



## **Transportation Noise & Vibration Feasibility Assessment**

**East Flats**

**Ottawa, Ontario**

REPORT: GWE17-074 – Noise & Vibration

**Prepared For:**

Neil Malhotra  
**Claridge Homes**  
2001-210 Gladstone Avenue  
Ottawa, Ontario  
K2P 0Y6

**Prepared By:**

Joshua Foster, P.Eng., Partner  
Omar Daher, B.Eng., EIT, Junior Environmental Scientist  
Michael Lafortune, Environmental Scientist

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## EXECUTIVE SUMMARY

This document describes a transportation noise feasibility and ground vibration study performed for the proposed East Flats multi-building, mixed-use, development in Ottawa, Ontario. The development consists of five buildings referred to as buildings A, B, C, D, and E, which rise 45, 30, 25, 30, and 25 storeys, respectively. The major sources of surface transportation noise are Booth Street, the Sir John A. Macdonald Parkway, and light rail noise from the Confederation LRT line currently under construction. Figure 1 shows the site plan and surrounding context.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment and Climate Change (MOECC) 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 roadway classifications; and (iv) architectural drawings received from Urban Strategies Inc.

The results of the current study indicate that noise levels due to roadway traffic over the site will range from 43 to 71 dBA during the daytime period (07:00-23:00) and from 36 to 64 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 71 dBA) occurs on the west façade of Building B (Receptor 9 and 10), which is nearest and most exposed to Booth Street. Noise levels predicted due to surface transportation sources exceed the criteria listed in Section 4.2 for building components. Therefore, upgraded building components will be required where noise levels exceed 65 dBA. As per city of Ottawa requirements, detailed Sound Transmission Class (STC) calculations will be required to be completed prior to building permit application for each unit type.

Results of the calculations also indicate Buildings A, B, C and E will require central air conditioning (or a similar mechanical system), which will allow occupants to keep windows closed and maintain a comfortable living environment. Building D will require forced air heating and provision for central air conditioning (or similar mechanical systems). In addition to upgraded building components and ventilation requirements, warning clauses are likely to be required at some locations. STC requirements will be determined as part of a detailed noise study for site plan control.

Based on an offset distance of 57 metres between the Confederation Line LRT and the nearest building foundation, the estimated vibration levels at the nearest point of reception are expected to be 0.005

mm/s RMS (45.8 dBV) based on the United States Federal Transit Authority (US FTA) protocol. Details of the calculation are provided in Appendix B. Since predicted vibration levels are below the criterion of 0.10 mm/s RMS, no mitigation will be required. According to the US FTA's vibration assessment protocol, ground borne noise can be estimated by subtracting 35 dB from the velocity vibration level in dBV. Since measured vibration levels were found to be less than 0.10 mm/s peak partial velocity (ppv), ground borne noise levels are also expected to be below the ground borne noise criteria of 35 dB.

Although the dominant source of noise across the site at grade level is likely to be roadway and LRT traffic, stationary sources of noise surrounding the site may have some influence. This includes but is not limited to rooftop mechanical equipment associated with the adjacent residential buildings to the east, as well as the proposed Pimisi Transit Station to the south. No other major industrial land uses are within 300 m of the development. Stationary noise impacts on the development will be determined as part of a detailed noise study for site plan control.

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## **1. INTRODUCTION**

Gradient Wind Engineering Inc. (GWE) was retained by Claridge Homes to undertake a transportation noise and vibration feasibility assessment for a proposed multi-building, mixed-use, development to be located at the southeast corner of the intersection of Booth Street and Fleet Street in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a transportation noise and vibration assessment. GWE's scope of work involved assessing exterior and interior noise levels generated by local roadway and railway traffic, as well as vibration levels generated by railway traffic. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa<sup>1</sup> and the Ministry of the Environment and Climate Change (MOECC)<sup>2</sup> guidelines. Noise calculations were based on concept drawings received from Urban Strategies Inc., with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications, and future railway volumes obtained from the City of Ottawa.

## **2. TERMS OF REFERENCE**

The focus of this noise and vibration feasibility study is the proposed multi-building, mixed-use, development to be located on a parcel of land bounded by Booth Street to the west, Fleet Street to the north, Rue Lett to the east, and the canal leading to the Fleet Street pumping station to the south, in Ottawa, Ontario. The proposed development will feature five buildings, referred to as Buildings A, B, C, D, and E, which rise 45, 30, 25, 30, and 25 storeys, respectively. The development site is located northeast of the Pimisi Transit Station currently under construction. The major sources of roadway noise are Booth Street, the Sir John A. Macdonald Parkway and the future Confederation Line Light Rail Transit (LRT). The site is surrounded on all sides by mixed-use land, primarily residential and open space. Figure 1 illustrates a complete site plan with the surrounding context. Outdoor living areas are not defined at this stage of development.

## **3. OBJECTIVES**

The main objective of this work is to calculate the future noise and vibration levels on the study building produced by local transportation traffic, to ensure that interior noise levels and vibration levels do not

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<sup>1</sup> City of Ottawa Environmental Noise Control Guidelines, SS Wilson Associates, May 10, 2006

<sup>2</sup> Ministry of the Environment – Publication NPC-300

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exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG), as outlined in Section 4.2 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 ( $2 \times 10^{-5}$  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 Criteria for Roadway and LRT Traffic Noise**

For surface transportation, 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 impacts on buildings. Table 1 below describes the applicable indoor noise level limits for roadway sources, as specified in the City of Ottawa's ENCG.

**TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD AND RAIL) <sup>3</sup>**

Type of Space	Time Period	Leq (dBA)	
		Road	Rail
General offices, reception areas, <b>retail stores</b> , etc.	07:00 – 23:00	50	45
<b>Living/dining/den areas of residences</b> , hospitals, schools, nursing/retirement homes, day-care centres, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45	40
Sleeping quarters of hotels/motels	23:00 – 07:00	45	40
<b>Sleeping quarters of residences</b> , hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40	35

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise, while a standard closed window is capable of providing a minimum 20 dBA noise reduction<sup>4</sup>. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which normally triggers the need for central air conditioning (or similar systems). Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, building components will require higher levels of sound attenuation<sup>5</sup>. Due to the significantly lower frequency content of railway noise, the indoor criteria for rail is 5 dBA lower than that of Roadway noise, as can be seen in Table 1.

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

## 4.3 Roadway and LRT Noise Assessment

### 4.3.1 Theoretical Roadway and LRT Noise Predictions

Noise predictions were performed with the aid of the MOECC computerized noise assessment program, STAMSON 5.04, for road analysis. Noise receptors were strategically identified at 25 locations around the

<sup>3</sup> Adapted from ENCG 2016 – Part 1, Table 2.2c

<sup>4</sup> Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125

<sup>5</sup> MOECC, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

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study area, as illustrated in Figure 2. 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. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise of 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.
- Site topography is accounted for in height parameters.
- Confederation Line LRT modeled as 4-car SRT source in STAMSON
- Surrounding buildings are in some cases used as barrier when the line of sight between the source and receiver is broken by the buildings.

### 4.3.2 Roadway and LRT Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan<sup>6</sup>, which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

**TABLE 2: ROADWAY AND LRT TRAFFIC DATA**

Source	Roadway Class	Speed Limit (km/h)	Official Plan AADT
Sir John A. Macdonald Parkway	4-Lane Urban Arterial- Divided (4-UAD)	40	35,000
Booth Street	4-Lane Urban Arterial- Undivided (4-UAU)	80	30,000
Confederation Line LRT	4-Car SRT	50	540/60*

\* - Daytime/nighttime volumes

<sup>6</sup> City of Ottawa Transportation Master Plan, November 2013  
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## 4.4 Ground Vibration & Ground-borne Noise

Transit systems and heavy vehicles on roadways can produce perceptible levels of ground vibrations, especially when they are in close proximity to residential neighbourhoods or vibration sensitive buildings. Similar to sound waves in air, vibrations in solids are generated at a source, propagated through the medium, and intercepted by a receiver. In the case of ground vibrations, the medium can be uniform, or more often, a complex layering of soils and rock strata. Also, similar to sound waves in air, ground vibrations produce perceptible motions and regenerated noise known as ‘ground-borne noise’ when the vibrations encounter a hollow structure such as a building. Ground-borne noise and vibrations are generated when there is excitation of the ground, from a train for instance. Repetitive motion of the wheels on the track or rubber tires passing over an uneven surface causes vibrations to propagate through the soil. When they encounter a building, vibrations pass along the structure of the building beginning at the foundation and propagating to all floors. Air inside the building excited by the vibrating walls and floors represents regenerated airborne noise. Characteristics of the soil and the building are imparted to the noise, thereby creating a unique noise signature.

Human response to ground vibrations is dependent on the magnitude of the vibrations, which is measured by the root mean square (RMS) of the movement of a particle on a surface. Typical units of ground vibration measures are millimeters per second (mm/s), or inch per second (in/s). Since vibrations can vary over a wide range, it is also convenient to represent them in decibel units, or dBV. In North America, it is common practice to use the reference value of one micro-inch per second ( $\mu\text{in/s}$ ) to represent vibration levels for this purpose. The threshold level of human perception to vibrations is about 0.10 mm/s RMS or about 72 dBV. Although somewhat variable, the threshold of annoyance for continuous vibrations is 0.5 mm/s RMS or 85 dBV, five times higher than the perception threshold, whereas the threshold for cosmetic structural damage is (10 mm/s RMS or 112 dBV) at least one hundred times higher than the perception threshold level.

### 4.4.1 Vibration Criteria

In the United States, the Federal Transportation Authority (FTA) has set vibration criteria for sensitive land use next to transit corridors. Similar standards have been developed by a partnership between the MOECC and the Toronto Transit Commission<sup>7</sup>. These standards indicate that the appropriate criteria for residential

<sup>7</sup> MOEE/TTC Protocol for Noise and Vibration Assessment for the Proposed Yonge-Spadina Subway Loop, June 16, 1993

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buildings are 0.1 mm/s RMS for vibrations. For main line railways, a document titled *Guidelines for New Development in Proximity to Railway Operations*<sup>8</sup>, indicates that vibration conditions should not exceed 0.14 mm/s RMS averaged over a one second time period at the first floor and above of the proposed building. As the main vibration source is due to a main line LRT corridor which has frequent events, the 0.10 mm/s RMS (72 dBV) vibration criteria and 35 dBA ground borne noise criteria were adopted for this study.

#### **4.4.1 Theoretical Ground Vibration Prediction Procedure**

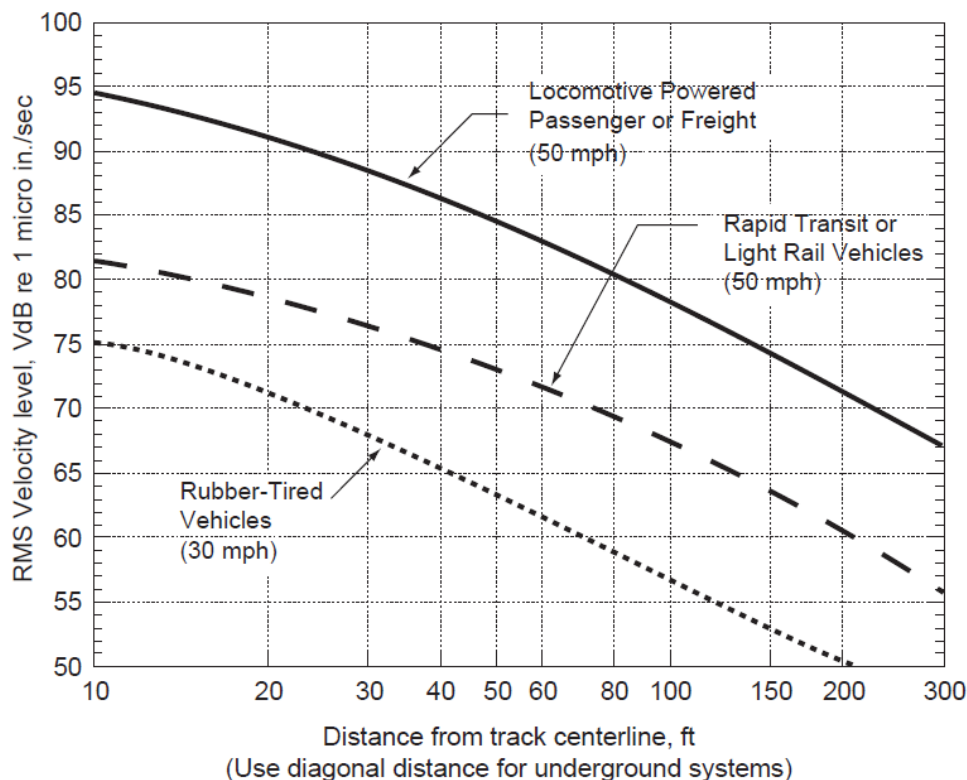
Potential vibration impacts of the existing LRT rail line were predicted using the FTA's Transit Noise and Vibration Impact Assessment<sup>9</sup> protocol. The FTA general vibration assessment is based on an upper bound generic set of curves that show vibration level attenuation with distance. These curves, illustrated in the figure below, are based on ground vibration measurements at various transit systems throughout North America. Vibration levels at points of reception are adjusted by various factors to incorporate known characteristics of the system being analyzed; such as operating speed of vehicles, conditions of the track, construction of the track and geology; as well as the structural type of the impacted building structures. Based on the setback distance of the closest building initial vibration levels were deduced from a curve for light rail trains at 50 miles per hour (mph) and applying an adjustment factor to account for an operational speed of 50 km/h (31 mph). Other factors considered; the track was assumed to be jointed with welds to minimize noise and vibration impacts of the new LRT.

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<sup>8</sup> Dialog and J.E. Coulter Associates Limited, prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada, May 2013

<sup>9</sup> C. E. Hanson; D. A. Towers; and L. D. Meister, Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

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**FTA GENERALIZED CURVES OF VIBRATION LEVELS VERSUS DISTANCE  
(ADOPTED FROM FIGURE 10-1, FTA TRANSIT NOISE AND VIBRATION  
IMPACT ASSESSMENT)**

## 5. RESULTS AND DISCUSSION

### 5.1 Roadway and LRT Noise Levels

The results of the roadway and LRT noise calculations are summarized in Table 3 below. Appendix A contains the complete set of input and output data from all STAMSON 5.04 calculations.

**TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY AND LRT TRAFFIC**

Receptor Number	Plane of Window Receptor Location	Combined Noise Level (dBA)*	
		Day	Night
1	Building A - West Façade - 45th floor	67	59
2	Building A - South Façade - 45th floor	69	61
3	Building A - East Façade - 45th floor	52	45
4	Building A - North Façade - 45th floor	43	36
5	West Façade - Podium - 1st Floor	71	63
6	South Façade - Podium - 1st Floor	67	59
7	Building B - North Façade - 1st floor	67	60
8	Building B - North Façade - 25th floor	69	61
9	Building B - West Façade - 1st floor	71	63
10	Building B - West Façade - 25th floor	71	64
11	Building B - South Façade - 25th floor	67	59
12	Building C - North Façade - 1st floor	59	51
13	Building C - North Façade - 25th floor	66	58
14	Building C - West Façade - 25th floor	62	54
15	Building C - South Façade - 25th floor	57	50
16	Building D - West Façade - 25th floor	55	47
17	Building D - South Façade - 1st floor	48	40
18	Building D - South Façade - 25th floor	48	40
19	Building E - North Façade - 1st floor	65	58
20	Building E - North Façade - 25th floor	66	58
21	Building E - West Façade - 1st floor	70	63
22	Building E - West Façade - 25th floor	70	63
23	Building E - South Façade - 1st floor	66	59
24	Building E - South Façade - 25th floor	66	59
25	Building E - East Façade - 1st floor	50	43

## 6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that noise levels due to roadway traffic over the site will range from 43 to 71 dBA during the daytime period (07:00-23:00) and from 36 to 64 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 71 dBA) occurs on the west façade of Building B (Receptor 9 and 10), which is nearest and most exposed to Booth Street. Noise levels predicted due to surface transportation sources exceed the criteria listed in Section 4.2 for building components. Therefore, upgraded building components will be required where noise levels exceed 65 dBA. As per city of Ottawa requirements, detailed STC calculations will be required to be completed prior to building permit application for each unit type.

Results of the calculations also indicate Building A, B, C, and E will require central air conditioning (or a similar mechanical system), which will allow occupants to keep windows closed and maintain a comfortable living environment. Building D will require forced air heating and provision for central air conditioning (or similar mechanical systems). In addition to upgraded building components and ventilation requirements, warning clauses are likely to be required at some locations. STC requirements will be determined as part of a detailed noise study for site plan control.

Based on an offset distance of 57 metres between the Confederation Line LRT and the nearest building foundation, the estimated vibration levels at the nearest point of reception are expected to be 0.005 mm/s RMS (45.8 dBV) based on the FTA protocol. Details of the calculation are provided in Appendix B. Since predicted vibration levels are below the criterion of 0.10 mm/s RMS, no mitigation will be required.

According to the United States Federal Transit Authority's vibration assessment protocol, ground borne noise can be estimated by subtracting 35 dB from the velocity vibration level in dBV. Since measured vibration levels were found to be less than 0.10 mm/s peak partial velocity (ppv), ground borne noise levels are also expected to be below the ground borne noise criteria of 35 dB.

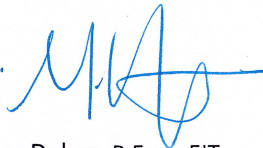
Although the dominant source of noise across the site at grade level is likely to be roadway and LRT traffic, stationary sources of noise surrounding the site may have some influence. This includes but is not limited to rooftop mechanical equipment associated with the adjacent residential buildings to the east, as well as the proposed Pimisi Transit Station to the south. No other major industrial land uses are within 300 m of

the development. Stationary noise impacts on the development will be determined as part of a detailed noise study for site plan control.

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,

**Gradient Wind Engineering Inc.**

P.P. 

Omar Daher, B.Eng., EIT  
Junior Environmental Scientist



Joshua Foster, P.Eng.  
Partner



Michael Lafortune  
Environmental Scientist  
GWE17-074 – Noise & Vibration



127 Walgreen Road  
Ottawa, Ontario  
(613) 836 0934

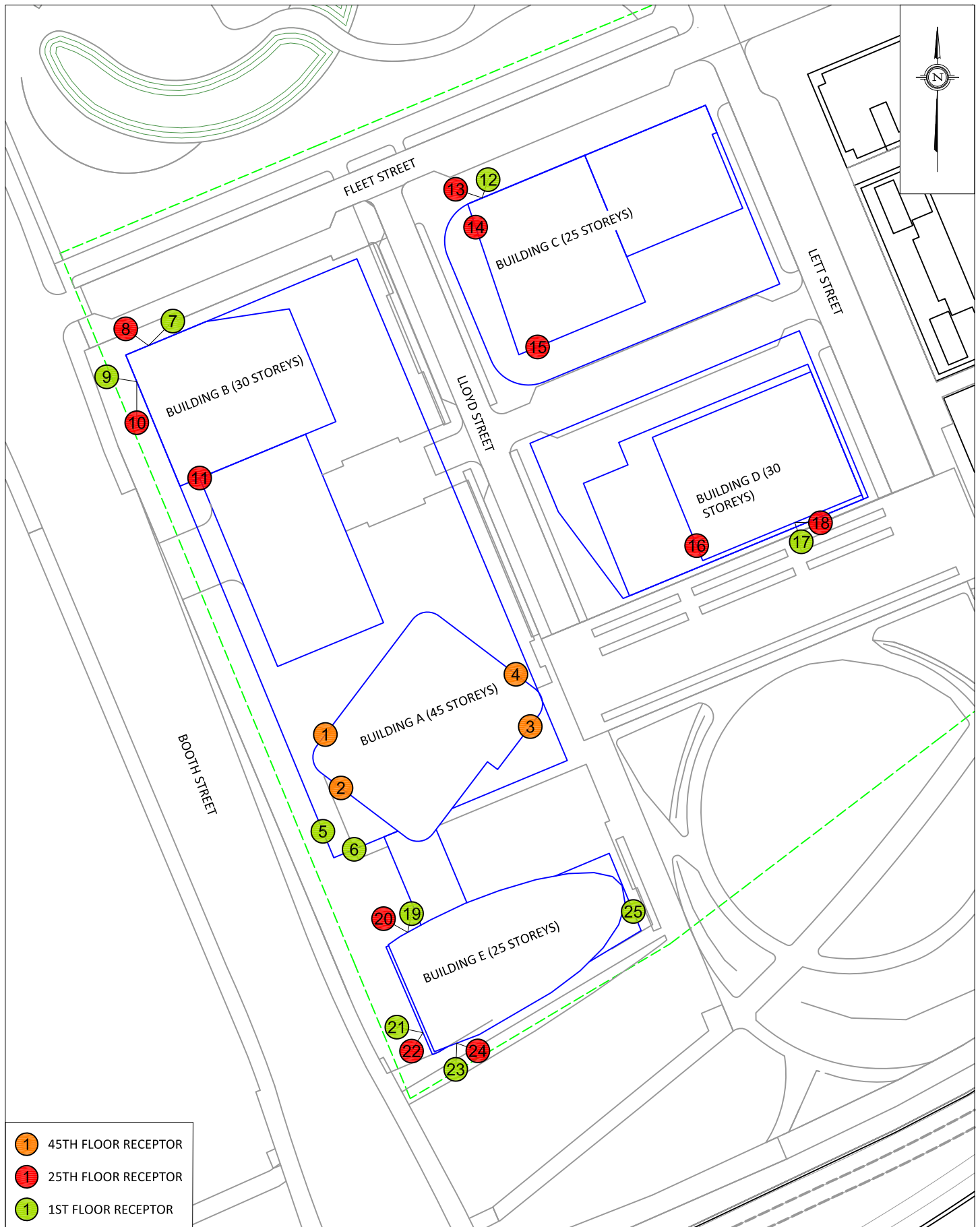
**GRADIENT WIND**  
ENGINEERING INC.

PROJECT		EAST FLATS, OTTAWA	
		TRANSPORTATION NOISE & VIBRATION FEASIBILITY ASSESSMENT	
SCALE	1:2000 (APPROX.)	DRAWING NO.	GWE17-074-1
DATE	JUNE 16, 2017	DRAWN BY	O.D.

DESCRIPTION

FIGURE 1:  
SITE PLAN AND SURROUNDING CONTEXT







## **APPENDIX A**

### **STAMSON 5.04 - INPUT AND OUTPUT DATA**

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:24:18  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -30.00 deg 75.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 25.00 / 25.00 m  
 Receiver height : 133.50 / 133.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 66.93 + 0.00) = 66.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	75	0.00	71.49	0.00	-2.22	-2.34	0.00	0.00	0.00	66.93

---

Segment Leq : 66.93 dBA

Total Leq All Segments: 66.93 dBA

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 59.33 + 0.00) = 59.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	75	0.00	63.89	0.00	-2.22	-2.34	0.00	0.00	0.00	59.33

---

Segment Leq : 59.33 dBA

Total Leq All Segments: 59.33 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.93  
(NIGHT): 59.33

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:26:43  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1    Angle2                      : -90.00 deg    60.00 deg  
 Wood depth                            : 0                      (No woods.)  
 No of house rows                      : 0 / 0  
 Surface                                : 2                      (Reflective ground surface)  
 Receiver source distance : 24.00 / 24.00 m  
 Receiver height                        : 133.50 / 133.50 m  
 Topography                            : 2                      (Flat/gentle slope; with barrier)  
 Barrier angle1                        : -90.00 deg    Angle2 : -84.00 deg  
 Barrier height                         : 75.00 m  
 Barrier receiver distance : 4.00 / 4.00 m  
 Source elevation                       : 0.00 m  
 Receiver elevation                      : 0.00 m  
 Barrier elevation                       : 0.00 m  
 Reference angle                        : 0.00

Results segment # 1: Booth (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	!	133.50	!	111.50	!	111.50

ROAD (0.00 + 54.68 + 68.48) = 68.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-84	0.00	71.49	0.00	-2.04	-14.77	0.00	0.00	-2.48	52.19*
-90	-84	0.00	71.49	0.00	-2.04	-14.77	0.00	0.00	0.00	54.68
-84	60	0.00	71.49	0.00	-2.04	-0.97	0.00	0.00	0.00	68.48

\* Bright Zone !

Segment Leq : 68.66 dBA

Total Leq All Segments: 68.66 dBA

Results segment # 1: Booth (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	133.50	111.50	111.50

ROAD (0.00 + 47.08 + 60.88) = 61.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-84	0.00	63.89	0.00	-2.04	-14.77	0.00	0.00	-2.48	44.60*
-90	-84	0.00	63.89	0.00	-2.04	-14.77	0.00	0.00	0.00	47.08
-84	60	0.00	63.89	0.00	-2.04	-0.97	0.00	0.00	0.00	60.88

\* Bright Zone !

Segment Leq : 61.06 dBA

Total Leq All Segments: 61.06 dBA

RT/Custom data, segment # 1: LRT 1 (day/night)

-----  
1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

-----  
Angle1 Angle2 : -28.00 deg -7.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 112.00 / 112.00 m  
Receiver height : 133.50 / 133.50 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -28.00 deg Angle2 : -7.00 deg  
Barrier height : 75.00 m  
Barrier receiver distance : 55.00 / 55.00 m  
Source elevation : 52.00 m  
Receiver elevation : 55.00 m  
Barrier elevation : 55.00 m  
Reference angle : 0.00

RT/Custom data, segment # 2: LRT 2 (day/night)

-----  
1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

-----  
Angle1 Angle2 : 24.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 112.00 / 112.00 m  
Receiver height : 133.50 / 133.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

---

Results segment # 1: LRT 1 (day)

---

Source height = 0.50 m

Barrier height for grazing incidence

---

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
0.50	!	133.50	!	66.71	!	121.71

---

RT/Custom (0.00 + 29.89 + 0.00) = 29.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-28	-7	0.00	60.51	-8.73	-9.33	0.00	0.00	-12.57	29.89

---

Segment Leq : 29.89 dBA

Results segment # 2: LRT 2 (day)

---

Source height = 0.50 m

RT/Custom (0.00 + 47.43 + 0.00) = 47.43 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
24	90	0.00	60.51	-8.73	-4.36	0.00	0.00	0.00	47.43

---

Segment Leq : 47.43 dBA

Total Leq All Segments: 47.51 dBA

Results segment # 1: LRT 1 (night)

Source height = 0.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.50	133.50	66.71	121.71

RT/Custom (0.00 + 23.35 + 0.00) = 23.35 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-28	-7	0.00	53.98	-8.73	-9.33	0.00	0.00	-12.57	23.35

Segment Leq : 23.35 dBA

Results segment # 2: LRT 2 (night)

Source height = 0.50 m

RT/Custom (0.00 + 40.89 + 0.00) = 40.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
24	90	0.00	53.98	-8.73	-4.36	0.00	0.00	0.00	40.89

Segment Leq : 40.89 dBA

Total Leq All Segments: 40.97 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.69  
(NIGHT): 61.10



STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:29:48  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg -30.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 63.00 / 63.00 m  
 Receiver height : 133.50 / 133.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -90.00 deg Angle2 : -34.00 deg  
 Barrier height : 75.00 m  
 Barrier receiver distance : 42.00 / 42.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Booth (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	133.50	45.50	45.50

ROAD (0.00 + 45.45 + 48.73) = 50.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-34	0.00	71.49	0.00	-6.23	-5.07	0.00	0.00	-14.74	45.45
-34	-30	0.00	71.49	0.00	-6.23	-16.53	0.00	0.00	0.00	48.73

Segment Leq : 50.40 dBA

Total Leq All Segments: 50.40 dBA

Results segment # 1: Booth (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	133.50	45.50	45.50

ROAD (0.00 + 37.85 + 41.13) = 42.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-34	0.00	63.89	0.00	-6.23	-5.07	0.00	0.00	-14.74	37.85
-34	-30	0.00	63.89	0.00	-6.23	-16.53	0.00	0.00	0.00	41.13

Segment Leq : 42.80 dBA

Total Leq All Segments: 42.80 dBA

RT/Custom data, segment # 1: LRT (day/night)

1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

Angle1	Angle2	: -53.00 deg	13.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	2	(Reflective ground surface)
Receiver source distance	:	107.00 / 107.00 m	
Receiver height	:	133.50 / 133.50 m	
Topography	:	2	(Flat/gentle slope; with barrier)
Barrier angle1	:	-5.00 deg	Angle2 : 13.00 deg
Barrier height	:	75.00 m	
Barrier receiver distance	:	46.00 / 46.00 m	
Source elevation	:	52.00 m	
Receiver elevation	:	55.00 m	
Barrier elevation	:	55.00 m	
Reference angle	:	0.00	

Results segment # 1: LRT (day)

Source height = 0.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.50	133.50	75.03	130.03

RT/Custom (46.24 + 41.98 + 0.00) = 47.62 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-53	-5	0.00	60.51	-8.53	-5.74	0.00	0.00	0.00	46.24
-5	13	0.00	60.51	-8.53	-10.00	0.00	0.00	-5.00	36.98*
-5	13	0.00	60.51	-8.53	-10.00	0.00	0.00	0.00	41.98

\* Bright Zone !

Segment Leq : 47.62 dBA

Total Leq All Segments: 47.62 dBA

Results segment # 1: LRT (night)

Source height = 0.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.50	133.50	75.03	130.03

RT/Custom (39.71 + 35.45 + 0.00) = 41.09 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-53	-5	0.00	53.98	-8.53	-5.74	0.00	0.00	0.00	39.71
-5	13	0.00	53.98	-8.53	-10.00	0.00	0.00	-5.00	30.45*
-5	13	0.00	53.98	-8.53	-10.00	0.00	0.00	0.00	35.45

\* Bright Zone !

Segment Leq : 41.09 dBA

Total Leq All Segments: 41.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 52.24  
(NIGHT) : 45.04



STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:30:27  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4.te                      Time Period: Day/Night 16/8 hours  
 Description:

RT/Custom data, segment # 1: LRT (day/night)

-----  
 1 - 4-car SRT:

Traffic volume        :     540/60        veh/TimePeriod  
 Speed                :     50 km/h

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

-----  
 Angle1    Angle2                : -47.00 deg    -24.00 deg  
 Wood depth                      :        0        (No woods.)  
 No of house rows                :        0 / 0  
 Surface                         :        2        (Reflective ground surface)  
 Receiver source distance        : 118.00 / 118.00 m  
 Receiver height                 : 133.50 / 133.50 m  
 Topography                      :        1        (Flat/gentle slope; no barrier)  
 Reference angle                 :     0.00

Results segment # 1: LRT (day)

-----  
 Source height = 0.50 m

RT/Custom (0.00 + 42.62 + 0.00) = 42.62 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	-24	0.00	60.51	-8.96	-8.94	0.00	0.00	0.00	42.62

-----  
 Segment Leq : 42.62 dBA

Total Leq All Segments: 42.62 dBA

Results segment # 1: LRT (night)

-----  
 Source height = 0.50 m

RT/Custom (0.00 + 36.09 + 0.00) = 36.09 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-47	-24	0.00	53.98	-8.96	-8.94	0.00	0.00	0.00	36.09

-----  
 Segment Leq : 36.09 dBA

Total Leq All Segments: 36.09 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 42.62  
 (NIGHT): 36.09

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:32:56  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 18.00 / 18.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 70.70 + 0.00) = 70.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.49	0.00	-0.79	0.00	0.00	0.00	0.00	70.70

---

Segment Leq : 70.70 dBA

Total Leq All Segments: 70.70 dBA

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 63.10 + 0.00) = 63.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.89	0.00	-0.79	0.00	0.00	0.00	0.00	63.10

---

Segment Leq : 63.10 dBA

Total Leq All Segments: 63.10 dBA



RT/Custom data, segment # 1: LRT (day/night)

1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

Angle1 Angle2 : 21.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 106.00 / 106.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Results segment # 1: LRT (day)

Source height = 0.50 m

RT/Custom (0.00 + 47.86 + 0.00) = 47.86 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
21	90	0.00	60.51	-8.49	-4.16	0.00	0.00	0.00	47.86

Segment Leq : 47.86 dBA

Total Leq All Segments: 47.86 dBA

Results segment # 1: LRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 41.33 + 0.00) = 41.33 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
21	90	0.00	53.98	-8.49	-4.16	0.00	0.00	0.00	41.33

Segment Leq : 41.33 dBA

Total Leq All Segments: 41.33 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.72  
(NIGHT): 63.13

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:34:06  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -86.00 deg 0.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 22.00 / 22.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 66.62 + 0.00) = 66.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	0	0.00	71.49	0.00	-1.66	-3.21	0.00	0.00	0.00	66.62

---

Segment Leq : 66.62 dBA

Total Leq All Segments: 66.62 dBA

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 59.02 + 0.00) = 59.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-86	0	0.00	63.89	0.00	-1.66	-3.21	0.00	0.00	0.00	59.02

---

Segment Leq : 59.02 dBA

Total Leq All Segments: 59.02 dBA

RT/Custom data, segment # 1: LRT (day/night)

1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

Angle1 Angle2 : 25.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 100.00 / 100.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Results segment # 1: LRT (day)

Source height = 0.50 m

RT/Custom (0.00 + 47.85 + 0.00) = 47.85 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
25	90	0.00	60.51	-8.24	-4.42	0.00	0.00	0.00	47.85

Segment Leq : 47.85 dBA

Total Leq All Segments: 47.85 dBA

Results segment # 1: LRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 41.32 + 0.00) = 41.32 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
25	90	0.00	53.98	-8.24	-4.42	0.00	0.00	0.00	41.32

Segment Leq : 41.32 dBA

Total Leq All Segments: 41.32 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.68  
(NIGHT): 59.09

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:35:07  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : 0.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 24.00 / 24.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

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

---

Car traffic volume : 28336/2464 veh/TimePeriod \*  
 Medium truck volume : 2254/196 veh/TimePeriod \*  
 Heavy truck volume : 1610/140 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): 35000  
 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: John A (day/night)

---

Angle1 Angle2 : -90.00 deg 32.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 95.00 / 95.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Road data, segment # 3: John A 2 (day/night)

---

Car traffic volume : 28336/2464 veh/TimePeriod \*  
 Medium truck volume : 2254/196 veh/TimePeriod \*  
 Heavy truck volume : 1610/140 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): 35000  
 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 # 3: John A 2 (day/night)

---

Angle1 Angle2 : 50.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 72.00 / 72.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 66.44 + 0.00) = 66.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	71.49	0.00	-2.04	-3.01	0.00	0.00	0.00	66.44

---

Segment Leq : 66.44 dBA

Results segment # 2: John A (day)

---

Source height = 1.50 m

ROAD (0.00 + 57.60 + 0.00) = 57.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	32	0.66	73.68	0.00	-13.31	-2.76	0.00	0.00	0.00	57.60

---

Segment Leq : 57.60 dBA

Results segment # 3: John A 2 (day)

---

Source height = 1.50 m

ROAD (0.00 + 52.50 + 0.00) = 52.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	90	0.66	73.68	0.00	-11.31	-9.87	0.00	0.00	0.00	52.50

---

Segment Leq : 52.50 dBA

Total Leq All Segments: 67.13 dBA



---

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 58.84 + 0.00) = 58.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	63.89	0.00	-2.04	-3.01	0.00	0.00	0.00	58.84

---

Segment Leq : 58.84 dBA

Results segment # 2: John A (night)

---

Source height = 1.50 m

ROAD (0.00 + 50.01 + 0.00) = 50.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	32	0.66	66.08	0.00	-13.31	-2.76	0.00	0.00	0.00	50.01

---

Segment Leq : 50.01 dBA

Results segment # 3: John A 2 (night)

---

Source height = 1.50 m

ROAD (0.00 + 44.90 + 0.00) = 44.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	90	0.66	66.08	0.00	-11.31	-9.87	0.00	0.00	0.00	44.90

---

Segment Leq : 44.90 dBA

Total Leq All Segments: 59.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.13  
(NIGHT): 59.53

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:35:47  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : 0.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 24.00 / 24.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

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

---

Car traffic volume : 28336/2464 veh/TimePeriod \*  
 Medium truck volume : 2254/196 veh/TimePeriod \*  
 Heavy truck volume : 1610/140 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): 35000  
 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: John A (day/night)

---

Angle1 Angle2 : -90.00 deg 32.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 95.00 / 95.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Road data, segment # 3: John A 2 (day/night)

---

Car traffic volume : 28336/2464 veh/TimePeriod \*  
 Medium truck volume : 2254/196 veh/TimePeriod \*  
 Heavy truck volume : 1610/140 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): 35000  
 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 # 3: John A 2 (day/night)

---

Angle1 Angle2 : 50.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 72.00 / 72.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 66.44 + 0.00) = 66.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	71.49	0.00	-2.04	-3.01	0.00	0.00	0.00	66.44

---

Segment Leq : 66.44 dBA

Results segment # 2: John A (day)

---

Source height = 1.50 m

ROAD (0.00 + 63.97 + 0.00) = 63.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	32	0.00	73.68	0.00	-8.02	-1.69	0.00	0.00	0.00	63.97

---

Segment Leq : 63.97 dBA

Results segment # 3: John A 2 (day)

---

Source height = 1.50 m

ROAD (0.00 + 60.33 + 0.00) = 60.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	90	0.00	73.68	0.00	-6.81	-6.53	0.00	0.00	0.00	60.33

---

Segment Leq : 60.33 dBA

Total Leq All Segments: 69.02 dBA

---

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 58.84 + 0.00) = 58.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	63.89	0.00	-2.04	-3.01	0.00	0.00	0.00	58.84

---

Segment Leq : 58.84 dBA

Results segment # 2: John A (night)

---

Source height = 1.50 m

ROAD (0.00 + 56.37 + 0.00) = 56.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	32	0.00	66.08	0.00	-8.02	-1.69	0.00	0.00	0.00	56.37

---

Segment Leq : 56.37 dBA

Results segment # 3: John A 2 (night)

---

Source height = 1.50 m

ROAD (0.00 + 52.73 + 0.00) = 52.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
50	90	0.00	66.08	0.00	-6.81	-6.53	0.00	0.00	0.00	52.73

---

Segment Leq : 52.73 dBA

Total Leq All Segments: 61.42 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.02  
(NIGHT): 61.42

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:38:39  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 19.00 / 19.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

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

```

-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    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): 35000
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: John A (day/night)

```

-----
Angle1 Angle2      : -90.00 deg  14.00 deg
Wood depth          :      0      (No woods.)
No of house rows    :      0 / 0
Surface            :      1      (Absorptive ground surface)
Receiver source distance : 99.00 / 99.00 m
Receiver height     : 1.50 / 1.50 m
Topography          :      1      (Flat/gentle slope; no barrier)
Reference angle     :      0.00
  
```

Results segment # 1: Booth (day)

Source height = 1.50 m

ROAD (0.00 + 70.46 + 0.00) = 70.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.49	0.00	-1.03	0.00	0.00	0.00	0.00	70.46

Segment Leq : 70.46 dBA



---

Results segment # 2: John A (day)

---

Source height = 1.50 m

ROAD (0.00 + 56.45 + 0.00) = 56.45 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	14	0.66	73.68	0.00	-13.60	-3.62	0.00	0.00	0.00	56.45

---

Segment Leq : 56.45 dBA

Total Leq All Segments: 70.63 dBA

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 62.87 + 0.00) = 62.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.89	0.00	-1.03	0.00	0.00	0.00	0.00	62.87

---

Segment Leq : 62.87 dBA

Results segment # 2: John A (night)

---

Source height = 1.50 m

ROAD (0.00 + 48.86 + 0.00) = 48.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	14	0.66	66.08	0.00	-13.60	-3.62	0.00	0.00	0.00	48.86

---

Segment Leq : 48.86 dBA

Total Leq All Segments: 63.04 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.63  
(NIGHT): 63.04

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:38:56  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 19.00 / 19.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

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

```

-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    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): 35000
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: John A (day/night)

```

-----
Angle1 Angle2      : -90.00 deg  14.00 deg
Wood depth          : 0          (No woods.)
No of house rows    : 0 / 0
Surface            : 1          (Absorptive ground surface)
Receiver source distance : 99.00 / 99.00 m
Receiver height     : 73.50 / 73.50 m
Topography          : 1          (Flat/gentle slope; no barrier)
Reference angle     : 0.00
  
```

# Results segment # 1: Booth (day)

Source height = 1.50 m

ROAD (0.00 + 70.46 + 0.00) = 70.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.49	0.00	-1.03	0.00	0.00	0.00	0.00	70.46

Segment Leq : 70.46 dBA

# Results segment # 2: John A (day)

Source height = 1.50 m

ROAD (0.00 + 63.10 + 0.00) = 63.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	14	0.00	73.68	0.00	-8.20	-2.38	0.00	0.00	0.00	63.10

Segment Leq : 63.10 dBA

Total Leq All Segments: 71.19 dBA

---

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 62.87 + 0.00) = 62.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.89	0.00	-1.03	0.00	0.00	0.00	0.00	62.87

---

Segment Leq : 62.87 dBA

Results segment # 2: John A (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	14	0.00	66.08	0.00	-8.20	-2.38	0.00	0.00	0.00	55.50

---

Segment Leq : 55.50 dBA

Total Leq All Segments: 63.60 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.19  
(NIGHT): 63.60

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:41:27  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 0.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 23.00 / 23.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 66.62 + 0.00) = 66.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	71.49	0.00	-1.86	-3.01	0.00	0.00	0.00	66.62

---

Segment Leq : 66.62 dBA

Total Leq All Segments: 66.62 dBA

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 59.03 + 0.00) = 59.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	63.89	0.00	-1.86	-3.01	0.00	0.00	0.00	59.03

---

Segment Leq : 59.03 dBA

Total Leq All Segments: 59.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.62  
(NIGHT): 59.03

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:42:33  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r12.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : 0.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 95.00 / 95.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

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

---

Car traffic volume : 28336/2464 veh/TimePeriod \*  
 Medium truck volume : 2254/196 veh/TimePeriod \*  
 Heavy truck volume : 1610/140 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): 35000  
 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: John A (day/night)

---

Angle1 Angle2 : -90.00 deg -5.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 110.00 / 110.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00



---

Road data, segment # 3: John A 2 (day/night)

---

Car traffic volume : 28336/2464 veh/TimePeriod \*

Medium truck volume : 2254/196 veh/TimePeriod \*

Heavy truck volume : 1610/140 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): 35000

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 # 3: John A 2 (day/night)

---

Angle1 Angle2 : 13.00 deg 90.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 108.00 / 108.00 m

Receiver height : 1.50 / 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 53.72 + 0.00) = 53.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	71.49	0.00	-13.31	-4.47	0.00	0.00	0.00	53.72

---

Segment Leq : 53.72 dBA

Results segment # 2: John A (day)

---

Source height = 1.50 m

ROAD (0.00 + 54.49 + 0.00) = 54.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-5	0.66	73.68	0.00	-14.36	-4.82	0.00	0.00	0.00	54.49

---

Segment Leq : 54.49 dBA

Results segment # 3: John A 2 (day)

---

Source height = 1.50 m

ROAD (0.00 + 54.00 + 0.00) = 54.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
13	90	0.66	73.68	0.00	-14.23	-5.44	0.00	0.00	0.00	54.00

---

Segment Leq : 54.00 dBA

Total Leq All Segments: 58.85 dBA

---

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 46.12 + 0.00) = 46.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	63.89	0.00	-13.31	-4.47	0.00	0.00	0.00	46.12

---

Segment Leq : 46.12 dBA

Results segment # 2: John A (night)

---

Source height = 1.50 m

ROAD (0.00 + 46.90 + 0.00) = 46.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-5	0.66	66.08	0.00	-14.36	-4.82	0.00	0.00	0.00	46.90

---

Segment Leq : 46.90 dBA

Results segment # 3: John A 2 (night)

---

Source height = 1.50 m

ROAD (0.00 + 46.41 + 0.00) = 46.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
13	90	0.66	66.08	0.00	-14.23	-5.44	0.00	0.00	0.00	46.41

---

Segment Leq : 46.41 dBA

Total Leq All Segments: 51.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.85  
(NIGHT): 51.26

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:42:54  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r13.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : 0.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 95.00 / 95.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

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

---

Car traffic volume : 28336/2464 veh/TimePeriod \*  
 Medium truck volume : 2254/196 veh/TimePeriod \*  
 Heavy truck volume : 1610/140 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): 35000  
 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: John A (day/night)

---

Angle1 Angle2 : -90.00 deg -5.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 110.00 / 110.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Road data, segment # 3: John A 2 (day/night)

---

Car traffic volume : 28336/2464 veh/TimePeriod \*  
 Medium truck volume : 2254/196 veh/TimePeriod \*  
 Heavy truck volume : 1610/140 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): 35000  
 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 # 3: John A 2 (day/night)

---

Angle1 Angle2 : 13.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 108.00 / 108.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 60.46 + 0.00) = 60.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	71.49	0.00	-8.02	-3.01	0.00	0.00	0.00	60.46

---

Segment Leq : 60.46 dBA

---

Results segment # 2: John A (day)

---

Source height = 1.50 m

ROAD (0.00 + 61.76 + 0.00) = 61.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-5	0.00	73.68	0.00	-8.65	-3.26	0.00	0.00	0.00	61.76

---

Segment Leq : 61.76 dBA

Results segment # 3: John A 2 (day)

---

Source height = 1.50 m

ROAD (0.00 + 61.41 + 0.00) = 61.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
13	90	0.00	73.68	0.00	-8.57	-3.69	0.00	0.00	0.00	61.41

---

Segment Leq : 61.41 dBA

Total Leq All Segments: 66.02 dBA

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 52.87 + 0.00) = 52.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	63.89	0.00	-8.02	-3.01	0.00	0.00	0.00	52.87

---

Segment Leq : 52.87 dBA

---

Results segment # 2: John A (night)

---

Source height = 1.50 m

ROAD (0.00 + 54.17 + 0.00) = 54.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-5	0.00	66.08	0.00	-8.65	-3.26	0.00	0.00	0.00	54.17

---

Segment Leq : 54.17 dBA

Results segment # 3: John A 2 (night)

---

Source height = 1.50 m

ROAD (0.00 + 53.82 + 0.00) = 53.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
13	90	0.00	66.08	0.00	-8.57	-3.69	0.00	0.00	0.00	53.82

---

Segment Leq : 53.82 dBA

Total Leq All Segments: 58.43 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.02  
(NIGHT): 58.43



STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:45:16  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r14.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1    Angle2                      : -74.00 deg    -31.00 deg  
 Wood depth                            : 0                      (No woods.)  
 No of house rows                      : 0 / 0  
 Surface                                : 2                      (Reflective ground surface)  
 Receiver source distance : 92.00 / 92.00 m  
 Receiver height                        : 73.50 / 73.50 m  
 Topography                            : 2                      (Flat/gentle slope; with barrier)  
 Barrier angle1                        : -74.00 deg    Angle2 : -58.00 deg  
 Barrier height                         : 135.00 m  
 Barrier receiver distance : 70.00 / 70.00 m  
 Source elevation                       : 0.00 m  
 Receiver elevation                     : 0.00 m  
 Barrier elevation                      : 0.00 m  
 Reference angle                        : 0.00

---

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

---

Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth 2 (day/night)

---

Angle1 Angle2 : -31.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 92.00 / 92.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -31.00 deg Angle2 : 4.00 deg  
 Barrier height : 90.00 m  
 Barrier receiver distance : 73.00 / 73.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Booth (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	73.50	18.71	18.71

ROAD (0.00 + 33.10 + 55.37) = 55.40 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	-58	0.00	71.49	0.00	-7.88	-10.51	0.00	0.00	-20.00	33.10
-58	-31	0.00	71.49	0.00	-7.88	-8.24	0.00	0.00	0.00	55.37

Segment Leq : 55.40 dBA

Results segment # 2: Booth 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	73.50	16.37	16.37

ROAD (0.00 + 36.50 + 60.41) = 60.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-31	4	0.00	71.49	0.00	-7.88	-7.11	0.00	0.00	-20.00	36.50
4	90	0.00	71.49	0.00	-7.88	-3.21	0.00	0.00	0.00	60.41

Segment Leq : 60.42 dBA

Total Leq All Segments: 61.61 dBA

Results segment # 1: Booth (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	73.50	18.71	18.71

ROAD (0.00 + 25.51 + 47.78) = 47.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-74	-58	0.00	63.89	0.00	-7.88	-10.51	0.00	0.00	-20.00	25.51
-58	-31	0.00	63.89	0.00	-7.88	-8.24	0.00	0.00	0.00	47.78

Segment Leq : 47.80 dBA

Results segment # 2: Booth 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	73.50	16.37	16.37

ROAD (0.00 + 28.90 + 52.81) = 52.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-31	4	0.00	63.89	0.00	-7.88	-7.11	0.00	0.00	-20.00	28.90
4	90	0.00	63.89	0.00	-7.88	-3.21	0.00	0.00	0.00	52.81

Segment Leq : 52.83 dBA

Total Leq All Segments: 54.02 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.61  
(NIGHT): 54.02

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:46:30  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r15.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1    Angle2 : -66.00 deg    0.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 94.00 / 94.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -66.00 deg    Angle2 : -42.00 deg  
 Barrier height : 135.00 m  
 Barrier receiver distance : 72.00 / 72.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Booth (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	73.50	18.35	18.35

ROAD (0.00 + 34.77 + 57.20) = 57.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-66	-42	0.00	71.49	0.00	-7.97	-8.75	0.00	0.00	-20.00	34.77
-42	0	0.00	71.49	0.00	-7.97	-6.32	0.00	0.00	0.00	57.20

Segment Leq : 57.22 dBA

Total Leq All Segments: 57.22 dBA

Results segment # 1: Booth (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	73.50	18.35	18.35

ROAD (0.00 + 27.17 + 49.60) = 49.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-66	-42	0.00	63.89	0.00	-7.97	-8.75	0.00	0.00	-20.00	27.17
-42	0	0.00	63.89	0.00	-7.97	-6.32	0.00	0.00	0.00	49.60

Segment Leq : 49.63 dBA

Total Leq All Segments: 49.63 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 57.22  
(NIGHT) : 49.63

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:48:40  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r16.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -55.00 deg -25.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 107.00 / 107.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -55.00 deg Angle2 : -29.00 deg  
 Barrier height : 75.00 m  
 Barrier receiver distance : 86.00 / 86.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

---

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

---

Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth 2 (day/night)

---

Angle1 Angle2 : -25.00 deg 30.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 107.00 / 107.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -25.00 deg Angle2 : 9.00 deg  
 Barrier height : 135.00 m  
 Barrier receiver distance : 85.00 / 85.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00



---

Road data, segment # 3: Booth 3 (day/night)

---

Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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 # 3: Booth 3 (day/night)

---

Angle1 Angle2 : 30.00 deg 53.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 107.00 / 107.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 30.00 deg Angle2 : 53.00 deg  
 Barrier height : 90.00 m  
 Barrier receiver distance : 89.00 / 89.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Booth (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	73.50	15.63	15.63

ROAD (0.00 + 34.55 + 46.43) = 46.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	-29	0.00	71.49	0.00	-8.53	-8.40	0.00	0.00	-20.00	34.55
-29	-25	0.00	71.49	0.00	-8.53	-16.53	0.00	0.00	0.00	46.43

Segment Leq : 46.70 dBA

Results segment # 2: Booth 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	73.50	16.30	16.30

ROAD (0.00 + 35.72 + 53.63) = 53.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	9	0.00	71.49	0.00	-8.53	-7.24	0.00	0.00	-20.00	35.72
9	30	0.00	71.49	0.00	-8.53	-9.33	0.00	0.00	0.00	53.63

Segment Leq : 53.70 dBA

Results segment # 3: Booth 3 (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	73.50	13.61	13.61

ROAD (0.00 + 34.02 + 0.00) = 34.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
30	53	0.00	71.49	0.00	-8.53	-8.94	0.00	0.00	-20.00	34.02

Segment Leq : 34.02 dBA

Total Leq All Segments: 54.53 dBA

Results segment # 1: Booth (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	73.50	15.63	15.63

ROAD (0.00 + 26.96 + 38.83) = 39.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-55	-29	0.00	63.89	0.00	-8.53	-8.40	0.00	0.00	-20.00	26.96
-29	-25	0.00	63.89	0.00	-8.53	-16.53	0.00	0.00	0.00	38.83

Segment Leq : 39.10 dBA

Results segment # 2: Booth 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	73.50	16.30	16.30

ROAD (0.00 + 28.12 + 46.03) = 46.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	9	0.00	63.89	0.00	-8.53	-7.24	0.00	0.00	-20.00	28.12
9	30	0.00	63.89	0.00	-8.53	-9.33	0.00	0.00	0.00	46.03

Segment Leq : 46.10 dBA

Results segment # 3: Booth 3 (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	73.50	13.61	13.61

ROAD (0.00 + 26.43 + 0.00) = 26.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
30	53	0.00	63.89	0.00	-8.53	-8.94	0.00	0.00	-20.00	26.43

Segment Leq : 26.43 dBA

Total Leq All Segments: 46.93 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.53  
(NIGHT): 46.93

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:52:16  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r17.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -43.00 deg -17.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 127.00 / 127.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -43.00 deg Angle2 : -23.00 deg  
 Barrier height : 75.00 m  
 Barrier receiver distance : 106.00 / 106.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

---

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

---

Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth 2 (day/night)

---

Angle1 Angle2 : -17.00 deg 0.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 127.00 / 127.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -17.00 deg Angle2 : 0.00 deg  
 Barrier height : 135.00 m  
 Barrier receiver distance : 105.00 / 105.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Booth (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 + 32.67 + 47.44) = 47.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-43	-23	0.00	71.49	0.00	-9.28	-9.54	0.00	0.00	-20.00	32.67
-23	-17	0.00	71.49	0.00	-9.28	-14.77	0.00	0.00	0.00	47.44

Segment Leq : 47.58 dBA

Results segment # 2: Booth 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 + 31.96 + 0.00) = 31.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	0	0.00	71.49	0.00	-9.28	-10.25	0.00	0.00	-20.00	31.96

Segment Leq : 31.96 dBA

Total Leq All Segments: 47.70 dBA

Results segment # 1: Booth (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 + 25.07 + 39.85) = 39.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-43	-23	0.00	63.89	0.00	-9.28	-9.54	0.00	0.00	-20.00	25.07
-23	-17	0.00	63.89	0.00	-9.28	-14.77	0.00	0.00	0.00	39.85

Segment Leq : 39.99 dBA

Results segment # 2: Booth 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 + 24.37 + 0.00) = 24.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	0	0.00	63.89	0.00	-9.28	-10.25	0.00	0.00	-20.00	24.37

Segment Leq : 24.37 dBA

Total Leq All Segments: 40.11 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 47.70  
(NIGHT): 40.11



STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:52:32  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r18.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -43.00 deg -17.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 127.00 / 127.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : -43.00 deg Angle2 : -23.00 deg  
 Barrier height : 75.00 m  
 Barrier receiver distance : 106.00 / 106.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

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

```
-----
Car traffic volume   : 24288/2112   veh/TimePeriod  *
Medium truck volume  : 1932/168    veh/TimePeriod  *
Heavy truck volume   : 1380/120    veh/TimePeriod  *
Posted speed limit   : 50 km/h
Road gradient        : 0 %
Road pavement        : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 30000
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: Booth 2 (day/night)

```
-----
Angle1   Angle2      : -17.00 deg   0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface     : 2 (Reflective ground surface)
Receiver source distance : 127.00 / 127.00 m
Receiver height : 73.50 / 73.50 m
Topography    : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -17.00 deg   Angle2 : 0.00 deg
Barrier height : 135.00 m
Barrier receiver distance : 105.00 / 105.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00
```

Results segment # 1: Booth (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	73.50	13.40	13.40

ROAD (0.00 + 32.67 + 47.44) = 47.58 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-43	-23	0.00	71.49	0.00	-9.28	-9.54	0.00	0.00	-20.00	32.67
-23	-17	0.00	71.49	0.00	-9.28	-14.77	0.00	0.00	0.00	47.44

Segment Leq : 47.58 dBA

Results segment # 2: Booth 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	73.50	13.97	13.97

ROAD (0.00 + 31.96 + 0.00) = 31.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	0	0.00	71.49	0.00	-9.28	-10.25	0.00	0.00	-20.00	31.96

Segment Leq : 31.96 dBA

Total Leq All Segments: 47.70 dBA

Results segment # 1: Booth (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	73.50	13.40	13.40

ROAD (0.00 + 25.07 + 39.85) = 39.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-43	-23	0.00	63.89	0.00	-9.28	-9.54	0.00	0.00	-20.00	25.07
-23	-17	0.00	63.89	0.00	-9.28	-14.77	0.00	0.00	0.00	39.85

Segment Leq : 39.99 dBA

Results segment # 2: Booth 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	73.50	13.97	13.97

ROAD (0.00 + 24.37 + 0.00) = 24.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-17	0	0.00	63.89	0.00	-9.28	-10.25	0.00	0.00	-20.00	24.37

Segment Leq : 24.37 dBA

Total Leq All Segments: 40.11 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 47.70  
(NIGHT): 40.11

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:56:00  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r19.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1    Angle2                      : 0.00 deg    85.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 25.00 / 25.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 68.00 deg    Angle2 : 85.00 deg  
 Barrier height : 6.00 m  
 Barrier receiver distance : 8.00 / 8.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

---

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

---

Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth 2 (day/night)

---

Angle1 Angle2 : 85.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 25.00 / 25.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 85.00 deg Angle2 : 90.00 deg  
 Barrier height : 135.00 m  
 Barrier receiver distance : 3.00 / 3.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Booth (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 (65.04 + 45.76 + 0.00) = 65.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	71.49	0.00	-2.22	-4.23	0.00	0.00	0.00	65.04
68	85	0.00	71.49	0.00	-2.22	-10.25	0.00	0.00	-13.27	45.76

Segment Leq : 65.10 dBA

Results segment # 2: Booth 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 + 34.62 + 0.00) = 34.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	90	0.00	71.49	0.00	-2.22	-15.56	0.00	0.00	-19.09	34.62

Segment Leq : 34.62 dBA

Total Leq All Segments: 65.10 dBA

Results segment # 1: Booth (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 (57.45 + 38.16 + 0.00) = 57.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	63.89	0.00	-2.22	-4.23	0.00	0.00	0.00	57.45
68	85	0.00	63.89	0.00	-2.22	-10.25	0.00	0.00	-13.27	38.16

Segment Leq : 57.50 dBA

Results segment # 2: Booth 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 + 27.02 + 0.00) = 27.02 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	90	0.00	63.89	0.00	-2.22	-15.56	0.00	0.00	-19.09	27.02

Segment Leq : 27.02 dBA

Total Leq All Segments: 57.50 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.10  
(NIGHT): 57.50



STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:56:22  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r20.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1    Angle2                      : 0.00 deg    85.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 25.00 / 25.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 68.00 deg    Angle2 : 85.00 deg  
 Barrier height : 6.00 m  
 Barrier receiver distance : 8.00 / 8.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

---

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

---

Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth 2 (day/night)

---

Angle1 Angle2 : 85.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 25.00 / 25.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 2 (Flat/gentle slope; with barrier)  
 Barrier angle1 : 85.00 deg Angle2 : 90.00 deg  
 Barrier height : 135.00 m  
 Barrier receiver distance : 3.00 / 3.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Results segment # 1: Booth (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	73.50	50.46	50.46

ROAD (65.04 + 59.02 + 0.00) = 66.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	71.49	0.00	-2.22	-4.23	0.00	0.00	0.00	65.04
68	85	0.00	71.49	0.00	-2.22	-10.25	0.00	0.00	0.00	59.02*
68	85	0.00	71.49	0.00	-2.22	-10.25	0.00	0.00	0.00	59.02

\* Bright Zone !

Segment Leq : 66.01 dBA

Results segment # 2: Booth 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	73.50	64.86	64.86

ROAD (0.00 + 35.38 + 0.00) = 35.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	90	0.00	71.49	0.00	-2.22	-15.56	0.00	0.00	-18.33	35.38

Segment Leq : 35.38 dBA

Total Leq All Segments: 66.01 dBA

Results segment # 1: Booth (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	73.50	50.46	50.46

ROAD (57.45 + 51.43 + 0.00) = 58.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	68	0.00	63.89	0.00	-2.22	-4.23	0.00	0.00	0.00	57.45
68	85	0.00	63.89	0.00	-2.22	-10.25	0.00	0.00	0.00	51.43*
68	85	0.00	63.89	0.00	-2.22	-10.25	0.00	0.00	0.00	51.43

\* Bright Zone !

Segment Leq : 58.42 dBA

Results segment # 2: Booth 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	!	73.50	!	64.86	!	64.86

ROAD (0.00 + 27.79 + 0.00) = 27.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	90	0.00	63.89	0.00	-2.22	-15.56	0.00	0.00	-18.33	27.79

Segment Leq : 27.79 dBA

Total Leq All Segments: 58.42 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.01  
(NIGHT): 58.42

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:57:09  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r21.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 20.00 / 20.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

Results segment # 1: Booth (day)

-----  
 Source height = 1.50 m

ROAD (0.00 + 70.24 + 0.00) = 70.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.49	0.00	-1.25	0.00	0.00	0.00	0.00	70.24

-----  
 Segment Leq : 70.24 dBA

Total Leq All Segments: 70.24 dBA

Results segment # 1: Booth (night)

Source height = 1.50 m

ROAD (0.00 + 62.64 + 0.00) = 62.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.89	0.00	-1.25	0.00	0.00	0.00	0.00	62.64

Segment Leq : 62.64 dBA

Total Leq All Segments: 62.64 dBA

RT/Custom data, segment # 1: LRT (day/night)

1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod

Speed : 50 km/h

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

Angle1	Angle2	: 36.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	2	(Reflective ground surface)
Receiver source distance	:	62.00 / 62.00	m
Receiver height	:	1.50 / 1.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Results segment # 1: LRT (day)

Source height = 0.50 m

RT/Custom (0.00 + 49.12 + 0.00) = 49.12 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
36	90	0.00	60.51	-6.16	-5.23	0.00	0.00	0.00	49.12

Segment Leq : 49.12 dBA

Total Leq All Segments: 49.12 dBA

Results segment # 1: LRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 42.59 + 0.00) = 42.59 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
36	90	0.00	53.98	-6.16	-5.23	0.00	0.00	0.00	42.59

Segment Leq : 42.59 dBA

Total Leq All Segments: 42.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.27  
(NIGHT): 62.68

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:57:34  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r22.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 20.00 / 20.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

Results segment # 1: Booth (day)

-----  
 Source height = 1.50 m

ROAD (0.00 + 70.24 + 0.00) = 70.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.49	0.00	-1.25	0.00	0.00	0.00	0.00	70.24

-----  
 Segment Leq : 70.24 dBA

Total Leq All Segments: 70.24 dBA



Results segment # 1: Booth (night)

Source height = 1.50 m

ROAD (0.00 + 62.64 + 0.00) = 62.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.89	0.00	-1.25	0.00	0.00	0.00	0.00	62.64

Segment Leq : 62.64 dBA

Total Leq All Segments: 62.64 dBA

RT/Custom data, segment # 1: LRT (day/night)

1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod

Speed : 50 km/h

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

Angle1	Angle2	: 36.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	2	(Reflective ground surface)
Receiver source distance	:	62.00 / 62.00	m
Receiver height	:	73.50 / 73.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Results segment # 1: LRT (day)

Source height = 0.50 m

RT/Custom (0.00 + 49.12 + 0.00) = 49.12 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
36	90	0.00	60.51	-6.16	-5.23	0.00	0.00	0.00	49.12

Segment Leq : 49.12 dBA

Total Leq All Segments: 49.12 dBA

Results segment # 1: LRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 42.59 + 0.00) = 42.59 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
36	90	0.00	53.98	-6.16	-5.23	0.00	0.00	0.00	42.59

Segment Leq : 42.59 dBA

Total Leq All Segments: 42.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.27  
(NIGHT): 62.68

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 08:58:38  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r23.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 0.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 25.00 / 25.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

---

Results segment # 1: Booth (day)

---

Source height = 1.50 m

ROAD (0.00 + 66.26 + 0.00) = 66.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	71.49	0.00	-2.22	-3.01	0.00	0.00	0.00	66.26

---

Segment Leq : 66.26 dBA

Total Leq All Segments: 66.26 dBA

Results segment # 1: Booth (night)

---

Source height = 1.50 m

ROAD (0.00 + 58.66 + 0.00) = 58.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	63.89	0.00	-2.22	-3.01	0.00	0.00	0.00	58.66

---

Segment Leq : 58.66 dBA

Total Leq All Segments: 58.66 dBA

RT/Custom data, segment # 1: LRT (day/night)

-----  
1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

-----  
Angle1 Angle2 : -76.00 deg -14.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 62.00 / 62.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

RT/Custom data, segment # 2: LRT 2 (day/night)

-----  
1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

-----  
Angle1 Angle2 : 42.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 62.00 / 62.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Results segment # 1: LRT (day)

Source height = 0.50 m

RT/Custom (0.00 + 49.72 + 0.00) = 49.72 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-76	-14	0.00	60.51	-6.16	-4.63	0.00	0.00	0.00	49.72

-76	-14	0.00	60.51	-6.16	-4.63	0.00	0.00	0.00	49.72
-----	-----	------	-------	-------	-------	------	------	------	-------

Segment Leq : 49.72 dBA

Results segment # 2: LRT 2 (day)

Source height = 0.50 m

RT/Custom (0.00 + 48.61 + 0.00) = 48.61 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
42	90	0.00	60.51	-6.16	-5.74	0.00	0.00	0.00	48.61

42	90	0.00	60.51	-6.16	-5.74	0.00	0.00	0.00	48.61
----	----	------	-------	-------	-------	------	------	------	-------

Segment Leq : 48.61 dBA

Total Leq All Segments: 52.21 dBA

Results segment # 1: LRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 43.19 + 0.00) = 43.19 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-76	-14	0.00	53.98	-6.16	-4.63	0.00	0.00	0.00	43.19

Segment Leq : 43.19 dBA

Results segment # 2: LRT 2 (night)

Source height = 0.50 m

RT/Custom (0.00 + 42.08 + 0.00) = 42.08 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
42	90	0.00	53.98	-6.16	-5.74	0.00	0.00	0.00	42.08

Segment Leq : 42.08 dBA

Total Leq All Segments: 45.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.43  
(NIGHT): 58.87

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 09:00:20  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r24.te                      Time Period: Day/Night 16/8 hours  
 Description:

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

-----  
 Car traffic volume : 24288/2112 veh/TimePeriod \*  
 Medium truck volume : 1932/168 veh/TimePeriod \*  
 Heavy truck volume : 1380/120 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 30000  
 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: Booth (day/night)

-----  
 Angle1 Angle2 : -90.00 deg 0.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 2 (Reflective ground surface)  
 Receiver source distance : 25.00 / 25.00 m  
 Receiver height : 73.50 / 73.50 m  
 Topography : 1 (Flat/gentle slope; no barrier)  
 Reference angle : 0.00

Results segment # 1: Booth (day)

-----  
 Source height = 1.50 m

ROAD (0.00 + 66.26 + 0.00) = 66.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	71.49	0.00	-2.22	-3.01	0.00	0.00	0.00	66.26

-----  
 Segment Leq : 66.26 dBA

Total Leq All Segments: 66.26 dBA



Results segment # 1: Booth (night)

Source height = 1.50 m

ROAD (0.00 + 58.66 + 0.00) = 58.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	63.89	0.00	-2.22	-3.01	0.00	0.00	0.00	58.66

Segment Leq : 58.66 dBA

Total Leq All Segments: 58.66 dBA

RT/Custom data, segment # 1: LRT (day/night)

1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

Angle1 Angle2 : -76.00 deg -14.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 62.00 / 62.00 m  
Receiver height : 73.50 / 73.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

RT/Custom data, segment # 2: LRT 2 (day/night)

1 - 4-car SRT:

Traffic volume : 540/60 veh/TimePeriod  
Speed : 50 km/h

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

Angle1 Angle2 : 42.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 2 (Reflective ground surface)  
Receiver source distance : 62.00 / 62.00 m  
Receiver height : 73.50 / 73.50 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00



Results segment # 1: LRT (day)

Source height = 0.50 m

RT/Custom (0.00 + 49.72 + 0.00) = 49.72 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

-76	-14	0.00	60.51	-6.16	-4.63	0.00	0.00	0.00	49.72
-----	-----	------	-------	-------	-------	------	------	------	-------

Segment Leq : 49.72 dBA

Results segment # 2: LRT 2 (day)

Source height = 0.50 m

RT/Custom (0.00 + 48.61 + 0.00) = 48.61 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	--------

42	90	0.00	60.51	-6.16	-5.74	0.00	0.00	0.00	48.61
----	----	------	-------	-------	-------	------	------	------	-------

Segment Leq : 48.61 dBA

Total Leq All Segments: 52.21 dBA

Results segment # 1: LRT (night)

Source height = 0.50 m

RT/Custom (0.00 + 43.19 + 0.00) = 43.19 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-76	-14	0.00	53.98	-6.16	-4.63	0.00	0.00	0.00	43.19

Segment Leq : 43.19 dBA

Results segment # 2: LRT 2 (night)

Source height = 0.50 m

RT/Custom (0.00 + 42.08 + 0.00) = 42.08 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
42	90	0.00	53.98	-6.16	-5.74	0.00	0.00	0.00	42.08

Segment Leq : 42.08 dBA

Total Leq All Segments: 45.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.43

(NIGHT): 58.87

STAMSON 5.0                      NORMAL REPORT                      Date: 09-06-2017 09:01:00  
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r25.te                      Time Period: Day/Night 16/8 hours  
 Description:

RT/Custom data, segment # 1: LRT (day/night)

-----  
 1 - 4-car SRT:

Traffic volume       :     540/60       veh/TimePeriod  
 Speed                :     50 km/h

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

-----  
 Angle1   Angle2               : -67.00 deg    0.00 deg  
 Wood depth                :       0        (No woods.)  
 No of house rows         :       0 / 0  
 Surface                    :       2        (Reflective ground surface)  
 Receiver source distance : 66.00 / 66.00 m  
 Receiver height          :   1.50 / 1.50 m  
 Topography                :       1        (Flat/gentle slope; no barrier)  
 Reference angle          :     0.00

Results segment # 1: LRT (day)

-----  
 Source height = 0.50 m

RT/Custom (0.00 + 49.79 + 0.00) = 49.79 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	0	0.00	60.51	-6.43	-4.29	0.00	0.00	0.00	49.79

-----  
 Segment Leq : 49.79 dBA

Total Leq All Segments: 49.79 dBA

Results segment # 1: LRT (night)

-----  
 Source height = 0.50 m

RT/Custom (0.00 + 43.26 + 0.00) = 43.26 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-67	0	0.00	53.98	-6.43	-4.29	0.00	0.00	0.00	43.26

-----  
 Segment Leq : 43.26 dBA

Total Leq All Segments: 43.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.79  
 (NIGHT): 43.26

---

## **APPENDIX B**

### **FTA VIBRATION CALCULATIONS**

Possible Vibration Impacts on East Flats  
Predicted using FTA General Assessment

Train Speed

50 km/h

31 mph

	Distance from C/L	
	(m)	(ft)
LRT	60.0	196.8

Vibration

From FTA Manual Fig 10-1

Vibration Levels at distance from track      61      dBV re 1 micro in/sec

Adjustment Factors FTA Table 10-1

Speed reference 50 mph	-4	Speed Limit of 50 km/h (31 mph)
Vehicle Parameters	0	Assume Soft primary suspension, Wheels run true
Track Condition	0	none
Track Treatments	0	none
Type of Transit Structure	-5	Station
Efficient vibration Propagation	0	Propagation through rock
Vibration Levels at Fdn	52	0.010
Coupling to Building Foundation	-10	Large Massonry on Piles
Floor to Floor Attenuation	-2.0	Ground Floor Ocupied
Amplification of Floor and Walls	6	
Total Vibration Level	45.84783	dBV or      0.005 mm/s
Noise Level in dBA	10.84783	dBA

**Table 10-1. Adjustment Factors for Generalized Predictions of  
Ground-Borne Vibration and Noise**

Factors Affecting Vibration Source				
Source Factor	Adjustment to Propagation Curve			Comment
Speed		Reference Speed		Vibration level is approximately proportional to $20 \cdot \log(\text{speed}/\text{speed}_{\text{ref}})$ . Sometimes the variation with speed has been observed to be as low as 10 to 15 $\log(\text{speed}/\text{speed}_{\text{ref}})$ .
	Vehicle Speed	50 mph	30 mph	
	60 mph	+1.6 dB	+6.0 dB	
	50 mph	0.0 dB	+4.4 dB	
	40 mph	-1.9 dB	+2.5 dB	
	30 mph	-4.4 dB	0.0 dB	
	20 mph	-8.0 dB	-3.5 dB	
Vehicle Parameters (not additive, apply greatest value only)				
Vehicle with stiff primary suspension	+8 dB			Transit vehicles with stiff primary suspensions have been shown to create high vibration levels. Include this adjustment when the primary suspension has a vertical resonance frequency greater than 15 Hz.
Resilient Wheels	0 dB			Resilient wheels do not generally affect ground-borne vibration except at frequencies greater than about 80 Hz.
Worn Wheels or Wheels with Flats	+10 dB			Wheel flats or wheels that are unevenly worn can cause high vibration levels. This can be prevented with wheel truing and slip-slide detectors to prevent the wheels from sliding on the track.
Track Conditions (not additive, apply greatest value only)				
Worn or Corrugated Track	+10 dB			If both the wheels and the track are worn, only one adjustment should be used. Corrugated track is a common problem. Mill scale on new rail can cause higher vibration levels until the rail has been in use for some time.
Special Trackwork	+10 dB			Wheel impacts at special trackwork will significantly increase vibration levels. The increase will be less at greater distances from the track.
Jointed Track or Uneven Road Surfaces	+5 dB			Jointed track can cause higher vibration levels than welded track. Rough roads or expansion joints are sources of increased vibration for rubber-tire transit.
Track Treatments (not additive, apply greatest value only)				
Floating Slab Trackbed	-15 dB			The reduction achieved with a floating slab trackbed is strongly dependent on the frequency characteristics of the vibration.
Ballast Mats	-10 dB			Actual reduction is strongly dependent on frequency of vibration.
High-Resilience Fasteners	-5 dB			Slab track with track fasteners that are very compliant in the vertical direction can reduce vibration at frequencies greater than 40 Hz.

**Table 10-1. Adjustment Factors for Generalized Predictions of  
Ground-Borne Vibration and Noise (Continued)**

Factors Affecting Vibration Path				
Path Factor	Adjustment to Propagation Curve			Comment
Resiliently Supported Ties	-10 dB			Resiliently supported tie systems have been found to provide very effective control of low-frequency vibration.
Track Configuration (not additive, apply greatest value only)				
Type of Transit Structure	Relative to at-grade tie & ballast: Elevated structure -10 dB Open cut 0 dB			The general rule is the heavier the structure, the lower the vibration levels. Putting the track in cut may reduce the vibration levels slightly. Rock-based subways generate higher-frequency vibration.
	Relative to bored subway tunnel in soil: Station -5 dB Cut and cover -3 dB Rock-based -15 dB			
Ground-borne Propagation Effects				
Geologic conditions that promote efficient vibration propagation	Efficient propagation in soil +10 dB			Refer to the text for guidance on identifying areas where efficient propagation is possible.
	Propagation in rock layer	Dist.	Adjust.	The positive adjustment accounts for the lower attenuation of vibration in rock compared to soil. It is generally more difficult to excite vibrations in rock than in soil at the source.
		50 ft	+2 dB	
		100 ft	+4 dB	
		150 ft	+6 dB	
200 ft	+9 dB			
Coupling to building foundation	Wood Frame Houses -5 dB			The general rule is the heavier the building construction, the greater the coupling loss.
	1-2 Story Masonry -7 dB			
	3-4 Story Masonry -10 dB			
	Large Masonry on Piles -10 dB			
	Large Masonry on Spread Footings -13 dB			
	Foundation in Rock 0 dB			
Factors Affecting Vibration Receiver				
Receiver Factor	Adjustment to Propagation Curve			Comment
Floor-to-floor attenuation	1 to 5 floors above grade: -2 dB/floor 5 to 10 floors above grade: -1 dB/floor			This factor accounts for dispersion and attenuation of the vibration energy as it propagates through a building.
Amplification due to resonances of floors, walls, and ceilings	+6 dB			
Conversion to Ground-borne Noise				
Noise Level in dBA	Peak frequency of ground vibration:			Use these adjustments to estimate the A-weighted sound level given the average vibration velocity level of the room surfaces. See text for guidelines for selecting low, typical or high frequency characteristics. Use the high-frequency adjustment for subway tunnels in rock or if the dominant frequencies of the vibration spectrum are known to be 60 Hz or greater.
	Low frequency (<30 Hz): -50 dB			
	Typical (peak 30 to 60 Hz): -35 dB			
	High frequency (>60 Hz): -20 dB			