



Transportation Noise Assessment

St. Helen's Anglican Church Church Expansion Ottawa, Ontario

REPORT: *GmE*13-084 - Traffic Noise

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EXECUTIVE SUMMARY

This document describes a traffic noise assessment performed for a proposed extension of St. Helen's Anglican Church at 1234 Prestone Drive, Ottawa, Ontario. The building will rise 13 meters above grade level. Figure 1 illustrates a site plan with surrounding context. The major source of roadway noise affecting the development is traffic along Prestone Drive.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment (MOE) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan right of way allowances; and (iv) architectural drawings received from Vandenberg & Wildeboer Architects Inc.

The results of the current study indicate that noise levels due to roadway traffic over the site will range between 36 and 62 dBA during the daytime period (07:00-23:00) and between 28 and 55 dBA during the nighttime period (23:00-07:00). The highest traffic noise levels will occur along the north side of the development, nearest to Prestone Drive. Minimum building construction in all areas is required to satisfy the Ontario Building Code (2006). As no dwelling units are associated with the development, Warning Clauses do not apply.

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1. INTRODUCTION

Gradient Microclimate Engineering Inc. (*GmE*) was retained by Vandenberg & Wildeboer Architects Inc. to undertake a transportation noise study of the proposed expansion of St. Helen's Anglican Church at 1234 Prestone Drive in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a roadway traffic noise assessment. *GmE's* scope of work involved assessing exterior and interior noise levels generated by local roadway traffic. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa¹ and Ministry of the Environment² guidelines. Noise calculations were based on architectural drawings received from Vandenberg & Wildeboer Architects Inc. with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP).

2. TERMS OF REFERENCE

The focus of this environmental noise assessment is a proposed expansion of St. Helen's Anglican Church. The existing church is planning on building a new sanctuary as well as increasing space for office and classroom use. The development is located on the east corner of the intersection of Prestone Drive and River Ridge Crescent. The major source of roadway noise is Prestone Drive, designated as a Major Collector. The site is surrounded by residential development on all sides, except for a retirement residence to the south. Figure 1 illustrates a complete site plan with surrounding context.

Upon completion the single storey building will rise 13 meters above grade level. No outdoor living areas (OLA's) are associated with this development.

¹ City of Ottawa Environmental Noise Control Guidelines, SS Wilson Associates, May 10, 2006

² MOE, LU-131 Noise Assessment In Land Use Planning, Tables 1 & 2, page 8

Vandenberg & Wildeboer Architects Inc.

3. OBJECTIVES

The main goals of this work are to: (i) calculate the future noise levels on the study building produced by local roadway traffic and (ii) ensure that interior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Sections 4.2 and 4.3 of this report.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For vehicle traffic, the equivalent sound energy level, L_{EQ} , provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{EQ} is commonly calculated on the basis of a 16-hour (L_{EQ16}) daytime (07:00-23:00) / 8-hour (L_{EQ8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit ranges (that are relevant to this study) are 50 dBA for general offices and 45 dBA for places of worship. Based on *GmE's* experience, more comfortable indoor noise levels should be targeted toward 42 dBA to control peak noise and deficiencies in building envelope construction.

Noise levels predicted at the plane of the window (POW) dictate the action required to achieve the recommended sound levels. Different mitigation measures are required when: (i) POW noise levels exceed 65 dBA daytime or 60 dBA nighttime; or (ii) when POW noise levels range between 55 and 65 dBA daytime; or between 50 and 60 dBA nighttime. In the first case, (i) POW noise levels exceeding 65 dBA daytime or 60 dBA nighttime require a full building component review. As windows are most often the weakest point in sound transmission through a façade, when the values are close to meeting the criteria, windows with adequate Sound Transmission Class (STC) ratings must be selected to provide the required noise attenuation.

4.2.2 Roadway Traffic Volumes

For future traffic noise predictions, the MOE document LU-131 requires the use of the Annual Average Daily Traffic (AADT) volumes, projected to exist ten years into the future, with an average annual growth rate of 2% per year. In contrast, the City of Ottawa's Official Plan (OP) requires that the AADT volumes should be based on roadway allowances, which are defined by the Right of Way (ROW) protection values identified in the OP for specific roadways.

To ensure compliance with the reasonable worst case situation, the following steps were taken;

- Recent counted traffic data were acquired from the City of Ottawa and the Ministry of Transportation (where available), upon which a growth rate of 2% per year was applied and extrapolated to the City's OP horizon year of 2023
- Traffic volumes based on roadway ROW values were obtained from the City of Ottawa Official Plan³ (Annex 1 – Road Classification and Rights of Way). For roadways where the ROW information was unavailable, the designation was assumed based on the size of the existing road and available traffic information.

In all cases, the higher of the OP versus projected values were used to calculate future noise levels. Table 1 (below) summarizes the AADT values used for each roadway included in this assessment.

³ www.ottawa.ca/city_hall/ottawa2020/official_plan/vol_1/07_annexes/annex_01/index_en.html
Vandenberg & Wildeboer Architects Inc.

TABLE 1: ROADWAY TRAFFIC DATA

Roadway	Roadway Class	Speed Limit (km/h)	Official Plan AADT	Available Traffic AADT From Count	Year of Traffic AADT	Projected 2023 AADT
Prestone Drive	2-UMCU	40	12,000	N/A	N/A	N/A

4.2.3 Theoretical Roadway Noise Predictions

Noise predictions were performed with the aid of the Ministry of the Environment (MOE) computerized noise assessment program, STAMSON 5.04, for road and rail analysis. Appendix A includes the STAMSON 5.04 input and output data.

Roadway noise calculations were performed by treating each road segment as separate line sources of noise, and by using existing building locations as noise barriers. The surrounding building massing, roadway layout geometry and site plan information was received from Vandenberg & Wildeboer Architects Inc. In addition to the traffic volumes summarized in Table 1, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions
- The day/night split was taken to be 92% / 8% respectively for all streets
- Absorptive and reflective intermediate ground surfaces based on specific source-receiver path ground characteristics
- The study site was treated as having flat topography

Noise receptors were strategically placed at five (5) locations around the study area (see Figure 2). The initial calculations revealed that outdoor noise levels were below the ENCG requirements. As such, STC verification of the building components is not required.

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2006) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneered walls can achieve STC 55. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40 dBA depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

According to the ENCG, when daytime noise levels at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure⁴ considers: (i) window type and total area as a percentage of total room floor area; (ii) exterior wall type and total area as a percentage of the total room floor area; (iii) the acoustic absorption characteristics of the room; (iv) outdoor noise source type and approach geometry; and (v) the indoor sound level criteria, which varies according to the intended use of a space. Based on published research⁵, exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition.

⁴ Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985

⁵ CMHC, Road & Rail Noise: Effects on Housing
Vandenberg & Wildeboer Architects Inc.

5. RESULTS AND DISCUSSION

5.1 Roadway Noise Levels

Appendix A contains the complete set of input and output data from all STAMSON 5.04 calculations. The results of the roadway noise calculations are summarized in Table 2 below.

TABLE 2: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

RECEPTOR NUMBER	RECEPTOR LOCATION	NOISE LEVEL (dBA)	
		DAY	NIGHT
1	POW – Ground Floor – North Façade	62	55
2	POW – Ground Floor – East Façade	37	30
3	POW – Ground Floor – South Façade	36	28
4	POW – Ground Floor – West Façade	54	46
5	POW – Ground Floor – West Façade	58	50

The results of the current analysis indicate that noise levels will range between 36 and 62 dBA during the daytime period (07:00-23:00) and between 28 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 62 dBA) occurs on the north side of the development, which is closest to Prestone Drive.

5.2 STC Requirements

The noise levels predicted due to road traffic are below the criteria listed in Table 1.8 of the ENCG for building components. As such, all building components must be compliant with the Ontario Building Code. No dwelling units are associated with the development; therefore Warning Clauses are not required.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels due to roadway traffic over the site will range between 36 and 62 dBA during the daytime period (07:00-23:00) and between 28 and 55 dBA during the nighttime period (23:00-07:00). The highest traffic noise levels will occur along the north side of the development, nearest to Prestone Drive. Minimum building construction in all areas is required to satisfy the Ontario Building Code (2006). No Warning Clauses are associated with this development.

This concludes our assessment and report. If you have any questions or wish to discuss our findings please advise us. In the interim, we thank you for the opportunity to be of service.

Yours truly,

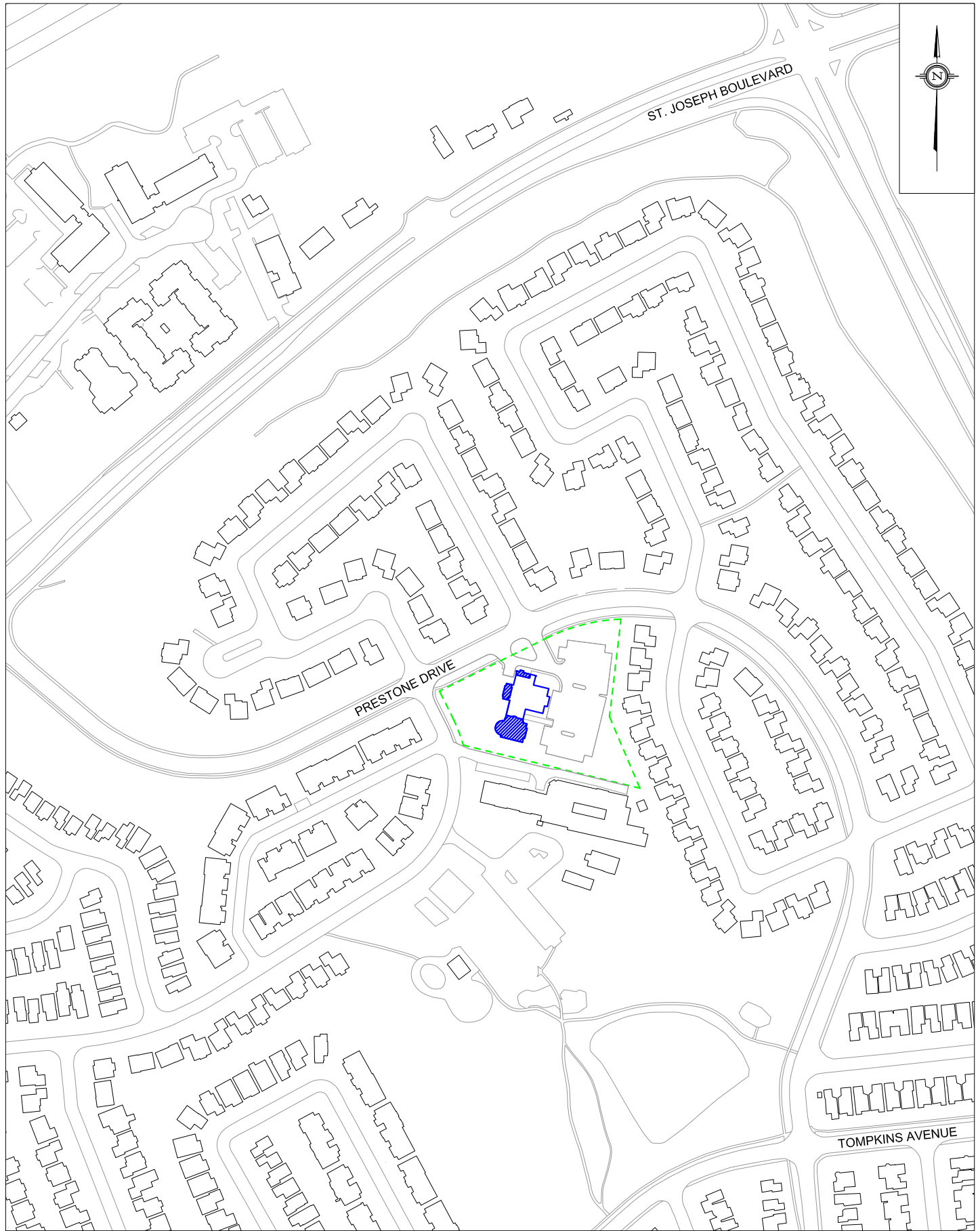
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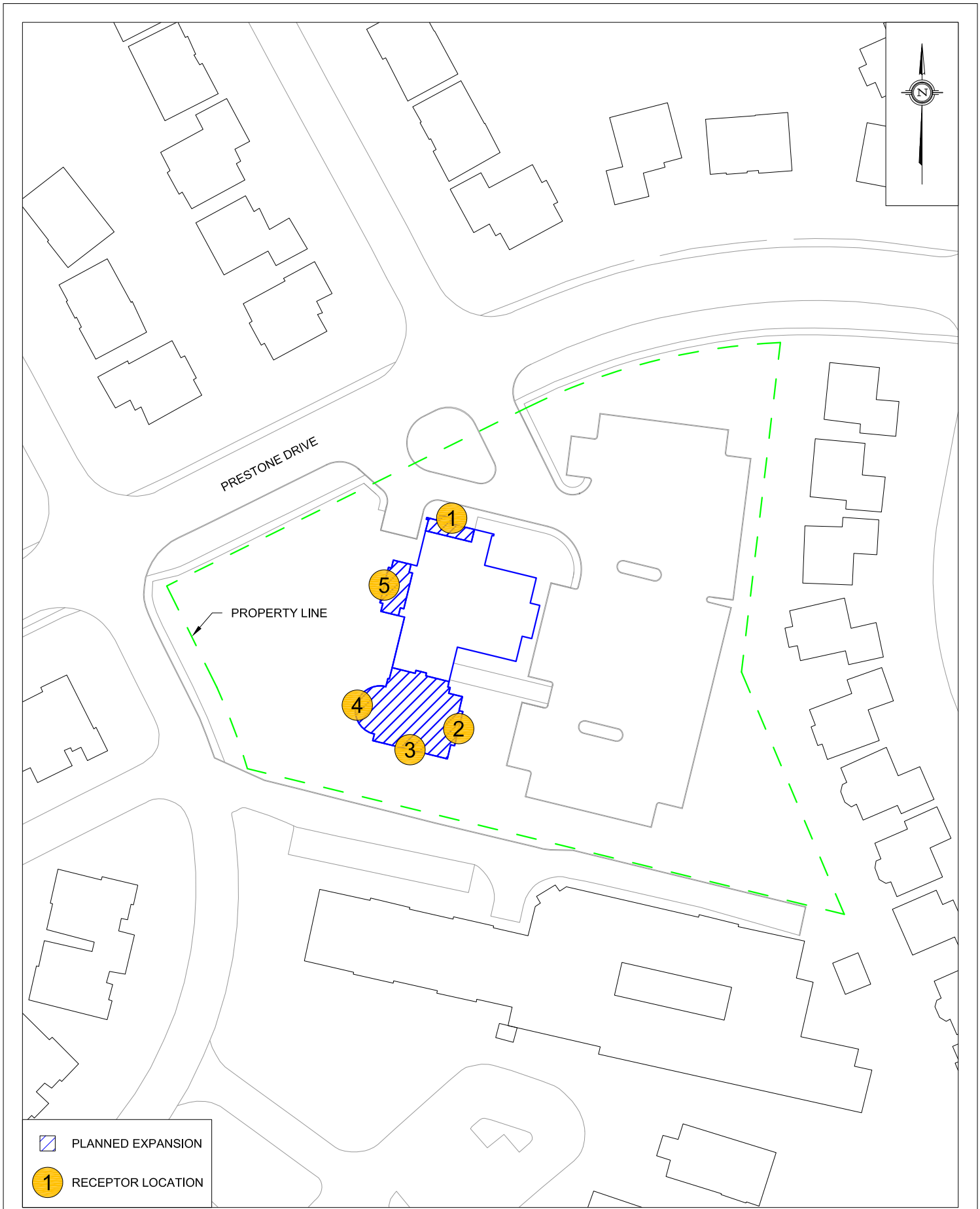




Vincent Ferraro, M.Eng. P.Eng.
Principal



PROJECT	ST. HELEN'S ANGLICAN CHURCH - TRAFFIC NOISE STUDY	
SCALE	1:3500 (APPROX.)	DRAWING NO. GME13-084-1
DATE	AUGUST 23, 2013	DRAWN BY T.C

DESCRIPTION	FIGURE 1: SITE PLAN & SURROUNDING CONTEXT
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-  PLANNED EXPANSION
-  RECEPTOR LOCATION

PROJECT	ST. HELEN'S ANGLICAN CHURCH - TRAFFIC NOISE STUDY	
SCALE	1:1000 (APPROX.)	DRAWING NO. GME13-084-2
DATE	AUGUST 23, 2013	DRAWN BY T.C

DESCRIPTION
 FIGURE 2:
 NOISE RECEPTOR LOCATIONS

APPENDIX A

STAMSON 5.04

INPUT AND OUTPUT DATA



STAMSON 5.0 NORMAL REPORT Date: 22-08-2013 16:14:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POR1.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -77.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 27.00 / 27.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Prestone 2 (day/night)

```

-----
Angle1   Angle2           : 31.00 deg   68.00 deg
Wood depth           :           0   (No woods.)
No of house rows     :           0 / 0
Surface              :           2   (Reflective ground surface)
Receiver source distance : 30.00 / 30.00 m
Receiver height      :   1.50 / 1.50 m
Topography           :           1   (Flat/gentle slope; no barrier)
Reference angle      :           0.00
  
```

Results segment # 1: Prestone 1 (day)

Source height = 1.50 m

ROAD (0.00 + 61.29 + 0.00) = 61.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-77	40	0.00	65.72	0.00	-2.55	-1.87	0.00	0.00	0.00	61.29

Segment Leq : 61.29 dBA

Results segment # 2: Prestone 2 (day)

Source height = 1.50 m

ROAD (0.00 + 55.84 + 0.00) = 55.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
31	68	0.00	65.72	0.00	-3.01	-6.87	0.00	0.00	0.00	55.84

Segment Leq : 55.84 dBA

Total Leq All Segments: 62.38 dBA

Results segment # 1: Prestone 1 (night)

Source height = 1.50 m

ROAD (0.00 + 53.69 + 0.00) = 53.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-77	40	0.00	58.12	0.00	-2.55	-1.87	0.00	0.00	0.00	53.69

Segment Leq : 53.69 dBA



Results segment # 2: Prestone 2 (night)

Source height = 1.50 m

ROAD (0.00 + 48.24 + 0.00) = 48.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
31	68	0.00	58.12	0.00	-3.01	-6.87	0.00	0.00	0.00	48.24

Segment Leq : 48.24 dBA

Total Leq All Segments: 54.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.38
(NIGHT): 54.78



STAMSON 5.0 NORMAL REPORT Date: 22-08-2013 16:14:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POR2.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -55.00 deg 32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 / 65.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -55.00 deg Angle2 : 32.00 deg
Barrier height : 6.60 m
Barrier receiver distance : 1.50 / 1.50 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
 Percentage of Annual Growth : 0.00
 Number of Years of Growth : 0.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Prestone 2 (day/night)

 Angle1 Angle2 : 22.00 deg 51.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 71.00 / 71.00 m
 Receiver height : 1.50 / 1.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 22.00 deg Angle2 : 51.00 deg
 Barrier height : 6.60 m
 Barrier receiver distance : 16.00 / 16.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00



Results segment # 1: Prestone 1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 34.37 + 0.00) = 34.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	32	0.26	65.72	0.00	-8.05	-3.30	0.00	0.00	-20.00	34.37

Segment Leq : 34.37 dBA

Results segment # 2: Prestone 2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 34.32 + 0.00) = 34.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
22	51	0.00	65.72	0.00	-6.75	-7.93	0.00	0.00	-16.71	34.32

Segment Leq : 34.32 dBA

Total Leq All Segments: 37.36 dBA



Results segment # 1: Prestone 1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 26.77 + 0.00) = 26.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	32	0.26	58.12	0.00	-8.05	-3.30	0.00	0.00	-20.00	26.77

Segment Leq : 26.77 dBA

Results segment # 2: Prestone 2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 26.72 + 0.00) = 26.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
22	51	0.00	58.12	0.00	-6.75	-7.93	0.00	0.00	-16.71	26.72

Segment Leq : 26.72 dBA

Total Leq All Segments: 29.76 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 37.36
(NIGHT): 29.76



STAMSON 5.0 NORMAL REPORT Date: 22-08-2013 16:15:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POR3.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -52.00 deg 38.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 / 65.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -52.00 deg Angle2 : 38.00 deg
Barrier height : 6.60 m
Barrier receiver distance : 1.50 / 1.50 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Prestone 2 (day/night)

Angle1 Angle2 : 29.00 deg 54.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 72.00 / 72.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 29.00 deg Angle2 : 54.00 deg
Barrier height : 6.60 m
Barrier receiver distance : 1.50 / 1.50 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



Results segment # 1: Prestone 1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 34.52 + 0.00) = 34.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-52	38	0.26	65.72	0.00	-8.05	-3.15	0.00	0.00	-20.00	34.52

Segment Leq : 34.52 dBA

Results segment # 2: Prestone 2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 30.33 + 0.00) = 30.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
29	54	0.00	65.72	0.00	-6.81	-8.57	0.00	0.00	-20.00	30.33

Segment Leq : 30.33 dBA

Total Leq All Segments: 35.92 dBA



Results segment # 1: Prestone 1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 26.92 + 0.00) = 26.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-52	38	0.26	58.12	0.00	-8.05	-3.15	0.00	0.00	-20.00	26.92

Segment Leq : 26.92 dBA

Results segment # 2: Prestone 2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 22.73 + 0.00) = 22.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
29	54	0.00	58.12	0.00	-6.81	-8.57	0.00	0.00	-20.00	22.73

Segment Leq : 22.73 dBA

Total Leq All Segments: 28.32 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 35.92
(NIGHT): 28.32



STAMSON 5.0 NORMAL REPORT Date: 22-08-2013 16:15:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POR4.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -57.00 deg 48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 52.00 / 52.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Prestone 2 (day/night)

Angle1 Angle2 : 38.00 deg 60.00 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 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 38.00 deg Angle2 : 60.00 deg
Barrier height : 6.60 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



Results segment # 1: Prestone 1 (day)

Source height = 1.50 m

ROAD (0.00 + 53.98 + 0.00) = 53.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-57	48	0.66	65.72	0.00	-8.96	-2.77	0.00	0.00	0.00	53.98

Segment Leq : 53.98 dBA

Results segment # 2: Prestone 2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 33.32 + 0.00) = 33.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
38	60	0.26	65.72	0.00	-7.61	-9.63	0.00	0.00	-15.16	33.32

Segment Leq : 33.32 dBA

Total Leq All Segments: 54.02 dBA



Results segment # 1: Prestone 1 (night)

Source height = 1.50 m

ROAD (0.00 + 46.38 + 0.00) = 46.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-57	48	0.66	58.12	0.00	-8.96	-2.77	0.00	0.00	0.00	46.38

Segment Leq : 46.38 dBA

Results segment # 2: Prestone 2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 25.72 + 0.00) = 25.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
38	60	0.26	58.12	0.00	-7.61	-9.63	0.00	0.00	-15.16	25.72

Segment Leq : 25.72 dBA

Total Leq All Segments: 46.42 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.02
(NIGHT): 46.42



STAMSON 5.0 NORMAL REPORT Date: 22-08-2013 16:15:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POR5.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -71.00 deg 51.00 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 : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



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

Car traffic volume : 9715/845 veh/TimePeriod *
Medium truck volume : 773/67 veh/TimePeriod *
Heavy truck volume : 552/48 veh/TimePeriod *
Posted speed limit : 40 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): 12000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: Prestone 2 (day/night)

Angle1 Angle2 : 42.00 deg 67.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 39.00 / 39.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 42.00 deg Angle2 : 67.00 deg
Barrier height : 6.60 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



Results segment # 1: Prestone 1 (day)

Source height = 1.50 m

ROAD (0.00 + 57.93 + 0.00) = 57.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	51	0.66	65.72	0.00	-5.46	-2.32	0.00	0.00	0.00	57.93

Segment Leq : 57.93 dBA

Results segment # 2: Prestone 2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 35.67 + 0.00) = 35.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
42	67	0.00	65.72	0.00	-4.15	-8.57	0.00	0.00	-17.32	35.67

Segment Leq : 35.67 dBA

Total Leq All Segments: 57.96 dBA



Results segment # 1: Prestone 1 (night)

Source height = 1.50 m

ROAD (0.00 + 50.33 + 0.00) = 50.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-71	51	0.66	58.12	0.00	-5.46	-2.32	0.00	0.00	0.00	50.33

Segment Leq : 50.33 dBA

Results segment # 2: Prestone 2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.50	1.50

ROAD (0.00 + 28.07 + 0.00) = 28.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
42	67	0.00	58.12	0.00	-4.15	-8.57	0.00	0.00	-17.32	28.07

Segment Leq : 28.07 dBA

Total Leq All Segments: 50.36 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.96
(NIGHT): 50.36