fri Jan 27 08:43:01 CST 2023
Project Unit System: U.S. Customary

Site Set: 4-Leg Roundabout
Site Set Comment: Created Fri Jan 27 11:25:57 CST 2023
Site Set Version: v1

Evaluation Title: 2024-2033 4-Leg Roundabout Analysis, WisDOT
Evaluation Comment: Created Thu Feb 02 16:40:11 CST 2023
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: WisDOT_Calibration_v16-2
Crash Distribution: WisDOT_Distributions_v16-2
Model/CMF: WisDOT_Models_v16-2
Note: A Model Data Set other than the HSM (Highway Safety Manual) Configuration was selected for this Evaluation. If Crash Modification Factors (CMFs) were modified, then the results will not be in accordance with the HSM (see HSM Appendix to Part C, section A.1.3).
First Year of Analysis: 2024
Last Year of Analysis: 2033
Empirical-Bayes Analysis: None

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Section Types

Roundabout Site Set CPM Evaluation

Site Type

Type: Roundabout USA 42R
Calibration Factor: USA 42R = 1.0

Table 1. Evaluation and Crash Data (CSD) (if applicable) Roundabout - Homogeneous Sites

Site No.	Type	Roundabout	Site Description	Area Type	Entering AADT
1	42R - Roundabout with 4 legs and two circulating lanes	Winneconne Ave	Winneconne Ave & Commercial St	Urban	Leg 1:2024: 7721; 2025: 7785; 2026: 7849; 2027: 7913; 2028: 7977; 2029: 8041; 2030: 8105; 2031: 8169; 2032: 8233; 2033: 8296; Leg 2:2024: 3680; 2025: 3711; 2026: 3742; 2027: 3773; 2028: 3803; 2029: 3834; 2030: 3865; 2031: 3896; 2032: 3927; 2033: 3957; Leg 3:2024: 5619; 2025: 5665; 2026: 5712; 2027: 5758; 2028: 5804; 2029: 5851; 2030: 5897; 2031: 5943; 2032: 5990; 2033: 6036; Leg 4:2024: 7631; 2025: 7694; 2026: 7757; 2027: 7820; 2028: 7883; 2029: 7946; 2030: 8009; 2031: 8072; 2032: 8135; 2033: 8198

Table 2. Predicted Crash Frequencies and Rates by Site

Site No.	Type	Roundabout	Site Description	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Intersection Travel Crash Rate (crashes/million veh)	Intersection Crash Rate (crashes/yr)
1	42R - Roundabout with 4 legs and two circulating lanes	Winneconne Ave	Winneconne Ave & Commercial St	152.616	15.2616	2.3422	12.9194	3.27	15.2616
		Total	Total	152.616	15.2616	2.3422	12.9194	3.27	15.2616

Table 3. Predicted Crash Frequencies by Year (Roundabout USA 42R)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	14.63	2.23	15.277	12.39	84.723
2025	14.77	2.26	15.293	12.51	84.707
2026	14.91	2.28	15.308	12.63	84.692
2027	15.05	2.31	15.323	12.74	84.677
2028	15.19	2.33	15.339	12.86	84.661
2029	15.33	2.35	15.354	12.98	84.646
2030	15.47	2.38	15.369	13.09	84.631
2031	15.61	2.40	15.383	13.21	84.617
2032	15.75	2.43	15.398	13.33	84.602
2033	15.89	2.45	15.413	13.44	84.587
Total	152.62	23.42	15.347	129.19	84.653
Average	15.26	2.34	15.347	12.92	84.653

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 4. Predicted Roundabout USA 42R Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.1026	1.6417	6.8994	14.7781	129.1944
Total	0.1026	1.6417	6.8994	14.7781	129.1944

Table 5. Predicted Roundabout USA 42R Crash Type Distribution

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Intersection	Collision with Animal	0.00	0.0	0.41	0.3	0.41	0.3
Intersection	Collision with Fixed Object	4.54	3.0	19.03	12.5	23.58	15.5
Intersection	Collision with Other Object	0.26	0.2	0.07	0.0	0.33	0.2
Intersection	Other Single-vehicle Collision	2.80	1.8	5.41	3.6	8.21	5.4
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Total Single Vehicle Crashes	7.60	5.0	24.92	16.4	32.52	21.4
Intersection	Angle Collision	3.58	2.4	23.48	15.4	27.07	17.8
Intersection	Head-on Collision	0.00	0.0	0.55	0.4	0.55	0.4
Intersection	Other Multiple-vehicle Collision	0.26	0.2	0.14	0.1	0.40	0.3
Intersection	Rear-end Collision	5.51	3.6	18.48	12.1	23.99	15.8
Intersection	Sideswipe	6.03	4.0	61.62	40.5	67.65	44.5
Intersection	Total Multiple Vehicle Crashes	15.38	10.1	104.27	68.5	119.65	78.6
Intersection	Total Intersection Crashes	22.98	15.1	129.19	84.9	152.18	100.0
	Total Crashes	22.98	15.1	129.19	84.9	152.18	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Interactive Highway Safety Design Model

Economic Analysis Report

February 2, 2023

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Economic Analysis Report

Economic Analysis Report Overview

Report Generated: Feb 2, 2023 4:47 PM
Report Template: System: Single Page [System] (eam3, Nov 17, 2021 8:25 AM)

Evaluation Title: 2024-2033 Economic Analysis, WisDOT
Evaluation Comment: Created Thu Feb 02 16:47:04 CST 2023
Evaluation Date: Thu Feb 02 16:47:21 CST 2023

User Name: efrailing
Organization Name:
Phone:
E-Mail:

Project Title: Winneconne Ave at Commercial St
Project Comment: Created Tue Jan 31 15:54:42 CST 2023

Configuration Summary

Crash Cost Configuration: WisDOTEconomics_v16-2
Configuration Comment: Updated with 2021 crash costs and '17-'21 crash proportions

Table 1. Economic Analysis Configuration

Configuration Data	
Crash Unit Cost Zero Year	**2021**
Crash Cost Index	**0.00**
Discount Rate	**0.05**
KABCO Unit Costs	
K Cost ($/Crash)	**13,021,489.00**
A Cost ($/Crash)	**698,010.00**
B Cost ($/Crash)	**220,717.00**
C Cost ($/Crash)	**125,983.00**
O Cost ($/Crash)	**16,034.00**

Table 2. RTL Segment FI Proportion Data

Segment Type	Fatal Crash (K) Proportion of FI (%)	Incapacitating Injury Crash (A) Proportion of FI (%)	Non-incapacitating Injury Crash (B) Proportion of FI (%)	Possible Injury Crash (C) Proportion of FI (%)
RTL 2U Two-Lane Undivided	3.916	12.980	47.819	35.286

Table 3. RTL Intersection FI Proportion Data

Intersection Type	Fatal Crash (K) Proportion of FI (%)	Incapacitating Injury Crash (A) Proportion of FI (%)	Non-incapacitating Injury Crash (B) Proportion of FI (%)	Possible Injury Crash (C) Proportion of FI (%)
RTL Three-Legged w/STOP control	4.196	16.268	46.961	32.575
RTL Four-Legged w/STOP control	4.524	14.796	48.678	32.002
RTL Four-Legged Signalized	1.290	9.678	46.451	42.581

Table 4. RML Segment FI Proportion Data

Segment Type	Fatal Crash (K) Proportion of FI (%)	Incapacitating Injury Crash (A) Proportion of FI (%)	Non-incapacitating Injury Crash (B) Proportion of FI (%)	Possible Injury Crash (C) Proportion of FI (%)
RML Four-Lane Undivided	3.916	12.980	47.819	35.286
RML Four-Lane Divided	3.916	12.980	47.819	35.286

Table 5. RML Intersection FI Proportion Data

Intersection Type	Fatal Crash (K) Proportion of FI (%)	Incapacitating Injury Crash (A) Proportion of FI (%)	Non-incapacitating Injury Crash (B) Proportion of FI (%)	Possible Injury Crash (C) Proportion of FI (%)
RML Three-Legged w/STOP control	3.723	15.633	45.409	35.236
RML Four-Legged w/STOP control	4.307	16.285	47.779	31.628
RML Four-Legged Signalized	0.875	6.704	41.690	50.730

Table 6. USA Segment FI Proportion Data

Segment Type	Fatal Crash (K) Proportion of FI (%)	Incapacitating Injury Crash (A) Proportion of FI (%)	Non-incapacitating Injury Crash (B) Proportion of FI (%)	Possible Injury Crash (C) Proportion of FI (%)
USA Two-Lane Undivided	1.301	7.610	38.365	52.724
USA Three-Lane w/Center TWLTL	1.301	7.610	38.365	52.724
USA Four-Lane Undivided	1.301	7.610	38.365	52.724
USA Four-Lane Divided	1.301	7.610	38.365	52.724
USA Five-Lane w/Center TWLTL	1.301	7.610	38.365	52.724

Table 7. USA Intersection FI Proportion Data

Intersection Type	Fatal Crash (K) Proportion of FI (%)	Incapacitating Injury Crash (A) Proportion of FI (%)	Non-incapacitating Injury Crash (B) Proportion of FI (%)	Possible Injury Crash (C) Proportion of FI (%)
USA Three-Legged w/STOP control	1.230	8.399	41.252	49.120
USA Three-Legged Signalized	0.623	4.506	35.042	59.828
USA Four-Legged w/STOP control	1.072	7.773	42.745	48.410
USA Four-Legged Signalized	0.706	5.399	37.509	56.385

Analysis Output Summary

Analysis Type: Benefit/Cost

Table 8. Case Cost Summary

Is Base Case	Title	Present Value of Crash Cost ($)	Present Value of Other Cost ($)	Net Present Value of Benefits (B) ($)	Net Present Value of Costs (C) ($)	Present Value of Net Benefit (B-C) ($)	Benefit Cost Ratio (B/C)
Yes	Existing Traffic Signal	1,827,075.56	0.00				
	Modified Traffic Signal	1,688,556.94	299,100.00	138,518.62	299,100.00	-160,581.38	0.4631
	4-Leg Roundabout	6,604,387.05	1,932,600.00	-4,777,311.49	1,932,600.00	-6,709,911.49	-2.4720

Table 9. Case Crash Summary

Is Base Case	Title	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)	Total Crashes (crashes)
Yes	Existing Traffic Signal	0.0509	0.3895	2.7063	4.0682	13.5512	20.7662
	Modified Traffic Signal	0.0472	0.3606	2.5051	3.7658	12.3307	19.0093
	4-Leg Roundabout	0.1063	1.7010	7.1487	15.3122	133.3034	157.5717

Crash Cost Data

Existing Traffic Signal Data

Case Title: Existing Traffic Signal
Is Base Case: true
Present Value of Crash Cost: 1,827,075.56
Present Value of Other Cost: 0.00

Table 10. Existing Traffic Signal Evaluation Cost

Project or Interchange	Selected Facility	Selected Evaluation	Present Value of Crash Cost ($)
Winneconne Ave at Commercial St	Existing Traffic Signal	2022-2031 Traffic Signal Analysis, WisDOT	1,827,075.56
Total			1,827,075.56

Table 11. Existing Traffic Signal Evaluation Crashes

Project or Interchange	Selected Facility	Selected Evaluation	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)	Total Crashes (crashes)
Winneconne Ave at Commercial St	Existing Traffic Signal	2022-2031 Traffic Signal Analysis, WisDOT	0.0509	0.3895	2.7063	4.0682	13.5512	20.7662
Total			0.0509	0.3895	2.7063	4.0682	13.5512	20.7662

Table 12. Existing Traffic Signal Facility Type Crashes

Facility Type	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)	Total Crashes (crashes)
Urban/Suburban Arterial Intersection (5 Lanes or Fewer)	0.0509	0.3895	2.7063	4.0682	13.5512	20.7662
Total	0.0509	0.3895	2.7063	4.0682	13.5512	20.7662

Modified Traffic Signal Data

Case Title: Modified Traffic Signal
Is Base Case: false
Present Value of Crash Cost: 1,688,556.94
Present Value of Other Cost: 299,100.00

Table 13. Modified Traffic Signal Evaluation Cost

Project or Interchange	Selected Facility	Selected Evaluation	Present Value of Crash Cost ($)
Winneconne Ave at Commercial St	Modified Traffic Signal	2022-2031 Modified Traffic Signal Analysis, WisDOT	1,688,556.94
Total			1,688,556.94

Table 14. Modified Traffic Signal Evaluation Crashes

Project or Interchange	Selected Facility	Selected Evaluation	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)	Total Crashes (crashes)
Winneconne Ave at Commercial St	Modified Traffic Signal	2022-2031 Modified Traffic Signal Analysis, WisDOT	0.0472	0.3606	2.5051	3.7658	12.3307	19.0093
Total			0.0472	0.3606	2.5051	3.7658	12.3307	19.0093

Table 15. Modified Traffic Signal Facility Type Crashes

Facility Type	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)	Total Crashes (crashes)
Urban/Suburban Arterial Intersection (5 Lanes or Fewer)	0.0472	0.3606	2.5051	3.7658	12.3307	19.0093
Total	0.0472	0.3606	2.5051	3.7658	12.3307	19.0093

4-Leg Roundabout Data

Case Title: 4-Leg Roundabout
Is Base Case: false
Present Value of Crash Cost: 6,604,387.05
Present Value of Other Cost: 1,932,600.00

Table 16. 4-Leg Roundabout Evaluation Cost

Project or Interchange	Selected Facility	Selected Evaluation	Present Value of Crash Cost ($)
Winneconne Ave at Commercial St	4-Leg Roundabout	2022-2031 4-Leg Roundabout Analysis, WisDOT	6,604,387.05
Total			6,604,387.05

Table 17. 4-Leg Roundabout Evaluation Crashes

Project or Interchange	Selected Facility	Selected Evaluation	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)	Total Crashes (crashes)
Winneconne Ave at Commercial St	4-Leg Roundabout	2022-2031 4-Leg Roundabout Analysis, WisDOT	0.1063	1.7010	7.1487	15.3122	133.3034	157.5717
Total			0.1063	1.7010	7.1487	15.3122	133.3034	157.5717

Table 18. 4-Leg Roundabout Facility Type Crashes

Facility Type	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)	Total Crashes (crashes)
Roundabout	0.1063	1.7010	7.1487	15.3122	133.3034	157.5717
Total	0.1063	1.7010	7.1487	15.3122	133.3034	157.5717

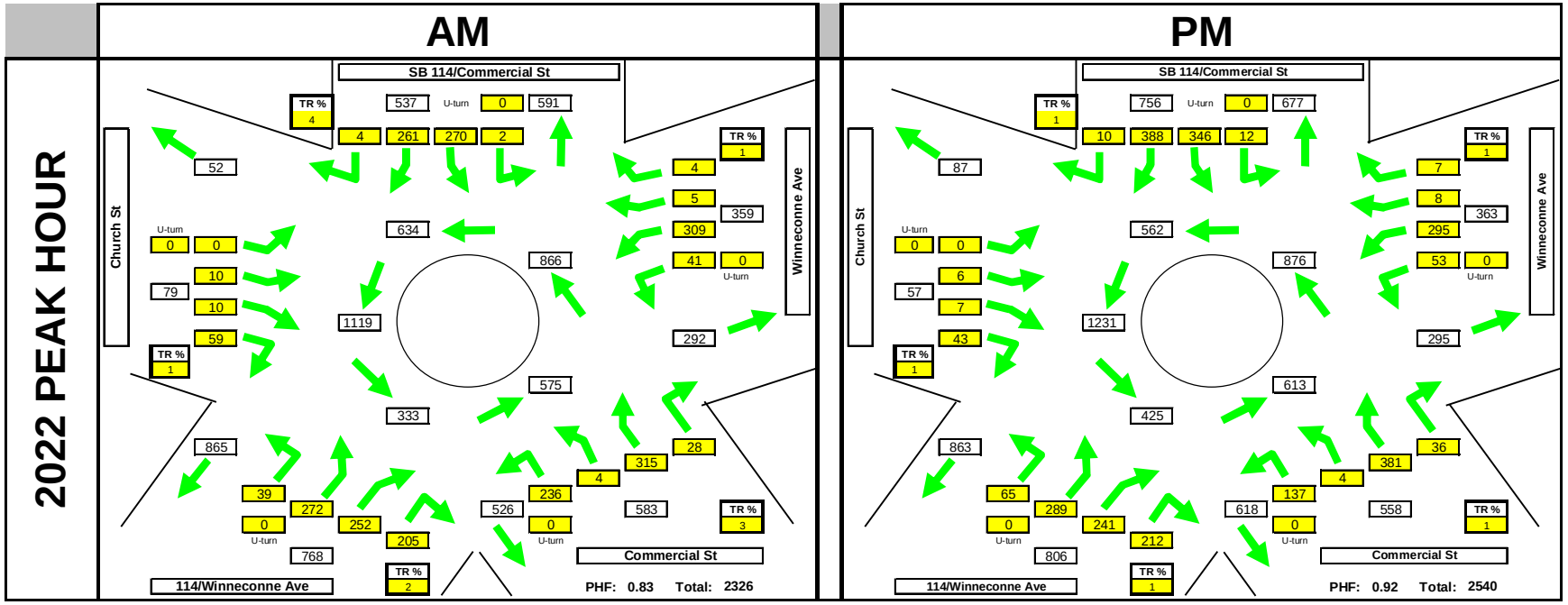
Evaluation Message

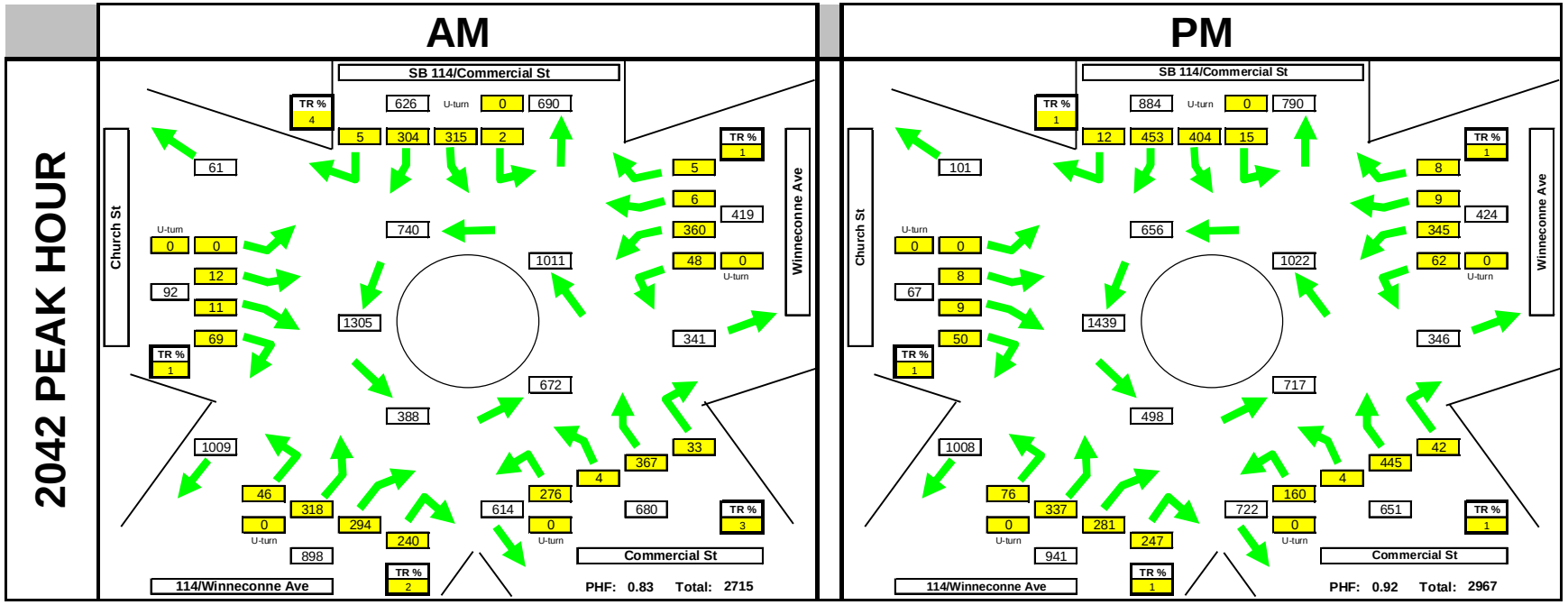
114/Winneconne Ave at 114/Commercial St - AM Peak														Growth Rate
		SB			WB			NB			EB			0.87%
Year		R	T	L	R	T	L	R	T	L	R	T	L	*Total*
2018	Volume	256	261	2	4	303	40	27	304	232	208	253	263	*2153*
2022	Volume	265	270	2	4	314	41	28	315	240	215	262	272	*2228*
2042	Volume	309	315	2	5	366	48	33	367	280	251	306	318	*2600*
HV%			4%			1%			3%			2%		

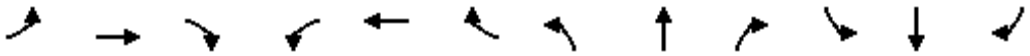
PHF
0.83

114/Winneconne Ave at 114/Commercial St - PM Peak														Growth Rate
		SB			WB			NB			EB			0.87%
Year		R	T	L	R	T	L	R	T	L	R	T	L	*Total*
2018	Volume	385	334	12	7	293	51	35	368	136	212	239	279	*2351*
2022	Volume	398	346	12	7	303	53	36	381	141	219	247	289	*2432*
2042	Volume	465	404	15	8	354	62	42	445	164	256	289	337	*2841*
HV%			1%			1%			1%			1%		

PHF
0.92


2022 PEAK HOUR
AM
SB 114/Commercial St
Church St
Winneconne Ave
114/Winneconne Ave
Commercial St
TR %
U-turn
PHF: 0.83 Total: 2326
PM
SB 114/Commercial St
Church St
Winneconne Ave
114/Winneconne Ave
Commercial St
TR %
U-turn
PHF: 0.92 Total: 2540


2042 PEAK HOUR
AM
SB 114/Commercial St
Church St
Winneconne Ave
114/Winneconne Ave
Commercial St
TR %
U-turn
PHF: 0.83 Total: 2715
PM
SB 114/Commercial St
Church St
Winneconne Ave
114/Winneconne Ave
Commercial St
TR %
U-turn
PHF: 0.92 Total: 2967

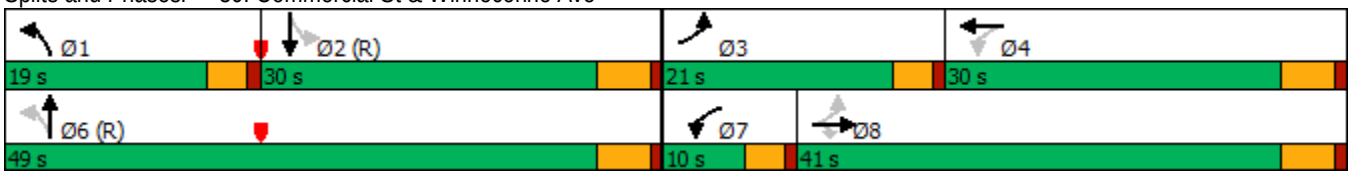


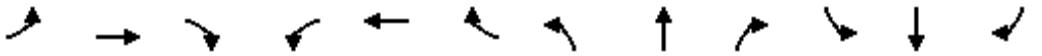
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	262	215	41	314	4	240	315	28	2	270	265
Future Volume (vph)	272	262	215	41	314	4	240	315	28	2	270	265
Ideal Flow (vphpl)	1785	1785	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
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		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1202	
Travel Time (s)		12.5			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	285	145	45	345	0	261	372	0	0	583	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	6.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	
Minimum Split (s)	10.0	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	
Total Split (s)	21.0	41.0	41.0	10.0	30.0		19.0	49.0		30.0	30.0	
Total Split (%)	21.0%	41.0%	41.0%	10.0%	30.0%		19.0%	49.0%		30.0%	30.0%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	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		4.0	5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	Min	Min	None	Max		None	C-Max		C-Max	C-Max	
v/c Ratio	0.75	0.42	0.19	0.12	0.76		0.79	0.51			0.64	
Control Delay	29.9	25.2	4.5	16.5	47.0		37.1	22.9			28.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	29.9	25.2	4.5	16.5	47.0		37.1	22.9			28.4	
Queue Length 50th (ft)	118	138	0	15	206		106	164			127	
Queue Length 95th (ft)	185	216	40	35	#355		#200	250			197	
Internal Link Dist (ft)		468			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	420	682	754	369	452		346	731			912	
Starvation Cap Reductn	0	0	0	0	0		0	0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	0.19	0.12	0.76		0.75	0.51			0.64	

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

Splits and Phases: 30: Commercial St & Winneconne Ave

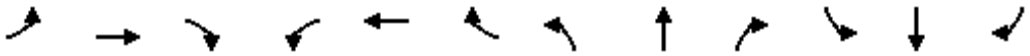




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	272	262	215	41	314	4	240	315	28	2	270	265
Future Volume (veh/h)	272	262	215	41	314	4	240	315	28	2	270	265
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1771	1771	1806	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	296	285	145	45	341	4	261	342	30	2	293	288
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, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	388	628	543	366	428	5	355	728	64	37	512	396
Arrive On Green	0.15	0.35	0.35	0.04	0.25	0.25	0.13	0.46	0.46	0.10	0.10	0.10
Sat Flow, veh/h	1687	1771	1530	1654	1713	20	1654	1573	138	2	1733	1339
Grp Volume(v), veh/h	296	285	145	45	0	345	261	0	372	295	0	288
Grp Sat Flow(s),veh/h/ln	1687	1771	1530	1654	0	1733	1654	0	1712	1735	0	1339
Q Serve(g_s), s	12.4	12.4	6.8	2.0	0.0	18.6	10.4	0.0	14.9	0.0	0.0	20.9
Cycle Q Clear(g_c), s	12.4	12.4	6.8	2.0	0.0	18.6	10.4	0.0	14.9	16.2	0.0	20.9
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.08	0.01		1.00
Lane Grp Cap(c), veh/h	388	628	543	366	0	433	355	0	792	549	0	396
V/C Ratio(X)	0.76	0.45	0.27	0.12	0.00	0.80	0.74	0.00	0.47	0.54	0.00	0.73
Avail Cap(c_a), veh/h	426	638	551	394	0	433	393	0	792	549	0	396
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.00	0.93
Uniform Delay (d), s/veh	23.5	24.8	23.0	25.7	0.0	35.1	22.2	0.0	18.5	39.1	0.0	41.2
Incr Delay (d2), s/veh	7.2	0.5	0.3	0.1	0.0	14.1	6.4	0.0	2.0	3.5	0.0	10.4
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	9.4	8.9	4.4	1.4	0.0	14.6	8.0	0.0	10.2	12.6	0.0	13.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.7	25.3	23.3	25.9	0.0	49.2	28.6	0.0	20.5	42.6	0.0	51.6
LnGrp LOS	C	C	C	C	A	D	C	A	C	D	A	D
Approach Vol, veh/h		726			390			633			583	
Approach Delay, s/veh		27.1			46.5			23.8			47.1	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	16.7	34.6	18.7	30.0		51.3	8.3	40.5				
Change Period (Y+Rc), s	4.0	5.0	4.0	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	15.0	25.0	17.0	25.0		44.0	6.0	36.0				
Max Q Clear Time (g_c+I1), s	12.4	0.0	14.4	0.0		0.0	4.0	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	34.5
HCM 6th LOS	C

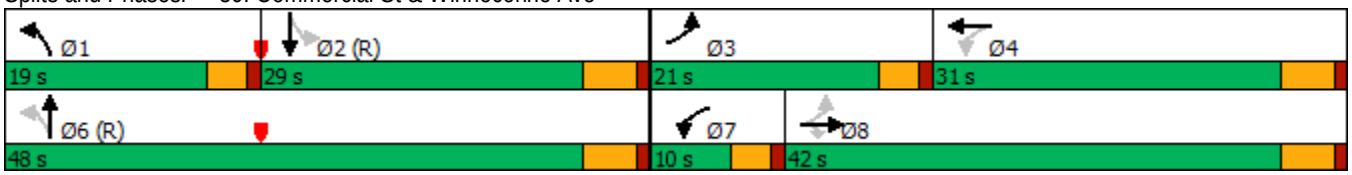


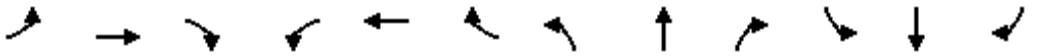
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	289	247	219	53	303	7	141	381	36	12	346	398
Future Volume (vph)	289	247	219	53	303	7	141	381	36	12	346	398
Ideal Flow (vphpl)	1785	1785	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
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		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1202	
Travel Time (s)		12.5			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	314	268	148	58	337	0	153	453	0	0	822	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	6.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	
Minimum Split (s)	10.0	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	
Total Split (s)	21.0	42.0	42.0	10.0	31.0		19.0	48.0		29.0	29.0	
Total Split (%)	21.0%	42.0%	42.0%	10.0%	31.0%		19.0%	48.0%		29.0%	29.0%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	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		4.0	5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	Min	Min	None	Max		None	C-Max		C-Max	C-Max	
v/c Ratio	0.76	0.40	0.20	0.15	0.73		0.65	0.63			0.84	
Control Delay	30.4	25.2	4.3	16.3	44.2		31.9	27.0			36.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	30.4	25.2	4.3	16.3	44.2		31.9	27.0			36.5	
Queue Length 50th (ft)	124	126	0	19	199		59	218			222	
Queue Length 95th (ft)	#201	198	39	41	#332		111	327			#336	
Internal Link Dist (ft)		468			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	430	665	740	380	462		299	714			982	
Starvation Cap Reductn	0	0	0	0	0		0	0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	0.73	0.40	0.20	0.15	0.73		0.51	0.63			0.84	

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

Splits and Phases: 30: Commercial St & Winneconne Ave

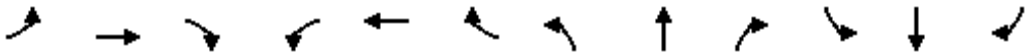




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	289	247	219	53	303	7	141	381	36	12	346	398
Future Volume (veh/h)	289	247	219	53	303	7	141	381	36	12	346	398
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1771	1771	1806	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	314	268	148	58	329	8	153	414	39	13	376	433
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, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	416	646	558	397	439	11	207	699	66	45	554	438
Arrive On Green	0.15	0.36	0.36	0.05	0.26	0.26	0.08	0.45	0.45	0.11	0.11	0.11
Sat Flow, veh/h	1687	1771	1530	1654	1688	41	1654	1563	147	23	1694	1339
Grp Volume(v), veh/h	314	268	148	58	0	337	153	0	453	389	0	433
Grp Sat Flow(s),veh/h/ln	1687	1771	1530	1654	0	1729	1654	0	1710	1717	0	1339
Q Serve(g_s), s	13.0	11.3	6.8	2.5	0.0	17.9	5.8	0.0	19.9	2.3	0.0	32.3
Cycle Q Clear(g_c), s	13.0	11.3	6.8	2.5	0.0	17.9	5.8	0.0	19.9	21.6	0.0	32.3
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	416	646	558	397	0	450	207	0	765	599	0	438
V/C Ratio(X)	0.75	0.41	0.27	0.15	0.00	0.75	0.74	0.00	0.59	0.65	0.00	0.99
Avail Cap(c_a), veh/h	445	655	566	417	0	450	323	0	765	599	0	438
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.00	0.93
Uniform Delay (d), s/veh	22.6	23.8	22.3	24.8	0.0	34.0	24.1	0.0	20.8	39.6	0.0	44.4
Incr Delay (d2), s/veh	6.7	0.4	0.3	0.2	0.0	10.9	5.1	0.0	3.4	5.0	0.0	38.7
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	9.7	8.3	4.4	1.8	0.0	13.7	4.5	0.0	13.1	16.1	0.0	22.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	24.2	22.6	25.0	0.0	44.9	29.2	0.0	24.1	44.7	0.0	83.2
LnGrp LOS	C	C	C	C	A	D	C	A	C	D	A	F
Approach Vol, veh/h		730			395			606			822	
Approach Delay, s/veh		26.1			42.0			25.4			64.9	
Approach LOS		C			D			C			E	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	12.0	37.7	19.3	31.0		49.7	8.8	41.5				
Change Period (Y+Rc), s	4.0	5.0	4.0	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	15.0	24.0	17.0	26.0		43.0	6.0	37.0				
Max Q Clear Time (g_c+I1), s	7.8	0.0	15.0	0.0		0.0	4.5	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			40.9									
HCM 6th LOS			D									

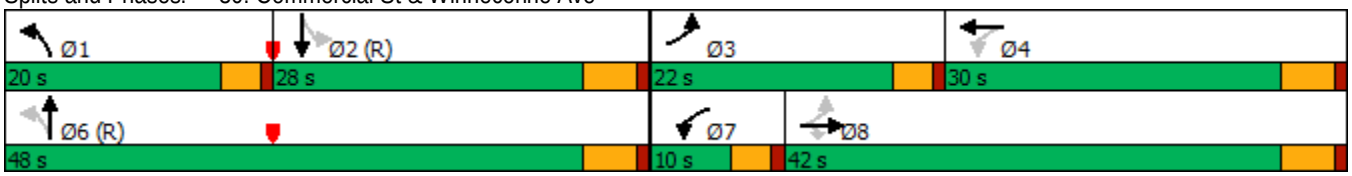


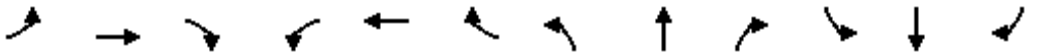
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	318	306	251	48	366	5	280	367	33	2	315	309
Future Volume (vph)	318	306	251	48	366	5	280	367	33	2	315	309
Ideal Flow (vphpl)	1785	1785	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
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		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1202	
Travel Time (s)		12.5			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	383	369	187	58	447	0	337	482	0	0	754	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	6.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	
Minimum Split (s)	10.0	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	
Total Split (s)	22.0	42.0	42.0	10.0	30.0		20.0	48.0		28.0	28.0	
Total Split (%)	22.0%	42.0%	42.0%	10.0%	30.0%		20.0%	48.0%		28.0%	28.0%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	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		4.0	5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?		Yes	Yes	Yes								
Recall Mode	None	Max	Max	None	Min		None	C-Max		C-Max	C-Max	
v/c Ratio	1.07	0.56	0.25	0.18	1.08		1.06	0.69			0.94	
Control Delay	96.3	28.7	4.1	16.9	104.4		93.2	29.0			44.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	96.3	28.7	4.1	16.9	104.4		93.2	29.0			44.5	
Queue Length 50th (ft)	~226	187	0	19	~320		~188	239			195	
Queue Length 95th (ft)	#355	253	33	38	#452		#315	316			#257	
Internal Link Dist (ft)		468			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	357	660	758	328	414		319	701			804	
Starvation Cap Reductn	0	0	0	0	0		0	0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	1.07	0.56	0.25	0.18	1.08		1.06	0.69			0.94	

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: 90	
Control Type: Actuated-Coordinated	
~ 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.	

Splits and Phases: 30: Commercial St & Winneconne Ave

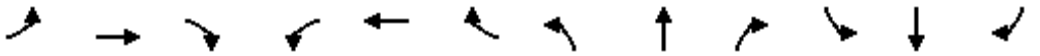




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	318	306	251	48	366	5	280	367	33	2	315	309
Future Volume (veh/h)	318	306	251	48	366	5	280	367	33	2	315	309
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1757	1757	1792	1723	1723	1723	1709	1709	1709	1695	1695	1695
Adj Flow Rate, veh/h	383	369	187	58	441	6	337	442	40	2	380	372
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	4	4	4
Cap, veh/h	373	650	562	324	404	5	332	682	62	37	409	316
Arrive On Green	0.18	0.37	0.37	0.05	0.24	0.24	0.16	0.44	0.44	0.08	0.08	0.08
Sat Flow, veh/h	1673	1757	1518	1641	1695	23	1628	1544	140	2	1692	1307
Grp Volume(v), veh/h	383	369	187	58	0	447	337	0	482	382	0	372
Grp Sat Flow(s),veh/h/ln	1673	1757	1518	1641	0	1719	1628	0	1684	1694	0	1307
Q Serve(g_s), s	18.0	16.7	8.8	2.6	0.0	23.8	16.0	0.0	22.4	2.8	0.0	24.2
Cycle Q Clear(g_c), s	18.0	16.7	8.8	2.6	0.0	23.8	16.0	0.0	22.4	22.4	0.0	24.2
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.08	0.01		1.00
Lane Grp Cap(c), veh/h	373	650	562	324	0	409	332	0	744	446	0	316
V/C Ratio(X)	1.03	0.57	0.33	0.18	0.00	1.09	1.01	0.00	0.65	0.86	0.00	1.18
Avail Cap(c_a), veh/h	373	650	562	343	0	430	332	0	744	446	0	316
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.96	0.00	0.96
Uniform Delay (d), s/veh	28.4	25.1	22.6	26.5	0.0	38.1	27.7	0.0	21.8	45.2	0.0	46.0
Incr Delay (d2), s/veh	53.5	3.6	1.6	0.3	0.0	71.9	52.9	0.0	4.3	18.1	0.0	106.3
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	18.6	11.9	6.0	1.9	0.0	26.4	16.4	0.0	14.5	18.1	0.0	26.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	81.9	28.7	24.2	26.8	0.0	110.0	80.6	0.0	26.1	63.2	0.0	152.3
LnGrp LOS	F	C	C	C	A	F	F	A	C	E	A	F
Approach Vol, veh/h		939			505			819			754	
Approach Delay, s/veh		49.5			100.4			48.6			107.2	
Approach LOS		D			F			D			F	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	20.0	29.2	22.0	28.8		49.2	8.8	42.0				
Change Period (Y+Rc), s	4.0	5.0	4.0	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	16.0	23.0	18.0	25.0		43.0	6.0	37.0				
Max Q Clear Time (g_c+I1), s	18.0	0.0	20.0	0.0		0.0	4.6	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			72.2									
HCM 6th LOS			E									

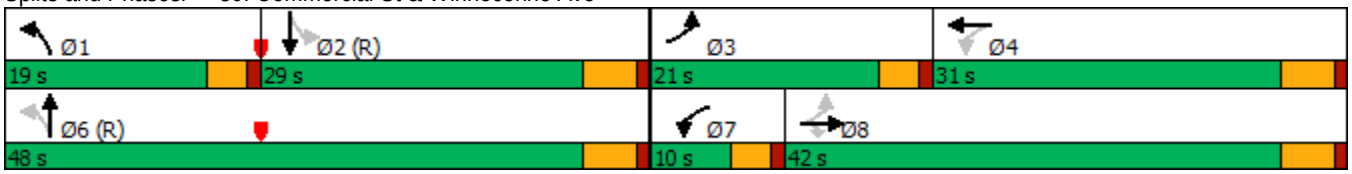


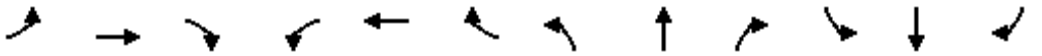
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	337	289	256	62	354	8	164	445	42	15	404	465
Future Volume (vph)	337	289	256	62	354	8	164	445	42	15	404	465
Ideal Flow (vphpl)	1785	1785	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
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		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		548			403			539			1202	
Travel Time (s)		12.5			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	366	314	173	67	394	0	178	530	0	0	960	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	
Protected Phases	3	8		7	4		1	6			2	
Permitted Phases	8		8	4			6			2		
Detector Phase	3	8	8	7	4		1	6		2	2	
Switch Phase												
Minimum Initial (s)	6.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	
Minimum Split (s)	10.0	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	
Total Split (s)	21.0	42.0	42.0	10.0	31.0		19.0	48.0		29.0	29.0	
Total Split (%)	21.0%	42.0%	42.0%	10.0%	31.0%		19.0%	48.0%		29.0%	29.0%	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	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		4.0	5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	Min	Min	None	Max		None	C-Max		C-Max	C-Max	
v/c Ratio	0.97	0.47	0.23	0.19	0.91		0.71	0.74			1.00	
Control Delay	62.2	26.6	4.2	16.8	62.5		36.1	31.3			61.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	62.2	26.6	4.2	16.8	62.5		36.1	31.3			61.3	
Queue Length 50th (ft)	161	152	0	22	243		70	273			~282	
Queue Length 95th (ft)	#347	235	42	46	#420		133	406			#442	
Internal Link Dist (ft)		468			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	378	665	756	353	434		301	714			956	
Starvation Cap Reductn	0	0	0	0	0		0	0			0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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	0.47	0.23	0.19	0.91		0.59	0.74			1.00	

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	
~ 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.	

Splits and Phases: 30: Commercial St & Winneconne Ave

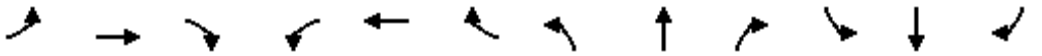




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	337	289	256	62	354	8	164	445	42	15	404	465
Future Volume (veh/h)	337	289	256	62	354	8	164	445	42	15	404	465
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1771	1771	1806	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	366	314	173	67	385	9	178	484	46	16	439	505
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, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	401	672	581	381	439	10	227	671	64	45	499	397
Arrive On Green	0.17	0.38	0.38	0.05	0.26	0.26	0.09	0.43	0.43	0.10	0.10	0.10
Sat Flow, veh/h	1687	1771	1530	1654	1690	40	1654	1561	148	27	1683	1339
Grp Volume(v), veh/h	366	314	173	67	0	394	178	0	530	455	0	505
Grp Sat Flow(s),veh/h/ln	1687	1771	1530	1654	0	1729	1654	0	1710	1710	0	1339
Q Serve(g_s), s	15.2	13.4	7.9	2.9	0.0	21.8	7.1	0.0	25.6	10.1	0.0	29.6
Cycle Q Clear(g_c), s	15.2	13.4	7.9	2.9	0.0	21.8	7.1	0.0	25.6	26.2	0.0	29.6
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.09	0.04		1.00
Lane Grp Cap(c), veh/h	401	672	581	381	0	450	227	0	735	544	0	397
V/C Ratio(X)	0.91	0.47	0.30	0.18	0.00	0.88	0.78	0.00	0.72	0.84	0.00	1.27
Avail Cap(c_a), veh/h	401	672	581	396	0	450	320	0	735	544	0	397
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.00	0.93
Uniform Delay (d), s/veh	23.0	23.4	21.7	24.8	0.0	35.5	24.5	0.0	23.5	43.5	0.0	45.1
Incr Delay (d2), s/veh	24.8	0.5	0.3	0.2	0.0	20.7	8.1	0.0	6.0	13.3	0.0	139.9
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	13.3	9.4	5.1	2.1	0.0	17.3	5.8	0.0	16.7	20.0	0.0	39.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.8	23.9	22.0	25.0	0.0	56.1	32.6	0.0	29.6	56.8	0.0	185.0
LnGrp LOS	D	C	C	C	A	E	C	A	C	E	A	F
Approach Vol, veh/h		853			461			708			960	
Approach Delay, s/veh		33.8			51.6			30.3			124.2	
Approach LOS		C			D			C			F	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	13.4	34.6	21.0	31.0		48.0	9.1	42.9				
Change Period (Y+Rc), s	4.0	5.0	4.0	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	15.0	24.0	17.0	26.0		43.0	6.0	37.0				
Max Q Clear Time (g_c+I1), s	9.1	0.0	17.2	0.0		0.0	4.9	0.0				
Green Ext Time (p_c), s	0.3	0.0	0.0	0.0		0.0	0.0	0.0				

Intersection Summary												
HCM 6th Ctrl Delay			64.8									
HCM 6th LOS			E									

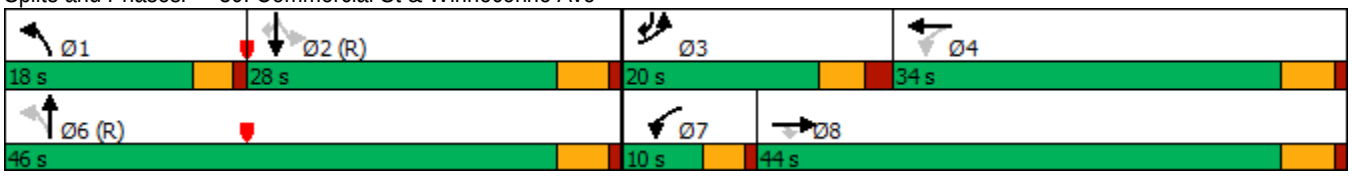


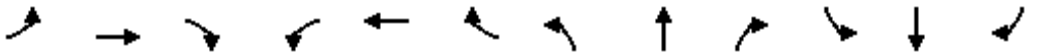
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	262	215	41	314	4	240	315	28	2	270	265
Future Volume (vph)	272	262	215	41	314	4	240	315	28	2	270	265
Ideal Flow (vphpl)	1805	1805	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	2		1	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		542			403			539			1202	
Travel Time (s)		12.3			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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%	62%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	285	145	45	345	0	261	372	0	0	295	179
Turn Type	Prot	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	3	8		7	4		1	6			2	3
Permitted Phases			8	4			6			2		2
Detector Phase	3	8	8	7	4		1	6		2	2	3
Switch Phase												
Minimum Initial (s)	8.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	8.0
Minimum Split (s)	13.5	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	13.5
Total Split (s)	20.0	44.0	44.0	10.0	34.0		18.0	46.0		28.0	28.0	20.0
Total Split (%)	20.0%	44.0%	44.0%	10.0%	34.0%		18.0%	46.0%		28.0%	28.0%	20.0%
Yellow Time (s)	3.5	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	3.5
All-Red Time (s)	2.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	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)	5.5	5.0	5.0	4.0	5.0		4.0	5.0			5.0	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?												
Recall Mode	None	Min	Min	None	Max		None	C-Max		C-Max	C-Max	None
v/c Ratio	0.73	0.38	0.18	0.11	0.67		0.63	0.55			0.40	0.26
Control Delay	52.6	22.6	4.0	14.6	38.4		27.8	25.8			36.8	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	52.6	22.6	4.0	14.6	38.4		27.8	25.8			36.8	14.5
Queue Length 50th (ft)	93	130	0	14	193		113	174			92	36
Queue Length 95th (ft)	137	203	38	33	299		179	266			142	99
Internal Link Dist (ft)		462			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	461	742	800	406	514		426	681			729	721
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.64	0.38	0.18	0.11	0.67		0.61	0.55			0.40	0.25

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	

Splits and Phases: 30: Commercial St & Winneconne Ave

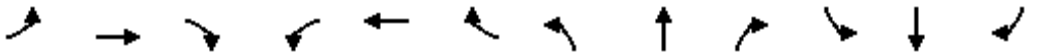




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	272	262	215	41	314	4	240	315	28	2	270	265
Future Volume (veh/h)	272	262	215	41	314	4	240	315	28	2	270	265
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1791	1791	1806	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	296	285	145	45	341	4	261	342	30	2	293	179
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, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	372	671	573	390	497	6	460	696	61	38	883	567
Arrive On Green	0.11	0.37	0.37	0.04	0.29	0.29	0.13	0.44	0.44	0.09	0.09	0.09
Sat Flow, veh/h	3309	1791	1530	1654	1713	20	1654	1573	138	4	3231	1471
Grp Volume(v), veh/h	296	285	145	45	0	345	261	0	372	158	137	179
Grp Sat Flow(s),veh/h/ln	1654	1791	1530	1654	0	1733	1654	0	1712	1734	1501	1471
Q Serve(g_s), s	8.7	11.8	6.5	1.9	0.0	17.7	10.8	0.0	15.5	0.0	8.5	9.7
Cycle Q Clear(g_c), s	8.7	11.8	6.5	1.9	0.0	17.7	10.8	0.0	15.5	8.5	8.5	9.7
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.08	0.01		1.00
Lane Grp Cap(c), veh/h	372	671	573	390	0	502	460	0	758	510	410	567
V/C Ratio(X)	0.80	0.42	0.25	0.12	0.00	0.69	0.57	0.00	0.49	0.31	0.33	0.32
Avail Cap(c_a), veh/h	480	698	597	419	0	502	478	0	758	510	410	567
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	43.3	23.3	21.6	22.9	0.0	31.5	20.6	0.0	19.8	37.0	37.0	27.4
Incr Delay (d2), s/veh	7.0	0.4	0.2	0.1	0.0	7.5	1.5	0.0	2.3	1.5	2.0	1.4
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	7.0	8.7	4.2	1.3	0.0	13.1	7.6	0.0	10.6	7.3	6.5	7.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.3	23.7	21.8	23.1	0.0	38.9	22.0	0.0	22.1	38.4	39.0	28.7
LnGrp LOS	D	C	C	C	A	D	C	A	C	D	D	C
Approach Vol, veh/h		726			390			633			474	
Approach Delay, s/veh		34.2			37.1			22.1			34.9	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	16.9	32.3	16.7	34.0		49.3	8.3	42.5				
Change Period (Y+Rc), s	4.0	5.0	5.5	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	14.0	23.0	14.5	29.0		41.0	6.0	39.0				
Max Q Clear Time (g_c+I1), s	12.8	11.7	10.7	0.0		0.0	3.9	0.0				
Green Ext Time (p_c), s	0.1	0.1	0.5	0.0		0.0	0.0	0.0				

Intersection Summary	
HCM 6th Ctrl Delay	31.4
HCM 6th LOS	C

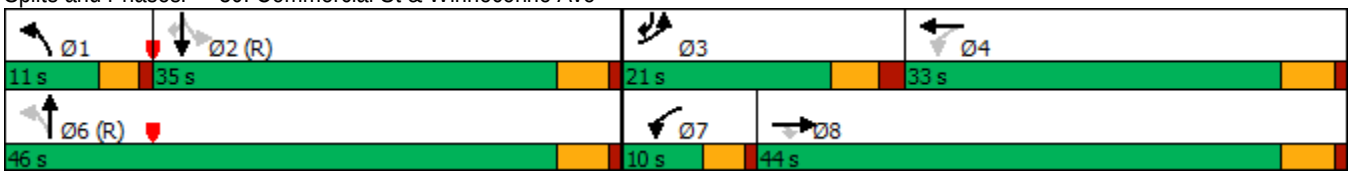


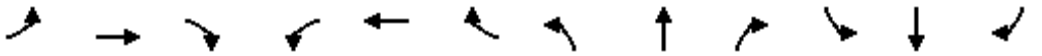
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	289	247	219	53	303	7	141	381	36	12	346	398
Future Volume (vph)	289	247	219	53	303	7	141	381	36	12	346	398
Ideal Flow (vphpl)	1805	1805	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	2		1	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		542			403			539			1202	
Travel Time (s)		12.3			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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%	62%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	314	268	148	58	337	0	153	453	0	0	389	268
Turn Type	Prot	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	3	8		7	4		1	6			2	3
Permitted Phases			8	4			6			2		2
Detector Phase	3	8	8	7	4		1	6		2	2	3
Switch Phase												
Minimum Initial (s)	8.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	8.0
Minimum Split (s)	13.5	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	13.5
Total Split (s)	21.0	44.0	44.0	10.0	33.0		11.0	46.0		35.0	35.0	21.0
Total Split (%)	21.0%	44.0%	44.0%	10.0%	33.0%		11.0%	46.0%		35.0%	35.0%	21.0%
Yellow Time (s)	3.5	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	3.5
All-Red Time (s)	2.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	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)	5.5	5.0	5.0	4.0	5.0		4.0	5.0			5.0	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?												
Recall Mode	None	Min	Min	None	Max		None	C-Max		C-Max	C-Max	None
v/c Ratio	0.73	0.38	0.19	0.14	0.67		0.45	0.67			0.43	0.32
Control Delay	51.9	23.4	4.1	15.1	39.1		23.5	29.4			35.5	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	51.9	23.4	4.1	15.1	39.1		23.5	29.4			35.5	14.0
Queue Length 50th (ft)	99	121	0	18	189		61	226			123	55
Queue Length 95th (ft)	143	191	38	40	296		106	340			179	143
Internal Link Dist (ft)		462			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	493	708	771	403	501		343	681			896	852
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.64	0.38	0.19	0.14	0.67		0.45	0.67			0.43	0.31

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	

Splits and Phases: 30: Commercial St & Winneconne Ave

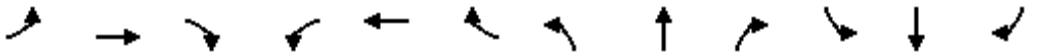




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	289	247	219	53	303	7	141	381	36	12	346	398
Future Volume (veh/h)	289	247	219	53	303	7	141	381	36	12	346	398
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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	1791	1791	1806	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	314	268	148	58	329	8	153	414	39	13	376	268
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, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	392	655	559	400	473	11	365	698	66	53	1063	670
Arrive On Green	0.12	0.37	0.37	0.05	0.28	0.28	0.07	0.45	0.45	0.11	0.11	0.11
Sat Flow, veh/h	3309	1791	1530	1654	1688	41	1654	1563	147	42	3159	1471
Grp Volume(v), veh/h	314	268	148	58	0	337	153	0	453	207	182	268
Grp Sat Flow(s),veh/h/ln	1654	1791	1530	1654	0	1729	1654	0	1710	1701	1501	1471
Q Serve(g_s), s	9.2	11.2	6.8	2.4	0.0	17.4	5.8	0.0	20.0	0.0	11.2	14.1
Cycle Q Clear(g_c), s	9.2	11.2	6.8	2.4	0.0	17.4	5.8	0.0	20.0	11.0	11.2	14.1
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.09	0.06		1.00
Lane Grp Cap(c), veh/h	392	655	559	400	0	484	365	0	763	610	505	670
V/C Ratio(X)	0.80	0.41	0.26	0.15	0.00	0.70	0.42	0.00	0.59	0.34	0.36	0.40
Avail Cap(c_a), veh/h	513	698	597	420	0	484	365	0	763	610	505	670
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	42.9	23.7	22.3	23.4	0.0	32.2	19.2	0.0	20.8	34.4	34.5	25.1
Incr Delay (d2), s/veh	6.7	0.4	0.2	0.2	0.0	8.0	0.8	0.0	3.4	1.4	1.9	1.7
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	7.4	8.3	4.4	1.8	0.0	13.1	4.1	0.0	13.2	9.0	8.2	9.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.6	24.1	22.5	23.6	0.0	40.2	20.0	0.0	24.2	35.8	36.3	26.7
LnGrp LOS	D	C	C	C	A	D	B	A	C	D	D	C
Approach Vol, veh/h		730			395			606			657	
Approach Delay, s/veh		34.8			37.8			23.2			32.2	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	11.0	38.6	17.4	33.0		49.6	8.8	41.6				
Change Period (Y+Rc), s	4.0	5.0	5.5	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	7.0	30.0	15.5	28.0		41.0	6.0	39.0				
Max Q Clear Time (g_c+I1), s	7.8	16.1	11.2	0.0		0.0	4.4	0.0				
Green Ext Time (p_c), s	0.0	0.2	0.6	0.0		0.0	0.0	0.0				

Intersection Summary			
HCM 6th Ctrl Delay		31.6	
HCM 6th LOS		C	

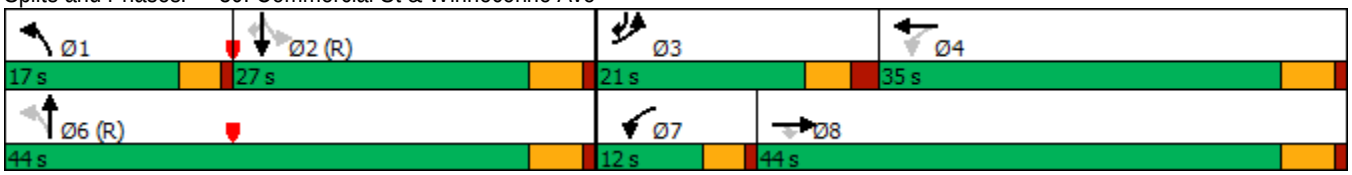


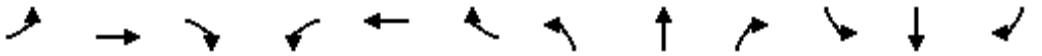
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	318	306	251	48	366	5	280	367	33	2	315	309
Future Volume (vph)	318	306	251	48	366	5	280	367	33	2	315	309
Ideal Flow (vphpl)	1805	1805	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	2		1	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		542			403			539			1202	
Travel Time (s)		12.3			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	62%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	383	369	187	58	447	0	337	482	0	0	382	372
Turn Type	Prot	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	3	8		7	4		1	6			2	3
Permitted Phases			8	4			6			2		2
Detector Phase	3	8	8	7	4		1	6		2	2	3
Switch Phase												
Minimum Initial (s)	8.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	8.0
Minimum Split (s)	13.5	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	13.5
Total Split (s)	21.0	44.0	44.0	12.0	35.0		17.0	44.0		27.0	27.0	21.0
Total Split (%)	21.0%	44.0%	44.0%	12.0%	35.0%		17.0%	44.0%		27.0%	27.0%	21.0%
Yellow Time (s)	3.5	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	3.5
All-Red Time (s)	2.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	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)	5.5	5.0	5.0	4.0	5.0		4.0	5.0			5.0	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?												
Recall Mode	None	Min	Min	None	Max		None	C-Max		C-Max	C-Max	None
v/c Ratio	0.83	0.51	0.23	0.15	0.87		0.95	0.76			0.59	0.56
Control Delay	57.6	25.5	3.8	14.0	52.9		64.9	35.3			41.4	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	57.6	25.5	3.8	14.0	52.9		64.9	35.3			41.4	29.0
Queue Length 50th (ft)	122	176	0	18	272		161	259			131	168
Queue Length 95th (ft)	158	243	32	35	#395		#289	342			166	236
Internal Link Dist (ft)		462			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	488	721	805	412	511		353	636			647	678
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.78	0.51	0.23	0.14	0.87		0.95	0.76			0.59	0.55

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: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 30: Commercial St & Winneconne Ave

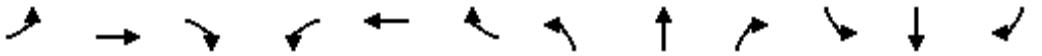




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	318	306	251	48	366	5	280	367	33	2	315	309
Future Volume (veh/h)	318	306	251	48	366	5	280	367	33	2	315	309
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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	1777	1777	1792	1723	1723	1723	1709	1709	1709	1695	1695	1695
Adj Flow Rate, veh/h	383	369	187	58	441	6	337	442	40	2	380	372
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	3	3	3	4	4	4
Cap, veh/h	454	720	615	363	509	7	369	628	57	37	747	539
Arrive On Green	0.14	0.41	0.41	0.05	0.30	0.30	0.13	0.41	0.41	0.08	0.08	0.08
Sat Flow, veh/h	3283	1777	1518	1641	1695	23	1628	1544	140	3	3155	1437
Grp Volume(v), veh/h	383	369	187	58	0	447	337	0	482	205	177	372
Grp Sat Flow(s),veh/h/ln	1641	1777	1518	1641	0	1719	1628	0	1684	1693	1466	1437
Q Serve(g_s), s	11.4	15.6	8.4	2.4	0.0	24.6	13.0	0.0	23.8	0.0	11.6	21.4
Cycle Q Clear(g_c), s	11.4	15.6	8.4	2.4	0.0	24.6	13.0	0.0	23.8	11.6	11.6	21.4
Prop In Lane	1.00		1.00	1.00		0.01	1.00		0.08	0.01		1.00
Lane Grp Cap(c), veh/h	454	720	615	363	0	516	369	0	685	437	347	539
V/C Ratio(X)	0.84	0.51	0.30	0.16	0.00	0.87	0.91	0.00	0.70	0.47	0.51	0.69
Avail Cap(c_a), veh/h	509	720	615	416	0	516	369	0	685	437	347	539
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.96	0.96	0.96
Uniform Delay (d), s/veh	42.0	22.3	20.2	22.2	0.0	33.1	28.3	0.0	24.6	40.5	40.5	31.7
Incr Delay (d2), s/veh	11.3	0.6	0.3	0.2	0.0	17.6	26.6	0.0	6.0	3.4	5.1	6.8
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	9.0	10.6	5.3	1.7	0.0	18.5	9.0	0.0	15.6	9.5	8.7	14.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.4	22.9	20.5	22.4	0.0	50.7	54.9	0.0	30.6	44.0	45.6	38.5
LnGrp LOS	D	C	C	C	A	D	D	A	C	D	D	D
Approach Vol, veh/h		939			505			819			754	
Approach Delay, s/veh		34.9			47.4			40.6			41.6	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	17.0	28.7	19.3	35.0		45.7	8.8	45.5				
Change Period (Y+Rc), s	4.0	5.0	5.5	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	13.0	22.0	15.5	30.0		39.0	8.0	39.0				
Max Q Clear Time (g_c+I1), s	15.0	23.4	13.4	0.0		0.0	4.4	0.0				
Green Ext Time (p_c), s	0.0	0.0	0.4	0.0		0.0	0.0	0.0				

Intersection Summary	
HCM 6th Ctrl Delay	40.2
HCM 6th LOS	D

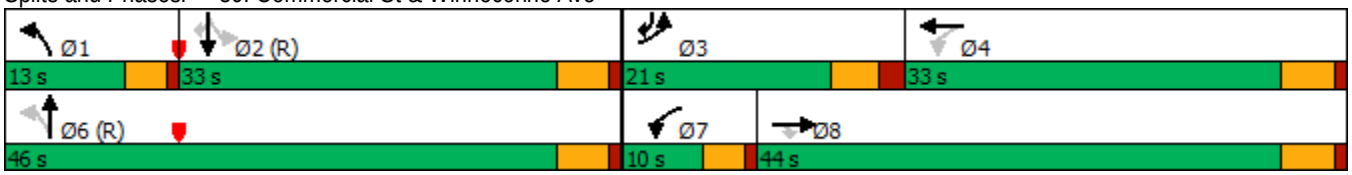


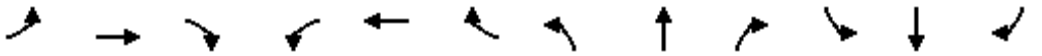
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	337	289	256	62	354	8	164	445	42	15	404	465
Future Volume (vph)	337	289	256	62	354	8	164	445	42	15	404	465
Ideal Flow (vphpl)	1805	1805	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width (ft)	11	11	16	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		150	0		0	0		0	0		0
Storage Lanes	2		1	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			25			30			25	
Link Distance (ft)		542			403			539			1202	
Travel Time (s)		12.3			11.0			12.3			32.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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%	62%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	366	314	173	67	394	0	178	530	0	0	455	313
Turn Type	Prot	NA	Perm	pm+pt	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	3	8		7	4		1	6			2	3
Permitted Phases			8	4			6			2		2
Detector Phase	3	8	8	7	4		1	6		2	2	3
Switch Phase												
Minimum Initial (s)	8.0	19.0	19.0	6.0	19.0		6.0	19.0		19.0	19.0	8.0
Minimum Split (s)	13.5	25.0	25.0	10.0	25.0		10.0	25.0		25.0	25.0	13.5
Total Split (s)	21.0	44.0	44.0	10.0	33.0		13.0	46.0		33.0	33.0	21.0
Total Split (%)	21.0%	44.0%	44.0%	10.0%	33.0%		13.0%	46.0%		33.0%	33.0%	21.0%
Yellow Time (s)	3.5	4.0	4.0	3.0	4.0		3.0	4.0		4.0	4.0	3.5
All-Red Time (s)	2.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	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)	5.5	5.0	5.0	4.0	5.0		4.0	5.0			5.0	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?												
Recall Mode	None	Min	Min	None	Max		None	C-Max		C-Max	C-Max	None
v/c Ratio	0.80	0.44	0.22	0.17	0.81		0.55	0.78			0.54	0.39
Control Delay	55.3	24.6	3.9	15.5	48.0		26.3	34.8			39.2	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	55.3	24.6	3.9	15.5	48.0		26.3	34.8			39.2	19.2
Queue Length 50th (ft)	115	147	0	21	236		72	284			156	87
Queue Length 95th (ft)	#169	226	41	44	#397		122	422			208	197
Internal Link Dist (ft)		462			323			459			1122	
Turn Bay Length (ft)			150									
Base Capacity (vph)	493	708	786	383	487		327	681			837	809
Starvation Cap Reductn	0	0	0	0	0		0	0			0	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0	0	0	0		0	0			0	0
Storage Cap Reductn	0	0	0	0	0		0	0			0	0
Reduced v/c Ratio	0.74	0.44	0.22	0.17	0.81		0.54	0.78			0.54	0.39

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

Splits and Phases: 30: Commercial St & Winneconne Ave





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	337	289	256	62	354	8	164	445	42	15	404	465
Future Volume (veh/h)	337	289	256	62	354	8	164	445	42	15	404	465
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	1791	1791	1806	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	366	314	173	67	385	9	178	484	46	16	439	313
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, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	440	676	577	380	473	11	341	675	64	53	948	640
Arrive On Green	0.13	0.38	0.38	0.05	0.28	0.28	0.09	0.43	0.43	0.10	0.10	0.10
Sat Flow, veh/h	3309	1791	1530	1654	1690	40	1654	1561	148	49	3140	1471
Grp Volume(v), veh/h	366	314	173	67	0	394	178	0	530	242	213	313
Grp Sat Flow(s),veh/h/ln	1654	1791	1530	1654	0	1729	1654	0	1710	1689	1501	1471
Q Serve(g_s), s	10.8	13.2	7.9	2.8	0.0	21.2	7.1	0.0	25.5	0.0	13.4	16.7
Cycle Q Clear(g_c), s	10.8	13.2	7.9	2.8	0.0	21.2	7.1	0.0	25.5	13.1	13.4	16.7
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.09	0.07		1.00
Lane Grp Cap(c), veh/h	440	676	577	380	0	484	341	0	739	548	453	640
V/C Ratio(X)	0.83	0.46	0.30	0.18	0.00	0.81	0.52	0.00	0.72	0.44	0.47	0.49
Avail Cap(c_a), veh/h	513	698	597	396	0	484	341	0	739	548	453	640
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.93	0.93	0.93
Uniform Delay (d), s/veh	42.3	23.5	21.9	23.4	0.0	33.6	21.0	0.0	23.4	37.3	37.5	26.7
Incr Delay (d2), s/veh	9.9	0.5	0.3	0.2	0.0	13.9	1.4	0.0	5.9	2.4	3.2	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.6	9.5	5.1	2.0	0.0	16.1	5.1	0.0	16.6	10.5	9.6	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.1	24.0	22.1	23.6	0.0	47.5	22.4	0.0	29.3	39.7	40.7	29.1
LnGrp LOS	D	C	C	C	A	D	C	A	C	D	D	C
Approach Vol, veh/h		853			461			708			768	
Approach Delay, s/veh		35.7			44.0			27.6			35.7	
Approach LOS		D			D			C			D	

Timer - Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	13.0	35.2	18.8	33.0		48.2	9.1	42.7				
Change Period (Y+Rc), s	4.0	5.0	5.5	5.0		5.0	4.0	5.0				
Max Green Setting (Gmax), s	9.0	28.0	15.5	28.0		41.0	6.0	39.0				
Max Q Clear Time (g_c+I1), s	9.1	18.7	12.8	0.0		0.0	4.8	0.0				
Green Ext Time (p_c), s	0.0	0.3	0.5	0.0		0.0	0.0	0.0				

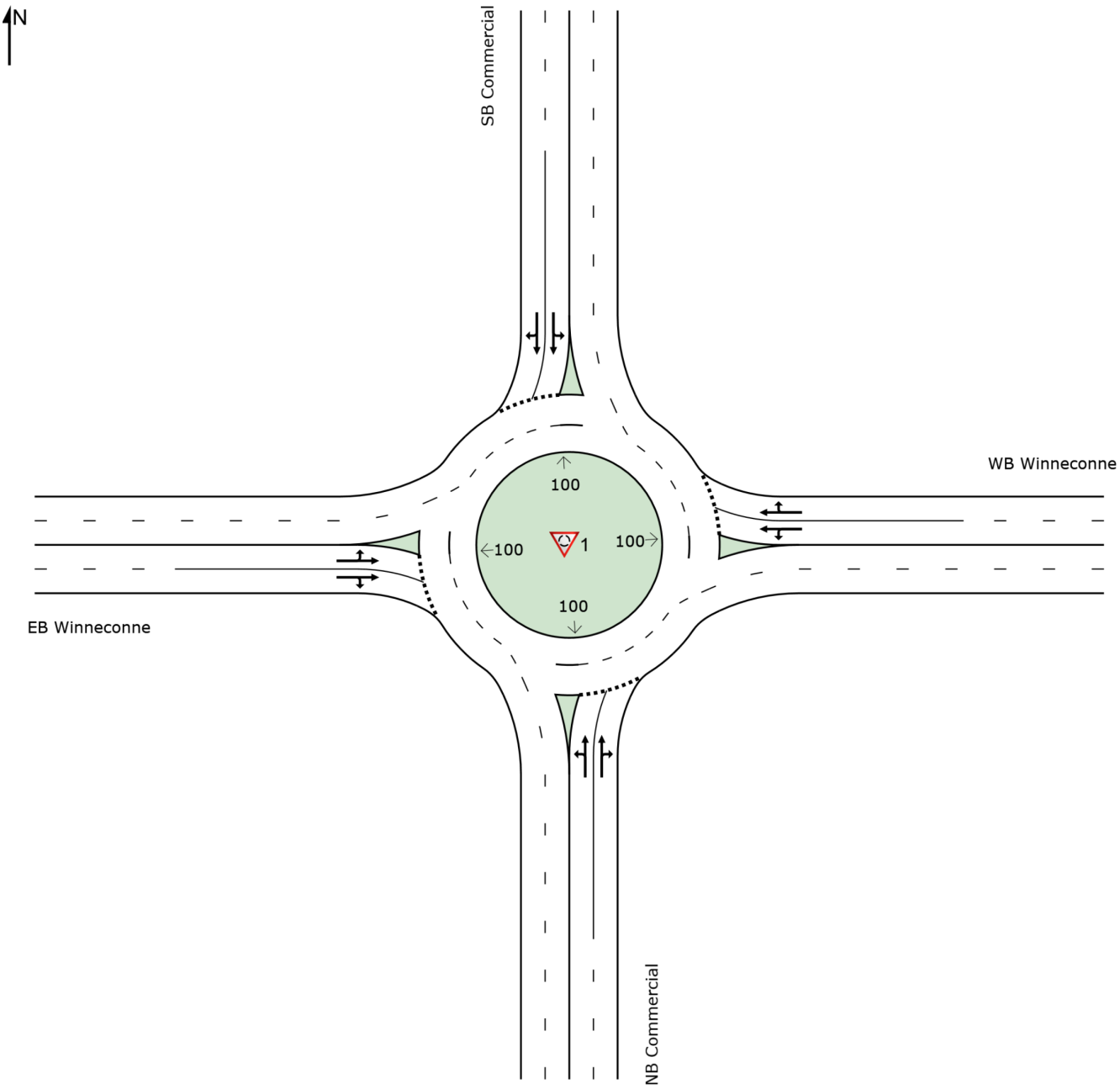
Intersection Summary			
HCM 6th Ctrl Delay		35.0	
HCM 6th LOS		D	

SITE LAYOUT

Site: 1 [Commercial & Winneconne 4-leg 2022 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



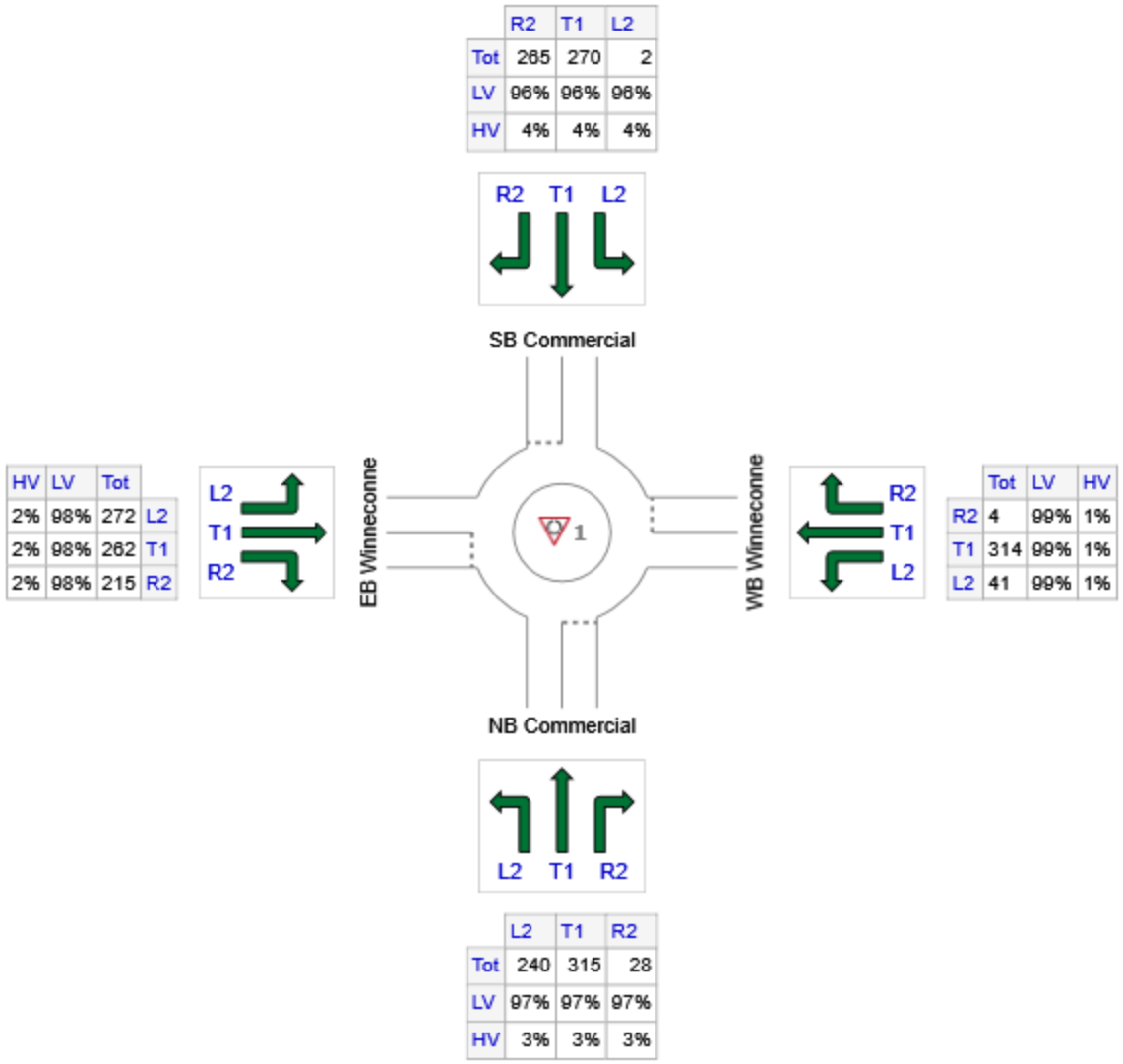
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 4-leg 2022 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	583	566	17
E: WB Winneconne	359	355	4
N: SB Commercial	537	516	21
W: EB Winneconne	749	734	15
Total	2228	2170	58

LANE SUMMARY

Site: 1 [Commercial & Winneconne 4-leg 2022 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	341	3.0	735	0.465	100	11.4	LOS B	2.7	68.9	Full	1600	0.0	0.0
Lane 2[d]	361	3.0	777	0.465	100	10.9	LOS B	2.6	66.5	Full	1600	0.0	0.0
Approach	702	3.0		0.465		11.2	LOS B	2.7	68.9				
East: WB Winneconne													
Lane 1	207	1.0	537	0.386	100	12.8	LOS B	1.7	43.7	Full	1600	0.0	0.0
Lane 2[d]	226	1.0	585	0.386	100	11.9	LOS B	1.7	42.3	Full	1600	0.0	0.0
Approach	433	1.0		0.386		12.3	LOS B	1.7	43.7				
North: SB Commercial													
Lane 1	314	4.0	682	0.460	100	12.0	LOS B	2.5	65.3	Full	1600	0.0	0.0
Lane 2[d]	333	4.0	725	0.460	100	11.4	LOS B	2.4	63.1	Full	1600	0.0	0.0
Approach	647	4.0		0.460		11.7	LOS B	2.5	65.3				
West: EB Winneconne													
Lane 1	444	2.0	949	0.468	100	9.4	LOS A	2.9	73.2	Full	1600	0.0	0.0
Lane 2[d]	459	2.0	981	0.468	100	9.2	LOS A	2.7	69.4	Full	1600	0.0	0.0
Approach	902	2.0		0.468		9.3	LOS A	2.9	73.2				
Intersection	2684	2.6		0.468		10.9	LOS B	2.9	73.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
South: NB Commercial										
Lane 1	289	52	-	341	3.0	735	0.465	100	NA	NA
Lane 2	-	327	34	361	3.0	777	0.465	100	NA	NA
Approach	289	380	34	702	3.0		0.465			
East: WB Winneconne										

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	49	158	-	207	1.0	537	0.386	100	NA	NA
Lane 2	-	221	5	226	1.0	585	0.386	100	NA	NA
Approach	49	378	5	433	1.0		0.386			
North: SB Commercial										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	2	311	-	314	4.0	682	0.460	100	NA	NA
Lane 2	-	14	319	333	4.0	725	0.460	100	NA	NA
Approach	2	325	319	647	4.0		0.460			
West: EB Winneconne										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	328	116	-	444	2.0	949	0.468	100	NA	NA
Lane 2	-	200	259	459	2.0	981	0.468	100	NA	NA
Approach	328	316	259	902	2.0		0.468			

	Total	%HV	Deg.Satn (v/c)
Intersection	2684	2.6	0.468

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 4-leg 2022 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam ft	Circ Width ft	Insc Diam ft	Entry Radius ft	Entry Angle °	Circ Lanes	Entry Lanes	Av.Entry Lane Width ft	App. Dist ft	Prop Queued Upstr Signal	Extra Bunching %
South	NB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow veh/h	Opng Flow pcu/h	In-Bunch Hdwy sec	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy sec	Dist] ft	Follow-up Hdwy sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	646	659	0.00	0.000	No	No	–	1.03	4.60	135.6	2.60
North	T1	1	Subdom.	646	659	0.00	0.000	No	No	–	1.03	4.60	135.6	2.60
North	T1	2	Dominant	646	659	0.00	0.000	No	No	–	1.03	4.30	126.7	2.60
East	R2	2	Dominant	646	659	0.00	0.000	No	No	–	1.03	4.30	126.7	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	996	1023	0.00	0.000	No	No	–	1.01	4.60	129.4	2.60
West	T1	1	Subdom.	996	1023	0.00	0.000	No	No	–	1.01	4.60	129.4	2.60
West	T1	2	Dominant	996	1023	0.00	0.000	No	No	–	1.01	4.30	120.9	2.60
North	R2	2	Dominant	996	1023	0.00	0.000	No	No	–	1.01	4.30	120.9	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	717	730	0.00	0.000	No	No	–	1.04	4.60	137.8	2.60
South	T1	1	Subdom.	717	730	0.00	0.000	No	No	–	1.04	4.60	137.8	2.60
South	T1	2	Dominant	717	730	0.00	0.000	No	No	–	1.04	4.30	128.8	2.60
West	R2	2	Dominant	717	730	0.00	0.000	No	No	–	1.04	4.30	128.8	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L2	1	Subdom.	377	391	0.00	0.000	No	No	–	1.02	4.60	156.9	2.60
East	T1	1	Subdom.	377	391	0.00	0.000	No	No	–	1.02	4.60	156.9	2.60
East	T1	2	Dominant	377	391	0.00	0.000	No	No	–	1.02	4.30	146.6	2.60
South	R2	2	Dominant	377	391	0.00	0.000	No	No	–	1.02	4.30	146.6	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates			
Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	446	455	69.1
Lane 2	200	204	30.9
Approach	646	659	
East: WB Winneconne			
Lane 1	669	686	67.1
Lane 2	327	337	32.9
Approach	996	1023	
North: SB Commercial			
Lane 1	496	507	69.5
Lane 2	221	223	30.5
Approach	717	730	
West: EB Winneconne			
Lane 1	363	376	96.2
Lane 2	14	15	3.8
Approach	377	391	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)					
Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial					
1	12.38	5.61	6.76	0.547	4.9
2	11.71	4.95	6.76	0.578	4.6
East: WB Winneconne					
1	12.31	7.49	4.82	0.391	6.7
2	11.30	6.48	4.82	0.426	6.2
North: SB Commercial					
1	12.17	5.94	6.23	0.512	5.3
2	11.45	5.21	6.23	0.544	5.0
West: EB Winneconne					
1	15.04	4.53	10.51	0.699	3.8
2	14.56	4.04	10.51	0.722	3.7

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)							
To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.38	5.61	6.76	0.547	4.9

North	T1	1	12.38	5.61	6.76	0.547	4.9
North	T1	2	11.71	4.95	6.76	0.578	4.6
East	R2	2	11.71	4.95	6.76	0.578	4.6
East: WB Winneconne							
South	L2	1	12.31	7.49	4.82	0.391	6.7
West	T1	1	12.31	7.49	4.82	0.391	6.7
West	T1	2	11.30	6.48	4.82	0.426	6.2
North	R2	2	11.30	6.48	4.82	0.426	6.2
North: SB Commercial							
East	L2	1	12.17	5.94	6.23	0.512	5.3
South	T1	1	12.17	5.94	6.23	0.512	5.3
South	T1	2	11.45	5.21	6.23	0.544	5.0
West	R2	2	11.45	5.21	6.23	0.544	5.0
West: EB Winneconne							
North	L2	1	15.04	4.53	10.51	0.699	3.8
East	T1	1	15.04	4.53	10.51	0.699	3.8
East	T1	2	14.56	4.04	10.51	0.722	3.7
South	R2	2	14.56	4.04	10.51	0.722	3.7

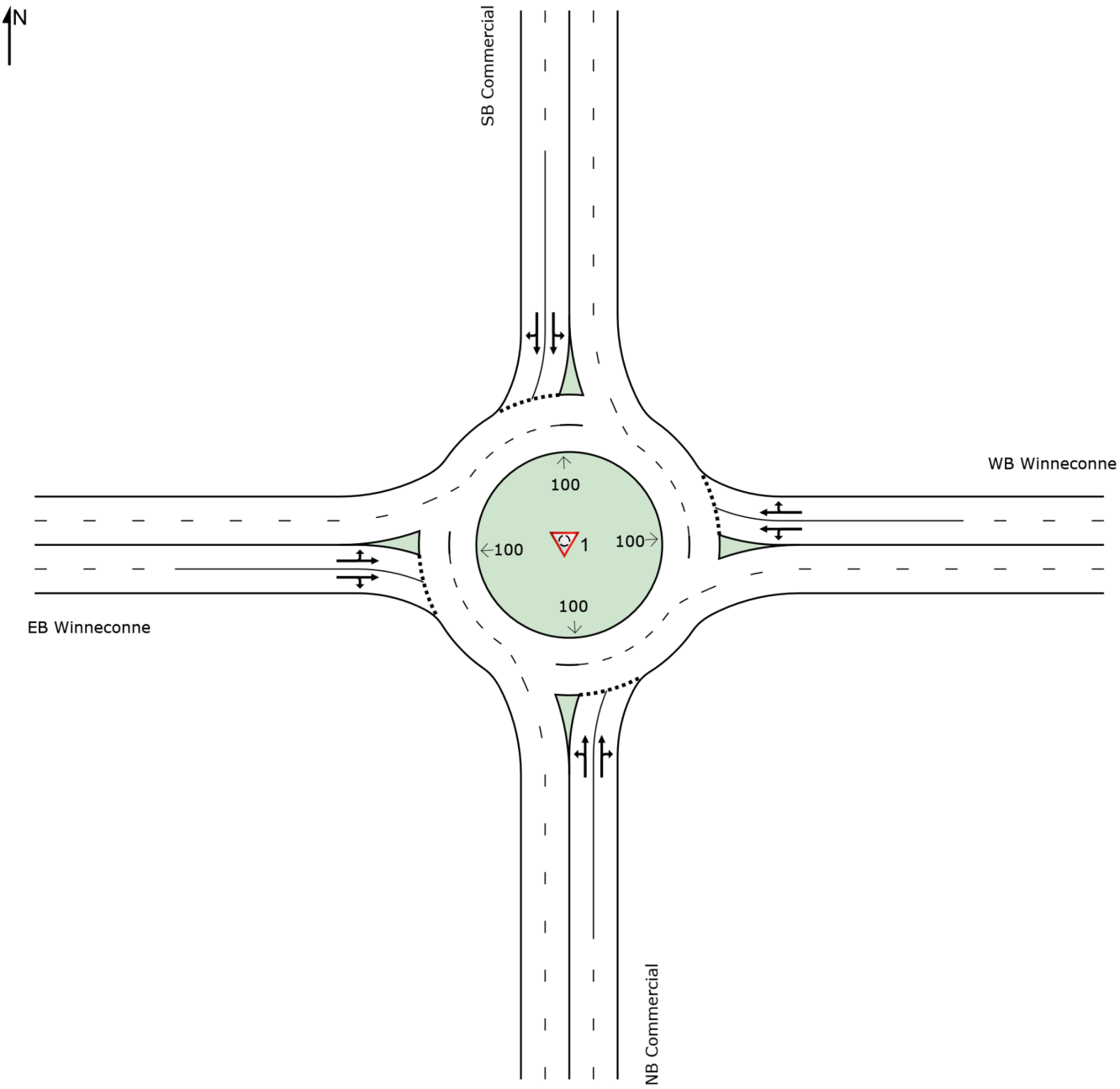
Roundabout Capacity Model: US HCM 6

SITE LAYOUT

Site: 1 [Commercial & Winneconne 4-leg 2022 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



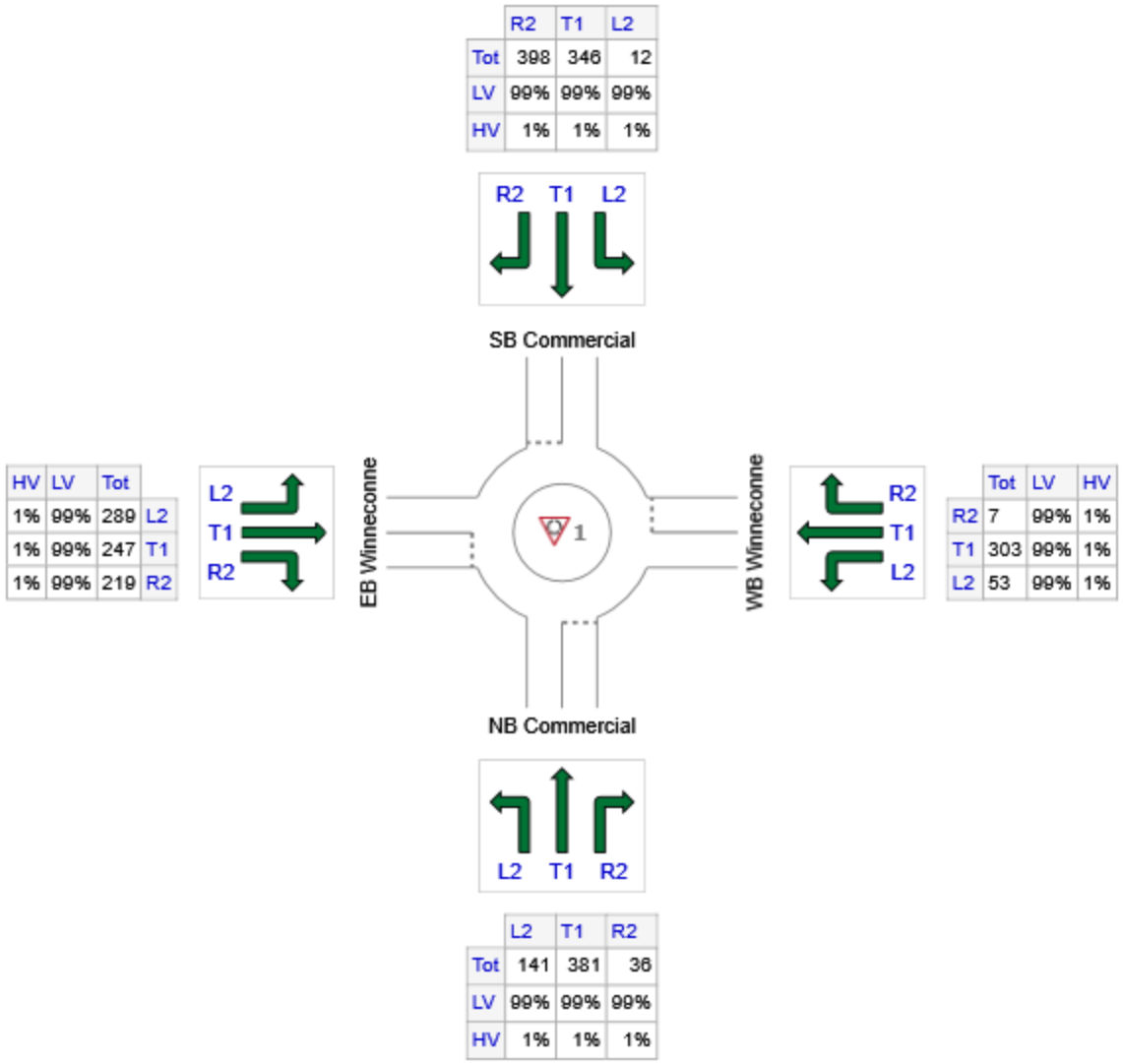
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 4-leg 2022 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	558	552	6
E: WB Winneconne	363	359	4
N: SB Commercial	756	748	8
W: EB Winneconne	755	747	8
Total	2432	2408	24

LANE SUMMARY

Site: 1 [Commercial & Winneconne 4-leg 2022 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	296	1.0	790	0.374	100	9.1	LOS A	1.8	45.7	Full	1600	0.0	0.0
Lane 2[d]	311	1.0	831	0.374	100	8.8	LOS A	1.7	43.4	Full	1600	0.0	0.0
Approach	607	1.0		0.374		8.9	LOS A	1.8	45.7				
East: WB Winneconne													
Lane 1	190	1.0	606	0.313	100	10.2	LOS B	1.3	32.6	Full	1600	0.0	0.0
Lane 2[d]	205	1.0	653	0.313	100	9.6	LOS A	1.2	31.1	Full	1600	0.0	0.0
Approach	395	1.0		0.313		9.9	LOS A	1.3	32.6				
North: SB Commercial													
Lane 1	389	1.0	831	0.468	94[5]	10.4	LOS B	2.9	73.6	Full	1600	0.0	0.0
Lane 2[d]	433	1.0	870	0.497	100	10.6	LOS B	3.2	81.2	Full	1600	0.0	0.0
Approach	822	1.0		0.497		10.5	LOS B	3.2	81.2				
West: EB Winneconne													
Lane 1	403	1.0	907	0.444	100	9.3	LOS A	2.6	65.7	Full	1600	0.0	0.0
Lane 2[d]	418	1.0	942	0.444	100	9.1	LOS A	2.5	62.5	Full	1600	0.0	0.0
Approach	821	1.0		0.444		9.2	LOS A	2.6	65.7				
Intersection	2643	1.0		0.497		9.7	LOS A	3.2	81.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Commercial

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	153	142	-	296	1.0	790	0.374	100	NA	NA
Lane 2	-	272	39	311	1.0	831	0.374	100	NA	NA
Approach	153	414	39	607	1.0		0.374			

East: WB Winneconne										
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	58	132	-	190	1.0	606	0.313	100	NA	NA
Lane 2	-	197	8	205	1.0	653	0.313	100	NA	NA
Approach	58	329	8	395	1.0		0.313			
North: SB Commercial										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	13	376	-	389	1.0	831	0.468	94[5]	NA	NA
Lane 2	-	-	433	433	1.0	870	0.497	100	NA	NA
Approach	13	376	433	822	1.0		0.497			
West: EB Winneconne										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	314	88	-	403	1.0	907	0.444	100	NA	NA
Lane 2	-	180	238	418	1.0	942	0.444	100	NA	NA
Approach	314	268	238	821	1.0		0.444			

	Total	%HV	Deg.Satn (v/c)
Intersection	2643	1.0	0.497

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 4-leg 2022 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam ft	Circ Width ft	Insc Diam ft	Entry Radius ft	Entry Angle °	Circ Lanes	Entry Lanes	Av.Entry Lane Width ft	App. Dist ft	Prop Queued Upstr Signal	Extra Bunching %
South	NB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow veh/h	Opng Flow pcu/h	In-Bunch Hdwy sec	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy sec	Dist] ft	Follow-up Hdwy sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	596	602	0.00	0.000	No	No	–	1.01	4.60	133.4	2.60
North	T1	1	Subdom.	596	602	0.00	0.000	No	No	–	1.01	4.60	133.4	2.60
North	T1	2	Dominant	596	602	0.00	0.000	No	No	–	1.01	4.30	124.7	2.60
East	R2	2	Dominant	596	602	0.00	0.000	No	No	–	1.01	4.30	124.7	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	882	890	0.00	0.000	No	No	–	1.01	4.60	134.5	2.60
West	T1	1	Subdom.	882	890	0.00	0.000	No	No	–	1.01	4.60	134.5	2.60
West	T1	2	Dominant	882	890	0.00	0.000	No	No	–	1.01	4.30	125.7	2.60
North	R2	2	Dominant	882	890	0.00	0.000	No	No	–	1.01	4.30	125.7	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	540	546	0.00	0.000	No	No	–	1.01	4.60	142.5	2.60
South	T1	1	Subdom.	540	546	0.00	0.000	No	No	–	1.01	4.60	142.5	2.60
West	R2	2	Dominant	540	546	0.00	0.000	No	No	–	1.01	4.30	133.1	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L2	1	Subdom.	447	451	0.00	0.000	No	No	–	1.01	4.60	155.8	2.60
East	T1	1	Subdom.	447	451	0.00	0.000	No	No	–	1.01	4.60	155.8	2.60
East	T1	2	Dominant	447	451	0.00	0.000	No	No	–	1.01	4.30	145.5	2.60
South	R2	2	Dominant	447	451	0.00	0.000	No	No	–	1.01	4.30	145.5	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates			
Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	416	420	69.8
Lane 2	180	182	30.2
Approach	596	602	
East: WB Winneconne			
Lane 1	610	616	69.2
Lane 2	272	275	30.8
Approach	882	890	
North: SB Commercial			
Lane 1	343	347	63.5
Lane 2	197	199	36.5
Approach	540	546	
West: EB Winneconne			
Lane 1	447	451	100.0
Lane 2	0	0	0.0
Approach	447	451	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)					
Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial					
1	12.65	5.36	7.28	0.576	4.6
2	12.02	4.74	7.28	0.606	4.3
East: WB Winneconne					
1	12.09	6.75	5.34	0.442	5.9
2	11.22	5.87	5.34	0.476	5.5
North: SB Commercial					
1	13.03	5.13	7.90	0.606	4.3
2	12.44	4.54	7.90	0.635	4.1
West: EB Winneconne					
1	14.03	4.75	9.28	0.661	4.0
2	13.51	4.23	9.28	0.687	3.8

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)							
To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.65	5.36	7.28	0.576	4.6
North	T1	1	12.65	5.36	7.28	0.576	4.6
North	T1	2	12.02	4.74	7.28	0.606	4.3

East	R2	2	12.02	4.74	7.28	0.606	4.3
East: WB Winneconne							
South	L2	1	12.09	6.75	5.34	0.442	5.9
West	T1	1	12.09	6.75	5.34	0.442	5.9
West	T1	2	11.22	5.87	5.34	0.476	5.5
North	R2	2	11.22	5.87	5.34	0.476	5.5
North: SB Commercial							
East	L2	1	13.03	5.13	7.90	0.606	4.3
South	T1	1	13.03	5.13	7.90	0.606	4.3
West	R2	2	12.44	4.54	7.90	0.635	4.1
West: EB Winneconne							
North	L2	1	14.03	4.75	9.28	0.661	4.0
East	T1	1	14.03	4.75	9.28	0.661	4.0
East	T1	2	13.51	4.23	9.28	0.687	3.8
South	R2	2	13.51	4.23	9.28	0.687	3.8

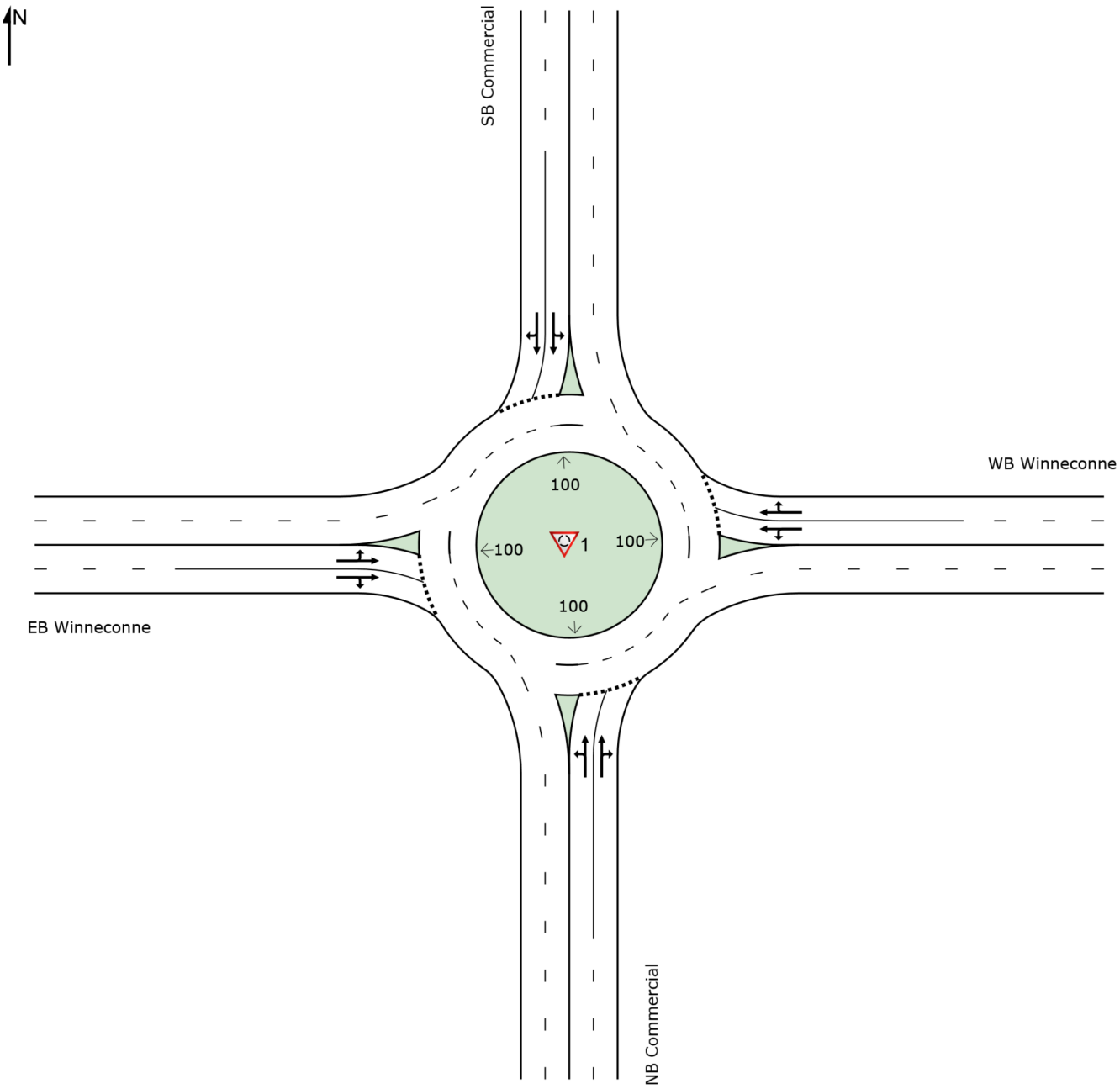
Roundabout Capacity Model: US HCM 6

SITE LAYOUT

Site: 1 [Commercial & Winneconne 4-leg 2042 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



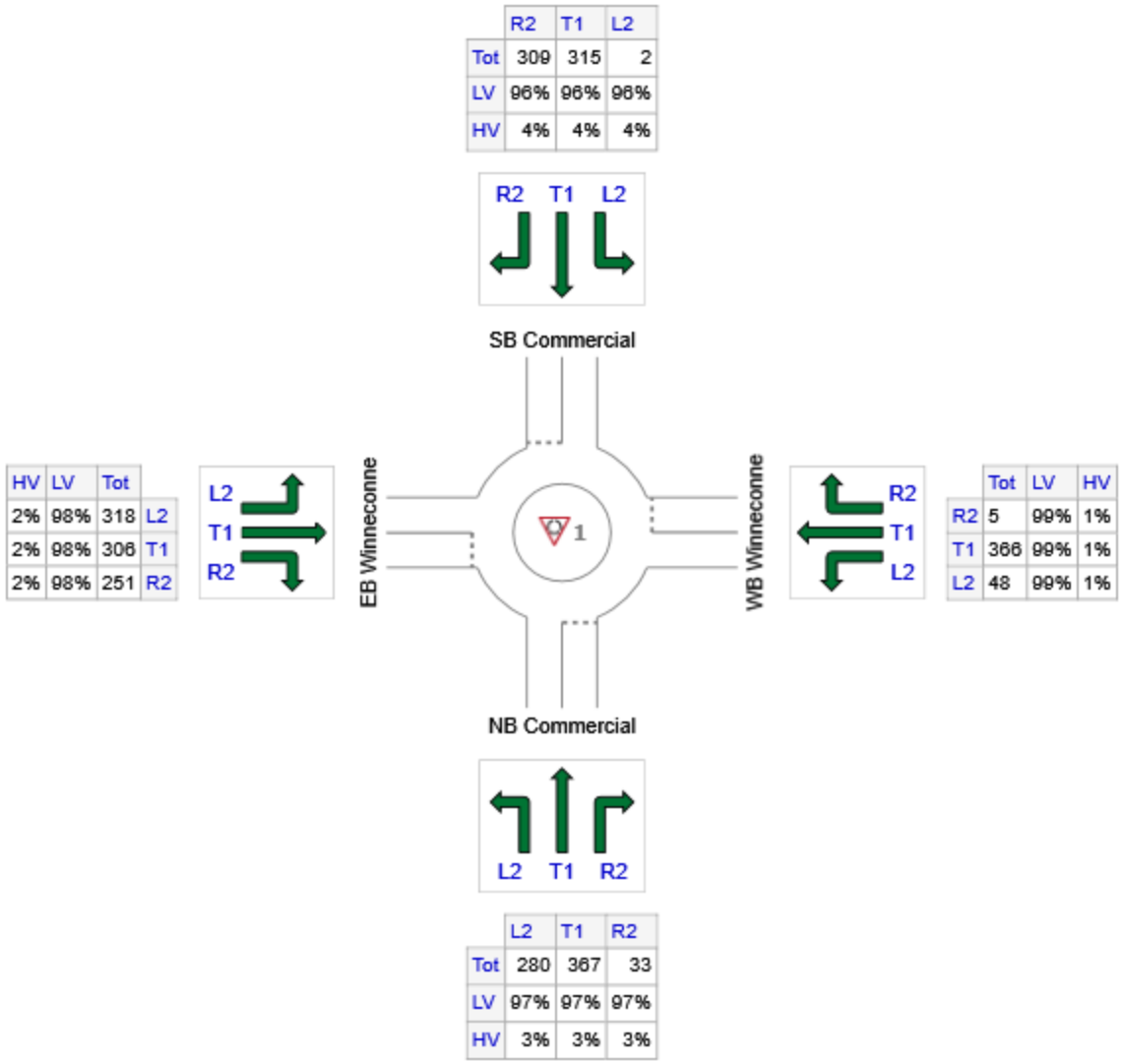
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 4-leg 2042 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	680	660	20
E: WB Winneconne	419	415	4
N: SB Commercial	626	601	25
W: EB Winneconne	875	858	18
Total	2600	2533	67

LANE SUMMARY

Site: 1 [Commercial & Winneconne 4-leg 2042 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	396	3.0	664	0.597	100	16.1	LOS C	4.2	108.4	Full	1600	0.0	0.0
Lane 2[d]	423	3.0	708	0.597	100	15.3	LOS C	4.2	106.6	Full	1600	0.0	0.0
Approach	819	3.0		0.597		15.7	LOS C	4.2	108.4				
East: WB Winneconne													
Lane 1	240	1.0	459	0.522	100	18.7	LOS C	2.6	66.5	Full	1600	0.0	0.0
Lane 2[d]	265	1.0	507	0.522	100	17.2	LOS C	2.6	65.5	Full	1600	0.0	0.0
Approach	505	1.0		0.522		17.9	LOS C	2.6	66.5				
North: SB Commercial													
Lane 1	364	4.0	610	0.596	100	17.2	LOS C	3.9	101.8	Full	1600	0.0	0.0
Lane 2[d]	391	4.0	655	0.596	100	16.2	LOS C	3.9	100.3	Full	1600	0.0	0.0
Approach	754	4.0		0.596		16.7	LOS C	3.9	101.8				
West: EB Winneconne													
Lane 1	517	2.0	894	0.578	100	12.3	LOS B	5.0	128.1	Full	1600	0.0	0.0
Lane 2[d]	537	2.0	929	0.578	100	11.9	LOS B	4.9	124.4	Full	1600	0.0	0.0
Approach	1054	2.0		0.578		12.1	LOS B	5.0	128.1				
Intersection	3133	2.6		0.597		15.1	LOS C	5.0	128.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Commercial

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	337	59	-	396	3.0	664	0.597	100	NA	NA
Lane 2	-	383	40	423	3.0	708	0.597	100	NA	NA
Approach	337	442	40	819	3.0		0.597			
East: WB Winneconne										

Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	58	182	-	240	1.0	459	0.522	100	NA	NA
Lane 2	-	259	6	265	1.0	507	0.522	100	NA	NA
Approach	58	441	6	505	1.0		0.522			
North: SB Commercial										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	2	361	-	364	4.0	610	0.596	100	NA	NA
Lane 2	-	18	372	391	4.0	655	0.596	100	NA	NA
Approach	2	380	372	754	4.0		0.596			
West: EB Winneconne										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	383	134	-	517	2.0	894	0.578	100	NA	NA
Lane 2	-	235	302	537	2.0	929	0.578	100	NA	NA
Approach	383	369	302	1054	2.0		0.578			

	Total	%HV	Deg.Satn (v/c)
Intersection	3133	2.6	0.597

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 4-leg 2042 AM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Queued Upstr Signal	Extra Bunching
		ft	ft	ft	ft	°			ft	ft		%
South	NB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow	Opng Flow	In-Bunch Hdwy	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy	Dist]	Follow-up Hdwy
				veh/h	pcu/h	sec						sec	ft	sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	754	769	0.00	0.000	No	No	–	1.03	4.60	135.6	2.60
North	T1	1	Subdom.	754	769	0.00	0.000	No	No	–	1.03	4.60	135.6	2.60
North	T1	2	Dominant	754	769	0.00	0.000	No	No	–	1.03	4.30	126.7	2.60
East	R2	2	Dominant	754	769	0.00	0.000	No	No	–	1.03	4.30	126.7	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	1163	1194	0.00	0.000	No	No	–	1.01	4.60	129.4	2.60
West	T1	1	Subdom.	1163	1194	0.00	0.000	No	No	–	1.01	4.60	129.4	2.60
West	T1	2	Dominant	1163	1194	0.00	0.000	No	No	–	1.01	4.30	120.9	2.60
North	R2	2	Dominant	1163	1194	0.00	0.000	No	No	–	1.01	4.30	120.9	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	836	851	0.00	0.000	No	No	–	1.04	4.60	137.8	2.60
South	T1	1	Subdom.	836	851	0.00	0.000	No	No	–	1.04	4.60	137.8	2.60
South	T1	2	Dominant	836	851	0.00	0.000	No	No	–	1.04	4.30	128.7	2.60
West	R2	2	Dominant	836	851	0.00	0.000	No	No	–	1.04	4.30	128.7	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L2	1	Subdom.	440	456	0.00	0.000	No	No	–	1.02	4.60	157.0	2.60
East	T1	1	Subdom.	440	456	0.00	0.000	No	No	–	1.02	4.60	157.0	2.60
East	T1	2	Dominant	440	456	0.00	0.000	No	No	–	1.02	4.30	146.6	2.60
South	R2	2	Dominant	440	456	0.00	0.000	No	No	–	1.02	4.30	146.6	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates			
Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	519	530	68.9
Lane 2	235	239	31.1
Approach	754	769	
East: WB Winneconne			
Lane 1	780	799	66.9
Lane 2	383	395	33.1
Approach	1163	1194	
North: SB Commercial			
Lane 1	577	590	69.3
Lane 2	259	262	30.7
Approach	836	851	
West: EB Winneconne			
Lane 1	421	437	95.8
Lane 2	18	19	4.2
Approach	440	456	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)					
Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial					
1	12.11	6.13	5.98	0.494	5.4
2	11.35	5.37	5.98	0.527	5.1
East: WB Winneconne					
1	12.89	8.58	4.32	0.335	7.8
2	11.66	7.35	4.32	0.370	7.1
North: SB Commercial					
1	12.07	6.54	5.53	0.458	5.9
2	11.24	5.71	5.53	0.492	5.5
West: EB Winneconne					
1	13.97	4.77	9.20	0.658	4.0
2	13.45	4.25	9.20	0.684	3.9

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)							
To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.11	6.13	5.98	0.494	5.4

North	T1	1	12.11	6.13	5.98	0.494	5.4
North	T1	2	11.35	5.37	5.98	0.527	5.1
East	R2	2	11.35	5.37	5.98	0.527	5.1
East: WB Winneconne							
South	L2	1	12.89	8.58	4.32	0.335	7.8
West	T1	1	12.89	8.58	4.32	0.335	7.8
West	T1	2	11.66	7.35	4.32	0.370	7.1
North	R2	2	11.66	7.35	4.32	0.370	7.1
North: SB Commercial							
East	L2	1	12.07	6.54	5.53	0.458	5.9
South	T1	1	12.07	6.54	5.53	0.458	5.9
South	T1	2	11.24	5.71	5.53	0.492	5.5
West	R2	2	11.24	5.71	5.53	0.492	5.5
West: EB Winneconne							
North	L2	1	13.97	4.77	9.20	0.658	4.0
East	T1	1	13.97	4.77	9.20	0.658	4.0
East	T1	2	13.45	4.25	9.20	0.684	3.9
South	R2	2	13.45	4.25	9.20	0.684	3.9

Roundabout Capacity Model: US HCM 6

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 4-leg 2042 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam ft	Circ Width ft	Insc Diam ft	Entry Radius ft	Entry Angle °	Circ Lanes	Entry Lanes	Av.Entry Lane Width ft	App. Dist ft	Prop Queued Upstr Signal	Extra Bunching %
South	NB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	100.00*	30.00*	160.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow veh/h	Opng Flow pcu/h	In-Bunch Hdwy sec	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy sec	Dist] ft	Follow-up Hdwy sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	697	704	0.00	0.000	No	No	–	1.01	4.60	133.4	2.60
North	T1	1	Subdom.	697	704	0.00	0.000	No	No	–	1.01	4.60	133.4	2.60
North	T1	2	Dominant	697	704	0.00	0.000	No	No	–	1.01	4.30	124.7	2.60
East	R2	2	Dominant	697	704	0.00	0.000	No	No	–	1.01	4.30	124.7	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	1028	1039	0.00	0.000	No	No	–	1.01	4.60	134.6	2.60
West	T1	1	Subdom.	1028	1039	0.00	0.000	No	No	–	1.01	4.60	134.6	2.60
West	T1	2	Dominant	1028	1039	0.00	0.000	No	No	–	1.01	4.30	125.7	2.60
North	R2	2	Dominant	1028	1039	0.00	0.000	No	No	–	1.01	4.30	125.7	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	630	637	0.00	0.000	No	No	–	1.01	4.60	142.5	2.60
South	T1	1	Subdom.	630	637	0.00	0.000	No	No	–	1.01	4.60	142.5	2.60
West	R2	2	Dominant	630	637	0.00	0.000	No	No	–	1.01	4.30	133.2	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L2	1	Subdom.	523	528	0.00	0.000	No	No	–	1.01	4.60	155.6	2.60
East	T1	1	Subdom.	523	528	0.00	0.000	No	No	–	1.01	4.60	155.6	2.60
East	T1	2	Dominant	523	528	0.00	0.000	No	No	–	1.01	4.30	145.4	2.60
South	R2	2	Dominant	523	528	0.00	0.000	No	No	–	1.01	4.30	145.4	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates			
Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	485	490	69.6
Lane 2	212	214	30.4
Approach	697	704	
East: WB Winneconne			
Lane 1	710	717	69.0
Lane 2	319	322	31.0
Approach	1028	1039	
North: SB Commercial			
Lane 1	399	403	63.2
Lane 2	232	234	36.8
Approach	630	637	
West: EB Winneconne			
Lane 1	523	528	100.0
Lane 2	0	0	0.0
Approach	523	528	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)					
Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial					
1	12.23	5.82	6.42	0.525	5.0
2	11.53	5.11	6.42	0.556	4.7
East: WB Winneconne					
1	12.35	7.59	4.77	0.386	6.8
2	11.32	6.55	4.77	0.421	6.2
North: SB Commercial					
1	12.47	5.51	6.95	0.558	4.7
2	11.82	4.86	6.95	0.588	4.5
West: EB Winneconne					
1	13.17	5.06	8.12	0.616	4.3
2	12.60	4.48	8.12	0.644	4.1

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)							
To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.23	5.82	6.42	0.525	5.0
North	T1	1	12.23	5.82	6.42	0.525	5.0
North	T1	2	11.53	5.11	6.42	0.556	4.7

East	R2	2	11.53	5.11	6.42	0.556	4.7
East: WB Winneconne							
South	L2	1	12.35	7.59	4.77	0.386	6.8
West	T1	1	12.35	7.59	4.77	0.386	6.8
West	T1	2	11.32	6.55	4.77	0.421	6.2
North	R2	2	11.32	6.55	4.77	0.421	6.2
North: SB Commercial							
East	L2	1	12.47	5.51	6.95	0.558	4.7
South	T1	1	12.47	5.51	6.95	0.558	4.7
West	R2	2	11.82	4.86	6.95	0.588	4.5
West: EB Winneconne							
North	L2	1	13.17	5.06	8.12	0.616	4.3
East	T1	1	13.17	5.06	8.12	0.616	4.3
East	T1	2	12.60	4.48	8.12	0.644	4.1
South	R2	2	12.60	4.48	8.12	0.644	4.1

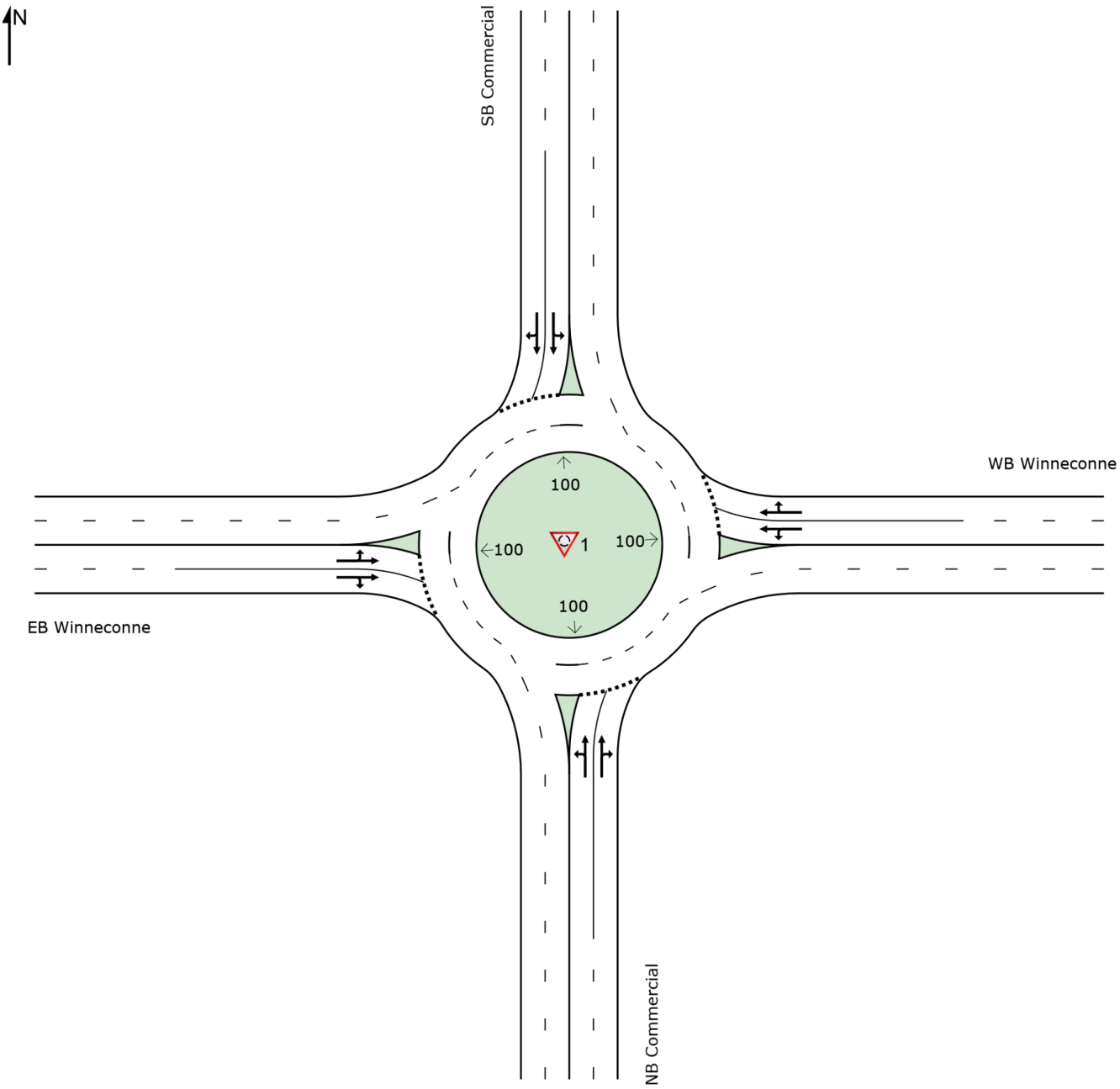
Roundabout Capacity Model: US HCM 6

SITE LAYOUT

Site: 1 [Commercial & Winneconne 4-leg 2042 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



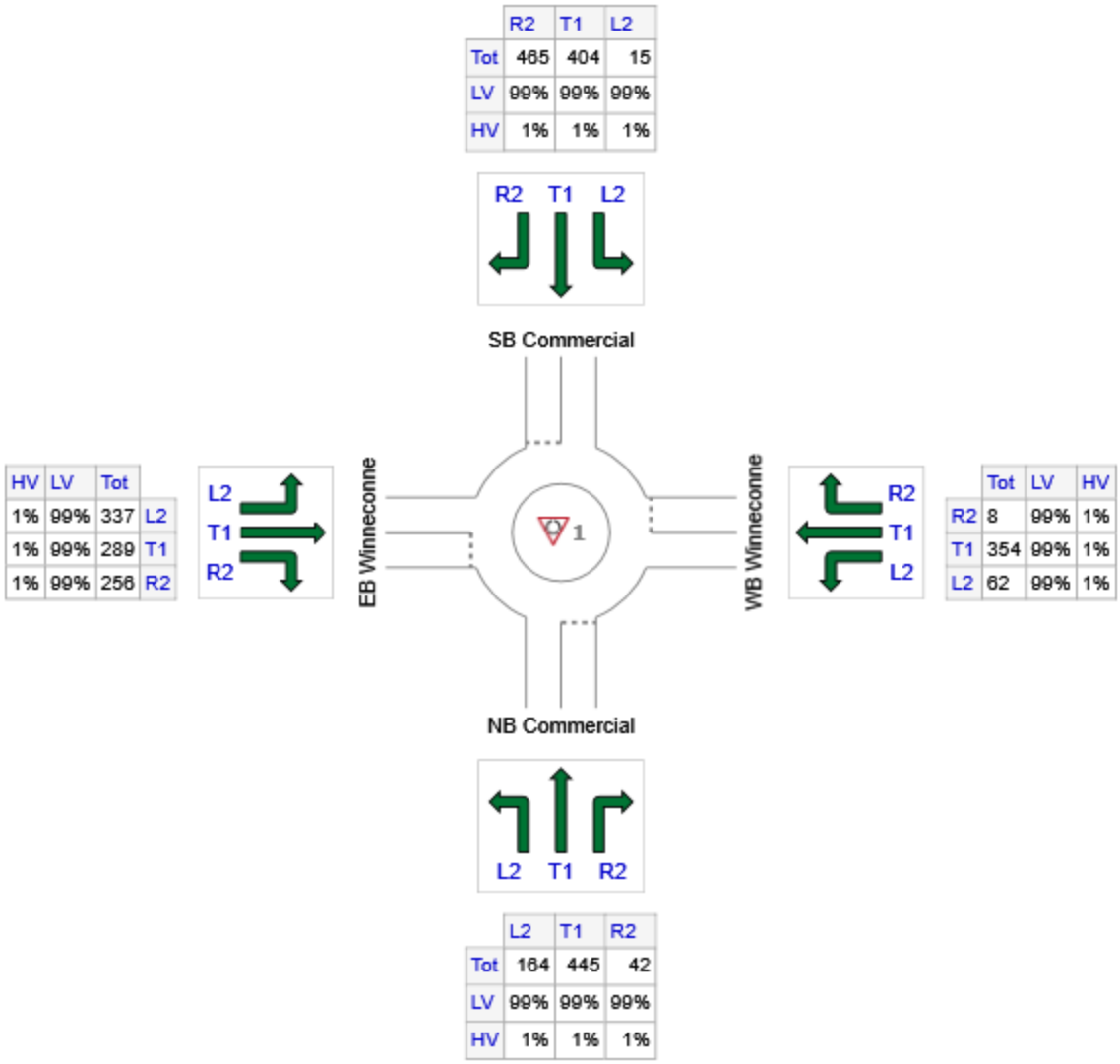
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 4-leg 2042 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	651	644	7
E: WB Winneconne	424	420	4
N: SB Commercial	884	875	9
W: EB Winneconne	882	873	9
Total	2841	2813	28

LANE SUMMARY

Site: 1 [Commercial & Winneconne 4-leg 2042 PM Peak (Site Folder: 4-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	343	1.0	719	0.477	100	11.9	LOS B	2.8	71.7	Full	1600	0.0	0.0
Lane 2[d]	364	1.0	763	0.477	100	11.3	LOS B	2.8	69.4	Full	1600	0.0	0.0
Approach	708	1.0		0.477		11.6	LOS B	2.8	71.7				
East: WB Winneconne													
Lane 1	220	1.0	529	0.417	100	13.7	LOS B	1.9	49.1	Full	1600	0.0	0.0
Lane 2[d]	240	1.0	577	0.417	100	12.7	LOS B	1.9	47.6	Full	1600	0.0	0.0
Approach	461	1.0		0.417		13.2	LOS B	1.9	49.1				
North: SB Commercial													
Lane 1	455	1.0	765	0.595	95[5]	14.4	LOS B	4.8	120.0	Full	1600	0.0	0.0
Lane 2[d]	505	1.0	807	0.626	100	14.8	LOS B	5.3	133.3	Full	1600	0.0	0.0
Approach	961	1.0		0.626		14.6	LOS B	5.3	133.3				
West: EB Winneconne													
Lane 1	469	1.0	845	0.555	100	12.2	LOS B	4.4	110.0	Full	1600	0.0	0.0
Lane 2[d]	490	1.0	883	0.555	100	11.8	LOS B	4.2	106.8	Full	1600	0.0	0.0
Approach	959	1.0		0.555		12.0	LOS B	4.4	110.0				
Intersection	3088	1.0		0.626		12.9	LOS B	5.3	133.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Commercial

Mov. From S To Exit:	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	178	165	-	343	1.0	719	0.477	100	NA	NA
Lane 2	-	319	46	364	1.0	763	0.477	100	NA	NA
Approach	178	484	46	708	1.0		0.477			

East: WB Winneconne										
Mov. From E To Exit:	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	153	-	220	1.0	529	0.417	100	NA	NA
Lane 2	-	232	9	240	1.0	577	0.417	100	NA	NA
Approach	67	385	9	461	1.0		0.417			
North: SB Commercial										
Mov. From N To Exit:	L2 E	T1 S	R2 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	16	439	-	455	1.0	765	0.595	95[5]	NA	NA
Lane 2	-	-	505	505	1.0	807	0.626	100	NA	NA
Approach	16	439	505	961	1.0		0.626			
West: EB Winneconne										
Mov. From W To Exit:	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	366	102	-	469	1.0	845	0.555	100	NA	NA
Lane 2	-	212	278	490	1.0	883	0.555	100	NA	NA
Approach	366	314	278	959	1.0		0.555			

	Total	%HV	Deg.Satn (v/c)
Intersection	3088	1.0	0.626

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

Merge Analysis

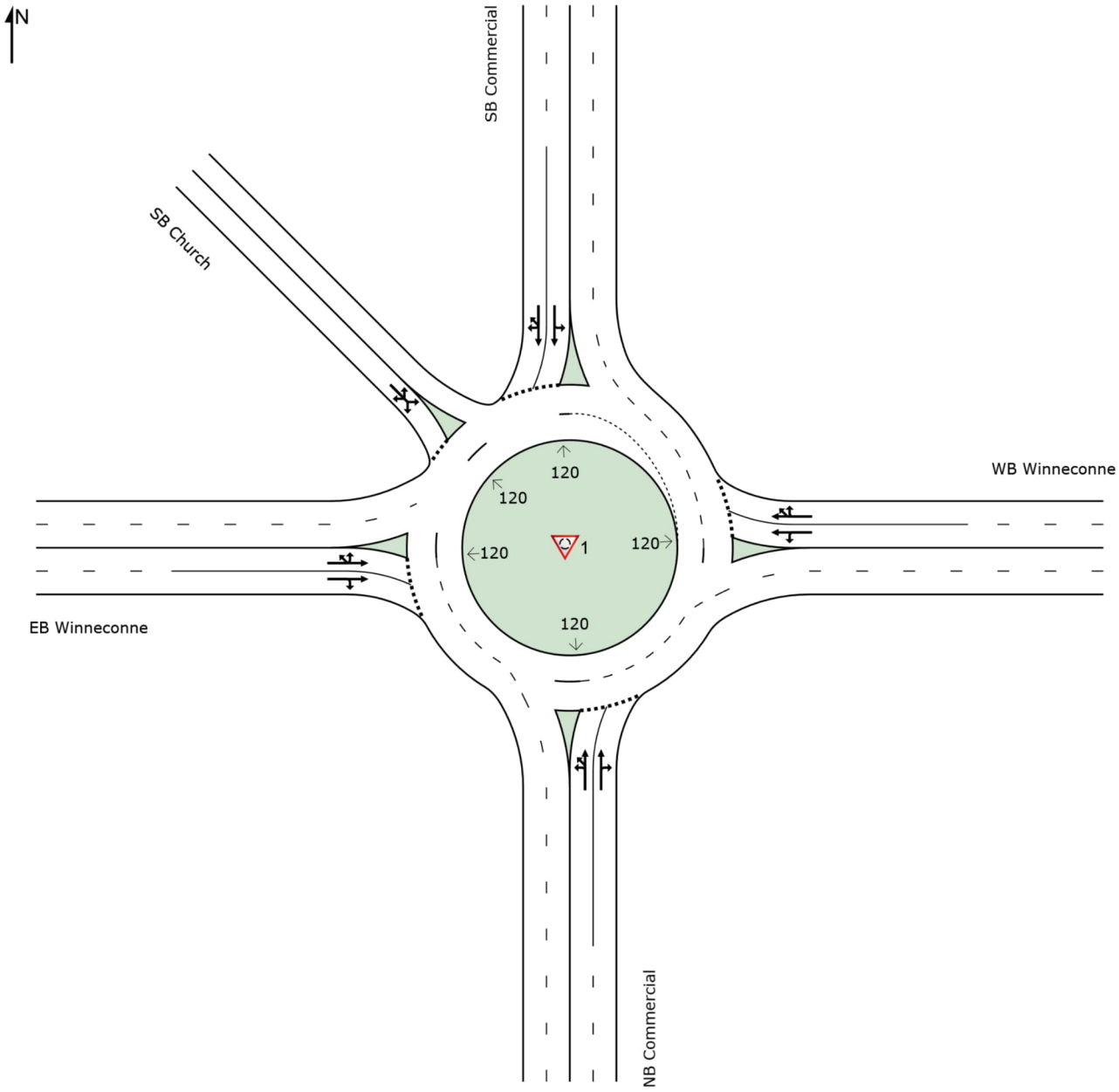
	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
West Exit: EB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										

SITE LAYOUT

Site: 1 [Commercial & Winneconne 5-leg 2022 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



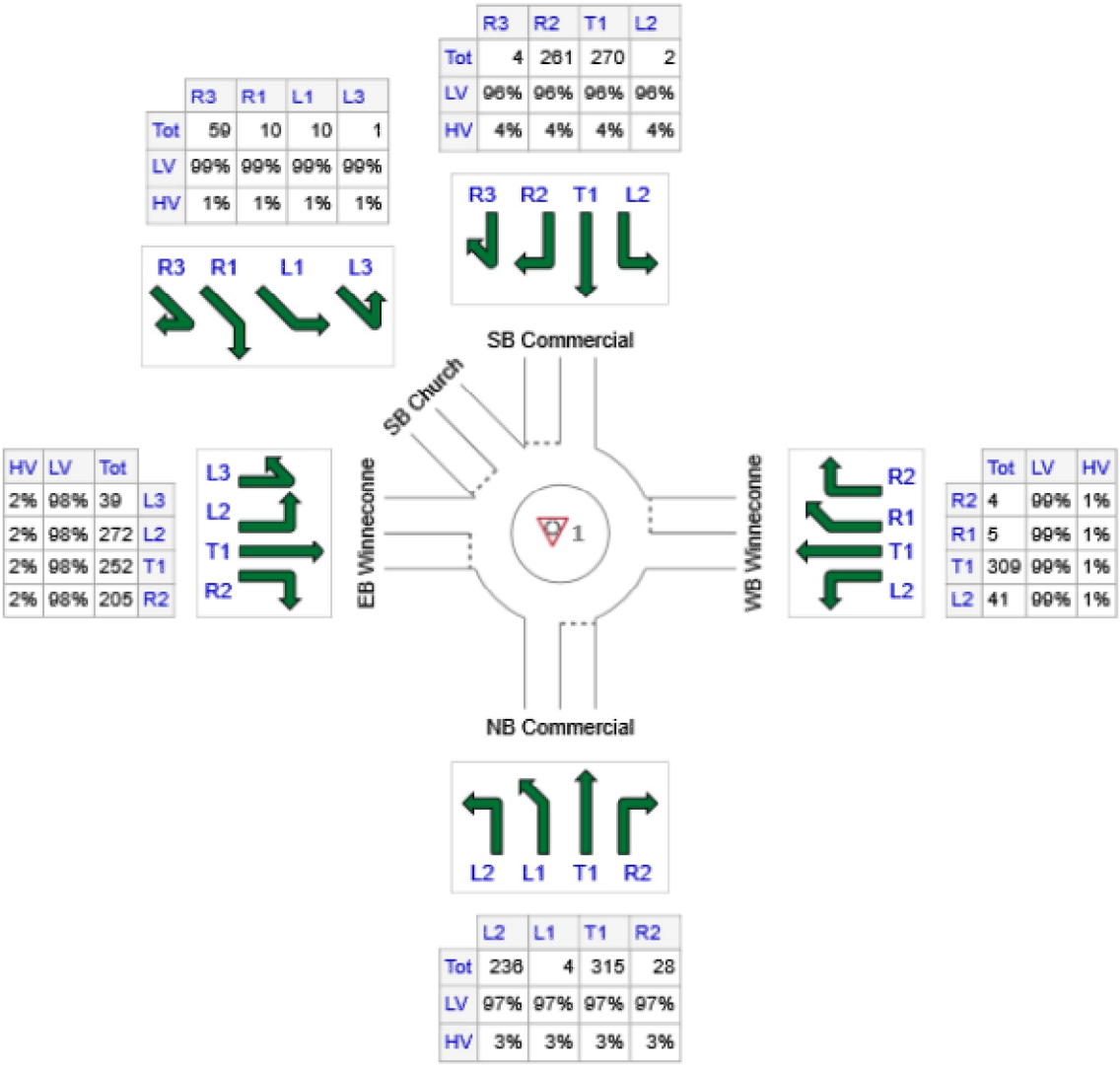
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 5-leg 2022 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	583	566	17
E: WB Winneconne	359	355	4
N: SB Commercial	537	516	21
NW: SB Church	80	79	1
W: EB Winneconne	768	753	15
Total	2327	2268	59

LANE SUMMARY

Site: 1 [Commercial & Winneconne 5-leg 2022 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	341	3.0	703	0.485	100	12.3	LOS B	2.9	73.3	Full	1600	0.0	0.0
Lane 2[d]	362	3.0	746	0.485	100	11.7	LOS B	2.8	71.1	Full	1600	0.0	0.0
Approach	702	3.0		0.485		12.0	LOS B	2.9	73.3				
East: WB Winneconne													
Lane 1	207	1.0	513	0.403	100	13.7	LOS B	1.8	46.0	Full	1600	0.0	0.0
Lane 2[d]	226	1.0	561	0.403	100	12.7	LOS B	1.8	44.6	Full	1600	0.0	0.0
Approach	433	1.0		0.403		13.2	LOS B	1.8	46.0				
North: SB Commercial													
Lane 1	313	4.0	653	0.479	100	12.9	LOS B	2.7	69.1	Full	1600	0.0	0.0
Lane 2[d]	334	4.0	697	0.479	100	12.2	LOS B	2.6	67.1	Full	1600	0.0	0.0
Approach	647	4.0		0.479		12.5	LOS B	2.7	69.1				
NorthWest: SB Church													
Lane 1[d]	96	1.0	356	0.271	100	15.2	LOS C	1.0	24.9	Full	1600	0.0	0.0
Approach	96	1.0		0.271		15.2	LOS C	1.0	24.9				
West: EB Winneconne													
Lane 1	455	2.0	927	0.490	100	10.0	LOS B	3.3	84.0	Full	1600	0.0	0.0
Lane 2[d]	471	2.0	960	0.490	100	9.8	LOS A	3.2	80.2	Full	1600	0.0	0.0
Approach	925	2.0		0.490		9.9	LOS A	3.3	84.0				
Intersection	2804	2.5		0.490		11.7	LOS B	3.3	84.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Commercial

Mov. From S To Exit:	L2 W	L1 NW	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	284	5	52	-	341	3.0	703	0.485	100	NA	NA
Lane 2	-	-	328	34	362	3.0	746	0.485	100	NA	NA
Approach	284	5	380	34	702	3.0		0.485			

East: WB Winneconne

Mov.	L2	T1	R1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane
From E To Exit:	S	W	NW	N			veh/h	v/c	%	%	No.
Lane 1	49	157	-	-	207	1.0	513	0.403	100	NA	NA
Lane 2	-	215	6	5	226	1.0	561	0.403	100	NA	NA
Approach	49	372	6	5	433	1.0		0.403			

North: SB Commercial

Mov.	L2	T1	R2	R3	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane
From N To Exit:	E	S	W	NW			veh/h	v/c	%	%	No.
Lane 1	2	311	-	-	313	4.0	653	0.479	100	NA	NA
Lane 2	-	15	314	5	334	4.0	697	0.479	100	NA	NA
Approach	2	325	314	5	647	4.0		0.479			

NorthWest: SB Church

Mov.	L3	L1	R1	R3	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane
From NW To Exit:	N	E	S	W			veh/h	v/c	%	%	No.
Lane 1	1	12	12	71	96	1.0	356	0.271	100	NA	NA
Approach	1	12	12	71	96	1.0		0.271			

West: EB Winneconne

Mov.	L3	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane
From W To Exit:	NW	N	E	S			veh/h	v/c	%	%	No.
Lane 1	47	328	80	-	455	2.0	927	0.490	100	NA	NA
Lane 2	-	-	224	247	471	2.0	960	0.490	100	NA	NA
Approach	47	328	304	247	925	2.0		0.490			

	Total	%HV	Deg.Satn (v/c)
Intersection	2804	2.5	0.490

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial Merge Type: **Not Applied**												

Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.
NorthWest Exit: SB Church Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
West Exit: EB Winneconne Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 5-leg 2022 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam ft	Circ Width ft	Insc Diam ft	Entry Radius ft	Entry Angle °	Circ Lanes	Entry Lanes	Av.Entry Lane Width ft	App. Dist ft	Prop Queued Upstr Signal	Extra Bunching %
South	NB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
NorthWest	SB Church	120.00*	30.00*	180.0*	85.0*	20.0*	2	1	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow veh/h	Opng Flow pcu/h	In-Bunch Hdwy sec	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy sec	Dist] ft	Follow-up Hdwy sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	694	708	0.00	0.000	No	No	–	1.03	4.60	141.5	2.60
NorthWest	L1	1	Subdom.	694	708	0.00	0.000	No	No	–	1.03	4.60	141.5	2.60
North	T1	1	Subdom.	694	708	0.00	0.000	No	No	–	1.03	4.60	141.5	2.60
North	T1	2	Dominant	694	708	0.00	0.000	No	No	–	1.03	4.30	132.2	2.60
East	R2	2	Dominant	694	708	0.00	0.000	No	No	–	1.03	4.30	132.2	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	1045	1072	0.00	0.000	No	No	–	1.01	4.60	136.8	2.60
West	T1	1	Subdom.	1045	1072	0.00	0.000	No	No	–	1.01	4.60	136.8	2.60
West	T1	2	Dominant	1045	1072	0.00	0.000	No	No	–	1.01	4.30	127.8	2.60
NorthWest	R1	2	Dominant	1045	1072	0.00	0.000	No	No	–	1.01	4.30	127.8	2.60
North	R2	2	Dominant	1045	1072	0.00	0.000	No	No	–	1.01	4.30	127.8	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	764	778	0.00	0.000	No	No	–	1.04	4.60	145.1	2.60
South	T1	1	Subdom.	764	778	0.00	0.000	No	No	–	1.04	4.60	145.1	2.60
South	T1	2	Dominant	764	778	0.00	0.000	No	No	–	1.04	4.30	135.6	2.60
West	R2	2	Dominant	764	778	0.00	0.000	No	No	–	1.04	4.30	135.6	2.60
NorthWest	R3	2	Dominant	764	778	0.00	0.000	No	No	–	1.04	4.30	135.6	2.60

t														
NorthWest: SB Church Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L3	1	Dominant	1348	1387	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
East	L1	1	Dominant	1348	1387	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
South	R1	1	Dominant	1348	1387	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
West	R3	1	Dominant	1348	1387	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
NorthWest	L3	1	Subdom.	402	416	0.00	0.000	No	No	–	1.02	4.60	166.6	2.60
North	L2	1	Subdom.	402	416	0.00	0.000	No	No	–	1.02	4.60	166.6	2.60
East	T1	1	Subdom.	402	416	0.00	0.000	No	No	–	1.02	4.60	166.6	2.60
East	T1	2	Dominant	402	416	0.00	0.000	No	No	–	1.02	4.30	155.7	2.60
South	R2	2	Dominant	402	416	0.00	0.000	No	No	–	1.02	4.30	155.7	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates

Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	470	480	67.8
Lane 2	224	228	32.2
Approach	694	708	
East: WB Winneconne			
Lane 1	717	734	68.5
Lane 2	328	338	31.5
Approach	1045	1072	
North: SB Commercial			
Lane 1	207	209	26.8
Lane 2	557	569	73.2
Approach	764	778	
NorthWest: SB Church			
Lane 1	804	827	59.6
Lane 2	544	560	40.4
Approach	1348	1387	
West: EB Winneconne			
Lane 1	388	401	96.3
Lane 2	15	15	3.7
Approach	402	416	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)

Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec

South: NB Commercial					
1	12.22	5.83	6.39	0.523	5.1
2	11.52	5.13	6.39	0.555	4.8
East: WB Winneconne					
1	12.45	7.79	4.66	0.374	7.0
2	11.38	6.72	4.66	0.409	6.4
North: SB Commercial					
1	12.10	6.17	5.93	0.490	5.5
2	11.33	5.40	5.93	0.523	5.2
NorthWest: SB Church					
1	15.00	11.10	3.90	0.260	10.1
West: EB Winneconne					
1	14.57	4.62	9.95	0.683	3.9
2	14.07	4.12	9.95	0.707	3.8

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)

To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.22	5.83	6.39	0.523	5.1
NorthWest	L1	1	12.22	5.83	6.39	0.523	5.1
North	T1	1	12.22	5.83	6.39	0.523	5.1
North	T1	2	11.52	5.13	6.39	0.555	4.8
East	R2	2	11.52	5.13	6.39	0.555	4.8
East: WB Winneconne							
South	L2	1	12.45	7.79	4.66	0.374	7.0
West	T1	1	12.45	7.79	4.66	0.374	7.0
West	T1	2	11.38	6.72	4.66	0.409	6.4
NorthWest	R1	2	11.38	6.72	4.66	0.409	6.4
North	R2	2	11.38	6.72	4.66	0.409	6.4
North: SB Commercial							
East	L2	1	12.10	6.17	5.93	0.490	5.5
South	T1	1	12.10	6.17	5.93	0.490	5.5
South	T1	2	11.33	5.40	5.93	0.523	5.2
West	R2	2	11.33	5.40	5.93	0.523	5.2
NorthWest	R3	2	11.33	5.40	5.93	0.523	5.2
NorthWest: SB Church							
North	L3	1	15.00	11.10	3.90	0.260	10.1
East	L1	1	15.00	11.10	3.90	0.260	10.1
South	R1	1	15.00	11.10	3.90	0.260	10.1
West	R3	1	15.00	11.10	3.90	0.260	10.1
West: EB Winneconne							
NorthWest	L3	1	14.57	4.62	9.95	0.683	3.9
North	L2	1	14.57	4.62	9.95	0.683	3.9
East	T1	1	14.57	4.62	9.95	0.683	3.9
East	T1	2	14.07	4.12	9.95	0.707	3.8
South	R2	2	14.07	4.12	9.95	0.707	3.8

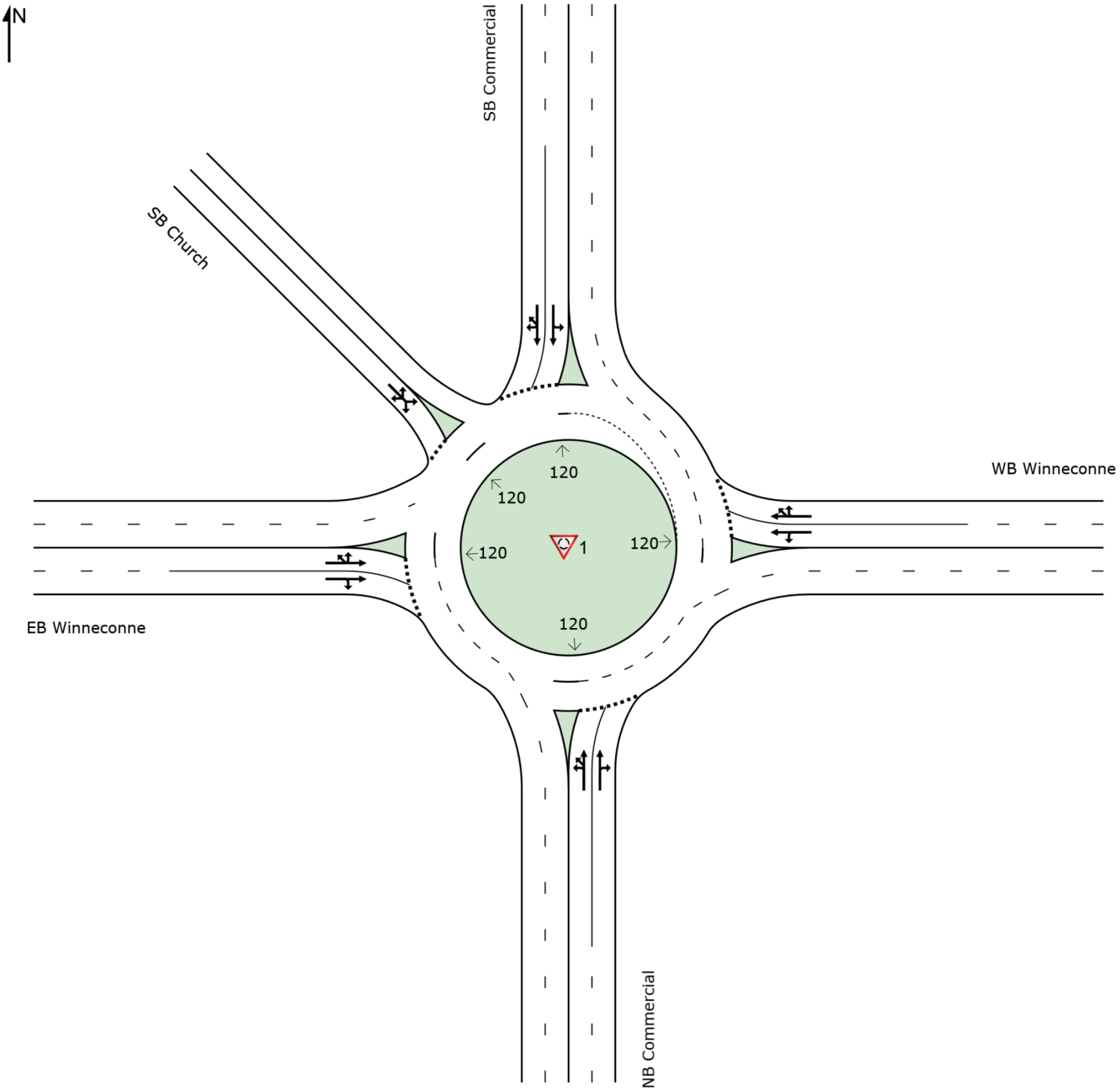
Roundabout Capacity Model: US HCM 6

SITE LAYOUT

Site: 1 [Commercial & Winneconne 5-leg 2022 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



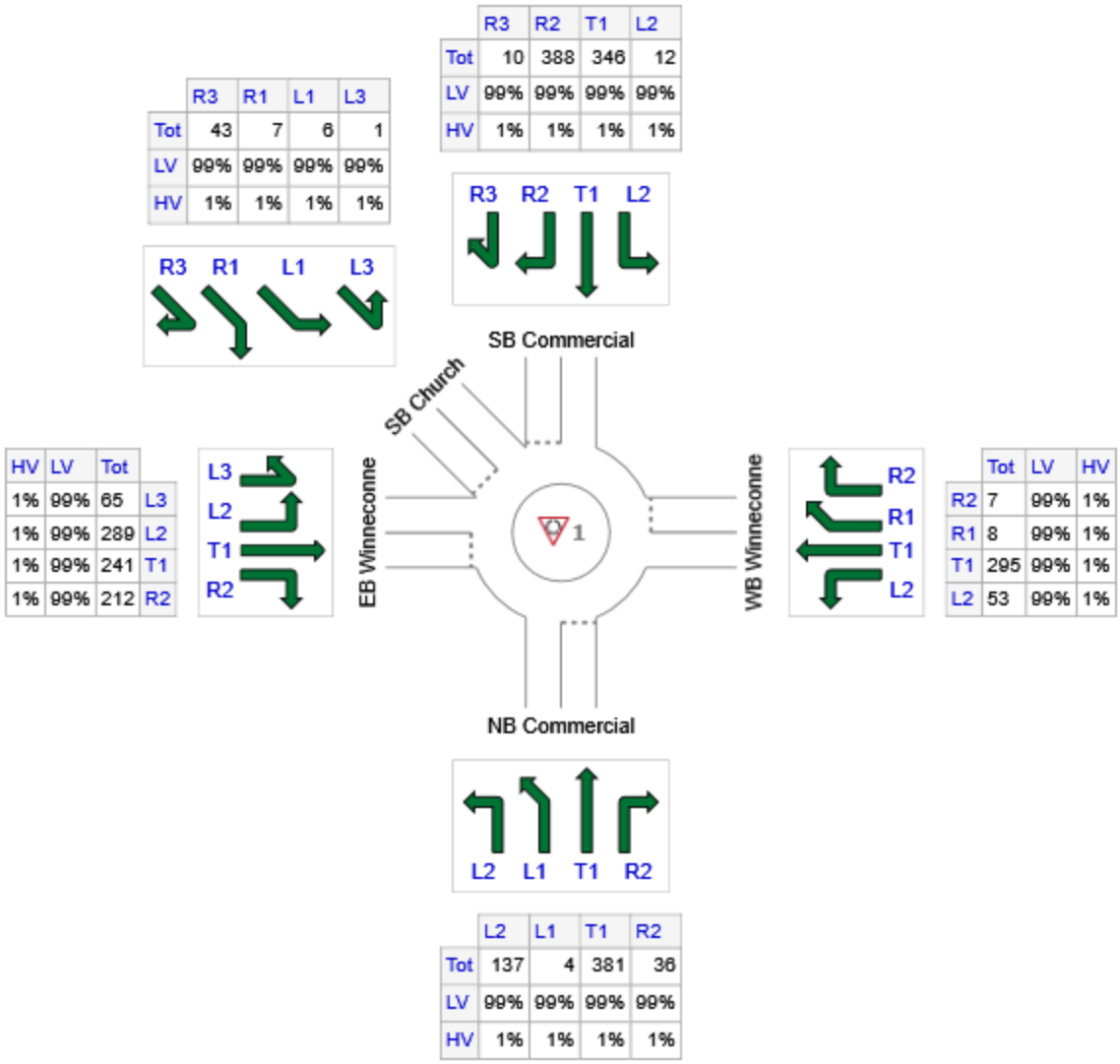
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 5-leg 2022 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	558	552	6
E: WB Winneconne	363	359	4
N: SB Commercial	756	748	8
NW: SB Church	57	56	1
W: EB Winneconne	807	799	8
Total	2541	2516	25

LANE SUMMARY

Site: 1 [Commercial & Winneconne 5-leg 2022 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	295	1.0	739	0.399	100	10.1	LOS B	2.0	51.3	Full	1600	0.0	0.0
Lane 2[d]	312	1.0	782	0.399	100	9.6	LOS A	1.9	49.1	Full	1600	0.0	0.0
Approach	607	1.0		0.399		9.8	LOS A	2.0	51.3				
East: WB Winneconne													
Lane 1	189	1.0	567	0.334	100	11.2	LOS B	1.4	35.5	Full	1600	0.0	0.0
Lane 2[d]	205	1.0	615	0.334	100	10.4	LOS B	1.4	34.1	Full	1600	0.0	0.0
Approach	395	1.0		0.334		10.8	LOS B	1.4	35.5				
North: SB Commercial													
Lane 1	389	1.0	779	0.500	95[5]	11.6	LOS B	3.3	82.2	Full	1600	0.0	0.0
Lane 2[d]	433	1.0	820	0.527	100	11.8	LOS B	3.6	89.7	Full	1600	0.0	0.0
Approach	822	1.0		0.527		11.7	LOS B	3.6	89.7				
NorthWest: SB Church													
Lane 1[d]	62	1.0	369	0.168	100	12.6	LOS B	0.6	14.6	Full	1600	0.0	0.0
Approach	62	1.0		0.168		12.6	LOS B	0.6	14.6				
West: EB Winneconne													
Lane 1	430	1.0	894	0.481	100	10.1	LOS B	3.2	80.1	Full	1600	0.0	0.0
Lane 2[d]	447	1.0	930	0.481	100	9.8	LOS A	3.0	76.7	Full	1600	0.0	0.0
Approach	877	1.0		0.481		10.0	LOS A	3.2	80.1				
Intersection	2762	1.0		0.527		10.6	LOS B	3.6	89.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Commercial

Mov. From S To Exit:	L2 W	L1 NW	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	149	4	141	-	295	1.0	739	0.399	100	NA	NA
Lane 2	-	-	273	39	312	1.0	782	0.399	100	NA	NA
Approach	149	4	414	39	607	1.0		0.399			

East: WB Winneconne

Mov. From E To Exit:	L2 S	T1 W	R1 NW	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	58	132	-	-	189	1.0	567	0.334	100	NA	NA
Lane 2	-	189	9	8	205	1.0	615	0.334	100	NA	NA
Approach	58	321	9	8	395	1.0		0.334			

North: SB Commercial

Mov. From N To Exit:	L2 E	T1 S	R2 W	R3 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	13	376	-	-	389	1.0	779	0.500	95[5]	NA	NA
Lane 2	-	-	422	11	433	1.0	820	0.527	100	NA	NA
Approach	13	376	422	11	822	1.0		0.527			

NorthWest: SB Church

Mov. From NW To Exit:	L3 N	L1 E	R1 S	R3 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	7	8	47	62	1.0	369	0.168	100	NA	NA
Approach	1	7	8	47	62	1.0		0.168			

West: EB Winneconne

Mov. From W To Exit:	L3 NW	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	71	314	45	-	430	1.0	894	0.481	100	NA	NA
Lane 2	-	-	217	230	447	1.0	930	0.481	100	NA	NA
Approach	71	314	262	230	877	1.0		0.481			

	Total	%HV	Deg.Satn (v/c)
Intersection	2762	1.0	0.527

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial												

Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.
NorthWest Exit: SB Church Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
West Exit: EB Winneconne Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 5-leg 2022 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam ft	Circ Width ft	Insc Diam ft	Entry Radius ft	Entry Angle °	Circ Lanes	Entry Lanes	Av.Entry Lane Width ft	App. Dist ft	Prop Queued Upstr Signal	Extra Bunching %
South	NB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
NorthWest	SB Church	120.00*	30.00*	180.0*	85.0*	20.0*	2	1	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow veh/h	Opng Flow pcu/h	In-Bunch Hdwy sec	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy sec	Dist] ft	Follow-up Hdwy sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	667	674	0.00	0.000	No	No	–	1.01	4.60	138.6	2.60
NorthWest	L1	1	Subdom.	667	674	0.00	0.000	No	No	–	1.01	4.60	138.6	2.60
North	T1	1	Subdom.	667	674	0.00	0.000	No	No	–	1.01	4.60	138.6	2.60
North	T1	2	Dominant	667	674	0.00	0.000	No	No	–	1.01	4.30	129.5	2.60
East	R2	2	Dominant	667	674	0.00	0.000	No	No	–	1.01	4.30	129.5	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	953	963	0.00	0.000	No	No	–	1.01	4.60	141.3	2.60
West	T1	1	Subdom.	953	963	0.00	0.000	No	No	–	1.01	4.60	141.3	2.60
West	T1	2	Dominant	953	963	0.00	0.000	No	No	–	1.01	4.30	132.0	2.60
NorthWest	R1	2	Dominant	953	963	0.00	0.000	No	No	–	1.01	4.30	132.0	2.60
North	R2	2	Dominant	953	963	0.00	0.000	No	No	–	1.01	4.30	132.0	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	611	617	0.00	0.000	No	No	–	1.01	4.60	147.9	2.60
South	T1	1	Subdom.	611	617	0.00	0.000	No	No	–	1.01	4.60	147.9	2.60
West	R2	2	Dominant	611	617	0.00	0.000	No	No	–	1.01	4.30	138.1	2.60
NorthWest	R3	2	Dominant	611	617	0.00	0.000	No	No	–	1.01	4.30	138.1	2.60
NorthWest: SB Church														

Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L3	1	Dominant	1338	1351	0.00	0.000	No	No	–	1.01	4.80	163.7	2.60
East	L1	1	Dominant	1338	1351	0.00	0.000	No	No	–	1.01	4.80	163.7	2.60
South	R1	1	Dominant	1338	1351	0.00	0.000	No	No	–	1.01	4.80	163.7	2.60
West	R3	1	Dominant	1338	1351	0.00	0.000	No	No	–	1.01	4.80	163.7	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
NorthWest	L3	1	Subdom.	462	467	0.00	0.000	No	No	–	1.01	4.60	166.2	2.60
North	L2	1	Subdom.	462	467	0.00	0.000	No	No	–	1.01	4.60	166.2	2.60
East	T1	1	Subdom.	462	467	0.00	0.000	No	No	–	1.01	4.60	166.2	2.60
East	T1	2	Dominant	462	467	0.00	0.000	No	No	–	1.01	4.30	155.2	2.60
South	R2	2	Dominant	462	467	0.00	0.000	No	No	–	1.01	4.30	155.2	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates

Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	451	455	67.5
Lane 2	217	219	32.5
Approach	667	674	
East: WB Winneconne			
Lane 1	681	687	71.4
Lane 2	273	275	28.6
Approach	953	963	
North: SB Commercial			
Lane 1	189	191	31.0
Lane 2	422	426	69.0
Approach	611	617	
NorthWest: SB Church			
Lane 1	727	735	54.4
Lane 2	611	617	45.6
Approach	1338	1351	
West: EB Winneconne			
Lane 1	462	467	100.0
Lane 2	0	0	0.0
Approach	462	467	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)

Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial					
1	12.32	5.68	6.64	0.539	4.9

2	11.64	5.00	6.64	0.570	4.6
East: WB Winneconne					
1	12.18	7.14	5.04	0.414	6.3
2	11.24	6.20	5.04	0.448	5.9
North: SB Commercial					
1	12.56	5.43	7.13	0.568	4.6
2	11.93	4.79	7.13	0.598	4.4
NorthWest: SB Church					
1	14.74	10.78	3.96	0.269	9.8
West: EB Winneconne					
1	13.83	4.81	9.02	0.652	4.0
2	13.30	4.28	9.02	0.678	3.9

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)

To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.32	5.68	6.64	0.539	4.9
NorthWest	L1	1	12.32	5.68	6.64	0.539	4.9
North	T1	1	12.32	5.68	6.64	0.539	4.9
North	T1	2	11.64	5.00	6.64	0.570	4.6
East	R2	2	11.64	5.00	6.64	0.570	4.6
East: WB Winneconne							
South	L2	1	12.18	7.14	5.04	0.414	6.3
West	T1	1	12.18	7.14	5.04	0.414	6.3
West	T1	2	11.24	6.20	5.04	0.448	5.9
NorthWest	R1	2	11.24	6.20	5.04	0.448	5.9
North	R2	2	11.24	6.20	5.04	0.448	5.9
North: SB Commercial							
East	L2	1	12.56	5.43	7.13	0.568	4.6
South	T1	1	12.56	5.43	7.13	0.568	4.6
West	R2	2	11.93	4.79	7.13	0.598	4.4
NorthWest	R3	2	11.93	4.79	7.13	0.598	4.4
NorthWest: SB Church							
North	L3	1	14.74	10.78	3.96	0.269	9.8
East	L1	1	14.74	10.78	3.96	0.269	9.8
South	R1	1	14.74	10.78	3.96	0.269	9.8
West	R3	1	14.74	10.78	3.96	0.269	9.8
West: EB Winneconne							
NorthWest	L3	1	13.83	4.81	9.02	0.652	4.0
North	L2	1	13.83	4.81	9.02	0.652	4.0
East	T1	1	13.83	4.81	9.02	0.652	4.0
East	T1	2	13.30	4.28	9.02	0.678	3.9
South	R2	2	13.30	4.28	9.02	0.678	3.9

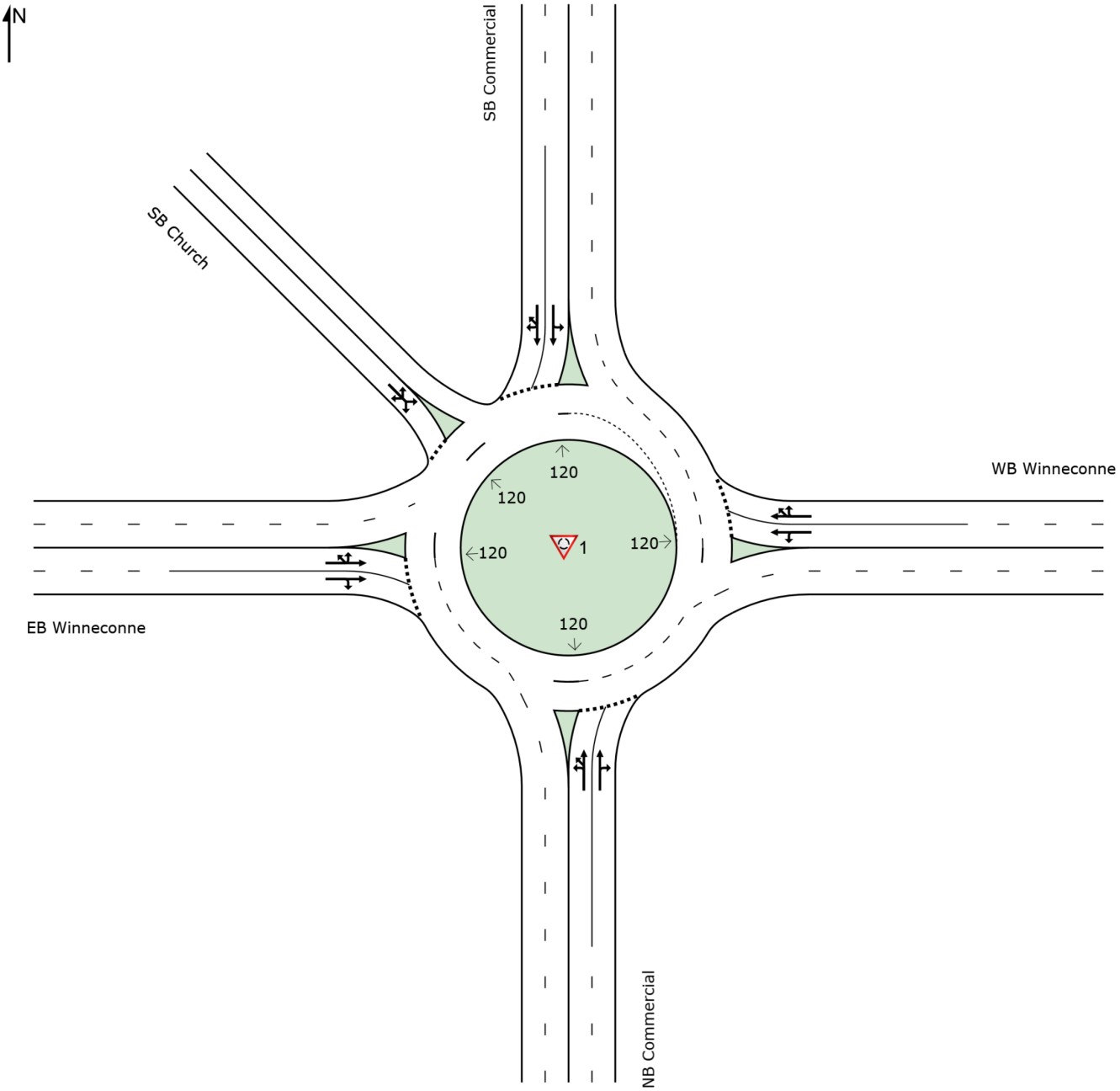
Roundabout Capacity Model: US HCM 6

SITE LAYOUT

Site: 1 [Commercial & Winneconne 5-leg 2042 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



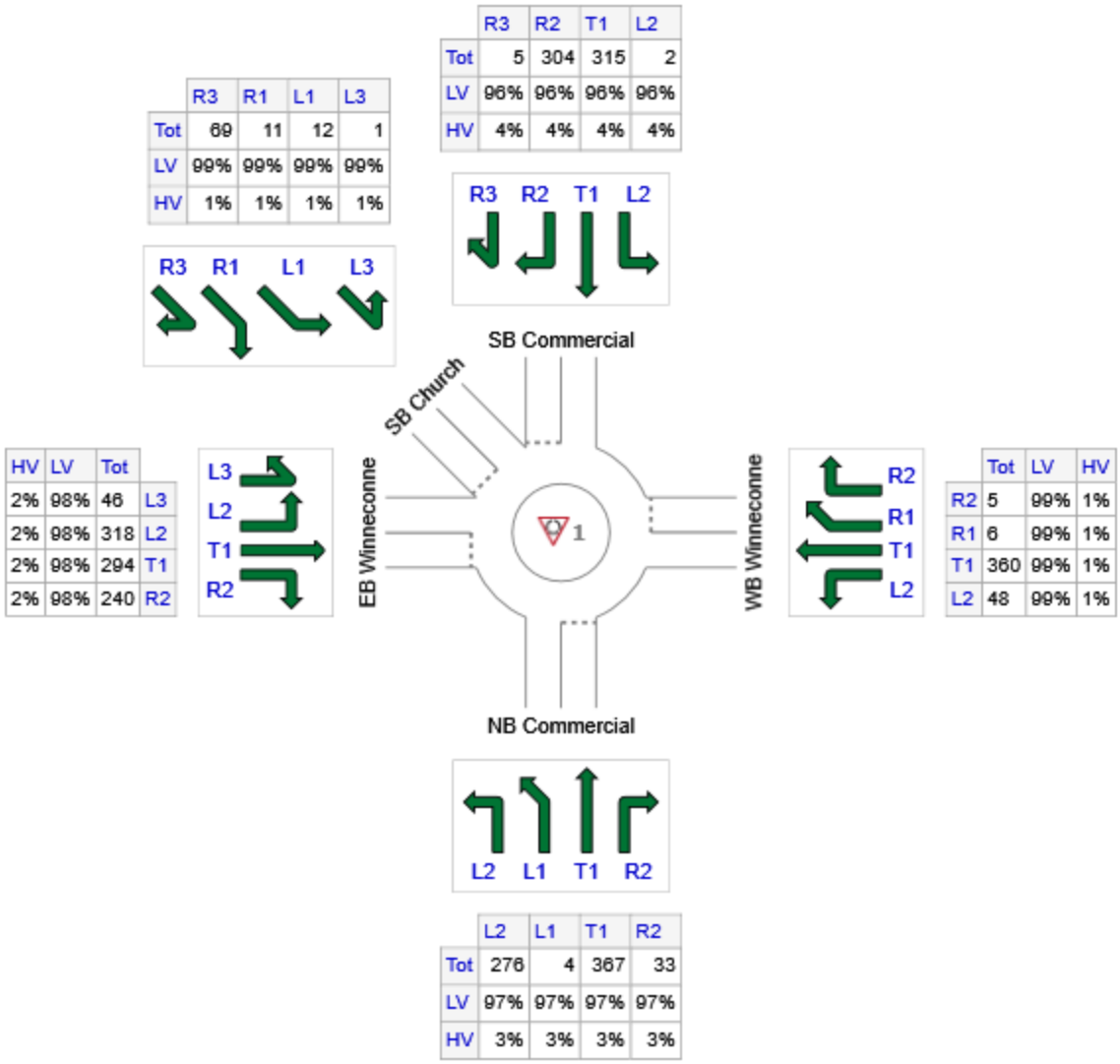
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 5-leg 2042 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	680	660	20
E: WB Winneconne	419	415	4
N: SB Commercial	626	601	25
NW: SB Church	93	92	1
W: EB Winneconne	898	880	18
Total	2716	2647	69

LANE SUMMARY

Site: 1 [Commercial & Winneconne 5-leg 2042 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	395	3.0	630	0.628	100	18.0	LOS C	4.5	116.3	Full	1600	0.0	0.0
Lane 2[d]	424	3.0	675	0.628	100	17.0	LOS C	4.5	114.8	Full	1600	0.0	0.0
Approach	819	3.0		0.628		17.5	LOS C	4.5	116.3				
East: WB Winneconne													
Lane 1	239	1.0	435	0.549	100	20.6	LOS C	2.8	70.6	Full	1600	0.0	0.0
Lane 2[d]	266	1.0	483	0.549	100	18.9	LOS C	2.8	69.8	Full	1600	0.0	0.0
Approach	505	1.0		0.549		19.7	LOS C	2.8	70.6				
North: SB Commercial													
Lane 1	363	4.0	579	0.626	100	19.2	LOS C	4.2	108.9	Full	1600	0.0	0.0
Lane 2[d]	391	4.0	625	0.626	100	18.0	LOS C	4.2	107.7	Full	1600	0.0	0.0
Approach	754	4.0		0.626		18.6	LOS C	4.2	108.9				
NorthWest: SB Church													
Lane 1[d]	112	1.0	285	0.393	100	22.6	LOS C	1.5	38.3	Full	1600	0.0	0.0
Approach	112	1.0		0.393		22.6	LOS C	1.5	38.3				
West: EB Winneconne													
Lane 1	530	2.0	871	0.609	100	13.4	LOS B	5.7	143.7	Full	1600	0.0	0.0
Lane 2[d]	552	2.0	907	0.609	100	13.0	LOS B	5.5	140.3	Full	1600	0.0	0.0
Approach	1082	2.0		0.609		13.2	LOS B	5.7	143.7				
Intersection	3272	2.5		0.628		16.8	LOS C	5.7	143.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Commercial

Mov. From S To Exit:	L2 W	L1 NW	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	333	5	58	-	395	3.0	630	0.628	100	NA	NA

Lane 2	-	-	384	40	424	3.0	675	0.628	100	NA	NA
Approach	333	5	442	40	819	3.0		0.628			
East: WB Winneconne											
Mov. From E To Exit:	L2 S	T1 W	R1 NW	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	58	181	-	-	239	1.0	435	0.549	100	NA	NA
Lane 2	-	252	7	6	266	1.0	483	0.549	100	NA	NA
Approach	58	434	7	6	505	1.0		0.549			
North: SB Commercial											
Mov. From N To Exit:	L2 E	T1 S	R2 W	R3 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	2	360	-	-	363	4.0	579	0.626	100	NA	NA
Lane 2	-	19	366	6	391	4.0	625	0.626	100	NA	NA
Approach	2	380	366	6	754	4.0		0.626			
NorthWest: SB Church											
Mov. From NW To Exit:	L3 N	L1 E	R1 S	R3 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	14	13	83	112	1.0	285	0.393	100	NA	NA
Approach	1	14	13	83	112	1.0		0.393			
West: EB Winneconne											
Mov. From W To Exit:	L3 NW	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	55	383	91	-	530	2.0	871	0.609	100	NA	NA
Lane 2	-	-	263	289	552	2.0	907	0.609	100	NA	NA
Approach	55	383	354	289	1082	2.0		0.609			
	Total	%HV	Deg.Satn (v/c)								
Intersection	3272	2.5	0.628								

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Full Length Lane	2	Merge Analysis not applied.
NorthWest Exit: SB Church Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
West Exit: EB Winneconne Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 5-leg 2042 AM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam ft	Circ Width ft	Insc Diam ft	Entry Radius ft	Entry Angle °	Circ Lanes	Entry Lanes	Av.Entry Lane Width ft	App. Dist ft	Prop Queued Upstr Signal	Extra Bunching %
South	NB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
NorthWest	SB Church	120.00*	30.00*	180.0*	85.0*	20.0*	2	1	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow veh/h	Opng Flow pcu/h	In-Bunch Hdwy sec	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy sec	Dist] ft	Follow-up Hdwy sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	811	827	0.00	0.000	No	No	–	1.03	4.60	141.4	2.60
NorthWest	L1	1	Subdom.	811	827	0.00	0.000	No	No	–	1.03	4.60	141.4	2.60
North	T1	1	Subdom.	811	827	0.00	0.000	No	No	–	1.03	4.60	141.4	2.60
North	T1	2	Dominant	811	827	0.00	0.000	No	No	–	1.03	4.30	132.1	2.60
East	R2	2	Dominant	811	827	0.00	0.000	No	No	–	1.03	4.30	132.1	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	1219	1251	0.00	0.000	No	No	–	1.01	4.60	136.8	2.60
West	T1	1	Subdom.	1219	1251	0.00	0.000	No	No	–	1.01	4.60	136.8	2.60
West	T1	2	Dominant	1219	1251	0.00	0.000	No	No	–	1.01	4.30	127.8	2.60
NorthWest	R1	2	Dominant	1219	1251	0.00	0.000	No	No	–	1.01	4.30	127.8	2.60
North	R2	2	Dominant	1219	1251	0.00	0.000	No	No	–	1.01	4.30	127.8	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	892	908	0.00	0.000	No	No	–	1.04	4.60	145.1	2.60
South	T1	1	Subdom.	892	908	0.00	0.000	No	No	–	1.04	4.60	145.1	2.60
South	T1	2	Dominant	892	908	0.00	0.000	No	No	–	1.04	4.30	135.5	2.60
West	R2	2	Dominant	892	908	0.00	0.000	No	No	–	1.04	4.30	135.5	2.60
NorthWest	R3	2	Dominant	892	908	0.00	0.000	No	No	–	1.04	4.30	135.5	2.60

NorthWest: SB Church Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L3	1	Dominant	1572	1617	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
East	L1	1	Dominant	1572	1617	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
South	R1	1	Dominant	1572	1617	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
West	R3	1	Dominant	1572	1617	0.00	0.000	No	No	–	1.01	4.80	160.7	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
NorthWest	L3	1	Subdom.	469	485	0.00	0.000	No	No	–	1.02	4.60	166.6	2.60
North	L2	1	Subdom.	469	485	0.00	0.000	No	No	–	1.02	4.60	166.6	2.60
East	T1	1	Subdom.	469	485	0.00	0.000	No	No	–	1.02	4.60	166.6	2.60
East	T1	2	Dominant	469	485	0.00	0.000	No	No	–	1.02	4.30	155.7	2.60
South	R2	2	Dominant	469	485	0.00	0.000	No	No	–	1.02	4.30	155.7	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates

Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	548	559	67.6
Lane 2	263	268	32.4
Approach	811	827	
East: WB Winneconne			
Lane 1	835	856	68.4
Lane 2	384	396	31.6
Approach	1219	1251	
North: SB Commercial			
Lane 1	239	242	26.6
Lane 2	652	666	73.4
Approach	892	908	
NorthWest: SB Church			
Lane 1	934	961	59.4
Lane 2	638	656	40.6
Approach	1572	1617	
West: EB Winneconne			
Lane 1	449	465	95.9
Lane 2	19	20	4.1
Approach	469	485	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)

Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial					

1	12.07	6.41	5.65	0.468	5.7
2	11.26	5.60	5.65	0.502	5.3
East: WB Winneconne					
1	13.16	8.98	4.18	0.317	8.3
2	11.84	7.67	4.18	0.353	7.4
North: SB Commercial					
1	12.10	6.84	5.27	0.435	6.2
2	11.22	5.95	5.27	0.469	5.8
NorthWest: SB Church					
1	16.98	13.45	3.53	0.208	12.6
West: EB Winneconne					
1	13.61	4.88	8.73	0.641	4.1
2	13.07	4.34	8.73	0.668	4.0

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)

To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.07	6.41	5.65	0.468	5.7
NorthWest	L1	1	12.07	6.41	5.65	0.468	5.7
North	T1	1	12.07	6.41	5.65	0.468	5.7
North	T1	2	11.26	5.60	5.65	0.502	5.3
East	R2	2	11.26	5.60	5.65	0.502	5.3
East: WB Winneconne							
South	L2	1	13.16	8.98	4.18	0.317	8.3
West	T1	1	13.16	8.98	4.18	0.317	8.3
West	T1	2	11.84	7.67	4.18	0.353	7.4
NorthWest	R1	2	11.84	7.67	4.18	0.353	7.4
North	R2	2	11.84	7.67	4.18	0.353	7.4
North: SB Commercial							
East	L2	1	12.10	6.84	5.27	0.435	6.2
South	T1	1	12.10	6.84	5.27	0.435	6.2
South	T1	2	11.22	5.95	5.27	0.469	5.8
West	R2	2	11.22	5.95	5.27	0.469	5.8
NorthWest	R3	2	11.22	5.95	5.27	0.469	5.8
NorthWest: SB Church							
North	L3	1	16.98	13.45	3.53	0.208	12.6
East	L1	1	16.98	13.45	3.53	0.208	12.6
South	R1	1	16.98	13.45	3.53	0.208	12.6
West	R3	1	16.98	13.45	3.53	0.208	12.6
West: EB Winneconne							
NorthWest	L3	1	13.61	4.88	8.73	0.641	4.1
North	L2	1	13.61	4.88	8.73	0.641	4.1
East	T1	1	13.61	4.88	8.73	0.641	4.1
East	T1	2	13.07	4.34	8.73	0.668	4.0
South	R2	2	13.07	4.34	8.73	0.668	4.0

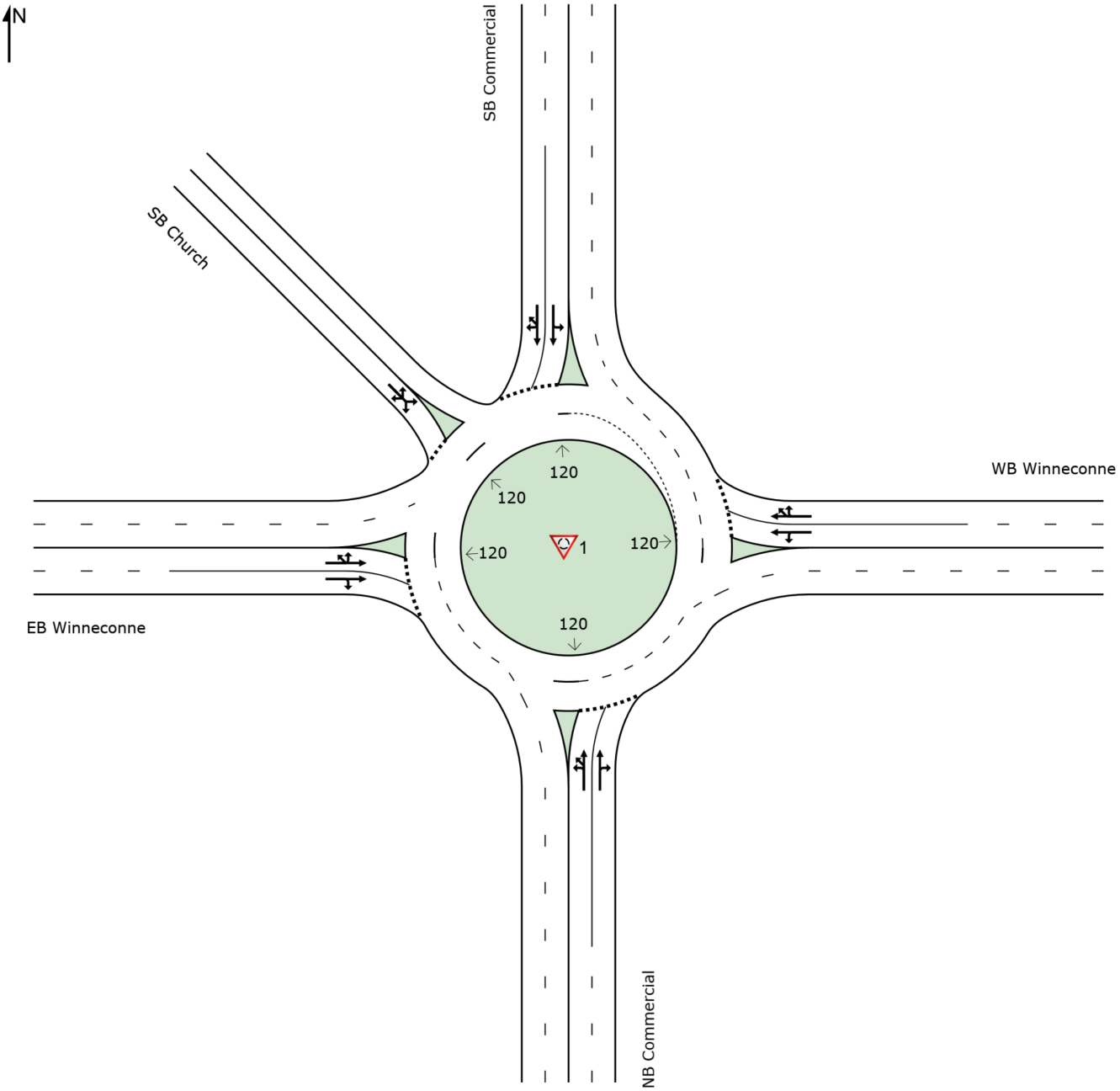
Roundabout Capacity Model: US HCM 6

SITE LAYOUT

Site: 1 [Commercial & Winneconne 5-leg 2042 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



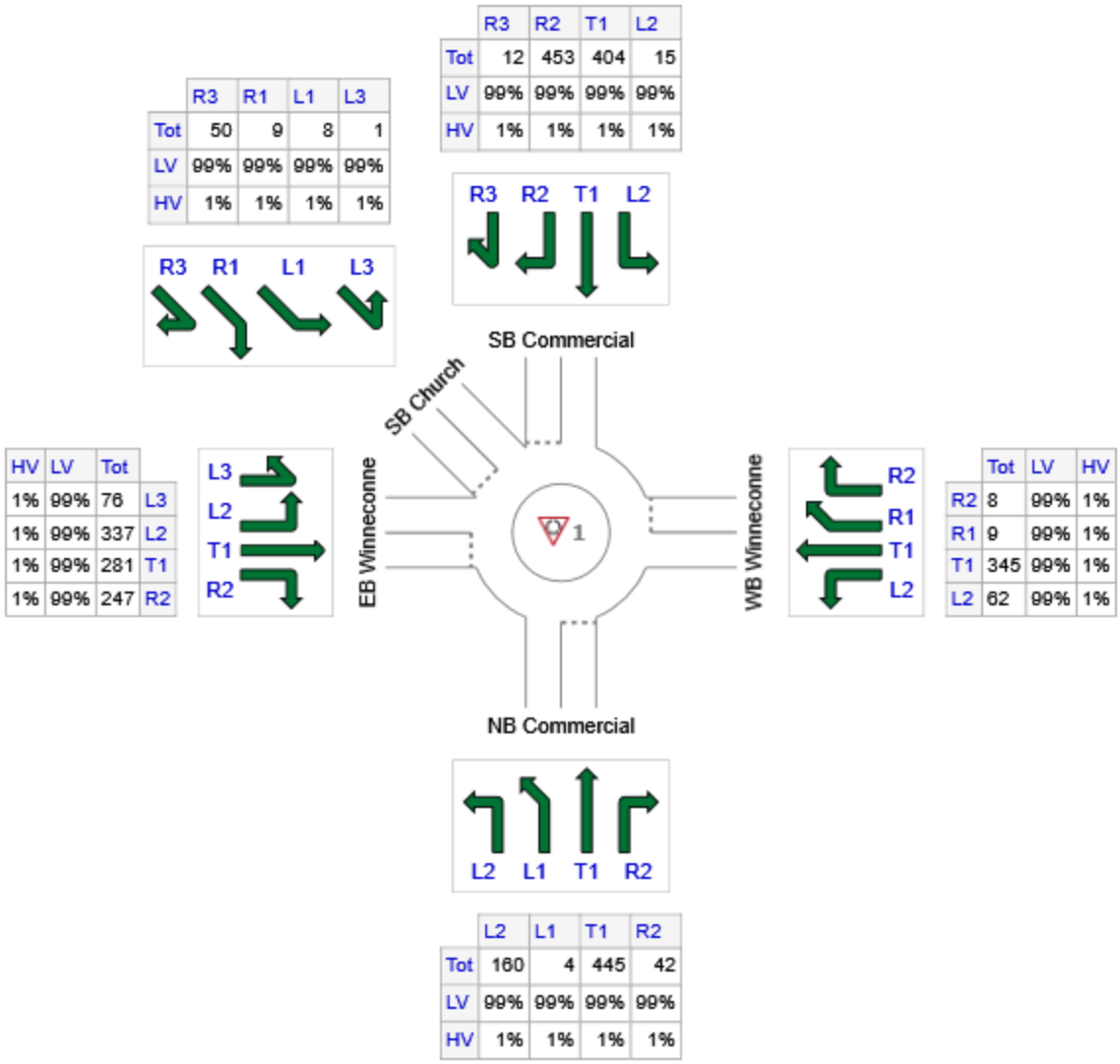
INPUT VOLUMES

Vehicles and pedestrians per 60 minutes

Site: 1 [Commercial & Winneconne 5-leg 2042 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: NB Commercial	651	644	7
E: WB Winneconne	424	420	4
N: SB Commercial	884	875	9
NW: SB Church	68	67	1
W: EB Winneconne	941	932	9
Total	2968	2938	30

LANE SUMMARY

Site: 1 [Commercial & Winneconne 5-leg 2042 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB Commercial													
Lane 1	342	1.0	666	0.514	100	13.6	LOS B	3.1	79.2	Full	1600	0.0	0.0
Lane 2[d]	366	1.0	711	0.514	100	12.9	LOS B	3.1	77.2	Full	1600	0.0	0.0
Approach	708	1.0		0.514		13.2	LOS B	3.1	79.2				
East: WB Winneconne													
Lane 1	220	1.0	490	0.448	100	15.4	LOS C	2.1	53.5	Full	1600	0.0	0.0
Lane 2[d]	241	1.0	538	0.448	100	14.3	LOS B	2.1	52.2	Full	1600	0.0	0.0
Approach	461	1.0		0.448		14.8	LOS B	2.1	53.5				
North: SB Commercial													
Lane 1	455	1.0	708	0.643	96[5]	17.0	LOS C	5.3	134.4	Full	1600	0.0	0.0
Lane 2[d]	505	1.0	753	0.672	100	17.3	LOS C	5.9	148.3	Full	1600	0.0	0.0
Approach	961	1.0		0.672		17.2	LOS C	5.9	148.3				
NorthWest: SB Church													
Lane 1[d]	74	1.0	295	0.250	100	17.5	LOS C	0.9	21.8	Full	1600	0.0	0.0
Approach	74	1.0		0.250		17.5	LOS C	0.9	21.8				
West: EB Winneconne													
Lane 1	500	1.0	830	0.602	100	13.7	LOS B	5.3	132.7	Full	1600	0.0	0.0
Lane 2[d]	523	1.0	869	0.602	100	13.2	LOS B	5.1	129.7	Full	1600	0.0	0.0
Approach	1023	1.0		0.602		13.4	LOS B	5.3	132.7				
Intersection	3226	1.0		0.672		14.8	LOS B	5.9	148.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Geometric Delay is not included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: NB Commercial

Mov. From S To Exit:	L2 W	L1 NW	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.

Lane 1	174	4	164	-	342	1.0	666	0.514	100	NA	NA
Lane 2	-	-	320	46	366	1.0	711	0.514	100	NA	NA
Approach	174	4	484	46	708	1.0		0.514			
East: WB Winneconne											
Mov. From E To Exit:	L2 S	T1 W	R1 NW	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	152	-	-	220	1.0	490	0.448	100	NA	NA
Lane 2	-	223	10	9	241	1.0	538	0.448	100	NA	NA
Approach	67	375	10	9	461	1.0		0.448			
North: SB Commercial											
Mov. From N To Exit:	L2 E	T1 S	R2 W	R3 NW	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	16	439	-	-	455	1.0	708	0.643	96[5]	NA	NA
Lane 2	-	-	492	13	505	1.0	753	0.672	100	NA	NA
Approach	16	439	492	13	961	1.0		0.672			
NorthWest: SB Church											
Mov. From NW To Exit:	L3 N	L1 E	R1 S	R3 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	9	10	54	74	1.0	295	0.250	100	NA	NA
Approach	1	9	10	54	74	1.0		0.250			
West: EB Winneconne											
Mov. From W To Exit:	L3 NW	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	83	366	51	-	500	1.0	830	0.602	100	NA	NA
Lane 2	-	-	255	268	523	1.0	869	0.602	100	NA	NA
Approach	83	366	305	268	1023	1.0		0.602			
	Total	%HV	Deg.Satn (v/c)								
Intersection	3226	1.0	0.672								

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

Merge Analysis

	Exit Lane Number	Short Lane Length ft	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: NB Commercial Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
East Exit: WB Winneconne Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
Full Length Lane	2	Merge Analysis not applied.										
North Exit: SB Commercial												

Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.
NorthWest Exit: SB Church Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
West Exit: EB Winneconne Merge Type: **Not Applied**		
Full Length Lane	1	Merge Analysis not applied.
Full Length Lane	2	Merge Analysis not applied.

ROUNDABOUT ANALYSIS

Site: 1 [Commercial & Winneconne 5-leg 2042 PM Peak (Site Folder: 5-leg Alternative)]

Site Category: (None)
Roundabout

Roundabout Basic Parameters

Location	Name	Central Island Diam ft	Circ Width ft	Insc Diam ft	Entry Radius ft	Entry Angle °	Circ Lanes	Entry Lanes	Av.Entry Lane Width ft	App. Dist ft	Prop Queued Upstr Signal	Extra Bunching %
South	NB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
East	WB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
North	SB Commercial	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0
NorthWest	SB Church	120.00*	30.00*	180.0*	85.0*	20.0*	2	1	13.00*	1600.0	NA[5]	0.0
West	EB Winneconne	120.00*	30.00*	180.0*	85.0*	20.0*	2	2	13.00*	1600.0	NA[5]	0.0

Roundabout Capacity Model: US HCM 6

5 Not Applicable (single Site analysis or unconnected Site in Network analysis).
* These parameters do not affect estimated capacity values in the HCM 6 Capacity Model.

Roundabout Entry and Circulating / Exiting Stream Parameters

To Approach	Turn	Lane No	Lane Type	Opng Flow veh/h	Opng Flow pcu/h	In-Bunch Hdwy sec	Prop. Bunched	Cap Const Effect	Priority Sharing	OD Factor	HVE for Entry	Critical Gap [Hdwy sec	Dist] ft	Follow-up Hdwy sec
South: NB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
West	L2	1	Subdom.	780	788	0.00	0.000	No	No	–	1.01	4.60	138.6	2.60
NorthWest	L1	1	Subdom.	780	788	0.00	0.000	No	No	–	1.01	4.60	138.6	2.60
North	T1	1	Subdom.	780	788	0.00	0.000	No	No	–	1.01	4.60	138.6	2.60
North	T1	2	Dominant	780	788	0.00	0.000	No	No	–	1.01	4.30	129.5	2.60
East	R2	2	Dominant	780	788	0.00	0.000	No	No	–	1.01	4.30	129.5	2.60
East: WB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
South	L2	1	Subdom.	1112	1123	0.00	0.000	No	No	–	1.01	4.60	141.3	2.60
West	T1	1	Subdom.	1112	1123	0.00	0.000	No	No	–	1.01	4.60	141.3	2.60
West	T1	2	Dominant	1112	1123	0.00	0.000	No	No	–	1.01	4.30	132.0	2.60
NorthWest	R1	2	Dominant	1112	1123	0.00	0.000	No	No	–	1.01	4.30	132.0	2.60
North	R2	2	Dominant	1112	1123	0.00	0.000	No	No	–	1.01	4.30	132.0	2.60
North: SB Commercial Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
East	L2	1	Subdom.	713	720	0.00	0.000	No	No	–	1.01	4.60	147.9	2.60
South	T1	1	Subdom.	713	720	0.00	0.000	No	No	–	1.01	4.60	147.9	2.60
West	R2	2	Dominant	713	720	0.00	0.000	No	No	–	1.01	4.30	138.2	2.60
NorthWest	R3	2	Dominant	713	720	0.00	0.000	No	No	–	1.01	4.30	138.2	2.60
NorthWest: SB Church														

Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
North	L3	1	Dominant	1564	1580	0.00	0.000	No	No	–	1.01	4.80	163.6	2.60
East	L1	1	Dominant	1564	1580	0.00	0.000	No	No	–	1.01	4.80	163.6	2.60
South	R1	1	Dominant	1564	1580	0.00	0.000	No	No	–	1.01	4.80	163.6	2.60
West	R3	1	Dominant	1564	1580	0.00	0.000	No	No	–	1.01	4.80	163.6	2.60
West: EB Winneconne Model Calibration Factor (HCM 6): 1.00 Entry/Circ Flow Adj (HCM 6): None														
NorthWest	L3	1	Subdom.	542	548	0.00	0.000	No	No	–	1.01	4.60	166.0	2.60
North	L2	1	Subdom.	542	548	0.00	0.000	No	No	–	1.01	4.60	166.0	2.60
East	T1	1	Subdom.	542	548	0.00	0.000	No	No	–	1.01	4.60	166.0	2.60
East	T1	2	Dominant	542	548	0.00	0.000	No	No	–	1.01	4.30	155.1	2.60
South	R2	2	Dominant	542	548	0.00	0.000	No	No	–	1.01	4.30	155.1	2.60

Roundabout Capacity Model: US HCM 6

Circulating Lane Flow Rates

Circ. Lane No	Circulating Flow Rate		
	veh/h	pcu/h	Percent
South: NB Commercial			
Lane 1	526	531	67.4
Lane 2	255	257	32.6
Approach	780	788	
East: WB Winneconne			
Lane 1	792	800	71.2
Lane 2	320	323	28.8
Approach	1112	1123	
North: SB Commercial			
Lane 1	220	222	30.8
Lane 2	493	498	69.2
Approach	713	720	
NorthWest: SB Church			
Lane 1	849	857	54.3
Lane 2	715	722	45.7
Approach	1564	1580	
West: EB Winneconne			
Lane 1	542	548	100.0
Lane 2	0	0	0.0
Approach	542	548	

Roundabout Capacity Model: The US HCM 6 roundabout capacity model option is in use.
This model considers only the total circulating flow and not the flow rates in individual circulating lanes.
To model the effects of flow distribution in circulating lanes on the entry capacity results, you should use the SIDRA Standard roundabout capacity model.

Gap Acceptance Cycle Parameters (Lanes)

Opposed Lane	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial					
1	12.09	6.22	5.87	0.485	5.4

2	11.31	5.45	5.87	0.519	5.1
East: WB Winneconne					
1	12.62	8.11	4.51	0.357	7.4
2	11.48	6.98	4.51	0.392	6.7
North: SB Commercial					
1	12.19	5.89	6.30	0.517	5.1
2	11.48	5.18	6.30	0.549	4.8
NorthWest: SB Church					
1	16.62	13.04	3.58	0.215	12.2
West: EB Winneconne					
1	13.01	5.14	7.87	0.605	4.3
2	12.42	4.55	7.87	0.634	4.1

Roundabout Capacity Model: US HCM 6

Gap Acceptance Cycle Parameters (Movements)

To Approach	Turn	Opsd Lane No	Cycle Time sec	Blocked Time sec	Unblocked Time sec	Unblocked Time Ratio	Minimum Delay sec
South: NB Commercial							
West	L2	1	12.09	6.22	5.87	0.485	5.4
NorthWest	L1	1	12.09	6.22	5.87	0.485	5.4
North	T1	1	12.09	6.22	5.87	0.485	5.4
North	T1	2	11.31	5.45	5.87	0.519	5.1
East	R2	2	11.31	5.45	5.87	0.519	5.1
East: WB Winneconne							
South	L2	1	12.62	8.11	4.51	0.357	7.4
West	T1	1	12.62	8.11	4.51	0.357	7.4
West	T1	2	11.48	6.98	4.51	0.392	6.7
NorthWest	R1	2	11.48	6.98	4.51	0.392	6.7
North	R2	2	11.48	6.98	4.51	0.392	6.7
North: SB Commercial							
East	L2	1	12.19	5.89	6.30	0.517	5.1
South	T1	1	12.19	5.89	6.30	0.517	5.1
West	R2	2	11.48	5.18	6.30	0.549	4.8
NorthWest	R3	2	11.48	5.18	6.30	0.549	4.8
NorthWest: SB Church							
North	L3	1	16.62	13.04	3.58	0.215	12.2
East	L1	1	16.62	13.04	3.58	0.215	12.2
South	R1	1	16.62	13.04	3.58	0.215	12.2
West	R3	1	16.62	13.04	3.58	0.215	12.2
West: EB Winneconne							
NorthWest	L3	1	13.01	5.14	7.87	0.605	4.3
North	L2	1	13.01	5.14	7.87	0.605	4.3
East	T1	1	13.01	5.14	7.87	0.605	4.3
East	T1	2	12.42	4.55	7.87	0.634	4.1
South	R2	2	12.42	4.55	7.87	0.634	4.1

Roundabout Capacity Model: US HCM 6

To: DOT ICE Review
From: MSA Professional Services, Inc.
Date: 12/1/2022
RE: n/a
Other
STH 114 (Winneconne Avenue) at STH 114 (Commercial Street)
City of Neenah, Winnebago County
Northeast Region

Project Description:

The City of Neenah has identified the intersection of STH 144 (Winneconne Avenue) at STH 144 (Commercial Street) as a target for improvements due to ongoing operational/capacity and safety issues. The project location is shown in Attachment 2.

STH 114, north of the intersection (Commercial Street), is a north-south four-lane urban principal arterial, with a posted speed limit of 25 mph. Sidewalks are present on both sides of the roadway. Winneconne Avenue, east of the intersection, is primarily a southwest-northeast two-lane urban minor arterial, with a posted speed limit of 25 mph. Sidewalk is only present on the south side of the roadway. Commercial Street, south of the intersection, is a north-south four-lane urban minor arterial, with a posted speed limit of 30 mph. Sidewalk is present on both sides of the roadway. STH 114, west of the intersection (Winneconne Avenue), is a southwest-northeast four-lane urban principal arterial, with a posted speed limit of 30 mph. Sidewalks are present on both sides of the roadway. Parking is restricted within the functional area of the intersections. No bicycle lanes are present on any of the approaches.

Church Street is a north-south two-lane urban collector roadway with a posted speed limit of 25 mph. Sidewalks are present on both sides of the roadway; however, no crossings are provided where Church Street intersects Winneconne Avenue (one block west of the Commercial Street intersection).

The intersection of Winneconne Avenue at Commercial Street is currently traffic signal controlled. The southbound approach contains two lanes: a shared left-turn/through lane and a shared through/right-turn lane. A commercial driveway is present on the east side of the approach, approximately 90-feet from the intersection. The westbound approach contains two lanes: an exclusive left-turn lane with approximately 90-feet of dedicated storage and a shared through/right-turn lane. One commercial driveway is located on the south side of the approach, approximately 60-feet from the intersection. The northbound approach contains two lanes: an exclusive left-turn lane with approximately 190-feet of dedicated storage and a shared through/right-turn lane. Commercial driveways are located on both sides of the road, approximately 100-feet from the intersection. The eastbound approach contains three lanes: an exclusive left-turn lane with approximately 65-feet of dedicated storage (however, enhanced lane separation markings extend approximately 350-feet further upstream – for a total length of 415-feet), an exclusive through lane, and a channelized exclusive right-turn lane, with approximately 145-feet of dedicated storage. The channelized right-turn lane is controlled by a Yield sign. The Church Street intersection is on the north side of this approach, approximately 100-feet from the intersection. A

commercial driveway is located on the south side of this approach, approximately 185-feet from the intersection.

The area is surrounded by mostly commercial developments, with residential development surrounding the commercial development. Valley Transit operates bus routes through the area. Routes currently use all approaches except for the east leg of the intersection. Bus routes are also shown to use Church Street as well.

Due to the pandemic, traffic counts were re-used from the 2018 traffic study, which included the Winneconne Avenue at Commercial Street intersection. Traffic was projected to 2022 and 2042 using growth rates provided by WisDOT planning-level forecast data. Site 700227 along STH 114 in the City of Neenah was used for establishing the growth rate (0.87%). The base count data and projected volumes are included in Attachment 3. These volumes were utilized to complete preliminary operational analyses for the intersection.

Description of Alternatives:

Based on alternatives reviewed as part of initial brainstorming, a modified traffic signal control or a roundabout are the most reasonable alternatives, as shown in Attachment 4. Given the proximity of the Church Street intersection to Commercial Street, two roundabout alternatives will be considered:

1. Replacing the existing traffic signal with a multilane roundabout and retaining the T-intersection of Winneconne Avenue at Church Street
2. Replacing the existing traffic signal with a five-leg multilane roundabout which incorporates Church Street into the intersection with Winneconne Avenue and Commercial Street.

Safety Considerations:

Over the 5-year period of 2017 – 2021, 34 crashes were reported at the intersection. This translates to a rate of approximately 0.83 crashes per million entering vehicles or approximately 6.8 crashes per year. A diagram of the reported crashes for provided in Attachment 5.

Observed Crash History Years: 2017 – 2021

Crash Type	Fatal	Injury A	Injury B	Injury C	KABC	PDO	Total
Rear-End *(Front-to-Rear)*	0	0	0	2	2	14	16
Angle *(Front-to-Side)*	0	0	2	0	2	6	8
Single Vehicle/Other	0	0	3	0	3	1	4
Sideswipe *(Same Direction)*	0	0	0	0	0	3	3
Head-On *(Front-to-Front)*	0	0	0	1	1	1	2
Sideswipe *(Opposite Directions)*	0	0	0	0	0	1	1
Total	0	0	5	3	8	26	34

Crash Trends: The intersection has a significant number of front-to-rear crash events, with most occurring on the eastbound approach. The majority of this crash type were property damage only;

however, two were of severity C (possible injury). Front-to-side crash events were the next most common, with no particular approach having a significant number of this crash type. Two of these crashes resulted in severity B (suspected minor injury) magnitude injuries. Three of the single-vehicle crashes resulted in injuries – all severity B (suspected minor injury) magnitude injuries. One of these events involved a pedestrian being struck by a southbound left-turning vehicle; one of the events involved a bicyclist being struck by a southbound right-turning vehicle.

Contributing Factors: Weather may have been a factor in two of the crashes (rain). Road conditions may have been a factor in at least ten crashes: five wet, three snow, one slush, and one ice. Drug impairment was cited in two crashes. Failure to yield was cited in 11 crashes. Distracted driving was identified in nine crashes. Disregard of a red light was cited in three crashes. Speed was cited in two crashes (too fast for conditions). Improper crossing was cited in the crash that involved a pedestrian.

Operational Considerations:
The existing traffic signal operates with unacceptable level of service (LOS), capacity, and delay during the base year (2022). Queues of 200 – 300-feet or greater are already observed on all approaches. The southbound right-turn movement is calculated to be near capacity currently. Operations continue to degrade through the 2042 design horizon without any additional improvements.

Traffic Signal Improvements
Lane modifications to the southbound and eastbound approaches combined with signal phasing and timing modifications are shown to provide acceptable operations through the 2042 design horizon.

Roundabout Improvements
Either a multilane four or five-legged roundabout design are expected to provide acceptable operations through the 2042 design horizon.

Preliminary operational analyses are included in Attachment 6 for the signalized and roundabout alternatives.

Other Considerations:
Right-of-way (R/W) will need to be acquired regardless of the alternative selected.

A modified traffic signal will require adding a southbound exclusive right-turn lane. The addition of this lane would require R/W to be acquired in the northwest corner of the intersection.

Either roundabout alternative would require a significant amount of R/W to be acquired, including a majority of the parcel in the northwest corner of the intersection (the parcel encompasses the entire block of Winneconne Avenue between Commercial Street and Church Street).

With the close proximity of the Church Street intersection, for safety reasons, southbound left-turns should be restricted from Church Street if the five-leg roundabout is not selected. Due to additional operational deficiencies with the inclusion of a fifth approach to a signalized intersection and considering the existing signal's operational deficiencies, an alternative which ties the Church Street approach into the signalized intersection is not being considered at this time.

Feasibility of Alternatives:

Preliminary analyses indicate a modified traffic signal or a roundabout (with 4 or 5 legs) would operate acceptably through the 2042 design year. Both alternatives would require R/W to be acquired; however, preliminary reviews indicate that a roundabout would require a full business acquisition.

Conclusion:

Based on the operational analyses and preliminary R/W needs, both a modified traffic signal and a roundabout (4 or 5 legs) are viable alternatives. A Phase II ICE is recommended to further vet the alternatives. As part of the Phase II ICE, the following alternatives will be investigated further:

1. Modified Traffic Signal
2. 4-leg Multilane Roundabout
3. 5-leg Multilane Roundabout with Inclusion of Church Street

Attachments:

Attachment 1: ICE Submittal Checklist
Attachment 2: Project Location Map
Attachment 3: Traffic Volumes
Attachment 4: Phase I: ICE Brainstorming Guide
Attachment 5: Intersection Crash Diagram
Attachment 6: Synchro and SIDRA Output

Note: All Attachments can be found in the appendix of the Phase 2 ICE Report included as part of Attachment A.

Phase I: ICE Brainstorming Guide

Date: 11/22/2022
Project ID: n/a
Control: Signal
Major Road AADT: 13,300
Minor Road AADT: 10,000

Intersection: WIS 114 (Winneconne Ave) at WIS 114 (Commercial St)
Reason for ICE: Safety, operational, and capacity issues have been noted at this intersection for many years. The City of Neenah has identified this intersection as a target for improvements

List of Alternatives:

v02

Alt. #	Control Type	Is Alt. Viable?	Meets Purpose & Need?	Performance Measures Acceptable?	ROW Impacts Acceptable?	Meets Warrants? (If Applicable)	Manual Override (Optional)	Explanation/Comments
1	Minor Road Stop Control	No	No	No		N/A		Intersection is currently controlled by a traffic signal
2	All-Way Stop Control	No	No	No		N/A		Intersection is currently controlled by a traffic signal
3	Traffic Signal	Yes	Yes	Yes	Yes	N/A		Current form of intersection control. Geometric modifications are required in order to maintain acceptable operations
4	Roundabout	Yes	Yes	Yes	Yes	N/A		Either a 4 or 5-leg roundabout is operationally feasible; however, an entire business would need to be acquired.
5	Right-In/Right-Out	No	No			N/A		Not applicable for the intersection type/issues encountered
6	Right-In/Right-Out/Left-In	No	No			N/A		Not applicable for the intersection type/issues encountered
7	Offset T	No	No		No	N/A		Not suitable for developed urban area
8	J-turn	No	No		No	N/A		Not suitable for R/W available
9	Median U-Turn	No	No		No	N/A		Not suitable for R/W available
10	Continuous Green-T	No	No			N/A		Not applicable for the intersection type/issues encountered
11	Quadrant/Jughandle	No	No		No	N/A		Not suitable for R/W available
12	Diamond	No	No		No	N/A		Not suitable for R/W available
13	Cloverleaf/ Partial Cloverleaf	No	No		No	N/A		Not suitable for R/W available
14	Diverging Diamond	No	No			N/A		Not applicable for the intersection type/issues encountered
15	Single Point	No	No			N/A		Not applicable for the intersection type/issues encountered
16	Echelon	No	No		No	N/A		Not suitable for R/W available
17	[Add more as needed]	-						