January 11th, 2021

Mr. Michael Nobes
Director of Development Services
County of Lennox & Addington
Infrastructure Services
45 Commercial Court
Napanee, Ontario
K7R 3L4

Dear Mr. Nobes;

Re: Proposed Asphalt Plant, 8205 County Road 2 Napanee – Traffic Impact Study Response 2 to County Comments (Dec. 18th, 2020) and GHD Peer Review (Jan. 8th, 2021)

Subsequent to the submission of the "*Proposed Asphalt Plant, 8205 County Road 2, Napanee Traffic Impact Study*" and the "*Response to County Comments and GHD Peer Review*" *(Nov. 2020)* the following County comment-response was noted as deficient:

> **County Comment 5:** *"In the TIA Table 1-2 and Table 2-2 under the approach/movement there are 2 references to SB on County Rd 2. I believe these should be referring to SB on County Rd 5. Please check and confirm these movements."*
>
> Table 1-2 referenced from page 5 of the TIS has been revised and included below. No changes to Table 2-2 are required as the second row correctly references the northbound approach.
>
> *The report attached in Appendix B still contains these errors and the new material supplied also contains the same errors. The southbound approach is on County Road 5 and the northbound approach is on Palace Road. The table erroneously refers to the northbound and southbound approached as County Road 2. The errors regarding the references to County Road 2 and County Road 5 continue in the new material supplied on page 3, in the paragraph below the bullet points.*

To resolve the above comments, the following table changes have been incorporated:

- Row 1 of Table A (Page 3 of Letter Response 1), Table B (Page 6 of Letter Response 1), Table 1-2 (Page 5 of TIS) and Table 2-2 (Page 14 of TIS) now indicate "**SB Approach: County Road 5";**
- Row 2 of Table A (Page 3 of Letter Response 1), Table B (Page 6 of Letter Response 1), Table 1-2 (Page 5 of TIS) and Table 2-2 (Page 14 of TIS) now indicate "**NB Approach: Palace Road";**

The Traffic Impact Study and Letter Response 1 (November, 2020) analysis, findings, and recommendations remain unchanged due to the above amendments. Table A (Revised) and Table B (Revised) are included below for ease of reference. The previous letter and TIS submissions have been included as attachments with the revised table references.

Table A (Revised): Build-Out Forecast Traffic Results (Forecast 2021 and Forecast 2026)

Intersection	*Weekday Morning Peak Hour (Afternoon Peak Hour)*						
	Approach / Movement	*Forecast (2021)*			*Forecast (2026)*		
		Delay (seconds)	**LOS**	**Volume/Capacity Ratio (v/c)**	**Delay (seconds)**	**LOS**	**Volume/Capacity Ratio (v/c)**
County Road 2 & County Road 5/Palace Road Two-Way STOP Controlled	~~SB on County Rd 2~~ **SB Approach: County Road 5**	12 (**43**)	B (**E**)	0.25 (0.74)	13 (**65**)	B (**F**)	0.28 (0.88)
	~~NB on County Rd 2~~ **NB Approach: Palace Road**	13 (31)	B (D)	0.16 (0.41)	14 (44)	B (**E**)	0.18 (0.55)
County Road 2 & Existing Quarry Access With EB-LT Lane	SB leaving Quarry Site	11 (14)	B (B)	0.04 (0.06)	12 (16)	B (C)	0.05 (0.07)

Table B (Revised): County Road 2 / County Road 5 - 2026 Forecast Intersection Capacity Results With and without a channelized and YIELD-controlled SB-RT Auxiliary Lane

Weekday Morning Peak Hour (Afternoon Peak Hour)							
Approach / Movement	*Forecast (2026) – No Improvements*			**Approach / Movement**	*Forecast (2026) With Channelized SB-RT*		
	Delay (seconds)	**LOS**	**Volume/ Capacity Ratio (v/c)**		**Delay (seconds)**	**LOS**	**Volume/ Capacity Ratio (v/c)**
~~SB on County Rd 2~~ **SB Approach: County Road 5**	13 (**65**)	B (**F**)	0.28 (0.88)	SB-Thru/LT	14 (**64**)	B (**F**)	0.13 (0.66)
				SB-RT Channelized	10 (12)	B (B)	0.16 (0.22)
~~NB on County Rd 2~~ **NB Approach: Palace Road**	14 (44)	B (**E**)	0.18 (0.55)	~~NB on County Rd 2~~ **NB Approach: Palace Road**	13 (41)	B (**E**)	0.18 (0.52)

This letter document has the following attachments:

- Annex A – November 20th Letter Response to County Comments and GHD Peer Review, Revised Tables;
- Annex B – Synchro Prints for 2026, 2026 with Channelized SB-RT and Traffic Signal Warrants (2026), No Changes; and

- Annex C – The *Proposed Asphalt Plant, 8205 County Road 2, Napanee Traffic Impact Study, July, 2020, Castleglenn Consultants Inc, Revision 3.* Revisions to Tables 1-2 and 2-2 as noted.

If you have any questions, or would like additional information, please feel free to contact the undersigned at (613) 731-4052.

Yours Truly

Mr. Arthur Gordon B.A. P.Eng
Principal Engineer
Castleglenn Consultants Inc.

Mr. Jake Berube P.Eng
Transportation Engineer
Castleglenn Consultants Inc.

Castleglenn Consultants
Engineers, Project Managers & Planners

Attachment A

Letter Response 1 Proposed Asphalt Plant, 8205 County Road 2 Napanee – Traffic Impact Study

Response to County Comments (October 23rd, 2020) and GHD Peer Review (October 8th, 2020)

November 20th, 2020

Mr. Michael Nobes
Director of Development Services
County of Lennox & Addington
Infrastructure Services
45 Commercial Court
Napanee, Ontario
K7R 3L4

Dear Mr. Nobes;

Re: Proposed Asphalt Plant, 8205 County Road 2 Napanee – Traffic Impact Study
Response to County Comments (October 23rd, 2020) and GHD Peer Review (October 8th, 2020)

Subsequent to the submission of the "*Proposed Asphalt Plant, 8205 County Road 2, Napanee Traffic Impact Study"* the following comments were received:

- An October 23rd, 2020 letter from Mr. Jim Klaver (County of Lennox & Addington) concerning staff comments regarding the first submission of the traffic impact study; and
- An October 8th, 2020 letter from Ms. Vanessa Skelton (GHD Group) regarding a peer review of the subject traffic study.

The following sections provide a response to the County and GHD comments regarding the proposed Asphalt Plant development.

1. County Comments – Site Entrance and Traffic Impact Assessment

County Comment 1: "*We are uncertain on the location of the existing entrance and roadway into this site. Is the entrance completely on the applicant's lands, unopened road allowance and or adjacent lands? Is there any form of agreement or easement for the adjacent landowner to use this entrance? "*

As illustrated on Exhibit 1-1 of the TIS, the existing quarry site access is located on the north side of County Road 2 approximately 915m east of the County Road 2 / County Road 5 intersection. The asphalt plant would be accessed from the existing quarry access.

Tomlinson is aware of this matter and is looking into property information to ascertain ownership and rights. The existing access has been in use for several decades and is currently used by trucks to access Tomlinson's quarry.

County Comment 2: *"The entrance to the site has given us maintenance problems in the past with mud being tracked out onto County Rd 2 during wet conditions. The County will have a* requirement *for paving of the entrance apron to mitigate this issue"*

Comment noted. Tomlinson is in agreement with paving the entrance apron as a condition of site plan approval.

County Comment 3: *"The TIA (Traffic Impact Assessment) identified the need for a left turn lane or slip around lane on County Rd 2 at the site entrance. The County will require the applicant to construct this and will provide more details on this at the Site Plan stage."*

Comment noted. Further design details will be provided at the Site Plan stage.

County Comment 4: *"The TIA did not look at the need for a right turn taper for WB traffic entering the site. This should be considered as we feel that this may improve safety for trucks decelerating to exit County Rd 2 and enter the site."*

While a detailed numerical warrant analysis for a left turn taper is provided by the Transportation Association of Canada (TAC), the need for a right turn lane and taper is based on "*when the volume of the decelerating or accelerating vehicles compared with the through traffic volume causes undue hazard*"[1].

Exhibit 1-3 of the TIS illustrated the morning and afternoon peak hour volumes at the site access, most of which travel to and from east of the site. The exhibit indicated a forecast of 6 trucks-per-hour entering the site from the east (WB-RT) for the combined asphalt plant and existing quarry activity. This represents a single vehicle every 10 minutes during the peak hours of travel demand. The exhibit also indicated a westbound thru volume of 210-to-390 vehicles-per-hour which could be disrupted by right-turning vehicles into the site.

The right turn truck volume is not anticipated to be substantial enough to require a right turn auxiliary lane or taper. Therefore, a right turn lane is not recommended to support the proposed asphalt plant.

County Comment 5: *"In the TIA Table 1-2 and Table 2-2 under the approach/movement there are 2 references to SB on County Rd 2. I believe these should be referring to SB on County Rd 5. Please check and confirm these movements."*

Table 1-2 referenced from page 5 of the TIS has been revised and included below. No changes to Table 2-2 are required as the second row correctly references the northbound approach.

January 11th, 2021 – Table A, Table B, Table 1-2 and Table 2-2 have been revised to indicate Southbound Approach: County Road 5 and Northbound Approach: Palace Road. Reference to County Road 2 approaches have been removed.

[1] "*Geometric Design Guide for Canadian Roads*", Transportation Association of Canada, June 2017, Chapter 9: Intersections, Section 9.14.

2. GHD Group Comments – Section 3.0 – Findings and Recommendations

GHD Comment 1: "*The analysis for the 5-year post development conditions were not provided and should be included in the report.*

Exhibit A illustrates the 5-year (2026) post development traffic forecast assuming 2% background traffic growth per year, representing a 10% surcharge on the 2021 background traffic volumes. The site generated traffic volume remains unchanged.

Table A summarizes the intersection capacity analysis that was undertaken for the County Road 2/County Road 5 and the County Road 2/Quarry Access intersections assuming the forecast 2021 (Build Out) and the forecast 2026 (+5 years beyond development) morning and afternoon peak hours of travel demand. The analysis assumed the existing intersection configuration for the County Road 2 / County Road 5 intersection.

Table A: Build-Out Forecast Traffic Results (Forecast 2021 and Forecast 2026)

Intersection	***Weekday Morning Peak Hour (Afternoon Peak Hour)***						
	Approach / Movement	***Forecast (2021)***			***Forecast (2026)***		
		Delay (seconds)	**LOS**	**Volume/Capacity Ratio (v/c)**	**Delay (seconds)**	**LOS**	**Volume/Capacity Ratio (v/c)**
County Road 2 & County Road 5 Two-Way STOP Controlled	~~SB on County Rd 2~~ **SB Approach: County Road 5**	12 (**43**)	B (**E**)	0.25 (0.74)	13 (**65**)	B (**F**)	0.28 (0.88)
	~~NB on County Rd 2~~ **NB Approach: Palace Road**	13 (31)	B (D)	0.16 (0.41)	14 (44)	B (**E**)	0.18 (0.55)
County Road 2 & Existing Quarry Access With EB-LT Lane	SB leaving Quarry Site	11 (14)	B (B)	0.04 (0.06)	12 (16)	B (C)	0.05 (0.07)

Table A indicates:

- Satisfactory traffic operations during the morning peak hour at both study area intersections;
- Satisfactory traffic operations remain at the existing quarry site access during the afternoon peak hour during the "full operational day" scenario; and
- Poor operations at the SB and NB approach of the County Road 2/County Road 5 intersection during the afternoon peak hour of travel demand, with delays up to 1 minute for the southbound approach.

The County Road 5/County Road 2 operations were found to have increased delays because of the additional background traffic growth on all approaches. The proposed asphalt plant would contribute only 9 trucks in the peak hour on the SB-LT, resulting in less than 5% of the southbound approach traffic volume. The delays are a direct result of east-west traffic volume along County Road 2 during

the afternoon peak hour that minimizes the number of gaps available to both northbound and southbound approach vehicle traffic to enter the County Road 5 traffic stream. As background growth increases along County Road 5 to and from the Town of Napanee, further intersection improvements should be evaluated.

The following section provides a traffic signal warrant analysis that was undertaken to assess if the SB minor approach operational deficiency would warrant traffic signals at this intersection.

GHD Comment 2: "*The traffic signal warrant analysis should be repeated with the 5-year post development traffic volumes"*

A traffic signal warrant analysis was undertaken for the two-way STOP-controlled County Road 2 & County Road 5/Palace Road intersection assuming the 2026 forecast traffic volumes. The analysis was undertaken using the Transportation Association of Canada (2014) traffic warrants spreadsheet. Attachment "B" provides the analysis details sheet. The analysis adopted the same 2020 "adjusted for Covid" traffic volumes as the base layer.

The analysis indicated a score of **81 out of 100**, which is an increase from the 2021 analysis which had indicated 66 out of 100. Despite the poor operations during the afternoon peak hour of travel demand for the minor approach legs, traffic signals were found **not** to be warranted at the County Road 2/County Road 5 intersection. The County is encouraged to monitor the intersection for safety concerns and excessive delays to determine if further improvements may be required

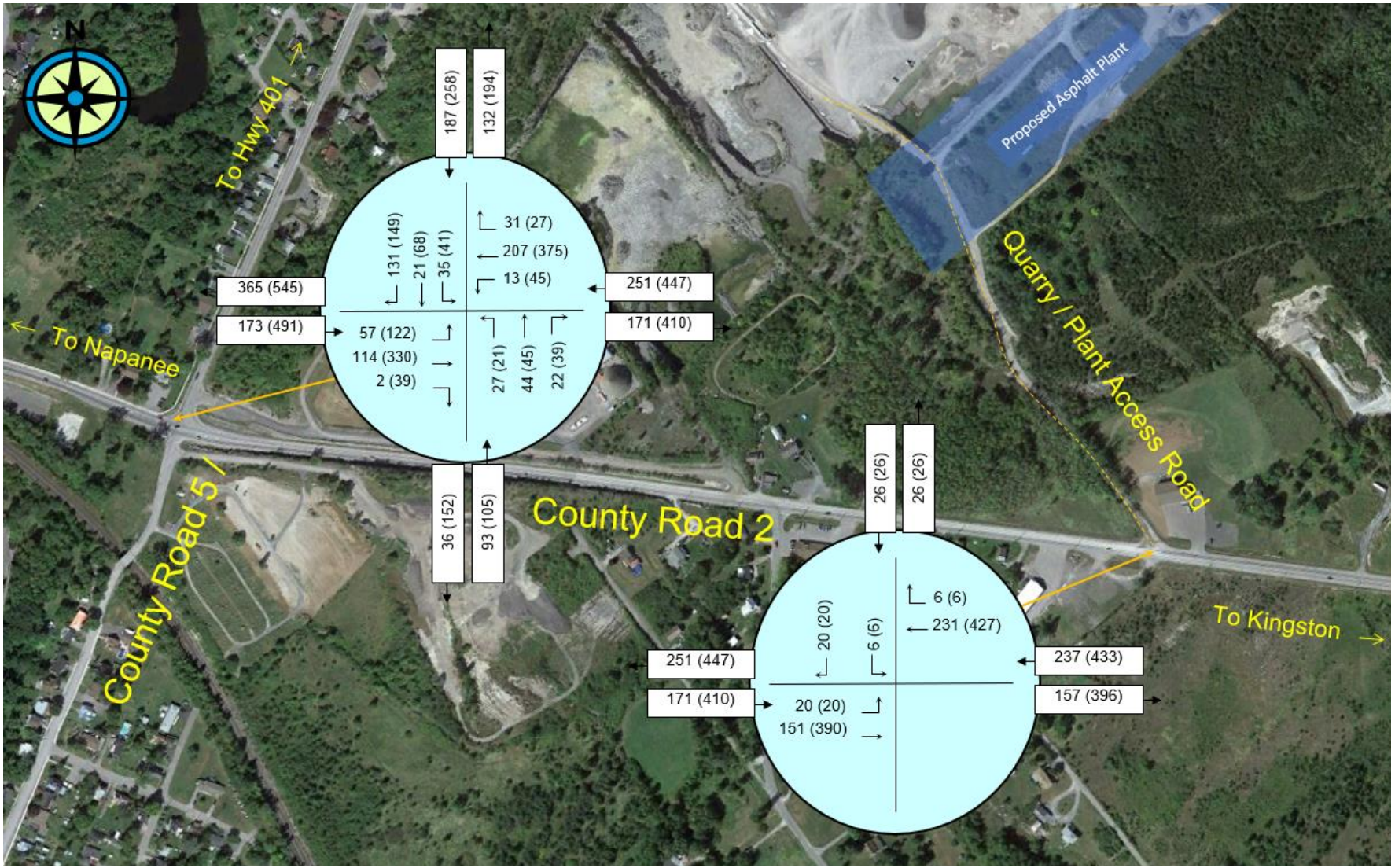


Exhibit A: 2026 Forecast Peak Hour Traffic Volumes – Build-out +5-Years – Includes Proposed Asphalt Plant – AM (PM)

GHD Comment 3: "*The installation of a channelized southbound right turn lane should also be tested as a mitigation measure.*"

Table B summarizes the intersection capacity results for the County Road 2 / County Road 5 intersection assuming the 2026 traffic forecast and a potential channelized SB-RT lane. The dedicated SB-RT lane would serve to divert 130-to-150 vehicles-per-hour and mainly serve to improve levels of service for southbound vehicles destined to the Town of Napanee.

Inspection of the table indicated:

- Slight improvements to the SB-LT/Thru movement and the NB approach movement during both peak hours; and
- Satisfactory operations for the channelized SB-RT.

While operational improvements are evident, the dedicated SB-RT with a channelized island does not have a significant impact on the overall intersection performance and is not likely to delay further intersection improvements, if implemented. Additionally, widening of the southbound approach could have negative impacts on the adjacent sidewalk/boulevard arrangement.

The addition of a channelized SB-RT, in isolation, is not recommended to address capacity constraints at the County Road 5 / County Road 2 intersection.

Table B (Revised): County Road 2 / County Road 5 - 2026 Forecast Intersection Capacity Results With and without a channelized and YIELD-controlled SB-RT Auxiliary Lane

Weekday Morning Peak Hour (Afternoon Peak Hour)							
Approach / Movement	***Forecast (2026) – No Improvements***			**Approach / Movement**	***Forecast (2026) With Channelized SB-RT***		
	Delay (seconds)	**LOS**	**Volume/ Capacity Ratio (v/c)**		**Delay (seconds)**	**LOS**	**Volume/ Capacity Ratio (v/c)**
~~SB on County Rd 2~~ **SB Approach: County Road 5**	13 (**65**)	B (**F**)	0.28 (0.88)	SB-Thru/LT	14 (**64**)	B (**F**)	0.13 (0.66)
				SB-RT Channelized	10 (12)	B (B)	0.16 (0.22)
~~NB on County Rd 2~~ **NB Approach: Palace Road**	14 (44)	B (**E**)	0.18 (0.55)	~~NB on County Rd 2~~ **NB Approach: Palace Road**	13 (41)	B (**E**)	0.18 (0.52)

Castleglenn Consultants
Engineers, Project Managers & Planners

Attachment B

Synchro Outputs – 2026 Forecast

Synchro Outputs – 2026 Forecast with Channelized SB-RT

Traffic Signal Warrants – County Road 5/County Road 2

Intersection	
Int Delay, s/veh	5.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	114	2	13	207	31	27	44	22	35	21	131
Future Vol, veh/h	57	114	2	13	207	31	27	44	22	35	21	131
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	1	10	0	0	8	11	0	9	0	50	8	0
Mvmt Flow	29	114	2	13	207	31	27	44	22	35	21	131

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	238	0	0	116	0	0	498	437	115	439	407	207
Stage 1	-	-	-	-	-	-	173	173	-	233	233	-
Stage 2	-	-	-	-	-	-	325	264	-	206	174	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.59	6.2	7.6	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.59	-	6.6	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.59	-	6.6	5.58	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4.081	3.3	3.95	4.072	3.3
Pot Cap-1 Maneuver	1335	-	-	1485	-	-	486	503	943	455	524	839
Stage 1	-	-	-	-	-	-	834	743	-	674	701	-
Stage 2	-	-	-	-	-	-	692	677	-	698	744	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1335	-	-	1485	-	-	388	487	943	404	508	839
Mov Cap-2 Maneuver	-	-	-	-	-	-	388	487	-	404	508	-
Stage 1	-	-	-	-	-	-	816	727	-	659	695	-
Stage 2	-	-	-	-	-	-	561	671	-	627	728	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0.4	13.7	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	507	1335	-	-	1485	-	-	658
HCM Lane V/C Ratio	0.183	0.021	-	-	0.009	-	-	0.284
HCM Control Delay (s)	13.7	7.8	-	-	7.4	-	-	12.6
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0	-	-	1.2

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	151	231	6	6	20
Future Vol, veh/h	20	151	231	6	6	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	20	151	231	6	6	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	237	0	-	0	425	234
Stage 1	-	-	-	-	234	-
Stage 2	-	-	-	-	191	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	918	-	-	-	438	613
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	653	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	918	-	-	-	428	613
Mov Cap-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	607	-
Stage 2	-	-	-	-	653	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	918	-	-	-	557
HCM Lane V/C Ratio	0.022	-	-	-	0.047
HCM Control Delay (s)	9	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	17.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	122	330	39	45	375	27	21	45	39	35	68	149
Future Vol, veh/h	122	330	39	45	375	27	21	45	39	35	68	149
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	1	0	3	3	30	0	4	0	25	0	0
Mvmt Flow	122	330	39	45	375	27	21	45	39	35	68	149

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	402	0	0	369	0	0	1181	1086	350	1101	1078	375
Stage 1	-	-	-	-	-	-	594	594	-	465	465	-
Stage 2	-	-	-	-	-	-	587	492	-	636	613	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.1	6.54	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.54	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.54	-	6.35	5.5	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.5	4.036	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1151	-	-	1184	-	-	168	214	698	171	220	676
Stage 1	-	-	-	-	-	-	495	490	-	536	566	-
Stage 2	-	-	-	-	-	-	499	544	-	430	486	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1151	-	-	1184	-	-	85	184	698	117	189	676
Mov Cap-2 Maneuver	-	-	-	-	-	-	85	184	-	117	189	-
Stage 1	-	-	-	-	-	-	443	438	-	479	544	-
Stage 2	-	-	-	-	-	-	327	523	-	326	434	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.8	44.3	65.7
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	192	1151	-	-	1184	-	-	287
HCM Lane V/C Ratio	0.547	0.106	-	-	0.038	-	-	0.878
HCM Control Delay (s)	44.3	8.5	-	-	8.2	-	-	65.7
HCM Lane LOS	E	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	2.9	0.4	-	-	0.1	-	-	7.8

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	390	427	6	6	20
Future Vol, veh/h	20	390	427	6	6	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	20	390	427	6	6	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	433	0	-	0	860	430
Stage 1	-	-	-	-	430	-
Stage 2	-	-	-	-	430	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	753	-	-	-	226	461
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	490	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	753	-	-	-	220	461
Mov Cap-2 Maneuver	-	-	-	-	220	-
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	490	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	753	-	-	-	368
HCM Lane V/C Ratio	0.027	-	-	-	0.071
HCM Control Delay (s)	9.9	-	-	-	15.5
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	114	2	13	207	31	27	44	22	35	21	131
Future Vol, veh/h	57	114	2	13	207	31	27	44	22	35	21	131
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Yield
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	1	10	0	0	8	11	0	9	0	50	8	0
Mvmt Flow	29	114	2	13	207	31	27	44	22	35	21	131

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	238	0	0	116	0	0	432	437	115	439	407	207
Stage 1	-	-	-	-	-	-	173	173	-	233	233	-
Stage 2	-	-	-	-	-	-	259	264	-	206	174	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.59	6.2	7.6	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.59	-	6.6	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.59	-	6.6	5.58	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4.081	3.3	3.95	4.072	3.3
Pot Cap-1 Maneuver	1335	-	-	1485	-	-	537	503	943	455	524	839
Stage 1	-	-	-	-	-	-	834	743	-	674	701	-
Stage 2	-	-	-	-	-	-	750	677	-	698	744	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1335	-	-	1485	-	-	429	487	943	404	508	839
Mov Cap-2 Maneuver	-	-	-	-	-	-	429	487	-	404	508	-
Stage 1	-	-	-	-	-	-	816	727	-	659	695	-
Stage 2	-	-	-	-	-	-	608	671	-	627	728	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0.4	13.3	11.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	527	1335	-	-	1485	-	-	438	839
HCM Lane V/C Ratio	0.176	0.021	-	-	0.009	-	-	0.128	0.156
HCM Control Delay (s)	13.3	7.8	-	-	7.4	-	-	14.4	10.1
HCM Lane LOS	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.6	0.1	-	-	0	-	-	0.4	0.6

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	151	231	6	6	20
Future Vol, veh/h	20	151	231	6	6	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	20	151	231	6	6	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	237	0	-	0	425	234
Stage 1	-	-	-	-	234	-
Stage 2	-	-	-	-	191	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	918	-	-	-	438	613
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	653	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	918	-	-	-	428	613
Mov Cap-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	607	-
Stage 2	-	-	-	-	653	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	918	-	-	-	557
HCM Lane V/C Ratio	0.022	-	-	-	0.047
HCM Control Delay (s)	9	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	10.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	122	330	39	45	375	27	21	45	39	35	68	149
Future Vol, veh/h	122	330	39	45	375	27	21	45	39	35	68	149
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Yield
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	1	0	3	3	30	0	4	0	25	0	0
Mvmt Flow	122	330	39	45	375	27	21	45	39	35	68	149

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	402	0	0	369	0	0	1107	1086	350	1101	1078	375
Stage 1	-	-	-	-	-	-	594	594	-	465	465	-
Stage 2	-	-	-	-	-	-	513	492	-	636	613	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.1	6.54	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.54	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.54	-	6.35	5.5	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.5	4.036	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1151	-	-	1184	-	-	189	214	698	171	220	676
Stage 1	-	-	-	-	-	-	495	490	-	536	566	-
Stage 2	-	-	-	-	-	-	548	544	-	430	486	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1151	-	-	1184	-	-	95	184	698	117	189	676
Mov Cap-2 Maneuver	-	-	-	-	-	-	95	184	-	117	189	-
Stage 1	-	-	-	-	-	-	443	438	-	479	544	-
Stage 2	-	-	-	-	-	-	360	523	-	326	434	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.8	41	33.3
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	201	1151	-	-	1184	-	-	156	676
HCM Lane V/C Ratio	0.522	0.106	-	-	0.038	-	-	0.66	0.22
HCM Control Delay (s)	41	8.5	-	-	8.2	-	-	64.3	11.8
HCM Lane LOS	E	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	2.7	0.4	-	-	0.1	-	-	3.7	0.8

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	390	427	6	6	20
Future Vol, veh/h	20	390	427	6	6	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	20	390	427	6	6	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	433	0	-	0	860	430
Stage 1	-	-	-	-	430	-
Stage 2	-	-	-	-	430	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	753	-	-	-	226	461
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	490	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	753	-	-	-	220	461
Mov Cap-2 Maneuver	-	-	-	-	220	-
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	490	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	753	-	-	-	368
HCM Lane V/C Ratio	0.027	-	-	-	0.071
HCM Control Delay (s)	9.9	-	-	-	15.5
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

City of Napanee - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	County Road 2	Direction (EW or NS)	EW	Road Authority:	City of Napanee
Side Street (name)	County Road 5	Direction (EW or NS)	NS	City:	Napanee
Quadrant / Int #		Comments	Forecast 2026 with Asphalt Plant With Volume Mods for Covid +2% background growth	Analysis Date:	2020 Nov 12, Thu
CHECK SHEET				Count Date:	2020 May 12, Tue
for Warrant Calculation Results, please hit 'Page Down'				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
County Road 2	WB	1		1			1		10,000	1			
County Road 2	EB	1				1			360	1			
County Road 5	NB				1				850	1			
County Road 5	SB				1				10,000	1			

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

Are the County Road 5 NB right turns significantly impeded by through movements? (y/n)		n
Are the County Road 5 SB right turns significantly impeded by through movements? (y/n)		n
Are the County Road 2 EB right turns significantly impeded by through movements? (y/n)		n

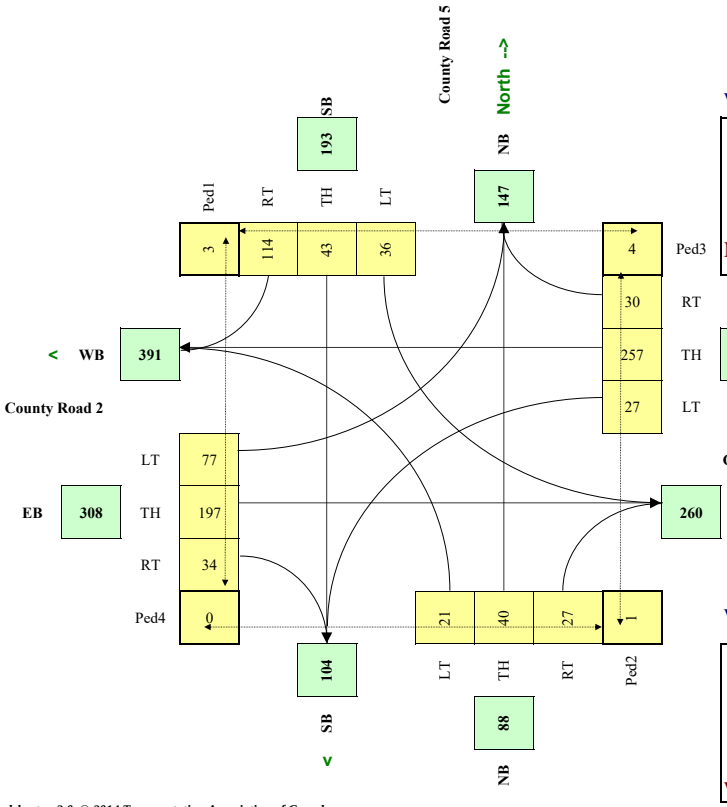
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	5,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
County Road 2	EW	60	8.0%	n	0.0
County Road 5	NS		3.0%	n	0.0

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:30 - 8:30	25	41	21	32	20	124	12	194	29	53	106	18	2	1	0	0
	6	17	26	26	19	67	12	180	29	42	142	29	2	1	3	0
	23	43	30	35	42	133	28	274	28	83	207	35	3	1	3	0
	23	43	30	35	42	133	28	274	28	83	207	35	3	1	6	1
	20	43	37	39	64	142	42	353	25	113	307	53	3	0	5	0
	26	53	18	47	70	85	42	264	42	88	213	34	3	0	8	1
Total (6-hour peak)	**123**	**240**	**162**	**214**	**257**	**684**	**164**	**1,539**	**181**	**462**	**1,182**	**204**	**16**	**4**	**25**	**2**
Average (6-hour peak)	**21**	**40**	**27**	**36**	**43**	**114**	**27**	**257**	**30**	**77**	**197**	**34**	**3**	**1**	**4**	**0**
													Actual Pedestrian Crossing Distance (m)			
													12.0	20.0	30.0	15.0

Average 6-hour Peak Turning Movements



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

W =	81	78	3
		Veh	*Ped*

NOT Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 8

Warranted - Complex Intersection

Castleglenn Consultants
Engineers, Project Managers & Planners

Attachment C

Proposed Asphalt Plant, 8205 County Road 2, Napanee
Traffic Impact Study and Appendices
Revision 3

PROPOSED ASPHALT PLANT
8205 COUNTY ROAD 2, NAPANEE
R.W TOMLINSON LTD

TRAFFIC IMPACT ASSESSMENT

REVISION 3

Presented to:

Mr. Craig Bellinger C.Tech
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R.W. Tomlinson Limited
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K2J 6K7

January 11, 2021

Castleglenn Consultants
Engineers, Project Managers & Planners

Project No. 7248
Revision 2

CASTLEGLENN CONSULTANTS LTD.

THIRD PARTY DISCLAIMER

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Mr. Arthur Gordon B.A., P. Eng
Principal Engineer

Mr. Jake Berube P.Eng
Transportation Engineer

Project No. 7248
Revision 2

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APPENDICES

LIST OF TABLES

LIST OF EXHIBITS

1.0 EXISTING AND PLANNED CONDITIONS

1.1 THE PROPOSED DEVELOPMENT

R.W. Tomlinson has proposed the development of a permanent asphalt plant to be located east of the Town of Napanee on the site of an existing quarry. Exhibit 1-1 illustrates the approximate of the proposed plant located north of County Road 2 and east of the County Road 5/Palace Road intersection. When completed, the plant would produce an average of 80,000 tonnes of hot mix asphalt-per-season and would generally serve construction projects in a service area bounded by Trenton on the west, Kaladar on the north, and Kingston to the east. The development is strategically well supported by rural arterial roads, designated as truck routes, such as County Road 2 and County Road 5 (Palace Road), as well as the Highway 401 corridor to the north.

The development proposes to utilize the existing County Road 2 quarry access located approximately 940m east of the County Road 2/Palace Road intersection. The existing quarry traffic is characterized by heavy haul vehicles; such as triaxle trucks. The asphalt plant would require similar trucks for the import of aggregate materials and export of mixed asphalt.

1.2 EXISTING CONDITIONS

STUDY AREA ROADWAYS

A desktop review of aerial and ground photography was undertaken to document the existing roadways that would serve the proposed development and surrounding area:

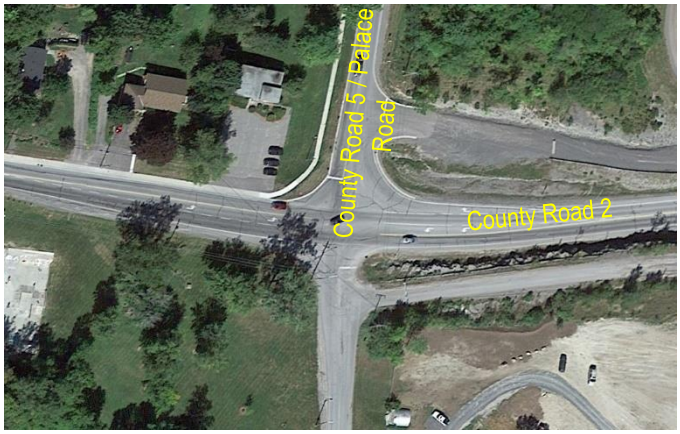
- **County Road 2** is an existing 2-lane east-west primary roadway that borders the proposed development to the south. It serves as a parallel route to Highway 401 and connects Napanee in the east to Odesssa and Kingston in the west. County Road 2 has a posted speed limit of 80 km/hr in the vicinity of the existing quarry access, which is reduced to 50 km/hr 180 m to the west of the site access. It is an existing truck route.

Exhibit 1-1: Site Plan Context

- **County Road 5** is an existing 2-lane north-south roadway that borders the existing quarry to the west. It is characterized by an urban cross section with a sidewalk and boulevard arrangement along the west side of the roadway from County Road 2 to Kent Street (440m north of County Road 2). County Road 5 then transitions into a rural cross section from Kent Street to the Highway 401. The surrounding land use consists residential driveways that are provided direct access to County Road 5. The corridor is posted at 60 km/hr and serves as an existing truck route north of County Road 2.
- **Highway 401** is an existing east-west Provincial highway that connects Windsor in the west to the Ontario-Quebec border in the east. Access to Highway 401 is currently provided at the Highway 401 / Palace Road-County Road 5 interchange to the north of the study area. It is anticipated a significant amount of the proposed development traffic would be destined to and from this corridor.

STUDY AREA INTERSECTIONS

- **County Road 2/County Road 5/Palace Road**: The County Road 2 / Palace Road intersection is a four-legged intersection controlled by STOP-signs along the minor road (Palace Road). The intersection is afforded auxiliary left turn lanes from the major approaches to the minor leg and a WB-RT lane. The intersection is characterized by a steep downgrade along County Road 2 WB. A pedestrian sidewalk is provided within the northwest quadrant.



- **County Road 2 / Site Access:** The proposed asphalt plant would be accessed through the existing access road located approximately 940m east of the County Road 2 / Palace Road intersection. The minor site access is STOP-controlled and is unpaved. It currently provides access to quarry truck traffic.

EXISTING (2020) TRAFFIC VOLUMES

A manual traffic count was undertaken at the County Road 2 / Palace Road intersection on Tuesday, May 12th, 2020. The traffic count recorded the number of passenger vehicles and heavy vehicles in 15-minute intervals from 7:00AM to 10:00AM and from 3:00PM to 6:00PM. During the month of May 2020, the COVID-19 health situation involved extensive work-from-home and

business closures that had an impact on the traffic counts. The study team also received afternoon peak hour turning movement traffic volumes counts from the County undertaken in 2016.

Table 1-1 summarizes the comparison between the 2016 and 2020 traffic counts. On inspection, the 2016 counts were found to be up to 50% greater than the 2020 counts. A "Covid-19" factor was calculated for each approach to augment the May 2020 counts to post-Covid values. A 2% simple growth rate was applied to all movements to account for potential growth since the 2016.

Table 1-1: Comparison of 2016 County Traffic Counts to May 2020 "Covid-19" Traffic Counts
County Road 2 / County Road 5-Palace Road

Direction & Movement		Castleglenn May 2020 Peak Hour Traffic Count (vph)		2016 PM Peak Hour Traffic Count (vph)	Comparison (vph)		Covid-19 Approach Factor	**Covid-19 Factor and +2%/year Growth (vph)**		Comparison of PM 2016 and Factored May 2020 PM Counts (vph)	**Percent Change of Approach Volume**
		AM	PM	PM	AM	PM		AM	PM		
Westbound	**RT**	9	6	22	-13	-16	1.23	12	8	-14	7.6%
	TH	139	254	293	-154	-39		183	333	40	
	LT	9	30	39	-30	-9		12	40	1	
Northbound	**RT**	12	21	32	-20	-11	1.58	20	35	3	6.8%
	TH	23	24	39	-16	-15		39	40	1	
	LT	14	11	17	-3	-6		24	19	2	
Eastbound	**RT**	1	31	35	-34	-4	1.04	2	35	0	8.2%
	TH	89	261	270	-181	-9		100	293	23	
	LT	45	97	99	-54	-2		51	109	10	
Southbound	**RT**	74	84	107	-33	-23	1.50	117	133	26	10.8%
	TH	12	38	62	-50	-24		19	61	-1	
	LT	9	13	25	-16	-12		15	21	-4	
Total (vph)		**436**	**870**	**1,040**	**-604**	**-170**		**594**	**1,127**	**87**	**8.4%**

vph – vehicles per hour

The existing quarry was also not open at the time of the May 2020 traffic counts. Therefore, the following assumptions were made to determine the site trip generation associated with the existing land use based on historical operating information:

- The annual aggregate output of the existing quarry was determined to be approximately 120,000 tonnes. Based on 200 working days-per-year and a 10-hour work day, the quarry is anticipated to produce an average of 600 tonnes-per-day. This represents approximately 30 triaxle truck loads each day or 3 trucks-per-hour; and
- For analysis purposes, the **maximum** daily output of the quarry was indicated to be 3,000 tonnes. This represents 150 truck loads and an average of 15 loads per hour. This was considered to be a rare occurrence, so the truck traffic associated with the quarry was assumed to be limited to 80% of the maximum daily output.

Exhibit 1-2 illustrates the existing (2020) factored base traffic volume within the study area assuming the quarry achieves 80% of its single day output maximum.

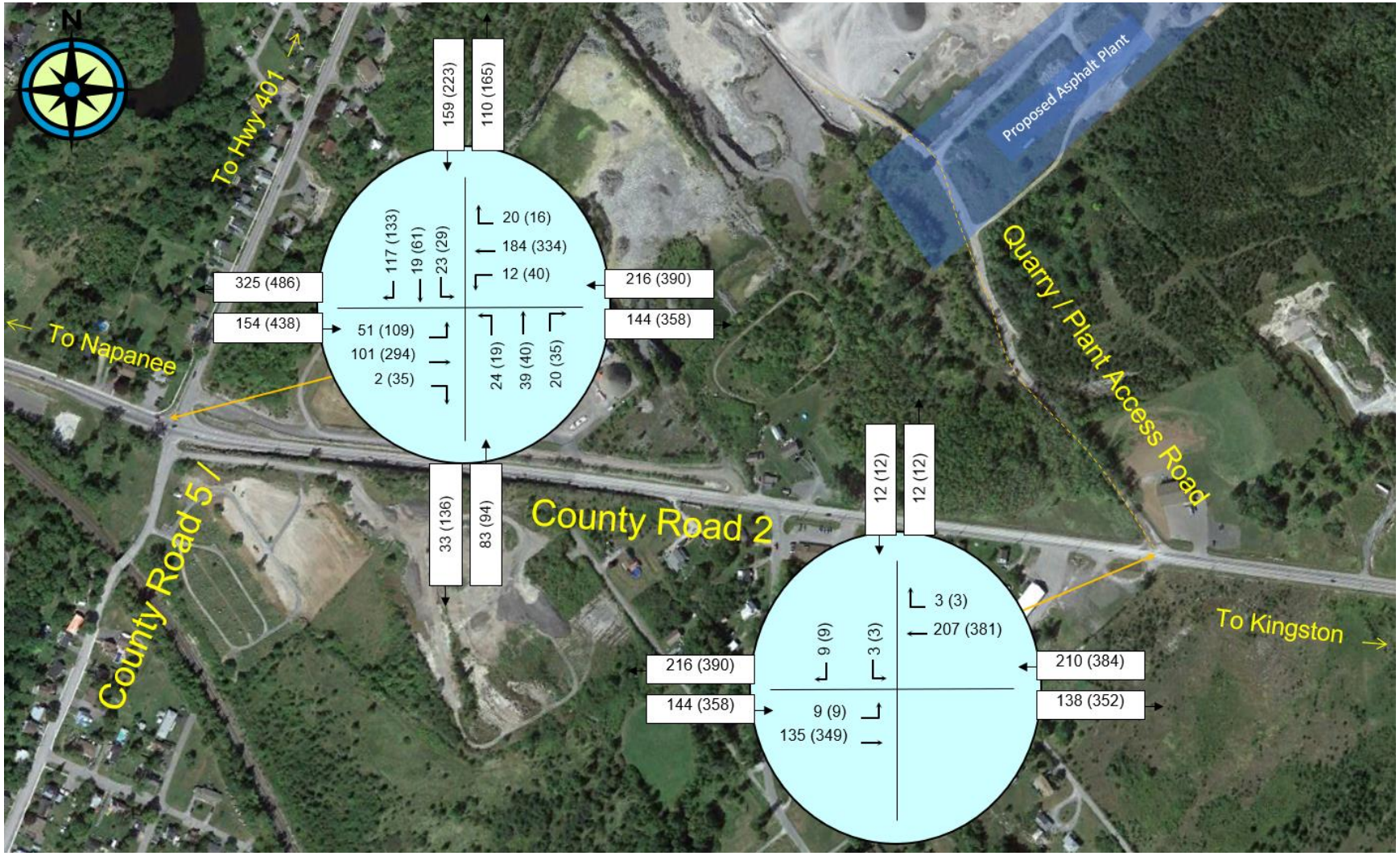


Exhibit 1-2: 2020 Factored Existing Traffic - Morning and Afternoon Peak Hour Traffic Volumes With High Quarry Traffic – Morning (Afternoon) – Vehicles-Per-Hour

1.3 EXISTING INTERSECTION CAPACITY ANALYSIS

Table 1-2 summarizes the intersection capacity analysis that was undertaken for the County Road 2/County Road 5 and the County Road 2/Quarry Access intersections assuming the existing morning and afternoon peak hours of travel demand. The analysis was undertaken utilizing Synchro™ 10 analysis software which uses Highway Capacity Manual 6th Edition methodologies to determine level-of-service (delay-based), volume-to-capacity (v/c) and 95th percentile vehicle queue lengths performance metrics.

Table 1-2: Existing Traffic Analysis (2020) – Morning and Afternoon Peak Hour

Intersection	Weekday Morning Peak Hour (Afternoon Peak Hour)			
	Critical Movement			
	Approach / Movement	**Average Delay per Vehicle (seconds)**	**Level of Service**	**Volume-to-Capacity Ratio (v/c)**
County Road 2/County Road 5/Palace Road Two-Way STOP Controlled	SB Approach: County Rd 5	11 (33)	B (D)	0.21 (0.65)
	NB Approach: Palace Road	13 (29)	B (D)	0.15 (0.38)
County Road 2/Existing Quarry Access	SB leaving Quarry Site	11 (14)	B (B)	0.02 (0.03)

Table 1-2 indicates that both study area intersections would operate with satisfactory levels of service and acceptable average delays-per-vehicle. The southbound approach was found to be the critical movement at the County Road 2/County Road 5-Palace Road intersection as it exhibited a level of service "D" (at the delay threshold for LOS D/E) with more than 30 seconds of delay for each vehicle.

1.4 TRAFFIC GENERATED BY THE PROPOSED ASPHALT PLANT DEVELOPMENT

The proposed asphalt plant has 2 primary functions that were accounted for to determine the amount of traffic generated:

1. The export of pre-mixed asphalt from the proposed asphalt plant; and
2. The import of asphalt-mix aggregates from an external location to the proposed asphalt plant. The amount of import material would be limited to the greatest extent possible as much of the asphalt mix can be procured from the adjacent quarry.

The site would be characterized by 20-tonne capacity triaxle vehicles and 36 tonne capacity trailer trucks. It is anticipated that both trucks would be utilized to varying degrees, depending on the amount of material imported/exported, to/from the location of the job site, the type of material and the availability of the vehicle. For the purposes of this study, the traffic generation values were converted to an equivalent triaxle (20-tonne) load.

The following general assumptions were reviewed in consultation with the development's proponent and adopted to determine the forecast traffic generated by the proposed development:

- Employee traffic associated with the proposed asphalt plant arrives/leaves outside of the peak hour of travel demand;
- All trucks trips involve an inbound trip followed by an outbound trip during the same hour. This represents a worst-case combined drop-off / pick-up of material;
- The proposed asphalt plant would operate from the start of May to the end of November, with some operations anticipated in the months of April and December. Therefore, the plant was assumed operational for 160 days/year;
- The proposed asphalt plant would operate for an average of 10-hours per work day; and
- The asphalt truck trips are assumed to be staggered throughout the day to minimize waiting times between loads. Operations do not follow a typical commuter traffic pattern with the peak number of trucks arriving/departing during the peak hours of travel demand.

1.4.1 Traffic Generation

A. Asphalt Plant Operations

- The proposed asphalt plant anticipates an approximate asphalt output of 80,000 tonnes annually. Based on 160 operational days-per-year the asphalt plant would export 500 tonnes-per- day of asphalt. This would result in 25 truck loads each day or an average of 2-to-3 trucks per-hour. This was assumed to result in 3 asphalt trips during the peak hour of an average day.
- For the purposes of this study, the **maximum** output of the asphalt plant is limited by the required processing rate to fill each truck. The plant's capacity of fully loading a truck and processing it was determined to be 6.5 minutes per-load. The maximum number of asphalt trucks per-hour during the busiest operational days of the asphalt plant was determined to be 9 asphalt trucks/hour.

B. Import of Material

- The site will make every effort to favor material from the adjacent quarry to limit the amount of import materials required. The amount of import material widely ranges depending on the job and the batch. Import material, such as sand and highway-grade coarse aggregates, are anticipated to be stockpiled ahead of busy asphalt days so that the material is ready for use on site. Asphalt Cement (AC) would ship on an as-needed basis.
- Materials are anticipated to be delivered to the site as follows:
    - Sand aggregates: 50-to-150 tonnes/day. This results in 3-to-8 loads per day;
    - Highway-grade coarse aggregates: 500-to-1,000 tonnes/day. This would result in 25-to-50 trucks-per-day; and
    - Asphalt Cement (AC): 25-to-90 tonnes/day. Though typically shipped with trailer trucks, the AC component would require 2-to-5 triaxle loads per day.

- *A **slow** import day*; (This coincides with a high asphalt production day as most activity on the site is attributed to the production and supply of asphalt materials.); a total of 4 import trucks would be anticipated in the peak hour of travel demand (3 coarse aggregates and one of either sand or AC during the peak hour AC).
- *A **busy** import day*: This occurs when stockpiling of materials take place ahead of anticipated high asphalt export days. (This coincides with **an average asphalt production day.**); a total of 7 import trucks could be expected during both peak hours of travel demand (1 sand, 5 coarse aggregates, and 1 AC))

C. ASPHALT PLANT TRAFFIC GENERATION

Table 1-3 serves to summarize the above information concerning the operations of the quarry, the proposed asphalt plant and the materials imported to the site. The table presents estimates of the total daily tonnage, daily truck volumes and the total peak hour truck volume estimated as the required number of triaxles trucks (20 tonne capacity) required to move the material entering and leaving the site.

The table presents the following two scenarios.

- *Typical Average Day:* This scenario envisioned what would be typical of site operations which would involve stockpiling import material. This scenario envisioned "average anticipated operation" for the asphalt plant, combined with a busy day of import material. This scenario would see a total of 500 tonnes of asphalt produced/delivered from the plant. Imported materials would consist of 150 tonnes of sand, 1,000 tonnes of coarse aggregates and 25 tonnes of asphalt cement;
- *"Full" Operational Day:* The scenario envisioned a "worst-case" busy day for both quarry and asphalt export. During these days, import of material would likely be low as it would have been stockpiled in advance. This scenario would see 1,800 tonnes of asphalt produced/delivered from the plant. Imported materials would consist of 50 tonnes of sand, 500 tonnes of coarse aggregates and 90 tonnes of asphalt cement. **This scenario is thought to represent a 'worst-case' scenario, and was carried forward for traffic analysis.**

Table 1-3: Summary of Site Traffic Generation

Operation			S1: Typical Average Day	S2: "Full Operational Day"
Asphalt Plant Operations	A	Annual Tonnes Production	80,000	--
	B	Operational Day/Year	160	--
	C=(A/B)	Tonnes/Day	**500**	**1,800**
	D	Tonnes per truck	20	20
	E=(C/D)	No of daily Trucks	**25**	**90**
	F	Hours of Operation per Day	10	10
	G=(E/F)	No. of Trucks during peak Hour	**3**	**9**
	H=(C/F)	Production (Tonnes-per-Hour)	60	180
Materials Delivery	I	***Sand Aggregates (Tonnes/Day)***	**150**	**50**
	J	Tonnes per truck	20	20
	K=(I/J)	Loads- Per Day	8	3
	L	***Highway Coarse Aggregates* (Tonnes/Day)**	**1,000**	**500**
	M	Tonnes per truck	20	20
	N=(L/M)	Loads- Per Day	50	25
	O	***Asphalt Cement (Tonnes/Day)***	**90**	**25**
	P	Tonnes per truck	20	20
	Q=(O/P)	Loads- Per Day	5	2
	R	Total Loads per Day	**63**	**30**
	S=(R/F)	No of Trucks during peak Hour	**7**	**4**[1]
Totals	C+J+M+P	**Total Tonnes per Day (Delivered and Processed)**	**1,740**	**2,375**
	E+R	**Total Daily Truck Volume**	**88**	**120**
	G+S	**Total Peak Hour Truck Volume**	**10**	**13**

1. **Assumes 3 coarse aggregate deliveries and 1 delivery related to either Asphalt Cement or Sand**

1.4.2 Trip Distribution & Assignment

The truck routes available within the study area were reviewed to determine the likely distribution of traffic to/from the site and the assignment to the local roadways nearest the site. As the proposed asphalt plant is intended to service a wide area that includes Kingston, Trenton, Kaladar and Napanee, the actual haulage route would depend on the construction site to be serviced and the origin of the haulage vehicles before they get to the quarry/asphalt plant site. County Road 2 and County Road 5 were adopted as the primary haulage routes for the proposed asphalt plant.

The following three routes were used to simulate the roadways used by the proposed asphalt plant traffic assuming a worst-case "full operational day":

- 9 of 13 trucks in the peak hour (70%) would utilize the existing arterial truck route of County Road 5-Palace Road to the Highway 401 corridor. This would be the primary route to and from the proposed asphalt plant;
- 3 of 13 trucks in the peak hour (22%) of site traffic would utilize the existing truck route along County Road 2 to access markets to the east. This serves as an alternate route to the Highway 401 corridor and would be used to serve markets west of Kingston; and
- The remaining 1 of 13 trucks in the peak hour (8%) would utilize County Road 2 to access the local markets in the Town of Napanee.

The proposed asphalt plant would add an additional triaxle truck every 5-to-6 minutes to the existing arterial truck routes surrounding the proposed asphalt plant development. This will likely have a negligible impact on the surrounding roadway network given that both County Road 2 and County Road 5 are both classified as "Rural Arterials" within Schedule A: County Road System Classification

1.4.3 Build-Out Traffic Forecast (2021)

Exhibit 1-3 illustrates the "Build-Out" 2021 forecast morning and afternoon peak hours of travel demand. The exhibit assumes a "full operational day" scenario combined with a 2% annual increase in all traffic volumes to account for potential background traffic growth associated with adjacent residential developments. This level of traffic growth is believed to be conservative (in addition to the 8% adjustment to the base counts) as the County TMP (2012) indicated a growth rate east of the proposed site (Station 147-1) of 0.38%.

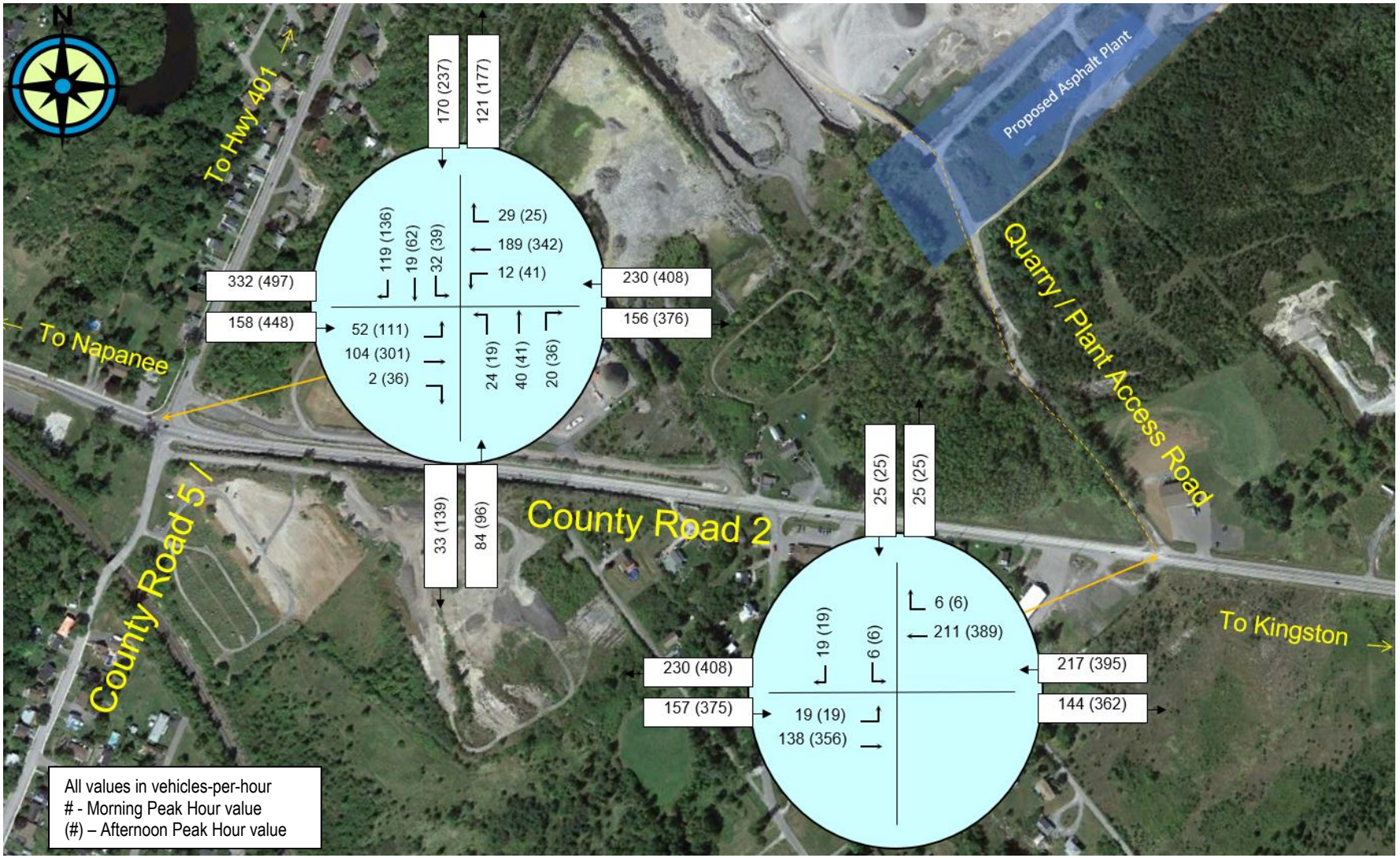


Exhibit 1-3: Future Build-Out (2021) Morning and Afternoon Peak Hour Traffic Volumes

2.0 BUILD-OUT FORECAST TRAFFIC ANALYSIS

2.1 TURN LANE WARRANT ANALYSIS

A turning lane warrant analysis was undertaken following geometric design standards[1] for Ontario highways. The warrants for left turn lanes are based on the left turn volume, the volume of opposing vehicles and the volume of advancing vehicles. The purpose of left turn auxiliary lanes is two-fold:

- to minimize that conflict between the advancing vehicles and the left turn vehicles during the left turn maneuver; and
- mitigate the delay for vehicles queued behind left turning vehicles.

The existing quarry and proposed asphalt plant would primarily be served by heavy vehicle truck traffic. A truck-to-passenger vehicle equivalency factor of 2.0 was applied to the left turn vehicles into the site.

Exhibit 2-2 and Exhibit 2-3 illustrate the left turn warrant analysis for the morning and afternoon peak hours, respectively. The exhibits illustrate, and Table 2-1 indicates, that:

- During the morning peak hour of travel demand the percentage of trucks in the advancing volume was found to be approximately 20% due to the low east-west traffic volumes. A turn lane into the development was found to not be warranted during the forecast morning peak hour; and
- During the afternoon peak hour of travel demand the percentage of trucks in the advancing volume was found to be 10%. However, as both the east and westbound directions are approaching 400 vehicles per direction, a turn bay/slip lane arrangement was found to be warranted.

A slip-lane arrangement, as illustrated in Exhibit 2-1, would serve to separate the turning vehicles from the advancing through movement. The dimensions of the left-turn lane, storage and taper are to be determined subsequent to a geometric review of the access and approach roadway. This is anticipated to be completed through site plan control.

1 *Appendix 9 for Chapter 9: Intersections*, MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads, June 2017

Table 2-1: Left Turn Lane Warrant Analysis – Full Operational Day

Parameter	***Morning Peak Hour***		***Afternoon Peak Hour***	
Left-Turn Volume	19 trucks/hour	38 PCU/hour	19 trucks/hour	38 PCU/hour
V_a, Number of vehicles approaching	157 vph	176 PCU/hr	375 vph	394 vph
V_o, Number of opposing vehicles	223 pcu/hr		401 pcu/hr vph	
LT%, Percentage of left-turning vehicles in approaching direction Rounded	--	20%	--	10%

vph – Vehicles-per-hour
pcu – Passenger Car Unit

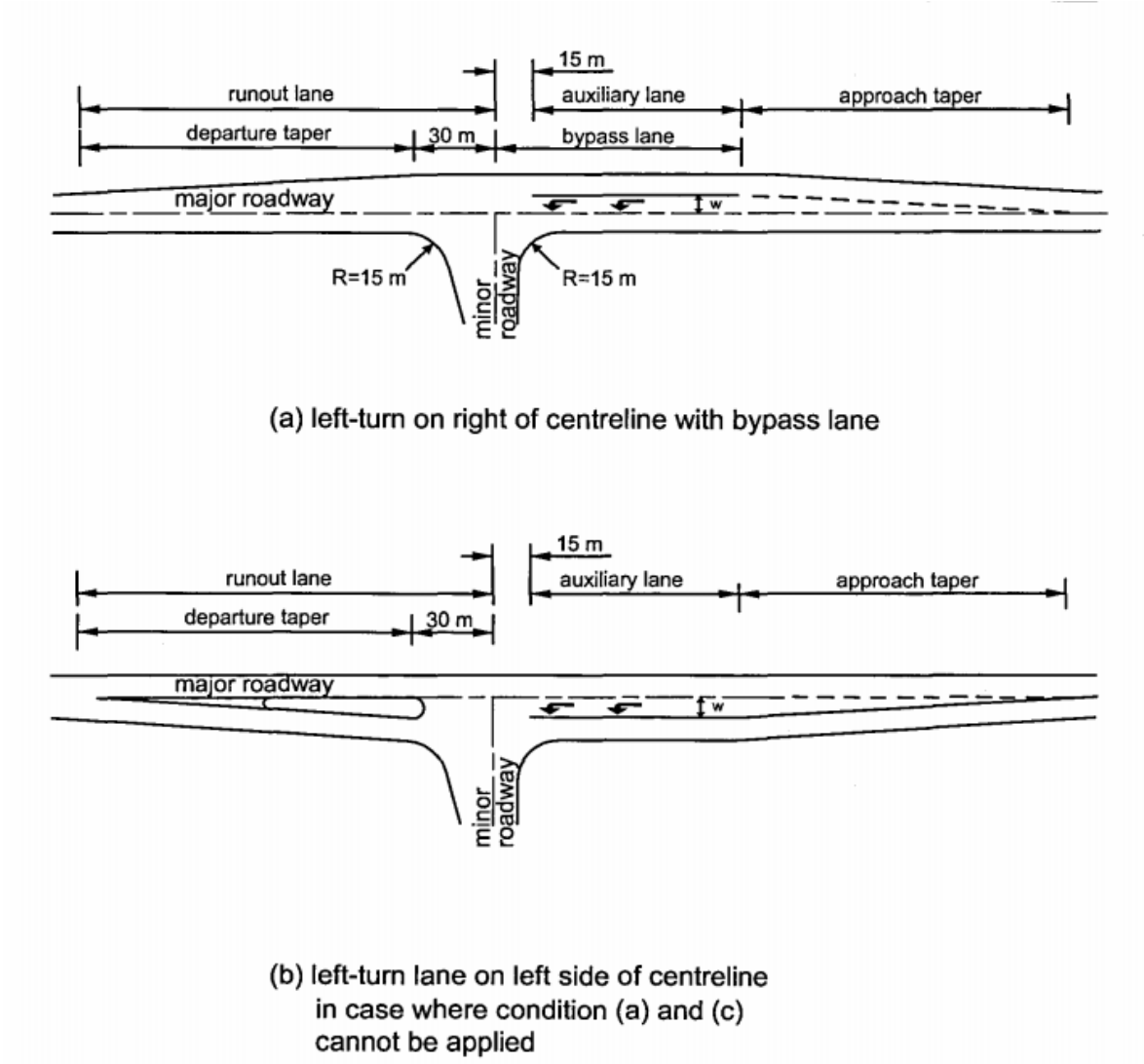


Exhibit 2-1: Sample Illustrations of Slip Lane Arrangement
Geometric Design Guide for Canadian Roads, Chapter 9, Figure 9.17.2 (June 2017)

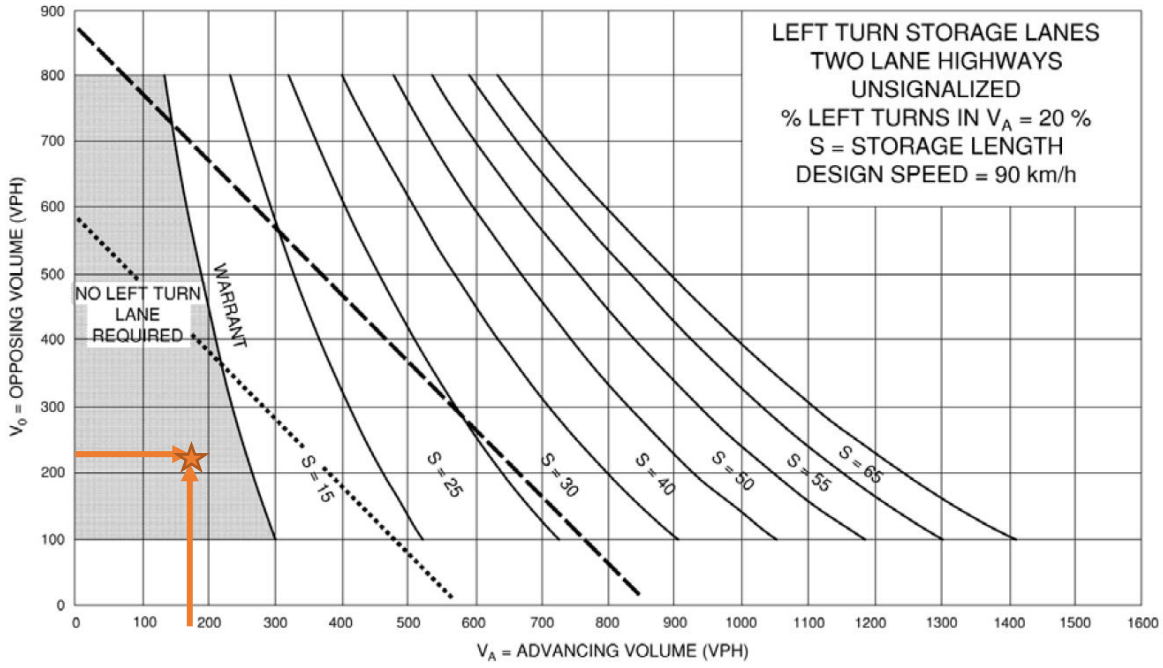


Exhibit 2-2: Build-Out (2021) Morning Peak Hour Forecast
Full Operations "Worst-Case" Truck Volume Scenario

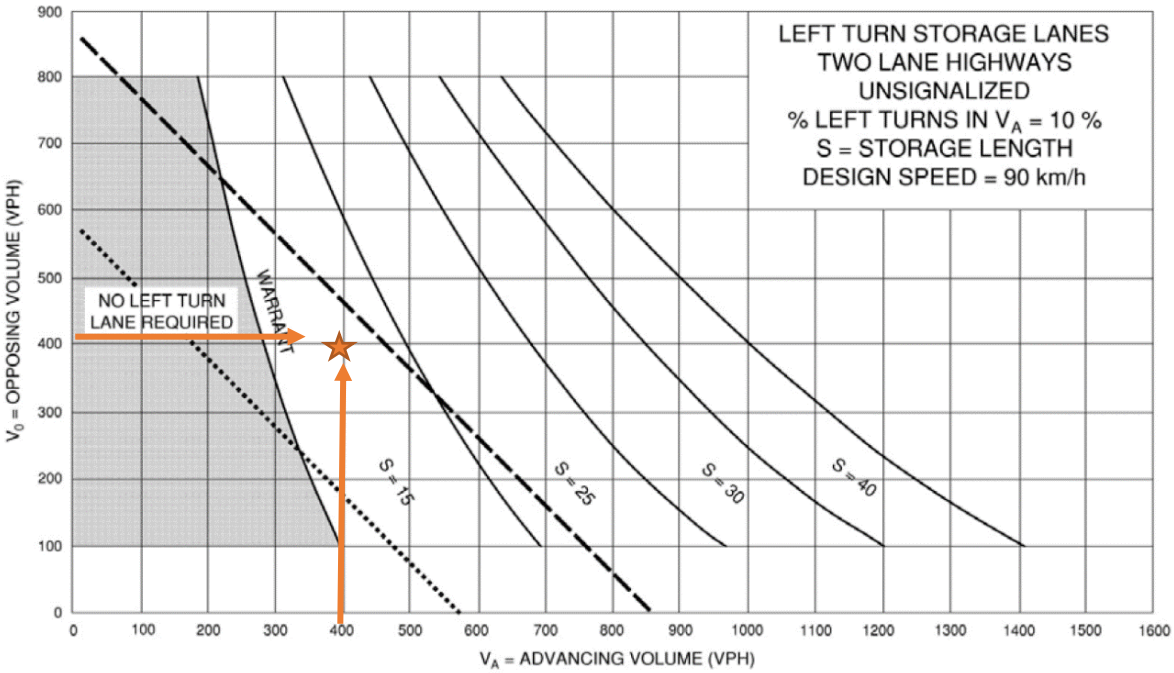


Exhibit 2-3: Build-Out (2021) Afternoon Peak Hour Forecast
Full Operations "Worst-Case" Volume Scenario

2.2 BUILD-OUT FORECAST INTERSECTION CAPACITY ANALYSIS

Table 2-2 summarizes the intersection capacity analysis that was undertaken for the County Road 2/County Road 5 and the County Road 2/Quarry Access intersections assuming the existing and forecast morning and afternoon peak hours of travel demand.

Appendix "B" provides the resulting Synchro™ traffic analysis sheets.

Table 2-2: Build-Out Forecast Traffic Results (Existing and Forecast)

Intersection	***Weekday Morning Peak Hour (Afternoon Peak Hour)***						
	Approach / Movement	***Existing (2020)***			***Forecast (2021)***		
		Delay (seconds)	**LOS**	**Volume/Capacity Ratio (v/c)**	**Delay (seconds)**	**LOS**	**Volume/Capacity Ratio (v/c)**
County Road 2 & County Road 5/Palace Road Two-Way STOP Controlled	SB Approach: County Rd 5	11 (33)	B (D)	0.21 (0.65)	12 (**43**)	B (**E**)	0.25 (0.74)
	NB Approach: Palace Road	13 (29)	B (D)	0.15 (0.38)	13 (31)	B (D)	0.16 (0.41)
County Road 2 & Existing Quarry Access With EB-LT Lane	SB leaving Quarry Site	11 (14)	B (B)	0.02 (0.03)	11 (14)	B (B)	0.04 (0.06)

Table 2-2 indicates:

- Satisfactory traffic operations during the morning peak hour at both study area intersections;
- Satisfactory traffic operations at the existing quarry site access during the afternoon peak hour during the "full operational day" scenario; and
- Poor operations at the SB approach of the County Road 2/County Road 5 intersection during the afternoon peak hour of travel demand, which is forecast to result in a LOS "E" with an average delay of 39 seconds-per-vehicle.

The County Road 5/County Road 2 intersection is forecast to provide unsatisfactory operations due to the additional 9 trucks attributed to the proposed asphalt plant development in combination with the background east-west traffic growth. However, the only improvement that would benefit the intersection would be traffic signal control which would improve access from the minor legs of the intersection. The following section provides a traffic signal warrant analysis that was undertaken to assess if the SB minor approach operational deficiency would warrant traffic signals at this intersection.

2.3 TRAFFIC SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis was undertaken for the two-way STOP-controlled County Road 2 & County Road 5/Palace Road intersection. The analysis was undertaken using the Transportation Association of Canada (2014) traffic warrants spreadsheet. Appendix "C" provides the analysis detail sheet. The analysis adopted the 2020 "adjusted for Covid" traffic volumes as the base layer.

The traffic warrant analysis requires a full day traffic count to extract the morning, midday and afternoon peak periods of travel demand. Each peak period consists of two continuous hours of traffic volumes which provide the peak 6-hour traffic demand utilized within the traffic signal warrant analysis. The May 2020 traffic volume count recorded the morning and afternoon peak periods. For the purposes of this study, the mid-day peak hours were assumed to be equivalent to the average of the morning and afternoon peak hours of travel demand.

A review of the analysis found that the intersection achieved a score of **66 out of 100**. Despite the poor operations for the minor southbound approach, traffic signals were found **not** to be warranted at the County Road 2/County Road 5 intersection. The County is encouraged to monitor the intersection should safety concerns or excessive delays characterize the intersection and could result in traffic signal control being required ahead of the volume-warrant.

3.0 FINDINGS AND RECOMMENDATIONS

3.1 SUMMARY OF FINDINGS

A review of the study was found to indicate:

- On a typical day, the existing quarry operations involve approximately 30 triaxle trucks of export material over a 10-hour period resulting in 2-to-3 trucks per hour on the existing network;
- The proposed plant, on a "typical average" day, would generate:
    - approximately 25 triaxles of asphalt material;
    - approximately 25-to-60 triaxle trucks of import materials for the asphalt plant. The import of materials for the asphalt plant would be mitigated to the greatest extent possible by utilizing materials produced on-site at the existing quarry.

  The average day for the proposed asphalt pant results in approximately 5-to-9 trucks/ hour throughout the work day on the adjacent roadways due to the proposed asphalt plant. On a typical day, this translate to an additional truck every 7-to-12 minutes on County Road 2;
- A "full operational" day where the proposed plant would see a busy production day generating 90 triaxle loads of asphalt and 30 triaxle loads of import material. This could result in 13 trucks per direction during the peak hour of travel demand;
- Assuming a "full operational" day, the site access was found to operate with acceptable traffic operations in both the morning and afternoon peak hour assuming the presence of a left turn bay/slip-lane arrangement designed to accommodate triaxle and truck trailer unit turning movements.
- The County Road 2/County Road 5 intersection was found to operate with congested conditions effecting the southbound approach during the afternoon peak hour of travel demand. The level of service was found to deteriorate from the existing LOS "D" to a LOS "E" due to the addition of background growth east-west growth and an additional 9 asphalt plant trucks on the SB-LT during the peak hour; and
- A traffic signal warrant analysis of the County Road 2 / County Road 5 intersection was found to indicate that traffic signal control is **not** warranted as only afternoon peak hour of demand is affected. The County is encouraged to monitor the intersection should safety concerns or excessive delays become a concern.

3.2 SUMMARY OF RECOMMENDATIONS

It is recommended that the County of Lennox and Addington:

- Consider a slip-lane configuration for the proposed site access to accommodate left-turn vehicle storage requirements for the heavy vehicle traffic approaching the proposed development. The design and arrangement of this left-turn lane would be determined through site plan control;

- Continue to monitor the County Road 2/County Road 5 intersection to ensure safety concerns are managed. Should safety concerns or excessive delays to thru-traffic arise, the Town may wish to consider additional traffic control measures.
- Assemble the required draft conditions that would permit the proposed permanent asphalt plant development located at 8205 County Road 5 to proceed.

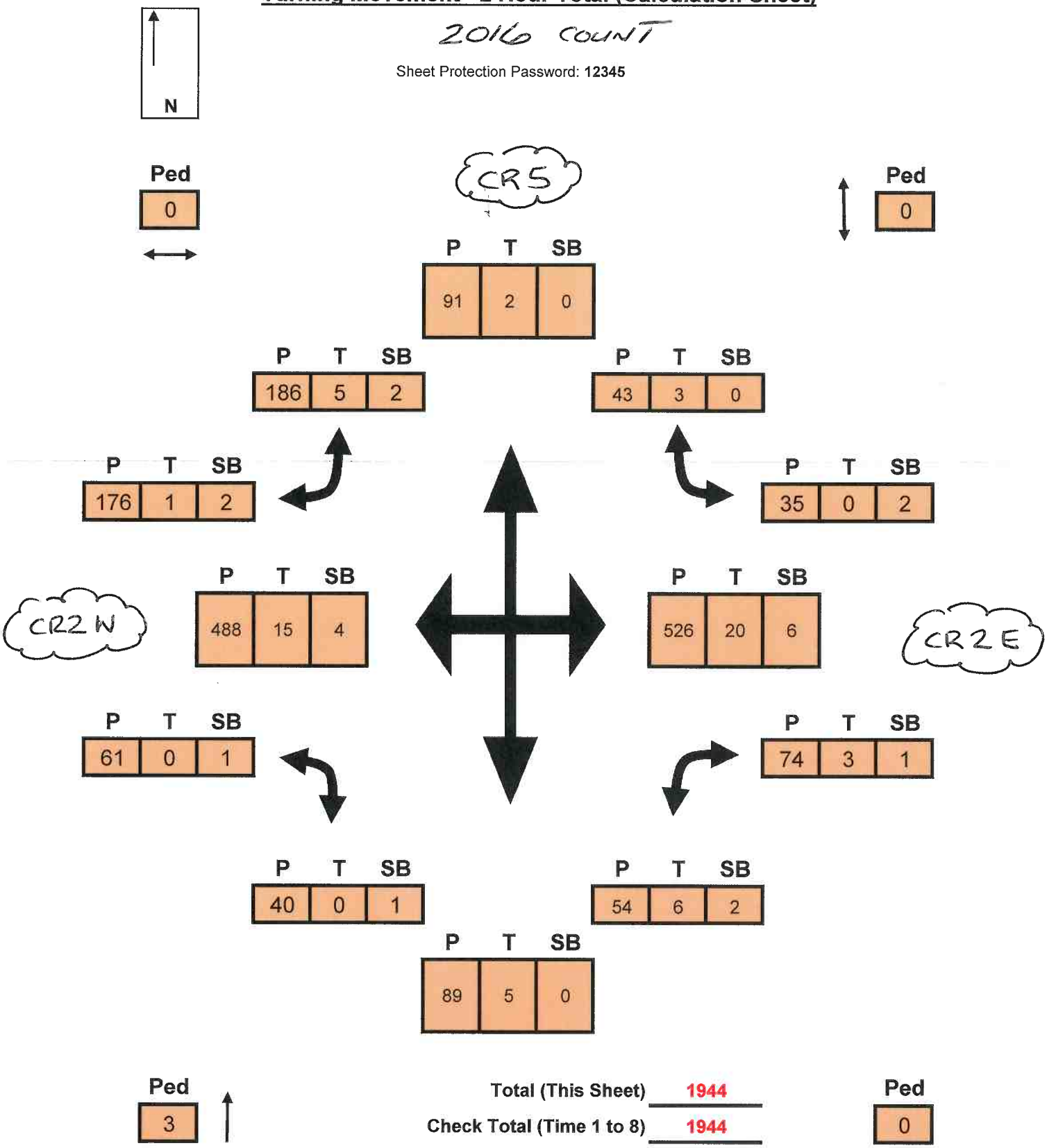
APPENDIX A: EXISTING TRAFFIC VOLUMES

TURNING MOVEMENT #29

Turning Movement - 2 Hour Total (Calculation Sheet)

2016 COUNT

Sheet Protection Password: **12345**



Total (This Sheet) 1944

Check Total (Time 1 to 8) 1944

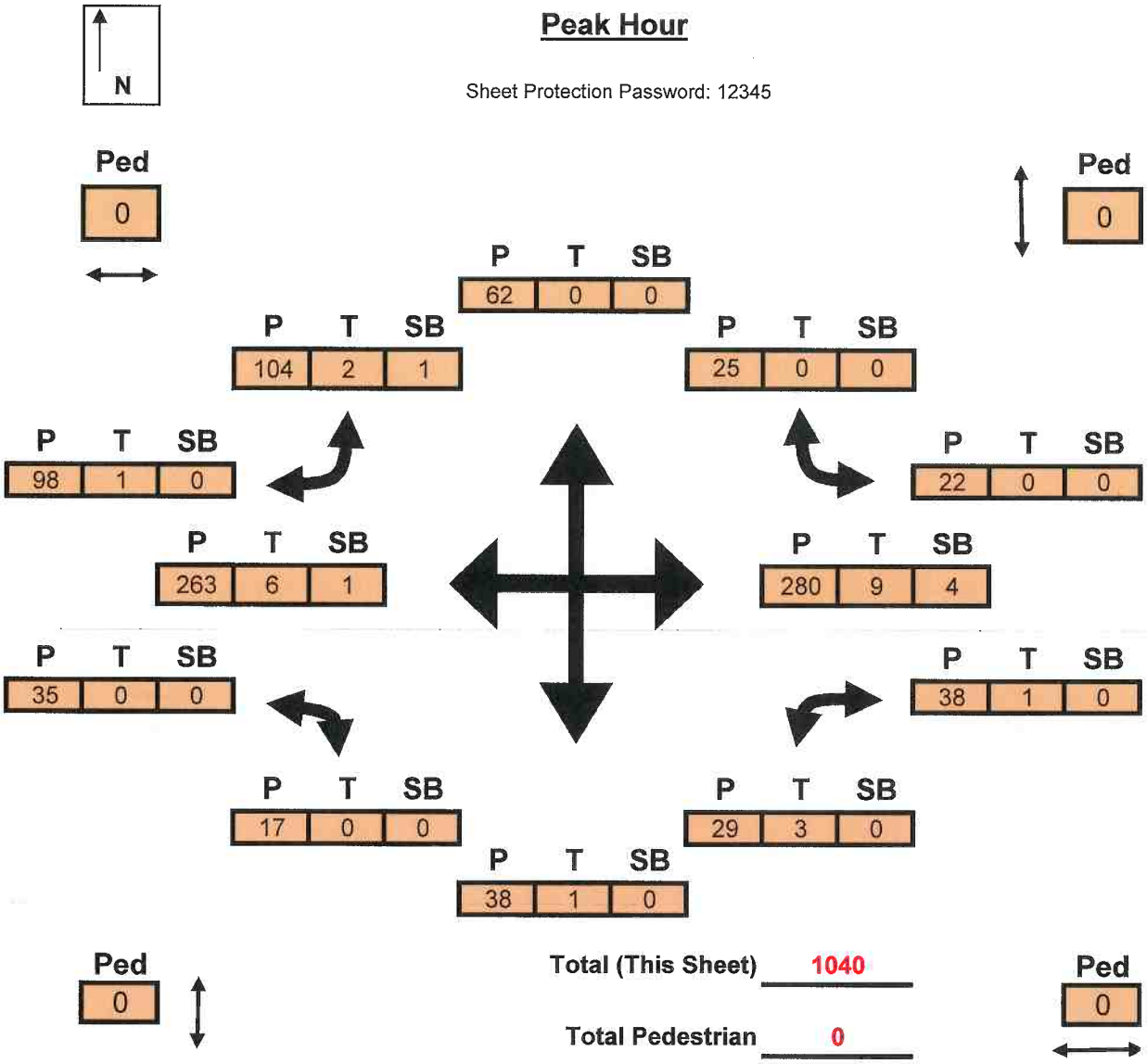
TURNING MOVEMENT #29

↓

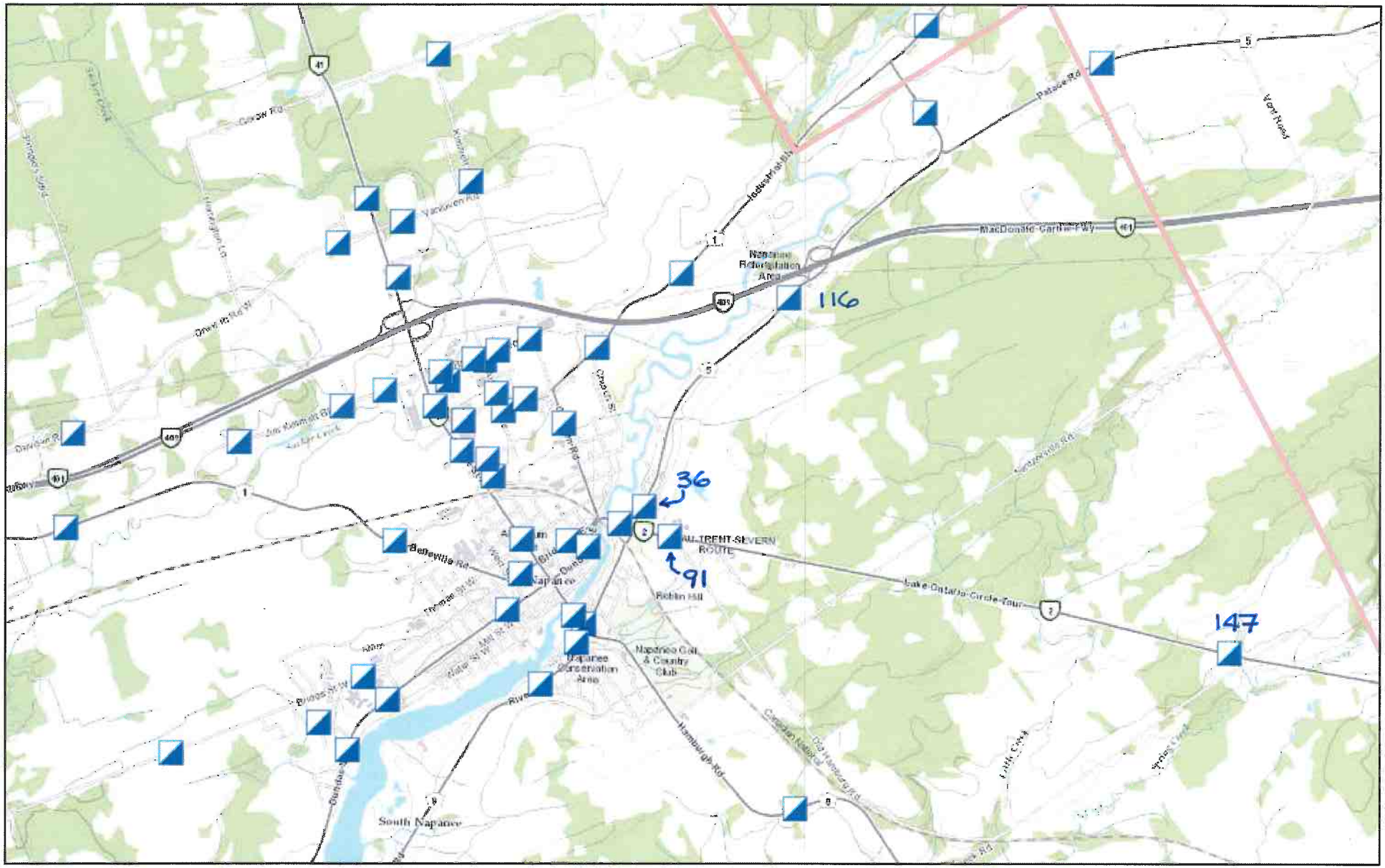
Total Pedestrian 3 ⟷

# of Vehicles		Rank
Time 1-4	904	5
Time 2-5	927	4
Time 3-6	954	3
Time 4-7	993	2
Time 5-8	1040	1

TURNING MOVEMENT #4



Roads Manager Print



2020-04-07, 2:51:17 p.m.

TRAFFIC COUNT SITES
(ADR TUBE COUNTS)

1:41,836

0 0.35 0.7 1.4 mi

0 0.5 1 2 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS,

L&A County Mapping Services

COUNTY OF LENNOX & ADDINGTON

PHYSICAL SERVICES DEPT.

county of Lennox & Addington

Speed Summary Report

91-2 0 2019-07-05 1025.EC2

Location: CR91 at Civic 53 <60 km/h>
Station #: 91-1 Location:
Start: 8:00 July 4, 2019
End: 8:00 July 5, 2019
Duration: (1 days, 0.142857 weeks)
Limit: 60 km/h
Profile: Cls(1-4) Dir(NESW) Sp(0,200) Headway(>0) Span(0 - 100) Lane(0-16), **Scheme:** SchemeF4-LA Aggregate (0 1 1 1 2 2 2 2 2 3 3 3 3 4)

		ALL	East	West	Adj Factor	Adj Total(AADT)					
Volume	All	7085	3447	3638	0.88	6235					
		Mean	85%ile	50%ile	15%ile	>PSL (60)	%>PSL (60)	> 70	%> 70	> 80	%>80
Statistics	All	64.3	79.0	61.2	51.3	3831	54.1	2237	31.6	984	13.9
		0 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 200
Speed Bins	Total	46	699	2509	1594	1253	668	258	45	10	3
	Percentage	0.6	9.9	35.4	22.5	17.7	9.4	3.6	0.6	0.1	0.0
		1 - (F1-F3)	2 - (F4-F8)	3 - (F9-F13)	4 - (F14)		Trucks				
Class	Grand Totals	6176	877	15	17		892				
	Percentage	87.2	12.4	0.2	0.2		12.6				
		Peak Volume	Peak Hour	Peak Percent							
Peaks	AM	479	11:00	6.8							
	PM	623	16:00	8.8							

MTE version 4.0.8.0

COUNTY OF LENNOX & ADDINGTON

PHYSICAL SERVICES DEPT.

county of Lennox & Addington

Speed Summary Report

147-1 0 2019-04-18 1449.EC2

Location: CR-2 Civic 7490 <80 km/h>
Station #: 147-1 Location:
Start: 13:00 April 17, 2019
End: 13:00 April 18, 2019
Duration: (1 days, 0.142857 weeks)
Limit: 80 km/h
Profile: Cls(1-4) Dir(NESW) Sp(0,200) Headway(>0) Span(0 - 100) Lane(0-16), **Scheme:** SchemeF4-LA Aggregate (0 1 1 1 2 2 2 2 2 3 3 3 3 4)

		ALL	North	South	Adj Factor	Adj Total(AADT)					
Volume	All	6046	2943	3103	1	6046					
		Mean	85%ile	50%ile	15%ile	>PSL (80)	%>PSL (80)	> 90	%> 90	> 100	%>100
Statistics	All	84.7	93.1	84.9	76.9	4544	75.2	1554	25.7	185	3.1
		0 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 200
Speed Bins	Total	12	13	63	213	1201	2990	1369	162	21	2
	Percentage	0.2	0.2	1.0	3.5	19.9	49.5	22.6	2.7	0.3	0.0
		1 - (F1-F3)	2 - (F4-F8)	3 - (F9-F13)	4 - (F14)		Trucks				
Class	Grand Totals	5529	508	8	1		516				
	Percentage	91.4	8.4	0.1	0.0		8.5				
		Peak Volume	Peak Hour	Peak Percent							
Peaks	AM	433	11:00	7.2							
	PM	562	16:00	9.3							

MTE version 4.0.8.0

COUNTY OF LENNOX & ADDINGTON

PHYSICAL SERVICES DEPT.

county of Lennox & Addington

Speed Summary Report

36-1 0 2019-07-05 1025.EC2

Location: CR 5 @ civic 358 < 50km/h>
Station #: 36-1 Location:
Start: 8:00 Thursday, July 04, 2019
End: 8:00 Friday, July 05, 2019
Duration: (1 days, 0.142857 weeks)
Limit: 50 km/h
Profile: Cls(1-4) Dir(NESW) Sp(0,200) Headway(>0) Span(0 - 100) Lane(0-16), **Scheme:** SchemeF4-LA Aggregate (0 1 1 1 2 2 2 2 2 3 3 3 3 3 4)

		ALL	North	South	Adj Factor	Adj Total(AADT)					
Volume	All	4383	2109	2274	0.98	4295.34					
		Mean	85%ile	50%ile	15%ile	>PSL (50)	%>PSL (50)	> 60	%> 60	> 70	%>70
Statistics	All	55.9	63.9	55.8	48.1	3392	77.39	1293	29.50	183	4.175
		0 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 200
Speed Bins	Total	93	898	2099	1110	171	11	1	0	0	0
	Percentage	2.122	20.49	47.89	25.33	3.901	0.251	0.023	0.000	0.000	0.000
		1 - (F1-F3)	2 - (F4-F8)	3 - (F9-F13)	4 - (F14)		Trucks				
Class	Grand Totals	4060	311	5	7		316				
	Percentage	92.63	7.096	0.114	0.160		7.21				
		Peak Volume	Peak Hour	Peak Percent							
Peaks	AM	343	08:00	7.8							
	PM	384	16:00	8.8							

MTE version 5.0.6.0

COUNTY OF LENNOX & ADDINGTON

PHYSICAL SERVICES DEPT.

county of Lennox & Addington

Speed Summary Report

116-1 0 2019-06-28 1002.EC2

Location: CR5 at Civic 810 <60 km/h>
Station #: 116-1 Location:
Start: 8:00 Wednesday, June 26, 2019
End: 8:00 Thursday, June 27, 2019
Duration: (1 days, 0.142857 weeks)
Limit: 60 km/h
Profile: Cls(1-4) Dir(NESW) Sp(0,200) Headway(>0) Span(0 - 100) Lane(0-16), **Scheme:** SchemeF4-LA Aggregate (0 1 1 1 2 2 2 2 2 3 3 3 3 4)

		ALL	North	South	Adj Factor	Adj Total(AADT)					
Volume	All	3451	1659	1792	0.89	3071.39					
		Mean	85%ile	50%ile	15%ile	>PSL (60)	%>PSL (60)	> 70	%> 70	> 80	%>80
Statistics	All	69.6	81.4	68.4	58.8	2800	81.14	1544	44.74	606	17.56
		0 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 200
Speed Bins	Total	20	55	576	1256	938	464	125	14	3	0
	Percentage	0.580	1.594	16.69	36.40	27.18	13.45	3.622	0.406	0.087	0.000
		1 - (F1-F3)	2 - (F4-F8)	3 - (F9-F13)	4 - (F14)		Trucks				
Class	Grand Totals	3063	368	15	5		383				
	Percentage	88.76	10.66	0.435	0.145		11.095				
		Peak Volume	Peak Hour	Peak Percent							
Peaks	AM	272	07:00	7.9							
	PM	358	16:00	10.4							

MTE version 5.0.6.0

APPENDIX B: SYNCHRO TRAFFIC ANALYSIS EXISTING AND FORECASTING

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	101	2	12	184	20	24	39	20	23	19	117
Future Vol, veh/h	51	101	2	12	184	20	24	39	20	23	19	117
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	1	10	0	0	8	30	0	9	0	1	8	0
Mvmt Flow	26	101	2	12	184	20	24	39	20	23	19	117

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	204	0	0	103	0	0	440	382	102	392	363	184
Stage 1	-	-	-	-	-	-	154	154	-	208	208	-
Stage 2	-	-	-	-	-	-	286	228	-	184	155	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.59	6.2	7.11	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.59	-	6.11	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.59	-	6.11	5.58	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4.081	3.3	3.509	4.072	3.3
Pot Cap-1 Maneuver	1374	-	-	1502	-	-	531	540	959	569	555	864
Stage 1	-	-	-	-	-	-	853	757	-	796	719	-
Stage 2	-	-	-	-	-	-	726	703	-	820	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1374	-	-	1502	-	-	438	525	959	515	540	864
Mov Cap-2 Maneuver	-	-	-	-	-	-	438	525	-	515	540	-
Stage 1	-	-	-	-	-	-	837	743	-	781	713	-
Stage 2	-	-	-	-	-	-	606	697	-	746	744	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0.4	12.6	11.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	554	1374	-	-	1502	-	-	739
HCM Lane V/C Ratio	0.15	0.019	-	-	0.008	-	-	0.215
HCM Control Delay (s)	12.6	7.7	-	-	7.4	-	-	11.2
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	135	207	3	3	9
Future Vol, veh/h	9	135	207	3	3	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	9	135	207	3	3	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	210	0	-	0	362	209
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	153	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	943	-	-	-	481	636
Stage 1	-	-	-	-	639	-
Stage 2	-	-	-	-	683	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	943	-	-	-	476	636
Mov Cap-2 Maneuver	-	-	-	-	476	-
Stage 1	-	-	-	-	633	-
Stage 2	-	-	-	-	683	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	943	-	-	-	587
HCM Lane V/C Ratio	0.01	-	-	-	0.02
HCM Control Delay (s)	8.9	0	-	-	11.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	9.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	109	294	35	40	334	16	19	40	35	29	61	133
Future Vol, veh/h	109	294	35	40	334	16	19	40	35	29	61	133
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	2	0	3	3	50	0	4	0	30	0	0
Mvmt Flow	109	294	35	40	334	16	19	40	35	29	61	133

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	350	0	0	329	0	0	1049	960	312	981	961	334
Stage 1	-	-	-	-	-	-	530	530	-	414	414	-
Stage 2	-	-	-	-	-	-	519	430	-	567	547	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.1	6.54	6.2	7.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.54	-	6.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.54	-	6.4	5.5	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.5	4.036	3.3	3.77	4	3.3
Pot Cap-1 Maneuver	1203	-	-	1225	-	-	207	255	733	203	258	712
Stage 1	-	-	-	-	-	-	536	523	-	564	597	-
Stage 2	-	-	-	-	-	-	544	580	-	462	521	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1203	-	-	1225	-	-	122	224	733	152	227	712
Mov Cap-2 Maneuver	-	-	-	-	-	-	122	224	-	152	227	-
Stage 1	-	-	-	-	-	-	487	475	-	513	577	-
Stage 2	-	-	-	-	-	-	383	561	-	366	474	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.8	28.4	32.6
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	246	1203	-	-	1225	-	-	345
HCM Lane V/C Ratio	0.382	0.091	-	-	0.033	-	-	0.646
HCM Control Delay (s)	28.4	8.3	-	-	8	-	-	32.6
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.7	0.3	-	-	0.1	-	-	4.3

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	349	381	3	3	9
Future Vol, veh/h	9	349	381	3	3	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	9	349	381	3	3	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	384	0	-	0	750	383
Stage 1	-	-	-	-	383	-
Stage 2	-	-	-	-	367	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	792	-	-	-	267	494
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	529	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	792	-	-	-	263	494
Mov Cap-2 Maneuver	-	-	-	-	263	-
Stage 1	-	-	-	-	512	-
Stage 2	-	-	-	-	529	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	792	-	-	-	405
HCM Lane V/C Ratio	0.011	-	-	-	0.03
HCM Control Delay (s)	9.6	0	-	-	14.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	106	2	12	190	30	24	40	20	33	19	119
Future Vol, veh/h	52	106	2	12	190	30	24	40	20	33	19	119
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	1	10	0	0	8	11	0	9	0	50	8	0
Mvmt Flow	26	106	2	12	190	30	24	40	20	33	19	119

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	220	0	0	108	0	0	457	403	107	403	374	190
Stage 1	-	-	-	-	-	-	159	159	-	214	214	-
Stage 2	-	-	-	-	-	-	298	244	-	189	160	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.59	6.2	7.6	6.58	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.59	-	6.6	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.59	-	6.6	5.58	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4.081	3.3	3.95	4.072	3.3
Pot Cap-1 Maneuver	1355	-	-	1495	-	-	517	526	953	482	547	857
Stage 1	-	-	-	-	-	-	848	753	-	691	714	-
Stage 2	-	-	-	-	-	-	715	691	-	714	754	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1355	-	-	1495	-	-	424	512	953	435	532	857
Mov Cap-2 Maneuver	-	-	-	-	-	-	424	512	-	435	532	-
Stage 1	-	-	-	-	-	-	832	739	-	678	708	-
Stage 2	-	-	-	-	-	-	594	685	-	648	740	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0.4	12.9	12
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	539	1355	-	-	1495	-	-	683
HCM Lane V/C Ratio	0.156	0.019	-	-	0.008	-	-	0.25
HCM Control Delay (s)	12.9	7.7	-	-	7.4	-	-	12
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	1

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	21	136	211	4	4	21
Future Vol, veh/h	21	136	211	4	4	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	21	136	211	4	4	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	215	0	-	0	391	213
Stage 1	-	-	-	-	213	-
Stage 2	-	-	-	-	178	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	938	-	-	-	461	632
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	938	-	-	-	451	632
Mov Cap-2 Maneuver	-	-	-	-	451	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	663	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	11.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	938	-	-	-	594
HCM Lane V/C Ratio	0.022	-	-	-	0.042
HCM Control Delay (s)	8.9	-	-	-	11.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	12

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	111	301	36	41	342	25	19	41	36	39	62	136
Future Vol, veh/h	111	301	36	41	342	25	19	41	36	39	62	136
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	1200	-	-	800	-	600	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	1	0	3	3	30	0	4	0	25	0	0
Mvmt Flow	111	301	36	41	342	25	19	41	36	39	62	136

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	367	0	0	337	0	0	1077	990	319	1004	983	342
Stage 1	-	-	-	-	-	-	541	541	-	424	424	-
Stage 2	-	-	-	-	-	-	536	449	-	580	559	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.1	6.54	6.2	7.35	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.54	-	6.35	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.54	-	6.35	5.5	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.5	4.036	3.3	3.725	4	3.3
Pot Cap-1 Maneuver	1186	-	-	1217	-	-	198	244	726	200	251	705
Stage 1	-	-	-	-	-	-	529	517	-	565	590	-
Stage 2	-	-	-	-	-	-	532	569	-	462	514	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1186	-	-	1217	-	-	114	214	726	147	220	705
Mov Cap-2 Maneuver	-	-	-	-	-	-	114	214	-	147	220	-
Stage 1	-	-	-	-	-	-	479	468	-	512	570	-
Stage 2	-	-	-	-	-	-	370	550	-	363	466	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.8	30.5	42.5
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	235	1186	-	-	1217	-	-	320
HCM Lane V/C Ratio	0.409	0.094	-	-	0.034	-	-	0.741
HCM Control Delay (s)	30.5	8.3	-	-	8.1	-	-	42.5
HCM Lane LOS	D	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	1.9	0.3	-	-	0.1	-	-	5.6

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	356	389	6	6	19
Future Vol, veh/h	19	356	389	6	6	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	600	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	100	12	8	100	100	100
Mvmt Flow	19	356	389	6	6	19

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	395	0	-	0	786	392
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	394	-
Critical Hdwy	5.1	-	-	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	3.1	-	-	-	4.4	4.2
Pot Cap-1 Maneuver	783	-	-	-	253	488
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	512	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	783	-	-	-	247	488
Mov Cap-2 Maneuver	-	-	-	-	247	-
Stage 1	-	-	-	-	501	-
Stage 2	-	-	-	-	512	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	783	-	-	-	395
HCM Lane V/C Ratio	0.024	-	-	-	0.063
HCM Control Delay (s)	9.7	-	-	-	14.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Castleglenn Consultants
Engineers, Project Managers & Planners

APPENDIX C: TRAFFIC SIGNAL WARRANT ANALYSIS
BUILD-OUT (2021) FORECAST CONDITIONS

City of Napanee - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	County Road 2	Direction (EW or NS)	EW
Side Street (name)	County Road 5	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Forecast 2021 with Saphalt Plant With Volume Mods for Covid

CHECK SHEET

for Warrant Calculation Results, please hit 'Page Down'

Road Authority:	City of Napanee
City:	Napanee
Analysis Date:	2020 Jun 18, Thu
Count Date:	2020 May 12, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
County Road 2	WB	1		1			1		10,000	1			
County Road 2	EB	1				1			360	1			
County Road 5	NB				1				850	1			
County Road 5	SB				1				10,000	1			

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

Are the County Road 5 NB right turns significantly impeded by through movements? (y/n)	n
Are the County Road 5 SB right turns significantly impeded by through movements? (y/n)	n
Are the County Road 2 EB right turns significantly impeded by through movements? (y/n)	n

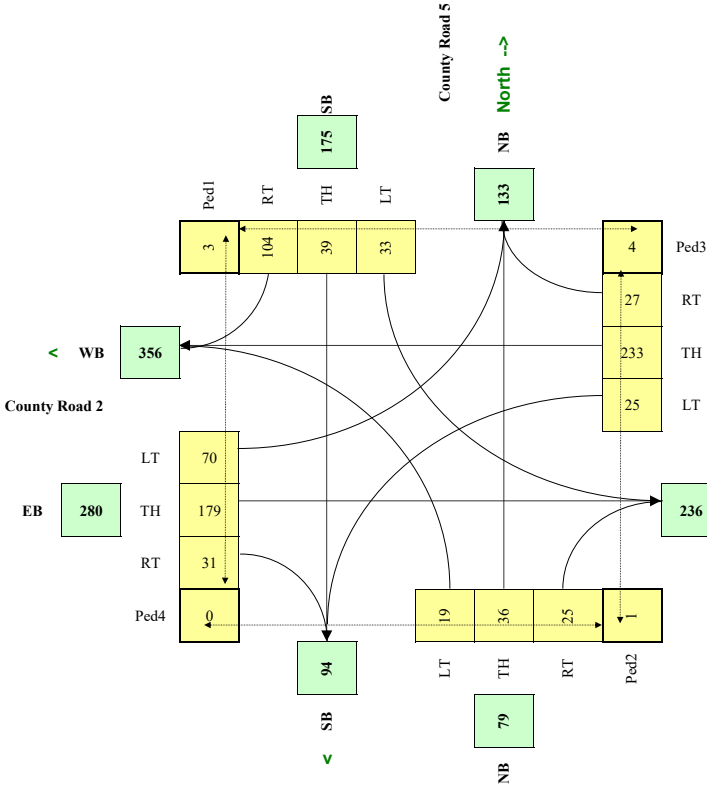
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	5,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
County Road 2	EW	60	8.0%	n	0.0
County Road 5	NS		3.0%	n	0.0

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:30 - 8:30	23	37	19	29	18	113	11	176	26	48	96	16	2	1	0	0
	5	15	24	24	17	61	11	164	26	38	129	26	2	1	3	0
	21	39	27	32	38	121	25	249	25	75	188	32	3	1	3	0
	21	39	27	32	38	121	25	249	25	75	188	32	3	1	6	1
	18	39	34	35	58	129	38	321	23	103	279	48	3	0	5	0
	24	48	16	43	64	77	38	240	38	80	194	31	3	0	8	1
Total (6-hour peak)	112	217	147	195	233	622	148	1,399	163	419	1,074	185	16	4	25	2
Average (6-hour peak)	19	36	25	33	39	104	25	233	27	70	179	31	3	1	4	0
Actual Pedestrian Crossing Distance (m)													12.0	20.0	30.0	15.0

Average 6-hour Peak Turning Movements



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

W = 66 64 2

Veh Ped

NOT Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 8

Spreadsheet Appears Bugged.
Ped. Warrants Incorporated Above.

~~Warranted - Complex Intersection~~