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Noise Feasibility Study
Proposed Residential Development
7769, 7751 & 7735 Thorold Stone Road
Niagara Falls, Ontario

Prepared for:

Thorowest Construction Ltd.
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Kelowna, British Columbia, V1W 0A7

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and

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February 23, 2023

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VERSION CONTROL

Noise Feasibility Study,
7769, 7751 & 7735 Thorold Stone Road,
Toronto, Ontario.

Ver.	Date	Version Description / Changelog	Prepared By
0	March 22, 2022	Noise Feasibility Study prepared as part of the planning and approvals process.	Y.Lo
1	February 23, 2023	Noise Feasibility Study update as part of the planning and approvals process.	Y.Lo

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1 Introduction and Summary

HGC Engineering was retained by Thorowest Construction Ltd. to conduct a noise feasibility study for a proposed residential development to be located at 7769, 7751, and 7735 Thorold Stone Road in Niagara Falls, Regional Municipality of Niagara (RMON), Ontario. The study is required for submission for site plan approval by the RMON to address the road traffic on Thorold Stone Road, Montrose Road, and the Queen Elizabeth Way (QEW).

This study is being updated to reflect the latest site plan prepared by Upper Canada Consultants Engineers/Planners dated February 9, 2023.

The primary noise sources impacting the site are road traffic on Thorold Stone Road. Secondary sources of noise include road traffic on Montrose Road and the QEW. Road traffic data for Thorold Stone Road and Montrose Road was obtained from the RMON. Road traffic data for the QEW was obtained from Ministry of Transportation (MTO) personnel. The data was used to predict future traffic sound levels at various locations around the proposed development. The predicted sound levels were compared to the guidelines of the Ministry of the Environment, Conservation and Parks (MECP) and the RMON.

The sound level predictions indicate that future road traffic sound levels will exceed MECP guidelines at the proposed residential development. An acoustic barrier will be required at the rear yard of the dwelling unit with flanking exposure to Thorold Stone Road. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning by the occupant will be required for all proposed dwelling units. Building constructions meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for all of the dwellings. Warning clauses are also recommended to inform future occupants of the traffic noise impacts, to address sound level excesses and to indicate the presence of the existing retail/commercial uses.

2 Site Description and Sources of Sound

A key plan showing the location of the proposed site is indicated in Figure 1. The development is located at 7769, 7751 & 7735 Thorold Stone Road in Niagara Falls, Ontario. A site plan prepared by Upper Canada Consultants Engineers/Planners dated February 9, 2023 is attached as Figure 2. The proposed residential development will consist of blocks of townhouses, semi-detached units, one single-detached unit, associated parking and roadways.

A site visit was performed by HGC Engineering personnel in November 2021 to investigate the surrounding land uses and to identify the significant noise sources in the vicinity. The primary sources of noise are road traffic on Thorold Stone Road and the QEW, with lesser contributions from Montrose Road. The surrounding lands comprise of existing residential uses. There are existing commercial/retail buildings located further east, adjacent to Montrose Road. An A&W with a drive-through and a commercial building with uses such as Thorowest Bakery, H&R Block, Quiznos, Mary Kraus Real Estate, Malibu Beach Tanning, Avondale Food Stores and Pho Vietnam. There are small rooftop units. During the site visit, traffic sounds dominated the site, nevertheless, a noise warning clause informing future owners and occupants of the building of the proximity to existing commercial/retail uses is recommended as included in Section 5.4. There are no other significant sources of stationary sound within 500 m of the subject site.

3 Criteria for Acceptable Sound Levels

3.1 Road Traffic Noise Criteria

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MECP publication NPC-300, “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, Part C release date October 21, 2013 and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A weighted decibels [dBA]. These criteria have generally been adopted by the Regional Municipality of Niagara.

Table 1: Road Traffic Noise Criteria

	Daytime $L_{EQ(16\ hour)}$ Road	Nighttime $L_{EQ(8\ hour)}$ Road
Outdoor Living Areas	55 dBA	--
Inside Living/Dining Rooms	45 dBA	45 dBA
Inside Bedrooms	45 dBA	40 dBA

Daytime refers to the period between 07:00 and 23:00, while nighttime refers to the period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace or other area where passive recreation is expected to occur. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MECP guidelines.

The guidelines in the MECP publication allow the sound level in an OLA to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements and offers of purchase and sale for the property. When OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom/living/dining room windows exceed 60 dBA or daytime sound levels exceed 65 dBA outside bedroom/living room windows. A forced air ventilation system with ducts sized for the future provision of air conditioning, or some other alternative form of mechanical ventilation, is required where nighttime sound levels at bedroom/living/dining room windows are in the range of 51 – 60 dBA or daytime sound levels are in the range of 56 – 65 dBA.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of bedroom/living/dining room window sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise.

Warning clauses are required to notify future residents of possible excesses when nighttime sound levels exceed 50 dBA at the plane of the bedroom/living/dining room window and daytime sound

levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom/living/dining room window due to road traffic.

4 Traffic Sound Level Assessment

4.1 Road Traffic Data

Road traffic data for Thorold Stone Road and Montrose Road was provided by RMON personnel in the form of Turning Movement Counts and is included in Appendix A. A commercial vehicle percentage of 2.0% was further split into 1.2% heavy trucks and 0.8% medium trucks for Thorold Stone Road. A commercial vehicle percentage of 2.2% was further split into 1.4% heavy trucks and 0.8% medium trucks for Montrose Road. The data was projected 20 years to the year 2043 as per RMON requirements using a 2.5% growth rate. A day/night split of 90%/10% and a posted speed limit of 50 km/h were used in the analysis.

Road traffic data for the QEW was obtained from the Ministry of Transportation, included in Appendix B, and projected to the year 2033 at a conservative growth rate of 2.5%/yr. A 67%/33% day/night split was used in the analysis. A commercial vehicle percentage of 10% was further split into 3.8% medium trucks and 6.2% heavy trucks. These vehicles were assumed to be travelling at the posted maximum speed of 100 km/hr. The projected road traffic volumes are shown in Table 2 below.

Table 2: Projected Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Thorold Stone Road *(projected to 2043)*	Daytime	29 113	238	356	29 707
	Nighttime	3 235	26	40	3 301
	Total	**32 348**	**264**	**396**	**33 008**
Montrose Road *(projected to 2043)*	Daytime	19 102	156	273	19 531
	Nighttime	2 122	17	30	2 170
	Total	**21 224**	**174**	**304**	**21 701**
Queen Elizabeth Way *(projected to 2033)*	Daytime	61 537	2 598	4 239	68 375
	Nighttime	30 764	1 299	2 119	34 182
	Total	**92 301**	**3 897**	**6 359**	**102 557**

4.2 Road Traffic Noise Predictions

To assess the levels of road traffic noise which would impact the site in the future, road traffic predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix B.

Prediction locations were chosen around the site to obtain a good representation of the future sound levels at various dwelling units with exposure to the surrounding roadways. Sound levels were also predicted at the top-storey façade during the daytime and nighttime hours to investigate ventilation requirements and building envelope construction and in the outdoor amenity areas to determine acoustic barrier requirements. The results of these predictions are summarized in Table 3.

Table 3: Future Road Traffic Sound Levels, [dBA], Without Mitigation

Prediction Location	Unit No.	Description	Daytime in OLA $L_{EQ-16\ hr}$	Daytime at Façade $L_{EQ-16\ hr}$	Nighttime at Façade $L_{EQ-8\ hr}$
[A]	34	Townhouse block with flanking exposure to Thorold Stone Road	62	64	59
[B]	32	Townhouse block with some exposure to Thorold Stone Road	58	60	57
[C]	39	Townhouse block with fronting exposure to Thorold Stone Road	<55	62	57
[D]	1	Semi-detached unit with flanking exposure to Thorold Stone Road	55	65	59
[E]	24	Single-detached unit with some exposure to Montrose Road	60	55	54

5 Traffic Noise Recommendations

The predictions indicate that the future traffic sound levels will exceed MECP guidelines at the proposed residential development. Recommendations to address these excesses are discussed below.

5.1 Outdoor Living Areas

The predicted daytime sound level in the rear yard of the dwelling with flanking exposure to Thorold Stone Road (Prediction Location [A]) will be 62 dBA, 7 dBA in excess of the MECP's limit of 55 dBA. An acoustic barrier 2.0 m in height will reduce sound levels to 56 dBA in this area. Alternatively, an acoustic barrier 2.3 m in height will reduce sound levels to less than 55 dBA in this area.

The predicted daytime sound level in the rear yard of the second dwelling unit with exposure to Thorold Road (Prediction Location [B]) will be 58 dBA, 3 dBA in excess of the MECP's limit of 55 dBA. The 3 dBA sound level excess is acceptable to the MECP with the use of a noise warning clause, if it is acceptable to the municipality. The acoustic barrier located at the rear yard of the dwelling unit at location [A] with flanking exposure to Thorold Stone Road will reduce sound levels at location [B].

The predicted daytime sound level in the rear yard of the dwelling unit with flanking exposure to Thorold Road (Prediction Location [E]) will be 60 dBA, 5 dBA in excess of the MECP's limit of 55 dBA. The 5 dBA sound level excess is acceptable to the MECP with the use of a noise warning clause, if it is acceptable to the municipality.

The dwelling units in the remaining blocks will have sound levels that are 55 dBA or less. Physical mitigation in the form of an acoustic barrier will not be required.

When grading information is available for the site, acoustic barrier heights should be refined. As a general note, acoustic barriers may be a combination of an acoustic wall and an earth berm. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m^2. The walls may be constructed from a variety of materials such as wood, brick, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks.

5.2 Indoor Living Areas

Provision for the Future Installation of Air Conditioning

The predicted future sound levels outside the top storey living/dining room/bedroom windows of all proposed dwelling units will be between 56 and 65 dBA during the daytime hours and between 51 and 60 dBA during the nighttime. To address this excess, the MECP guidelines recommend that this dwelling be equipped with a forced air ventilation system with ducts sized to accommodate the future installation of air conditioning by the occupant.

Window or through-the-wall air conditioning units are not recommended for any residential units because of the noise they produce and because the units penetrate through the exterior wall which degrades the overall noise insulating properties of the envelope. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-300, as applicable. The guidelines also recommend warning clauses for all units with ventilation requirements.

5.3 Building Façade Constructions

All proposed dwelling units in the development will have daytime sound levels less than 65 dBA and nighttime sound levels at the top storey façade that will be less than 60 dBA. For these dwellings, any exterior wall, and double glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for the dwelling units.

5.4 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all units with anticipated traffic sound level excesses. Examples are provided below.

Suggested wording for dwellings which have sound level excesses but do not require mitigation measures is given below.

Type A:

> Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling unit occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria.

Suggested wording for future dwellings with daytime OLA sound levels exceeding the MECP criteria by 6 dB or more, for which physical mitigation has been provided is given below.

Type B:

> Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment, Conservation and Parks' noise criteria. The acoustical barrier as installed shall be maintained, repaired or replaced by the owner. Any maintenance, repair or replacement shall be with the same material, to the same standards and having the same colour and appearance of the original.

A suggested wording for future dwellings requiring forced air ventilation systems is given below.

Type C:

> This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suggested wording for future dwellings adjacent to commercial/retail facilities is given below.

Type D:

> Purchasers are advised that due to the proximity of the existing commercial, and retail facilities, sound levels from these facilities may at times be audible.

These sample clauses are provided by the MECP as examples and can be modified by the Municipality as required.

6 Summary and Recommendations

The following list and Table 4 summarize the recommendations made in this report.

1. An acoustic barrier is required in the rear yard of the proposed dwelling unit with flanking exposure to Thorold Road (Prediction Location [A]). When grading plans are available, the acoustic barrier height should be refined.

2. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning system will be required for all proposed dwelling units. The location, installation and sound ratings of the air conditioning devices should comply with NPC-300, as applicable.

3. Building constructions meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation for the indoor spaces of all dwelling units.

4. Warning clauses should be used to inform future residents of the traffic noise issues and the presence of the surrounding commercial and retail facilities.

Table 4: Summary of Noise Control Requirements and Noise Warning Clauses

Prediction Location	Lot/Block No.	Acoustic Barrier	Ventilation Requirements *	Type of Warning Clause	Building Façade Constructions
[A]	34	✓	Forced Air	B, C, D	OBC
[B]	32	--	Forced Air	A, C, D	OBC
[C]	39	--	Forced Air	A, C, D	OBC
[D]	1	--	Forced Air	A, C, D	OBC
[E]	24	--	Forced Air	A, C, D	OBC

Notes:
-- no specific requirement
* The location, installation and sound rating of the air conditioning condensers must be compliant with MOE Guideline NPC-300, as applicable
OBC – meeting the minimum requirements of the Ontario Building Code
✓ Acoustic barrier required. When grading plans are available, the acoustic barrier height should be refined

6.1 Implementation

To ensure that the noise control recommendations outlined above are fully implemented, it is recommended that:

1. Prior to an application for a building permit, a Professional Engineer qualified to provide acoustical engineering services in the Province of Ontario or the chief building official shall review the grading plan, to ensure that the acoustic barriers are adequately designed to ensure acceptable indoor and outdoor noise levels.

2. Prior to assumption of the subdivision, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly installed and constructed.

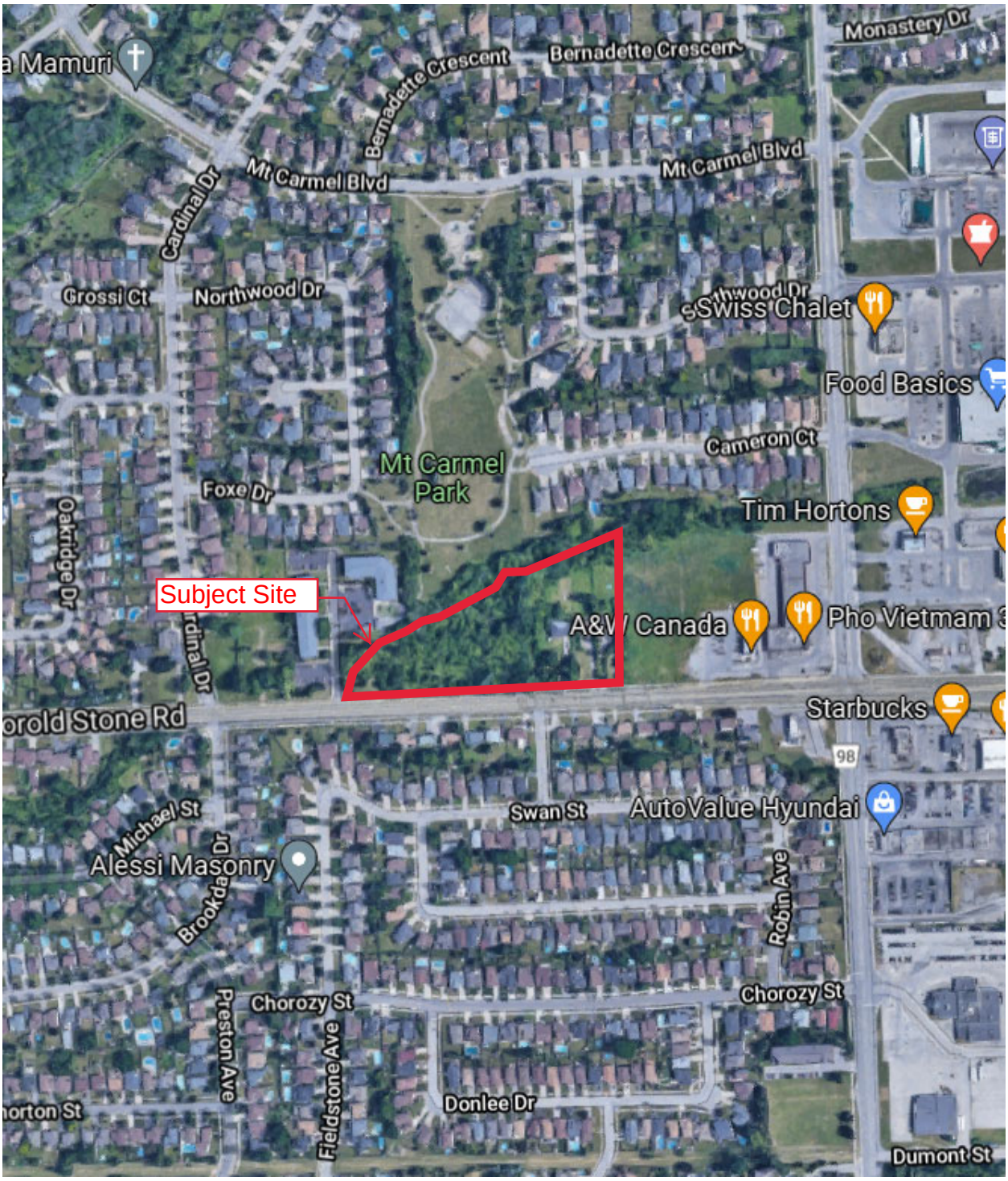


Figure 1: Key Plan

THOROWEST VILLAGE
CITY OF NIAGARA FALLS

LEGEND

- WV ⊗ EX WATER VALVE
- HYD EX HYDRANT
- CB EX CATCHBASIN
- MH EX MANHOLE
- HP EX HYDRO POLE
- IB SHORT IRON BAR
- LS EX LIGHT STANDARD
- LS PROPOSED LIGHT STANDARD
- FRS PROPOSED FIRE ROUTE SIGN
- PROPOSED CHAIN LINK FENCE
- PROPOSED WOOD PRIVACY FENCE
- CMB PROP COMMUNITY MAILBOX
- 6.0m WIDE FIRE ROUTE

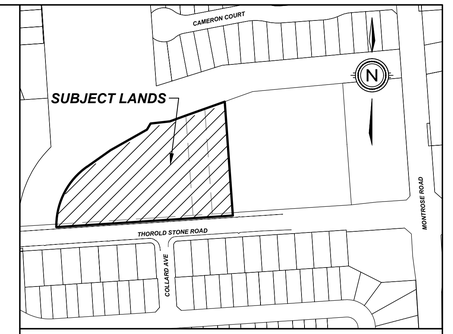
Typ. Fire Access Route Signage

SIGNAGE NOTES:
ALL FIRE ROUTE SIGNS TO BE LOCATED ON STREET LIGHTS WHERE POSSIBLE.

ALL SIGNS SHALL BE MOUNTED AT A HEIGHT OF 2–3 METRES FROM TOP OF CURB TO BOTTOM OF SIGN.

ALL SIGNS SHALL CONFORM TO THE ONTARIO TRAFFIC MANUAL AND HIGHWAY TRAFFIC ACT.

FIRE ROUTE SIGN DETAIL
NTS



KEY PLAN
N.T.S.

SITE PLAN

ZONING MATRIX

PROVISION	ZONING (R4)	PROVIDED
BLOCK TOWNHOUSE DWELLING		
MIN. LOT AREA	250m² for each dwelling unit	326.62m²
MIN. LOT FRONTAGE	30m	186.44m
MIN. FRONT YARD DEPTH	6m + any applicable distance specified in section 4.27.1	6.05m
MIN. REAR YARD DEPTH	7.5m + any applicable distance specified in section 4.27.1	6.90m
MIN. INTERIOR SIDE YARD	one half the height of the building	3.00m
MIN EXTERIOR SIDE YARD WIDTH	4.5m + any applicable distance specified in section 4.27.1	N/A
MAX. LOT COVERAGE	35%	30.65%
MAX. HEIGHT OF BUILDING OR STRUCTURE	10m subject to section 4.7	11m
MIN. LANDSCAPED AREA OPEN SPACE	45m² for each dwelling unit	157.37m² for each dwelling unit
MIN. PRIVACY AREA YARD DEPTH FOR EACH TOWNHOUSE DWELLING UNIT, AS MEASURED FROM THE EXTERIOR REAR WALL OF EVERY DWELLING UNIT	7.5m	7.5m

SITE STATISTICS

AREA	Ha.	% COVERAGE
BUILDING	0.491	30.67
ROAD/DRIVEWAY/PARKING	0.282	17.61
LANDSCAPING	0.771	48.16
3.0m ROAD WIDENING	0.057	3.56
TOTAL	1.601	100.00
UNITS		49
DEVELOPABLE AREA		1.544Ha.
DENSITY (UNITS/DEVELOPABLE AREA)		31.74u/Ha.
PARKING REQUIRED TOTAL (1.4 SPACES PER UNIT)		69
PARKING SPACES PROVIDED TOTAL		77
PARKING PROVIDED DRIVEWAY = 56 PARKING PROVIDED VISITOR = 21		

#	REVISION	DATE	INIT
.	.	.	.
.	.	.	.
0	ISSUED FOR APPROVAL	2023-02-09	M.K

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

DRAWING TITLE
SITE PLAN

DRAFTING	AV/MK
DATE	APRIL 13, 2022
PRINTED	FEBRUARY 9, 2023
SCALE	1:300
DWG No.	REV
2169-SP	**0**

Figure 2: Proposed Site Plan Showing Prediction Locations

DRAWING FILE: F:\2169\Planning\2169_Thorold Stone Road_SP-DP.dwg PLOTTED: Feb 09, 2023 - 11:53am PLOTTED BY: mark

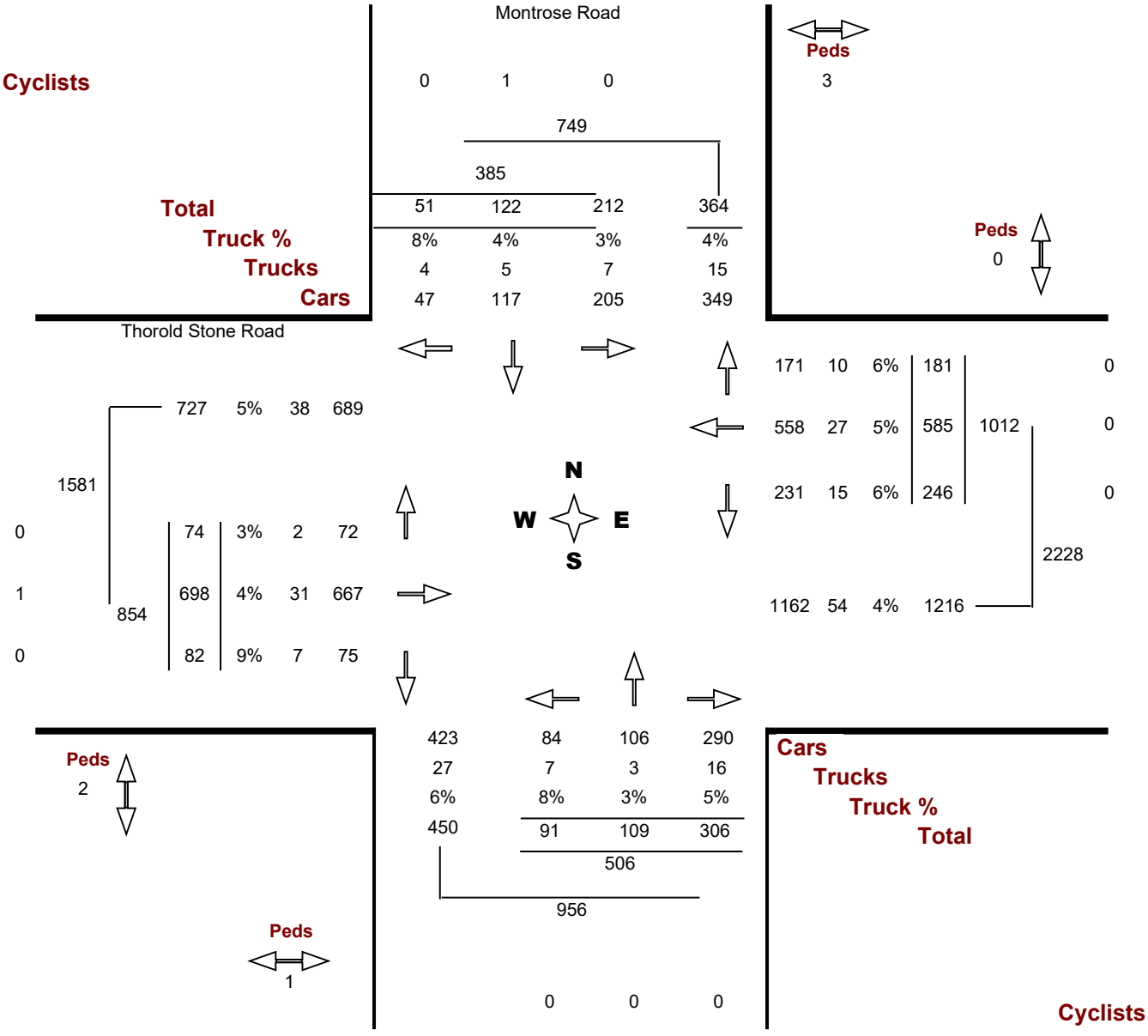
APPENDIX A

Road Traffic Data

Turning Movements Report - AM Period

Location..... Montrose Road @ Thorold Stone Road
Municipality. NIAGARA FALLS
Traffic Cont.
Major Dir..... East west

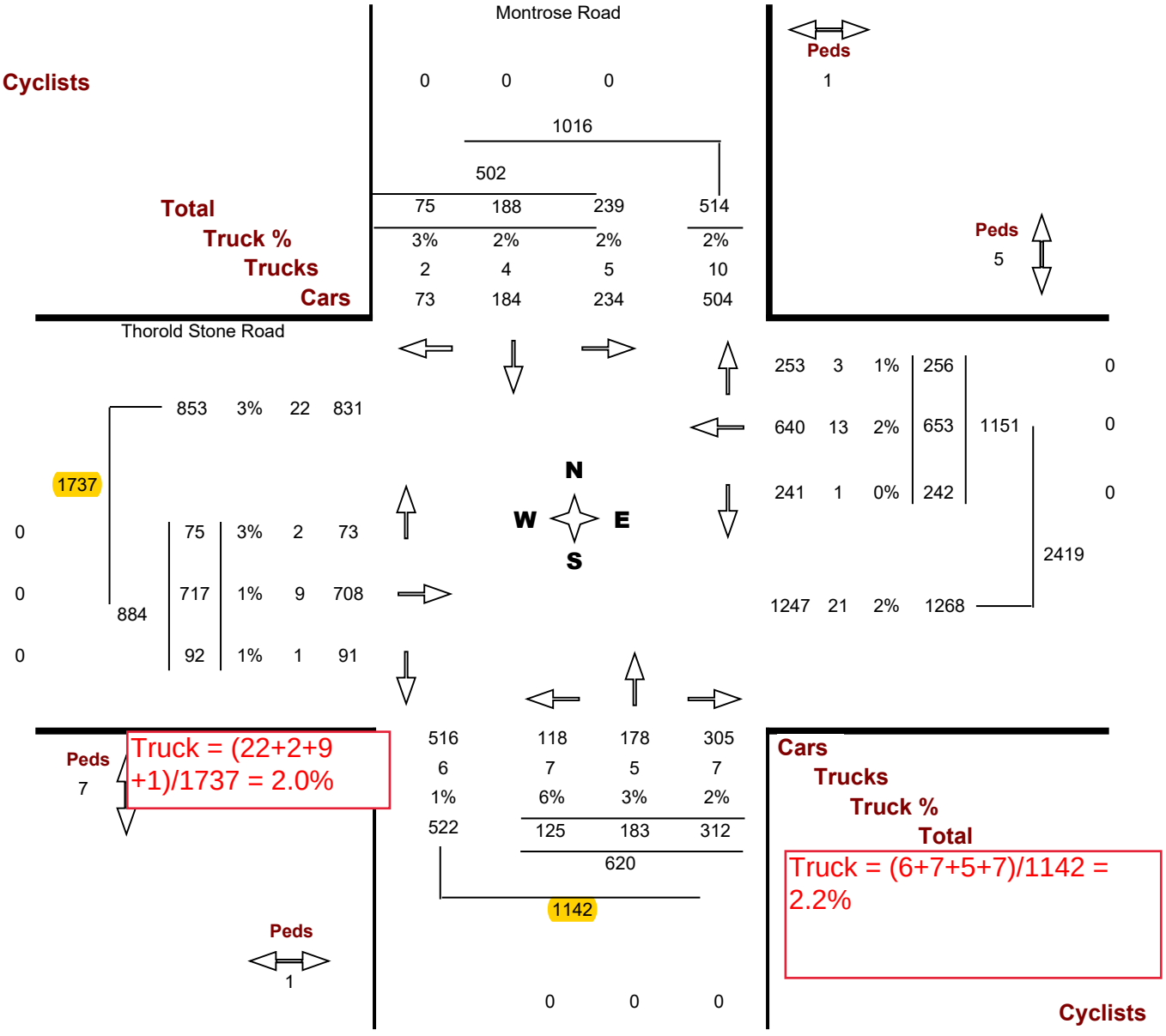
GeoID..... 01421
Count Date. Tuesday, 07 February, 2017
Count Time. 07:00 AM — 09:00 AM
Peak Hour.. 08:00 AM — 09:00 AM



Turning Movements Report - PM Period

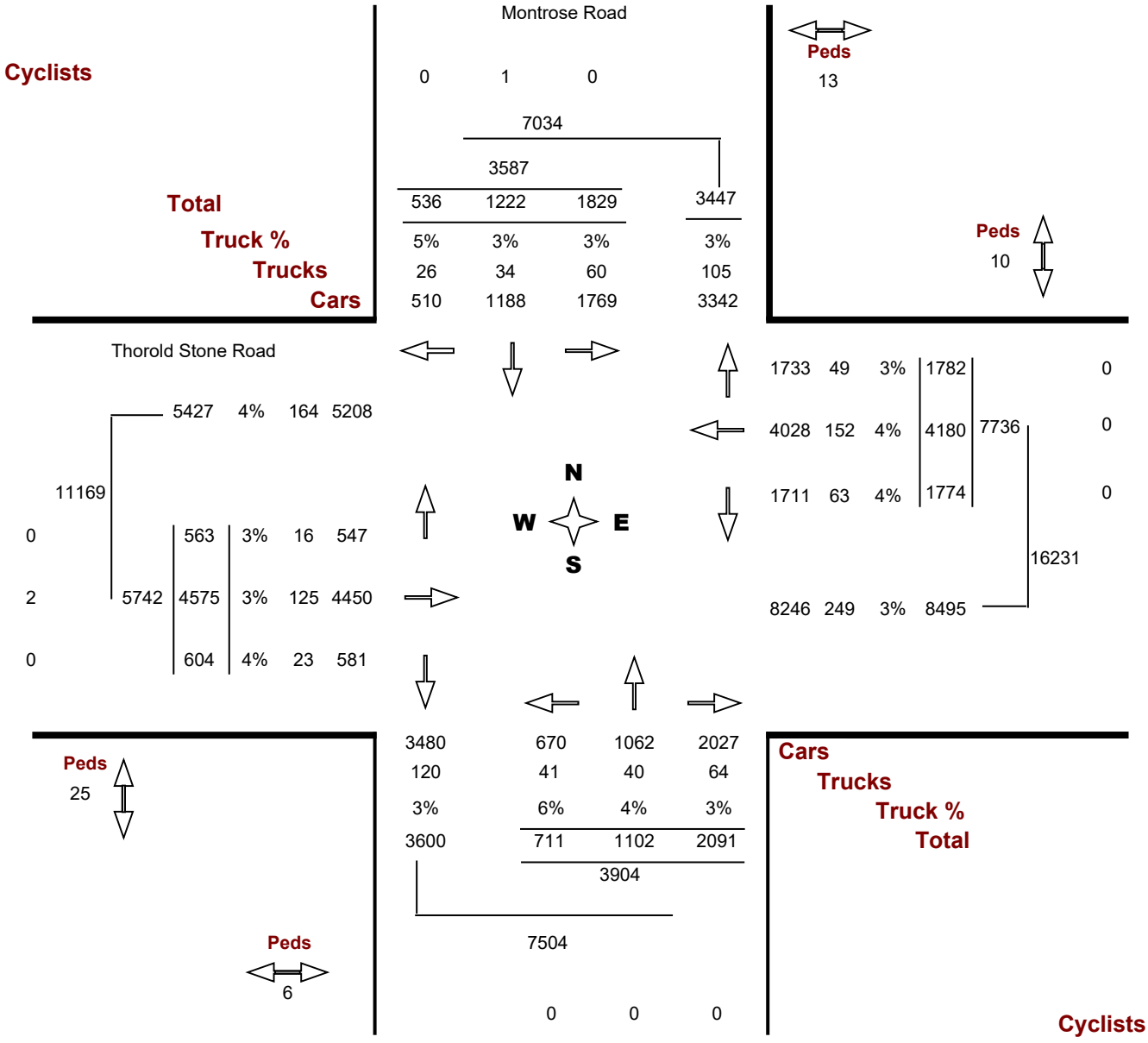
Location..... Montrose Road @ Thorold Stone Road
Municipality. NIAGARA FALLS
Traffic Cont.
Major Dir..... East west

GeoID..... 01421
Count Date. Tuesday, 07 February, 2017
Count Time. 03:00 PM — 06:00 PM
Peak Hour.. 04:15 PM — 05:15 PM



Turning Movement Count Report
Full Study

Location..... Montrose Road @ Thorold Stone Road
Municipality..... NIAGARA FALLS
GeoID..... 01421
Count Date..... Tuesday, 07 February, 2017



Turning Movement Count - Details Report (15 min)

Location..... Montrose Road @ Thorold Stone Road

Municipality..... NIAGARA FALLS

Count Date..... Tuesday, February 07, 2017

		Montrose Road										Thorold Stone Road									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00	07:15	30	18	4	0	52	11	12	24	0	47	22	62	32	0	116	9	55	15	0	79
07:15	07:30	36	16	12	0	64	15	17	33	0	65	40	91	22	0	153	14	74	17	0	105
07:30	07:45	51	27	13	0	91	21	23	50	0	94	38	113	27	0	178	14	139	7	0	160
07:45	08:00	60	30	8	0	98	14	29	67	0	110	59	123	37	0	219	14	164	27	0	205
Hourly Total		177	91	37	0	305	61	81	174	0	316	159	389	118	0	666	51	432	66	0	549
08:00	08:15	51	29	13	0	93	24	23	66	0	113	70	149	40	0	259	18	141	29	0	188
08:15	08:30	56	26	15	0	97	26	21	95	0	142	52	147	28	0	227	16	197	16	0	229
08:30	08:45	53	23	11	0	87	27	20	70	0	117	61	150	57	0	268	18	178	15	0	211
08:45	09:00	52	44	12	0	108	14	45	75	0	134	63	139	56	0	258	22	182	22	0	226
Hourly Total		212	122	51	0	385	91	109	306	0	506	246	585	181	0	1012	74	698	82	0	854
11:00	11:15	73	32	11	0	116	12	15	76	0	103	45	98	62	0	205	15	105	11	0	131
11:15	11:30	67	25	19	0	111	16	16	55	0	87	41	109	67	0	217	13	122	24	0	159
11:30	11:45	56	32	13	0	101	27	25	53	0	105	64	127	69	0	260	16	110	13	0	139
11:45	12:00	71	37	17	0	125	17	37	62	0	116	56	117	73	0	246	12	132	16	0	160
Hourly Total		267	126	60	0	453	72	93	246	0	411	206	451	271	0	928	56	469	64	0	589
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12:45	13:00	71	51	24	0	146	17	44	62	0	123	63	128	50	0	241	19	137	21	0	177
Hourly Total		234	219	98	0	551	89	187	283	0	559	235	483	257	0	975	73	481	70	0	624
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13:15	13:30	66	36	12	0	114	16	40	57	0	113	51	117	56	0	224	15	129	14	0	158
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15:45	16:00	58	33	23	0	114	24	28	56	0	108	67	161	61	0	289	23	141	12	0	176
Hourly Total		216	163	80	0	459	86	171	261	0	518	251	625	235	0	1111	88	625	83	0	796
16:00	16:15	44	37	19	0	100	29	41	85	0	155	56	172	61	0	289	24	167	18	0	209

		Montrose Road										Thorold Stone Road									
		North Approach					South Approach					East Approach					West Approach				
Time Period		LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15	16:30	63	51	20	0	134	25	42	63	0	130	60	164	55	0	279	18	181	27	0	226
16:30	16:45	52	37	17	0	106	31	47	90	0	168	65	162	60	0	287	19	143	28	0	190
16:45	17:00	46	52	21	0	119	27	41	71	0	139	58	167	69	0	294	17	212	23	0	252
Hourly Total		205	177	77	0	459	112	171	309	0	592	239	665	245	0	1149	78	703	96	0	877
17:00	17:15	78	48	17	0	143	42	53	88	0	183	59	160	72	0	291	21	181	14	0	216
17:15	17:30	65	38	20	0	123	17	37	76	0	130	52	119	66	0	237	19	171	23	0	213
17:30	17:45	66	31	15	0	112	26	28	50	0	104	55	140	51	0	246	20	153	12	0	185
17:45	18:00	47	34	19	0	100	28	20	55	0	103	56	135	59	0	250	15	143	20	0	178
Hourly Total		256	151	71	0	478	113	138	269	0	520	222	554	248	0	1024	75	648	69	0	792
Grand Total		1829	1222	536	0	3587	711	1102	2091	0	3904	1774	4180	1782	0	7736	563	4575	604	0	5742
Truck %		3%	3%	5%	0%	3%	6%	4%	3%	0%	4%	4%	4%	3%	0%	3%	3%	3%	4%	0%	3%

Yvonne Lo

From: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Sent: November 25, 2021 6:16 PM
To: Yvonne Lo
Cc: Bee, Christopher (MTO)
Subject: RE: Commercial Vehicle % - QEW at Thorold Stone Rd

Follow Up Flag: Flag for follow up
Flag Status: Flagged

To Yvonne Lo, HGC:

I am well, thanks.

QEW at Thorold Stone Road has official MTO statistics of "% trucks" steady for the last 10 years to 2016, at 10%.
There is no further official data past 2016.

"% trucks" include long trucks, short trucks, vans, buses, cars with trailer, and specials, but not regular cars.
There is no further breakdown available within this group.

Regards.

Christopher Bee
MTO CR
STIRCS, TIMD

From: Yvonne Lo <ylo@hgcengineering.com>
Sent: November 24, 2021 3:13 PM
To: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Subject: Commercial Vehicle % - QEW at Thorold Stone Rd

Hi Christopher,

How is it going? We're currently conducting a noise study for a proposed development located at 7769 Thorold Stone Road, in Niagara Falls, ON, as shown in the link below:

https://goo.gl/maps/sHCBHBTnVtDHE3cbA

Can you please provide commercial vehicle percentages for the QEW at Thorold Stone Road?

Thank you!

Best,

Yvonne Lo, MEng, PEng
Project Consultant

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1995	UC	43,800	47,300	49,100	40,300	0.5
			1996	UC	46,100	51,900	52,600	41,500	0.8
			1997	UC	48,200	61,700	59,300	40,600	0.5
			1998	UC	51,200	65,000	62,500	43,200	0.3
			1999	UC	50,200	63,300	60,800	42,300	0.5
			2000	UC	51,600	65,000	62,500	43,500	0.7
			2001	UC	51,300	58,000	58,000	46,200	0.6
			2002	UC	54,500	61,000	61,500	49,000	0.4
			2003	UC	56,000	62,700	63,300	50,400	0.5
			2004	UC	57,400	64,100	64,500	51,800	0.5
			2005	UC	56,200	62,600	63,100	50,500	0.4
			2006	UC	57,500	63,900	64,400	51,700	0.3
			2007	UC	58,800	65,300	66,200	52,800	0.5
			2008	UC	60,200	66,400	65,500	54,000	0.5
			2009	UC	61,500	67,900	68,500	55,300	0.3
			2010	UC	62,800	69,200	69,800	56,500	0.4
			2011	UC	64,300	70,700	71,300	57,800	N/A
			2012	UC	66,000	72,600	71,300	59,400	N/A
			2013	UC	66,800	73,500	72,800	60,100	N/A
			2014	UC	68,100	68,100	65,400	64,700	N/A
			2015	UC	69,200	69,200	66,400	65,700	N/A
			2016	UC	70,400	70,400	67,600	66,900	N/A
QEW	THOROLD STONE RD IC-32	2.5	1988	UC	39,200	50,800	47,700	32,800	0.6
			1989	UC	41,100	52,100	49,700	35,300	0.9
			1990	UC	43,000	53,600	50,600	37,300	0.8
			1991	UC	40,400	50,900	50,500	35,100	1.1
			1992	UC	40,300	50,700	48,700	34,200	0.7
			1993	UC	40,800	50,100	48,500	35,400	1.0
			1994	UC	40,500	51,800	49,400	34,200	1.0
			1995	UC	44,500	57,000	54,700	37,500	0.8
			1996	UC	45,500	58,200	56,000	38,400	1.1
			1997	UC	46,500	59,500	57,200	39,200	0.5
			1998	UC	47,500	60,300	58,000	40,100	0.3

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1999	UC	48,700	61,400	59,000	41,100	0.6
			2000	UC	50,100	63,100	60,700	42,200	0.6
			2001	UC	50,800	64,000	61,500	42,700	0.3
			2002	UC	52,700	66,500	63,800	44,500	0.4
			2003	UC	53,500	67,400	64,700	45,500	0.6
			2004	UC	55,300	68,700	66,100	46,900	0.5
			2005	UC	54,900	68,000	65,300	46,600	0.7
			2006	UC	57,300	70,900	68,000	48,600	0.5
			2007	UC	58,500	72,500	71,800	49,600	0.7
			2008	UC	59,700	73,900	72,400	50,700	0.5
			2009	UC	61,000	74,600	71,700	51,800	0.3
			2010	UC	62,200	75,700	72,800	52,800	0.4
			2011	UC	56,400	68,800	66,000	47,900	N/A
			2012	UC	63,100	76,400	75,700	53,700	N/A
			2013	UC	63,500	63,500	64,100	60,300	N/A
			2014	UC	65,200	65,200	62,600	61,900	N/A
			2015	UC	66,300	66,300	63,600	63,000	N/A
			2016	UC	67,400	67,400	64,700	64,000	N/A
QEW	MOUNTAIN RD IC-34	2.4	1988	IC	39,900	51,800	48,600	33,400	0.7
			1989	IC	42,000	53,300	50,800	36,100	1.1
			1990	IC	44,100	55,000	51,900	38,300	0.6
			1991	IC	44,300	55,700	55,300	38,400	1.0
			1992	IC	44,200	55,600	53,400	37,500	0.8
			1993	IC	44,800	55,100	53,300	38,900	0.9
			1994	IC	43,200	55,300	52,700	36,400	1.1
			1995	IC	58,000	74,200	71,300	48,900	0.6
			1996	IC	61,800	79,100	76,000	52,100	1.0
			1997	IC	62,100	79,500	76,400	52,400	0.5
			1998	IC	63,900	81,200	78,000	53,900	0.8
			1999	IC	65,900	83,100	79,800	55,600	0.5
			2000	IC	67,900	85,600	82,200	57,300	0.6
			2001	IC	73,500	92,600	88,900	61,700	0.6
			2002	IC	76,800	96,900	92,900	64,800	0.5

APPENDIX B

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 23-02-2023 10:02:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours
Description: **Predicted daytime and nighttime sound levels 2-storey townhouse block with flanking exposure to Thorold Stone Road Unit 34, prediction location [A].**

Road data, segment # 1: Thorold (day/night)

Car traffic volume : 29113/3235 veh/TimePeriod *
Medium truck volume : 238/26 veh/TimePeriod *
Heavy truck volume : 356/40 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 17370
Percentage of Annual Growth : 2.50
Number of Years of Growth : 26.00
Medium Truck % of Total Volume : 0.80
Heavy Truck % of Total Volume : 1.20
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Thorold (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 21.50 / 21.50 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Montrose (day/night)

Car traffic volume : 19102/2122 veh/TimePeriod *
Medium truck volume : 156/17 veh/TimePeriod *
Heavy truck volume : 273/30 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 11420
Percentage of Annual Growth : 2.50
Number of Years of Growth : 26.00
Medium Truck % of Total Volume : 0.80
Heavy Truck % of Total Volume : 1.40

```
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Montrose (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 170.00 / 170.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: QEW (day/night)
---------------------------------------
Car traffic volume  : 61537/30764 veh/TimePeriod  *
Medium truck volume :  2598/1299  veh/TimePeriod  *
Heavy truck volume  :  4239/2119  veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):  67400
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  17.00
    Medium Truck % of Total Volume     :   3.80
    Heavy Truck  % of Total Volume     :   6.20
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 3: QEW (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 500.00 / 500.00 m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Thorold (day)
----------------------------------

Source height = 1.05 m

ROAD (0.00 + 63.65 + 0.00) = 63.65 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.58  67.45   0.00  -2.48  -1.33   0.00   0.00   0.00
63.65
```

```
-------------------------------------------------------------------------
---

Segment Leq : 63.65 dBA

Results segment # 2: Montrose (day)
-----------------------------------

Source height = 1.09 m

ROAD (0.00 + 44.89 + 0.00) = 44.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      0   0.58  65.91   0.00 -16.68  -4.33   0.00   0.00   0.00
44.89
-------------------------------------------------------------------------
---

Segment Leq : 44.89 dBA

Results segment # 3: QEW (day)
------------------------------

Source height = 1.58 m

ROAD (0.00 + 53.22 + 0.00) = 53.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      0   0.57  81.40   0.00 -23.87  -4.31   0.00   0.00   0.00
53.22
-------------------------------------------------------------------------
---

Segment Leq : 53.22 dBA

Total Leq All Segments: 64.08 dBA

Results segment # 1: Thorold (night)
------------------------------------

Source height = 1.05 m

ROAD (0.00 + 57.14 + 0.00) = 57.14 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.58  60.94   0.00  -2.48  -1.33   0.00   0.00   0.00
57.14
```

```
-------------------------------------------------------------------------
---

Segment Leq : 57.14 dBA

Results segment # 2: Montrose (night)
-----------------------------------

Source height = 1.08 m

ROAD (0.00 + 38.33 + 0.00) = 38.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      0   0.58  59.35   0.00 -16.68  -4.34   0.00   0.00   0.00
38.33
-------------------------------------------------------------------------
---

Segment Leq : 38.33 dBA

Results segment # 3: QEW (night)
--------------------------------

Source height = 1.58 m

ROAD (0.00 + 53.22 + 0.00) = 53.22 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90      0   0.57  81.40   0.00 -23.87  -4.31   0.00   0.00   0.00
53.22
-------------------------------------------------------------------------
---

Segment Leq : 53.22 dBA

Total Leq All Segments: 58.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.08
                           (NIGHT): 58.66
```