

# 2019

## Chief Mistawasis Bridge Traffic Assessment



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## 1. Introduction

The Chief Mistawasis Bridge and the Traffic Bridge opened in October 2018. This report outlines the traffic impacts due to the bridge openings. Assessments are as follows:

- Bridge Traffic Comparisons
- Road Segment Review
- Intersection Analysis

The study locations are illustrated in Figure 1.

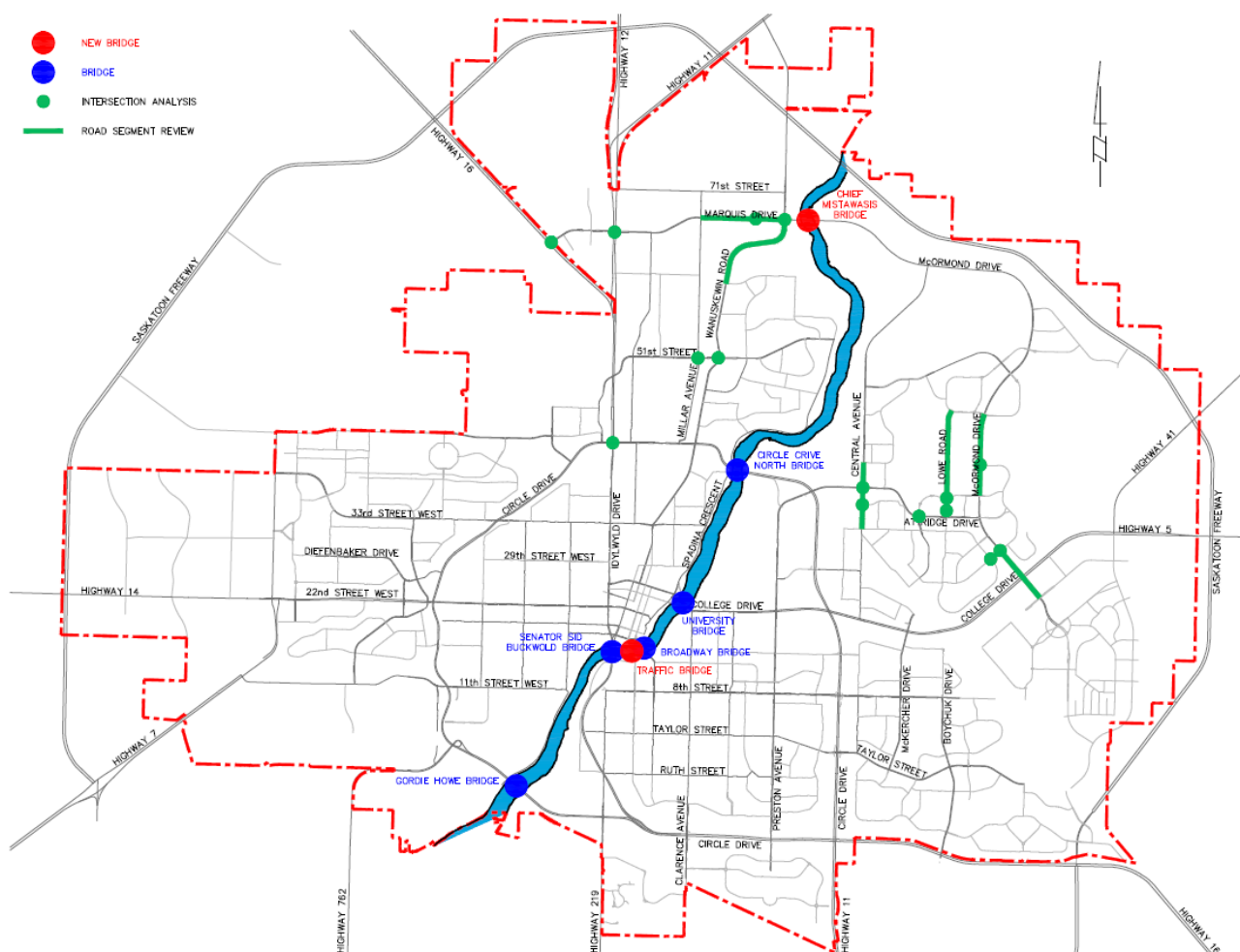
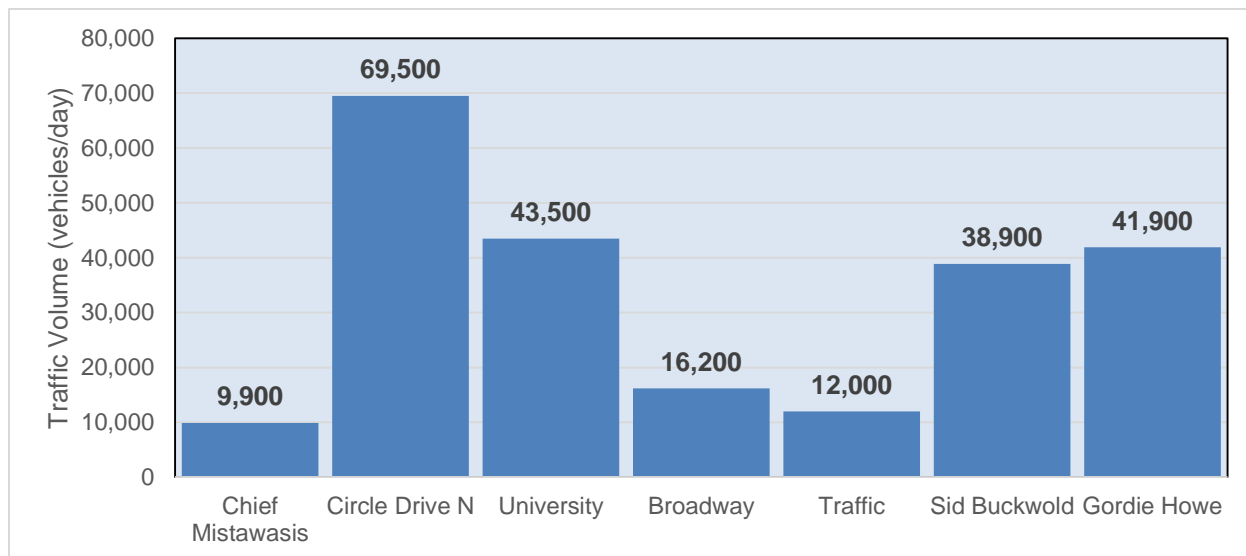


Figure 1: Study Locations

## 2. Bridge Traffic Comparison

The Average Daily Traffic observed on Saskatoon's bridges is illustrated in Figure 2. The data was collected in early 2019.



**Figure 2: Average Daily Traffic – Bridges**

A review of the information presented in the figure above yields the following observations:

- The Chief Mistawasis Bridge has been operating with approximately 10,000 vehicles per day (vpd) since opening, resulting in a reduction of approximately 10,000 vpd on the Circle Drive North Bridge.
- The re-opened Traffic Bridge has been operating at approximately 12,000 vpd. There may be some impact to this volume due to construction on the nearby Sid Buckwold Bridge.
- Traffic volumes on the remaining bridges are relatively unchanged since the opening of the two new bridges.

### 3. Road Segment Review

The street network is comprised of various street types, each of which performs a particular function in facilitating the way people and goods move through and within the city. The City of Saskatoon street classifications characteristics for the street types included in the study are summarized in Table 1.

**Table 1: City of Saskatoon Street Classifications Characteristics**

Characteristic	Collectors		Arterials		Expressways/ Freeways
	Residential	Commercial	Minor	Major	
<b>Traffic Service Function</b>	Traffic movement and land access of equal importance		Traffic movement major consideration	Traffic movement primary consideration	Traffic movement primary consideration
<b>Typical Traffic Volume (veh/day)</b>	<5,000	8,000 to 10,000	5,000 to 25,000		>10,000 / >20,000
<b>Traffic Flow Characteristics</b>	Interrupted flow		Uninterrupted flow except at signals and crosswalks		Free-flow (grade separated) Uninterrupted flow except at signals
<b>Typical Posted Speed Limits (kph)</b>	50		50 to 70		80 to 90
<b>Typical Vehicle Type</b>	Passenger and service vehicles	All types	All types	All types, large portion of trucks	All types, large portion of trucks

The before and after Average Daily Traffic volumes for a number of various street segments are presented in Table 2.

**Table 2: Road Segment Traffic Changes**

Segment	Road Classification	Previous Observations		2019	Change
		Year	AADT	ADT	
Chief Mistawasis Bridge	Major Arterial	-	-	9,900	-
Circle Drive (North) Bridge	Expressway	2018	79,300	69,500	-9,800
University Bridge	Major Arterial	2017	43,100	43,500	+400
Broadway Bridge	Major Arterial	2018	17,900	16,200	-1,700
Traffic Bridge	Commercial Collector	2018	6,100	12,000	+5,900
Sid Buckwold Bridge	Freeway	2017	45,400	38,900	-6,500
Gordie Howe Bridge	Freeway	2018	43,500	41,900	-1,600
Marquis Drive (Millar Avenue – Arthur Rose Avenue)	Major Arterial	2017	5,300	7,800	+2,500
Central Avenue (Attridge Drive – Konihowski Road)	Major Arterial	2015	9,300	13,500	+4,200
Central Avenue (Attridge Drive – 115 <sup>th</sup> Street)	Major Arterial	2018	11,000	13,200	+2,200
Lowe Road (Nelson Road – Evergreen Boulevard)	Commercial Collector	2016	6,500	5,500	-1,000
McOrmond Drive (Stensrud Road – Baltzan Boulevard)	Major Arterial	2016	7,600	13,200	+5,600
Wanuskewin Road (south of Marquis Drive)	Major Arterial	2016	10,800	9,800	-1,000
McOrmond Drive (Kerr Road – College Drive)	Major Arterial	2016	39,200	25,100	-14,100
McOrmond Drive (South of College Drive)	Major Arterial	New in 2019	-	9,000	-

Note: AADT = Annual Average Daily Traffic, ADT = Average Daily Traffic,

A review of the information presented in the table above yields the following observations:

- In general, the streets directly connected to the new Chief Mistawasis Bridge saw increased daily traffic.
- Previous alternate routes connecting to the Circle Drive North Bridge saw some decreases.



## 4. Intersection Analysis – Signalized Intersections

The North American traffic engineering standard for measuring the performance of a signalized intersection is to measure the *average delay* in seconds a driver will experience in completing a maneuver. The software used to analyze the intersection calculates an average delay to each movement based on the traffic volumes, permitted movements and signal timing. This average delay corresponds to established Levels of Service (LOS). The LOS can range from A to F (the shorter the average delay the better the LOS, the longer the average delay the worse the LOS). Generally, the City prefers to avoid LOS E and F. However, a LOS E or F does not indicate the need for or trigger improvements. Other considerations include: the traffic volume performing the problematic movement with LOS E or F, intersection geometrics and signal operation, intersection spacing, road classification, availability of alternate routes, pedestrian movements, access management, type of adjacent land use, future development in the area and cost. A summary of the Level of Service characteristics for signalized intersections is provided in Table 3.

**Table 3: Level of Service Characteristics (signalized)**

Average Control Delay (sec./veh.)	Level of Service	General Description
≤ 10	A	Free Flow
>10 to 20	B	Stable Flow (slight delays)
>20 to 35	C	Stable Flow (acceptable delays)
>35 to 55	D	Approaching unstable flow (tolerable delay, occasional wait through more than one signal cycle before proceeding)
>55 to 80	E	Unstable flow
>80	F	Forced flow

Detailed intersection analysis, including weekday AM and PM peak hours, was completed for the following signalized intersections:

- Marquis Drive and Wanuskewin Drive
- Marquis Drive and Arthur Rose Avenue
- Marquis Drive and Idylwyld Drive
- Marquis Drive and Highway 16
- 51<sup>st</sup> Street and Warman Road
- 51<sup>st</sup> Street and Millar Avenue
- Circle Drive and Idylwyld Drive
- Attridge Drive and Central Avenue
- Attridge Drive and Berini Drive
- McOrmond Drive and Kerr Road



A summary of the analysis for each intersection is provided in Table 4. Detailed analysis results for each intersection movement is provided in Appendix 1.

**Table 4: Intersection Analysis – Signalized Intersections**

Intersection	Weekday AM Peak Hour			Weekday PM Peak Hour		
	Max v/c ratio	Average Delay (s)	LOS	Max v/c ratio	Average Delay (s)	LOS
Marquis Drive and Wanuskewin Drive	0.53	24.6	C	0.8	35.7	D
Marquis Drive and Arthur Rose Avenue	0.63	15.7	B	0.91	23.1	C
Marquis Drive and Idylwyld Drive	1.28	59.9	E	2.29	163.4	F
Marquis Drive and Highway 16	0.62	37.4	D	0.58	32.3	C
51st Street and Warman Road	0.82	38.3	D	1.11	44	D
51st Street and Millar Avenue	0.84	38.7	D	1.83	177.5	F
Circle Drive and Idylwyld Drive	0.72	20.7	C	1.05	55	E
Attridge Drive and Central Avenue	0.88	33	C	0.99	68.2	E
Attridge Drive and Berini Drive	0.83	24	C	0.85	21.4	C
McOrmond Drive and Kerr Road	0.75	18.7	B	0.74	21.4	C

v/c – volume to capacity; LOS – Level of Service

A review of the information provided in the table above and Appendix 1 yield the following observations:

- Marquis Drive and Idylwyld Drive – multiple intersection movements, notably eastbound and westbound movements, provide a poor LOS with significant delays in both AM and PM peak hours.
- 51<sup>st</sup> Street and Millar Avenue – multiple intersection movements, notably southbound and northbound movements, provide a poor LOS with significant delay mostly in the weekday PM peak hour.
- Circle Drive and Idylwyld Drive – multiple intersection movements, in all directions, provide a poor LOS with significant delay mostly in the weekday PM peak hour.
- Attridge Drive and Central Avenue – multiple intersection movements, in all directions, provide a poor LOS with significant delay mostly in the weekday PM peak hour.

The following is recommended:

- In the short-term, continue to monitor and adjust signal timings at impacted intersections.
- As part of the North Saskatoon Transportation Study include an intersection improvement plan for the intersection of Marquis Drive and Idylwyld Drive.
- Begin stakeholder consultation for the previously identified required improvement at the intersection of 51<sup>st</sup> Street and Millar Avenue.
- Revisit the previously completed functional planning study for the Circle Drive and Idylwyld Drive interchange once Phase 1 of the Saskatoon Freeway Functional Planning project is complete. More details are provided in Appendix 4.
- Complete an intersection improvement study for the intersections of Attridge Drive and Central Avenue in advance of the Bus Rapid Transit (BRT) project.

## 5. Intersection Analysis – Unsignalized Intersections

Details of the Level of Service for unsignalized intersections is provided in Table 5.

**Table 5: Level of Service Standards (unsignalized)**

Average Control Delay (sec./veh.)	Level of Service	General Description
<= 10	A	Free Flow
>10 to 15	B	Stable Flow (slight delays)
>15 to 25	C	Stable Flow (acceptable delays)
>25 to 35	D	Approaching unstable flow (tolerable delay, occasional wait through more than one signal cycle before proceeding)
>35 to 50	E	Unstable flow
>50	F	Forced flow

Detailed intersection analysis was completed for the following unsignalized intersections:

- McOrmond Drive and Stensrud Road (north)
- Central Avenue and Reid Road/Rossmo Road
- Lowe Road and Nelson Road
- Lowe Road and Ludlow Street
- Kerr Road and Kenderdine Road

A summary of the analysis for each of the unsignalized intersections is provided in Table 6. In addition, assessments were conducted to determine the need for traffic signals in adherence to the Traffic Signal and Pedestrian Signal Head Warrant Handbook. A warrant system assigns points for a variety of conditions including:

- Number of traffic lanes;
- Posted speed limit of the street;
- Distance to the nearest protected traffic signal; and
- Number of pedestrians and vehicles at the location.

Pedestrians and traffic data was collected during the peak hours of 7:00 a.m. to 9:00 a.m., 11:30 a.m. to 1:30 p.m., and 4:00 p.m. to 6:00 p.m. Full details of the intersection analysis for the unsignalized locations are provided in Appendix 2. Traffic Signal Warrants are provided in Appendix 3.

**Table 6: Intersection Analysis – Unsignalized Intersections**

Intersection	Weekday AM Peak Hour			Weekday PM Peak Hour			Traffic Signal Warrant
	Max v/c ratio	Average Delay (s)	LOS	Max v/c ratio	Average Delay (s)	LOS	
McOrmond Drive and Stensrud Road (north)	0.42	3.3	A	0.52	2.8	A	56 (Traffic Signal NOT warranted)
Central Avenue and Reid Road / Rossmo Road	0.52	5.5	A	1.17	16.5	C	74 (Traffic Signal NOT warranted)
Lowe Road and Nelson Road	0.61	18.9	C	0.63	20.4	C	112 (Traffic Signal warranted)
Lowe Road and Ludlow Street	0.6	4.8	B	0.62	8.7	B	86 (Traffic Signal NOT warranted)
Kerr Road and Kenderdine Road	0.44	9.8	A	1.02	37.1	E	66 (Traffic Signal NOT warranted)

A review of the information provided in Table 5, Table 6, Appendix 2 and Appendix 3 yield the following observations:

- Traffic signals are not warranted at the intersection of McOrmond Drive and Stensrud Road (north), the intersection of Central Avenue and Reid Road/ Rossmo Road, the intersection of Lowe Road and Ludlow Street.
- Traffic signals are warranted at the intersection of Lowe Road and Nelson Road.
- At the intersection of Kerr Road and Kenderdine Road there is a poor LOS for the southwest bound movement in the weekday PM peak hour.

The following is recommended:

- Place the intersection of Lowe Road and Nelson Road on the prioritization list for intersections to be signalized.
- Adjust lane designations (i.e. signs and pavement markings) at the intersection of Kerr Road and Kenderdine Road.

## **6. Summary**

### **6.1 Bridge Traffic Comparison**

The Chief Mistawasis Bridge has been operating with approximately 10,000 vpd, resulting in a reduction of approximately 10,000 vpd on the Circle Drive North Bridge. The Traffic Bridge has been operating at approximately 12,000 vpd. There may be some impact to the volume due to construction of the nearby Sid Buckwold Bridge.

Traffic volumes on the remaining bridges are relatively unchanged since the opening of the two new bridges.

### **6.2 Road Segment Review**

In general, the streets directly connected to the new Chief Mistawasis Bridge saw increased daily traffic, and previous alternate routes connecting to the Circle Drive North Bridge saw some decreases.

### **6.3 Intersection Recommendations**

The following is recommended:

1. In the short-term, continue to monitor and adjust signal timings at impacted intersections.
2. As part of the North Saskatoon Transportation Study include an intersection improvement plan for the intersection of Marquis Drive and Idylwyld Drive.
3. Begin stakeholder consultation for the previously identified required improvement at the intersection of 51<sup>st</sup> Street and Millar Avenue.
4. Revisit the previously completed functional planning study for the Circle Drive and Idylwyld Drive interchange once Phase 1 of the Saskatoon Freeway Functional Planning project is complete.
5. Complete an intersection improvement study for the intersections of Attridge Drive and Central Avenue in advance of the BRT project.
6. Place the intersection of Lowe Road and Nelson Road on the prioritization list for intersections to be signalized.
7. Adjust lane designations (i.e. signs and pavement markings) at the intersection of Kerr Road and Kenderdine Road.

## Appendix 1: Intersection Analysis – Signalized Intersections

### Marquis Drive and Wanuskewin Drive

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.49	35.2	D	45.8	0.74	57.5	E	77.7
	Thru	0.53	28.5	C	56.8	0.29	25.6	C	45.0
	RT	0.27	4.0	A	9.1	0.05	0.2	A	0
NB	LT	0.32	33.0	C	28.4	0.31	51.9	D	23.6
	Thru	0.32	30.8	C	24.8	0.80	43.7	D	99.0
	RT	0.08	0.4	A	0	0.34	6.8	A	16.5
EB	LT	0.06	34.9	C	6.7	0.27	39.0	D	26.1
	Thru	0.11	26.2	C	13.2	0.70	39.2	D	94.6
	RT	0.03	0.1	A	0	0.05	0.1	A	0
WB	LT	0.24	34.9	C	17.9	0.20	49.1	D	13.3
	Thru	0.51	24.9	C	71.0	0.26	41.3	D	23.7
	RT	0.22	2.7	A	6.3	0.38	5.8	A	10.6
Intersection Summary		Max 0.53	Average 24.6	C	-	Max 0.80	Average 35.7	D	-

### Marquis Drive and Arthur Rose Avenue

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT/Thru/RT	0.05	5.1	A	5.1	0.10	6.4	A	7.9
NB	LT/Thru/RT	0.29	10.9	B	22.9	0.24	8.6	A	16.2
EB	LT	0.54	29.6	C	21.1	0.09	12.9	B	7.0
	Thru/RT	0.23	7.2	A	10.7	0.91	28.7	C	88.2
WB	LT	0.14	13.6	B	8.5	0.34	21.7	C	11.1
	Thru/RT	0.69	19.0	B	46.8	0.20	13.0	B	15.5
Intersection Summary		Max 0.63	Average 15.7	B	-	Max 0.91	Average 23.1	C	-

### Marquis Drive and Idylwyld Drive

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.88	100.9	F	144.6	0.86	9104.1	F	125.0
	Thru	0.85	40.8	D	322.7	0.59	31.6	C	188.6
	RT	0.08	0.9	A	2.4	0.11	3.0	A	9.1
NB	LT	0.47	87.2	F	32.1	0.68	90.3	F	52.2
	Thru	0.43	36.2	D	113.8	1.09	93.7	F	436.7
	RT	0.34	4.2	A	19.8	0.16	5.2	A	14.1
EB	LT	0.30	52.7	D	35.3	1.00	113.8	F	130.4
	Thru	1.28	204.1	F	232.9	2.29	617.5	F	477.8
	RT	1.28	204.1	F	232.9	2.29	617.5	F	477.8
WB	LT	0.56	62.5	E	46.4	0.82	87.3	F	76.1
	Thru	0.58	67.0	E	72.5	1.31	198.0	F	191.4
	RT	0.58	67.0	E	72.5	1.31	198.0	F	191.4
Intersection Summary		Max 1.28	Average 59.9	E	-	Max 2.29	Average 163.4	F	-

### Marquis Drive and Highway 16

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.62	51.6	D	57.1	0.47	48.7	D	37.2
	Thru	0.53	36.0	C	73.0	0.33	28.4	C	58.9
	RT	0.53	36.0	C	73.0	0.33	28.4	C	58.9
NB	LT	0.36	42.5	D	37.1	0.17	41.2	D	17.1
	Thru	0.28	32.8	C	39.5	0.51	33.7	C	69.1
EB	LT/Thru/RT	0.56	46.4	D	51.0	0.58	40.3	D	48.1
WB	LT	0.17	43.1	D	17.8	0.30	43.0	D	28.3
	Thru	0.44	48.8	D	40.1	0.46	46.4	D	41.0
	RT	0.26	1.7	A	0	0.54	11.5	B	21.0
Intersection Summary		Max 0.62	Average 37.4	D	-	Max 0.58	Average 32.3	C	-



**51<sup>st</sup> Street and Warman Road**

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.36	60.2	E	29.1	0.68	49.0	D	51.3
	Thru	0.82	54.8	D	114.6	0.75	57.1	E	118.0
	RT	0.65	21.2	C	63.9	0.41	7.8	A	22.1
NB	LT	0.75	53.0	D	87.7	0.71	64.4	E	78.4
	Thru	0.39	29.0	C	67.9	0.81	52.1	D	153.5
	RT	0.19	1.9	A	5.9	0.68	23.5	C	91.5
EB	LT	0.46	32.2	C	41.9	0.71	17.0	B	42.4
	Thru	0.36	30.8	C	34.8	0.60	26.8	C	105.0
	RT	0.36	30.8	C	34.8	1.11	69.0	E	201.1
WB	LT	0.64	34.1	C	73.7	0.62	36.1	D	48.7
	Thru	0.51	38.3	D	79.5	0.33	40.9	D	66.3
	RT	0.51	38.3	D	79.5	0.24	2.3	A	5.0
Intersection Summary		Max 0.82	Average 38.3	D	-	Max 1.11	Average 44.0	D	-

**51<sup>st</sup> Street and Millar Avenue**

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.78	52.7	D	86.2	1.83	412.9	F	279.5
	Thru								
	RT								
NB	LT	0.84	60.4	E	95.2	2.05	326.3	F	184.8
	Thru								
	RT								
EB	LT	0.84	64.4	E	78.2	0.62	36.3	D	44.4
	Thru	0.35	32.6	C	50.4	0.93	57.5	E	193.5
	RT	0.35	32.6	C	50.4	0.93	57.5	E	193.5
WB	LT	0.53	15.0	B	36.8	0.62	46.8	D	48.4
	Thru	0.81	27.1	C	135.5	0.54	54.3	D	114.3
	RT	0.81	27.1	C	135.5	0.54	54.3	D	114.3
Intersection Summary		Max 0.84	Average 38.7	D	-	Max 1.83	Average 177.5	F	-

### Circle Drive and Idylwyld Drive

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.65	65.1	E	64.4	0.63	60.7	E	73.8
	RT	0.24	1.7	A	0	0.53	20.8	C	36.5
NB	LT	0.72	86.1	F	52.2	0.72	76.4	E	75.6
	RT	0.62	34.4	C	36.7	0.67	41.8	D	56.4
EB	LT	0.60	59.9	E	78.5	0.53	62.7	E	74.6
	Thru	0.58	4.5	A	52.6	0.68	18.0	B	42.5
	RT	0.71	10.5	B	45.6	0.68	18.0	B	42.5
WB	LT	0.63	66.2	E	52.3	0.70	49.9	E	48.8
	Thru	0.61	27.1	C	60.0	1.05	71.1	F	177.0
	RT	0.61	27.1	C	60.0	1.05	71.1	F	177.0
Intersection Summary		Max 0.72	Average 20.7	C	-	Max 1.05	Average 55.0	E	-

### Attridge Drive and Central Avenue

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.10	62.2	E	12.4	0.42	88.5	F	68.3
	Thru	0.43	67.6	E	32.2	0.53	87.2	F	77.8
	RT	0.71	2.8	A	0	0.85	25.0	C	73.7
NB	LT	0.83	80.0	E	121.2	0.75	100.9	F	143.4
	Thru	0.80	66.7	E	97.1	0.74	87.4	E	124.4
	RT	0.80	66.7	E	97.1	0.74	87.4	D	124.4
EB	LT	0.68	74.9	E	37.0	0.81	80.2	F	193.1
	Thru	0.36	23.9	C	84.4	0.99	72.9	E	578.4
	RT	0.19	3.6	A	13.1	0.92	54.2	D	457.8
WB	LT	0.20	54.3	D	7.7	0.32	82.1	F	58.5
	Thru	0.88	33.0	C	290.4	0.79	65.4	E	325.3
	RT	0.05	0.1	A	0	0.08	5.0	A	5.8
Intersection Summary		Max 0.88	Average 33.0	C	-	Max 0.99	Average 68.2	E	-

**Attridge Drive and Berini Drive**

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.43	45.6	D	20.8	0.28	52.3	D	16.6
	Thru	0.59	18.7	B	23.1	0.46	22.1	C	17.4
	RT	0.59	18.7	B	23.1	0.46	22.1	C	17.4
NB	LT	0.83	51.1	D	53.3	0.51	42.0	D	41.0
	Thru	0.25	24.3	C	25.7	0.05	33.0	C	7.9
	RT	0.16	4.4	A	25.7	0.28	7.8	A	14.2
EB	LT	0.56	21.6	C	29.7	0.36	9.6	A	16.8
	Thru	0.50	19.7	B	72.7	0.85	27.8	C	207.8
	RT	0.50	19.7	B	72.7	0.85	27.8	C	207.8
WB	LT	0.22	10.4	B	12.5	0.48	34.4	C	18.9
	Thru	0.83	26.8	C	150.6	0.51	9.1	A	75.2
	RT	0.20	3.3	A	6.1	0.51	0.2	A	0.2
Intersection Summary		Max 0.83	Average 24.0	C	-	Max 0.85	Average 21.4	C	-

**McOrmond Drive and Kerr Road/Stensrud Road**

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB (McOrmond Dr)	LT	0.12	12.2	B	10.2	0.46	16.8	B	25.4
	Thru	0.59	26.5	C	76.1	0.61	34.1	C	104.4
	RT	0.08	0.2	A	0	0.25	7.4	A	16.9
NB (McOrmond Dr)	LT	0.36	14.6	B	20.8	0.74	22.2	C	106.1
	Thru	0.38	21.6	C	51.1	0.58	19.7	B	119.4
	RT	0.18	4.6	A	10.7	0.48	5.1	A	33.8
EB (Kerr Rd)	LT	0.19	19.4	B	21.9	0.27	34.1	C	28.6
	Thru	0.05	17.5	B	9.8	0.16	31.6	C	23.4
	RT	0.53	4.3	A	18.4	0.47	6.7	A	19.1
WB (Stensrud Rd)	LT	0.75	34.2	C	94.2	0.72	48.8	D	72.4
	Thru	0.06	17.6	B	10.9	0.14	31.4	C	21.5
	RT	0.27	4.0	A	12.5	0.23	5.9	A	10.4
Intersection Summary		Max 0.75	Average 18.7	B	-	Max 0.74	Average 21.4	C	-

## Appendix 2: Intersection Analysis – Unsignalized Intersections

### McOrmond Drive and Stensrud Road (north intersection)

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.02	8.3	A	0.6	0.09	9.8	A	2.2
	Thru	0.17	0	A	0	0.24	0	A	0
NB	Thru	0.12	0	A	0	0.24	0	A	0
	RT	0.02	0	A	0	0.08	0	A	0
WB	LT	0.42	23.8	C	15.3	0.52	59.9	F	18.7
	RT	0.09	10.0	A	2.3	0.11	11.7	B	2.8
Intersection Summary		Max 0.42	Average 3.3	A	-	Max 0.52	Average 2.8	A	-

### Central Avenue and Reid Road/Rossmo Road

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT/Thru	0.03	1.1	A	0.7	0.18	4.2	A	4.9
	RT	0.03	0	A	0	0.07	0	A	0
NB	LT/Thru/RT	0.01	0.2	A	0.2	0.05	1.2	A	1.1
EB	LT/Thru/RT	0.52	44.8	E	20.1	1.17	251.6	F	50.4
WB	LT/Thru/RT	0.28	16.3	C	8.6	0.36	33.0	D	50.4
Intersection Summary		Max 0.52	Average 5.5	A	-	Max 1.17	Average 16.5	C	-

### Lowe Road and Nelson Road

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT/Thru/RT	NA	24.7	C	NA	NA	15.7	C	NA
NB	LT/Thru/RT	NA	14.2	B	NA	NA	26.1	D	NA
EB	LT/Thru/RT	NA	14.7	B	NA	NA	12.7	B	NA
WB	LT/Thru/RT	NA	16.9	C	NA	NA	19.3	C	NA
Intersection Summary		0.61	18.9	C	NA	0.63	20.4	C	NA

**Lowe Road and Ludlow Street**

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	All movements	0.02	0.6	A	0	0.04	1.3	A	1
NB	LT / Thru	0.16	5.0	A	4	0.01	0.3	A	0
	RT	0.07	0	A	0	0.09	0	A	0
EB	All movements	0.11	13.4	B	3	0.07	12.9	B	2
WB	All movements	0.34	36.8	E	10	0.71	45.6	E	37
<b>Intersection Summary</b>		<b>0.60</b>	<b>4.8</b>	<b>B</b>	<b>NA</b>	<b>0.62</b>	<b>8.7</b>	<b>B</b>	<b>NA</b>

**Kerr Road and Kenderdine Road**

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SEB (Kenderdine Rd)	LT/Thru/RT	0.10	9.0	A	-	0.34	13.5	B	-
NWB (Kenderdine Rd)	LT/Thru/RT	0.44	10.8	B	-	0.42	13.8	B	-
NEB (Kerr Rd)	LT	0.18	8.8	A	-	0.21	10.7	B	-
	Thru/RT	0.18	8.7	A	-	0.20	10.4	B	-
SWB (Kerr Rd)	LT/Thru	0.17	9.2	A	-	1.02	68.3	F	-
	RT	0.02	7.1	A	-	0.10	8.1	A	-
<b>Intersection Summary</b>		<b>Max 0.44</b>	<b>Average 9.8</b>	<b>A</b>	<b>-</b>	<b>Max 1.02</b>	<b>Average 37.1</b>	<b>E</b>	<b>-</b>

## Appendix 3: Traffic Signal Warrants

### McOrmond Drive and Stensrud Road (north intersection)

Main Street (name)	McOrmond Dr	Direction (EW or NS)	NS	Road Authority:	City of Saskatoon
Side Street (name)	Stensrud (north)	Direction (EW or NS)	EW	City:	Saskatoon
Quadrant / Int #		Comments		Analysis Date:	2019 Sep 11, Wed
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2019 Apr 18, Thu
				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	Upstream Signal (m)	# of Tmo Lanes
McOrmond Dr	NB			2		1			3
McOrmond Dr	SB	1		2					2
Stensrud (north)	WB	1					1		
Stensrud (north)	EB								

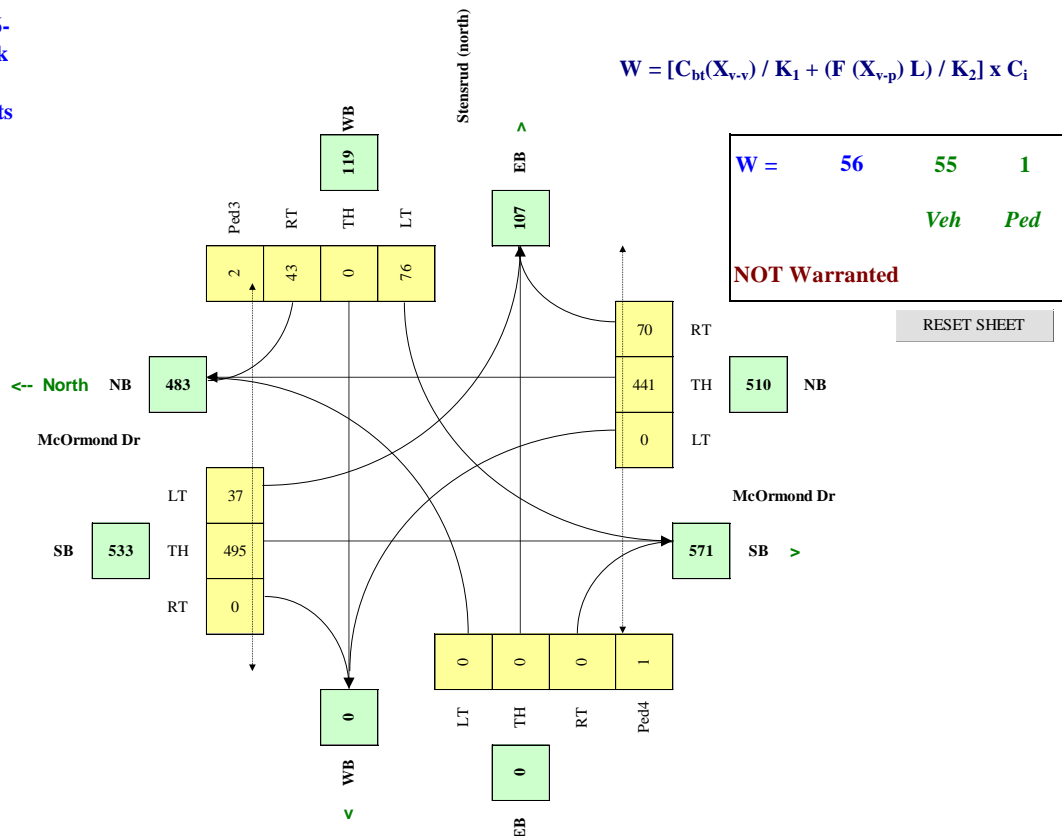
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	250,000
Central Business District	(y/n)	n

Other input		Speed (Kmh)	Truck %	Bus Rt (y/n)	Median (m)
McOrmond Dr	NS	50	2.0%	y	5.0
Stensrud (north)	EW	50	2.0%	y	

Set Peak Hours													Ped1	Ped2	Ped3	Ped4
Traffic Input	NB			SB			WB			EB			NS	NS	EW	EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:00 - 8:00		361	16	16	475		97		73						4	1
8:00 - 9:00		346	52	33	519		118		38						3	1
11:30 - 12:30		313	64	22	359		50		27						1	
12:30 - 13:30		311	52	20	345		62		22						4	
4:00 - 5:00		601	125	64	645		67		61							
5:00 - 6:00		711	109	69	628		61		35							2
Total (6-hour peak)	0	2,643	418	224	2,971	0	455	0	256	0	0	0	0	0	12	4
Average (6-hour peak)	0	441	70	37	495	0	76	0	43	0	0	0	0	0	2	1

Average 6-  
hour Peak  
Turning  
Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p}) L) / K_2] \times C_i$$



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## Central Avenue and Reid Road/Rossmo Road

Main Street (name)	Central Ave	Direction (EW or NS)	NS
Side Street (name)	Reid Rd/Rossmo Rd	Direction (EW or NS)	EW
Quadrant / Int #		Comments	
for Warrant Calculation Results, please hit 'Page Down'			
CHECK SHEET			

Road Authority:	City of Saskatoon
City:	Saskatoon
Analysis Date:	2019 Sep 11, Wed
Count Date:	2019 Apr 30, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT-LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Central Ave NB			1			1			2
Central Ave SB			1				1		1
Reid Rd/Rossmo Rd WB					1				
Reid Rd/Rossmo Rd EB					1				

Are the Reid Rd/Rossmo Rd WB right turns significantly impeded by through movements? (y/n) n

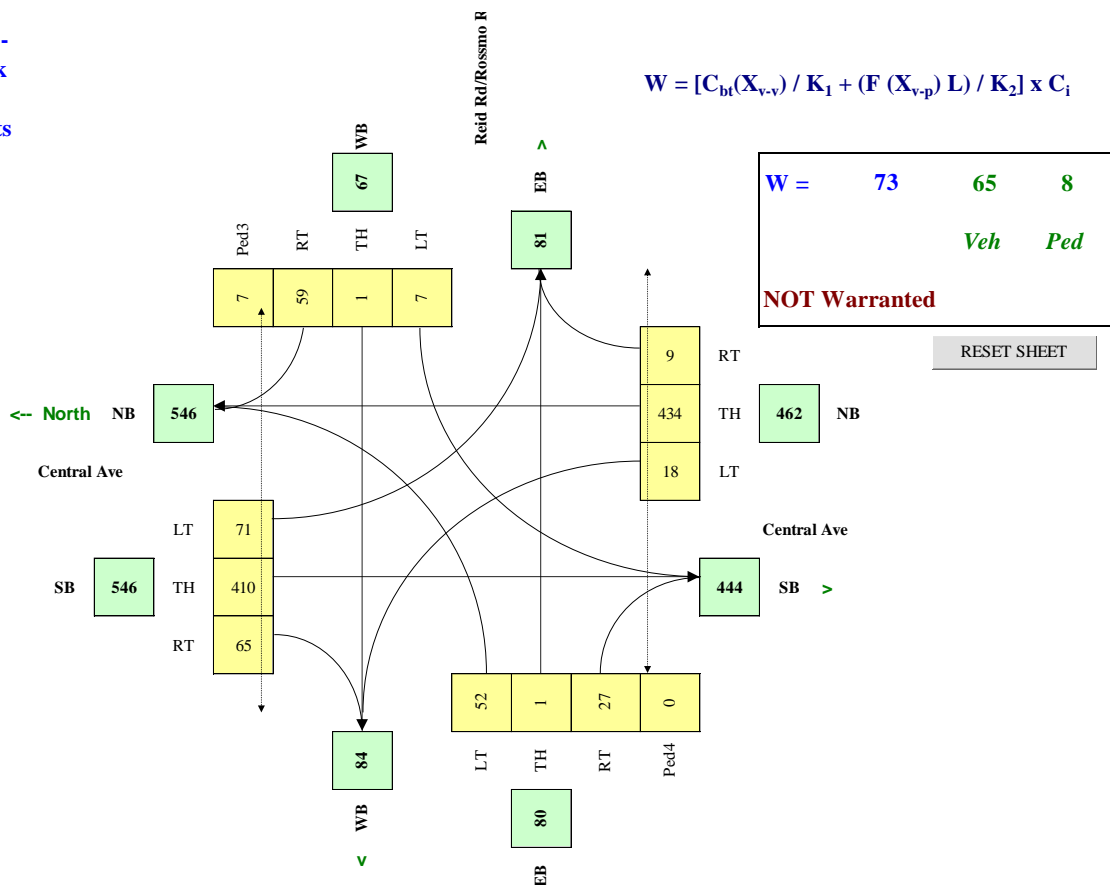
Are the Reid Rd/Rossmo Rd EB right turns significantly impeded by through movements? (y/n) n

Other input		Speed (Kmh)	Truck %	Bus Rt (y/n)	Median (m)
Central Ave	NS	50	2.0%	y	
Reid Rd/Rossmo Rd	EW	50	2.0%	y	

Set Peak Hours													Ped1	Ped2	Ped3	Ped4
Traffic Input													NS	NS	EW	EW
NB				SB			WB			EB			W Side	E Side	N Side	S Side
LT	Th	RT		LT	Th	RT	LT	Th	RT	LT	Th	RT				
7:00 - 8:00	6	465	3	8	178	15	4	0	90	74	0	26	8	3	6	2
8:00 - 9:00	13	528	5	28	266	48	6	0	96	56	2	28	3	3	12	
11:30 - 12:30	15	402	9	44	366	59	9	1	27	48	1	17	1	4	6	
12:30 - 13:30	17	360	10	45	372	40	7	2	50	46	1	16	4	0	3	
4:00 - 5:00	29	387	12	136	628	121	7	0	36	43	1	32	1	5	7	
5:00 - 6:00	28	464	16	165	647	107	10	2	57	46	0	44	2	2	6	
Total (6-hour peak)	108	2,606	55	426	2,457	390	43	5	356	313	5	163	19	17	40	2
Average (6-hour peak)	18	434	9	71	410	65	7	1	59	52	1	27	3	3	7	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v,v}) / K_1 + (F(X_{v,p}) L) / K_2] \times C_i$$





# Chief Mistawasis Bridge Traffic AssessmentAppend 1 - Chief Mistawasis Bridge Traffic Assessment.docx

## Lowe Road and Nelson Road

Main Street (name)	Nelson	Direction (EW or NS)	EW
Side Street (name)	Lowe	Direction (EW or NS)	NS
Quadrant / Int #		Comments	
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	City of Saskatoon
City:	Saskatoon
Analysis Date:	2019 Aug 27, Tue
Count Date:	2019 Apr 16, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT-LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Nelson	WB				1				1
Nelson	EB				1				1
Lowe	NB				1				
Lowe	SB				1				

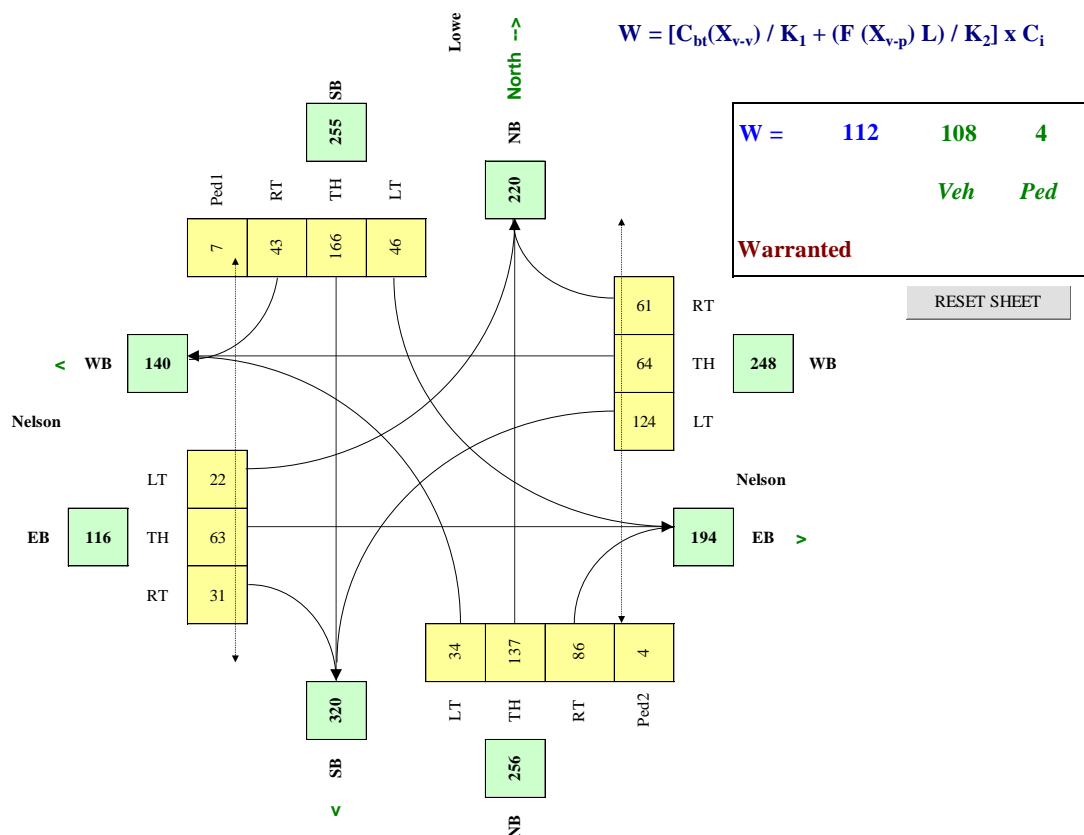
Are the Lowe NB right turns significantly impeded by through movements? (y/n) n  
Are the Lowe SB right turns significantly impeded by through movements? (y/n) n

Other input		Speed (Kmh)	Truck %	Bus Rt (y/n)	Median (m)
Nelson	EW	50	20.0%	y	
Lowe	NS	50	10.0%	y	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	250,000
Central Business District	(y/n)	n

Low		NS	30	10.0%	Y																		
Set Peak Hours														Ped1	Ped2	Ped3	Ped4						
Traffic Input		NB			SB			WB			EB			NS	NS	EW	EW						
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side						
7:00 - 8:00		13	48	21	45	215	27	76	37	18	4	19	7	3	3	4	3						
8:00 - 9:00		68	80	61	41	226	142	100	134	27	38	107	72	6	1	8	43						
11:30 - 12:30		21	130	94	44	125	9	119	32	56	28	71	39	10	4	22	10						
12:30 - 13:30		38	105	93	34	151	32	173	74	58	14	46	25	11	6	21	22						
4:00 - 5:00		22	223	125	60	132	15	125	44	90	37	66	15	4	6	23	14						
5:00 - 6:00		41	235	120	49	148	32	149	60	115	13	68	25	9	4	27	17						
Total (6-hour peak)		203	821	514	273	997	257	742	381	364	134	377	183	43	24	105	109						
Average (6-hour peak)		34	137	86	46	166	43	124	64	61	22	63	31	7	4	18	18						

### Average 6-hour Peak Turning Movements



# Chief Mistawasis Bridge Traffic AssessmentAppend 1 - Chief Mistawasis Bridge Traffic Assessment.docx

## Lowe Road and Ludlow Street

Main Street (name)	Low Rd	Direction (EW or NS)	NS
Side Street (name)	Ludlow St	Direction (EW or NS)	EW
Quadrant / Int #		Comments	
for Warrant Calculation Results, please hit 'Page Down'			
CHECK SHEET			

Road Authority:	City of Saskatoon
City:	Saskatoon
Analysis Date:	2019 Sep 11, Wed
Count Date:	2019 Apr 17, Wed
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT-LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Low Rd	NB		1				1		1
Low Rd	SB				1				1
Ludlow St	WB				1				
Ludlow St	EB				1				

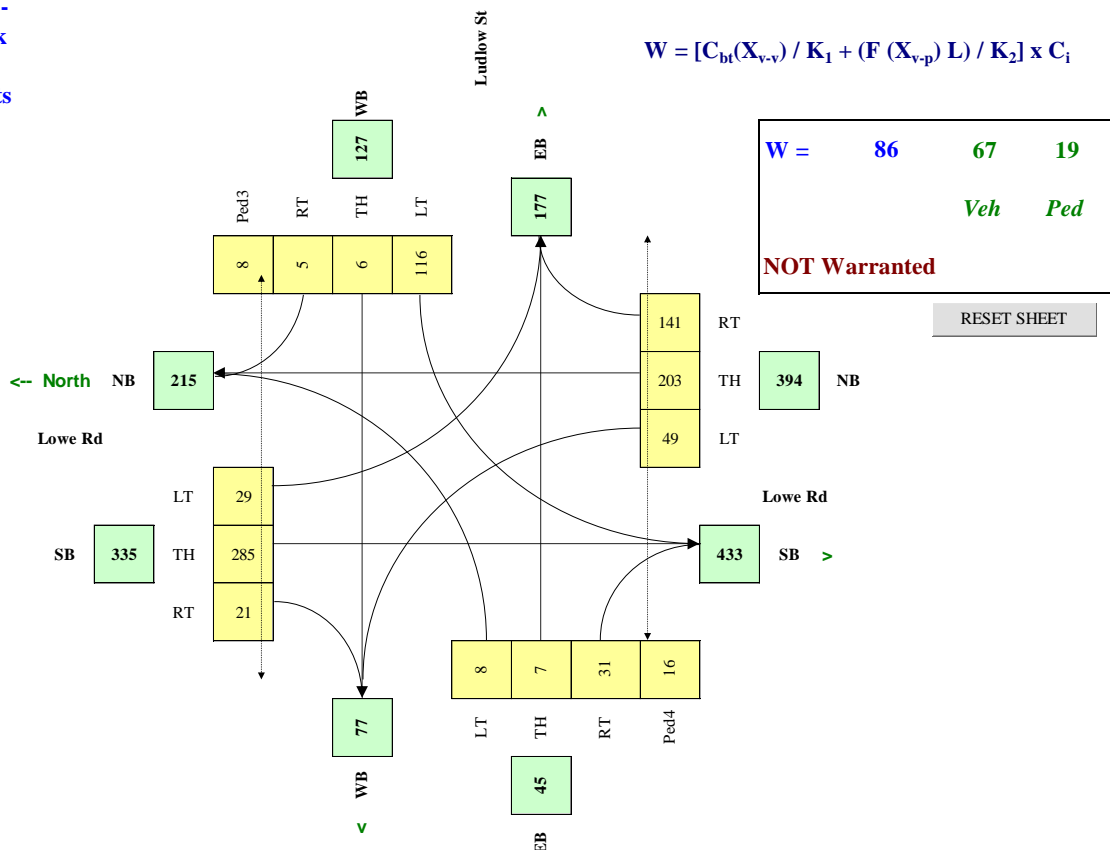
Are the Ludlow St WB right turns significantly impeded by through movements? (y/n) n  
Are the Ludlow St EB right turns significantly impeded by through movements? (y/n) y

Other input		Speed (Kmh)	Truck %	Bus Rt (y/n)	Median (m)
Low Rd	NS	50	2.0%	y	0.0
Ludlow St	EW	50	2.0%	n	

Set Peak Hours														Ped1	Ped2	Ped3	Ped4
Traffic Input														NS	NS	EW	EW
NB				SB			WB			EB				W Side	E Side	N Side	S Side
LT	Th	RT		LT	Th	RT	LT	Th	RT	LT	Th	RT					
7:00 - 8:00	11	74	84	16	301	2	48	1	0	0	0	4	4	4	2	1	2
8:00 - 9:00	165	185	107	19	325	56	47	4	3	2	5	43	4	2	1	6	
11:30 - 12:30	17	171	156	32	252	4	143	10	8	16	6	61	15	3	11	15	
12:30 - 13:30	70	173	195	42	289	47	148	18	7	13	18	37	26	10	25	67	
4:00 - 5:00	11	285	170	28	263	2	180	1	4	8	5	22	21	6	6	3	
5:00 - 6:00	21	331	135	39	280	15	132	4	5	6	5	20	1	8	1	2	
Total (6-hour peak)	295	1,219	847	176	1,710	126	698	38	27	45	39	187	71	31	45	95	
Average (6-hour peak)	49	203	141	29	285	21	116	6	5	8	7	31	12	5	8	16	

### Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v,v}) / K_1 + (F(X_{v,p}) L) / K_2] \times C_i$$



# Chief Mistawasis Bridge Traffic AssessmentAppend 1 - Chief Mistawasis Bridge Traffic Assessment.docx

## Kerr Road and Kenderdine Road

Main Street (name)	Kerr	Direction (EW or NS)	EW
Side Street (name)	Kenderdine	Direction (EW or NS)	NS
Quadrant / Int #		Comments	
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	City of Saskatoon
City:	Saskatoon
Analysis Date:	2019 Sep 11, Wed
Count Date:	2019 Jul 09, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT-LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Kerr	WB		1				1		1
Kerr	EB		1			1			2
Kenderdine	NB				1				
Kenderdine	SB				1				

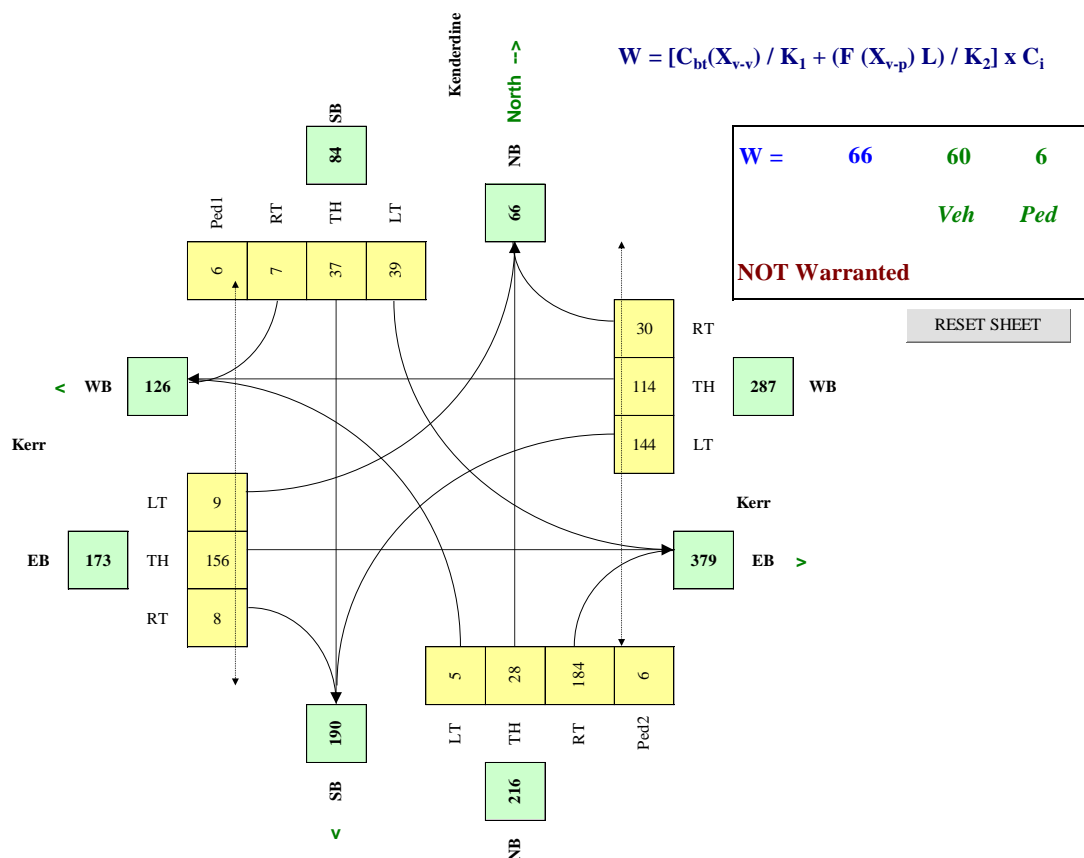
Are the Kenderdine NB right turns significantly impeded by through movements? (y/n) y  
Are the Kenderdine SB right turns significantly impeded by through movements? (y/n) n

Other input		Speed (Kmh)	Truck %	Bus Rt (y/n)	Median (m)
Kerr	EW	50	2.0%	y	0.0
Kenderdine	NS	50	2.0%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	250,000
Central Business District	(y/n)	n

Kendurine		NS	30	2.0%	n															
Set Peak Hours													Ped1	Ped2	Ped3	Ped4				
Traffic Input	NB			SB			WB			EB			NS	NS	EW	EW				
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side				
7:00 - 8:00	5	25	297	40	10	2	38	39	10	4	183	6	9	2	6	3				
8:00 - 9:00	5	32	220	28	18	3	69	57	18	9	183	3	8	4	5					
11:30 - 12:30	3	23	114	32	30	10	122	102	30	9	110	8	5	3	7					
12:30 - 13:30	6	8	158	32	26	11	111	98	15	9	165	8	5	5	12	2				
4:00 - 5:00	7	32	149	37	67	14	242	196	49	14	150	12	2	6	8					
5:00 - 6:00	3	46	165	65	73	3	283	190	55	9	146	12	9	14	6					
Total (6-hour peak)	29	166	1,103	234	224	43	865	682	177	54	937	49	38	34	44	5				
Average (6-hour peak)	5	28	184	39	37	7	144	114	30	9	156	8	6	6	7	1				

### Average 6-hour Peak Turning Movements



## Appendix 4: Circle Drive and Idylwyld Drive Interchange

### Background:

In August 2010, the City of Saskatoon retained Hatch Mott MacDonald to review the design of the Idylwyld Drive/Circle Drive interchange in an effort to identify opportunities to improve its operation and function, as well as the operation and function of the Circle Drive North corridor between Millar Avenue and Avenue C.

The Administration brought a report to the Planning and Operations Committee on March 6, 2012 recommending:

1. “That the Idylwyld Drive – Circle Drive Functional Design Study – Final Report be approved in principle; and
2. That the Administration report further with respect to the funding and/or timing of the implementation of the recommendations from the Idylwyld Drive – Circle Drive Functional Design Study – Final Report.”

The Administration proposed the following course of action:

1) That the Administration continue to work with the Province on the development of the Saskatoon Freeway as the preferred commercial vehicle route (to address capacity issues related to truck movements at this interchange).

- The functional planning study is currently underway.

2) That the Administration investigate the potential to improve the Warman Road and 51<sup>st</sup> Street corridors as a means to relieve the operational problems at the interchange and along the corridor.

- The intersection of Warman Road and 51<sup>st</sup> Street was improved in 2016.
- The functional planning study for intersection improvements at 51<sup>st</sup> Street and Millar Avenue will begin stakeholder engagement in 2020.

3) That the Administration create a capital budget submission to undertake short term ramp improvements at the interchange.

- This work was delayed to wait for the opening of the Chief Mistawasis Bridge.

4) That the Administration undertake further investigations into the design of a “Single Point Urban Interchange” at this location.

- This work was delayed to wait for the opening of the Chief Mistawasis Bridge. Table A4-1 illustrates the LOS with existing traffic volumes.

**Table A4-1: Circle Drive and Idylwyld Drive – Single Point Urban Interchange**

Movement		Weekday AM Peak Hour				Weekday PM Peak Hour			
		v/c ratio	Delay (s)	LOS	Queue (m)	v/c ratio	Delay (s)	LOS	Queue (m)
SB	LT	0.74	48.5	D	40.8	0.86	59.3	E	53.5
	Thru	-	-	-	-	-	-	-	-
	RT	0.06	0	A	0	0.13	0.2	A	0
NB	LT	0.50	43.6	D	36.2	0.77	60.5	E	61.1
	Thru	-	-	-	-	-	-	-	-
	RT	0.10	0	A	0	0.13	0.2	A	0
EB	LT	0.73	49.1	D	55.3	0.73	48.9	D	54.8
	Thru	0.81	21.9	C	159.0	0.78	21.9	C	115.3
	RT	0.16	2.8	A	9.5	0.22	2.7	A	10.6
WB	LT	0.52	45.0	D	33.3	0.65	47.9	D	47.1
	Thru	0.51	18.9	B	63.6	0.81	25.4	C	123.2
	RT	0.47	3.8	A	16.4	0.56	4.2	A	17.8
<b>Intersection Summary</b>		<b>Max 0.78</b>	<b>Average 21.5</b>	<b>C</b>	<b>-</b>	<b>Max 0.81</b>	<b>Average 24.0</b>	<b>C</b>	<b>-</b>

5) That the Administration continue to monitor and assess the effects on traffic patterns arising from the completion of Circle Drive South and alternate routing.

- Circle Drive South and the Gordie Howe Bridge opened in 2011 and a follow-up study was completed in 2012.
- The Chief Mistawasis Bridge opened October 2, 2018.

The Administration does not recommend proceeding to the development of a capital project for the short-term ramp improvements at this time. During Phase 1 of the Saskatoon Freeway Functional Planning Study a significant change to the regional highway network is proposed – relocating Highway 11 from Idylwyld Drive to Wanuskewin Road near the northern city limits. This has the potential to move some commercial truck traffic from the Circle Drive and Idylwyld Drive interchange further east to the Warman Road interchange as well as shift some commuter traffic in a similar manner. The Administration is working with the Ministry and the Ministry's consultant on the functional plan for the Saskatoon Freeway, as planning progresses to a recommendation the Administration will revisit the Single Point Urban Interchange at this location.