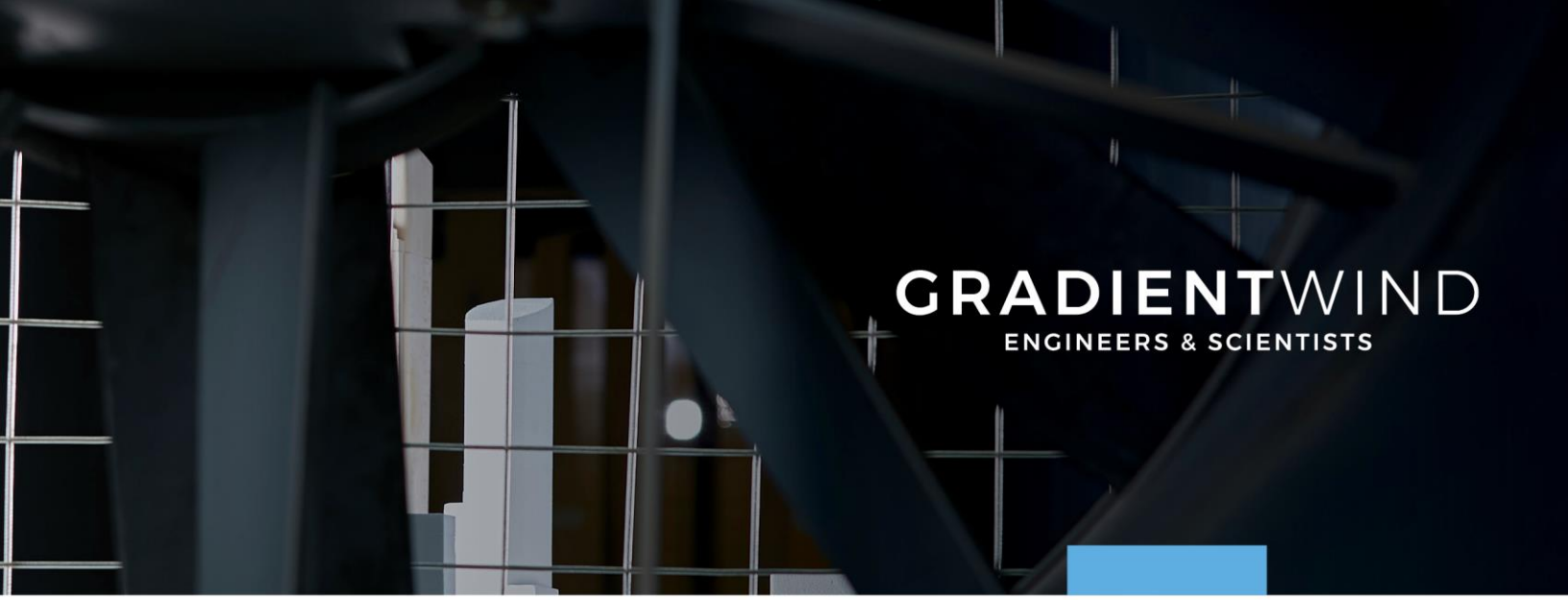

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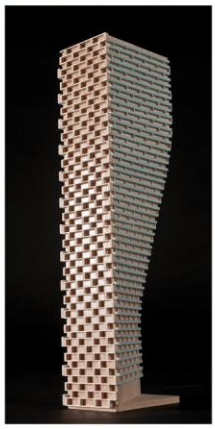
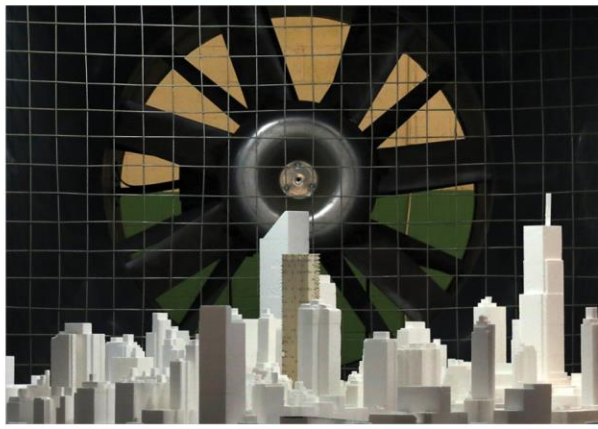
ENGINEERS & SCIENTISTS

Environmental Noise & Vibration Assessment

City Park Redevelopment Phase 2
Ottawa, Ontario

REPORT: GWE15-068 – Noise & Vibration Phase 2





November 13, 2018

PREPARED FOR

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EXECUTIVE SUMMARY

This document describes an environmental noise & vibration assessment performed for Phase 2 of a proposed mixed-use multi-phase redevelopment located at 2280 City Park Drive in Ottawa, Ontario. The master concept plan contains three adjacent residential towers with individual podia, Phase 2 is the center of these towers. The east tower (Phase 1) is currently under construction. The major sources of noise in the area are Highway 174 and City Park Drive, with potential influence from the future light rail transit (LRT) line currently under construction.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment (MECP) 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 Hobin Architects, dated October 31, 2018.

The results of the current analysis indicate that noise levels will range between 54 and 75 dBA during the daytime period (07:00-23:00) and between 47 and 68 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 75 dBA) occur along the south façade of Tower B, as well as the podium, which is nearest and most exposed to Highway 174. Building components on Phase 2 with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated on Figure 3. It is anticipated that Phase 3 to 5 will also require upgraded building components but will be confirmed when these phases progress to detailed design.

Results of the calculations also indicate that Phase 2 will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. It is anticipated that Phase 3 to 5 will also require air conditioning. A Warning Clause will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels calculated using STAMSON at the podium terrace (Receptor 15), exceed the ENCG criteria for outdoor living areas. Gradient Wind investigated mitigation options using the software program *Predictor-Lima*, which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This model is more suited to calculate rooftop terrace noise levels, which is

outside the intended functionality of STAMPSON[1]. Our investigation of noise control at the podium terrace showed noise levels can be reduced to 60 dBA with the use of 1.1 m high planters acting as a noise barrier, as indicated on the architectural site plan. As noise levels can be reduced to 60 dBA but are more than 55 dBA, a warning clause as indicated in Section 6 will be required.

There are no significant stationary sources in operation in the area. The existing commercial building and new LRT station are at a sufficient distance to be considered insignificant in terms of noise levels produced by traffic.

Based on the Phase 1 study, vibration levels due to railway activity in the area are expected be fall below the criterion of 0.14 mm/s at the nearest residences to the track. As a result, mitigation for vibrations is not required.

[1] According to ORNAMENT the prediction accuracy deceases in cases of irregular topography

TABLE OF CONTENTS

1. INTRODUCTION 1
2. TERMS OF REFERENCE 1
3. OBJECTIVES 2
4. METHODOLOGY 2
4.1 Background 2
4.2 Roadway Traffic Noise 2
4.2.1 Criteria for Roadway and LRT Traffic Noise 2
4.2.2 Theoretical Roadway and LRT Noise Predictions 4
4.2.1 Roadway and LRT Traffic Volumes 4
4.3 Indoor Noise Calculations 5
4.4 Ground Vibration & Ground-borne Noise 6
4.4.1 Vibration Criteria 7
4.4.2 Theoretical Ground Vibration Prediction Procedure 7
5. RESULTS AND DISCUSSION 9
5.1 Roadway Traffic Noise Levels 9
5.2 Noise Control Measures 10
5.3 Impacts of Existing Stationary Noise 11
5.4 Ground Vibrations & Ground-borne Noise Levels 12
6. CONCLUSIONS AND RECOMMENDATIONS 12
FIGURES
APPENDICES
Appendix A – STAMSON 5.04 Input and Output Data and Supporting Information
Appendix B – FTA Vibration Calculations

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by RioTrin Prop (Gloucester 3) Inc. (RioCan REIT) to undertake an environmental noise and vibration study of Phase 2 of a proposed mixed-use multi-phase development located at 2280 City Park Drive in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to an environmental noise and ground vibration assessment. GWE's scope of work involved assessing exterior and interior noise levels, as well as ground vibration generated by local roadway traffic and stationary sources. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa[2] and Ministry of the Environment NPC-300[3] guidelines. Noise calculations were based on architectural drawings received from Hobin Architects, dated October 31, 2018, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this environmental noise and vibration assessment is Phase 2 of a proposed mixed-use multi-phase development. The master concept plan contains three adjacent residential towers with individual podia, Phase 2 is the center of these towers. Surrounding this are stand-alone buildings, part of future phases of development. The development is located between Highway 174 and City Park Drive, just west of Blair Transit Station. For the purposes of clarity within this report, we have assigned each building a letter. Starting from the southeast corner of the site going clockwise, they are labelled as Phase 5 Building (18 storeys), Phase 1 Tower A (24 storeys), Phase 2 Tower B (20 storeys), Phase 3 Tower C (20 storeys), Phase 4 Building (16 storeys). Tower A is currently under construction and was addressed in a previous report prepared by Gradient Wind, it is therefore not a subject of this study. The major sources of transportation noise are Highway 174 and City Park Drive, with potential influence from the future light rail transit (LRT) line currently under construction. The site is surrounded on all sides with mixed-use land, specifically commercial, residential, transit-oriented development and parks & open space zones. Figure 1 illustrates a complete site plan with surrounding context. The development will contain residential suites

[2] City of Ottawa Environmental Noise Control Guidelines, January 2016
[3] Ministry of the Environment – Publication NPC-300

and common areas throughout. Outdoor amenity space will be provided at grade, north of the building, as well as atop the podium.

3. OBJECTIVES

The main goals of this work are to: (i) calculate the future noise levels on the study building produced by local roadway traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4 of this report.

4. METHODOLOGY

4.1 Background

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

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway and LRT Traffic Noise

For surface roadway traffic noise, the equivalent sound energy level, L_{eq}, provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The City of Ottawa's Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range

(that is relevant to this study) is 45 and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD)[4]

Type of Space	Time Period	Leq (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of **residences**, 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
Sleeping quarters of hotels/motels	23:00 – 07:00	45
Sleeping quarters of **residences**, hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

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[5]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[6]. 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. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, building components will require higher levels of sound attenuation[7].

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] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[5] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[7] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 Theoretical Roadway and LRT Noise Predictions

Noise predictions were performed with the aid of the MOECP computerized noise assessment program, STAMSON 5.04, for road analysis. Appendix A includes the STAMSON 5.04 input and output data.

Roadway traffic noise calculations were performed by treating each roadway segment as separate line sources of noise. 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 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Surrounding buildings included as barriers for some receptors.
- Noise receptors were strategically placed at 15 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated for a sample of receptors in Figure 4-5.

4.2.1 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[8] 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. Future LRT volumes were obtained through a representative of the Rail Implementation Office.

[8] City of Ottawa Transportation Master Plan, November 2013

TABLE 2: ROADWAY AND LRT TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Highway 174 WB	6-Freeway	100	**55,000**
Highway 174 EB	6-Freeway	100	**55,000**
City Park Drive	2-UCU	50	**8,000**
Confederation Line	LRT	70	**540 Day / 60 Night**

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2012) typically exceed STC 35, depending on exterior cladding, thickness and interior finish details. For example, brick veneer walls can achieve STC 50 or more. Standard commercially sided exterior metal stud walls have around STC 45. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

As per Section 4.2, when daytime noise levels (from road and rail sources) at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure[9] considers:

- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which varies according to the intended use of a space

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

Based on published research[10], exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for site plan approval, detailed floor layouts and building elevations have not been finalized; therefore, detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels).

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 vibration 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 (µin/s) to represent vibration levels for this purpose. The threshold level of human perception to vibrations is about 0.10 mm/s RMS or

[10] CMHC, Road & Rail Noise: Effects on Housing

about 72 dBV. Although somewhat variable, the threshold of annoyance for continuous vibrations is (1.0 mm/s RMS or 92 dBV), ten times higher than the perception threshold, whereas the threshold for significant structural damage is (10 mm/s RMS or 112 dBV) at least one hundred times higher than the annoyance threshold level.

4.4.1 Vibration Criteria

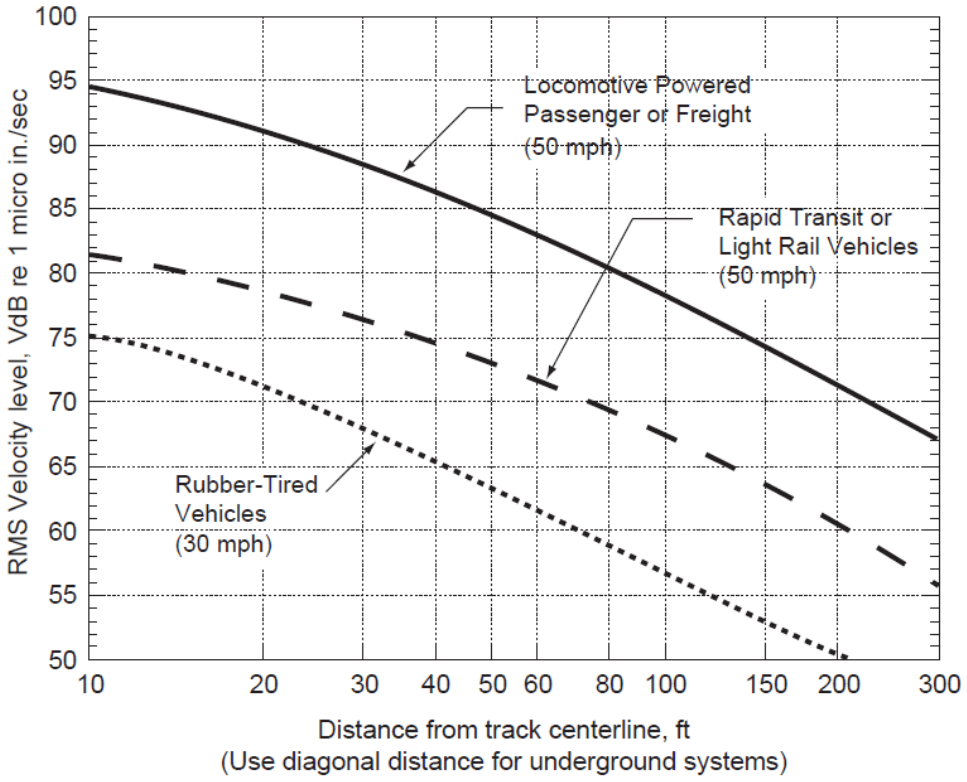
In the United States, the Federal Transportation Authority (FTA) has set vibration criteria for sensitive land use next to Transit corridors. Similar standards have been developed by a partnership between the MECP and the Toronto Transit Commission[11]. These standards indicate that the appropriate criteria for residential 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[12], 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 LRT, the 0.1 mm/s RMS (72 dBV) vibration criteria and 35 dBA ground borne noise criteria were adopted for this study.

4.4.2 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[13] 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 of -1 dBV to account for an

[11] MOEE/TTC Protocol for Noise and Vibration Assessment for the Proposed Yonge-Spadina Subway Loop, June 16, 1993
[12] Dialog and J.E. Coulter Associates Limited, prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada, May 2013
[13] C. E. Hanson; D. A. Towers; and L. D. Meister, Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

operational speed of 70 km/h (44 mph). Other factors considered; the track was assumed to be have welded joints. Details of the vibration calculations are presented in Appendix B.



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 Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD AND LRT TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	16.5	POW – Tower B Podium – 6th Floor – South Façade	75	68
2	16.5	POW – Tower B Podium – 6th Floor – West Façade	72	64
3	16.5	POW – Tower C Podium – 6th Floor – East Façade	72	64
4	16.5	POW – Tower C Podium – 6th Floor – North Façade	57	49
5	10.5	POW – Building D – 4th Floor – West Façade	70	62
6	10.5	POW – Building D – 4th Floor – South Façade	69	62
7	40	POW – Tower C – 13th Floor – North Façade	54	47
8	40	POW – Tower C – 13th Floor – East Façade	71	63
9	47.5	POW – Tower B – 16th Floor – North Façade	54	47
10	47.5	POW – Tower B – 16th Floor – South Façade	75	68
11	47.5	POW – Tower B – 16th Floor – West Façade	72	64
12	63.5	POW – Tower C – 20th Floor – North Façade	56	49
13	63.5	POW – Tower C – 20th Floor – East Façade	71	63
14	1.5	OLA – Amenity Space – Ground Level	55	48
15	6	OLA – Amenity Space – Podium	68	61

The results of the current analysis indicate that noise levels will range between 54 and 75 dBA during the daytime period (07:00-23:00) and between 47 and 68 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 75 dBA) occur along the south façade of Tower B, as well as the podium, which is nearest and most exposed to Highway 174.

5.2 Noise Control Measures

The noise levels predicted due to road traffic exceed the criteria listed in the ENCG for building components. As discussed in Section 4.3 the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels). As per city of Ottawa requirements, detailed STC calculations will be required to be completed prior to building permit application for each unit type. The STC requirements for the windows are summarized below for various units within the development (see Figures 4 - 6):

- **Bedroom Windows**

(i) Bedroom windows facing south on Tower B and Podium will require a minimum STC of 38

(ii) Bedroom windows facing east or west on Tower B and Podium will require a minimum STC of 35

(iii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Living Room Windows**

(i) Living room windows facing south on Tower B and Podium will require a minimum STC of 33

(ii) Living room windows facing east or west on Tower B and Podium will require a minimum STC of 30

(iii) All other living room windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Exterior Walls**

(i) Exterior wall components facing east, south or west on Tower B and Podium require a minimum STC of 45 which will be achieved with brick cladding or an acoustical equivalent according to NRC test data[14]

The STC requirements would apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a window/wall system is used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing.

[14] J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.

Although we have specified an example window configuration, several manufacturers and various combinations of window components, such as those proposed, will offer the necessary sound attenuation rating. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels calculated using STAMSON at the podium terrace (Receptor 15), exceed the ENCG criteria for outdoor living areas. Gradient Wind investigated mitigation options using the software program *Predictor-Lima*, which incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. This model is more suited to calculate rooftop terrace noise levels, which is outside the intended functionality of STAMPSON[15]. Our investigation of noise control at the podium terrace showed noise levels can be reduced to 60 dBA with the use of 1.1 m high planters acting as a noise barrier, as indicated on the architectural site plan. As noise levels can be reduced to 60 dBA but are more than 55 dBA, a warning clause as indicated in Section 6 will be required.

5.3 Impacts of Existing Stationary Noise

A site visit was conducted on October 16, 2015. It was observed the dominant source of noise across the site at grade level was roadway traffic from Highway 174 and City Park Drive. An OC Transpo station is located just east of the development; however, there was no audible noise from the facility. No other major industrial land uses are within 300 m of the development. HVAC equipment on the adjacent mall consists of small rooftop units. Given the separation distances to the new residential towers and the size of the equipment, noise from the HVAC equipment is unlikely to be audible over roadway traffic noise at the plane of window of residences.

[15] According to ORNAMENT the prediction accuracy deceases in cases of irregular topography

5.4 Ground Vibrations & Ground-borne Noise Levels

Based on an offset distance of 34 meters between the railway centerline and the nearest foundation, the estimated vibration levels at the nearest residence façade are expected to be 0.026 mm/s RMS (60 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, vibration mitigation will not 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 60 dBV, ground borne noise levels are expected to be 25 dBA. This is below the ground borne noise criteria of 35 dBA.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 54 and 75 dBA during the daytime period (07:00-23:00) and between 47 and 68 dBA during the nighttime period (23:00-07:00). The highest noise levels (i.e. 75 dBA) occur along the south façade of Tower B, as well as the podium, which is nearest and most exposed to Highway 174. Building components on Phase 2 with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated on Figure 3. It is anticipated that Phase 3 to 5 will also require upgraded building components.

Results of the calculations also indicate that Phase 2 will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. It is anticipated that Phase 3 and 4 will also require air conditioning.

The park area to the north of the building will be sufficiently sheltered from road and LRT noise, and sound levels are not expected to be under 55 dBA. The podium amenity space to the west of Tower B will have 1.1 m tall planters as indicated on architectural site plan. These planters will act as noise barriers to protect the outdoor living area. As noise levels will be above 55 dBA, but cannot be technically reduced any further, the following Warning Clause[16] will be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

[16] City of Ottawa Environmental Noise Control Guidelines, January 2016

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing roadway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment, Conservation and Parks. To help address the need for sound attenuation, this development includes:

- *STC rated multi-pane glazing elements and spandrel panels*
  - *East and west façade bedroom/living room: STC 35/30*
  - *South façade bedroom/living room: STC 38/33*
- *STC rated exterior walls*
  - *East, south and west façade: STC 45*
- *A planter acting as a sound barrier is provided for the amenity area atop the podium*

This dwelling unit has also been designed with air conditioning. Air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment, Conservation and Parks.

To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features."

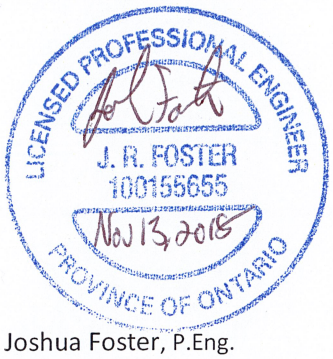
There are no significant stationary sources in operation in the area. The existing commercial building and new LRT station are at a sufficient distance to be considered insignificant in terms of noise levels produced by traffic.

Vibration levels due to railway activity in the area are expected be fall below the criterion of 0.10 mm/s at the nearest residences to the track. As a result, mitigation for vibrations is not required.

This concludes our traffic noise 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.

Sincerely,

Gradient Wind Engineering Inc.



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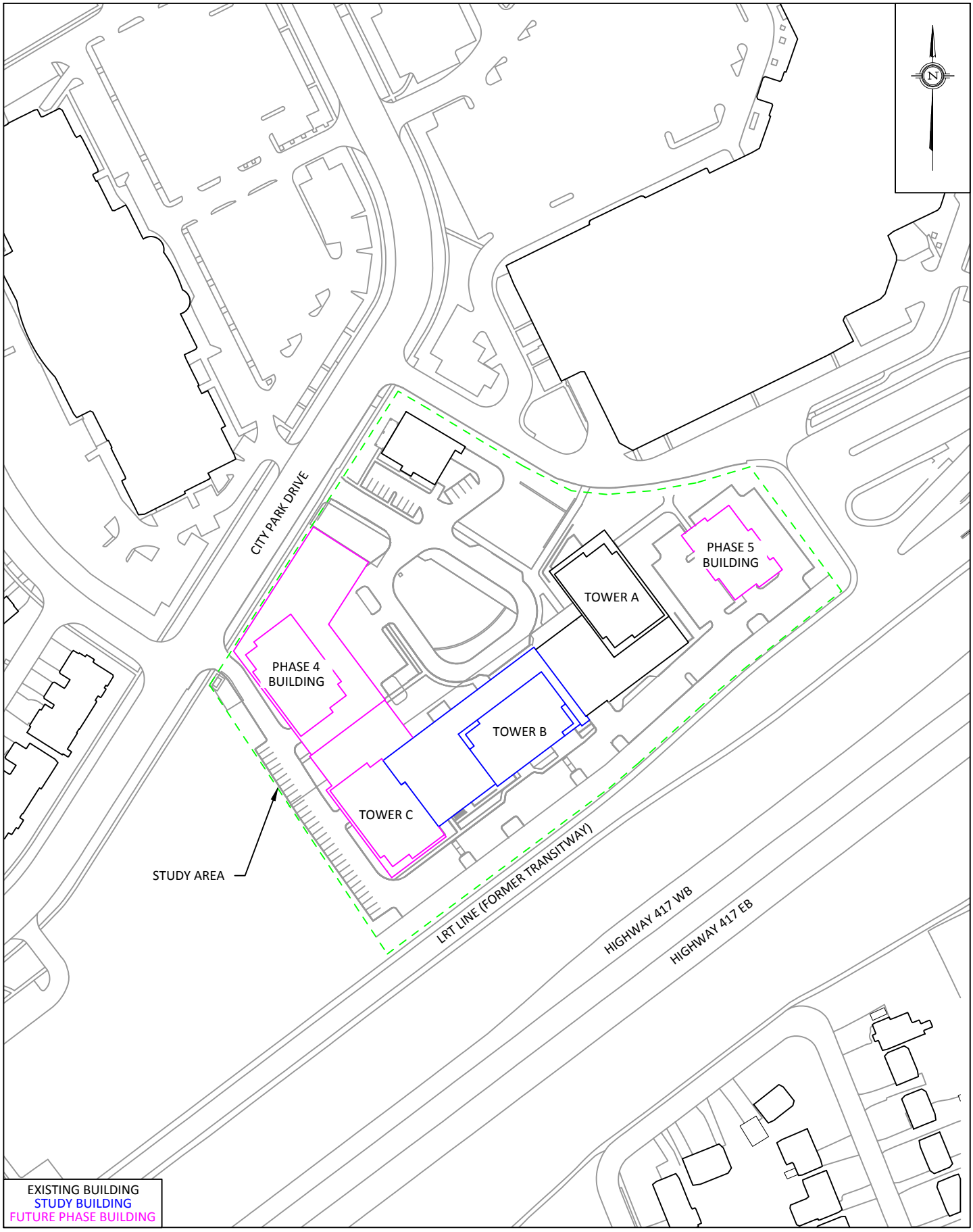

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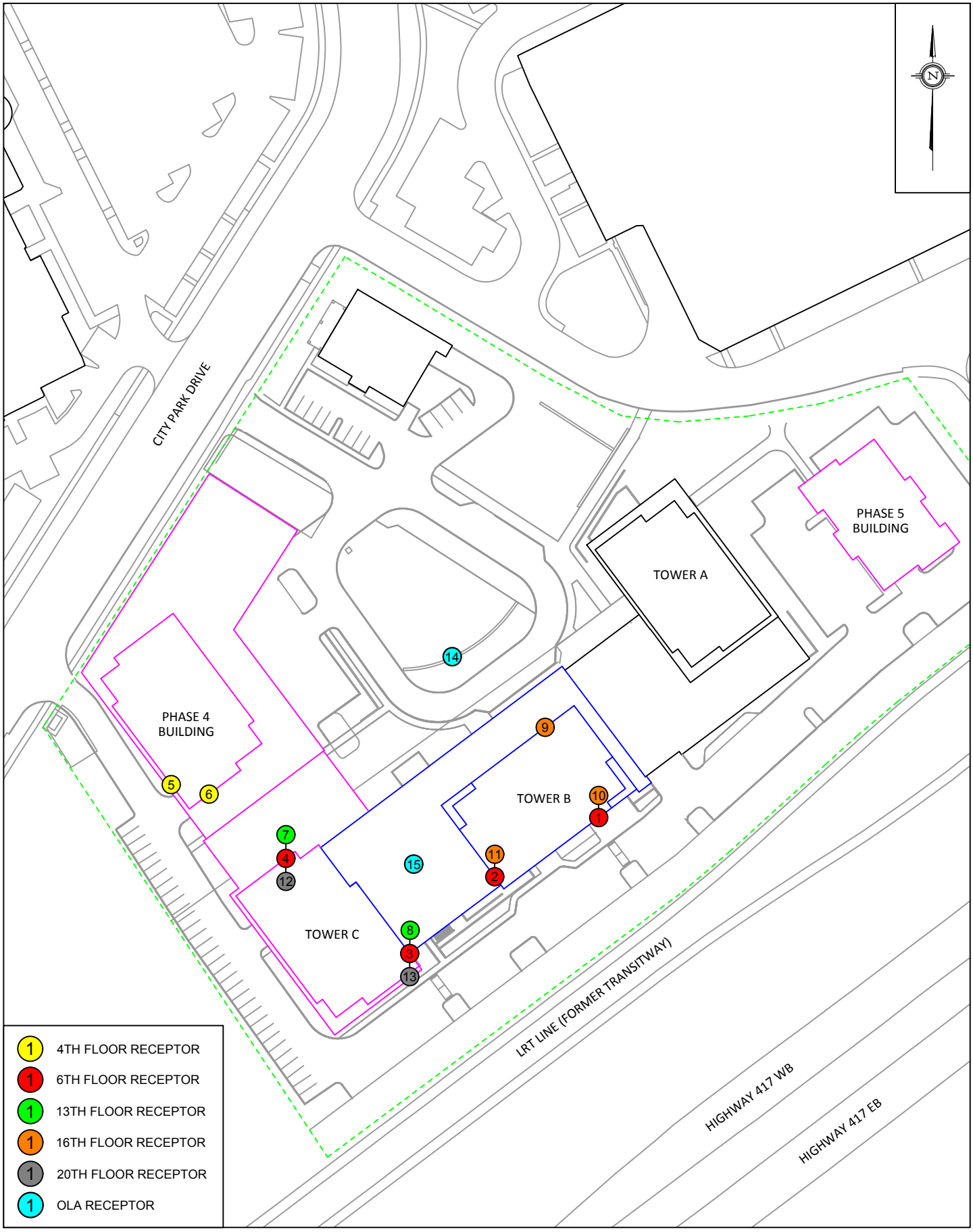
PROJECT	CITY PARK PHASE 2 - TRANSPORTATION NOISE & VIBRATION STUDY
SCALE	1:2000 (APPROX.)
DRAWING NO.	GWE15-068-1
DATE	NOVEMBER 12, 2018
DRAWN BY	M.L

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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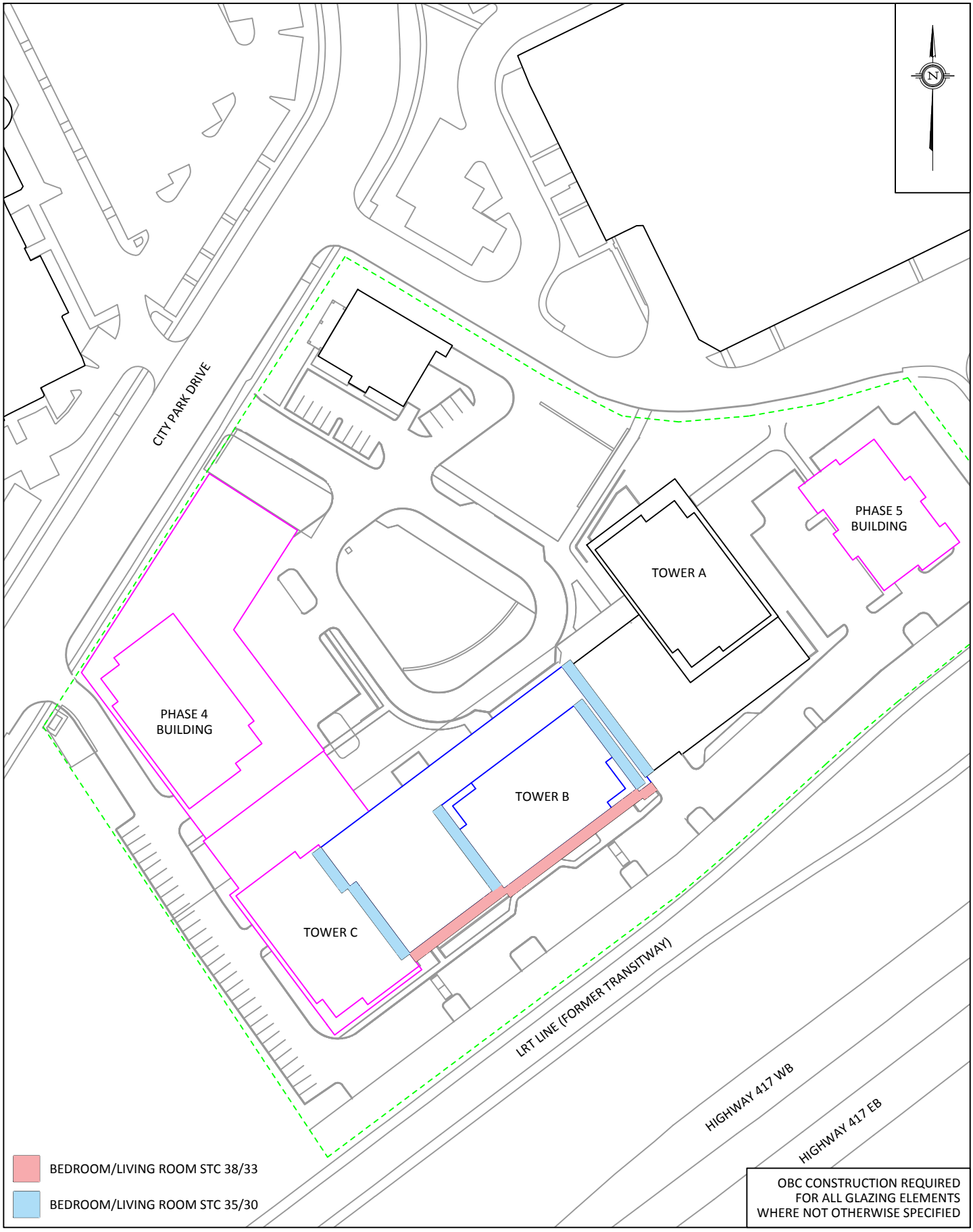
PROJECT	CITY PARK PHASE 2 - TRANSPORTATION NOISE & VIBRATION STUDY		DESCRIPTION
SCALE	1:1250 (APPROX.)	DRAWING NO.	GWE15-068-2
DATE	NOVEMBER 12, 2018	DRAWN BY	M.L

FIGURE 2:
RECEPTOR LOCATIONS



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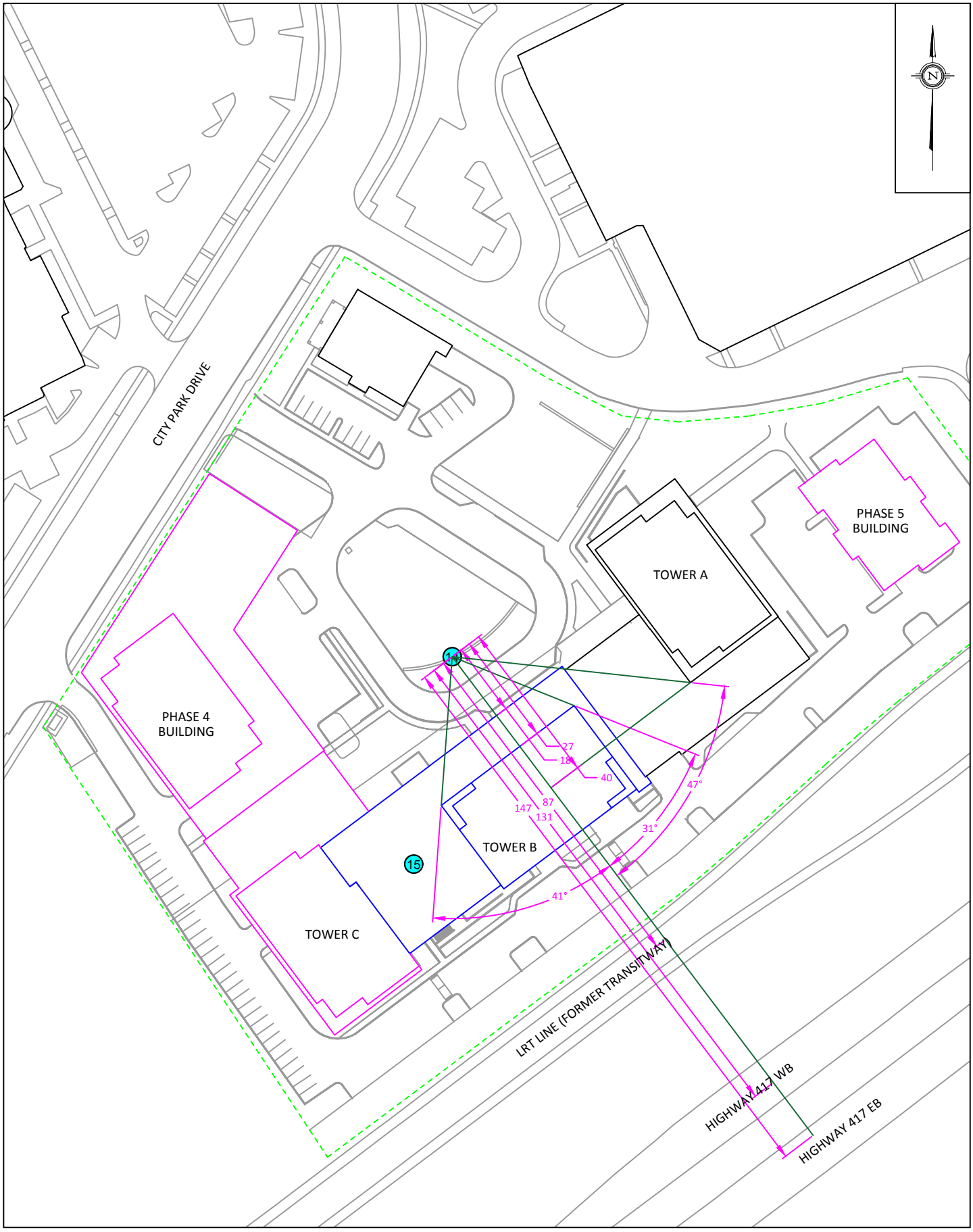
PROJECT	CITY PARK PHASE 2 - TRANSPORTATION NOISE & VIBRATION STUDY
SCALE	1:1250 (APPROX.)
DRAWING NO.	GWE15-068-3
DATE	NOVEMBER 12, 2018
DRAWN BY	M.L
DESCRIPTION	FIGURE 3: WINDOW STC REQUIREMENTS



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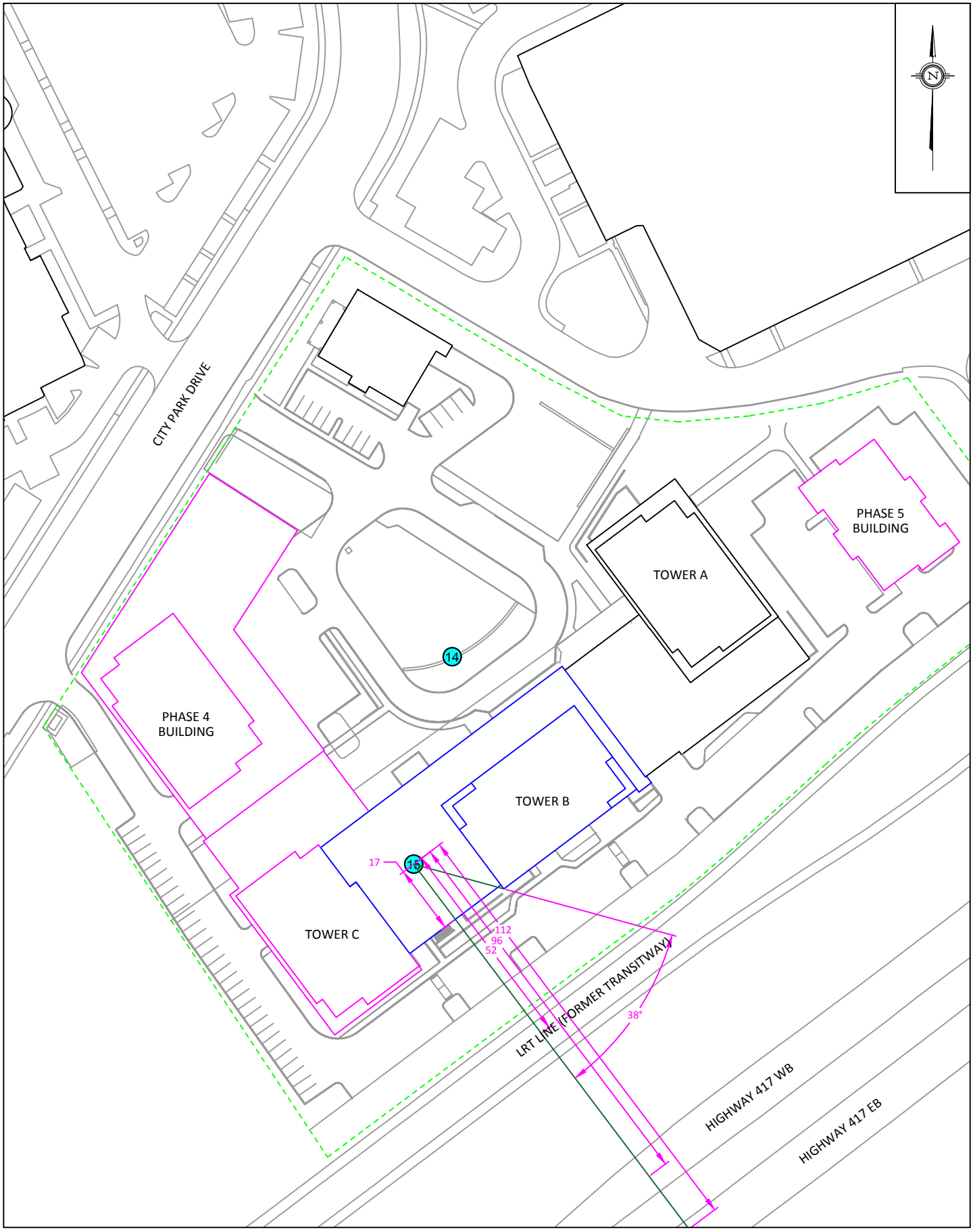
PROJECT	CITY PARK PHASE 2 - TRANSPORTATION NOISE & VIBRATION STUDY
SCALE	1:1250 (APPROX.)
DRAWING NO.	GWE15-068-4
DATE	NOVEMBER 12, 2018
DRAWN BY	M.L

DESCRIPTION

FIGURE 4:
STAMSON INPUT SAMPLE - RECEPTOR 14



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PROJECT	CITY PARK PHASE 2 - TRANSPORTATION NOISE & VIBRATION STUDY
SCALE	1:1250 (APPROX.)
DRAWING NO.	GWE15-068-5
DATE	NOVEMBER 12, 2018
DRAWN BY	M.L

DESCRIPTION

FIGURE 5:
STAMSON INPUT SAMPLE - RECEPTOR 15

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:21:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
----------------------------------------
Angle1   Angle2           : -81.00 deg   81.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  78.00 / 78.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -79.00 deg   79.00 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           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 72.53 + 0.00) = 72.53 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -81     81   0.00  80.15   0.00  -7.16  -0.46   0.00   0.00   0.00
72.53
-------------------------------------------------------------------------
--

Segment Leq : 72.53 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.61 + 0.00) = 71.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -79     79   0.00  80.15   0.00  -7.97  -0.57   0.00   0.00   0.00
71.61
-------------------------------------------------------------------------
--

Segment Leq : 71.61 dBA

Total Leq All Segments: 75.10 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.93 + 0.00) = 64.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -81     81   0.00  72.55   0.00  -7.16  -0.46   0.00   0.00   0.00
64.93
-------------------------------------------------------------------------
--

Segment Leq : 64.93 dBA


Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.01 + 0.00) = 64.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -79     79   0.00  72.55   0.00  -7.97  -0.57   0.00   0.00   0.00
64.01
-------------------------------------------------------------------------
--

Segment Leq : 64.01 dBA

Total Leq All Segments: 67.50 dBA
```

```
RT/Custom data, segment # 1: LRT (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT (day/night)
-------------------------------------
Angle1   Angle2           : -82.00 deg   82.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  34.00 / 34.00  m
Receiver height           :  16.50 / 16.50  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 + 59.48 + 0.00) = 59.48 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -82     82   0.00  63.44  -3.55  -0.40   0.00   0.00   0.00  59.48
-------------------------------------------------------------------------

Segment Leq : 59.48 dBA

Total Leq All Segments: 59.48 dBA


Results segment # 1: LRT (night)
--------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 52.95 + 0.00) = 52.95 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -82     82   0.00  56.91  -3.55  -0.40   0.00   0.00   0.00  52.95
-------------------------------------------------------------------------

Segment Leq : 52.95 dBA

Total Leq All Segments: 52.95 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 75.22
                           (NIGHT): 67.65
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
---------------------------------------
Angle1   Angle2           :   0.00 deg   81.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  81.00 / 81.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           :   0.00 deg   79.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  97.00 / 97.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.36 + 0.00) = 69.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     81   0.00  80.15   0.00  -7.32  -3.47   0.00   0.00   0.00
69.36
-------------------------------------------------------------------------
--

Segment Leq : 69.36 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.46 + 0.00) = 68.46 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     79   0.00  80.15   0.00  -8.11  -3.58   0.00   0.00   0.00
68.46
-------------------------------------------------------------------------
--

Segment Leq : 68.46 dBA

Total Leq All Segments: 71.94 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

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
-------------------------------------------------------------------------
--
     0     81   0.00  72.55   0.00  -7.32  -3.47   0.00   0.00   0.00
61.76
-------------------------------------------------------------------------
--

Segment Leq : 61.76 dBA


Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.87 + 0.00) = 60.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     79   0.00  72.55   0.00  -8.11  -3.58   0.00   0.00   0.00
60.87
-------------------------------------------------------------------------
--

Segment Leq : 60.87 dBA

Total Leq All Segments: 64.35 dBA
```

```
RT/Custom data, segment # 1: LRT (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT (day/night)
-------------------------------------
Angle1   Angle2          :   0.00 deg   81.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance :  37.00 / 37.00  m
Receiver height          :  16.50 / 16.50  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 + 56.05 + 0.00) = 56.05 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     81   0.00  63.44  -3.92  -3.47   0.00   0.00   0.00  56.05
-------------------------------------------------------------------------

Segment Leq : 56.05 dBA

Total Leq All Segments: 56.05 dBA


Results segment # 1: LRT (night)
--------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 49.52 + 0.00) = 49.52 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     81   0.00  56.91  -3.92  -3.47   0.00   0.00   0.00  49.52
-------------------------------------------------------------------------

Segment Leq : 49.52 dBA

Total Leq All Segments: 49.52 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 72.05
                           (NIGHT): 64.49
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:44
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
-----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
---------------------------------------
Angle1   Angle2           : -80.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  86.00 / 86.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -78.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 102.00 / 102.00 m
Receiver height           :  16.50 / 16.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.04 + 0.00) = 69.04 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -80      0   0.00  80.15   0.00  -7.58  -3.52   0.00   0.00   0.00
69.04
-------------------------------------------------------------------------
--

Segment Leq : 69.04 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.19 + 0.00) = 68.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -78      0   0.00  80.15   0.00  -8.33  -3.63   0.00   0.00   0.00
68.19
-------------------------------------------------------------------------
--

Segment Leq : 68.19 dBA

Total Leq All Segments: 71.65 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 61.44 + 0.00) = 61.44 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -80      0   0.00  72.55   0.00  -7.58  -3.52   0.00   0.00   0.00
61.44
-------------------------------------------------------------------------
--

Segment Leq : 61.44 dBA


Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.59 + 0.00) = 60.59 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -78      0   0.00  72.55   0.00  -8.33  -3.63   0.00   0.00   0.00
60.59
-------------------------------------------------------------------------
--

Segment Leq : 60.59 dBA

Total Leq All Segments: 64.05 dBA
```

```
RT/Custom data, segment # 1: LRT (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT (day/night)
-------------------------------------
Angle1   Angle2           : -80.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  42.00 / 42.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : -76.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :   6.00 / 6.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: LRT (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 !       16.50 !       14.21 !        14.21

RT/Custom (0.00 + 22.43 + 55.22) = 55.22 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -80    -76   0.00  63.44  -4.47 -16.53   0.00   0.00 -20.00  22.43
-------------------------------------------------------------------------
   -76      0   0.00  63.44  -4.47  -3.74   0.00   0.00   0.00  55.22
-------------------------------------------------------------------------

Segment Leq : 55.22 dBA

Total Leq All Segments: 55.22 dBA


Results segment # 1: LRT (night)
--------------------------------

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 !       16.50 !       14.21 !        14.21

RT/Custom (0.00 + 15.90 + 48.69) = 48.69 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -80    -76   0.00  56.91  -4.47 -16.53   0.00   0.00 -20.00  15.90
-------------------------------------------------------------------------
   -76      0   0.00  56.91  -4.47  -3.74   0.00   0.00   0.00  48.69
-------------------------------------------------------------------------

Segment Leq : 48.69 dBA

Total Leq All Segments: 48.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.74
                           (NIGHT): 64.17
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
----------------------------------------
Angle1   Angle2           : -76.00 deg   76.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 125.00 / 125.00 m
Receiver height           :  16.50 / 16.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -76.00 deg   Angle2 : 76.00 deg
Barrier height            :  18.50 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -74.00 deg   74.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 141.00 / 141.00 m
Receiver height           :  16.50 / 16.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -74.00 deg   Angle2 : 74.00 deg
Barrier height            :  18.50 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: CityParkR (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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: CityParkR (day/night)
--------------------------------------------
Angle1   Angle2           :  -9.00 deg   37.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  80.00 / 80.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -9.00 deg   Angle2 : 37.00 deg
Barrier height            :  15.90 m
Barrier receiver distance :  63.00 / 63.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: CityParkL (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 4: CityParkL (day/night)
-----------------------------------------------
Angle1   Angle2           : -37.00 deg   -9.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  80.00 / 80.00  m
Receiver height           :  16.50 / 16.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -37.00 deg   Angle2 : -9.00 deg
Barrier height            :   5.60 m
Barrier receiver distance :  30.00 / 30.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !       16.38 !        16.38

ROAD (0.00 + 52.79 + 0.00) = 52.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  80.15   0.00  -9.21  -0.73   0.00   0.00 -17.41
52.79
-------------------------------------------------------------------------------
--

Segment Leq : 52.79 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !       16.39 !        16.39

ROAD (0.00 + 52.07 + 0.00) = 52.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -74     74   0.00  80.15   0.00  -9.73  -0.85   0.00   0.00 -17.49
52.07
-------------------------------------------------------------------------------
--

Segment Leq : 52.07 dBA
```

```
Results segment # 3: CityParkR (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !        4.68 !         4.68

ROAD (0.00 + 32.55 + 0.00) = 32.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    -9     37   0.00  65.75   0.00  -7.27  -5.93   0.00   0.00 -20.00
32.55
-------------------------------------------------------------------------------
--

Segment Leq : 32.55 dBA
```

```
Results segment # 4: CityParkL (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !       10.87 !        10.87

ROAD (0.00 + 50.40 + 0.00) = 50.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -37     -9   0.00  65.75   0.00  -7.27  -8.08   0.00   0.00   0.00
50.40*
   -37     -9   0.00  65.75   0.00  -7.27  -8.08   0.00   0.00   0.00
50.40
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 50.40 dBA

Total Leq All Segments: 56.65 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !       16.38 !        16.38

ROAD (0.00 + 45.19 + 0.00) = 45.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  72.55   0.00  -9.21  -0.73   0.00   0.00 -17.41
45.19
-------------------------------------------------------------------------------
--

Segment Leq : 45.19 dBA


Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !       16.39 !        16.39

ROAD (0.00 + 44.47 + 0.00) = 44.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -74     74   0.00  72.55   0.00  -9.73  -0.85   0.00   0.00 -17.49
44.47
-------------------------------------------------------------------------------
--

Segment Leq : 44.47 dBA
```

```
Results segment # 3: CityParkR (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !        4.68 !         4.68

ROAD (0.00 + 24.96 + 0.00) = 24.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    -9     37   0.00  58.16   0.00  -7.27  -5.93   0.00   0.00 -20.00
24.96
-------------------------------------------------------------------------------
--

Segment Leq : 24.96 dBA
```

```
Results segment # 4: CityParkL (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       16.50 !       10.87 !        10.87

ROAD (0.00 + 42.81 + 0.00) = 42.81 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -37     -9   0.00  58.16   0.00  -7.27  -8.08   0.00   0.00   0.00
42.81*
   -37     -9   0.00  58.16   0.00  -7.27  -8.08   0.00   0.00   0.00
42.81
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 42.81 dBA

Total Leq All Segments: 49.05 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 56.65
                           (NIGHT): 49.05
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WBL (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WBL (day/night)
----------------------------------------
Angle1   Angle2           : -20.00 deg   -16.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 178.00 / 178.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -20.00 deg   Angle2 : -16.00 deg
Barrier height            :  65.00 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
```

```
Road data, segment # 2: 417EBL (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EBL (day/night)
----------------------------------------
Angle1   Angle2           : -20.00 deg   -16.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 194.00 / 194.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -20.00 deg   Angle2 : -16.00 deg
Barrier height            :  65.00 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
```

```
Road data, segment # 3: 417WBR (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WBR (day/night)
----------------------------------------
Angle1   Angle2           : -16.00 deg   69.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 178.00 / 178.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -16.00 deg   Angle2 : 36.00 deg
Barrier height            :   5.60 m
Barrier receiver distance :  25.00 / 25.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: 417EBR (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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 # 4: 417EBR (day/night)
----------------------------------------
Angle1   Angle2           : -16.00 deg   67.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 194.00 / 194.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -16.00 deg   Angle2 : 36.00 deg
Barrier height            :   5.60 m
Barrier receiver distance :  25.00 / 25.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 5: CityPark (day/night)
------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 5: CityPark (day/night)
------------------------------------------
Angle1   Angle2           : -78.00 deg   0.00 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           :  10.50 / 10.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: 417WBL (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.00 !         6.00

ROAD (0.00 + 32.87 + 0.00) = 32.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -20    -16   0.00  80.15   0.00 -10.74 -16.53   0.00   0.00 -20.00
32.87
-------------------------------------------------------------------------------
--

Segment Leq : 32.87 dBA


Results segment # 2: 417EBL (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.37 !         6.37

ROAD (0.00 + 32.50 + 0.00) = 32.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -20    -16   0.00  80.15   0.00 -11.12 -16.53   0.00   0.00 -20.00
32.50
-------------------------------------------------------------------------------
--

Segment Leq : 32.50 dBA
```

```
Results segment # 3: 417WBR (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        9.24 !         9.24

ROAD (0.00 + 64.01 + 62.04) = 66.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -16     36   0.00  80.15   0.00 -10.74  -5.39   0.00   0.00   0.00
64.01*
   -16     36   0.00  80.15   0.00 -10.74  -5.39   0.00   0.00   0.00
64.01
-------------------------------------------------------------------------------
--
    36     69   0.00  80.15   0.00 -10.74  -7.37   0.00   0.00   0.00
62.04
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 66.15 dBA
```

```
Results segment # 4: 417EBR (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        9.34 !         9.34

ROAD (0.00 + 63.64 + 61.39) = 65.67 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -16     36   0.00  80.15   0.00 -11.12  -5.39   0.00   0.00   0.00
63.64*
   -16     36   0.00  80.15   0.00 -11.12  -5.39   0.00   0.00   0.00
63.64
-------------------------------------------------------------------------------
--
    36     67   0.00  80.15   0.00 -11.12  -7.64   0.00   0.00   0.00
61.39
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 65.67 dBA
```

```
Results segment # 5: CityPark (day)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.87 + 0.00) = 60.87 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -78      0   0.00  65.75   0.00  -1.25  -3.63   0.00   0.00   0.00
60.87
-------------------------------------------------------------------------
--

Segment Leq : 60.87 dBA

Total Leq All Segments: 69.56 dBA


Results segment # 1: 417WBL (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.00 !         6.00

ROAD (0.00 + 25.28 + 0.00) = 25.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -20    -16   0.00  72.55   0.00 -10.74 -16.53   0.00   0.00 -20.00
25.28
-------------------------------------------------------------------------
--

Segment Leq : 25.28 dBA
```

```
Results segment # 2: 417EBL (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.37 !         6.37

ROAD (0.00 + 24.90 + 0.00) = 24.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -20    -16   0.00  72.55   0.00 -11.12 -16.53   0.00   0.00 -20.00
24.90
-------------------------------------------------------------------------------
--

Segment Leq : 24.90 dBA
```

```
Results segment # 3: 417WBR (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        9.24 !         9.24

ROAD (0.00 + 56.41 + 54.44) = 58.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -16     36   0.00  72.55   0.00 -10.74  -5.39   0.00   0.00   0.00
56.41*
   -16     36   0.00  72.55   0.00 -10.74  -5.39   0.00   0.00   0.00
56.41
-------------------------------------------------------------------------------
--
    36     69   0.00  72.55   0.00 -10.74  -7.37   0.00   0.00   0.00
54.44
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 58.55 dBA
```

```
Results segment # 4: 417EBR (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        9.34 !         9.34

ROAD (0.00 + 56.04 + 53.79) = 58.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -16     36   0.00  72.55   0.00 -11.12  -5.39   0.00   0.00   0.00
56.04*
   -16     36   0.00  72.55   0.00 -11.12  -5.39   0.00   0.00   0.00
56.04
-------------------------------------------------------------------------------
--
    36     67   0.00  72.55   0.00 -11.12  -7.64   0.00   0.00   0.00
53.79
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 58.07 dBA
```

```
Results segment # 5: CityPark (night)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.28 + 0.00) = 53.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -78      0   0.00  58.16   0.00  -1.25  -3.63   0.00   0.00   0.00
53.28
-------------------------------------------------------------------------
--

Segment Leq : 53.28 dBA

Total Leq All Segments: 61.96 dBA
```

```
RT/Custom data, segment # 1: LRTL (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRTL (day/night)
--------------------------------------
Angle1   Angle2           : -20.00 deg   -16.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 134.00 / 134.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -20.00 deg   Angle2 : -16.00 deg
Barrier height            :  65.00 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
```

```
RT/Custom data, segment # 2: LRTR (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: LRTR (day/night)
--------------------------------------
Angle1   Angle2          : -16.00 deg   57.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance : 134.00 / 134.00 m
Receiver height          :  10.50 / 10.50  m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -16.00 deg   Angle2 : 36.00 deg
Barrier height           :   5.60 m
Barrier receiver distance :  25.00 / 25.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
Results segment # 1: LRTL (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 !       10.50 !        3.86 !         3.86

RT/Custom (0.00 + 17.40 + 0.00) = 17.40 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -20    -16   0.00  63.44  -9.51 -16.53   0.00   0.00 -20.00  17.40
-------------------------------------------------------------------

Segment Leq : 17.40 dBA


Results segment # 2: LRTR (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 !       10.50 !        8.63 !         8.63

RT/Custom (0.00 + 48.53 + 44.60) = 50.01 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -16     36   0.00  63.44  -9.51  -5.39   0.00   0.00   0.00  48.53*
   -16     36   0.00  63.44  -9.51  -5.39   0.00   0.00   0.00  48.53
-------------------------------------------------------------------
    36     57   0.00  63.44  -9.51  -9.33   0.00   0.00   0.00  44.60
-------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 50.01 dBA

Total Leq All Segments: 50.01 dBA
```

```
Results segment # 1: LRTL (night)
---------------------------------

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 !       10.50 !        3.86 !         3.86

RT/Custom (0.00 + 10.86 + 0.00) = 10.86 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -20    -16   0.00  56.91  -9.51 -16.53   0.00   0.00 -20.00  10.86
-------------------------------------------------------------------

Segment Leq : 10.86 dBA


Results segment # 2: LRTR (night)
---------------------------------

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 !       10.50 !        8.63 !         8.63

RT/Custom (0.00 + 42.00 + 38.06) = 43.48 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -16     36   0.00  56.91  -9.51  -5.39   0.00   0.00   0.00  42.00*
   -16     36   0.00  56.91  -9.51  -5.39   0.00   0.00   0.00  42.00
-------------------------------------------------------------------
    36     57   0.00  56.91  -9.51  -9.33   0.00   0.00   0.00  38.06
-------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 43.48 dBA

Total Leq All Segments: 43.48 dBA


TOTAL Leq FROM ALL SOURCES (DAY): 69.61
                           (NIGHT): 62.02
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:59
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WBL (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WBL (day/night)
----------------------------------------
Angle1   Angle2           : -71.00 deg   -12.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 164.00 / 164.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -71.00 deg   Angle2 : -12.00 deg
Barrier height            :  65.00 m
Barrier receiver distance :  75.00 / 75.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EBL (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EBL (day/night)
----------------------------------------
Angle1   Angle2           : -69.00 deg   -12.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 180.00 / 180.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -69.00 deg   Angle2 : -12.00 deg
Barrier height            :  65.00 m
Barrier receiver distance :  75.00 / 75.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: 417WBR (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WBR (day/night)
----------------------------------------
Angle1   Angle2           : -12.00 deg   71.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 164.00 / 164.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -12.00 deg   Angle2 : 71.00 deg
Barrier height            :   5.60 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 # 4: 417EBR (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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 # 4: 417EBR (day/night)
----------------------------------------
Angle1   Angle2           : -12.00 deg   69.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 180.00 / 180.00 m
Receiver height           :  10.50 / 10.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -12.00 deg   Angle2 : 69.00 deg
Barrier height            :   5.60 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
```

```
Results segment # 1: 417WBL (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.38 !         6.38

ROAD (0.00 + 44.92 + 0.00) = 44.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -71    -12   0.00  80.15   0.00 -10.39  -4.84   0.00   0.00 -20.00
44.92
-------------------------------------------------------------------------------
--

Segment Leq : 44.92 dBA


Results segment # 2: 417EBL (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.75 !         6.75

ROAD (0.00 + 44.36 + 0.00) = 44.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -69    -12   0.00  80.15   0.00 -10.79  -4.99   0.00   0.00 -20.00
44.36
-------------------------------------------------------------------------------
--

Segment Leq : 44.36 dBA
```

```
Results segment # 3: 417WBR (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        5.78 !         5.78

ROAD (0.00 + 66.40 + 0.00) = 66.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -12     71   0.00  80.15   0.00 -10.39  -3.36   0.00   0.00  -4.98
61.41*
   -12     71   0.00  80.15   0.00 -10.39  -3.36   0.00   0.00   0.00
66.40
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 66.40 dBA
```

```
Results segment # 4: 417EBR (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.20 !         6.20

ROAD (0.00 + 65.89 + 0.00) = 65.89 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -12     69   0.00  80.15   0.00 -10.79  -3.47   0.00   0.00  -4.83
61.06*
   -12     69   0.00  80.15   0.00 -10.79  -3.47   0.00   0.00   0.00
65.89
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 65.89 dBA

Total Leq All Segments: 69.19 dBA
```

```
Results segment # 1: 417WBL (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.38 !         6.38

ROAD (0.00 + 37.32 + 0.00) = 37.32 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -71    -12   0.00  72.55   0.00 -10.39  -4.84   0.00   0.00 -20.00
37.32
-------------------------------------------------------------------------------
--

Segment Leq : 37.32 dBA


Results segment # 2: 417EBL (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.75 !         6.75

ROAD (0.00 + 36.76 + 0.00) = 36.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -69    -12   0.00  72.55   0.00 -10.79  -4.99   0.00   0.00 -20.00
36.76
-------------------------------------------------------------------------------
--

Segment Leq : 36.76 dBA
```

```
Results segment # 3: 417WBR (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        5.78 !         5.78

ROAD (0.00 + 58.80 + 0.00) = 58.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -12     71   0.00  72.55   0.00 -10.39  -3.36   0.00   0.00  -4.98
53.82*
   -12     71   0.00  72.55   0.00 -10.39  -3.36   0.00   0.00   0.00
58.80
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 58.80 dBA
```

```
Results segment # 4: 417EBR (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       10.50 !        6.20 !         6.20

ROAD (0.00 + 58.29 + 0.00) = 58.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -12     69   0.00  72.55   0.00 -10.79  -3.47   0.00   0.00  -4.83
53.46*
   -12     69   0.00  72.55   0.00 -10.79  -3.47   0.00   0.00   0.00
58.29
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 58.29 dBA

Total Leq All Segments: 61.59 dBA
```

```
RT/Custom data, segment # 1: LRTL (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRTL (day/night)
--------------------------------------
Angle1   Angle2          : -61.00 deg   -12.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance : 120.00 / 120.00 m
Receiver height          :  10.50 / 10.50  m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -61.00 deg   Angle2 : -12.00 deg
Barrier height           :  65.00 m
Barrier receiver distance :  75.00 / 75.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
RT/Custom data, segment # 2: LRTR (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: LRTR (day/night)
--------------------------------------
Angle1   Angle2          : -12.00 deg   61.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance : 120.00 / 120.00 m
Receiver height          :  10.50 / 10.50  m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -12.00 deg   Angle2 : 61.00 deg
Barrier height           :   5.60 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
```

```
Results segment # 1: LRTL (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 !       10.50 !        4.25 !         4.25

RT/Custom (0.00 + 28.76 + 0.00) = 28.76 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -61    -12   0.00  63.44  -9.03  -5.65   0.00   0.00 -20.00  28.76
-------------------------------------------------------------------

Segment Leq : 28.76 dBA


Results segment # 2: LRTR (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 !       10.50 !        3.33 !         3.33

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
-------------------------------------------------------------------
   -12     61   0.00  63.44  -9.03  -3.92   0.00   0.00  -8.40  42.08
-------------------------------------------------------------------

Segment Leq : 42.08 dBA

Total Leq All Segments: 42.28 dBA
```

```
Results segment # 1: LRTL (night)
---------------------------------

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 !       10.50 !        4.25 !         4.25

RT/Custom (0.00 + 22.22 + 0.00) = 22.22 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -61    -12   0.00  56.91  -9.03  -5.65   0.00   0.00 -20.00  22.22
-------------------------------------------------------------------------

Segment Leq : 22.22 dBA


Results segment # 2: LRTR (night)
---------------------------------

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 !       10.50 !        3.33 !         3.33

RT/Custom (0.00 + 35.55 + 0.00) = 35.55 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -12     61   0.00  56.91  -9.03  -3.92   0.00   0.00  -8.40  35.55
-------------------------------------------------------------------------

Segment Leq : 35.55 dBA

Total Leq All Segments: 35.75 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 69.20
                           (NIGHT): 61.60
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:23:04
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
-----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
---------------------------------------
Angle1   Angle2           : -76.00 deg   76.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 122.00 / 122.00 m
Receiver height           :  40.00 / 40.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -76.00 deg   Angle2 : 76.00 deg
Barrier height            :  65.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -74.00 deg   74.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 139.00 / 139.00 m
Receiver height           :  40.00 / 40.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -74.00 deg   Angle2 : 74.00 deg
Barrier height            :  65.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: CityParkL (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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: CityParkL (day/night)
--------------------------------------------
Angle1   Angle2           : -44.00 deg   -27.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  86.00 / 86.00  m
Receiver height           :  40.00 / 40.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -44.00 deg   Angle2 : -27.00 deg
Barrier height            :   5.60 m
Barrier receiver distance :  36.00 / 36.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: CityParkR (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 4: CityParkR (day/night)
-----------------------------------------------
Angle1   Angle2           : -27.00 deg   44.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  86.00 / 86.00  m
Receiver height           :  40.00 / 40.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -27.00 deg   Angle2 : 44.00 deg
Barrier height            :  15.90 m
Barrier receiver distance :  69.00 / 69.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       39.68 !        39.68

ROAD (0.00 + 50.31 + 0.00) = 50.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  80.15   0.00  -9.10  -0.73   0.00   0.00 -20.00
50.31
-------------------------------------------------------------------------------
--

Segment Leq : 50.31 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       39.72 !        39.72

ROAD (0.00 + 49.63 + 0.00) = 49.63 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -74     74   0.00  80.15   0.00  -9.67  -0.85   0.00   0.00 -20.00
49.63
-------------------------------------------------------------------------------
--

Segment Leq : 49.63 dBA
```

```
Results segment # 3: CityParkL (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       23.88 !        23.88

ROAD (0.00 + 47.92 + 0.00) = 47.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -44    -27   0.00  65.75   0.00  -7.58 -10.25   0.00   0.00   0.00
47.92*
   -44    -27   0.00  65.75   0.00  -7.58 -10.25   0.00   0.00   0.00
47.92
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 47.92 dBA
```

```
Results segment # 4: CityParkR (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !        9.11 !         9.11

ROAD (0.00 + 36.27 + 0.00) = 36.27 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -27     44   0.00  65.75   0.00  -7.58  -4.04   0.00   0.00 -17.85
36.27
-------------------------------------------------------------------------------
--

Segment Leq : 36.27 dBA

Total Leq All Segments: 54.24 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       39.68 !        39.68

ROAD (0.00 + 42.71 + 0.00) = 42.71 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  72.55   0.00  -9.10  -0.73   0.00   0.00 -20.00
42.71
-------------------------------------------------------------------------------
--

Segment Leq : 42.71 dBA


Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       39.72 !        39.72

ROAD (0.00 + 42.03 + 0.00) = 42.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -74     74   0.00  72.55   0.00  -9.67  -0.85   0.00   0.00 -20.00
42.03
-------------------------------------------------------------------------------
--

Segment Leq : 42.03 dBA
```

```
Results segment # 3: CityParkL (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       23.88 !        23.88

ROAD (0.00 + 40.32 + 0.00) = 40.32 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -44    -27   0.00  58.16   0.00  -7.58 -10.25   0.00   0.00   0.00
40.32*
   -44    -27   0.00  58.16   0.00  -7.58 -10.25   0.00   0.00   0.00
40.32
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 40.32 dBA
```

```
Results segment # 4: CityParkR (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !        9.11 !         9.11

ROAD (0.00 + 28.68 + 0.00) = 28.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -27     44   0.00  58.16   0.00  -7.58  -4.04   0.00   0.00 -17.85
28.68
-------------------------------------------------------------------------------
--

Segment Leq : 28.68 dBA

Total Leq All Segments: 46.64 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 54.24
                           (NIGHT): 46.64
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:23:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
----------------------------------------
Angle1   Angle2           : -80.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :  40.00 / 40.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : -69.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -78.00 deg   0.00 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           :  40.00 / 40.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -78.00 deg   Angle2 : -69.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       35.29 !        35.29

ROAD (0.00 + 40.23 + 68.20) = 68.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -80    -69   0.00  80.15   0.00  -7.78 -12.14   0.00   0.00 -20.00
40.23
-------------------------------------------------------------------------------
--
   -69      0   0.00  80.15   0.00  -7.78  -4.16   0.00   0.00   0.00
68.20
-------------------------------------------------------------------------------
--

Segment Leq : 68.21 dBA
```

```
Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       36.00 !        36.00

ROAD (0.00 + 38.64 + 67.49) = 67.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -78    -69   0.00  80.15   0.00  -8.49 -13.01   0.00   0.00 -20.00
38.64
-------------------------------------------------------------------------------
--
   -69      0   0.00  80.15   0.00  -8.49  -4.16   0.00   0.00   0.00
67.49
-------------------------------------------------------------------------------
--

Segment Leq : 67.50 dBA

Total Leq All Segments: 70.88 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       35.29 !        35.29

ROAD (0.00 + 32.63 + 60.61) = 60.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -80    -69   0.00  72.55   0.00  -7.78 -12.14   0.00   0.00 -20.00
32.63
-------------------------------------------------------------------------------
--
   -69      0   0.00  72.55   0.00  -7.78  -4.16   0.00   0.00   0.00
60.61
-------------------------------------------------------------------------------
--

Segment Leq : 60.61 dBA
```

```
Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       40.00 !       36.00 !        36.00

ROAD (0.00 + 31.05 + 59.89) = 59.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -78    -69   0.00  72.55   0.00  -8.49 -13.01   0.00   0.00 -20.00
31.05
-------------------------------------------------------------------------------
--
   -69      0   0.00  72.55   0.00  -8.49  -4.16   0.00   0.00   0.00
59.89
-------------------------------------------------------------------------------
--

Segment Leq : 59.90 dBA

Total Leq All Segments: 63.28 dBA
```

```
RT/Custom data, segment # 1: LRT (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT (day/night)
-------------------------------------
Angle1   Angle2           : -79.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  46.00 / 46.00  m
Receiver height           :  40.00 / 40.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -79.00 deg   Angle2 : 0.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: LRT (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 !       40.00 !       30.55 !        30.55

RT/Custom (0.00 + 34.99 + 0.00) = 34.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -79      0   0.00  63.44  -4.87  -3.58   0.00   0.00 -20.00  34.99
-------------------------------------------------------------------------

Segment Leq : 34.99 dBA

Total Leq All Segments: 34.99 dBA


Results segment # 1: LRT (night)
--------------------------------

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 !       40.00 !       30.55 !        30.55

RT/Custom (0.00 + 28.46 + 0.00) = 28.46 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -79      0   0.00  56.91  -4.87  -3.58   0.00   0.00 -20.00  28.46
-------------------------------------------------------------------------

Segment Leq : 28.46 dBA

Total Leq All Segments: 28.46 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 70.88
                           (NIGHT): 63.28
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:23:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
----------------------------------------
Angle1   Angle2           : -78.00 deg   78.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 104.00 / 104.00 m
Receiver height           :  47.50 / 47.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -78.00 deg   Angle2 : 78.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -76.00 deg   76.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 120.00 / 120.00 m
Receiver height           :  47.50 / 47.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -76.00 deg   Angle2 : 76.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: CityParkL (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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: CityParkL (day/night)
--------------------------------------------
Angle1   Angle2           : -29.00 deg   -6.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 122.00 / 122.00 m
Receiver height           :  47.50 / 47.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -29.00 deg   Angle2 : -6.00 deg
Barrier height            :  15.90 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
```

```
Road data, segment # 4: CityParkR (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 4: CityParkR (day/night)
--------------------------------------------
Angle1   Angle2           :  -6.00 deg   29.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 122.00 / 122.00 m
Receiver height           :  47.50 / 47.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   1.00 deg   Angle2 : 29.00 deg
Barrier height            :  15.90 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: 417WB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !       47.06 !        47.06

ROAD (0.00 + 51.12 + 0.00) = 51.12 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -78     78   0.00  80.15   0.00  -8.41  -0.62   0.00   0.00 -20.00
51.12
-------------------------------------------------------------------------------
--

Segment Leq : 51.12 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !       47.12 !        47.12

ROAD (0.00 + 50.38 + 0.00) = 50.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  80.15   0.00  -9.03  -0.73   0.00   0.00 -20.00
50.38
-------------------------------------------------------------------------------
--

Segment Leq : 50.38 dBA
```

```
Results segment # 3: CityParkL (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !        7.91 !         7.91

ROAD (0.00 + 28.42 + 0.00) = 28.42 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -29     -6   0.00  65.75   0.00  -9.10  -8.94   0.00   0.00 -19.29
28.42
-------------------------------------------------------------------------------
--

Segment Leq : 28.42 dBA
```

```
Results segment # 4: CityParkR (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !        7.91 !         7.91

ROAD (42.55 + 29.24 + 0.00) = 42.74 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    -6      1   0.00  65.75   0.00  -9.10 -14.10   0.00   0.00   0.00
42.55
-------------------------------------------------------------------------------
--
     1     29   0.00  65.75   0.00  -9.10  -8.08   0.00   0.00 -19.33
29.24
-------------------------------------------------------------------------------
--

Segment Leq : 42.74 dBA

Total Leq All Segments: 54.12 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !       47.06 !        47.06

ROAD (0.00 + 43.52 + 0.00) = 43.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -78     78   0.00  72.55   0.00  -8.41  -0.62   0.00   0.00 -20.00
43.52
-------------------------------------------------------------------------------
--

Segment Leq : 43.52 dBA
```

```
Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !       47.12 !        47.12

ROAD (0.00 + 42.79 + 0.00) = 42.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  72.55   0.00  -9.03  -0.73   0.00   0.00 -20.00
42.79
-------------------------------------------------------------------------------
--

Segment Leq : 42.79 dBA
```

```
Results segment # 3: CityParkL (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !        7.91 !         7.91

ROAD (0.00 + 20.83 + 0.00) = 20.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -29     -6   0.00  58.16   0.00  -9.10  -8.94   0.00   0.00 -19.29
20.83
-------------------------------------------------------------------------------
--

Segment Leq : 20.83 dBA
```

```
Results segment # 4: CityParkR (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       47.50 !        7.91 !         7.91

ROAD (34.95 + 21.65 + 0.00) = 35.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
    -6      1   0.00  58.16   0.00  -9.10 -14.10   0.00   0.00   0.00
34.95
-------------------------------------------------------------------------
--
     1     29   0.00  58.16   0.00  -9.10  -8.08   0.00   0.00 -19.33
21.65
-------------------------------------------------------------------------
--

Segment Leq : 35.15 dBA

Total Leq All Segments: 46.52 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.12
                           (NIGHT): 46.52
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:21:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
-----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
---------------------------------------
Angle1   Angle2           : -81.00 deg   81.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  79.00 / 79.00  m
Receiver height           :  47.50 / 47.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
---------------------------------------
Angle1   Angle2           : -79.00 deg   79.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  96.00 / 96.00  m
Receiver height           :  47.50 / 47.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 72.47 + 0.00) = 72.47 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -81     81   0.00  80.15   0.00  -7.22  -0.46   0.00   0.00   0.00
72.47
-------------------------------------------------------------------------
--

Segment Leq : 72.47 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 71.52 + 0.00) = 71.52 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -79     79   0.00  80.15   0.00  -8.06  -0.57   0.00   0.00   0.00
71.52
-------------------------------------------------------------------------
--

Segment Leq : 71.52 dBA

Total Leq All Segments: 75.03 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.88 + 0.00) = 64.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -81     81   0.00  72.55   0.00  -7.22  -0.46   0.00   0.00   0.00
64.88
-------------------------------------------------------------------------
--

Segment Leq : 64.88 dBA


Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.92 + 0.00) = 63.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -79     79   0.00  72.55   0.00  -8.06  -0.57   0.00   0.00   0.00
63.92
-------------------------------------------------------------------------
--

Segment Leq : 63.92 dBA

Total Leq All Segments: 67.44 dBA
```

```
RT/Custom data, segment # 1: LRT (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT (day/night)
-------------------------------------
Angle1   Angle2           : -82.00 deg   82.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  36.00 / 36.00  m
Receiver height           :  47.50 / 47.50  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 + 59.23 + 0.00) = 59.23 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -82     82   0.00  63.44  -3.80  -0.40   0.00   0.00   0.00  59.23
-------------------------------------------------------------------------

Segment Leq : 59.23 dBA

Total Leq All Segments: 59.23 dBA


Results segment # 1: LRT (night)
--------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 52.70 + 0.00) = 52.70 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -82     82   0.00  56.91  -3.80  -0.40   0.00   0.00   0.00  52.70
-------------------------------------------------------------------------

Segment Leq : 52.70 dBA

Total Leq All Segments: 52.70 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 75.14
                           (NIGHT): 67.58
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:21:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
-----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
---------------------------------------
Angle1   Angle2           :   0.00 deg   81.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  82.00 / 82.00  m
Receiver height           :  47.50 / 47.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           :   0.00 deg   79.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  99.00 / 99.00  m
Receiver height           :  47.50 / 47.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 69.30 + 0.00) = 69.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     81   0.00  80.15   0.00  -7.38  -3.47   0.00   0.00   0.00
69.30
-------------------------------------------------------------------------
--

Segment Leq : 69.30 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

ROAD (0.00 + 68.38 + 0.00) = 68.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     79   0.00  80.15   0.00  -8.20  -3.58   0.00   0.00   0.00
68.38
-------------------------------------------------------------------------
--

Segment Leq : 68.38 dBA

Total Leq All Segments: 71.87 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 61.71 + 0.00) = 61.71 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     81   0.00  72.55   0.00  -7.38  -3.47   0.00   0.00   0.00
61.71
-------------------------------------------------------------------------
--

Segment Leq : 61.71 dBA


Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.78 + 0.00) = 60.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     79   0.00  72.55   0.00  -8.20  -3.58   0.00   0.00   0.00
60.78
-------------------------------------------------------------------------
--

Segment Leq : 60.78 dBA

Total Leq All Segments: 64.28 dBA
```

```
RT/Custom data, segment # 1: LRT (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT (day/night)
-------------------------------------
Angle1   Angle2          :   0.00 deg   81.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance :  39.00 / 39.00  m
Receiver height          :  47.50 / 47.50  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 + 55.82 + 0.00) = 55.82 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     81   0.00  63.44  -4.15  -3.47   0.00   0.00   0.00  55.82
-------------------------------------------------------------------------

Segment Leq : 55.82 dBA

Total Leq All Segments: 55.82 dBA


Results segment # 1: LRT (night)
--------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 49.29 + 0.00) = 49.29 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
     0     81   0.00  56.91  -4.15  -3.47   0.00   0.00   0.00  49.29
-------------------------------------------------------------------------

Segment Leq : 49.29 dBA

Total Leq All Segments: 49.29 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 71.98
                           (NIGHT): 64.42
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
----------------------------------------
Angle1   Angle2           : -76.00 deg   76.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 122.00 / 122.00 m
Receiver height           :  63.50 / 63.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -76.00 deg   Angle2 : 76.00 deg
Barrier height            :  65.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -74.00 deg   74.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 139.00 / 139.00 m
Receiver height           :  63.50 / 63.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -74.00 deg   Angle2 : 74.00 deg
Barrier height            :  65.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: CityParkL (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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: CityParkL (day/night)
--------------------------------------------
Angle1   Angle2           : -44.00 deg   -27.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  86.00 / 86.00  m
Receiver height           :  63.50 / 63.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -44.00 deg   Angle2 : -27.00 deg
Barrier height            :   5.60 m
Barrier receiver distance :  36.00 / 36.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: CityParkR (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    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):   8000
    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 # 4: CityParkR (day/night)
--------------------------------------------
Angle1   Angle2           : -27.00 deg   44.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  86.00 / 86.00  m
Receiver height           :  63.50 / 63.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -27.00 deg   Angle2 : 44.00 deg
Barrier height            :  15.90 m
Barrier receiver distance :  69.00 / 69.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       62.99 !        62.99

ROAD (0.00 + 52.61 + 0.00) = 52.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  80.15   0.00  -9.10  -0.73   0.00   0.00 -17.70
52.61
-------------------------------------------------------------------------------
--

Segment Leq : 52.61 dBA


Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       63.05 !        63.05

ROAD (0.00 + 52.01 + 0.00) = 52.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -74     74   0.00  80.15   0.00  -9.67  -0.85   0.00   0.00 -17.62
52.01
-------------------------------------------------------------------------------
--

Segment Leq : 52.01 dBA
```

```
Results segment # 3: CityParkL (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       37.54 !        37.54

ROAD (0.00 + 47.92 + 0.00) = 47.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -44    -27   0.00  65.75   0.00  -7.58 -10.25   0.00   0.00   0.00
47.92*
   -44    -27   0.00  65.75   0.00  -7.58 -10.25   0.00   0.00   0.00
47.92
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 47.92 dBA
```

```
Results segment # 4: CityParkR (day)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       13.75 !        13.75

ROAD (0.00 + 45.93 + 0.00) = 45.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -27     44    0.00  65.75   0.00  -7.58  -4.04   0.00   0.00  -8.20
45.93
-------------------------------------------------------------------------------
--

Segment Leq : 45.93 dBA

Total Leq All Segments: 56.46 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       62.99 !        62.99

ROAD (0.00 + 45.01 + 0.00) = 45.01 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -76     76   0.00  72.55   0.00  -9.10  -0.73   0.00   0.00 -17.70
45.01
-------------------------------------------------------------------------------
--

Segment Leq : 45.01 dBA
```

```
Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       63.05 !        63.05

ROAD (0.00 + 44.41 + 0.00) = 44.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -74     74    0.00  72.55   0.00  -9.67  -0.85   0.00   0.00 -17.62
44.41
-------------------------------------------------------------------------------
--

Segment Leq : 44.41 dBA
```

```
Results segment # 3: CityParkL (night)
-----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       37.54 !        37.54

ROAD (0.00 + 40.32 + 0.00) = 40.32 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -44    -27   0.00  58.16   0.00  -7.58 -10.25   0.00   0.00   0.00
40.32*
   -44    -27   0.00  58.16   0.00  -7.58 -10.25   0.00   0.00   0.00
40.32
-------------------------------------------------------------------------------
--

 * Bright Zone !

Segment Leq : 40.32 dBA
```

```
Results segment # 4: CityParkR (night)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
-------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       13.75 !        13.75

ROAD (0.00 + 38.33 + 0.00) = 38.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -27     44   0.00  58.16   0.00  -7.58  -4.04   0.00   0.00  -8.20
38.33
-------------------------------------------------------------------------------
--

Segment Leq : 38.33 dBA

Total Leq All Segments: 48.86 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 56.46
                           (NIGHT): 48.86
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB (day/night)
----------------------------------------
Angle1   Angle2           : -80.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :  63.50 / 63.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -80.00 deg   Angle2 : -69.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417EB (day/night)
----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB (day/night)
----------------------------------------
Angle1   Angle2           : -78.00 deg   0.00 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           :  63.50 / 63.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -78.00 deg   Angle2 : -69.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: 417WB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       55.92 !        55.92

ROAD (0.00 + 40.23 + 68.20) = 68.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -80    -69   0.00  80.15   0.00  -7.78 -12.14   0.00   0.00 -20.00
40.23
-------------------------------------------------------------------------------
--
   -69      0   0.00  80.15   0.00  -7.78  -4.16   0.00   0.00   0.00
68.20
-------------------------------------------------------------------------------
--

Segment Leq : 68.21 dBA
```

```
Results segment # 2: 417EB (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       57.07 !        57.07

ROAD (0.00 + 38.64 + 67.49) = 67.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -78    -69   0.00  80.15   0.00  -8.49 -13.01   0.00   0.00 -20.00
38.64
-------------------------------------------------------------------------------
--
   -69      0   0.00  80.15   0.00  -8.49  -4.16   0.00   0.00   0.00
67.49
-------------------------------------------------------------------------------
--

Segment Leq : 67.50 dBA

Total Leq All Segments: 70.88 dBA
```

```
Results segment # 1: 417WB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       55.92 !        55.92

ROAD (0.00 + 32.63 + 60.61) = 60.61 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -80    -69   0.00  72.55   0.00  -7.78 -12.14   0.00   0.00 -20.00
32.63
-------------------------------------------------------------------------------
--
   -69      0   0.00  72.55   0.00  -7.78  -4.16   0.00   0.00   0.00
60.61
-------------------------------------------------------------------------------
--

Segment Leq : 60.61 dBA
```

```
Results segment # 2: 417EB (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !       63.50 !       57.07 !        57.07

ROAD (0.00 + 31.05 + 59.89) = 59.90 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -78    -69   0.00  72.55   0.00  -8.49 -13.01   0.00   0.00 -20.00
31.05
-------------------------------------------------------------------------------
--
   -69      0   0.00  72.55   0.00  -8.49  -4.16   0.00   0.00   0.00
59.89
-------------------------------------------------------------------------------
--

Segment Leq : 59.90 dBA

Total Leq All Segments: 63.28 dBA
```

```
RT/Custom data, segment # 1: LRT (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT (day/night)
-------------------------------------
Angle1   Angle2           : -79.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  46.00 / 46.00  m
Receiver height           :  63.50 / 63.50  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -79.00 deg   Angle2 : 0.00 deg
Barrier height            :  80.00 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: LRT (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 !       63.50 !       48.43 !        48.43

RT/Custom (0.00 + 34.99 + 0.00) = 34.99 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -79      0   0.00  63.44  -4.87  -3.58   0.00   0.00 -20.00  34.99
-------------------------------------------------------------------------

Segment Leq : 34.99 dBA

Total Leq All Segments: 34.99 dBA


Results segment # 1: LRT (night)
--------------------------------

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 !       63.50 !       48.43 !        48.43

RT/Custom (0.00 + 28.46 + 0.00) = 28.46 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -79      0   0.00  56.91  -4.87  -3.58   0.00   0.00 -20.00  28.46
-------------------------------------------------------------------------

Segment Leq : 28.46 dBA

Total Leq All Segments: 28.46 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 70.88
                           (NIGHT): 63.28
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB1 (day/night)
-----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -47.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 131.00 / 131.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -47.00 deg
Barrier height            :  75.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417WB2 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB2 (day/night)
----------------------------------------
Angle1   Angle2           : -47.00 deg   -31.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 131.00 / 131.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -47.00 deg   Angle2 : -31.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: 417WB3 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB3 (day/night)
----------------------------------------
Angle1   Angle2           : -31.00 deg   41.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 131.00 / 131.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -31.00 deg   Angle2 : 41.00 deg
Barrier height            :  63.00 m
Barrier receiver distance :  27.00 / 27.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: 417WB4 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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 # 4: 417WB4 (day/night)
----------------------------------------
Angle1   Angle2           :  41.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 131.00 / 131.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  41.00 deg   Angle2 : 90.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 5: 417EB1 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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 # 5: 417EB1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -47.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 147.00 / 147.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -47.00 deg
Barrier height            :  75.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 6: 417EB2 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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 # 6: 417EB2 (day/night)
----------------------------------------
Angle1   Angle2           : -47.00 deg   -31.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 147.00 / 147.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -47.00 deg   Angle2 : -31.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 7: 417EB3 (day/night)
------------------------------------------
Car traffic volume  :  1600/800   veh/TimePeriod
Medium truck volume :   320/160   veh/TimePeriod
Heavy truck volume  :   160/80    veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 7: 417EB3 (day/night)
------------------------------------------
Angle1   Angle2           : -31.00 deg   41.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 147.00 / 147.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -31.00 deg   Angle2 : 41.00 deg
Barrier height            :  63.00 m
Barrier receiver distance :  27.00 / 27.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 8: 417EB4 (day/night)
------------------------------------------
Car traffic volume  :  1600/800   veh/TimePeriod
Medium truck volume :   320/160   veh/TimePeriod
Heavy truck volume  :   160/80    veh/TimePeriod
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 8: 417EB4 (day/night)
------------------------------------------
Angle1   Angle2           :  41.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 147.00 / 147.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  41.00 deg   Angle2 : 90.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: 417WB1 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 44.91 + 0.00) = 44.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -47   0.00  80.15   0.00  -9.41  -6.22   0.00   0.00 -19.61
44.91
-------------------------------------------------------------------------------
--

Segment Leq : 44.91 dBA


Results segment # 2: 417WB2 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 44.71 + 0.00) = 44.71 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -47    -31   0.39  80.15   0.00 -13.08 -10.95   0.00   0.00 -11.41
44.71
-------------------------------------------------------------------------------
--

Segment Leq : 44.71 dBA
```

```
Results segment # 3: 417WB3 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 46.76 + 0.00) = 46.76 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -31     41   0.00  80.15   0.00  -9.41  -3.98   0.00   0.00 -20.00
46.76
-------------------------------------------------------------------------------
--

Segment Leq : 46.76 dBA


Results segment # 4: 417WB4 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 51.07 + 0.00) = 51.07 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    41     90   0.39  80.15   0.00 -13.08  -7.43   0.00   0.00  -8.56
51.07
-------------------------------------------------------------------------------
--

Segment Leq : 51.07 dBA
```

```
Results segment # 5: 417EB1 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 44.43 + 0.00) = 44.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -47   0.00  80.15   0.00  -9.91  -6.22   0.00   0.00 -19.59
44.43
-------------------------------------------------------------------------------
--

Segment Leq : 44.43 dBA


Results segment # 6: 417EB2 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 44.08 + 0.00) = 44.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -47    -31   0.39  80.15   0.00 -13.78 -10.95   0.00   0.00 -11.34
44.08
-------------------------------------------------------------------------------
--

Segment Leq : 44.08 dBA
```

```
Results segment # 7: 417EB3 (day)
---------------------------------

Source height = 1.67 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.67 !        1.50 !        1.53 !         1.53

ROAD (0.00 + 34.19 + 0.00) = 34.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -31     41   0.00  68.08   0.00  -9.91  -3.98   0.00   0.00 -20.00
34.19
-------------------------------------------------------------------------------
--

Segment Leq : 34.19 dBA


Results segment # 8: 417EB4 (day)
---------------------------------

Source height = 1.67 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.67 !        1.50 !        1.52 !         1.52

ROAD (0.00 + 38.45 + 0.00) = 38.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    41     90   0.39  68.08   0.00 -13.73  -7.41   0.00   0.00  -8.49
38.45
-------------------------------------------------------------------------------
--

Segment Leq : 38.45 dBA

Total Leq All Segments: 54.75 dBA
```

```
Results segment # 1: 417WB1 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 37.31 + 0.00) = 37.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -47   0.00  72.55   0.00  -9.41  -6.22   0.00   0.00 -19.61
37.31
-------------------------------------------------------------------------------
--

Segment Leq : 37.31 dBA


Results segment # 2: 417WB2 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 37.11 + 0.00) = 37.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -47    -31   0.39  72.55   0.00 -13.08 -10.95   0.00   0.00 -11.41
37.11
-------------------------------------------------------------------------------
--

Segment Leq : 37.11 dBA
```

```
Results segment # 3: 417WB3 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 39.16 + 0.00) = 39.16 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -31     41   0.00  72.55   0.00  -9.41  -3.98   0.00   0.00 -20.00
39.16
-------------------------------------------------------------------------------
--

Segment Leq : 39.16 dBA


Results segment # 4: 417WB4 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 43.48 + 0.00) = 43.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    41     90   0.39  72.55   0.00 -13.08  -7.43   0.00   0.00  -8.56
43.48
-------------------------------------------------------------------------------
--

Segment Leq : 43.48 dBA
```

```
Results segment # 5: 417EB1 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 36.83 + 0.00) = 36.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -47   0.00  72.55   0.00  -9.91  -6.22   0.00   0.00 -19.59
36.83
-------------------------------------------------------------------------------
--

Segment Leq : 36.83 dBA


Results segment # 6: 417EB2 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 36.48 + 0.00) = 36.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -47    -31   0.39  72.55   0.00 -13.78 -10.95   0.00   0.00 -11.34
36.48
-------------------------------------------------------------------------------
--

Segment Leq : 36.48 dBA
```

```
Results segment # 7: 417EB3 (night)
----------------------------------

Source height = 1.67 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.67 !        1.50 !        1.53 !         1.53

ROAD (0.00 + 34.19 + 0.00) = 34.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -31     41   0.00  68.08   0.00  -9.91  -3.98   0.00   0.00 -20.00
34.19
-------------------------------------------------------------------------------
--

Segment Leq : 34.19 dBA


Results segment # 8: 417EB4 (night)
----------------------------------

Source height = 1.67 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.67 !        1.50 !        1.52 !         1.52

ROAD (0.00 + 38.45 + 0.00) = 38.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
    41     90   0.39  68.08   0.00 -13.73  -7.41   0.00   0.00  -8.49
38.45
-------------------------------------------------------------------------------
--

Segment Leq : 38.45 dBA

Total Leq All Segments: 47.78 dBA
```

```
RT/Custom data, segment # 1: LRT1 (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT1 (day/night)
-------------------------------------
Angle1   Angle2           : -90.00 deg   -47.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  87.00 / 87.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -47.00 deg
Barrier height            :  75.00 m
Barrier receiver distance :  40.00 / 40.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
RT/Custom data, segment # 2: LRT2 (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: LRT2 (day/night)
--------------------------------------
Angle1   Angle2          : -47.00 deg   -31.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      1       (Absorptive ground surface)
Receiver source distance :  87.00 / 87.00  m
Receiver height          :   1.50 / 1.50   m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -47.00 deg   Angle2 : -31.00 deg
Barrier height           :   4.50 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
RT/Custom data, segment # 3: LRT3 (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 3: LRT3 (day/night)
--------------------------------------
Angle1   Angle2          : -31.00 deg   41.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      1       (Absorptive ground surface)
Receiver source distance :  87.00 / 87.00  m
Receiver height          :   1.50 / 1.50   m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -31.00 deg   Angle2 : 41.00 deg
Barrier height           :  63.00 m
Barrier receiver distance :  27.00 / 27.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
RT/Custom data, segment # 4: LRT4 (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 4: LRT4 (day/night)
--------------------------------------
Angle1   Angle2          :  41.00 deg   90.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      1       (Absorptive ground surface)
Receiver source distance :  87.00 / 87.00  m
Receiver height          :   1.50 / 1.50   m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           :  41.00 deg   Angle2 : 90.00 deg
Barrier height           :   4.50 m
Barrier receiver distance :  18.00 / 18.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
Results segment # 1: LRT1 (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 !        1.50 !        1.04 !         1.04

RT/Custom (0.00 + 29.91 + 0.00) = 29.91 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -90    -47   0.00  63.44  -7.63  -6.22   0.00   0.00 -19.67  29.91
-------------------------------------------------------------------

Segment Leq : 29.91 dBA


Results segment # 2: LRT2 (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 !        1.50 !        1.29 !         1.29

RT/Custom (0.00 + 29.38 + 0.00) = 29.38 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -47    -31   0.42  63.44 -10.84 -10.98   0.00   0.00 -12.24  29.38
-------------------------------------------------------------------

Segment Leq : 29.38 dBA
```

```
Results segment # 3: LRT3 (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 !        1.50 !        1.19 !         1.19

RT/Custom (0.00 + 31.82 + 0.00) = 31.82 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----------------------------------------------------------------------
   -31     41   0.00  63.44  -7.63  -3.98   0.00   0.00 -20.00  31.82
-----------------------------------------------------------------------

Segment Leq : 31.82 dBA


Results segment # 4: LRT4 (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 !        1.50 !        1.29 !         1.29

RT/Custom (0.00 + 35.98 + 0.00) = 35.98 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----------------------------------------------------------------------
    41     90   0.42  63.44 -10.84  -7.55   0.00   0.00  -9.06  35.98
-----------------------------------------------------------------------

Segment Leq : 35.98 dBA

Total Leq All Segments: 38.65 dBA
```

```
Results segment # 1: LRT1 (night)
----------------------------------

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 !        1.50 !        1.04 !         1.04

RT/Custom (0.00 + 23.38 + 0.00) = 23.38 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -47   0.00  56.91  -7.63  -6.22   0.00   0.00 -19.67  23.38
-------------------------------------------------------------------------

Segment Leq : 23.38 dBA


Results segment # 2: LRT2 (night)
----------------------------------

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 !        1.50 !        1.29 !         1.29

RT/Custom (0.00 + 22.85 + 0.00) = 22.85 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -47    -31   0.42  56.91 -10.84 -10.98   0.00   0.00 -12.24  22.85
-------------------------------------------------------------------------

Segment Leq : 22.85 dBA
```

```
Results segment # 3: LRT3 (night)
---------------------------------

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 !        1.50 !        1.19 !         1.19

RT/Custom (0.00 + 25.29 + 0.00) = 25.29 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -31     41   0.00  56.91  -7.63  -3.98   0.00   0.00 -20.00  25.29
-------------------------------------------------------------------

Segment Leq : 25.29 dBA


Results segment # 4: LRT4 (night)
---------------------------------

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 !        1.50 !        1.29 !         1.29

RT/Custom (0.00 + 29.45 + 0.00) = 29.45 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
    41     90   0.42  56.91 -10.84  -7.55   0.00   0.00  -9.06  29.45
-------------------------------------------------------------------

Segment Leq : 29.45 dBA

Total Leq All Segments: 32.12 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 54.86
                           (NIGHT): 47.89
```

```
STAMSON 5.0        NORMAL REPORT        Date: 12-11-2018 14:22:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: 417WB1 (day/night)
-----------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -38.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  96.00 / 96.00  m
Receiver height           :   6.00 / 6.00   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -38.00 deg
Barrier height            :  63.00 m
Barrier receiver distance :  17.00 / 17.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: 417WB2 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417WB2 (day/night)
----------------------------------------
Angle1   Angle2           : -38.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  96.00 / 96.00  m
Receiver height           :   6.00 / 6.00   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -38.00 deg   Angle2 : 90.00 deg
Barrier height            :   5.60 m
Barrier receiver distance :  17.00 / 17.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 3: 417EB1 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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: 417EB1 (day/night)
----------------------------------------
Angle1   Angle2           : -90.00 deg   -38.00 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           :   6.00 / 6.00   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -38.00 deg
Barrier height            :  63.00 m
Barrier receiver distance :  17.00 / 17.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 4: 417EB2 (day/night)
------------------------------------------
Car traffic volume  : 44528/3872  veh/TimePeriod  *
Medium truck volume :  3542/308   veh/TimePeriod  *
Heavy truck volume  :  2530/220   veh/TimePeriod  *
Posted speed limit  :   100 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  55000
    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 # 4: 417EB2 (day/night)
----------------------------------------
Angle1   Angle2           : -38.00 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           :   6.00 / 6.00   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -38.00 deg   Angle2 : 90.00 deg
Barrier height            :   5.60 m
Barrier receiver distance :  17.00 / 17.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: 417WB1 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.20 !         5.20

ROAD (0.00 + 47.05 + 0.00) = 47.05 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -38    0.00  80.15   0.00  -8.06  -5.39   0.00   0.00 -19.64
47.05
-------------------------------------------------------------------------------
--

Segment Leq : 47.05 dBA


Results segment # 2: 417WB2 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.20 !         5.20

ROAD (0.00 + 65.39 + 0.00) = 65.39 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -38     90    0.00  80.15   0.00  -8.06  -1.48   0.00   0.00  -5.21
65.39
-------------------------------------------------------------------------------
--

Segment Leq : 65.39 dBA
```

```
Results segment # 3: 417EB1 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.32 !         5.32

ROAD (0.00 + 46.40 + 0.00) = 46.40 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -38   0.00  80.15   0.00  -8.73  -5.39   0.00   0.00 -19.63
46.40
-------------------------------------------------------------------------------
--

Segment Leq : 46.40 dBA


Results segment # 4: 417EB2 (day)
---------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.32 !         5.32

ROAD (0.00 + 64.83 + 0.00) = 64.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -38     90   0.00  80.15   0.00  -8.73  -1.48   0.00   0.00  -5.11
64.83
-------------------------------------------------------------------------------
--

Segment Leq : 64.83 dBA

Total Leq All Segments: 68.19 dBA
```

```
Results segment # 1: 417WB1 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.20 !         5.20

ROAD (0.00 + 39.45 + 0.00) = 39.45 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -38    0.00  72.55   0.00  -8.06  -5.39   0.00   0.00 -19.64
39.45
-------------------------------------------------------------------------------
--

Segment Leq : 39.45 dBA


Results segment # 2: 417WB2 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.20 !         5.20

ROAD (0.00 + 57.80 + 0.00) = 57.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -38     90    0.00  72.55   0.00  -8.06  -1.48   0.00   0.00  -5.21
57.80
-------------------------------------------------------------------------------
--

Segment Leq : 57.80 dBA
```

```
Results segment # 3: 417EB1 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.32 !         5.32

ROAD (0.00 + 38.80 + 0.00) = 38.80 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90    -38    0.00  72.55   0.00  -8.73  -5.39   0.00   0.00 -19.63
38.80
-------------------------------------------------------------------------------
--

Segment Leq : 38.80 dBA


Results segment # 4: 417EB2 (night)
----------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        6.00 !        5.32 !         5.32

ROAD (0.00 + 57.23 + 0.00) = 57.23 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -38     90    0.00  72.55   0.00  -8.73  -1.48   0.00   0.00  -5.11
57.23
-------------------------------------------------------------------------------
--

Segment Leq : 57.23 dBA

Total Leq All Segments: 60.60 dBA
```

```
RT/Custom data, segment # 1: LRT1 (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 1: LRT1 (day/night)
--------------------------------------
Angle1   Angle2          : -90.00 deg   -38.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance :  52.00 / 52.00  m
Receiver height          :   6.00 / 6.00   m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -90.00 deg   Angle2 : -38.00 deg
Barrier height           :  63.00 m
Barrier receiver distance :  17.00 / 17.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
RT/Custom data, segment # 2: LRT2 (day/night)
-----------------------------------------
1 - 4-car SRT:
Traffic volume    :   540/60    veh/TimePeriod
Speed             :    70 km/h

Data for Segment # 2: LRT2 (day/night)
--------------------------------------
Angle1   Angle2          : -38.00 deg   90.00 deg
Wood depth               :      0       (No woods.)
No of house rows         :      0 / 0
Surface                  :      2       (Reflective ground surface)
Receiver source distance :  52.00 / 52.00  m
Receiver height          :   6.00 / 6.00   m
Topography               :      2       (Flat/gentle slope; with barrier)
Barrier angle1           : -38.00 deg   Angle2 : 90.00 deg
Barrier height           :   5.60 m
Barrier receiver distance :  17.00 / 17.00  m
Source elevation         :   0.00 m
Receiver elevation       :   0.00 m
Barrier elevation        :   0.00 m
Reference angle          :   0.00
```

```
Results segment # 1: LRT1 (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 !        6.00 !        4.20 !         4.20

RT/Custom (0.00 + 32.94 + 0.00) = 32.94 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -90    -38   0.00  63.44  -5.40  -5.39   0.00   0.00 -19.71  32.94
-------------------------------------------------------------------

Segment Leq : 32.94 dBA


Results segment # 2: LRT2 (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 !        6.00 !        4.20 !         4.20

RT/Custom (0.00 + 49.15 + 0.00) = 49.15 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------
   -38     90   0.00  63.44  -5.40  -1.48   0.00   0.00  -7.41  49.15
-------------------------------------------------------------------

Segment Leq : 49.15 dBA

Total Leq All Segments: 49.25 dBA
```

```
Results segment # 1: LRT1 (night)
----------------------------------

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 !        6.00 !        4.20 !         4.20

RT/Custom (0.00 + 26.40 + 0.00) = 26.40 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90    -38   0.00  56.91  -5.40  -5.39   0.00   0.00 -19.71  26.40
-------------------------------------------------------------------------

Segment Leq : 26.40 dBA


Results segment # 2: LRT2 (night)
----------------------------------

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 !        6.00 !        4.20 !         4.20

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
-------------------------------------------------------------------------
   -38     90   0.00  56.91  -5.40  -1.48   0.00   0.00  -7.41  42.62
-------------------------------------------------------------------------

Segment Leq : 42.62 dBA

Total Leq All Segments: 42.72 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 68.25
                           (NIGHT): 60.67
```

APPENDIX B

FTA VIBRATION CALCULATIONS

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

GME15-068 20-Oct-15

Possible Vibration Impacts on Lot 11 to 41
Perdicted using FTA General Assesment

Train Speed 70 km/h 43.5 mph

	Distance from C/L	
	(m)	(ft)
LRT	34.0	111.5

Vibration

From FTA Manual Fig 10-1

Vibration Levels at distance from track	67.5	dBV re 1 micro in/sec

Adjustment Factors FTA Table 10-1

Speed reference 50 mph	-1	Speed Limit of 70 km/h (43.5 mph)
Vehicle Parameters	0	Assume Soft primary suspension, Weels run true
Track Condition	0	Worn or Corrugated Track
Track Treatments	0	None
Type of Transit Structure	0	Station
Efficient vibration Propagation	0	Propagation through rock
Vibration Levels at Fdn	66	
Coupling to Building Foundation	-10	Large masonry on piles
Floor to Floor Attenuation	-2.0	Ground Floor Ocupied
Amplification of Floor and Walls	6	
Total Vibration Level	60.3	dBV or 0.026 mm/s
Noise Level in dBA	25.3	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*log(speed/speed$_{ref}$). Sometimes the variation with speed has been observed to be as low as 10 to 15 log(speed/speed$_{ref}$).
	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. 50 ft +2 dB 100 ft +4 dB 150 ft +6 dB 200 ft +9 dB	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.
Coupling to building foundation	Wood Frame Houses -5 dB 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	The general rule is the heavier the building construction, the greater the coupling loss.

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	The actual amplification will vary greatly depending on the type of construction. The amplification is lower near the wall/floor and wall/ceiling intersections.
Conversion to Ground-borne Noise		
Noise Level in dBA	Peak frequency of ground vibration: Low frequency (<30 Hz): -50 dB Typical (peak 30 to 60 Hz): -35 dB High frequency (>60 Hz): -20 dB	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.