HGC ENGINEERING

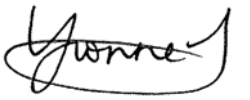
Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044

Noise Feasibility Study
Proposed Residential Development
200 South Service Road and 201 Radley Road
City of Mississauga, Ontario

Prepared for:

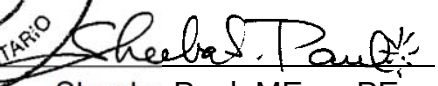
10299839 Canada Corp. and 10298786 Canada Corp.
16 McAdam Avenue, Unit 1
North York, Ontario
M6A 0B9

Prepared by



Yvonne Lo, BASc, EIT

and



Sheeba Paul, MEng, PEng

January 18, 2018

Project Number: 01700632

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1 Introduction and Summary

HGC Engineering was retained by 10299839 Canada Corp. and 10298786 Canada Corp. to conduct a noise feasibility study for their proposed residential development to be located at 200 South Service Road and 201 Radley Road in the City of Mississauga, Ontario. The proposed residential development will include five single detached units. The study is required by the City of Mississauga in accordance with the Ministry of Environment and Climate Change (MOECC) publication NPC-300 to analyze the impact of road traffic noise on the proposed residential units, as part of the planning and approvals process.

The primary sources of noise impacting the site are road traffic on the Queen Elizabeth Way (QEW) and South Service Road. Relevant road traffic data was obtained from the Ministry of Transportation (MTO) and the City of Mississauga. The data was used to predict future traffic sound levels at the locations of the proposed dwelling facades and in the outdoor living areas. The predicted sound levels were compared to the guidelines of the MOECC.

The sound level predictions indicate that the future road traffic sound levels will exceed MOECC guidelines at all of the residential dwelling units in the development. Acoustic barriers are required for the rear yards of the dwelling units with exposure to the QEW and South Service Road. Upgraded building constructions and central air conditioning systems will be required for the proposed dwelling units closest to the QEW and South Service Road. Provision for the future installation of central air conditioning at the occupant's discretion is required for the dwelling units further from the QEW and South Service Road. Warning clauses are recommended to inform future residents of the traffic noise impacts and to address sound level excesses.

2 Site Description and Sources of Sound

Figure 1 is a key plan showing the location of the site. The site is located at the south-east corner of South Service Road and Crestview Avenue, immediately south of the Queen Elizabeth Way, in the City of Mississauga, Ontario. Figure 2 shows the proposed site plan prepared by Mara Cervini Architect, received August 10th, 2017. The proposed development will include five single detached dwelling units fronting onto Crestview Avenue.

A site visit was made by HGC Engineering personnel in September 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 and south. West of the site is an existing commercial building that has been rezoned for a townhouse development. The subject site is currently occupied by two existing single detached units which will be demolished.

Road traffic on the QEW and South Service Road 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 South Service Road currently consists of one lane in each direction. There is an existing 4.9 m high MTO concrete acoustic barrier between the QEW and South Service Road, located approximately 13 m away to the north of the subject site. This existing barrier was included in the analysis.

3 Criteria for Acceptable Sound Levels

Guidelines for acceptable levels of road traffic noise impacting residential developments are given in the MOECC publication NPC-300 “Environment 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 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table 1: MOECC 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 MOECC guidelines.

The guidelines in the MOECC publication allow the sound level in an Outdoor Living Area 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 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 windows exceed 60 dBA or daytime sound levels outside living/dining/bedroom windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning by the occupant is required when nighttime sound levels at bedroom windows are in the range of 51 to 60 dBA or when daytime sound levels at living/dining/bedroom 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 the bedroom window sound levels are greater than 60 dBA or the daytime sound levels are 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 window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the living/dining room window due to road traffic.

4 Traffic Sound Level Assessment

4.1 Road Traffic Data

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 A. An SADT volume of 201 500 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 2028 using a 2.5 % growth rate. A commercial percentage of 11.5% was further split into 2.9 % medium trucks and 8.6% 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.

Road traffic information for South Service Road was obtained from the City of Mississauga, in the form of ultimate Average Annual Daily Traffic (AADT) values, and is provided in Appendix A. An ultimate AADT of 15 000 vehicles per day, along with a speed limit of 60 km/h, was applied in the analysis. A commercial vehicle percentage of 3% was provided and was further split into 1.65% and 1.35% for medium and heavy trucks, respectively. Table 2 summarizes the traffic volume data used in this study.

Table 2: Ultimate and Projected Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
South Service Road *(Ultimate)*	Daytime	13 095	223	182	13 500
	Nighttime	1 455	25	20	1 500
	Total	**14 550**	**248**	**202**	**15 000**
QEW *(Projected to Year 2028)*	Daytime	211 051	6 916	20 509	238 476
	Nighttime	28 780	943	2 797	32 519
	Total	**239 831**	**7 859**	**23 306**	**270 995**

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 MOECC. Sample STAMSON output is included in Appendix B.

A numerical computer modeling package Cadna-A (*version 2018 build 161.4801*), was employed to create a 3-D model to assist in the determination of acoustic barrier heights for the rear yards to supplement STAMSON calculations. The model is based on the methods from ISO Standard 9613-2.2, "Acoustics – Attenuation of Sound During Propagation Outdoors", which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structure (or by topography and foliage where applicable).

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 South Service Road. Future daytime sound levels were predicted at 1.5 m above ground level in the outdoor living area (backyard at the rear of the house) to determine whether noise barriers will be necessary. 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. The results of these predictions are summarized in Table 3.

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 MOECC guidelines, the QEW was divided into two segments (eastbound and westbound). The acoustic requirements may be subject to modifications if the site plan is changed significantly.

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

Unit No.	Description	Daytime - in OLA $L_{EQ(16)}$	Daytime - at Façade $L_{EQ(16)}$	Nighttime - at Façade $L_{EQ(8)}$
1	Unit flanking onto South Service Road and QEW	65	72	67
2	Unit with some exposure to South Service Road and QEW	63	67	62
3	Unit with some exposure to South Service Road and QEW	63	66	60
4	Unit with some exposure to South Service Road and QEW	63	65	59
5	Unit with some exposure to South Service Road and QEW	61	64	58

Note:
* Predicted sound level includes the effect of the existing 4.9 m high acoustic wall located approximately 13 m north of the north property line of site

5 Recommendations

The predictions indicate that the future traffic sound levels will exceed MOECC guidelines at all units within the development. 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 1.

5.1 Outdoor Living Areas

The predicted sound level in the rear yards Lots 1 – 4 will be up to 10 dBA in excess of MOECC's limit of 55 dBA. Physical mitigation in the form of acoustic barriers are required. The barrier heights required to achieve 60 dBA for each rear yard are provided in Table 4. Calculations indicate that higher acoustic barriers along these rear yards will not further reduce the sound levels by much. The 5 dBA sound level excess is acceptable to the MOECC with the use of an appropriate noise warning clause.

Table 4: Barrier Heights (m) Required to achieve 60 dBA

Unit No.	Description	Barrier Height Required (m)
1	Unit flanking onto South Service Road and QEW	4.3
2	Unit with some exposure to South Service Road and QEW	3.3
3	Unit with some exposure to South Service Road and QEW	2.8
4	Unit with some exposure to South Service Road and QEW	2.6
5	Unit furthest from QEW and South Service Road	--

The future daytime sound level in the rear yard of Lot 5 will be 60 dBA, 5 dBA in excess of the MOECC's limit of 55 dBA. The 5 dBA sound level excess is acceptable to the MOECC with the use of an appropriate noise warning clause. Physical mitigation will not be required.

Acoustic barrier heights should be refined when grading plans are available. As a general note, an acoustic barrier 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. The heights and extents of the barriers should be chosen to reduce the sound levels in the OLA's to below 60 dBA and as close to 55 dBA as is technically, administratively and economically feasible, subject to the approval of the municipality respecting any applicable fence height by-laws.

5.2 Indoor Living Areas

Installation of Air Conditioning

The predicted future sound levels outside the second storey living/dining/bedroom windows will be greater than 65 dBA during the daytime hours and greater than 60 dBA during the nighttime hours for units closer to South Service Road and the QEW (Lots 1 – 3). To address these excesses, the MOECC guidelines recommend that these dwellings be equipped with central air conditioning systems, so that the windows may remain closed. The lots requiring central air conditioning are

indicated with solid red hatching in Figure 3. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MOECC publication NPC-300.

Provision for the Future Installation of Air Conditioning

The predicted future sound levels outside the second storey living/dining/bedroom windows will be between 51 and 60 dBA during the nighttime hours and between 56 to 65 dBA during the daytime hours for units further from South Service Road and the QEW (Lots 4 and 5). These dwellings should be designed with a provision for the installation of air conditioning in the future, at the occupant's discretion and are shown on Figure 3. 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 MOECC publication NPC-300, as applicable.

5.3 Building Façade Constructions

Future sound levels at units closer to South Service Road and the QEW (Lots 1 – 3) will exceed 65 dBA during the daytime and 60 dBA during the nighttime. MOECC guidelines recommend that the windows, walls and doors be designed so that the indoor sound levels comply with MOECC noise criteria.

The required building components are selected based on the Acoustical Insulation Factor (AIF) value for road traffic. To do so, calculations were performed to determine the acoustical insulation factors to maintain indoor sound levels within MOECC guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building facades, and the anticipated area ratios of the facade components (windows and walls) and the floor area of the adjacent room.

The minimum necessary specification for the building envelope of the dwelling unit flanking onto the QEW and South Service Road (Lot 1) is AIF-32 for bedrooms/living/dining/family rooms based on the possibility of sound entering buildings through windows and walls. A well-sealed thermopane unit having a Sound Transmission Class (STC) rating of 30, that is, two 3 mm panes and a 13 mm

inter-pane gap would provide sufficient noise insulation for the dwellings, assuming a window to floor area ratio of 16% for bedrooms/living/dining/family rooms.

The minimum necessary specification for the building envelope of Lot 2 is AIF-27 for bedrooms/living/dining/family rooms based on the possibility of sound entering buildings through windows and walls. A well-sealed thermopane unit having a Sound Transmission Class (STC) rating of 30, that is, two 3 mm panes and a 13 mm inter-pane gap would provide sufficient noise insulation for the dwellings, assuming a window to floor area ratio of 50% for bedrooms/living/dining/family rooms.

The minimum necessary specification for the building envelope of Lot 3 is AIF-25 for bedrooms and AIF-26 for living/dining/family rooms based on the possibility of sound entering buildings through windows and walls. A well-sealed thermopane unit having a Sound Transmission Class (STC) rating of 30, that is, two 3 mm panes and a 13 mm inter-pane gap would provide sufficient noise insulation for the dwellings, assuming a window to floor area ratio of 80% and 63% for bedrooms and living/dining/family rooms respectively.

Lots 4 and 5 will have daytime and nighttime sound levels at the top storey façade that are less than 65 dBA and 60 dBA respectively. 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. Any insulated metal exterior door meeting OBC requirements will be sufficient to provide noise insulation. If sliding patio doors are to be used in the dwellings, they must be included in the window area.

a) Further Detailed Study

When detailed floor plans and elevations are available for the future dwelling units closest to South Service Road and the QEW (Lots 1 – 3), a detailed noise study should be performed to specify wall and window requirements with sufficient acoustical insulation for the dwelling units based on actual window to floor area ratios.

5.4 Warning Clauses

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

Suggested wording for future dwellings with minor sound level excesses 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 and Climate Change's noise criteria.

Suggested wording 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 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 and Climate Change's noise criteria.

Suitable 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 and Climate Change.

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

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 sound level limits of the Municipality and the Ministry of the Environment and Climate Change.

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

6 Summary and Recommendations

The following list and Table 5 summarizes the recommendations made in this report.

1. Acoustic barriers are required to reduce sound levels in the rear yards of the Lots 1 – 4. When grading information is available, the acoustic barrier heights should be refined.

2. Central air conditioning systems are required for Lots 1 – 3. Forced air ventilation systems with ductwork sized for the future installation of central air conditioning are require for Lots 4 and 5.

3. Upgraded building constructions will be required for lots closest to the QEW and South Service Road. When detailed floor plans and building elevations are available for these units, an acoustical consultant should provide revised glazing constructions based on actual window-to-floor area ratios. For all other dwellings in the proposed development, any building construction meeting the minimum requirements of the Ontario Building Code will provide sufficient acoustical insulation.

4. Warning clauses should be included in the property and tenancy agreements and offers of purchase and sale for all the dwelling units to inform future residents of the traffic noise issues.

Table 5: Summary of Noise Control Requirements and Noise Warning Clauses

Unit No.	Description	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Building Façade Constructions
1	Unit flanking onto South Service Road and QEW	✓	Central Air	B,D	LR/DR: AIF-32 BR: AIF-32
2	Unit with some exposure to South Service Road and QEW	✓	Central Air	B,D	LR/DR: AIF-27 BR: AIF-27
3	Unit with some exposure to South Service Road and QEW	✓	Central Air	B,D	LR/DR: AIF-26 BR: AIF-25
4	Unit with some exposure to South Service Road and QEW	✓	Forced Air	B,C	OBC
5	Unit with some exposure to South Service Road and QEW	--	Forced Air	A,C	OBC

-- No specific requirement
✓ Outdoor living areas require acoustic barriers as indicated in Table 4. When grading information is available, the acoustic barrier heights should be refined.
* The location, installation and sound rating of the air conditioning condensers must be compliant with MOECC Guideline NPC-300, as applicable.
LR/DR – Living/Dining Room
BR- Bedroom
OBC – Ontario Building Code

6.1 Implementation

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

1. When architectural plans and grading information are available for the development, an acoustical consultant should review the plans to determine appropriate window and wall constructions and refine acoustic barrier requirements.

2. 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.

3. 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.

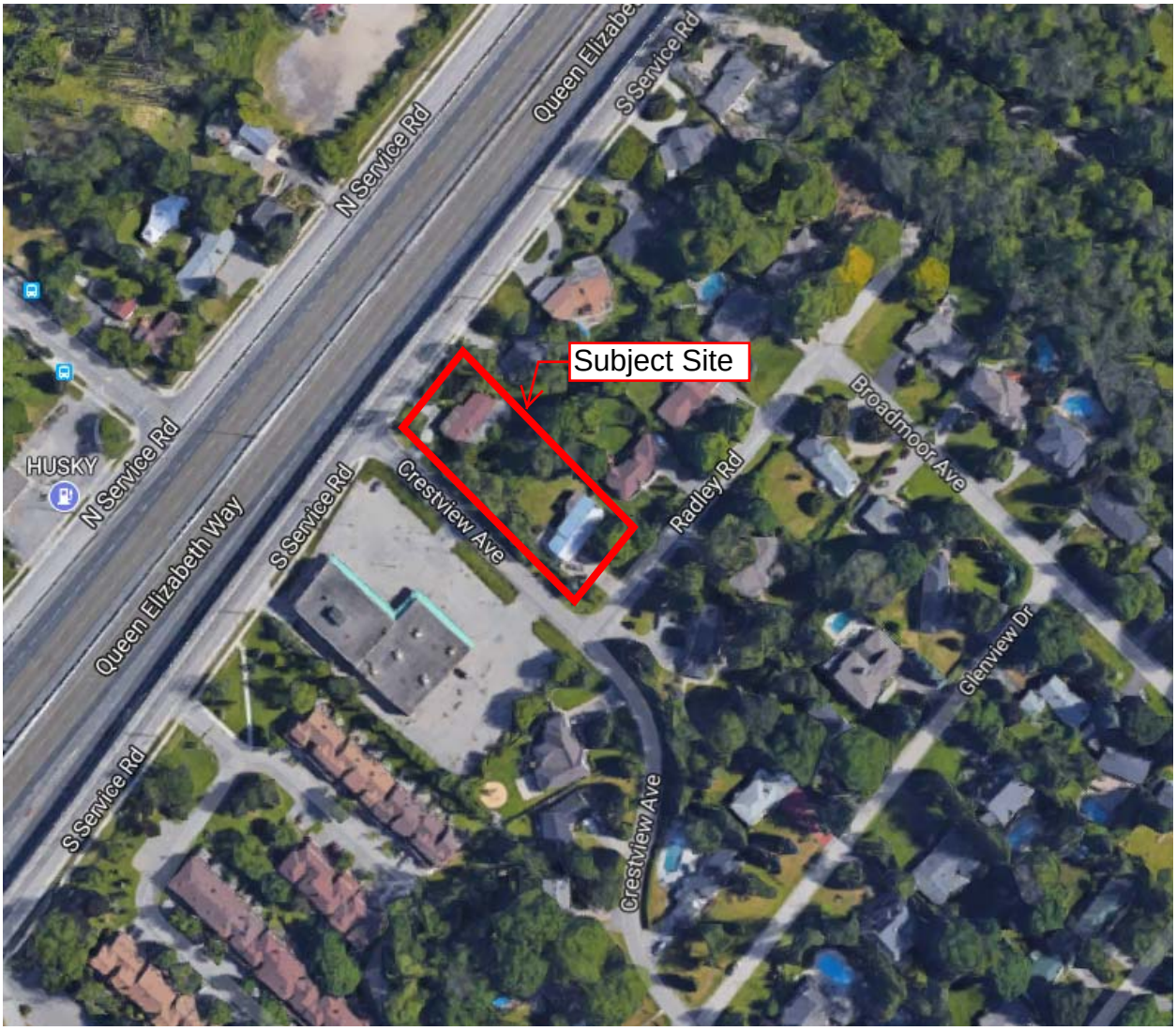
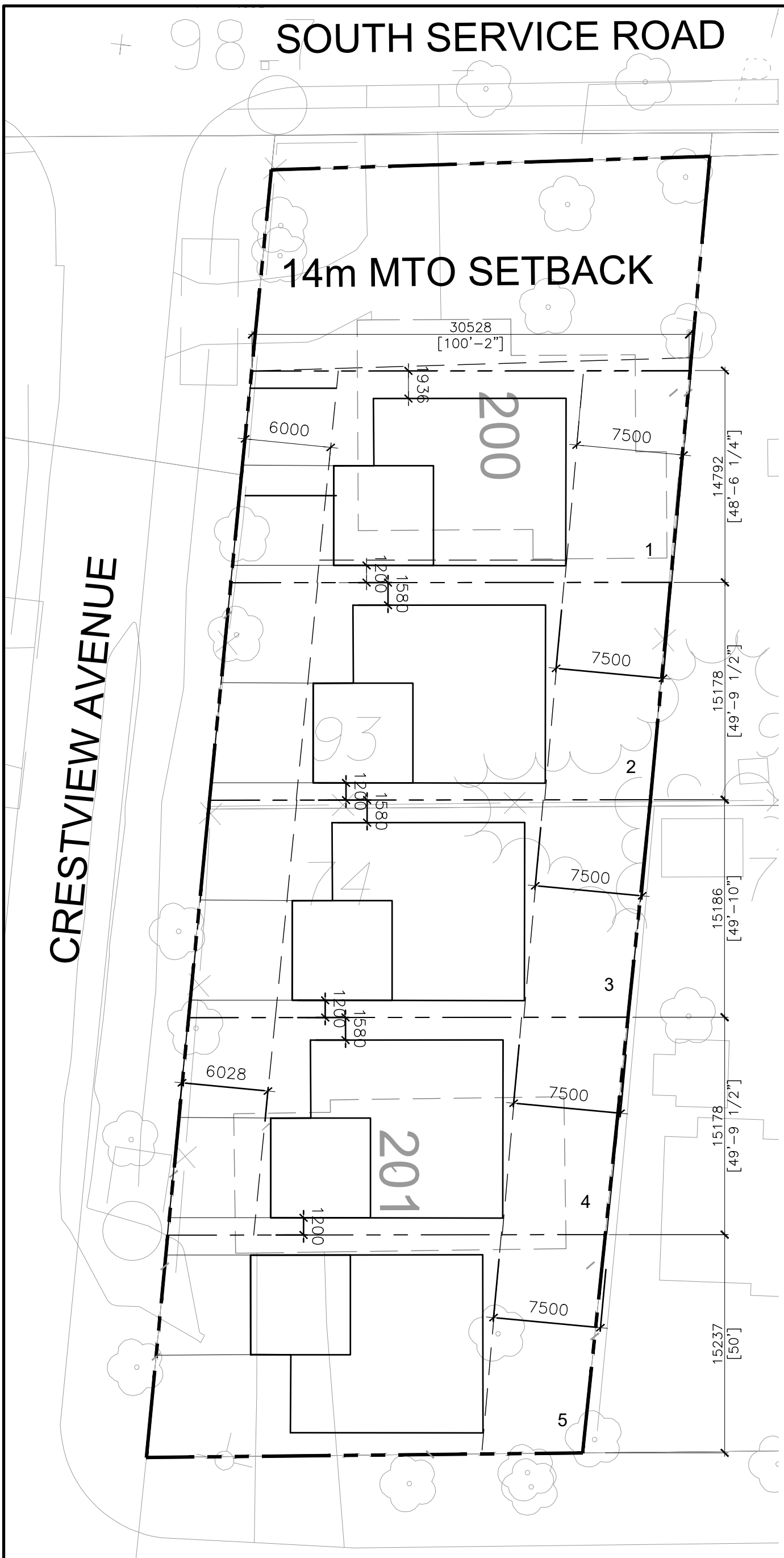


Figure 1: Key Plan



Site 1:
lot size = 454m2
frontage = 14.79m
coverage = 25%
front setback =6.0m
side setback = 1.9
side setback = 1.2
rear setback = 7.5m
Approx GFA = 3250sf

Site 2-5:
lot size = 466m2
frontage = 15.178m
coverage = 40%
front setback =6.0m
side setback = 1.58
side setback = 1.2
rear setback = 7.5m
approx GFA = 3300

Proposed saleable GFA :
16,450sf

Current Zoning R1-2
R1 zoning:
min lot size = 750m2
min frontage = 22.5m
coverage = 25%
front setback = 9.0m
side setback = 1.8
side setback = 4.2
rear setback = 7.5m

Proposed Zoning R4
R4 zoning:
min lot size = 365m2
min frontage = 12.0m
coverage = 40%
front setback = 6.0m
side setback = 1.2m
rear setback = 7.5m

MARA CERVINI, ARCHITECT
MC.A
maracerviniarch.com

PROJECT NAME:	DRAWING NAME:	DRAWING NUMBER:
200-250 S Service Road Mississauga, ON	Site Plan 5 Single Family Homes	01
PROJECT NUMBER: 17-08	SCALE: 1:300	

Figure 2: Proposed Site Plan

SOUTH SERVICE ROAD

LEGEND

Acoustic Barrier

Central Air Conditioning Required

Forced air heating with ducts sized for the future installation of air conditioning by the occupant

14m MTO SETBACK

CRESTVIEW AVENUE

RADLEY ROAD

30528 [100'–2"]

200

6000

1936

7500

14792 [48'–6 1/4"]

1

1200

1580

7500

15178 [49'–9 1/2"]

93

2

1200

1580

7500

15186 [49'–10"]

74

3

1200

1580

6028

7500

201

15178 [49'–9 1/2"]

4

1200

7500

15237 [50']

5

4.3 m high

Site 1:
lot size = 454m2
frontage = 14.79m
coverage = 25%
front setback =6.0m
side setback = 1.9
side setback = 1.2
rear setback = 7.5m
Approx GFA = 3250sf

3.3 m high

Site 2-5:
lot size = 466m2
frontage = 15.178m
coverage = 40%
front setback =6.0m
side setback = 1.58
side setback = 1.2
rear setback = 7.5m
approx GFA = 3300

Proposed saleable GFA :
16,450sf

2.8 m high

2.6 m high

Current Zoning R1-2
R1 zoning:
min lot size = 750m2
min frontage = 22.5m
coverage = 25%
front setback = 9.0m
side setback = 1.8
side setback = 4.2
rear setback = 7.5m

Proposed Zoning R4
R4 zoning:
min lot size = 365m2
min frontage = 12.0m
coverage = 40%
front setback = 6.0m
side setback = 1.2m
rear setback = 7.5m

MARA CERVINI, ARCHITECT
MC.A
maracerviniarch.com

PROJECT NAME: 200-250 S Service Road Mississauga, ON

DRAWING NAME: Site Plan 5 Single Family Homes

DRAWING NUMBER: 01

PROJECT NUMBER: 17-08

SCALE: 1:300

Figure 3: Proposed Site Plan showing Ventilation and Barrier Requirements

APPENDIX A

Road Traffic Information

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1990	C	130,900	140,000	151,700	124,300	1.0
			1991	C	128,900	136,600	148,200	125,000	0.8
			1992	C	129,800	137,500	146,600	119,400	0.8
			1993	C	137,900	146,200	155,800	126,900	1.1
			1994	C	143,700	152,300	160,900	132,200	1.3
			1995	C	144,600	153,300	160,500	133,000	1.2
			1996	C	148,100	157,600	173,300	140,700	1.0
			1997	C	151,600	159,200	177,400	142,500	0.8
			1998	C	155,100	165,000	181,500	147,300	1.1
			1999	C	157,600	167,700	184,400	149,700	0.9
			2000	C	160,500	170,800	189,100	150,900	1.2
			2001	C	163,500	174,900	192,900	153,700	0.8
			2002	C	166,500	177,400	195,900	155,900	1.0
			2003	C	169,500	179,700	200,000	159,300	0.9
			2004	C	186,500	197,100	218,500	176,200	0.6
			2005	C	175,400	185,600	205,100	164,500	0.7
			2006	C	167,500	177,100	195,700	157,600	0.8
			2007	C	169,000	179,200	195,600	158,600	1.1
			2008	C	142,000	156,700	154,600	127,400	1.3
			2009	C	142,500	186,600	188,400	152,200	0.7
			2010	C	165,900	191,300	193,000	156,300	0.7
			2011	C	170,000	187,000	188,700	153,000	N/A
			2012	C	169,100	186,000	182,600	152,200	N/A
			2013	C	170,000	187,000	185,300	153,000	N/A
			2014	C	171,000	188,100	183,000	153,900	N/A
			2015	C	171,900	189,100	183,900	154,700	N/A
			2016	C	172,900	190,200	185,000	155,600	N/A
QEW	CAWTHRA RD IC-134	1.8	1988	C	124,500	130,700	140,600	117,000	0.9
			1989	C	128,800	135,100	145,400	122,300	0.8
			1990	C	132,900	142,200	154,100	126,200	0.6
			1991	C	130,900	138,700	150,500	126,900	0.5
			1992	C	131,900	139,800	149,000	121,300	0.8
			1993	C	137,400	145,500	157,900	131,800	0.8

Highway	Location Description	Dist. (KM)	Year	Pattern Type	AADT	SADT	SAWDT	WADT	AR
			1994	C	137,700	146,000	154,200	126,700	0.8
			1995	C	139,600	148,000	155,000	128,400	1.1
			1996	C	141,500	150,600	165,600	134,400	0.9
			1997	C	143,400	150,600	167,800	134,800	0.7
			1998	C	152,100	161,800	178,000	144,500	0.7
			1999	C	152,600	162,400	178,500	145,000	0.8
			2000	C	155,900	165,900	183,700	146,500	0.7
			2001	C	159,200	170,300	187,900	149,600	0.8
			2002	C	162,500	173,100	191,200	152,100	0.7
			2003	C	165,700	175,600	195,500	155,800	0.6
			2004	C	166,000	175,400	194,500	156,800	0.8
			2005	C	163,300	172,800	191,000	153,200	0.7
			2006	C	165,000	174,500	192,800	155,300	0.8
			2007	C	167,000	177,100	193,300	156,700	0.9
			2008	C	168,900	178,400	167,500	158,000	0.6
			2009	C	163,400	172,500	190,400	153,700	0.5
			2010	C	167,800	184,900	186,600	151,100	0.5
			2011	C	170,000	187,000	188,700	153,000	N/A
			2012	C	175,700	193,300	189,800	158,100	N/A
			2013	C	177,600	195,300	193,600	159,800	N/A
			2014	C	179,500	197,400	192,000	161,500	N/A
			2015	C	181,300	199,400	194,000	163,200	N/A
			2016	C	183,200	201,500	196,000	164,900	N/A
QEW	DIXIE RD(WBL)IC-136	1.8	1988	UC	155,000	162,700	175,100	145,600	0.8
			1989	UC	160,300	168,200	181,000	152,200	0.7
			1990	UC	165,100	176,600	191,400	156,700	0.7
			1991	UC	162,200	171,900	186,500	157,300	0.6
			1992	UC	163,200	172,900	184,400	150,100	0.7
			1993	UC	163,800	173,600	188,300	157,200	0.9
			1994	UC	164,500	174,400	184,200	151,300	0.6
			1995	UC	165,000	174,900	183,200	151,800	0.6
			1996	UC	165,500	176,100	193,600	157,200	0.6
			1997	UC	166,100	174,400	194,300	156,100	0.6

Sheeba Paul

From: Bee, Christopher (MTO) <Christopher.Bee@ontario.ca>
Sent: November-21-13 3:55 PM
To: Sheeba Paul
Cc: Bee, Christopher (MTO)
Subject: FW: Traffic Data- % commercial
Attachments: %commercial.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

To Sheeba Paul, HGC Engineering;

The % commercial (%truck) statistics has not changed since 2008,
It is still steady at 11.5% in yr. 2010.

There is no more recent official data.

Christopher Bee
MTO CR Traffic Office
Traffic Information and Roadwork Scheduling Section (TIRSS)

From: Sheeba Paul [mailto:spaul@hgcengineering.com]
Sent: November 21, 2013 3:25 PM
To: Bee, Christopher (MTO)
Subject: RE: Traffic Data- % commercial

Hi Christopher

HGC Engineering is performing a noise study for a development at South Service Road, south of the QEW in Mississauga at 372 to 374 South Service Road.

A Google link is attached for your reference.

https://maps.google.ca/maps?q=372+south+service+road,+mississauga,+on&hnear=372+S+Service+Rd,+Mississauga,+Peel+Regional+Municipality,+Ontario+L5G&gl=ca&t=h&z=16

We have % commercial from 2012 which is attached. Is the % commercial still valid?

Thank you.

Ms. Sheeba Paul, MEng, PEng
Senior Engineer, Associate

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**: spaul@hgcengineering.com
Visit our new website! www.hgcengineering.com **Follow Us** – LinkedIn | Twitter | YouTube

Date:	26-Nov-13

NOISE REPORT FOR PROPOSED DEVELOPMENT

CITY OF MISSISSAUGA

REQUESTED BY:	
Name:	Sheeba Paul
Company	HGC Engineering
Fax#:	(905) 826-4044
PREPARED BY:	
Name:	Loudel Uy, C.E.T
Tel#:	(905) 615-3200

Location:	South Service Road- Hurontario Street to Cawthra Road
Look Up ID#:	316

ON SITE TRAFFIC DATA

Specific	***Street Names***				
	South Service Road				
AADT:	15,000				
# of Lanes:	2 lanes				
% Trucks:	3%				
Medium/Heavy Trucks Ratio:	55/45				
Day/Night Traffic Split:	90/10				
Posted Speed Limit:	60 km/h				
Gradient of Road:	<2%				
Ultimate R O W:	20 m				

Comments:	Ultimate Traffic Data only.

APPENDIX B

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 18-01-2018 15:32:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: L1.te Time Period: Day/Night 16/8 hours
Description: **Daytime and nighttime sound levels at Unit #1, unit flanking onto South Service Road, prediction location [A]**

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

Car traffic volume : 105525/14390 veh/TimePeriod *
Medium truck volume : 3458/472 veh/TimePeriod *
Heavy truck volume : 10254/1398 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): 100750
Percentage of Annual Growth : 2.50
Number of Years of Growth : 12.00
Medium Truck % of Total Volume : 2.90
Heavy Truck % of Total Volume : 8.60
Day (16 hrs) % of Total Volume : 88.00

Data for Segment # 1: QEW (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 / 60.00 m
Receiver height : 4.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 4.90 m
Barrier receiver distance : 26.00 / 26.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

```
Road data, segment # 2: QEW (day/night)
---------------------------------------
Car traffic volume  : 105525/14390 veh/TimePeriod  *
Medium truck volume :  3458/472   veh/TimePeriod  *
Heavy truck volume  : 10254/1398  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): 100750
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  12.00
    Medium Truck % of Total Volume     :   2.90
    Heavy Truck  % of Total Volume     :   8.60
    Day (16 hrs) % of Total Volume     :  88.00

Data for Segment # 2: QEW (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  :  39.00 / 39.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   4.90 m
Barrier receiver distance :  26.00 / 26.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

Road data, segment # 3: SSR (day/night)
---------------------------------------
Car traffic volume  : 13095/1455  veh/TimePeriod  *
Medium truck volume :   223/25    veh/TimePeriod  *
Heavy truck volume  :   182/20    veh/TimePeriod  *
Posted speed limit  :    60 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):  15000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.65
    Heavy Truck  % of Total Volume     :   1.35
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 3: SSR (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  :  23.00 / 23.00  m
Receiver height         :   4.50 / 4.50   m
Topography              :      1       (Flat/gentle slope; no barrier)
Reference angle         :   0.00

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

Source height = 1.71 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.71 !        4.50 !        3.29 !         3.29

ROAD (0.00 + 68.95 + 0.00) = 68.95 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.27  84.49   0.00  -7.64  -0.70   0.00   0.00  -7.19  68.95
-------------------------------------------------------------------------------

Segment Leq : 68.95 dBA

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

Source height = 1.71 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.71 !        4.50 !        2.64 !         2.64

ROAD (0.00 + 68.70 + 0.00) = 68.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.27  84.49   0.00  -5.27  -0.70   0.00   0.00  -9.82  68.70
-------------------------------------------------------------------------------

Segment Leq : 68.70 dBA

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

Source height = 1.08 m

ROAD (0.00 + 62.01 + 0.00) = 62.01 dBA
```

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	66.27	0.00	-2.94	-1.32	0.00	0.00	0.00	62.01

Segment Leq : 62.01 dBA

Total Leq All Segments: 72.27 dBA

Results segment # 1: QEW (night)

Source height = 1.71 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.71	4.50	3.29	3.29

ROAD (0.00 + 63.31 + 0.00) = 63.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.27	78.84	0.00	-7.64	-0.70	0.00	0.00	-7.19	63.31

Segment Leq : 63.31 dBA

Results segment # 2: QEW (night)

Source height = 1.71 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.71	4.50	2.64	2.64

ROAD (0.00 + 63.06 + 0.00) = 63.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.27	78.84	0.00	-5.27	-0.70	0.00	0.00	-9.82	63.06

Segment Leq : 63.06 dBA

Results segment # 3: SSR (night)

Source height = 1.07 m

ROAD (0.00 + 55.46 + 0.00) = 55.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	59.73	0.00	-2.94	-1.32	0.00	0.00	0.00	55.46

Segment Leq : 55.46 dBA

Total Leq All Segments: 66.55 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.27
(NIGHT): 66.55