



REPORT  
Project: 39606-5.2.2

# ENVIRONMENTAL NOISE IMPACT ASSESSMENT RICHARDSON RIDGE PHASE 4 CITY OF OTTAWA

---

Prepared for The City of Ottawa  
by IBI GROUP



SEPTEMBER 2016

## Table of Contents

---

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>2</b>	<b>BACKGROUND .....</b>	<b>2</b>
2.1	Noise Sources .....	2
2.2	Sound Level Limits for Road Traffic .....	2
2.2.1	Outdoor sound level criterion.....	2
2.2.2	Indoor sound level criterion – ventilation and warning clause requirements.....	2
2.2.3	Indoor Sound Level Criterion – Building Components .....	2
<b>3</b>	<b>ROADWAY NOISE .....</b>	<b>3</b>
3.1	Road Traffic Data .....	3
3.2	Calculation Methods .....	3
<b>4</b>	<b>RESULTS.....</b>	<b>4</b>
4.1	Indoor Sound Levels .....	4
4.2	Outdoor Sound Levels.....	4
<b>5</b>	<b>CONCLUSION .....</b>	<b>6</b>

## List of Figures and Tables

---

<b>Figure 1</b>	Free Field Noise Contours
<b>Table 3.1</b>	Traffic and Road Data Summary
<b>Table 3.2</b>	Free Field Analysis Results

## List of Appendices

---

<b>Appendix</b>	Noise Calculations
-----------------	--------------------

# 1 INTRODUCTION

This report has been prepared to determine the impact of roadway traffic on the residential lands of the Phase 4 of the Richardson Ridge development in the Kanata North area. The report deals with the expected noise levels in the development and any required noise control measures.

The subject property is bounded by Terry Fox Drive to the west, natural environment areas to the south and west and by future residential development to the north.

## 3 ROADWAY NOISE

### 3.1 Road Traffic Data

The major source of road noise impacting the site is the traffic moving along Terry Fox Drive.

Terry Fox Drive is currently a two lane undivided roadway which will be widened to a 4 lane divided roadway (4 UAD), traffic parameters are taken from Table 1.7 of the guidelines. Table 3.1 summarizes the traffic and road parameters used in this report.

**TABLE 3.1 – TRAFFIC AND ROAD DATA SUMMARY**

	TERRY FOX DRIVE
Annual Average Daily Traffic (AADT)	35,000
Posted Speed Limit (km/hr)	80
% Medium Trucks	7%
% Heavy Trucks	5%
% Daytime Traffic	92%

### 3.2 Calculation Methods

Roadway noise is calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment.

A free field analysis was conducted of noise impacts on the proposed development without any of the proposed buildings to provide noise mitigation. Noise level limits as discussed in Section 2 are determined for the outdoor living area (OLA) and indoor criteria. In the STAMSON program noise levels are calculated separately for the future northbound and southbound lanes of the divided Terry Fox Drive and combined. In Table 3.2 the distance from the edge of the road right of way to the sound level limit is shown.

**TABLE 3.2 – NOISE CONTOUR OFFSETS**

FREE FIELD LIMIT	DISTANCE FROM (M)		
	NB LANE	SB LANE	ROW LIMIT
55 dBA OLA	225.00	237.50	209.5
60 dBA OLA	109.70	122.20	94.2
50 dBA Indoor (Night)	182.70	195.26	167.2
55 dBA Indoor (Day)	238.50	251.00	223.0
60 dBA Outdoor (Night)	38.45	50.95	23.0
65 dBA Indoor (Day)	54.20	66.70	38.7

Based on the above table for indoor noise evaluation, the daytime levels are further away from Terry Fox Drive than the nighttime levels for the same criterion, therefore only the daytime levels will be used in the evaluation. The noise levels are shown in noise contours on **Figure 1**.

## 2 BACKGROUND

### 2.1 Noise Sources

The study area is primarily subject to roadway noise from Terry Fox Drive, there are no collector roads in the site that would be considered noise sources. Aircraft noise from the Ottawa International Airport is not a factor as the airport is not in close proximity to the study area; there are no rail lines within 500 meters of the site.

### 2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic is taken from the City of Ottawa Environmental Noise Control Guidelines hereafter referred to as the guidelines. Noise levels are expressed in the form Leq (T) which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

#### 2.2.1 Outdoor sound level criterion

The recommended sound level for an outdoor living area (OLA) for the daytime period between 07:00 and 23:00 hours is 55 dBA Leq (16). The outdoor living area is located 3 metres from the building façade at the centre of the unit.

If the Leq sound level is less than or equal to the above criteria then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may either provide a warning clause to prospective purchasers or install physical attenuation. For sound levels greater than 5 dBA above the criteria control measures are required to reduce the noise levels.

#### 2.2.2 Indoor sound level criterion – ventilation and warning clause requirements

For the purposes of assessing indoor sound, the sound levels are calculated at the outside building face which allows for noise attenuation from normal house construction techniques. Similar to outdoor noise levels, the recommended indoor sound level limits, per Table 1.10 of the guidelines, measured at the exterior building face for road and rail traffic are:

- Bedrooms – 23:00 to 07:00 – 50 dBA Leq (8)
- Other areas – 07:00 to 23:00 – 55 dBA Leq (16)

No control measures are necessary if the outdoor sound level is less than or equal to 50 dBA Leq (8) for nighttime or 55 dBA Leq (16) for daytime.

If the outdoor sound levels are between 51 and 60 dBA Leq (8) during nighttime and/or 56 and 65 dBA Leq (16) during daytime, alternate means of ventilation are required as well as a warning clause. Alternate means of ventilation usually consists of a forced air heating system with the ducts sized for the future installation of central air conditioning.

If the outdoor sound level exceeds 60 dBA Leq (8) for nighttime and/or 65 dBA Leq (16) for daytime, central air conditioning is required.

For the purpose of assessing indoor sound levels at nighttime, the outdoor sound levels are observed at the plane of the bedroom window 4.5 metres above the ground.

#### 2.2.3 Indoor Sound Level Criterion – Building Components

If the roadway outdoor sound level exceeds 60 dBA Leq (8) nighttime and/or 65 dBA Leq (16) daytime, building components including windows, walls and doors must be reviewed to determine the acoustical performance required to meet indoor sound levels.

## 4 RESULTS

### 4.1 Indoor Sound Levels

The daytime indoor 55 dBA contour shown on **Figure 1** represents the limit in which a Type 'C' Warning Clause and forced air heating with provision for central air conditioning are required for the residential units. The 65 dBA daytime contour is the limit in which a Type 'D' warning clause, central air conditioning and an acoustical review/design of the building components are required. As noted in Section 3.2, the free field noise contours have not been adjusted to account for screening by the proposed buildings.

For the units which directly face Terry Fox Drive the daytime noise levels exceed 65 dBA requiring a Type "D" warning clause along with mandatory central air conditioning and a review/design of the building components. The location of the units requiring a Type "C" warning clause and ventilation requirements will be determined during the detailed design phase when the effect of building screening is taken into account.

#### Type 'C':

"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."

#### 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 City's and the Ministry of the Environment's noise criteria."

### 4.2 Outdoor Sound Levels

The outdoor 60 dBA contour on **Figure 1** represents the limit in which physical attenuation is required in the outdoor living areas of residential units. For units between the 60 dBA and 55 dBA contours, physical attenuation may not be required but should be considered as stated on Table 1.10 of the guidelines. A summary of the results for each roadway is as follows:

Based on the 60 dBA OLA noise contour on **Figure 1** a noise barrier will be required for the townhouse units on Blocks 61 and 63 flanking Terry Fox Drive. Due to the high level of noise generated by Terry Fox it may not be practical to build a noise barrier high enough to reduce to noise below 55a dBA, in this case a Type "B" warning clause may be required. Another noise barrier will likely be required on Block 56 as shown on **Figure 1**.

Due to the building configuration the remaining outdoor living areas will be shielded from the Terry Fox Drive noise. Should during detailed design an OLA noise level is determined to be above 55 dBA but below 60 dBA, a Type "A" warning clause could be used in lieu of a noise barrier.

Type 'A'

"Purchasers/tenants are advised that sound levels due to increasing Terry Fox Drive traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

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 Terry Fox Drive traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

## 5 CONCLUSION

This report outlines the impact of roadway noise on the Richardson Ridge Phase 4 development. The exact location of residential units requiring noise warning clauses, ventilation, air conditioning requirements, acoustical review/design of building components, and the location and size of noise barriers will be determined during the detailed design phase when site plans and grading plans are finalized.

Prepared by:



Lance Erion, P. Eng.  
Associate





— OUTDOOR NOISE  
CONTOUR

— INDOOR NOISE  
CONTOUR



Scale

NTS

Project Title

RICHARDSON RIDGE PHASE 4

Drawing Title

FREE FIELD NOISE CONTOURS

Sheet No.

FIGURE 1

# APPENDIX

STAMSON 5.0                      NORMAL REPORT                      Date: 08-09-2016 13:27:43  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 55OLA.te                      Time Period: Day/Night 16/8 hours  
Description: Terry Fox Drive 55 dBA OLA

Road data, segment # 1: Terry Fox N (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox N (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 : 225.00 / 225.00 m  
Receiver height : 1.50 / 4.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox S (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 : 237.50 / 237.50 m
Receiver height  :           1.50 / 4.50 m
Topography      :           1           (Flat/gentle slope; no barrier)
Reference angle  :           0.00

```

Results segment # 1: Terry Fox N (day)

Source height = 1.50 m

ROAD (0.00 + 52.18 + 0.00) = 52.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.16	0.00	-19.52	-1.46	0.00	0.00	0.00	52.18

Segment Leq : 52.18 dBA

Results segment # 2: Terry Fox S (day)

Source height = 1.50 m

ROAD (0.00 + 51.79 + 0.00) = 51.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.16	0.00	-19.91	-1.46	0.00	0.00	0.00	51.79

Segment Leq : 51.79 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: Terry Fox N (night)

Source height = 1.50 m

ROAD (0.00 + 45.79 + 0.00) = 45.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-18.47	-1.30	0.00	0.00	0.00	45.79

Segment Leq : 45.79 dBA

Results segment # 2: Terry Fox S (night)

---

Source height = 1.50 m

ROAD (0.00 + 45.42 + 0.00) = 45.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-18.83	-1.30	0.00	0.00	0.00	45.42

---

Segment Leq : 45.42 dBA

Total Leq All Segments: 48.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00  
(NIGHT): 48.62

STAMSON 5.0                      NORMAL REPORT                      Date: 08-09-2016 13:23:55  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 60OLA.te                      Time Period: Day/Night 16/8 hours  
Description: Terry Fox Drive 60 dBA OLA

Road data, segment # 1: Terry Fox N (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox N (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 : 109.70 / 109.70 m  
Receiver height : 1.50 / 4.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox S (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 : 122.20 / 122.20 m
Receiver height  :           1.50 / 4.50 m
Topography      :           1           (Flat/gentle slope; no barrier)
Reference angle  :           0.00

```

Results segment # 1: Terry Fox N (day)

Source height = 1.50 m

ROAD (0.00 + 57.36 + 0.00) = 57.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.16	0.00	-14.34	-1.46	0.00	0.00	0.00	57.36

Segment Leq : 57.36 dBA

Results segment # 2: Terry Fox S (day)

Source height = 1.50 m

ROAD (0.00 + 56.58 + 0.00) = 56.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.16	0.00	-15.12	-1.46	0.00	0.00	0.00	56.58

Segment Leq : 56.58 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Terry Fox N (night)

Source height = 1.50 m

ROAD (0.00 + 50.69 + 0.00) = 50.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-13.57	-1.30	0.00	0.00	0.00	50.69

Segment Leq : 50.69 dBA

Results segment # 2: Terry Fox S (night)

Source height = 1.50 m

ROAD (0.00 + 49.95 + 0.00) = 49.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-14.30	-1.30	0.00	0.00	0.00	49.95

Segment Leq : 49.95 dBA

Total Leq All Segments: 53.35 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00  
(NIGHT): 53.35



STAMSON 5.0                      NORMAL REPORT                      Date: 08-09-2016 13:46:16  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 50indnig.te                      Time Period: Day/Night 16/8 hours  
Description: Terry Fox Drive 50 dBA Indoor nighttime

Road data, segment # 1: Terry Fox N (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox N (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 : 182.70 / 182.70 m  
Receiver height : 2.50 / 4.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox S (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 : 195.20 / 195.20 m
Receiver height       :           2.50 / 4.50 m
Topography           :           1       (Flat/gentle slope; no barrier)
Reference angle       :           0.00

```

Results segment # 1: Terry Fox N (day)

Source height = 1.50 m

ROAD (0.00 + 54.05 + 0.00) = 54.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-17.70	-1.41	0.00	0.00	0.00	54.05

Segment Leq : 54.05 dBA

Results segment # 2: Terry Fox S (day)

Source height = 1.50 m

ROAD (0.00 + 53.58 + 0.00) = 53.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-18.17	-1.41	0.00	0.00	0.00	53.58

Segment Leq : 53.58 dBA

Total Leq All Segments: 56.83 dBA

Results segment # 1: Terry Fox N (night)

Source height = 1.50 m

ROAD (0.00 + 47.21 + 0.00) = 47.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-17.05	-1.30	0.00	0.00	0.00	47.21

Segment Leq : 47.21 dBA

Results segment # 2: Terry Fox S (night)

---

Source height = 1.50 m

ROAD (0.00 + 46.76 + 0.00) = 46.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-17.50	-1.30	0.00	0.00	0.00	46.76

---

Segment Leq : 46.76 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.83  
(NIGHT): 50.00

Filename: 55indoor.te                      Time Period: Day/Night 16/8 hours  
Description: Terry Fox Drive 55 dBA Indoor daytime

Road data, segment # 1: Terry Fox N (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox N (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 : 238.50 / 238.50 m  
Receiver height : 2.50 / 4.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox S (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 : 251.00 / 251.00 m
Receiver height       :          2.50 / 4.50 m
Topography           :          1          (Flat/gentle slope; no barrier)
Reference angle       :          0.00

```

Results segment # 1: Terry Fox N (day)

Source height = 1.50 m

ROAD (0.00 + 52.17 + 0.00) = 52.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-19.58	-1.41	0.00	0.00	0.00	52.17

Segment Leq : 52.17 dBA

Results segment # 2: Terry Fox S (day)

Source height = 1.50 m

ROAD (0.00 + 51.80 + 0.00) = 51.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-19.95	-1.41	0.00	0.00	0.00	51.80

Segment Leq : 51.80 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: Terry Fox N (night)

Source height = 1.50 m

ROAD (0.00 + 45.39 + 0.00) = 45.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-18.86	-1.30	0.00	0.00	0.00	45.39

Segment Leq : 45.39 dBA

Results segment # 2: Terry Fox S (night)

Source height = 1.50 m

ROAD (0.00 + 45.05 + 0.00) = 45.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-19.21	-1.30	0.00	0.00	0.00	45.05

Segment Leq : 45.05 dBA

Total Leq All Segments: 48.23 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00  
(NIGHT): 48.23

STAMSON 5.0                      NORMAL REPORT                      Date: 08-09-2016 13:55:38  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 60indnig.te                      Time Period: Day/Night 16/8 hours  
Description: Terry Fox Drive 60 dBA Indoor nighttime

Road data, segment # 1: Terry Fox N (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox N (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 : 38.45 / 38.45 m  
Receiver height : 2.50 / 4.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox S (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 : 50.95 / 50.95 m
Receiver height       :      2.50 / 4.50 m
Topography           :      1           (Flat/gentle slope; no barrier)
Reference angle       :      0.00

```

Results segment # 1: Terry Fox N (day)

Source height = 1.50 m

ROAD (0.00 + 65.09 + 0.00) = 65.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-6.66	-1.41	0.00	0.00	0.00	65.09

Segment Leq : 65.09 dBA

Results segment # 2: Terry Fox S (day)

Source height = 1.50 m

ROAD (0.00 + 63.09 + 0.00) = 63.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-8.66	-1.41	0.00	0.00	0.00	63.09

Segment Leq : 63.09 dBA

Total Leq All Segments: 67.21 dBA

Results segment # 1: Terry Fox N (night)

Source height = 1.50 m

ROAD (0.00 + 57.84 + 0.00) = 57.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-6.42	-1.30	0.00	0.00	0.00	57.84

Segment Leq : 57.84 dBA



Results segment # 2: Terry Fox S (night)

---

Source height = 1.50 m

ROAD (0.00 + 55.92 + 0.00) = 55.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-8.34	-1.30	0.00	0.00	0.00	55.92

---

Segment Leq : 55.92 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.21  
(NIGHT): 60.00

STAMSON 5.0                    NORMAL REPORT                    Date: 08-09-2016 13:41:41  
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 65Indoor.te                    Time Period: Day/Night 16/8 hours  
Description: Terry Fox Drive 65 dBA Indoor daytime

Road data, segment # 1: Terry Fox N (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox N (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 : 54.20 / 54.20 m  
Receiver height : 2.50 / 4.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Terry Fox S (day/night)

-----  
Car traffic volume : 14168/1232 veh/TimePeriod \*  
Medium truck volume : 1127/98 veh/TimePeriod \*  
Heavy truck volume : 805/70 veh/TimePeriod \*  
Posted speed limit : 80 km/h  
Road gradient : 1 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500  
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: Terry Fox S (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 : 66.70 / 66.70 m
Receiver height       :    2.50 / 4.50 m
Topography           :           1       (Flat/gentle slope; no barrier)
Reference angle       :           0.00

```

Results segment # 1: Terry Fox N (day)

Source height = 1.50 m

ROAD (0.00 + 62.66 + 0.00) = 62.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-9.09	-1.41	0.00	0.00	0.00	62.66

Segment Leq : 62.66 dBA

Results segment # 2: Terry Fox S (day)

Source height = 1.50 m

ROAD (0.00 + 61.19 + 0.00) = 61.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.63	73.16	0.00	-10.56	-1.41	0.00	0.00	0.00	61.19

Segment Leq : 61.19 dBA

Total Leq All Segments: 65.00 dBA

Results segment # 1: Terry Fox N (night)

Source height = 1.50 m

ROAD (0.00 + 55.50 + 0.00) = 55.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-8.76	-1.30	0.00	0.00	0.00	55.50

Segment Leq : 55.50 dBA

Results segment # 2: Terry Fox S (night)

Source height = 1.50 m

ROAD (0.00 + 54.08 + 0.00) = 54.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.56	0.00	-10.18	-1.30	0.00	0.00	0.00	54.08

Segment Leq : 54.08 dBA

Total Leq All Segments: 57.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00  
(NIGHT): 57.86