NOISE IMPACT STUDY
RESIDENTIAL DEVELOPMENT
436 FOUNTAIN STREET SOUTH
CAMBRIDGE, ONTARIO

FOR

KIAH GROUP INC.
KIAH GROUP (VISTA RIDGE) INC.

BY

Howard Patlik
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CHECKED BY

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1.0 INTRODUCTION

At the request of Kiah Group Inc and Kiah Group (Vista Ridge) Inc. and the requirements of the Ministry of the Environment, Conservation and Parks (MECP), J.E. COULTER ASSOCIATES LIMITED has reviewed the proposed residential development at 436 Fountain Street South in Cambridge, Ontario, for the noise impact potential from the nearby transportation corridor (see Appendix A, Figure 1).

The purpose of this study is to establish the acoustical mitigation measures that are necessary to satisfy the requirements of the Region of Waterloo Noise Guidelines (July 14, 1999). The guideline is summarized in Appendix D.

The Draft Plan currently consists of 11 units (single-family dwellings) as shown in Appendix A, Figure 2. The immediate neighbourhood consists of existing single-family dwellings/townhouses on all sides of the proposed development. There are no commercial or industrial uses that would impact this development.

This report will also comment on any stationary sources of noise that may impact the development as per the Ministry of the Environment, Conservation and Parks' (MECP) *NPC-300* noise guideline.

2.0 TRANSPORTATION SOURCES

The main sources of transportation noise at this development are Fountain Street South and Highway 401 to the north. There is a setback of approximately 710m from the highway to the most northerly dwellings (see Appendix A, Figure 3). The Region of Waterloo and MTO have provided the traffic data as noted in Table 1, below (see Appendix B).

Table 1: Roadway Traffic Volume Projection

Roadway	Projected Daily Traffic (Veh/Day)	Truck %		Speed Limit (kph)
		Medium	Heavy	
Fountain Street South, west of Shantz Hill Road/King Street South	15,500 (2030)	1.6	1.3	50
Highway 401 (Homer Watson to King Street South)	93,200 SADT (2019)	5.3	16.6	100
Highway 401 (Homer Watson to King Street South)	125,071 (2030)	5.3	16.6	100

Notes: *1.* SADT refers to the Summer Average Daily Traffic. Historically (1988–2016), Highway 401 for this segment has grown 2.71% per annum, compounded.

2. It is assumed that Shantz Hill Road carries the same traffic as Fountain Street South.

The road gradient along Fountain Street South is under 2.0%, which does not influence the sound level compared to a level roadway. Shantz Hill Road has limited exposure to this development including a wooded area and existing housing between the proposed development and the road. Shantz Hill Road will be acoustically insignificant relative to Fountain Street South for most units.

3.0 NOISE CRITERIA

3.1 Transportation Noise Sources

The Region of Waterloo's noise criterion for private outdoor amenity space is 55 dB L_{eq} daytime. The Region, however, does allow up to a maximum of 5 dB in excess (i.e., 60 dB L_{eq}) if a noise warning clause is provided to each affected dwelling unit (see Appendix D). When the sound level is greater than 60 dB L_{eq} daytime, mitigation measures (i.e., noise barriers of suitable heights and/or additional setback) are required to attenuate the sound levels to 60 dB L_{eq} daytime or less. In outdoor amenity areas, sound levels above this level interfere significantly with normal speech communication.

The residential building ventilation requirements are based on the sound level at the exterior building façade, as per Regional guidelines. Air conditioning is required prior to occupancy when the sound level is 60 dB L_{eq} or greater at exterior bedroom windows at nighttime, or when it is 65 dB L_{eq} or greater at exterior living room windows during the daytime. Forced air heating with a provision for the future installation of central air conditioning installed by the occupant is required when the nighttime sound level at bedroom windows is above 50 and below 60 dB L_{eq} or when the daytime sound level at the living room window is above 55 and below 65 dB L_{eq}.

Those residences that require provision for either central air conditioning or future installation of air conditioning must be provided with Warning Clauses Type C or D (see Appendix C).

4.0 PROJECTED SOUND LEVELS

4.1 Transportation Sources

The daytime L_{eq} at grade level and nighttime second-storey sound levels were calculated for various units with no barrier, using the anticipated traffic volumes as provided by the Region of Waterloo (see Appendix B). All sound level calculations have been computed using the Ministry of the Environment, Conservation and Parks' *ORNAMENT* noise prediction procedure (*STAMSON 5.04*). Computer printouts are provided in Appendix B.

The most affected areas are the exterior building façades directly exposed to Fountain Street South. The three units along the south portion of the development are elevated above Fountain Street South by approximately 10 to 12m. As a result, the shielding effects of the existing row of housing along Fountain Street directly to the south of this proposed development have not been included into the calculations.

The following table indicates the sound levels based on the anticipated traffic volume on Fountain Street South with no acoustical barriers.

Table 2A: Projected Unmitigated Sound Levels – Fountain Street South

	L_{eq} Daytime Sound Level	L_{eq} Nighttime Sound Level
Location	**Fountain Street South**	**Fountain Street South**
Unit 1 – Rear yard	49	--
Unit 1 – Front Façade, 2nd Level	58	51
Unit 2 – Front Façade, 2nd Level	52	45
Units 2 to 7 – Front Façade, 2nd Level	52	45
Unit 7 – Front Façade, 2nd Level	51	44
Unit 8 – Rear yard	54 (Fountain) 42 (Shantz Hill) Total: 54	--
Unit 8 – Rear Façade, 2nd Level	56 (Fountain) 43 (Shantz Hill) Total: 56	50 (Fountain) 37 (Shantz Hill) Total: 50
Unit 9 – Rear Façade, 2nd Level	55	48
Unit 9 – Rear yard	54	--
Unit 10 – Rear Façade, 2nd Level	55	48
Unit 10 – Rear yard	54	--
Unit 11 – Rear Façade, 2nd Level	55	49
Unit 11 – Rear yard	55	--

Note: The receiver heights are assumed to be 4.5m above grade at the 2nd-storey window. Grade level (rear yard) receptors are 1.5m above grade.

The projected sound levels generated by Fountain Street South will meet the Region and Provincial noise guidelines at all units with the exception of Units 1 and 8, which each have minor noise excess at the exterior façade. Shantz Hill Road has no influence on the overall sound levels at any unit. Noise mitigation measures are described below.

The projected sound levels generated by Highway 401 to the north were calculated for the dwellings at the northern extent of the site (Units 2 to 7).

Table 2B: Projected Unmitigated Sound Levels – Highway 401		
	L_{eq} Daytime Sound Level	**L_{eq} Nighttime Sound Level**
Location	**Highway 401**	**Highway 401**
Units 2 to 7 – Rear yard	44	--
Units 2 to 7 – Rear Façade	47	47

The projected sound levels generated by Highway 401 will meet the Region and Provincial noise guidelines based on the existing topography, large setback, and shielding factors. Consequently, noise control measures (barriers, ventilation, or warning clauses) are not required as a result of Highway 401.

5.0 NOISE CONTROL MEASURES

There are no exterior noise control measures (acoustic barriers) required as the sound levels meet the Region's noise criteria of 55 dB L_{eq} daytime as a result of traffic on Fountain Street South and Highway 401.

6.0 VENTILATION AND WARNING CLAUSE REQUIREMENTS

MECP requests that central air conditioning be provided prior to occupancy where the nighttime sound levels from road traffic exceed 60 dB L_{eq} at the exterior building façade (bedroom window) or 65 dB L_{eq} at the exterior building façade (living room window). For this development, none of the dwellings is exposed to sound levels above these limits. The sound levels, however, exceed 50 dB L_{eq} and/or 55 dB L_{eq} daytime at Unit 1. The dwelling on Unit 1 will require a forced air heating system with ducting sized to accommodate the future installation of central air conditioning (an air-cooled condenser unit) at the homeowner's responsibility, in addition to a warning clause included in any development agreement and *Agreement of Purchase and Sale* (see Appendix C, Warning Clauses). This is a standard feature incorporated into most new homes and is not an onerous requirement.

All remaining units meet all provincial noise criteria without the need for any noise mitigation measures.

7.0 FAÇADE COMPONENTS

To meet the interior sound level criterion of 40 dB L_{eq} nighttime for bedrooms and 45 dB L_{eq} daytime for living/dining rooms, as required by MECP, no special façade components are necessary. Based on a living room or bedroom window-area-to-floor-area ratio of 200%, an extraordinary large window-area-to-floor-area ratio, any OBC-compatible double-glazed window will be satisfactory to meet the criterion in the living/dining rooms and bedrooms. The exterior walls and doors can be minimum OBC compatible construction. No special measures are required.

8.0 CONCLUSIONS

The analysis shows a minor noise impact at this proposed residential development as a result of transportation noise. Noise control measures, including ventilation (forced air heating with provision for the installation of air conditioning, and warning clauses) have been recommended for specific units. The noise impact is not sufficient to require special façade components (glazing or walls) for any dwelling in the development.

No stationary sources were identified that would impact this proposed development. No additional measures are required.

9.0 RECOMMENDATIONS

To meet the current criteria of the Region of Waterloo, the following recommendations are proposed:

1. Units 1 and 8 will require forced air heating with a provision for the future installation of central air conditioning and Warning Clauses A and C (see Appendix C) to be inserted into the *Agreement of Purchase and Sale*, indicating that sound levels at the building façade exceed the Region's traffic noise guidelines.

2. With the exception of Units 1 and 8, the Region's interior sound level criterion of 40 dB L_{eq} in bedrooms and 45 dB L_{eq} in living/dining rooms can be easily met by any Ontario Building Code (OBC) compatible construction with double glazing (minimum 3mm glass with a 6mm air gap and 3mm glass). Based on a living room or bedroom window-area-to-floor-area ratio of 200%, an extraordinary large window-area-to-floor-area ratio, any OBC-compatible double-glazed window will be satisfactory to meet the criterion in the living/dining rooms and bedrooms. The exterior walls and doors can be minimum OBC compatible construction. No special measures are required.

/pt/hp

APPENDIX A: FIGURES

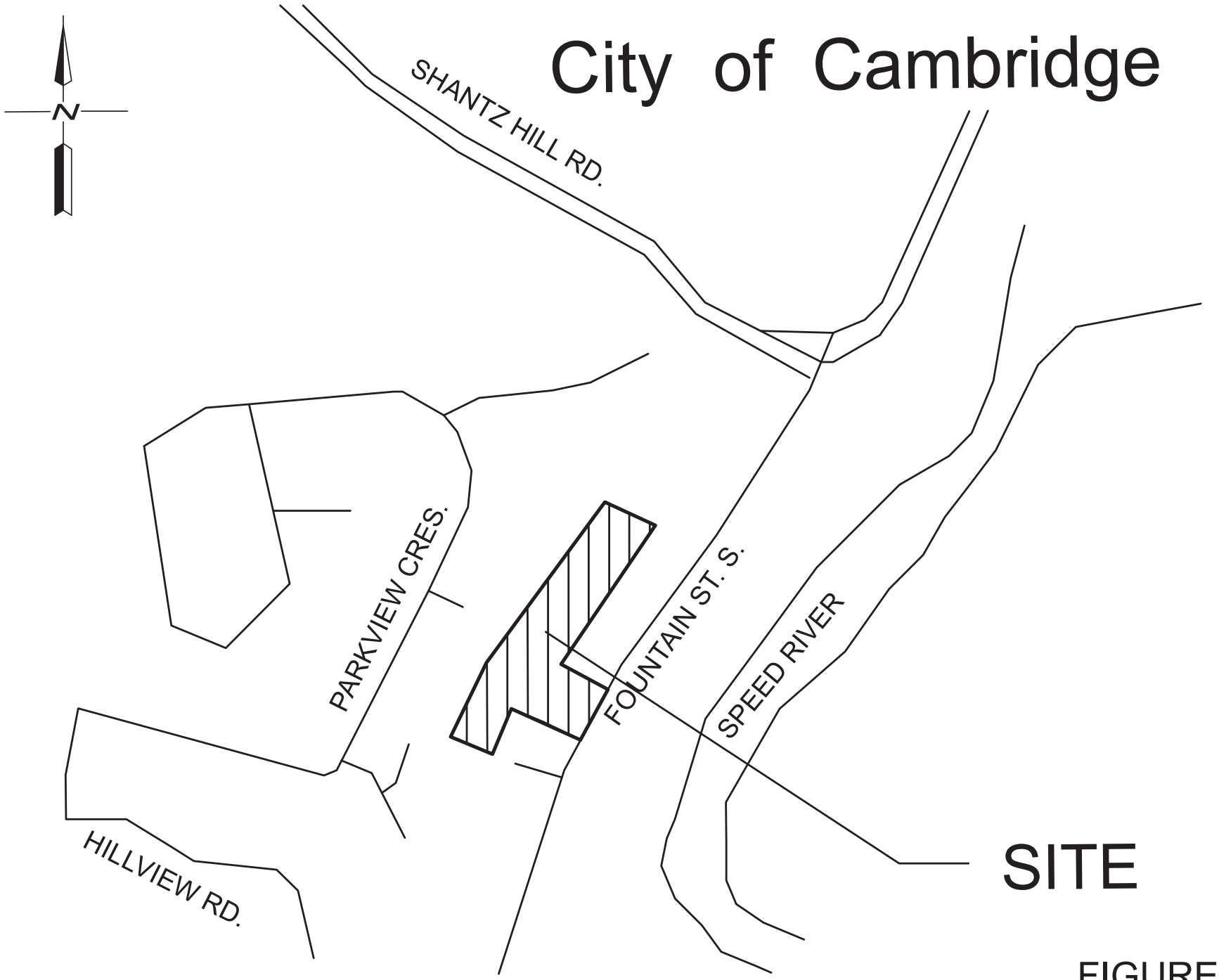

City of Cambridge
N
SHANTZ HILL RD.
PARKVIEW CRES.
FOUNTAIN ST. S.
SPEED RIVER
HILLVIEW RD.
SITE

FIGURE 1

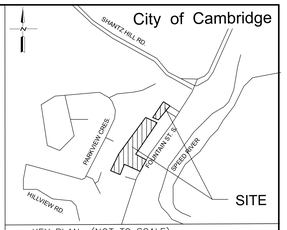
DRAFT PLAN OF VACANT LAND CONDOMINIUM
LOT 27 AND PART OF LOTS 30 AND 35, MUNICIPAL COMPILED PLAN 731, AND

(FORMERLY IN THE TOWN OF PRESTON)

CITY OF CAMBRIDGE, REGIONAL MUNICIPALITY OF WATERLOO

SCALE 1:300

MacDONALD TAMBLYN LORD SURVEYING



KEY PLAN (NOT TO SCALE)

ADDITIONAL INFORMATION

(UNDER SECTION 51(17) OF THE PLANNING ACT, R.S.O. 1990)

a) O.L.S. CERTIFIED PROPERTY BOUNDARIES: SEE SURVEYOR'S CERTIFICATE
b) PROPOSED/ EXISTING HIGHWAY LOCATION, NAME & WIDTH: SEE PLAN
c) KEY PLAN NOT LESS THAN 1:10,000: SEE KEY PLAN ABOVE
d) PROPOSED USES: VACANT LAND CONDOMINIUM, RESIDENTIAL
e) ADJOINING USES: RESIDENTIAL
f) AS SHOWN
g) NATURAL AND ARTIFICIAL FEATURES: SEE PLAN
h) WATER SUPPLY: MUNICIPAL
i) SOILS: UNKNOWN
K) SERVICES: BELL, HYDRO, GAS, MUNICIPAL WATER, SANITARY AND STORM
l) RESTRICTIONS: SUBJECT TO EASEMENT BY INST. # WS514818

LAND USE SCHEDULE

ZONING: RM1

UNIT AREAS:	8,766m²	59%
COMMON ELEMENTS AREA:	6095m²	41%
TOTAL SITE AREA:	14,861m²	100%

TOTAL UNITS: 11 VACANT LAND UNITS – LEVEL 1

TOTAL PARKING PROVIDED:
11 SPACES (GARAGES)
11 SPACES (DRIVEWAYS)
3 SPACES (VISITOR)
25 SPACES TOTAL

PARKVIEW CRESCENT
WATSON STREET
BAUMAN AVENUE
FOUNTAIN STREET
LANE
BLOCK 10
BLOCK 11
BLOCK 13, REGISTERED PLAN 1327
REGISTERED PLAN 742
REGISTERED PLAN 698
COMPILED PLAN 731
PART OF LOT 5, B.B.F.C. (EAST OF THE GRAND RIVER) PART 2, PLAN 67R-2997
WATERLOO STANDARD CONDO. No. 590
COMMON ELEMENTS
UNIT 1
UNIT 2
UNIT 3
UNIT 4
UNIT 5
UNIT 6
UNIT 7
UNIT 8
UNIT 9
UNIT 10
UNIT 11
LOT 7
LOT 25
LOT 27
LOT 30
LOT 31
LOT 32
LOT 33
LOT 34
LOT 35
LOT 36
LOT 522
LOT 11 (LOTS WEST OF FOUNTAIN STREET)
MUNICIPAL
PROPOSED RETAINING WALL
PART 2, PLAN WR883787
PART 1, PLAN 58R-19767
PART 2, PLAN 58R-19767
PART 31, PLAN 58R-19767
PART 1 PLAN WR909198
PART 5
PART 4

FIGURE 2

OWNER'S CERTIFICATE

I AUTHORIZE MacDONALD TAMBLYN LORD SURVEYING TO PREPARE AND SUBMIT THIS DRAFT PLAN OF STANDARD CONDOMINIUM TO THE CITY OF CAMBRIDGE.

I, SEAN O'NEIL, HAVE THE AUTHORITY TO BIND THE CORPORATION

DATE

SEAN O'NEIL
KIAH GROUP (VISTA RIDGE) INC.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE CORRECTLY AND ACCURATELY SHOWN.

MARCH 13, 2020
DATE

ROD LORD, O.L.S.
MacDONALD TAMBLYN LORD SURVEYING

MacDONALD TAMBLYN LORD SURVEYING
A division of J. D. Barnes Limited
SURVEYING MAPPING GIS
50 FLEMING DRIVE, UNIT 2, CAMBRIDGE, ON N1T 2B1
T: (519) 621-9600 F: (519) 621-6480 www.jdbarnes.com

DRAWN BY:	CHECKED BY:	REFERENCE NO.:
R.L.	R.L.	18-40-335-03

FILE: 18-40-335-03

DATED: 13/03/2020

PLOTTED: 13/03/2020


401
710m
Preston Heights
Linden Dr
Parkview Cres
PROPOSED RESIDENTIAL SITE --->
MacDonald-Cartier Fwy
Hillcrest Rd
King St W
Rogers
Cornell St
Chopin Dr
Nelson St
Eagle St S
Dover St S
Waterloo St S
Argyle St S
Beaver St
Sherring St
Hillview Rd
Woods Ln
Fountain St S

FIGURE 3

APPENDIX B: SOUND LEVEL CALCULATIONS

Region of Waterloo AADT Forecast

1. Development/Location	436 Fountain St S (Fountain Street&Shantz Hill Drive-West Leg)
2. Current AADT (2020)	13,400
3. Forecast AADT (2030)	15,500
4. Commercial Vehicle Rates	% Medium Trucks 1.6% % Heavy Trucks 1.3%
5. Posted Speed Limit	50 km/h
6. Day/Night Splits	Regional Standard 90/10 Day/Night Split
7. Expiry	31-Dec-2023
8. Notes	This forecast is intended for the purpose of carrying out a noise study only. The above AADTs represent the traffic volumes on Fountain Street S/west of Shantz Hill Drive (Consider Shantz Hill Drive runs N/S) This forecast remains valid up to the date indicated above. The Region of Waterloo should be contacted for an updated forecast if there are plans to use this forecast beyond the above validity period.

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:46:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit1.te Time Period: Day/Night 16/8 hours
Description: Unit 1 - South Facade - 2nd Storey

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 32.00 / 32.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 58.02 + 0.00) = 58.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	64.55	0.00	-5.21	-1.33	0.00	0.00	0.00	58.02

Segment Leq : 58.02 dBA

Total Leq All Segments: 58.02 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 51.48 + 0.00) = 51.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	58.02	0.00	-5.21	-1.33	0.00	0.00	0.00	51.48

Segment Leq : 51.48 dBA

Total Leq All Segments: 51.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.02
(NIGHT): 51.48

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:48:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit2.te Time Period: Day/Night 16/8 hours
Description: Unit 2 - South Facade - 2nd Storey

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 79.00 / 79.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.00 m

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Fountain St (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 71 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 79.00 / 79.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.00 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 50.71 + 0.00) = 50.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.37	64.55	0.00	-9.91	-3.94	0.00	0.00	0.00	50.71

Segment Leq : 50.71 dBA

Results segment # 2: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 46.05 + 0.00) = 46.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.37	64.55	0.00	-9.91	-3.94	0.00	-4.66	0.00	46.05

Segment Leq : 46.05 dBA

Total Leq All Segments: 51.99 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 43.27 + 0.00) = 43.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.37	58.02	0.00	-9.91	-3.94	0.00	-0.90	0.00	43.27

Segment Leq : 43.27 dBA

Results segment # 2: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 39.52 + 0.00) = 39.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.37	58.02	0.00	-9.91	-3.94	0.00	-4.66	0.00	39.52

Segment Leq : 39.52 dBA

Total Leq All Segments: 44.80 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.99
(NIGHT): 44.80

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:48:20
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit7.te Time Period: Day/Night 16/8 hours
Description: Unit 7 - South Facade - 2nd Storey

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 1
House density : 20 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 97.00 / 97.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.00 m

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Fountain St (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 1
House density : 71 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 97.00 / 97.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.00 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 49.49 + 0.00) = 49.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.37	64.55	0.00	-11.13	-3.94	0.00	0.00	0.00	49.49

Segment Leq : 49.49 dBA

Results segment # 2: Fountain St (day)

Source height = 1.07 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
0	90	0.37	64.55	0.00	-11.13	-3.94	0.00	-4.60	0.00	44.89

Segment Leq : 44.89 dBA

Total Leq All Segments: 50.78 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 42.05 + 0.00) = 42.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.37	58.02	0.00	-11.13	-3.94	0.00	-0.90	0.00	42.05

Segment Leq : 42.05 dBA

Results segment # 2: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 38.35 + 0.00) = 38.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.37	58.02	0.00	-11.13	-3.94	0.00	-4.60	0.00	38.35

Segment Leq : 38.35 dBA

Total Leq All Segments: 43.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.78
(NIGHT): 43.59

STAMSON 5.0 NORMAL REPORT Date: 20-04-2020 17:08:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit8.te Time Period: Day/Night 16/8 hours
Description: Unit 8 - 2nd Storey

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 53.00 / 53.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.00 m

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

Car traffic volume : 13545/1505 veh/TimePeriod
Medium truck volume : 50/25 veh/TimePeriod
Heavy truck volume : 181/20 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Shantz Hill (day/night)

Angle1 Angle2 : -15.00 deg 30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 141.00 / 141.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 56.10 + 0.00) = 56.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.37	64.55	0.00	-7.53	-0.92	0.00	0.00	0.00	56.10

Segment Leq : 56.10 dBA

Results segment # 2: Shantz Hill (day)

Source height = 1.07 m

ROAD (0.00 + 42.63 + 0.00) = 42.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	30	0.58	64.14	0.00	-15.40	-6.11	0.00	0.00	0.00	42.63

Segment Leq : 42.63 dBA

Total Leq All Segments: 56.29 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 49.57 + 0.00) = 49.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.37	58.02	0.00	-7.53	-0.92	0.00	0.00	0.00	49.57

Segment Leq : 49.57 dBA

Results segment # 2: Shantz Hill (night)

Source height = 1.07 m

ROAD (0.00 + 36.50 + 0.00) = 36.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	30	0.58	58.02	0.00	-15.40	-6.11	0.00	0.00	0.00	36.50

Segment Leq : 36.50 dBA

Total Leq All Segments: 49.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.29
(NIGHT): 49.78

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:47:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit9.te Time Period: Day/Night 16/8 hours
Description: Unit 9 - South Facade - 2nd Storey

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 66.00 / 66.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.00 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 54.80 + 0.00) = 54.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.37	64.55	0.00	-8.83	-0.92	0.00	0.00	0.00	54.80

Segment Leq : 54.80 dBA

Total Leq All Segments: 54.80 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 48.26 + 0.00) = 48.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.37	58.02	0.00	-8.83	-0.92	0.00	0.00	0.00	48.26

Segment Leq : 48.26 dBA

Total Leq All Segments: 48.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.80
(NIGHT): 48.26

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:47:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit10.te Time Period: Day/Night 16/8 hours
Description: Unit 10 - South Facade - 2nd Storey

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 63.00 / 63.00 m
Receiver height : 4.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 5.50 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 54.70 + 0.00) = 54.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.42	64.55	0.00	-8.84	-1.02	0.00	0.00	0.00	54.70

Segment Leq : 54.70 dBA

Total Leq All Segments: 54.70 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 48.16 + 0.00) = 48.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.42	58.02	0.00	-8.84	-1.02	0.00	0.00	0.00	48.16

Segment Leq : 48.16 dBA

Total Leq All Segments: 48.16 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.70
(NIGHT): 48.16

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:47:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit11.te Time Period: Day/Night 16/8 hours
Description: Unit 11 - South Facade - 2nd Storey

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 58.00 / 58.00 m
Receiver height : 1.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 5.50 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 54.51 + 0.00) = 54.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	64.55	0.00	-8.86	-1.19	0.00	0.00	0.00	54.51

Segment Leq : 54.51 dBA

Total Leq All Segments: 54.51 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 48.67 + 0.00) = 48.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.42	58.02	0.00	-8.33	-1.02	0.00	0.00	0.00	48.67

Segment Leq : 48.67 dBA

Total Leq All Segments: 48.67 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.51
(NIGHT): 48.67

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:49:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: hwy401.te Time Period: 24 hours
Description: Units 2 to 7 - North Facade – Grade Level - Hwy 401

Road data, segment # 1: Hwy 401

Car traffic volume : 97680 veh/TimePeriod *
Medium truck volume : 6629 veh/TimePeriod *
Heavy truck volume : 20762 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy 401

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 4
House density : 75 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 712.00 m
Receiver height : 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 150.00 m
Source elevation : 295.00 m
Receiver elevation : 283.00 m
Barrier elevation : 299.00 m

Results segment # 1: Hwy 401

Source height = 2.02 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
2.02	1.50	-11.86	287.14

ROAD (0.00 + 44.18 + 0.00) = 44.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.64	85.08	0.00	-27.57	-1.43	0.00	-8.80	0.00	47.29
-90	90	0.64	85.08	0.00	-27.57	-1.43	0.00	0.00	-11.90	44.18

Segment Leq : 44.18 dBA

Total Leq All Segments: 44.18 dBA

TOTAL Leq FROM ALL SOURCES: 44.18

STAMSON 5.0 NORMAL REPORT Date: 20-02-2020 08:14:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: hwy401.te Time Period: 24 hours
Description: Unit 2 to 7 - 2nd Storey

Road data, segment # 1: Hwy 401

Car traffic volume : 97680 veh/TimePeriod *
Medium truck volume : 6629 veh/TimePeriod *
Heavy truck volume : 20762 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Hwy 401

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 4
House density : 75 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 712.00 m
Receiver height : 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 150.00 m
Source elevation : 295.00 m
Receiver elevation : 283.00 m
Barrier elevation : 299.00 m

Results segment # 1: Hwy 401

Source height = 2.02 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
2.02	4.50	-9.49	289.51

ROAD (0.00 + 47.17 + 0.00) = 47.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.55	85.08	0.00	-26.06	-1.27	0.00	-8.80	0.00	48.95
-90	90	0.55	85.08	0.00	-26.06	-1.27	0.00	0.00	-10.58	47.17

Segment Leq : 47.17 dBA

Total Leq All Segments: 47.17 dBA

TOTAL Leq FROM ALL SOURCES: 47.17

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:49:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit1r.te Time Period: Day/Night 16/8 hours
Description: Unit 1 - Rear yard

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 54.00 / 54.00 m
Receiver height : 4.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -50.00 deg Angle2 : 50.00 deg
Barrier height : 7.50 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.07	4.50	4.31	4.31

ROAD (46.22 + 36.76 + 46.22) = 49.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-50	0.58	64.55	0.00	-8.81	-9.53	0.00	0.00	0.00	46.22
-50	50	0.13	64.55	0.00	-6.30	-2.63	0.00	0.00	-18.86	36.76
50	90	0.58	64.55	0.00	-8.81	-9.53	0.00	0.00	0.00	46.22

Segment Leq : 49.47 dBA

Total Leq All Segments: 49.47 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 49.47

```
STAMSON 5.0        NORMAL REPORT        Date: 20-04-2020 17:09:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit8r.te             Time Period: Day/Night 16/8 hours
Description: Unit 8 - Rear yard - No Barrier

Road data, segment # 1: Fountain St (day/night)
----------------------------------------------
Car traffic volume  : 13545/1505  veh/TimePeriod  *
Medium truck volume :   223/25    veh/TimePeriod  *
Heavy truck volume  :   181/20    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):  15500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.60
    Heavy Truck  % of Total Volume     :   1.30
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Fountain St (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   45.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  60.00 / 60.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   7.00 m

Road data, segment # 2: Shantz Hill (day/night)
----------------------------------------------
Car traffic volume  : 13545/1505  veh/TimePeriod  *
Medium truck volume :   223/25    veh/TimePeriod  *
Heavy truck volume  :   181/20    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):  15500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  10.00
    Medium Truck % of Total Volume     :   1.60
    Heavy Truck  % of Total Volume     :   1.30
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 2: Shantz Hill (day/night)
----------------------------------------------
Angle1   Angle2           : -15.00 deg   30.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 138.00 / 138.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      3       (Elevated; no barrier)
Elevation                 :   0.00 m
```

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 53.71 + 0.00) = 53.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.46	64.55	0.00	-8.81	-2.04	0.00	0.00	0.00	53.71

Segment Leq : 53.71 dBA

Results segment # 2: Shantz Hill (day)

Source height = 1.07 m

ROAD (0.00 + 42.44 + 0.00) = 42.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	30	0.66	64.55	0.00	-16.00	-6.12	0.00	0.00	0.00	42.44

Segment Leq : 42.44 dBA

Total Leq All Segments: 54.02 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 47.84 + 0.00) = 47.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.37	58.02	0.00	-8.27	-1.91	0.00	0.00	0.00	47.84

Segment Leq : 47.84 dBA

Results segment # 2: Shantz Hill (night)

Source height = 1.07 m

ROAD (0.00 + 36.65 + 0.00) = 36.65 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	30	0.58	58.02	0.00	-15.26	-6.11	0.00	0.00	0.00	36.65

Segment Leq : 36.65 dBA

Total Leq All Segments: 48.16 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.02
(NIGHT): 48.16

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:51:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: uni9r.te Time Period: Day/Night 16/8 hours
Description: Unit 9 - Rear yard

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 63.00 / 63.00 m
Receiver height : 1.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 7.00 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 54.33 + 0.00) = 54.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.46	64.55	0.00	-9.12	-1.10	0.00	0.00	0.00	54.33

Segment Leq : 54.33 dBA

Total Leq All Segments: 54.33 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 48.53 + 0.00) = 48.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.37	58.02	0.00	-8.56	-0.92	0.00	0.00	0.00	48.53

Segment Leq : 48.53 dBA

Total Leq All Segments: 48.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.33

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:50:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit10r.te Time Period: Day/Night 16/8 hours
Description: Unit 10 - Rear yard

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 60.00 / 58.00 m
Receiver height : 1.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 5.50 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 54.29 + 0.00) = 54.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	64.55	0.00	-9.08	-1.19	0.00	0.00	0.00	54.29

Segment Leq : 54.29 dBA

Total Leq All Segments: 54.29 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.29

STAMSON 5.0 NORMAL REPORT Date: 14-02-2020 15:50:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: unit11r.te Time Period: Day/Night 16/8 hours
Description: Unit 11 - Rear yard

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

Car traffic volume : 13545/1505 veh/TimePeriod *
Medium truck volume : 223/25 veh/TimePeriod *
Heavy truck volume : 181/20 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): 15500
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 1.60
Heavy Truck % of Total Volume : 1.30
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Fountain St (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 : 55.00 / 58.00 m
Receiver height : 1.50 / 4.50 m
Topography : 3 (Elevated; no barrier)
Elevation : 5.50 m

Results segment # 1: Fountain St (day)

Source height = 1.07 m

ROAD (0.00 + 54.86 + 0.00) = 54.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.51	64.55	0.00	-8.51	-1.19	0.00	0.00	0.00	54.86

Segment Leq : 54.86 dBA

Total Leq All Segments: 54.86 dBA

Results segment # 1: Fountain St (night)

Source height = 1.07 m

ROAD (0.00 + 48.67 + 0.00) = 48.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.42	58.02	0.00	-8.33	-1.02	0.00	0.00	0.00	48.67

Segment Leq : 48.67 dBA

Total Leq All Segments: 48.67 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.86

APPENDIX C: WARNING CLAUSES

TYPE A

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

TYPE B

"Purchasers 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 occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

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."

TYPE D

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

APPENDIX D: NOISE CRITERIA

The noise study was based on the following criteria for residential units, as required by the Region of Waterloo:

TABLE A-1: NOISE CONTORL REQUIREMENTS FOR OUTDOOR LIVING AREAS		
Projected Outdoor Noise Level* **Daytime – $L_{eq}(16)$** (0700–2300)**	**Exceeds Objective By**	**Noise Control Measures**
56–60 dBA	1–5 dBA	• Noise Warning Clause (NWC) (Policy 6.1)
61+ dBA	6+ dBA	• Alternative Land Use • Alternative Draft Plan Designs • Barriers • Possible NWC in conjunction with other measures (Policy 6.1, 6.2)

TABLE A-2: VENTILATION REQUIREMENTS FOR INDOOR LIVING AREAS			
Projected Outdoor Noise Level*		**Exceeds Objective By**	**Noise Control Measures**
Daytime – $L_{eq}(16)$ (0700–2300)**	**Nighttime – $L_{eq}(8)$** (2300–0700)**		
46-55 dBA	41–50 dBA	1–10 dBA	• Provision for air conditioning; NWC (Policy 6.1, 6.2)
56+ dBA	51+ dBA	10+ dBA	• Central A/C or other ventilation system installed prior to occupancy (Policy 6.1, 6.3)

TABLE A-3: BUILDING COMPONENTS REQUIREMENTS			
Projected Outdoor Noise Level*		**Exceeds Objective By**	**Noise Control Measures**
Daytime – $L_{eq}(16)$ (0700–2300)**	**Nighttime – $L_{eq}(8)$** (2300–0700)**		
Road: 46–55 dBA **Rail**[1]: 41–50 dBA	**Road**: 41–50 dBA **Rail**[1]: 36–40 dBA	1–10 dBA	• Compliance with Ontario Building Code; also see Policy 3.3.8
Road 56+ dBA **Rail**[1]: 51+ dBA	**Road**: 51+ dBA **Rail**[1]: 46+ dBA	10+ dBA	• Building components designed to achieve indoor sound level criteria; NWC (Policy 6.1, 6.3); also see 3.3.8
[1]Whistle noise included in rail noise calculation.			

* Projected noise levels to be rounded to nearest whole number.
** Defined as 10 dBA less than noise level calculated at exterior plane of window.

All sound calculations are based on the Survey Plan dated March 13, 2020.

L_{eq}

The L_{eq} is defined as the mean energy of the sound level averaged over the measurement period. It can be considered as the continuous steady sound level which would have the same acoustic energy as the real fluctuating noise measured over the same period of time.

APPENDIX E: REFERENCES

1. Ministry of the Environment, “Publication NPC-300, Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning”, August 2013.

2. Ministry of the Environment, *ORNAMENT*, Ontario Road Noise Analysis Method for Environment and Transportation, November 1988.

3. Ministry of the Environment, *STAMSON* Computer Programme (*Version 5.04*).