HGC ENGINEERING

Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

Noise Feasibility Study
Proposed Stacked Townhouse Development
1575 Hurontario Street
Mississauga, Ontario

Prepared for:

Dream Maker Inc.
Attn: Isaac Olowolafe
59 East Liberty Street
Toronto, Ontario
M6K 3R1

Prepared by

Victor Garcia, PEng

Reviewed by

Sheeba Paul, MEng, PEng

October 25, 2019

HGC Project No: 01700181

Table of Contents

1 Introduction & Summary

HGC Engineering was retained by Dream Maker Inc. to conduct a noise feasibility study for a proposed stacked townhouse development to be located at 1575 Hurontario Street, in Mississauga, Ontario. The proposed development will include two 3-storey stacked back-to-back townhouse blocks. The study is required by the Municipality as part of the planning and approvals process.

The primary sources of noise impacting the site were determined to be road traffic on Hurontario Street and the Queen Elizabeth Way (QEW). Relevant road traffic data was obtained from the Ministry of Transportation (MTO) and the City of Mississauga, and was used to predict future traffic sound levels at the locations of the proposed residential dwelling facades. The predicted sound levels were compared to the guidelines of the Ministry of the Environment, Conservation and Parks (MECP) and the Municipality to develop noise control recommendations.

The sound level predictions indicate that the future road traffic sound levels will exceed MECP guidelines at the townhouse blocks. Central air conditioning systems are required for all the townhouse units. Upgraded building and glazing constructions are required for all the dwellings. Associated acoustical requirements are specified in this report. Warning clauses are recommended to inform future residents of the road traffic noise impacts and to address sound level excesses.

2 Site Description & Noise Sources

The proposed residential development is located at 1575 Hurontario Street in the City of Mississauga, Ontario. Figure 1 shows a key plan illustrating the location of the subject site. A site plan prepared by Kirkor Architects + Planners dated October 11, 2019 is shown in Figure 2. The proposed development will consist of two blocks of 3 -storey stacked back-to-back townhouses and associated roadways. Appendix A includes the preliminary elevations.

A site visit was made by HGC Engineering personnel in March 2017 to make observations of the acoustic environment, and to identify the significant noise sources in the vicinity. The acoustical environment surrounding the site is urban in nature, with existing residences to the east, west and south. Immediately to the north of the site is the New Port Credit Centre. Futher to the north is the Queen Elizabeth Senior Public School and Ontario Provincial Police facility.

Road traffic on Hurontario Street and the QEW were confirmed to be the primary sources of sound impacting the site. The QEW includes three lanes and a merging lane in each direction, while Hurontario Street currently consists of six lanes in each direction. There were no other significant sources of stationary noise noted within 500 m of the subject site.

There is a proposed future Light Rail Transit (LRT) system along the centre of Hurontario Street. Information regarding the Hurontario-Main LRT line was obtained from the report prepared for SNC-Lavalin Inc. in support of Transit Project Assessment Process (TPAP) by J.E. Coulter Associates Ltd. The report states that the LRT line will run along the Hurontario and Main Street corridor, beginning at the Port Credit GO Station and ending at the Brampton GO Transit Station. The findings of the report prepared by J.E. Coulter Associates Limited for the future Hurontario-Main Street LRT indicate that there will be no noticeable change in the sound levels along most parts of the corridor and that the contribution of the LRT in relation to the overall sound level from cars and buses is negligible.

3 Noise Level Criteria

3.1 Road Traffic Noise

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", release date October 21, 2013 and are listed in Table 1 below. The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MECP Road Traffic Noise Criteria [dBA]

Space	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 MECP guidelines allow the daytime sound levels in OLA to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is recommended 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 is required for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 60 dBA or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation systems with ducts sized to accommodate the future installation of air conditioning by the occupant is required when nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA.

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

Warning clauses to notify future residents of possible noise excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom or living/dining room window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the bedroom or living/dining room window due to road traffic.

4 Traffic Noise Assessment

4.1 Road Traffic Data

Road traffic information for Hurontario Street was obtained from the City of Mississauga, in the form of ultimate Average Annual Daily Traffic (AADT) values, and is provided in Appendix B. An ultimate AADT of 48 000 vehicles per day, along with a speed limit of 50 km/h, was applied to Hurontario Street. A commercial vehicle percentage of 10% was used in the analysis and was further split into 5.5% and 4.5% for medium and heavy trucks, respectively.

Road traffic data for the QEW was obtained from the Ministry of Transportation (MTO), in the form of Summer Average Daily Traffic (SADT) values for the year 2016, and is provided in Appendix B. A SADT of 187 000 vehicles per day, along with a posted speed limit of 100 km/h, was applied to the QEW. The data was projected to the year 2029 using a 2.5 % growth rate. A commercial percentage of 12.0% was further split into 3.0% medium trucks and 9.0% heavy trucks, and was used in the analysis as per MTO procedures. A day/night split of 88%/12% for the QEW was obtained from HGC Engineering project files for other projects in the area and was applied to the roadway. Table II summarizes the traffic volume data used in this study.

Table II: Projected and Ultimate Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Hurontario Street *(Ultimate)*	Daytime	38 880	2 376	1 944	43 200
	Nighttime	4 320	264	216	4 800
	Total	**43 200**	**2 640**	**2 160**	**48 000**
QEW *(Projected to 2029)*	Daytime	193 648	6 602	19 804	220 054
	Nighttime	26 406	900	2 700	30 006
	Total	**220 054**	**7 502**	**22 504**	**250 060**

4.2 Road Traffic Noise Predictions

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

Prediction locations were chosen around the residential site to obtain a good representation of the future sound levels at the dwellings with exposure to the QEW and Hurontario Street. Sound levels were predicted at the plane of the top storey bedroom and/or living/dining room windows during daytime and nighttime hours to investigate ventilation requirements. Sound levels were also predicted in the common outdor amenity area at the east of the site. The results of these predictions are summarized in Table III.

The distance setback of the buildings indicated on the site plan were used in the analysis, along with an aerial photo to determine the distance to the major roadways. In accordance with MECP guidelines, Hurontario Street and the QEW were divided into two segments. The acoustic requirements may be subject to modifications if the site plan is changed significantly.

Table III: Predicted Road Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Daytime - at OLA $L_{EQ(16)}$	Daytime - at Façade $L_{EQ(16)}$	Nighttime - at Façade $L_{EQ(8)}$
A	Building A, west façade	--	72	66
B	Building A, north façade	--	70	63
C	Building A, south façade	--	68	61
D	Building B, north façade	--	67	61
E	Building B, south façade	--	63	56
F	Building B, north façade	--	67	61
G	Common amenity space	59	--	--

5 Traffic Noise Recommendations

The predictions indicate that the future traffic sound levels will exceed MECP guidelines at all the townhouse units within the development with exposure to Hurontario Street and the QEW. The following discussion outlines recommendations for acoustic barriers, ventilation requirements, upgraded building façade constructions, and warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

The dwelling units have balconies that are less than 4 m in depth. The section drawing provided in Appendix A indicates the rooftop amenity areas are less than 4 m in depth. These balconies are not considered to be outdoor living areas under MECP guidelines, and therefore are exempt from traffic noise assessment.

A common outdoor amenity space is located to the east of the buildings. The sound level in the amenity space (prediction location [G]) is predicted to be 59 dBA, 4 dBA in excess of the MECP limit of 55 dBA. The 4 dBA excess is acceptable to the MECP if it is acceptable to the municipality with the use of a noise warning clause.

5.2 Indoor Living Areas & Ventilation Requirements

The predicted daytime and nighttime sound levels outside the top storey bedroom and/or living/dining room of all future dwellings with exposure to Hurontario Street and the QEW will be greater than 65 dBA and 60 dBA respectively. To address these excesses, the MECP guidelines

recommend that the residential blocks be equipped with central air conditioning systems, so that the windows can be closed.

Figure 3 shows the ventilation requirements for the development. Window or through-the-wall air conditioning units are not recommended for any commercial or 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 of the dwellings.

5.3 Building Façade Constructions

Predicted sound levels at the building façades were used to determine sound insulation requirements of the building envelope. The required acoustic insulation of the wall and window components was determined using methods developed by the National Research Council (NRC).

Exterior Wall Constructions

The exterior walls of the proposed stacked townhouses include brick on the upper two floors and stone on the bottom floors. The proposed building constructions will provide sufficient acoustical insulation.

Exterior Doors

Glazed sliding patio doors for entry onto the balconies from living/dining rooms and some bedrooms are shown on the elevation drawings. The glazing areas on the doors have been counted as part of the total window glazing area. If exterior swing doors are to be used, they shall be insulated metal doors equipped with head, jamb and threshold weather seals.

Acoustical Requirements for Glazing

The preliminary floor plans and building elevations prepared by Kirkor Architects + Planners dated May 8, 2017 were used in the analysis (Appendix A). Based on the floor plans and building

elevations, the calculated window to floor area ratios for both buildings are up to 24% for living/dining rooms and 27% for bedrooms. Based on the window to floor area ratios and proposed building façade constructions, any double glazed window construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation for the buildings.

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 townhouse blocks with anticipated traffic sound level excesses. The following noise warning clauses are required for specific units as indicated in Table IV.

Suggested wording for the blocks with sound levels exceeding the MECP criteria is given below:

Type A:

> 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 traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks.

Suitable wording for future buildings requiring central air conditioning systems is given below.

Type B:

> This unit has been supplied with a central air conditioning system which allows windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the noise criteria of the Municipality and the Ministry of the Environment, Conservation and Parks.

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

6 Impact of the Development on the Environment

It is expected that any increase in local traffic associated with the development will not be substantial enough to affect noise levels significantly.

MECP Publication NPC-300 stipulate sound level limits for new stationary (non-traffic) sources of noise. The sound level limit for a stationary source which operates in a Class 1 urban environment is related to the minimum one-hour L_{EQ} ambient (background) sound level, at any potentially impacted residential point of reception. HGC Engineering has not performed monitoring of the background sound levels in the area during all daytime and nighttime hours, but experience indicates that, for a typical urban environment, a minimum daytime sound level of 50 dBA and a minimum nighttime sound level of 45 dBA can be assumed during the quietest hours. These criteria apply to equipment such as rooftop air-conditioners, cooling towers, exhaust fans, standby generators, etc.

Provided air-conditioning equipment recommended in item 5.2 is selected and placed appropriately so as not to impact the existing residential and proposed residential dwellings, noise impacts are not expected. An acoustical consultant should review the design of the mechanical building systems and the equipment selections when they have been determined, to help ensure that the noise levels emitted by the development to the environment are likely to meet the bylaw requirements.

7 Impact of the Development on Itself

The impact of the development on itself can be categorized into noise intrusions transmitted between adjacent spaces, and noise generated by mechanical systems or other equipment within the building.

Section 9.11.1 of the Ontario Building Code (OBC) specifies the minimum required sound insulation characteristics for demising partitions, in terms of Sound Transmission Class (STC) values. In order to maintain adequate acoustical privacy between separate suites in a multi-tenant building, inter-suite walls should meet or exceed STC-50. Walls separating a suite from a noisy space such as a refuse chute, or elevator shaft, should meet or exceed STC-55. Tables 1 and 2 in Section SB-3 of the Supplementary Guideline to the OBC provide a comprehensive list of constructions that will meet the above requirements. It is recommended that partitions be selected 3 to 4 points above tables so that performance in the field meets these minimum specifications.

Tarion's Builder Bulletin B19R requires the internal design of condominium projects to integrate suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself is maintained within acceptable levels.

8 Summary & Recommendations

The following list and Table IV summarize the recommendations made in this report. The reader is referred to the Figure 3, as well as previous sections of the report where these recommendations are applied and discussed in more detail.

1. Central air conditioning is required for the proposed stacked townhouse blocks. The location, installation and sound rating of the outdoor condensing units must be compliant with MECP Guideline NPC-300, as applicable.

2. With the proposed building exterior constructions, any double glazed window construction and meeting the minimum requirements of the OBC will provide adequate sound insulation for the buildings.

3. Noise warning clauses to inform the occupants of the sound level excesses should be placed in the property and tenancy agreements and offers of purchase and sale.

4. Tarion Builder's Bulletin B19R requires that the internal design of condominium projects integrates suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself are maintained within acceptable

levels. Outdoor sound emissions should also be checked to ensure compliance with the noise by-law.

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

Block No.	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Required Minimum STC
A	--	Central A/C	A, B	OBC
B	--		A, B	OBC

Notes:
* The location, installation and sound rating of the air conditioning condensers must be compliant with MECP Guideline NPC-300 as applicable.
-- no specific requirement
LR/DR – Living Room/Dining Room
BR – Bedroom

8.1 Implementation

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

1. Prior to the issuance of building permits for this development, 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 incorporated.

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 incorporated, installed and constructed.

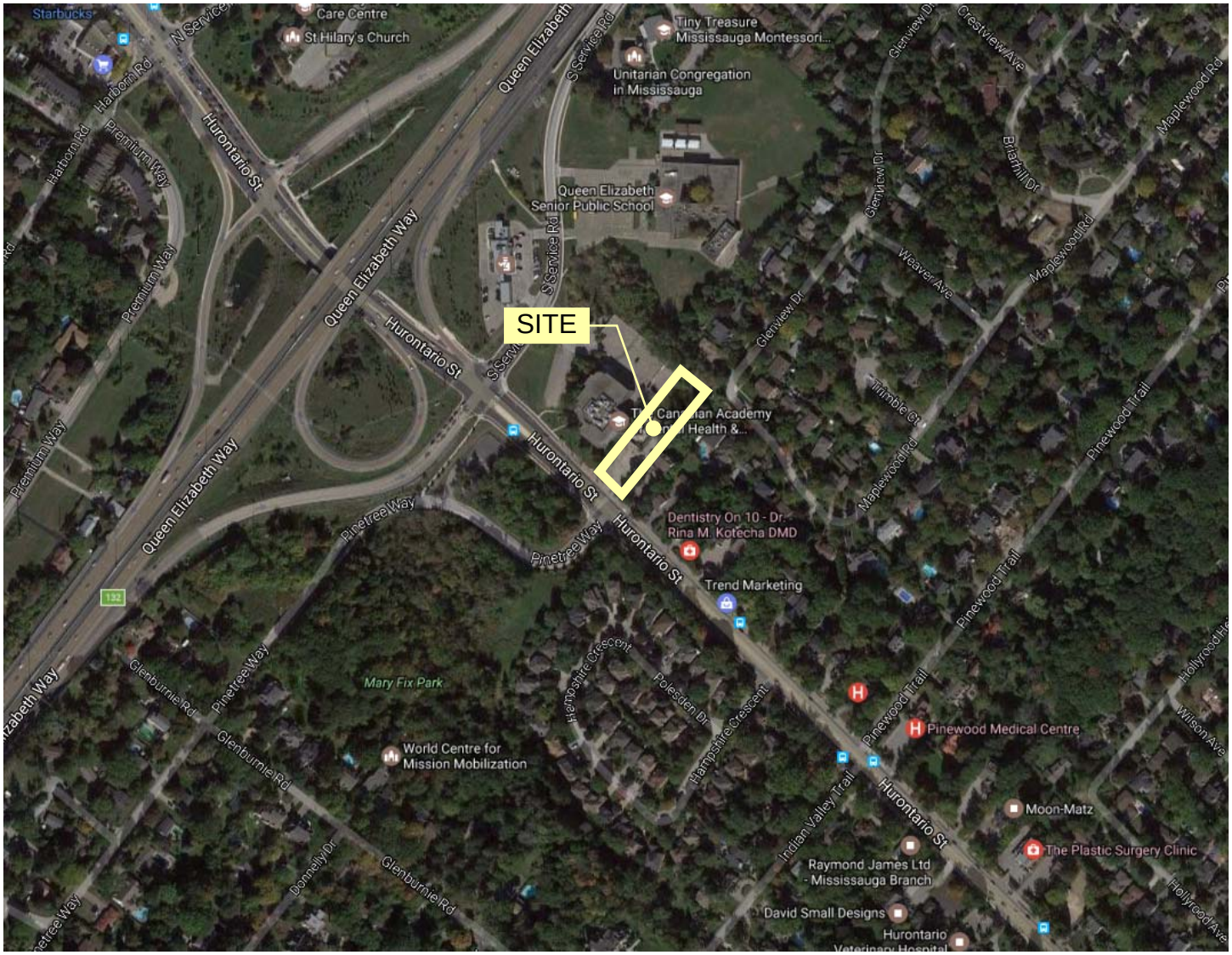
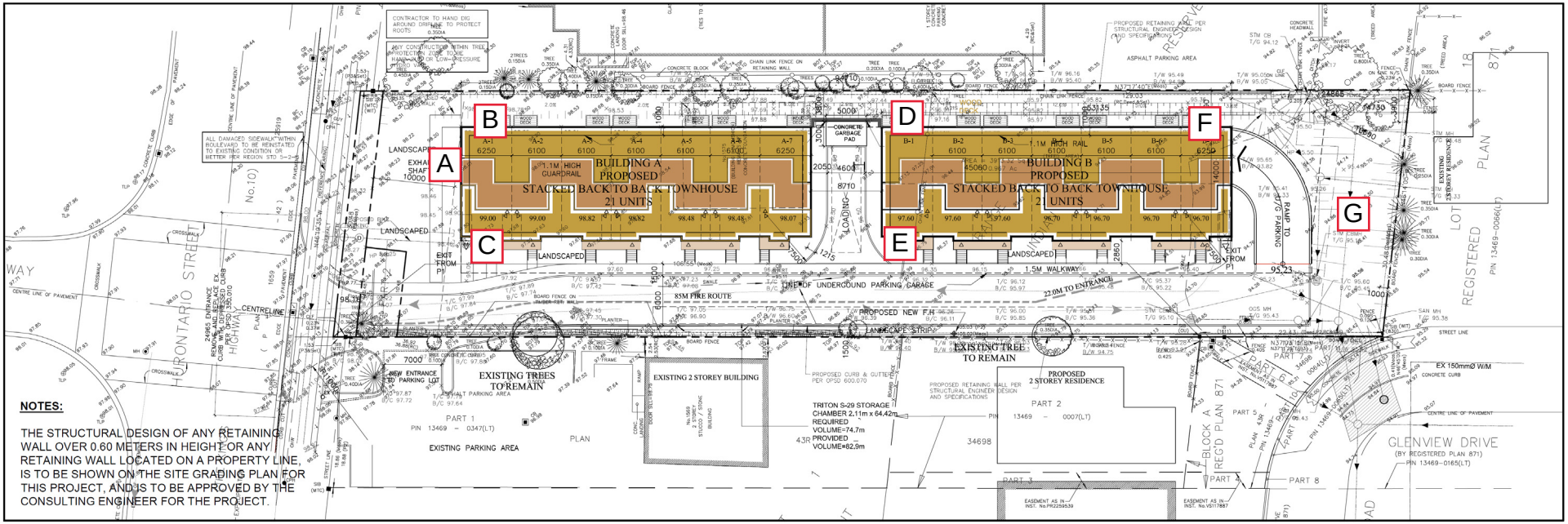


Figure 1 - Key Plan



Site Plan 1:250 — 4 RZ-01

Figure 2 - Proposed Site Plan Showing Sound Level Prediction Locations

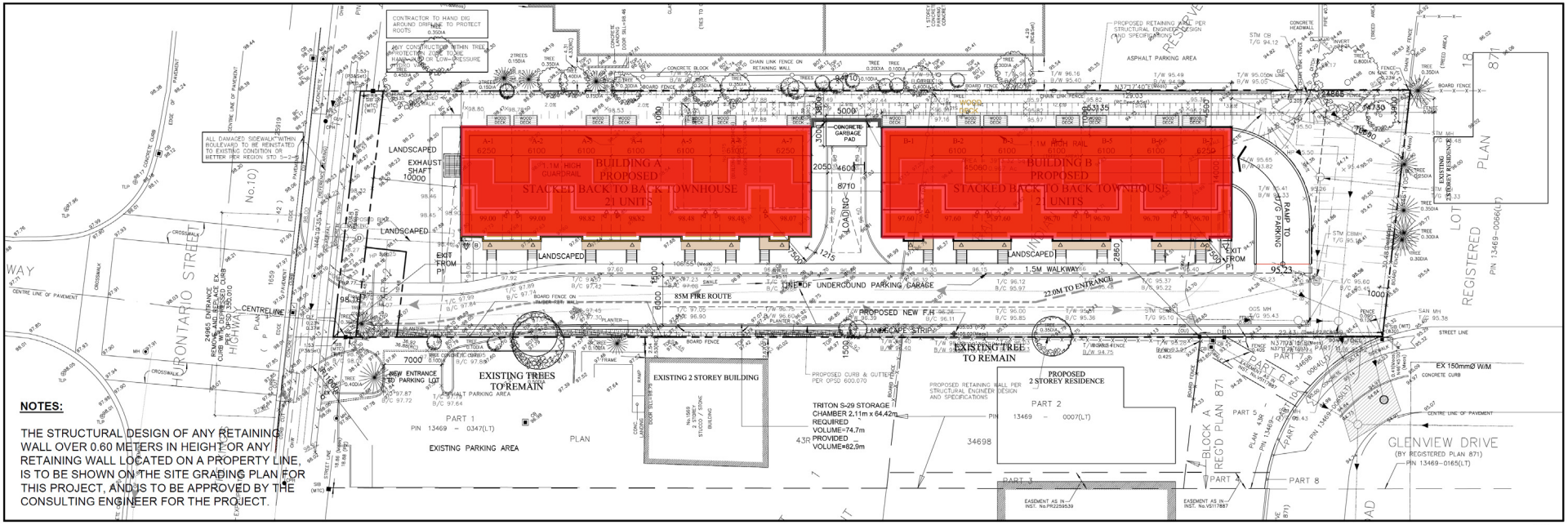
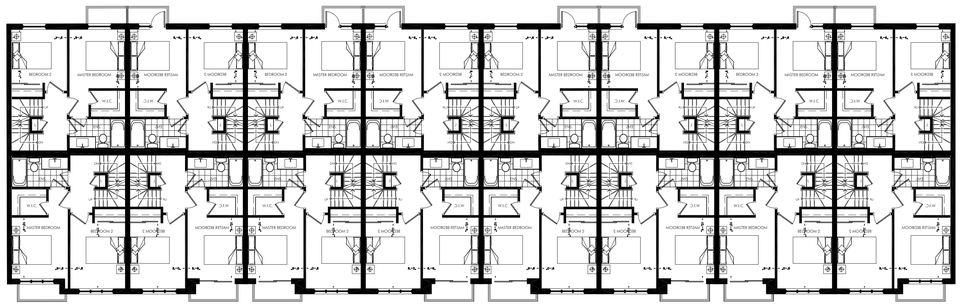


Figure 3 - Proposed Site Plan Showing Ventilation Requirements

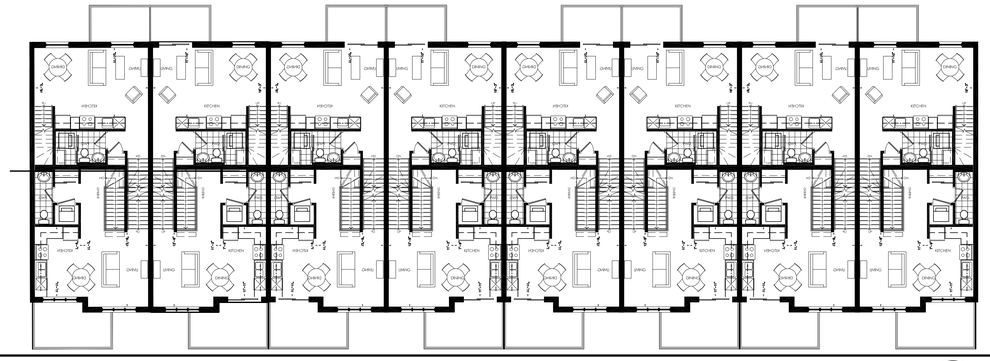
APPENDIX A

Supporting Drawings

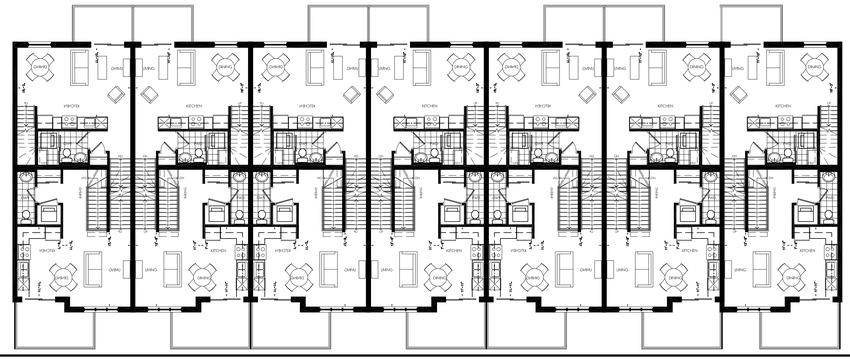


Building A Third Level Floor Plan 8
1:125 SP-03

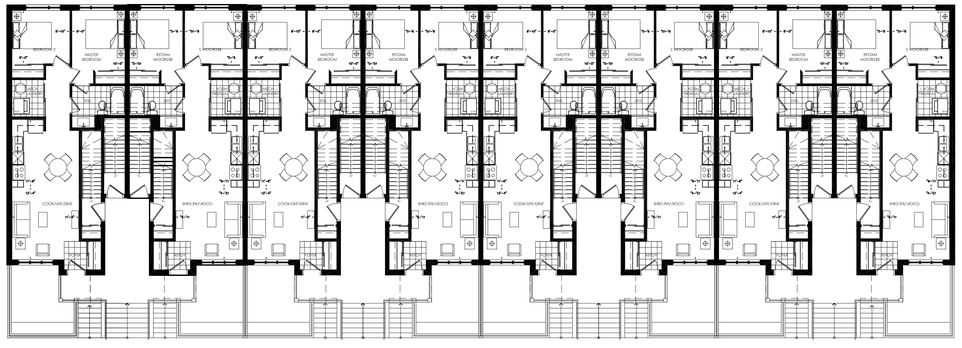
Building B Third Level Floor Plan 4
1:125 SP-03



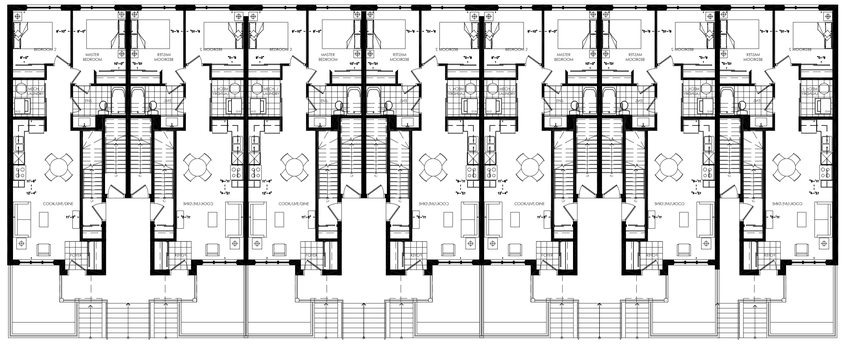
Building A Second Floor Plan 7
1:125 SP-03



Building B Second Floor Plan 3
1:125 SP-03



Building A Ground Floor Plan 6
1:125 SP-03



Building B Ground Floor Plan 2
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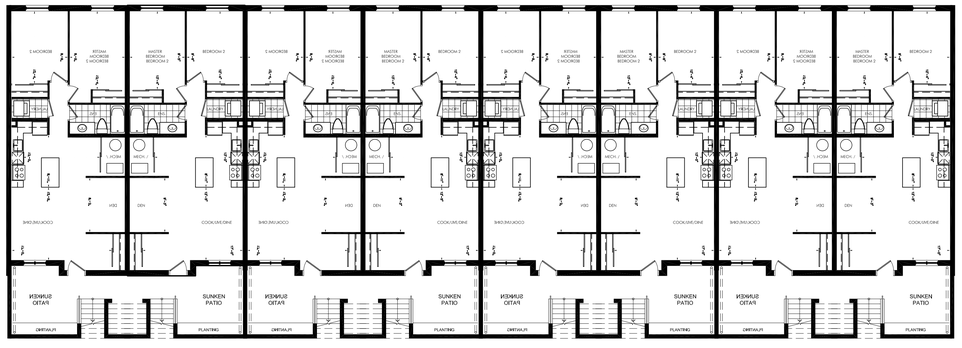

Building A Lower Level Floor Plan 5
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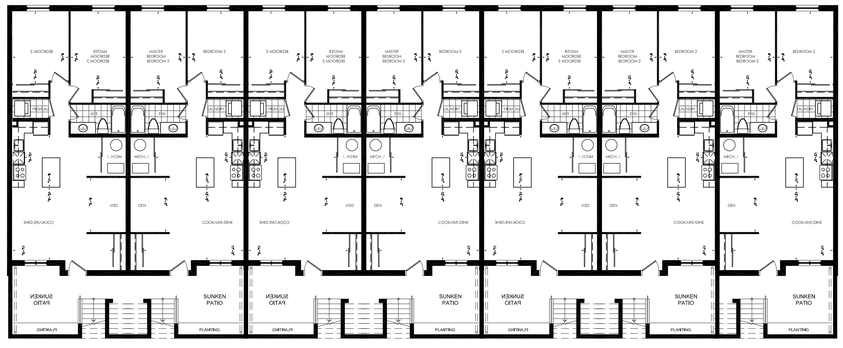

Building B Lower Level Floor Plan 1
1:125 SP-03

Date:

KIRKOR ARCHITECTS + PLANNERS
20 Martin Ross Avenue, Toronto, Ontario, M3J 2K8
T(416) 665-6060, F(416) 665-1234, www.kirkorarchitects.com

No.	Revision	Date

PRELIMINARY

No.	Issued For	Date

Drawing Title:

Building A & B Floor Plans

DRAWING PHASE 12

Project:

STREET PROPERTIES
PROPOSED
TOWNHOUSE
RESIDENTIAL DEVELOPMENT
/

1575 HURONTARIO,
MISSISSAUGA, ONTARIO.

Scale:

Drawn by: I.L

Checked by: S.M

File No.: 16-121

Plot Date: May. 08, 2017

2 OF X

SP-03

BUILDING A
SOUTH ELEVATION

FRONT ELEVATION

1575 HURONTARIO STREET.

STREET DEVELOPMENTS | MISSISSAUGA, ON

KIRKOR ARCHITECTS + PLANNERS

FRONT ELEVATION

1575 HURONTARIO STREET.

STREET DEVELOPMENTS | MISSISSAUGA, ON

KIRKOR ARCHITECTS + PLANNERS

APPENDIX B

Road Traffic Information

Date:	23-Mar-17

NOISE REPORT FOR PROPOSED DEVELOPMENT

REQUESTED BY:	
Name:	Victor Garcia
Company	HGC Engineering

PREPARED BY:	
Name:	Jacqueline Hunter
Tel#:	(905) 615-3200

Location:	Hurontario Street (near 1575 Hurontario Street) Hurontario Street south of QEW
Look Up ID#:	369

ON SITE TRAFFIC DATA

Specific	***Street Names***				
	Hurontario Street				
AADT:	48,000				
# of Lanes:	4				
% Trucks:	10%				
Medium/Heavy Trucks Ratio:	55/45				
Day/Night Traffic Split:	90/10				
Posted Speed Limit:	50 km/h				
Gradient of Road:	<2%				
Ultimate R O W:	35m				

Comments:	
	* Ultimate Traffic Data
	Ultimate Data is based on the proposed LRT project along Hurontario Street with existing lanes
	converted from 6 to 4 lanes with 2 LRT lines in middle/both sides.
	For more details, please call Matthew Williams (905) 615- 3200 ext. 5834

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			2015	C	138,400	152,200	148,100	124,600	N/A
			2016	C	139,800	153,800	149,600	125,900	N/A
QEW	MISSISSAUGA RD IC-130	2.0	1988	C	114,000	126,500	126,500	102,500	1.0
			1989	C	118,000	130,900	132,100	106,100	1.2
			1990	C	121,600	134,900	134,900	109,300	0.9
			1991	C	120,100	132,100	133,300	109,200	1.0
			1992	C	120,900	130,500	134,100	112,400	0.9
			1993	C	123,300	133,100	136,800	113,400	1.1
			1994	C	125,800	137,100	140,900	113,200	1.0
			1995	C	128,300	138,600	143,700	118,000	0.8
			1996	C	131,900	148,400	150,400	118,800	0.8
			1997	C	138,200	145,100	161,700	129,900	0.9
			1998	C	144,100	153,300	168,600	136,900	1.2
			1999	C	147,600	157,000	172,700	140,200	0.6
			2000	C	146,000	164,300	164,800	131,500	0.8
			2001	C	148,000	167,200	167,200	133,200	0.9
			2002	C	150,000	168,000	169,300	135,000	1.1
			2003	C	154,800	173,400	174,900	139,300	1.0
			2004	C	158,800	177,400	178,500	143,300	0.9
			2005	C	162,000	180,400	181,900	145,500	0.8
			2006	C	152,500	169,400	170,800	137,200	0.9
			2007	C	154,500	171,700	174,100	138,800	0.8
			2008	C	137,200	151,400	149,300	123,100	1.1
			2009	C	149,200	164,700	166,300	134,300	0.7
			2010	C	158,700	174,900	176,500	142,900	0.7
			2011	C	160,300	176,300	177,900	144,200	N/A
			2012	C	161,800	178,000	174,800	145,600	N/A
			2013	C	150,000	165,000	163,500	135,000	N/A
			2014	C	162,200	178,500	173,600	146,000	N/A
			2015	C	163,600	180,000	175,100	147,200	N/A
			2016	C	164,900	181,400	176,500	148,500	N/A
QEW	HWY 10-HURONTARIO ST IC-132	2.1	1988	C	122,500	128,600	138,400	115,100	1.0
			1989	C	126,800	133,100	143,200	120,400	1.0

Victor Garcia

From: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Sent: March-28-17 12:52 PM
To: Victor Garcia
Cc: Jawed, Bushra (MTO); Bee, Christopher (MTO)
Subject: RE: Commercial vehicle percent for QEW at Hurontario

To Victor Garcia, HGC Engineering:

QEW and Hurontario (Hwy 10) is at reference point LHRS 10150
Based on official MTO TVIS data, from years 2011 to 2013, the (% truck/commercial) at this location has increased slightly to 12.0%.

There is no official data after 2013.

Regards.

Christopher Bee
MTO Central Region Traffic Office
Safety Traffic Information and Roadwork Coordination Section (STIRCS)

From: Victor Garcia [mailto:vgarcia@hgcengineering.com]
Sent: March-23-17 10:29 AM
To: Jawed, Bushra (MTO)
Cc: Bee, Christopher (MTO)
Subject: Commercial vehicle percent for QEW at Hurontario

Hi Bushra,

HGC Engineering is performing a Noise Feasibility Study for a proposed stacked townhouse development located at 1575 Hurontario Street in the City of Mississauga. A google link is included for your reference:

https://goo.gl/maps/v3juL1Z6SaT2

We previously obtained the attached commercial vehicle percentage in the area. Are these numbers still valid?

Thanks,

Victor Garcia, P.Eng
Project Engineer

HGC Engineering NOISE | VIBRATION | ACOUSTICS
Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044 e: vgarcia@hgcengineering.com
Visit our website – www.hgcengineering.com **Follow Us** – LinkedIn | Twitter | YouTube

APPENDIX C

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 25-10-2019 11:11:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours

Description: Building A, west facade

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

Car traffic volume : 19440/2160 veh/TimePeriod *
Medium truck volume : 1188/132 veh/TimePeriod *
Heavy truck volume : 972/108 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): 24000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 5.50
Heavy Truck % of Total Volume : 4.50
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 18.00 / 18.00 m
Receiver height : 7.50 / 7.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 19440/2160 veh/TimePeriod *
Medium truck volume : 1188/132 veh/TimePeriod *
Heavy truck volume : 972/108 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:

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                                        A
    24 hr Traffic Volume (AADT or SADT):  24000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.50
    Heavy Truck  % of Total Volume     :   4.50
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Hurontario (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  28.00 / 28.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: QEW (day/night)
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Car traffic volume  : 96824/13203 veh/TimePeriod  *
Medium truck volume :  3301/450   veh/TimePeriod  *
Heavy truck volume  :  9902/1350  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):  90700
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  13.00
    Medium Truck % of Total Volume     :   3.00
    Heavy Truck  % of Total Volume     :   9.00
    Day (16 hrs) % of Total Volume     :  88.00

Data for Segment # 3: QEW (day/night)
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Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 263.00 / 263.00 m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 4: QEW (day/night)
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Car traffic volume  : 96824/13203 veh/TimePeriod  *
Medium truck volume :  3301/450   veh/TimePeriod  *
Heavy truck volume  :  9902/1350  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):  90700
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  13.00
    Medium Truck % of Total Volume     :   3.00
    Heavy Truck  % of Total Volume     :   9.00
    Day (16 hrs) % of Total Volume     :  88.00

Data for Segment # 4: QEW (day/night)
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Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 286.00 / 286.00 m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Hurontario (day)
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Source height = 1.46 m

ROAD (0.00 + 69.17 + 0.00) = 69.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  69.96   0.00  -0.79   0.00   0.00   0.00   0.00  69.17
-------------------------------------------------------------------------------

Segment Leq : 69.17 dBA

Results segment # 2: Hurontario (day)
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Source height = 1.46 m

ROAD (0.00 + 67.25 + 0.00) = 67.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
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Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	69.96	0.00	-2.71	0.00	0.00	0.00	0.00	67.25

Segment Leq : 67.25 dBA

Results segment # 3: QEW (day)

Source height = 1.73 m

ROAD (0.00 + 59.32 + 0.00) = 59.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.47	84.27	0.00	-18.32	-4.14	0.00	-2.49	0.00	59.32

Segment Leq : 59.32 dBA

Results segment # 4: QEW (day)

Source height = 1.73 m

ROAD (0.00 + 58.80 + 0.00) = 58.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.47	84.27	0.00	-18.86	-4.14	0.00	-2.48	0.00	58.80

Segment Leq : 58.80 dBA

Total Leq All Segments: 71.81 dBA

Results segment # 1: Hurontario (night)

Source height = 1.46 m

ROAD (0.00 + 62.64 + 0.00) = 62.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.43	0.00	-0.79	0.00	0.00	0.00	0.00	62.64

Segment Leq : 62.64 dBA

Results segment # 2: Hurontario (night)

A

Source height = 1.46 m

ROAD (0.00 + 60.72 + 0.00) = 60.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.43	0.00	-2.71	0.00	0.00	0.00	0.00	60.72

Segment Leq : 60.72 dBA

Results segment # 3: QEW (night)

Source height = 1.73 m

ROAD (0.00 + 56.17 + 0.00) = 56.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.47	78.63	0.00	-18.32	-4.14	0.00	0.00	0.00	56.17

Segment Leq : 56.17 dBA

Results segment # 4: QEW (night)

Source height = 1.73 m

ROAD (0.00 + 55.64 + 0.00) = 55.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.47	78.63	0.00	-18.86	-4.14	0.00	0.00	0.00	55.64

Segment Leq : 55.64 dBA

Total Leq All Segments: 65.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.81 dBA
(NIGHT): 65.79 dBA